OPENING UP MEDICINE

PHYSICIANS AND LEADERSHIP IN TIMES OF TRANSFORMATION

Wouter A. Keijser

Opening up Medicine:
Physicians and Leadership in Times of Transformation

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To the brave ones that look further than what they feel, think and know
and
share what they see

(Anonymous)

Abstract

This dissertation focusses on the phenomenon of ‘medical leadership’ (ML) that has recently emerged, exemplified by increasing international attention within the academic as well as wider healthcare community. While an abundance of ML trainings has flooded physicians’ post-graduate training programs and various medical schools gradually integrate ML education in their curricula, much ambiguity about this novel concept exists. This thesis has two objectives: a) to establish more understanding about ML and b) to further its discourse in related research, practice and education. From a distinct set of study perspectives, qualitative as well as quantitative approaches were employed and data is analyzed from various sources, ranging from literature reviews, interviews, surveys and through other measures.

International literature is scrutinized, deriving from various fields, including social sciences, ML and leadership studies as well as national archives in six Western countries. Scaffolded by interviews with national experts on ML in these nations, this resulted in detailed analysis of ML’s institutional origins. Also, ML’s prime dimensions were identified, comprising: ‘interconnectedness’; ‘openness and reciprocity’; and ‘adaptively organizing for inclusive change’. Jointly, these reflect physicians’ new orientation in the studied healthcare systems.

Featuring the Netherlands as case study, the development process of a national ML competency framework is also portrayed. One of the processes this thesis describes is how a community of practice, in collaboration with the Dutch Royal Medical Association, and applying a mixed methods approach, can provide to the medical community a national taxonomical language on ML.

Placing ML in the multi-faceted perspective of the healthcare system and society-at-large, an analytic model is developed in this thesis furthermore, that assists unwrapping and, ultimately, deployment of ML’s potential, taking into account the variety of stakeholders and levels at which ML is operated and influenced. This is accompanied by a comprehensive analysis of how physicians are challenged in addressing healthcare’s wicked problems that convoy healthcare transformation processes. Recommendations for further actions at educational, organizational and governance levels are specified, that will enable the medical profession in better preparing for governing wicked problem.

Aspiring the advancement of ML development, this thesis provides two more originalities. A conceptual framework is presented that stipulates the guiding principles for effective design and deployment of ML training. In a similar way utilizing international academic literature and cross-pollinating relevant theories, a new approach is developed to enable ML development in clinical settings, significantly aided by the input of non-medical staff. Rooted in theories of communities of practice, professional medical (leadership) identity formation, and interprofessional education this novel method provides interdisciplinary teams with a tool to endeavor their higher levels of effective collaboration.

Also from a practical perspective, a longitudinal 4.5-year intervention-effect study, employing a blended use of the comprehensive TeamSTEPPS curriculum and ML coaching of cardiothoracic surgeons and anesthesiologist in an academic multidisciplinary setting, is described, while applying the new guideline for reporting complex multi-professional healthcare teamwork training, which development as part of this thesis.

The thesis concludes with a set of reflections on the future perspective of ML development, comprising a literature review on physician ‘e-leadership’ and an overview of a recent multi-program and -national European study on e-health implementation, involving profound integration of social and healthcare services for the elderly.

Apparently, contemporary physicians in various Western countries are incorporating new non-clinical behaviors and competencies in their professional repertoire, that increasingly promotes as well as furthers continuous and inclusive innovation and change. This thesis finds evidence that ML is not a lofty trend: it is here to stay. However, as is described in various chapters, merely scheduling ML training for physicians will not suffice. In order to harvest the potential effects of physicians’ new leadership, a network approach is needed that musters all parties that are to be involved. Besides individual physicians’ engagement in profound self-reflection and training relating their new non-clinical competencies, much remains in the hands of various stakeholders to support these professionals in their highly responsible work and life-long education.

ABSTRACT (DUTCH)

Dit proefschrift richt zich op het fenomeen van medisch leiderschap (ML), dat recent opdook in de zorgwereld en dat sindsdien toenemend in de belangstelling staat binnen de wereld van zorgprofessionals en onderzoekers. Ondanks het overvloedige aanbod van ML-trainingen ten behoeve van artsen en het feit dat ML-educatie ook steeds meer wordt ingebed in de medische curricula, is nog veel onduidelijkheid met betrekking tot dit nieuwe concept. Dit proefschrift heeft twee doelen: a) bijdragen aan het verhelderen van het begrip ML en b) het bevorderen van discussie over dit fenomeen, in wetenschap, in zorgpraktijk, en (medisch) onderwijs. Vanuit verschillende onderzoeksperspectieven werden kwalitatieve en kwantitatieve onderzoeksmethoden toegepast en werd onderzoekdata afkomstige van uiteenlopende bronnen geanalyseerd, variërend van literatuur reviews, interviews, focusgroepen, enquêtes en andere metingen.

Internationale wetenschappelijke literatuur vanuit verschillende gebieden alsmede nationaal archiefmateriaal uit zes Westerse landen werd bestudeerd. Mede ondersteund door een serie interviews met nationale ML-experts in deze zes landen resulteerde deze studie in een duidelijker beeld van de ontstaansgeschiedenis en -wortels van ML. Tevens leidde dit onderzoek tot het identificeren van de belangrijkste dimensies van ML, namelijk: ‘interconnectiviteit’, ‘openheid en reciprociteit’ en ‘adaptief organiseren van inclusieve verandering’. Gezamenlijk vormen deze drie de nieuwe professionele oriëntatie van dokters in de onderzochte landen.

Voorts wordt het ontwikkelproces van een nationaal raamwerk ML-competenties uiteengezet, gebaseerd op de Nederlandse ‘casus’. Hier wordt uitgebreid beschreven hoe een zogenaamde ‘community of practice’, in deze casus in samenwerking met de Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst (KNMG) en op basis van de toepassing van onderscheidene onderzoeksmethoden, een nationale ‘taal’ aan de medische gemeenschap kan leveren.

Door ML te plaatsen in het veelzijdige perspectief van het zorgsysteem en de maatschappij in het algemeen, werd een model ontwikkeld dat kan helpen bij analytisch onderzoek naar de potentiële positieve bijdragen van ML en de wijze waarop deze geoogst kunnen worden. Dit werk werd vergezeld door een uitgebreide studie naar hoe artsen adequaat bij kunnen dragen aan het effectief aangaan van de ‘wicked problems’, die kenmerkend zijn voor de transformatie in het zorgsysteem, resulterend in een serie aanbevelingen voor onderwijskundigen, management en bestuurders.

Een conceptueel raamwerk wordt gepresenteerd waarin de richtinggevende principes uiteen worden gelegd voor doelmatig ontwerp en adequate uitrol van ML-training. Daarnaast, in een vergelijkbare kruisbestuiving van verschillende expertise gebieden, werd een aanpak ontwikkeld waarmee in de zorgpraktijk ML kan worden ontplooid op basis van nauwe samenwerking met niet-medische professionals. Geworteld in de theorieën van ‘communities of practise’, professionele (medisch) leiderschap identiteit ontwikkeling en interprofessioneel onderwijs biedt deze nieuwe aanpak multidisciplinaire afdelingen een instrumentarium ten behoeve van meer effectieve samenwerking.

Vanuit een praktijk-perspectief wordt een 4,5 jaar durende interventie-effect studie beschreven, waarin een samenvoeging van het interdisciplinaire teamwork curriculum ‘TeamSTEPPS’ met ML-competentie coaching van chirurgen en anesthesiologen binnen de academische multidisciplinaire setting van een hartchirurgische afdeling wordt toegepast. Daarbij wordt gebruikt gemaakt van een nieuwe richtlijn ten behoeve van de wetenschappelijke rapportage van multiprofessionele teamwork interventies, welke tevens in het kader van dit proefschrift werd ontwikkeld.

Het proefschrift besluit tenslotte met een tweetal reflecties op ML met betrekking tot innovatieve zorgvormen, behelzende een literatuur review naar het ‘e-leiderschap’ van artsen en een overzicht van een recent consortium van meerdere pan-Europese programma’s binnen een studie naar de implementatie van e-health toepassingen ten behoeve van vergaande integratie van medische, wijk-, en mantelzorg voor ouderen in verschillende Europese regio’s.

Op basis van het onderzoek dat werd gedaan in het kader van dit proefschrift, blijken medici in verschillende Westerse landen actief bezig met de inlijving van hun nieuwe niet-klinische gedragslijnen en competenties in hun professionele repertoire, dat toenemend gericht is op en aanstuurt op continue en

inclusieve innovatie en verandering. Dit proefschrift toont op wetenschappelijk wijze aan dat ML niet een 'holle' of trendy term is, maar van een blijvend karakter is. Daarentegen, zoals in verschillende hoofdstukken wordt beschreven, geeft dit proefschrift ook aan dat er meer nodig is dan het louter organiseren van ML-training voor artsen. Om uiteindelijk de potentiële voordelen van het nieuwe leiderschap van artsen te kunnen oogsten, is een netwerk-aanpak nodig waarin alle betrokken partijen in de zorg participeren. Naast de inzet van individuele artsen die zich door middel van ML in hogere mate bekwamen in zelfreflectie en het ontwikkelen van nieuwe niet-klinische competenties, ligt de toekomst van ML grotendeels in de handen van andere belanghebbenden in de zorg waarvan verwacht mag worden dat zij deze medische professionals ondersteunen in hun verantwoordelijke werk en levenslange leerproces.

Preface

The travelling seeds of this thesis were planted in my earlier years in medicine: harvesting venous materials during coronary artery bypass grafting in my second year of medical school; dealing with challenges during surgical internships in the Indonesian outback; experiencing the authority of some of my medical mentors during my clinical rotations (at times resulting in combats with my personality); the years working at 'mother' Mayo Clinic, Rochester, Minnesota (US), and in the Foothills Hospital, Calgary, Canada: all contributed to what follows in this book. After a number of years of balancing my time between family medicine and healthcare innovation programs, I decided to dedicate my career fully to the question: *'Why is it so difficult to bring about change in healthcare?'*. Despite diverting my professional life to this territory and adjourning my dearly valued patient encounters that really enrich a physician's life, this question continued to remain unanswered for a long time. Moreover, the relevance of it staggered in the numerous successive programs in which we attempted to implement innovative technologies in the Netherlands and various other European regions. Those catching the first wave of the e-health hype with me, at the end of the previous century, were also often astonished at how new routines and processes, that could potentially benefit patient care, encountered such professional resistance. Next, the globally surfacing acknowledgment of human error, as the main cause of preventable adverse effects in healthcare, also startled me and many others. *Was it the medical culture after all?* My mission gained momentum after I joined the American Agency for Healthcare Research and Quality, with its TeamSTEPPS training program, in 2009. On returning as the first European 'master trainer' and on executing TeamSTEPPS's Dutch version with my colleagues at CBO, Radboud UMC, Amsterdam UMC, Groningen UMC and other Dutch healthcare organizations, we witnessed the 'imperial' effects of the more comprehensive types of coaching programs in multidisciplinary healthcare teams and on the well-being of their members, these novel approaches sought to deliver. In all cases we noticed that the often-wished-for culture of continuous improvement in healthcare organizations is profoundly characterized by the proficiency with which professionals at the micro-system level communicate effectively and share information, facilitated by adequate collaborative governance from those managing the surrounding 'eco-systems'. Nonetheless, we were also confronted over the years with the absence of physicians from such events.

It was also in this period that the importance of medical doctors' non-clinical competencies came into focus internationally. Not long after my return from the UK, where I became a certified National Health Service clinical leadership facilitator (2012), I had the privilege of guiding a pluriform and intensively motivated group of Dutch enthusiasts towards what we now know as the Dutch Medical Leadership Competency Framework (2015). Meanwhile, almost everywhere in the healthcare arena, in and outside the Netherlands, medical leadership had become the new buzz word. On becoming relatively knowledgeable about various leadership theories and practices in my post-graduate trainings, in executive and leadership coaching, I strongly felt the urge to strengthen these brave and unprecedented initiatives to rethink professionalization, also supported by various European Commission funded projects and other agents of change whom I had consulted about this endeavor.

The journey leading to this thesis comprised an almost endless inquiry into the fields of change management and organizational behavior and many other social-science domains and areas that were new to me. This has brought me in absolute awe of so many insights in professionalization and transformation which they do not teach (yet) in medical school. Hence, in part as a countermeasure to the Pavlovian reflex of 'doctor bashing' when things in healthcare go sour, I hope this book will provide scholarly nuance as well as a better understanding and appreciating of the depths one has to reach when aiming for sustainable change in healthcare sectors that include the professionalism of physicians. The way the medical profession is currently warming-up for what lies ahead reflects the same perseverance and vocation with which it has looked after us, medically, in the last 2000 years. So, for now: ***Hora est!***

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Introduction

Since over 2000 years physicians have been ultimate keepers and executors of the art of Western medicine. Over time, this profession has persistently striven to the highest of standards in healthcare quality and safety for patients. However, at increasing speed, a mounting quantity of technological, economic and societal challenges are driving processes of healthcare reform and transformation, jointly affecting how these and other healthcare professionals work and collaborate. In search for ways to adequately adapt to unsurmountable changes, in the last decade, the term 'medical leadership' (ML) is widely being mused. Supposedly, ML is heralding various advantageous effects of physicians' non-clinical competencies, assisting them in meeting up with healthcare's contemporary challenges. Relevantly, in medicine's international directive for specialists' education, physicians' former role description of 'manager' has been replaced with 'leader'. In the last decade, in many countries an increasing attention to ML is reflected in uncountable new ML training offerings, as well as in a growing number of scholarly reports on ML.

Historically, the medical profession has played an unequivocally central position in the healthcare arena. From this societally as well as professionally well-respected high-seat position, physicians not only execute their by-law exclusive right to perform the art of medicine: they also hold the key to evidence-based medicine: the paradigm that informs a majority of healthcare's regulatory and financial schemes. In many ways, the essential qualities of effective healthcare are undeniably linked to physicians and their professional actions, including for example: patient access and safety; affordability; working conditions; capacity to innovate and to work efficiently. The arrival of the phenomenon of ML suggests physicians' potential even higher impact on healthcare, including how this important industry will evolve in the future. Nonetheless, there is much unclarity on ML's meaning, which can result in even more ambiguities as well as reluctancy in operating this new concept in adequate training and practice. For example, it is questionable if the concept of ML is meant to support physicians in their encounters with patients. Furthermore, the term 'leadership' could imply a certain (new) dominance of the medical profession, or even a certain elevated bossiness of physicians. Originally being a managerial term, leadership could also indicate certain professional qualities to adequately manage processes and people. Also, although it is undeniable that physicians' work is increasingly gobbled up by a paralyzing amount of non-patient related bureaucratic processes, it is questionable whether ML is envisioned to be the ultimate cure for that sore. However, it is more plausible that, alike in management, leadership that is enacted by physicians aims to be a type of 'add-on service' to their distinct clinical expertise and services.

In order to legitimize and direct new efforts and resources in the education and training of this already highly educated, well-performing and often overly busy group of professionals, we argue that it is relevant to address the main question of this thesis: *(How) can ML contribute to healthcare transformation?* We attempt to answer this question in the coming chapters, for which the following sub-questions guided our work: *What exactly is (meant by) ML? Is it here to stay? And if so, (how) can we use it best?*

Aims and Objectives

The overall objective of this thesis can be formulated as to scholarly investigate the recent notion of ML. We do so from various theoretical and practical perspectives that, jointly, characterize the complexity of the healthcare domain, and in particular the work and education of the medical profession. Our aim is to contribute to more theoretical as well as practical knowledge in regard to ML, not so much in a bio-medical sense, but in the spheres of the social sciences as well as medicine's organizational challenges and education. Ultimately, we hope our efforts can contribute to a dilution of the current ambiguities relating ML. More knowledge about ML is essential if one is to steer its alleged promises of powerfully valorizing physicians' exquisite position, knowledge and intellect to support furthering patients' healthcare beyond the boundaries of medicine itself.

The thesis' chapters report work that vary from scrutinizing the epistemological essence of ML's new concept to reviewing fresh literature on its application in the e-health domain. This broadness is reflected in a relatively wide range of academic domains. Our scientifically multi-domain and methodologically pluriform approach to investigating the notion of ML exemplifies its young age as well as the complexity of the daily life, education and work that physicians encounter, in their unceasing dedication to medicine. In the following section we describe how the thesis chapters are organized and interrelate.

Organization of this Thesis

In Table 1 we depict the different scientific domains that supported our quest for applying the adequate methodologies to answer the specific research question(s) each chapter in this thesis addresses. The portions of work on which this thesis is founded are depicted in Figure 1, categorized in different types of philosophical traditions, comprising:

1. **Epistemology**: the philosophical field revolving around (the study of) knowledge, including its different entities and categories that describe reality;
2. **Axiology**: the study that seeks to understand the nature of values, their judgments and how values come about in a society;
3. **Pragmatism**: the philosophical tradition that supports evaluation of ideas, theories or beliefs in terms of the success with which they are utilized in practice;
4. **Praxeology**: the study of human action.

Additionally, we also consider a fifth category in which we placed our work in the perspectives of contemporary as well as upcoming technological innovations:

5. ‘**Futurology’**, or ‘**future studies**’: a line of thought postulating possible, probable, and preferable futures.

We chose these philosophical lines of thought because, jointly, they reflect a holistic view on ML. Such an approach, we argue, provides a rounded impression of perspectives that supports our quest for establishing understanding as well as (if needed and possible) appropriation of ML. According to these five subdivisions, below we briefly explicate the contents of the thesis’ chapters.

Figure 1. Philosophical ‘line-up’ of this thesis’ parts

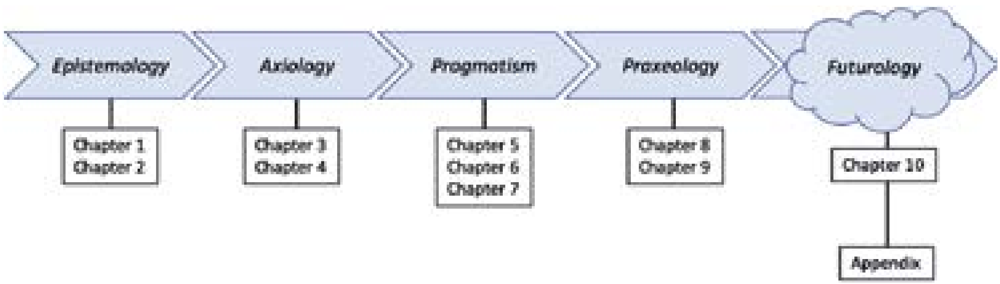

Table 1. Thesis' outline, research questions and domains

Philosophical viewpoint		Research question	Domains and/or theories
Epistemology	**Chapter 1**	*What institutional changes have triggered ML's emergence and what related new 'structures' are influencing ML's content and focus?*	Structuration theory Institutional change
	Chapter 2	*How is ML defined and what are related ML competencies in the Dutch healthcare system?*	Grounded theory Taxonomy
Axiology	**Chapter 3**	*How can understanding the healthcare ecosystem help unlock ML's potential?*	Governance Intersectoral collaboration
	Chapter 4	*How can ML help to equip physicians to address healthcare's wicked problems, and what else is needed?*	Wicked problem solving Complexity theory
Pragmatism	**Chapter 5**	*What constitutes effective design and delivery of ML training?*	Medical education Adult learning Leadership training
	Chapter 6	*What provides a practical approach for inclusive meaning-making and development of contextualized (medical) leadership in frontline healthcare settings?*	Professionalization Community of practice theory Personas
	Chapter 7	*What elements are crucial in adequately reporting the implementing of complex team training interventions?*	Team training Complex interventions Interdisciplinary practice
Praxeology	**Chapter 8**	*What are determinants and interventions for national ML development?*	National level ML development Change management
	Chapter 9	*How can implementing team training and ML coaching instill organizational cultural change in a multi-disciplinary cardio-thoracic surgery team?*	Implementation ML coaching Cardio-thoracic surgery
Futurology	**Chapter 10**	*What are leadership roles and the required leadership competencies of physicians in virtual healthcare team settings?*	E-health Virtual teamwork Integrated care
	Appendix	European Commission co-funded pan-European e-health enabled integrated care programs	

Epistemology & taxonomy
We started out with conceptualizing the nature, boundaries and knowledge domain of ML, in a two-pronged approach. First, we applied theories of structuration and institutional change to identify the causes and meaning of ML in six Western countries (**Chapter 1**). This resulted in identifying the various underlying institutional changes and mechanisms that have inculcated ML' emergence as well as illuminating distinct entities and categories of how ML is intellectualized within the reality of these countries.

In **Chapter 2** we explicate how more ontological clarity is brought by revealing the relevant entities and ideas related to ML according to a system of categories, following a taxonomical approach in a mixed-methods study. A design-process description of the activities of a national community of practice depicts the making of the Dutch ML competency framework. Created with a national level allure and professionally acknowledged by the medical community, this canonical 'knowledge artefact', or lexicon, provides new 'language' for ML in the Dutch healthcare system. Its aim is to reduce Babylonian unclarities through a more homogenic comprehension of ML's concept and, ultimately, better alignment in new education efforts.

Axiology
In order to better grasp its worth and, ultimately, to determine the motives of investing in and organizing ML, its concept must be placed in the perspectives of the wide array of stakeholders in healthcare, including society-at-large. This enables a more adequate consideration, specification and contextualization of ML's values and ethics, that may contribute to how ML is best to be governed. Ultimately, obtaining such a multi-faceted perspective could support an effective shifting of the status quo of (the often deeply rooted) rules and belief systems of medical (and allied) professionals and those who regulate and govern their related systems.

In **Chapter 3** we reflect on the puzzling issues of transformational healthcare change in 'regional' ecosystems and their inhabitants, who are often engaged in a paradoxical multi-stakeholder 'stand-off'. A review of the literature on these tensions, in the wake of the importance of greater multi-level and multi-stakeholder collaborative working, this chapter presents a conceptual framework for a deeper understanding of such 'local' healthcare ecosystems or networks. The resulting model positions ML's potential in the context of healthcare's complex or multi-faceted nature with distinct interrelated levels of analysis, or domains. These are important to consider if one thinks of the myriad of influences enshrined in ML's potential to support or even catalyze transformation of healthcare delivery for the better.

When considering efforts to address the wicked problems that typify healthcare transformation, institutionalized and professionalized ways of working are important to reflect on. By placing ML in the context of such types of problems, **Chapter 4** takes a slightly different axiological stance to its phenomenon. In this chapter it is argued that, although physicians' established ways of working can make them excellent clinicians, their education and experience make it difficult for them to address healthcare's wicked problems. After describing the impending beneficial impact of ML on more effectively addressing wicked problems, this chapter explains how certain proposed changes in contemporary healthcare education, organization and governance may contribute to realizing these outlooks.

Pragmatism
Beneficial utilization of the (perhaps overly idealistic and varied?) ideas and promises residing in the concept of ML requires practical applications in medical education as well as in healthcare's frontlines. Moreover, practical use of ML must be diligently evidenced by means of high-quality scientific endeavors. In the three chapters of the third part of the thesis, we attempt contributing to connecting ML-related theorizing to ML-related research and practice.

Despite a spiking number of scholarly reports and training opportunities, the current absence of standards in ML training design and delivery jeopardize well-informed decisions on training practice, as well as high-quality and accurate analytic enquiries into training effectiveness. Therefore, in **Chapter 5** we address the question: *What constitutes effective design and delivery of ML training?* This chapter places training of ML competencies in three different contexts: its relevant scholarly fundaments (theory); the determinants of effective training design and delivery (practice); and various current knowledge gaps that help inform a future-research agenda on ML training (research). Building on extant scholarly work on ML training as well as on theories and practices of medical education, general leadership training and adult learning, (the development of) a conceptual framework is discussed, presenting guiding principles for ML training, categorized in a number of well-founded dimensions.

In **Chapter 6** we take another pragmatist approach. Contributing to a solid utilization of ML, this chapter provides a novel approach in supporting more interprofessional and inclusive collaborative work at healthcare's frontlines, at the same time fueling the process of ML competency development at the levels of the individual physician an her/his medical team. A coming together of the theories of community of practice and (medical) professionalization, provide a set of 12 empirically developed ML 'Personas' and directions for their use in practice. Applying the ML Personas Inventory in the 'socially rich' context of community of practices, physicians and related professionals may find in them a practical approach for inclusive meaning-making contributing to effective (medical) leadership in frontline healthcare settings.

Inspired by our own and others' previous work indicating the significance of practice-based learning for ML, and in the current absence of such a tool, we set out to develop a guideline contributing to better scholarly reporting of complex interdisciplinary team-based interventions, also accommodating ML training. Consulting various registered frameworks and similar reporting guidelines and after validating our findings with a distinct selection of peer-reviewed publications reporting on implementing the TeamSTEPPS™ curriculum, in **Chapter 7** we present a checklist for Reporting Complex Multi-Professional Healthcare Teamwork Training (ReCoMuTe). The checklist also aims to serve better reporting of ML training efforts that are embedded in interdisciplinary settings and was applied in **Chapter 9**.

Praxeology

From the realms of studying 'praxis' (i.e., the purposeful behavior of humans), we consider ML at two levels: the national healthcare level and the interdisciplinary delivery of healthcare at the frontline.

First, we reflect on the development of ML from a national level viewpoint, foremost since little is known about effective strategies and tactics for national level ML development. The increasing number of countries that have been investing in leadership competencies of their medical corps, issued a growing body of scholarly reports, which we systematically scrutinize in **Chapter 8**. Categorizing our finding, this study provides six distinct categories of elements that determine proper implementation of national level ML development, concurrent with a set of practical interventions. Furthermore, considering these findings, we discuss how the local and national level activities in ML development, advisably, are typified by multi-faceted and multi-level approaches, taking into account resistance to change and redesign of institutionalized logics that accompany shifting professional positions and reconstruction of professional identities of physicians.

In a second account of ML 'praxis', we report of the implementation processes and impact of a longitudinal, four-and-a-half-year study in a Dutch cardio-thoracic surgery team, implementing a multi-phased complex intervention combining ML coaching and a comprehensive contextualized team-training program (TeamSTEPPS™). **Chapter 9** presents our findings and considerations on the various dynamics that comprise effectively instilling a sustained (according to this study's data) organizational cultural change within one of healthcare's most high-risk surgical settings.

Futurology

Contemplating innovation or futurism is a relatively subjective matter. Moreover, evidence-based medicine's rules require distinct testing before accepting novel ways of working. Nevertheless, we also place ML in the context of the relatively new (hence not fully evidenced), yet increasingly embraced, domain of e-health.

In our last chapter we report the results of a systematic literature review on physicians' leadership roles and related competencies in virtual teams delivering healthcare and in the context of implementing e-health. Despite the significant lack of academic writing on this specific topic in the expanding area of e-health, this study reveals new themes relevant to the work of virtual working and collaborating in healthcare. Systematically couched in recent e-health literature and corroborated with reported experiences on virtual teamwork outcome the healthcare domain, this **Chapter 10** discusses a set of practical approaches and future studies that can support attempts to progress the 21st Century medical profession as proficient implementors as well as active users of nowadays' technological advancements for the better of their patients.

Finally, in our **Appendix** we take an even further look-into-the-future, by laying out the contours and objectives of three interrelating pan-European programs endeavoring an unprecedented integration of social, health, informal and self-care, enabled by e-health innovations. Co-funded by the European Commission, this appendix displays our envisioned platform for further studying the (re)professionalization of the medical as well as other professions, towards their effective and inclusive co-leadership in the transformations needed to address healthcare's contemporary challenges.

CHAPTER 1

Deciphering the Institutional Origins and Current Promises of 21st Century Medical Leadership in Six Western Nations

Submitted paper

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Celeste Wilderom

Keywords

- Medical leadership
- Structuration theory
- Institutional change
- Healthcare system reform
- Professionalization
- Qualitative analysis
- Australia, Canada, Denmark, New Zealand, the Netherlands, UK

Abbreviations

ML, Medical Leadership
ST, Structuration Theory

ABSTRACT

Having recently emerged in the face of various healthcare innovations and reforms, the concept of medical leadership (ML) has received significant attention, propagating doctors' use of organizing-type competencies. ML implies more active involvement in innovation and change towards more effective patient-centered and value-based care. Although the various forms in which ML is enacted in clinical practice, medical education and training are staggering, they are accompanied by ambiguities, making it difficult to comprehend the heralded virtues of ML or even steering focused efforts to augment its discourse. Our qualitative study aims to contribute to a better understanding of ML as a phenomenon and to inform those attempting to further its potential, by investigating the institutional roots of ML and how it ultimately may benefit 21st-century patients. We studied the discourse on ML based on archival material and interviewing topical experts from six purposefully selected Western nations. We analyzed the data through the theoretical lenses of structuration and institutional change and found fifteen institutional shifts that jointly triggered the emergence of ML in these nations. They denote fundamental, possibly irreversible, changes in doctors' roles and positions, attitudes and work foci. The synthesis of our data resulted in identifying three distinct dimensions associated with contemporary doctors' professional work: interconnectedness with other health-care professionals; openness and reciprocity in dealing with relevant stakeholders; a focus on adaptively organizing for continuous organizational change. Thus, we drew links between various macro-level transformative changes and the appearance of ML. Based on our analysis, we propose that the current notion of ML fosters an altered medical professional identity, which incorporates skills that promote sustainable innovation and change, and an associated set of collaborative attitudes and collaborative behaviors, which are instrumental in more effective patient healing and system reform.

INTRODUCTION

After centuries of relative stability, unprecedented economical, societal and technological forces have impacted daily life in healthcare systems (Martin & Learmonth, 2012; Grady & Hinings, 2018), disrupting practices of healthcare professionals, including the medical profession (Reay et al., 2016). Shifts in medical traditions and new patient demands have had a significant impact on the work of doctors (Bohmer, 2012; Ilife & Manthorpe, 2018; Ewert, 2018). Moreover, bureaucratic policy schemes related to, for example, resource allocation and accountability, continue to impart perverse incentives, resulting in interprofessional power battles that can neutralize or even reverse well-intended attempts to innovate or reform (McNulty & Ferlie 2002; Currie et al., 2012; Powell & Davies, 2012; Micelotta & Washington, 2013). Within this turbulence, the medical profession has often been described as conservative and change-averse, fiercely holding on to professional autonomy and sovereignty in medical expertise (Martin et al., 2017; Philibert et al., 2019). However, the medical leadership (ML) phenomenon has emerged rapidly within the last two decades, heralding doctors' new set of competencies which, allegedly, will help resolve various persisting problems (Dath et al., 2015; Keijser et al., 2017a). Consequentially, individual doctors, their professional bodies, healthcare organization executives and others are increasingly considering investing in ML training and education (McKimm et al., 2009; Turner et al., 2018). Notwithstanding the mounting ML educational offerings and the scholarly reports on the proposed benefits of ML, its discourse is accompanied with ambiguity or unclarities.

This study investigates what triggered the emergence of ML in the context of the current dynamics of healthcare, building on the theories of structuration (Giddens, 1984) and institutional change (Scott, 1995). Our focus on placing the emergence of ML in the perspective of agentic responses to institutional change reflects our conviction that understanding the origins of ML better provides not only insights into its concept, meaning and proposed benefits, but can also guide its future discourse and adequate investments in its education, all to the benefit of patients. By scrutinizing the institutional 'DNA' of ML, we hope to contribute to insights into contemporary medical professionalism through which doctors are renewing their social contract with society (Cruess & Cruess, 2008). Eventually, such knowledge could support the multifaceted dynamics of healthcare transformation, particularly amid the professions and their socially structured arrangements (Giddens, 1979), reflected in higher quality and more affordable patient care. Our two-pronged research question is as follows: *What institutional changes triggered the emergence of ML and what related new 'structures' are influencing the content and focus of ML?*

Before setting out our methods and results, we will review the literature about relevant neo-institutional theories as the foundation for explaining the institutional origins of ML and for sketching new educational challenges and opportunities that are currently emerging.

Doctors, Professionalism, Agency and Leadership

As archetypical profession, doctors have been subject to profound scholarly interests of sociologists (Freidson, 2001). It has long been believed that doctors' relatively stable traits and the distinct privileges of their profession dictated their professionalism, which prescribes: an exchange between medical care to the public and doctors' exclusive control over clinical knowledge; their autonomous mandate over clinical practice; high levels of trust and social status; substantial compensation; professional self-regulation (Cruess & Cruess, 2004). Despite the distinct powerful embeddedness of the medical profession, which is also reflected in institutional stability and occupational closure (Witz, 1992; Greenwood & Suddaby, 2006), there is increasing realization that medical professionalism is constantly evolving, with a significant dependence on the institutional context (Cruess & Cruess, 2008). Moreover, after having enjoyed – relatively unchallenged – their merits at the hierarchical 'Olympus' of healthcare for centuries, doctors' traditional sovereignty, dominance and characteristic independence are gradually in decline, being curbed by various societal pressures (Tallis, 2006; Gilmartin & D'Aunno, 2007; Hodges et al. 2011; Spurgeon et al., 2011; Parker, 2013). Institutional changes, leading to an "erosion of the medical roles and status" (Parker, 2013, p. 403), have activated doctors' responses, varying from resistance (Currie et al., 2012;

Lockett et al., 2012; Powell & Davies, 2012; Reay et al., 2017), compromises vis-à-vis other professionals (Reay & Hinings, 2005), taking a 'back seat' in collaborative work (Reay et al., 2017), adjustments to system transformation (Kyratsis et al., 2017) and pragmatic alignment of professional logics (Noordegraaf et al., 2016). A recent form of such professional response can also be found in the entrance of ML (Noordegraaf et al., 2016), illustrated by doctors' growing 'appetite' for ML training and education (McKimm et al., 2009; Keijser et al., 2017a; Berghout et al., 2018), increasing scientific support for the alleged beneficial effects of ML on clinical and organizational indicators (West et al., 2015; Lees & Armit, 2018) and the recent name change in 'CanMEDS' (i.e., the international directive in medical education) of doctors' role from 'manager' to 'leader' (Dath et al., 2015). However, ML is not routinized or embedded in the daily reality of healthcare, yet, and remains a contested concept, surrounded by ambiguities.

In the face of contemporary institutional change, ML can be seen as representing doctors' reconsiderations of their professional roles and identities (Chreim et al., 2007). Others previously indicated ML as a power re-grabbing countermeasure to doctors' decaying authority and autonomy (Voogt et al., 2015), a response to increasing bureaucratic burdens (Ewert, 2018), a way for those anticipating high ranked hierarchical 'hybrid' positions (Noordegraaf, 2015; Berghout et al., 2018) and governmental attempts to engage doctors in (quality) management (Martin & Learmonth, 2012). Notwithstanding, patient-care oriented doctors often regard ML as an unwelcome burden to already busy clinical and educational schedules. Moreover, ML training offerings are reported as having a "hodgepodge" character (Satiani et al., 2014, p. 542), lacking peer-educators who have undergone ML training themselves (representing the ML 'educator's gap') or without addressing specific needs and demands of clinical settings or specialties (Turner et al., 2018). Finally, in the absence of validated tools to quantify competencies or to monitor their development (Lees & Armit, 2018), ML seems immeasurable and not fitting a bio-medically evidence-based professional culture, which enhances ambiguous responses to its emergence.

Despite the great attention paid to ML, it remains unclear whether ML is a short-lived institutional trend or entails a here-to-stay new set of professional values and structures, currently in the process of being routinised in the wider context of the medical profession (Greenwood et al., 2002). In order to make more sense of ML, be it individually, educationally, managerially or anything else, one should track its (partly invariable) origins.

Theories of Structuration and Institutional Change

The aim of institutional thinking is to understand better the resilient aspects of social 'structures' in organizational fields (DiMaggio & Powell, 1983). Healthcare signifies a complex, pluralistic professional field with deeply embedded institutions and structures. Scott's (2008) three "pillars of institutions" (p. 59) provide a helpful frame for distinguishing its numerous elements. This frame has been applied before in healthcare studies (Scott et al., 2000), for example in analyzing whole system transformational change (MacFarlane et al., 2013), agency of emergent professions (Kitchener & Mertz, 2012), organizational and market factors (Weech-Maldonado et al., 2012), legitimacy building for innovations (Kaganer et al., 2010) and healthcare system divergence (Hughes & Vincent-Jones, 2008). The first pillar represents the 'regulative' aspects of institutions, essential in the more formal control of constituents' behaviors and actions. The second 'normative' pillar entails professionals' ideas or norms, values and appropriateness, which jointly serve as the prescriptive, evaluative and obligatory dimensions (including moral and other rights, privileges and responsibilities) of their social interactions and behaviors. Scott's third 'cultural-cognitive' pillar comprises the most unconsciously agreed upon, 'unwritten' aspects of institutional life. Collectively, these three categories of institutional structures create frames of meaning that shape professional identities and arrangements, and dictate what happens in daily life (Douglas, 1986).

Critics of institutional analyses have voiced the danger of treating extant structures over agency of human individuals or groups (Suddaby, 2010; Lawrence et al., 2011; Munir, 2015; Suddaby, 2015). Also, there have been calls to expressly combine institutional theory with behavioral agency ('micro') and structures ('macro') (Lockett et al., 2012). This concurs with recent suggestions concerning "bringing together knowledge about institutionalization together with professionalization in ways that help to illuminate the inherent power dynamics that can either maintain or facilitate institutional change", particularly in healthcare (Reay et al., 2016, p. 26). Our present study answers these critical concerns by combining Scott's framework and Giddens's foundational structuration theory (ST) as its analyzing lens.

ST describes the social and material adaptation implied by processes that offer 'structure' that "gives form and shape to social life, but it is not itself the form and shape" (Giddens, 1989, p. 256). Our study of the emergence of ML draws on ST as a comprehensive social theory and, in line with Giddens' own preference for the 'sparing and critical' use of ST concepts (Jones et al., 2004), we only apply few elements (Den Hond et al., 2012), namely duality of structure and the interwoven concepts of action and consciousness.

Duality and consciousness

A structure can take different forms (e.g., management or government structures, educational systems and professional language) across action systems, and tends to evolve over time. ST suggests that processes of structuration develop because embedded field actors (i.e., individuals, organizations, professions, governments and other social entities) activate distinct 'rules' and 'resources.' Rules are either normative (e.g., obligations and rights) or interpretative "generalizable procedures applied in the enactment operated and reproduction of social life" (Giddens, 1984, p. 21). Resources represent "media whereby transformative capacity is employed as power [i.e., a subcategory of transformative capacity] in the routine course of social interaction" in actors' daily activities (Giddens, 1979, p. 92). ST helps in conceptualizing the relationships between individual or collectives of field actors and their institutional environment in their production and reproduction of social structures *through* these social structures. Thus, structure and action evolve hand-in-hand, because "structure is both medium and outcome of reproduction of practices" (Giddens, 1979, p. 5). Accordingly, "social practices ordered across space and time" (Giddens, 1984, p. 2) represent the basic domain in social sciences (Den Hond et al., 2012). Whereas actors' actions often discern more observable dimensions in ST, 'structure' represents a largely invisible, latent dimension.

In contrast to more neo-institutional views, ST importantly leans on the knowledgeability, or consciousness, of actors. Consciousness refers to all aspects they know (or believe) about the contexts of their and others' actions, which are drawn upon in the enactment of these actions, including various forms of knowledge (Giddens, 1984). ST propagates that structuration processes are neither based on fully deliberate agency nor on actors' consciously justified actions, and distinguishes a continuum of actors' knowledgeability, comprising unconscious and conscious types of knowledge. According to ST, knowledge is divided into 'practical', tacit or taken-for-granted knowledge (on which actions are based) and 'discursive' knowledge, which actors are capable of explicitly articulating and justifying on the level of discourse (Giddens, 1979). Within an institutional field, the knowledge continuum provides incumbents with the foundation of a certain emotional stability through structures that helps them ascertain a continuity of their professional identity and existence (Giddens, 1991). Discursive and practical consciousness continuously interlink through cyclic processes of structuration, in which a process of reflexive monitoring of actions informs the transformation of knowledge into more routinised knowledge, ultimately resulting in actors gaining higher levels of practical and, ultimately, discursive consciousness.

In sociological studies, ST is proven to be valuable for healthcare, for example in governance remodeling (Bodolica et al., 2015), understanding the implementation of technology (Lehoux et al., 2002; Greenhalgh & Stones, 2010) and contestations about contemporary medical professionalism (Correia, 2011). We argue that the current emergence of ML represents a complex process of (re)structuration, involving various actors, their agency and evolving levels of knowledge and consciousness towards new socially relevant structures. In this process, the institutional prescriptions that are represented in Scott's pillars (Dimaggio & Powell, 1983) can enable as well as constrain structuration, by facilitating actors' actions and inflicting impediments and restrictions. Hence, we apply this bi-focal lens to better understand the emergence of ML.

Thus, we analyze it through a theoretical binocular comprising the lenses of ST and Scott's pillars of institutional change, as an approach that suggests "neither determinism nor [professional] heroism and is potentially sensitive to both the oppressiveness of social, cultural, and material structures, and the potential for emancipation from some of those structures" (Lawrence, 2011, p. 56).

RESEARCH DESIGN

We undertook a cross-sectional study of the emergence of ML in six countries (Eisenhardt, 1989; Hartley, 1994; Chreim et al., 2007). After initially analyzing up-to-date archival documents related to ML in these six countries, we carefully chose three experts in each nation for individual interviews.

Data Collection

Choosing the countries for our data collection was based on purposive sampling guided by three criteria (Eisenhardt, 1989; Keijser et al., 2017a). First, the maturity levels of ML in a country should indicate that its concept had evolved to substantial awareness (e.g., in terms of publications and activities), within as well as outside the medical community. Secondly, a national ML competency framework had to be available. Thirdly, this framework had to be formally endorsed (e.g., by national authorities or professional associations) and not based merely on local (e.g., hospital level or regional healthcare system) or mono-professional (e.g., leadership for medical managers) activities (Table 1).

Table 1 Interviewees' characteristics

Country	Number of Interviews	Gender	Current Work Setting
Australia	3	Female	Professional association
		Female	Governmental
		Male	Healthcare
Canada	3	Male	University
		Male	Governmental
		Male	Professional association
Denmark	3	Female	Healthcare
		Male	University
		Female	Professional association
The Netherlands	3	Female	Professional association
		Female	National ML*
		Female	Professional association
New Zealand	3	Male	Governmental
		Female	Professional association
		Male	University
United Kingdom	3	Male	Governmental
		Female	National ML*
		Male	National ML*
Total	18	F/M = 9/9	

Note: 11 of the 18 interviewees were practicing doctors.
*Individually active in their own nation as an educator or topic expert on ML.

The selection resulted in the inclusion of Australia, Canada, Denmark, the Netherlands, New Zealand and the United Kingdom. During this process, we identified at least eight other countries with a moderate level of nascence of ML, including the United States, Finland, Sweden, Norway, Germany, Italy, Singapore and South Korea, but none of them had a national ML framework.

Archival analysis

We composed an archival data repository for each included country, using government reports, publications from medical associations, scientific and professional articles, leaflets and online information (Bowen, 2009). We identified relevant information and documents through Google™ search, our personal libraries and the local university archives, applied snowball techniques searches and consulted international content experts in our networks. We composed six similarly structured archival reports (each approximately 14 pages), including: summary; timeline of national ML development activities; overview of main actors; list of used sources; relevant other facts and notes.

Interviews

We selected all three interviewees from each of the six countries based on their engagement in the emergence of ML in their country. We stratified the interviewees across three levels of engagement in national ML development: 'strategic' or 'macro level' (in top-level positions, such as ministry of health and inspectorate), 'tactical' or 'meso level' (e.g., managers or board members and national project managers of ML initiatives), and 'operational' or 'micro level' (e.g., in ML-related training) (Table 1). We initiated the interviewee selection by contacting relevant individuals in our networks and, based on their extensive recommendations, approached the potential interviewees. One declined but was replaced by someone with equivalent subject knowledge.

In order to confirm accuracy and completeness, we asked all the interviewees to review the composed archival reports on their country, before their interview (Creswell, 1994). Following a protocol with open-ended questions focusing on explanations of the emergence of ML, we carried out eighteen semi-structured Skype™-based interviews, between June and September 2016, each lasting 30 to 80 minutes. We transcribed all the interviews verbatim, resulting in a dataset containing 96,611 words.

Data Analysis and Synthesis

We organized our analysis into three phases. We performed data analysis iteratively during all the phases, based on results from coding and discussing, while going back and forth between the original sources and our notes (Strauss & Corbin, 1990; Locke, 2001; Gioia et al., 2012). One of us initially performed thematic coding; we were both involved in the subsequent analysis and interpretations. During coding, we followed a stepped process (Lee et al., 1999), and applied open and thematic coding whilst (re)reading both archival and interview data, whereupon we documented our findings in tables (Microsoft™ WORD). We made notes during all the phases. This process created 'pattern codes', describing possible relationships between the coded fragments and the overarching codes (Miles & Huberman, 1994).

First, we sought to discern relevant institutional shifts or patterns that reflected changes relating to the medical profession and were consistent across the archival data and interviews in all six countries. Provisional categories with codes represented grouped quotations and phrases from our data that were relevant to the medical profession. We compared and contrasted these open codes, in order to cluster them into more homogeneous themes. Taking language and terminology into account, we engaged in (re)grouping the codes in order to distil distinct shifts, which we subsequently ordered into three categories ('institutional pillars').

In our second phase of data analysis, we re-ordered the identified, more general types of institutional shifts, in search for common characteristics related to ML and its emergence, and ultimately merged shifts with a high level of resemblance. We did so, based on discussion, while iteratively consulting the previously identified descriptions of institutional shifts, their original codes, and associated data and notes. Eventually, we re-phrased the merged shifts into 1st order concepts, by describing their relatedness to the emergence of ML. Based on subsequent discussion and consulting of our data if needed, we then inductively synthesized and described our 2nd order themes, representing social structures or agency related to the emergence of ML in the studied countries.

Finally, in the last phase, based on abductive reasoning, we looked for most likely aggregate dimensions (i.e., our ‘3rd order dimensions’) which signify the more abstract, theoretical categories, representing clusters of 2nd order themes.

FINDINGS

Our data revealed fifteen distinct institutional changes, all affecting doctors’ positions and daily work life in various ways (Tolbert & Zucker, 1996), which embody institutional shifts. We categorized them according to Scott’s (2008) three levels of institutional reality (see columns *From* and *To* in Table 2). Table 3 displays selected interviewees’ quotes which are illustrative of the fifteen shifts.

A thematic regrouping of these institutional shifts, based on their commonalities relating to ML, and the merging of similar shifts, resulted in ten 1st order concepts (1st order concepts in Figure 1). We inductively distilled ten themes from these initial concepts that represent the contemporary contextuality of ML-related structures (2nd order structures in Figure 1). Jointly, they affect healthcare professionals’ social schemes in new ways, particularly medical professionals and their enactment of leadership competencies. We then identified three 3rd order dimensions overarching these ten 2nd order themes, comprising ‘Interconnectedness’, ‘Openness and Reciprocity’ and ‘Adaptively Organizing Inclusive Change’ (Figure 1). These three, we argue, characterize the current concept of ML. Next, we reflect – as educationalists – on our findings along these three new ‘structuring’ dimensions.

Interconnectedness

Triggered by influences instilling changes in roles, positions and professional identity, actively (re)connecting with other actors is becoming the new norm of a doctor’s position in daily activities. Each of the six studied nations is moving away from fragmented and siloed patient care. Yet, old and resilient institutional logics within and between domains and professions continue to instill turf battles. Hard-wired inter-organizational as well as interdisciplinary processes and norms often decelerate hoped-for initiatives towards inter-professional blending of values that could enable better patient-centered care and shared decision-making. Yet, prejudicial inter-professional distance and hierarchical doctor-centeredness are declining (C01 and C03). Furthermore, ML is not perceived as a doctor’s new prerogative, but rather as part of a new leadership-by-all professional paradigm (i.e., ‘clinical leadership’) (F03). Non-medical healthcare professions are also rethinking their views about inter-professional connectiveness and even ‘see the value in what doctors can bring as leaders and managers to their organizations’ (A01). The ‘changing expectations relating to doctors and the medical culture’ (A01 and B01) are spurred by innovations, including digitalization, altering societal and social values, and organizational processes, and by patients becoming increasingly empowered and openly voicing their ideas and demands (E01 and B02). Also, many other influences strengthen the medical profession into progressively reconsidering as well as reaching beyond their own traditional turf, including doctors’ representation at executive positions, their intensified collaboration with other professions and the influx of ‘Millennial’ medical colleagues.

Due to intensifying encounters in daily clinical practice, interdisciplinary work and education are gradually on the rise and encourage mutual knowledgeability about work perspectives of other professions. Thus, after being ‘siloed too long’ (C01 and B03) and being exposed to fading inter-professional boundaries and intensified collaborative practice, our data suggest that doctors are starting to understand the need to ‘reach out and work with other health professionals’, ‘beyond the point where certain people are making the rules, and others are carrying out the tasks’, despite the fact that ‘they often have difficulty recognizing that’ (C01). Although ‘doctors have only just begun to be seriously challenged in terms of their behaviors, and their roles within multidisciplinary teams and within the organizations’ (A02), it is argued that ‘every doctor is a leader. Not the boss who waves the flag, but somebody who has leadership skills, as we integrate more and more into multidisciplinary teams’ (C03). This requires knowledge and skills on ‘how to be a good team leader, how to be a good follower, how to be good in communication, and how to effectively negotiate and solve conflicts' (D02). Effectively managing and leading colleagues can even encompass 'trying to pull a rather dysfunctional group of people together to achieve something', and other tasks that are relatively new to most doctors (A01).

Next to exhibiting more effective leadership as well as followership (A01), doctors are also seen as more engaged in various non-clinical and even societal issues, thereby exceeding their natural clinical focus (A01, B02, C01 and F02). After centuries of relative entrapment in the traditional doctor-nurse-patient triangle, concomitantly with a vastly changing society, doctors are gradually being relieved of their contested divine status (F01). With this decline in the hierarchical nature of doctor-centeredness and professional distance, doctors are notably being regarded less as 'the boss' (C01 and C03). However, the traditional medical hierarchy still affects such interactions. Doctors are often not 'asked to clean out their coffee cups' and are 'seen as dominant' (F01 and F03), mirroring the stickiness of old mental frames among non-medical professionals (see, for example, Gilmartin & D'Aunno, 2007).

Figure 1. Data structure and coding categories

Shifts **1st Order: Concepts** **2nd Order: Structures** **3rd Order: Dimensions**

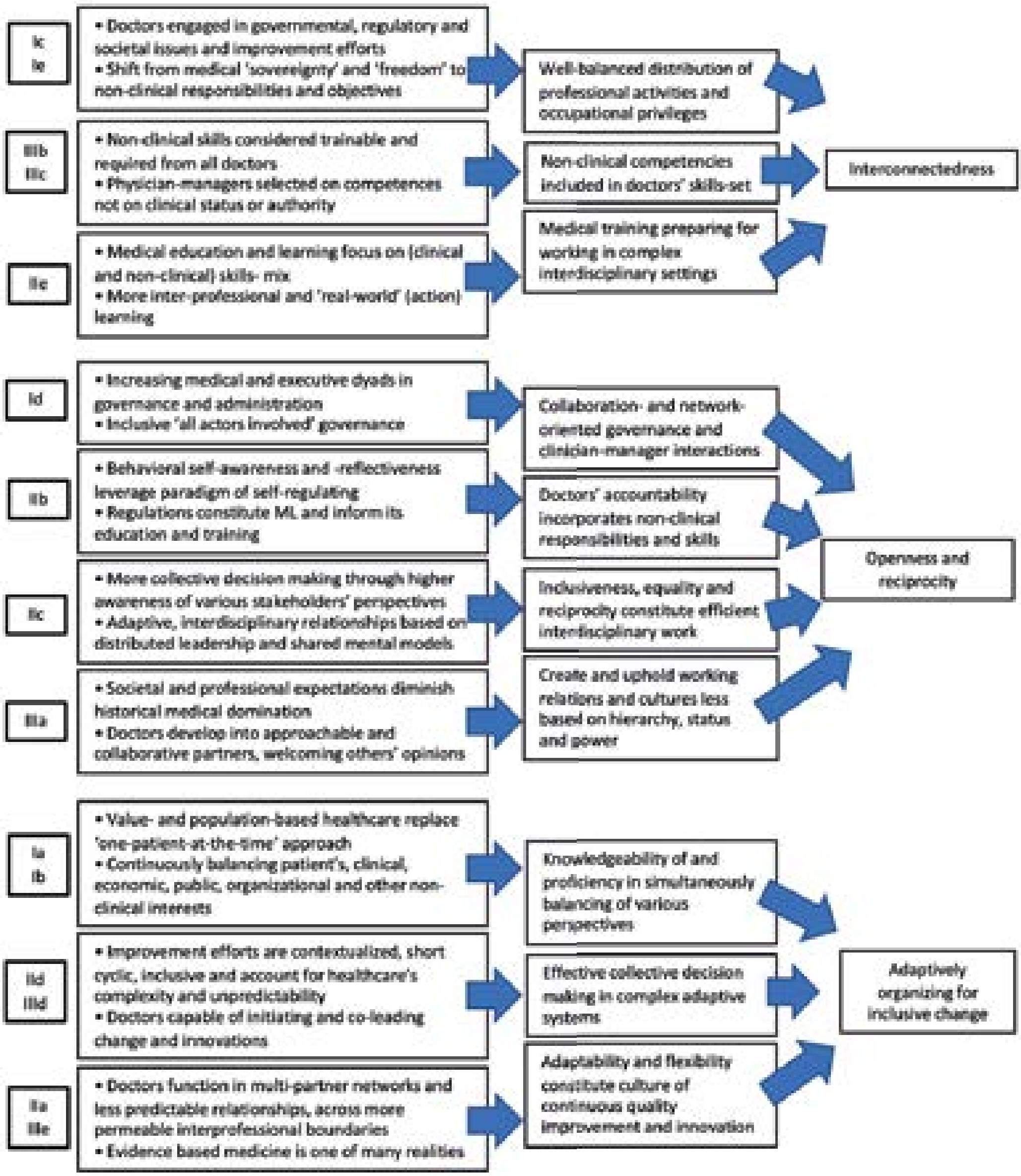

Table 2. Institutional shifts related to the emergence of medical leadership, categorized by Scott's Institutional Pillars (Scott, 2008)

PILLAR I - REGULATIVE SHIFTS *From*	*To*	PILLAR II - NORMATIVE SHIFTS *From*	*To*	PILLAR III - COGNITIVE-CULTURAL SHIFTS *From*	*To*
Ia. Healthcare system		**IIa. Work logics and focus**		**IIIa. Hierarchy and status**	
Funding primarily based on one-patient-at-the-time approach, and pay-for-performance	Value and population-based healthcare management	Evidence-based medical reasoning and working is the 'only reality'	Continuously balancing between clinical and organizational interests while pursuing individual patient's interests	Doctors('s) rules ('Doctor's orders')	Doctors are approachable and collaborative, welcoming others' opinions
Ib. Work processes		**IIb. Accountability**		**IIIb. Doctors and managing**	
Medically dominated organization of linear, often greatly bureaucratic, activities	Patient-centered, non-linear, multi-partner networks within complex adaptive systems	Individuals belonging to an autonomous self-regulating medical profession	Professionals capable of continuously organizing, receiving and effectively processing feedback	Doctors with the highest clinical status and authority are the best managers	All doctors have management capabilities and the best leader leads
Ic. Occupational position		**IIc. Collaboration**		**IIIc. Doctors in teamwork**	
Sovereign professional position	Expert profession, balancing justifiable clinical freedom with non-clinical responsibilities and (shared) clinical leadership	Medically dominated and fragmented decision making, in and between hierarchical professional territories	Adaptive, inter-disciplinary relationships in continuously changing settings, with distributed leadership and shared mental models	The few doctors capable of non-clinical skills, are born that way	All doctors can lead and/or follow
Id. Governance		**IId. Quality and innovation**		**IIId. Doctors in change**	
Archaic 'managerial' governance principles focusing primarily on budgets and related processes	Optimal healthcare quality based on 'all actors involved' governance approach, including focus on organization culture, accountability and openness	Innovations are fragmented, medicine oriented, slow paced ('multi-centred randomized trial based')	A culture of continuously, collectively and context-related improvement	Doctors are traditional, risk and change aversive	Doctors, capable of leading change, are continuously seeking for improvements
Ie. Societal position		**IIe. Learning and training**		**IIIe. Doctors' self-esteem**	
Expert professionals at relative distance from government, policy making and societal issues	Engaged expert-collaborators in public health and improvement	Medical skills-oriented mono-disciplinary learning, and 'hidden' curriculum	Real-world based and life-long medical training, including interprofessional practice oriented, action learning	Medical identity hinges on clinical accomplishments and authority received from same-profession peers	Doctor's professional self-esteem, based on an amalgamation of clinical *and* non-clinical activities

Table 3. Selected interviewees' exemplary quotes regarding institutional shifts that are relevant to the emergence of medical leadership

Pillar I - Regulative shifts	
Ia. Healthcare system	*Some doctors are having a hard time moving from the patient specific view to a health system view.* C01 *Many of the social determinants of health outlie traditional medicine: younger doctors realize they are trying to find a place to do all of those.* F02
Ib. Work processes	*We really want to give responsibility to doctors in teams, as close to the patient as possible, and include the patient in discussions and to suggest new solutions.* E02 *The model we have […] is one of collective responsibility: a partnership between the different professional groups.* F03
Ic. Occupational position	*Healthcare has become so complex, also because of various technologies available to patients who have all sorts of opinions.* B01 *Doctors are to engage more with senior management, executive management, and become part of leading improvement in quality and safety of health care.* D01
Id. Governance	*You start to put qualifications around leadership roles, [..] so what does an organization have to do to optimize the contribution of its medical leaders.* A03 *The […] medical association early understood that management of hospitals and departments needed to have a clinical aspect.* E03
Ie. Societal position	*There was some sort of authority and the things you said to patients was considered of high importance and automatically was conferred to the municipality.* B02 *If you really want to make changes you need to empower the doctors to be part of it, they have to be part leader.* C01
Pillar II - Normative shifts	
IIa. Work logics and focus	*I was trained when it was considered to be cool if you acquired the most expensive medical equipment.* B02 *It is not at all evidence-based medicine: some solutions are made with the garbage can theory and come from compromises with difficult political agendas.* E02
IIb. Accountability	*Doctors only have just begun to be seriously challenged in terms of their behaviors, in their roles within multidisciplinary teams and organizations.* A02 *Ten years ago, the medical world just saw the doctor as the autonomous guy who says that is the way it is.* C03
IIc. Collaboration	*Traditionally, doctors had more leadership roles within teams, but now it is becoming more decentralized.* C02 *The way it is often discussed is that it is health-professional leadership, with a focus on all professions working together.* F03
IId. Quality and innovation	*Because now you get used to get paid for services, and used to see your task in medical leadership, and also in developing services and forming services.* E02 *If doctors are to engage more with leading improvement in quality, safety, and performance of health care systems, we would be better off. D01*
IIe. Learning and training	*Since 2000 anyone getting into a specialty is definitely exposed to leadership development as part of their specialty training.* C01 *We have really well-intentioned medical leaders, but they do not only lack some very important leadership skills but also some very basic managerial skills.* F01
Pillar III - Cognitive-cultural shifts	
IIIa. Hierarchy and status	*Twenty years ago, we had medical cultures that were more hierarchal, made more assumptions about the doctor being the sole owner of power.* A01 *Through change in society's expectations and to changes in their own behaviors, doctors are seen rather differently: more as partners, less as authorities.* C01
IIIb. Doctors and managing	*Doctors are more interested in how to impact beyond the clinical area and how they can work better with administrators, politicians* C01 *The leader of a department was often just the best medical person, not the best leader.* E01
IIIc. Doctors in teamwork	*People had an old mental model of what leadership meant for doctors ten years ago, and that model is changing slowly.* C03 *How to be a good team leader, a follower, good in communication; and how to negotiate and solve conflicts: those professional skills doctors should have.* D02
IIId. Doctors in change	*Because now you get used to see your task in medical leadership, and also in developing services and forming services.* E02 *They don't take risks or experiment. So, when change has happened somewhere else and it is evidence-based, and it is already working, then they will.* F01
IIIe. Doctors' self-esteem	*They want to lead, but they don't want to lead if that involves serious consequences. They want to be in charge, but they don't want to be responsible.* A02 *It can be difficult to get in and talk about how to organize, how to structure things, when that is not important for their self-esteem.* F02

Openness and Reciprocity

As with many other healthcare actors, doctors are progressively being faced with the consequences of bureaucracy (A01, A03, D03 and F03). Moreover, after having enjoyed privileges of exclusive autonomous self-regulation for centuries, the medical community is now required to demonstrate unprecedented levels of openness and accountability. Increasingly, daily healthcare work processes incorporate transparency measures to account for their performance (B03). Former 'control and command' dogmas are superimposed upon, consequently oppressing doctors' historic sovereignty and autonomy.

Ongoing task substitutions and resulting shifts in responsibilities and authorities (C01, D02, A02 and B03), as well as intensified super-specialization and the arrival of the patient as a partner (B01), are steering doctors towards more 'opening-up' of their enactments and a renegotiation of power distribution within the wider healthcare community. Historically, power in the healthcare setting was allocated rather unevenly, benefitting the medical practitioner (Currie et al., 2012). Although educated to function in doctor-centered and medically-led situations, gradually having to function more in interdisciplinary teams and multi-partnerships, doctors are more and more expected to engage in shared decision-making (B02, C01, C02 and F03). In our data, we noted additional institutional pressures: increased stewardship and service orientation; a shift away from pay-per-performance funding; incentives towards novel healthcare models; a transition from infrequent quality auditing to (a collective culture of) continuous improvement; formalization of doctors' individual accountability; highly intensified doctor appraisal (revalidation and recertification) procedures (A01, A03 and D03).

The data also suggest that external and internal pressures and actions urge the medical community to change old norms and values (E01). Former unwritten rules (e.g., medical or scientific accomplishments) no longer dictate which doctors lead, and are overhauled by, for example, more junior colleagues with more proficiency in effective leadership. Until recently, doctors' professional esteem and role identity were influenced by a primarily inward focused, self-regulatory medical context and a hierarchical mentor-based, 'hidden' curriculum (Hafferty, 1998). Contemporary doctors are increasingly required to continuously deal with feedback from a variety of sources, also those originating from outside their professional 'tribe' and often based on other paradigms than medical reasoning. These effects are making doctors adapt their attitudes and behaviors and find a new balance between leadership and followership through more open and reciprocal partnerships with allied healthcare actors. Accordingly, doctors at formal leadership positions are also reported to be held accountable for proficiency in leadership that aligns with their (hybrid) clinical-managerial positions (A02). Moreover, while the determinants of a medically well-led healthcare system are gradually becoming part of common jargon, formal qualifications and benchmarking tools (e.g., assessments) of the individual doctor's ML competencies are looming on the horizon (A03).

Adaptively Organizing Inclusive Change

Our data indicate various aspects influencing doctors' work foci, especially those related to continuous improvement and innovation. There has been significant impact of historic events suggesting doctors have been absent or ineffectively involved in leadership and management of organizations, inadvertently contributing – indirectly – to poor-quality care (A01, A02, F02 and F03). Various scientific reports and national enquiries were part of our data as indications of alleged serious inadequacies in healthcare performance, also indicating characteristics of the medical profession and its members as important contributing factors (Kitchener, 2000; Francis, 2013). Contrastingly, current research is showing positive relationships between ML, organizational performance and sustainable change (Shannon, 2015; West et al., 2015). Moreover, data denote an important relation between healthcare quality and frontline professionals: 'Doctors are often at the very frontline and should constantly think about how we can do things better' (D01). Furthermore, operational processes have long been burdened by doctor-centeredness and organizational fragmentation (e.g., abysmal distance between social, medical and other (health)care domains; increasing numbers of sub- and super-specializations). Lately, new paradigms emerged that call for a more decentralized organization (e.g., value-based care, chronic disease management and whole-pathway care), 'as close to the patient as possible' (E02). There seems a demand for 'a more distributive leadership model' supported by 'multidisciplinary teams working in complex systems' (C02, C03 and E02) and more 'responsibility to doctors in teams' (E02 and B02). Large scale, often e-health-supported, decentralization efforts embrace a more interdisciplinary, collaborative approach. Also, these efforts imply processes being organized as less doctor-centered. Doctors' active co-organizing engagement, along with their day-to-day patient care work, is regarded as essential. Doctors need to execute their clinical evidence-based jobs within these new constellations, with more collaborative and organizational types of reasoning (A02, B02, D01, E03, E02 and F02). This necessitates them to also acquire competencies to be able to be continuously aware of and to influence, or nudge, a 'shared mental model' between professionals, notably: 'As a doctor, you have to step out of your office and no longer take care of a patient on a one-to-one basis; you have to kind of zoom out and see the system at large, and how you can function in that' (C02). New scientific insights into effective preventive healthcare also advocate a more holistic view of doctors' work (Malik et al., 2018). Gradually permeating into medical education, these developments steer doctors also to engage more in societal discourses of reducing costs and improving quality (A02 and E03). Thus, doctors are urged to 'understand organizations' more accurately, on top of continuously balancing between the interests of the individual patient and those of economic, political, organizational and system perspectives (E02, E03 and F01).

Preceding medical generations primarily focused on a modus operandi of one-patient-at-a-time. Now, mature or well-honed non-clinical skills are indispensable for doctors 'to understand the ambiguity in complex adaptive systems' (C02). Nevertheless, in the nations we studied, these competencies are often underrepresented in doctors' formal education and training curricula, concurring with recent findings (e.g., Frich & Spehar, 2018). The same holds for education and training related to (leading) processes of change. While more doctors proactively seek to enhance healthcare quality and improvement, many lack adequate training in organizational (change) knowledge and skills (A01, C01, C02 and F03). As an ultimate goal, quality improvement and change ought to be included as one of doctors' 'generic professional capabilities' (A01). In this context, the deeply enshrined paradigms of evidence-based medicine, and doctors' infamous reluctance to change are noted as well (F01) (see, for example, Currie et al., 2012). The interrelatedness of what is 'good clinical practice' and 'good organizational practice' frequently puzzles doctors and others.

DISCUSSION

In each of the six studied Western countries, the emergence of ML represents a unique structuration process encompassing an almost inextricable myriad of factors, events and (mostly uncoordinated) actions from numerous actors, over longer periods of time and with multiple effects at various levels. Our data imply a non-linearly evolving temporality as well as a multi-actor, multi-action and multi-location of a process on its way towards a new set of social structures and arrangements that concern medical professionals. Apparently, in none of the countries a pre-set program or scheme provided a blueprint for this shaping process. However, there are commonalities in the temporal sequence of various tightly interrelating events, as we have inductively shown and identified as the 15 shifts (Figure 1).

Our sources revealed unanimously the initial notions of insecurity among the medical community of being disenfranchised and under-resourced (Martí & Mair, 2009), symptomatically represented in, for example, doctor-bashing, overregulation, bureaucracy and burn-out. As a consequence, in various ways and through a variety of actors and actions, in all the studied countries this instilled a growing notion of possible 'new ways of *seeing* things', going beyond merely 'new ways of *doing* things' (Martí & Mair, 2009, p. 93). Ultimately, this imparted the medical profession's adaptive emancipation efforts which are importantly scaffolded by its new guise of ML (Lawrence et al., 2011). Currently, ML is a concept still enmeshed in a process of "rendering of ideas into understandable and compelling formats" (Greenwood et al., 2002, p. 75) (Marin & Learmonth, 2017). Despite few tangible material resources (e.g., competency frameworks and ML training programs) and practices (e.g., ML training and educational, influence of champions and gradual incorporation of ML in medical curricula) (Keijser et al., 2017b), our data confirm that ML is far from fully 'systemized'.

Whilst the meaning and appropriateness of ML is being 'molded' into its current phase of institutional 'experimentation' and 'theorization' (Greenwood et al., 2002), the process itself inculcates changes in the social relations between various actors, indicating Giddens' structure-agency duality (Giddens, 1984). These processes also reveal the cyclic course of 'reflective monitoring' of actions, representing the interwovenness of action and consciousness. Expectedly, ML will become more established through increased "practical consciousness", ultimately resulting in a growing number of doctors' and others becoming "knowledgeable agents" (Giddens 1984, p. 15). Relatedly, data signify doctors' currently growing interest and agency in developing and enacting ML. Such growing 'intentionality' might herald doctors' more routinised agency of consciously and strategically redeveloping their position and roles through ML (Emirbayer & Mische, 1998; Lawrence et al., 2011). We contend that routinising ML will also require doctors to undertake what Giddens (1991) denotes as 'face-work' (i.e., those actions that make their 'being a doctor' consistent with the structures and associated expectations that relate to ML as part of doctors' new skill set and identity), in order to build trust at the level of work relations with others as well as at the system level (e.g., medicine's social contract with society) (Giddens, 1991; Ward, 2006; Hotho, 2008). Expectedly, through this process and by using 'discursive knowledge', as well as by being carriers of knowledgeability themselves, incrementally doctors will more consciously interpret and execute the meaning and potential of ML.

Strengths and Limitations

We consider several possible merits and shortcomings in our methods and analysis. We triangulated our iteratively consulted data from different sources, validated our sources through expert-checking, and systematically coded and synthesized the excerpts and quotes (Glaser & Strauss, 1967; Bryman, 2013). Through a mixture of methods, data sources and a theoretical underpinning, we attained a high level of credibility of our findings (LeCompte & Goetz, 1982; Lincoln & Guba, 1985). However, when generalizing the findings from the six countries, dissimilarities in doctors' payment structures, cultures, governance, education, historic events and other aspects may also need to be taken into account (Denis & van Gestel, 2016). Nevertheless, the commonalities in the six countries we studied suggest that the current analysis might offer a useful basis for further studying or stimulating the discourse on ML in other (Western) healthcare systems (Chreim et al., 2007).

If one were to ask trend-setters or experts in ML (i.e., our interviewees) to speak about a phenomenon about which they have already been working, it might bias their answers. The reason why we studied their views on ML is that our 18 interviewees were in positions in which they could signal prior and ongoing institutional changes operating in their particular healthcare system.

Our data do not foretell future evolvements of ML. Although counterintuitive to the relatively positive notion of ML that is reflected in our data, after the current period of ideologically motivated experimentation with ML, a risk exists that ML evolves into less alluring isomorphic change (Dimaggio & Powell, 1983). For example, ML could turn out to be a manipulative or re-grabbing response of the medical profession to regain its authoritarian power (Currie et al., 2012; Voogt et al., 2015).

Interestingly, in contrast to more peripheral actors, doctors have a relatively high capacity to influence organizational logics in line with their vested interests and their sovereign embeddedness in the field (Greenwood & Suddaby, 2006). Possibly, the concept of ML can also impart doctors' new routines in upholding their own professional interests, for example by resisting specific reforms that could influence their long-established roles and comfortable positions (Oliver, 1991; Martin et al., 2009; Currie et al., 2012; Powell & Davies, 2012). Such evolvements could divert the discourse on ML into renewed inter-professional tribal battles for status and power, steering away from its connotation of effective inter-professional collaboration, openness and reciprocity, and continuous improvement, ultimately for the sake of patients.

Further scrutiny of the institutional fields of healthcare, and especially of micro-level (effective) leadership behaviors of individual professionals and teams of professionals, is needed. Taking the herein reported shifting of inter-professional boundaries into account, doctors' professional identity seems to be changing towards a new equilibrium inviting more inclusive collaboration with immediate stakeholders. In order to prepare doctors optimally for these relatively untraditional ways of working, we must understand better what forces propel (or hamper) these shifts. This will allow to facilitate them and offer doctors chances to excel in the new hyper-patient centered era.

CONCLUSIONS

In this paper, we apply relevant macro-sociological understandings in "helping to make sense of large-scale inter-organizational and societal transformations" (Lawrence, 2011, p. 53) that flagged the frequent (re-)appearance of ML as something of added value for medical professionals. While attempting to avoid a "flip-flop" between deterministic structures and heroic agency (Cooper et al. 2008, p. 676), we assert the value in combining ST and Scott's framework for scrutinizing institutional change in healthcare. Specifically, we set out to investigate which institutional changes triggered the rapid emergence of ML and what new 'structures' accompany or typify the (in part re-)arrival of ML. Studying a diversity of data from six Western countries where ML has reached a certain maturity, we found a variety of multi-level institutional changes or shifts. In all studied countries, the identified (fifteen) institutional shifts have contributed to increased instability of the identity and self-esteem of the medical profession, instigating a process of adaption and restructuring, resulting in a series of new, mainly socially-related structures expressed by three distinct dimensions that define contemporary doctors' work. These dimensions comprise: higher levels of interconnectedness towards other types of professionals; changing attitudes towards more openness and reciprocity vis-à-vis other healthcare actors; an intensified focus on adaptive organizing for inclusive change towards better value-based and patient-centered healthcare. Having emerged from various unconscious professional identity motives and cognitions, ML appears to be gradually crystalizing through practical consciousness as well as tangible means (e.g., ML competency frameworks and trainings), towards a more mature level of discursive consciousness (Giddens, 1984) or behavioral repertoire of doctors. This societal process is working through the three identified dimensions that accompany the emergence of ML. Jointly, they provide a new set of 'rules' for medical professionalism and the inevitably accompanying notion of ML, implying a less dominant, yet 'leaderful', societal force of medical doctors. Lastly, the emergence of ML even illustrates Giddens's key premise that, in any given community, change processes gel due to a myriad of constitutive (f)actors.

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CHAPTER 2

Development of a National Medical Leadership Competency Framework: The Dutch Approach

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Keywords

- Medical leadership
- National competency framework
- Medical education
- Qualitative
- Design research

Abbreviations

MLCF, Medical Leadership Competency Framework
CBE, Competency Based Education
DML, Dutch Medical Leadership
FG, Focus Group
ML, Medical Leadership
PBL, Problem-Based Learning
PML, Platform Medical Leadership
KNMG, Royal Dutch Medical Association
UT, University of Twente

ABSTRACT

The concept of medical leadership (ML) can enhance physicians' inclusion in efforts for higher quality healthcare. Despite ML's spiking popularity, only a few countries have built a national taxonomy to facilitate ML competency education and training. In this paper we discuss the development of the Dutch ML competency framework with two objectives: to account for the framework's making and to complement to known approaches of developing such frameworks.

We designed a research approach and analyzed data from multiple sources based on Grounded Theory. Facilitated by the Royal Dutch Medical Association, a group of 14 volunteer researchers met over a period of 2.5 years to perform: 1) a literature review; 2) individual interviews; 3) focus groups; 4) online surveys; 5) international framework comparison; and 6) comprehensive data synthesis.

The developmental processes that led to the framework provided a taxonomic depiction of ML in Dutch perspective. It can be seen as a canonical 'knowledge artefact' created by a community of practice and comprises a contemporary definition of ML and 12 domains, each entailing four distinct ML competencies.

This paper demonstrates how a new language for ML can be created in a healthcare system. The success of our approach to capture insights, expectations and demands relating leadership by Dutch physicians depended on close involvement of the Dutch national medical associations and a nationally active community of practice; voluntary work of diverse researchers and medical practitioners and an appropriate research design that used multiple methods and strategies to circumvent reverberation of established opinions and conventionalisms.

The experiences reported here may provide inspiration and guidance for those anticipating similar work in other countries to develop a tailored approach to create a ML framework.

INTRODUCTION

Emergence and Discourse

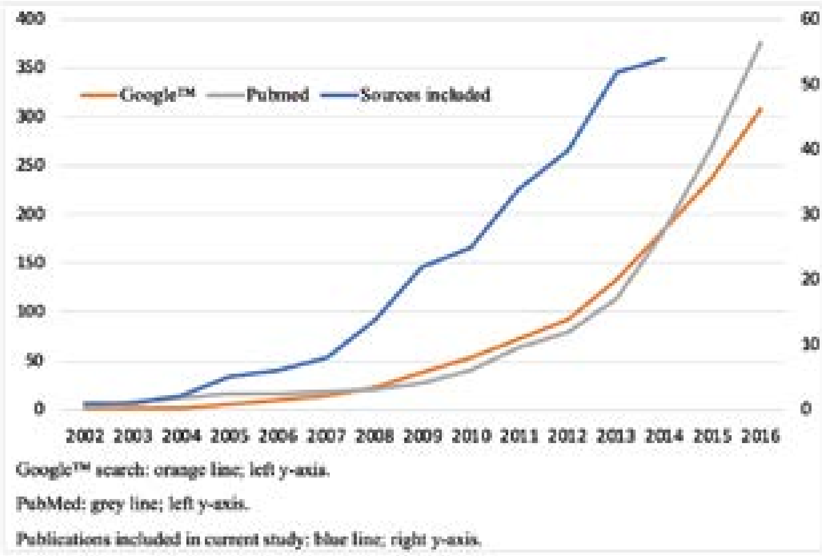
Over the past decade the concept of medical leadership (ML) has emerged as a result of various contestations over physicians' changing roles and impact on healthcare delivery [1]. Supposedly, ML emerged during attempts to include more medical professionals in quality and safety improvements and healthcare transformation [2, 3]. In recent years, ML has been increasingly theorized as being a part of physicians' attempts to re-professionalize [4, 5].

The discourse of ML can be explained in two ways. First, it can be conceived as a revision of physicians' professional identity as a response to institutional disruptions, which increasingly affect physicians' traditional dominant and autonomic positions [6, 7, 8]. Secondly, rapid changes in daily healthcare practices warrant ML efforts [9, 10]. The changing role of physicians is influenced by various factors, including: technological innovations; patient empowerment; system reforms; and rising economic constraints. Over the years, such developments have ignited the need for agency to rebalance the shifting interprofessional arrangements between physicians and other field actors. Physicians' skill sets have been in transit within these processes, from individualistic clinical experts or "heroic lone healers" [11: p57] to collaborative leaders in change and improvement [12].

A transition to a more collective approach to practicing medicine is well represented in the current literature on ML (Figure 1). Moreover, the literature provides indications for the beneficial effects of ML e.g., on clinical and organizational outcomes [13], as well as on physician's burnout reduction [14]. Yet, enhancement of rigor in research on ML is wanted [15].

Internationally, the physician's role of 'leader' was recently formalized through replacement of the former 'manager' role in the CanMEDS framework [16]. Also, various forms of ML training are increasingly being offered, including the appearance of ML competency programs in formal curricula [17]. Triggered by a variety of precipitating activities and an increasing appetite for ML within as well as outside national medical communities [1, 20], interestingly, in several countries a comprehensive national ML competency framework has been developed and implemented [1, 3, 18, 19]. As it appears, ML is here to stay. ML is following a national discourse in which the creation of a national taxonomy on ML is an essential component [1, 3, 5, 13, 18, 19, 20]. To our knowledge, to date, there has been no publication providing detailed insights on 'the making of' such an artifact. This paper provides an account of the development of a national ML competency framework, exemplified by the approach taken in the Netherlands.

Figure 1. Various types and numbers of publications on medical leadership: 2001-2016



Medical Leadership Competency Frameworks

Specifying professional behavior and performance, competencies form part of the shared identity of a profession and its members. Formally defining them can contribute to explicating a profession's objectives to others [21]. ML frameworks (that comprise the relevant competencies of a physician's role(s) in leading [16]), have been subject to disputes [22, 23]. Generally, leadership frameworks can benefit from a collective understanding of leadership practices and educational content [19]. Detailing desirable behaviors, such frameworks, or 'knowledge artefacts', help convey clear meaning, and align classifications of terms, concepts, and elements [24]. Furthermore, competency frameworks "constitute a blueprint for optimal performance" which individuals are expected to master them [25: p.870]. Such frameworks also answer the need to establish consistent standards of practices across settings, including evaluating outcomes of competency development [26]. Furthermore, competency frameworks can provide practitioners, educators and human resource professionals with an outline to appropriately choose or develop educational activities and assessments to enhance proficiency [25, 27]. Without a common and well-designed vocabulary on the concept of ML, applicable in daily practice and in education, any effective enactment of it by physicians, educators, managers, policymakers and others might remain ambiguous, consequently hampering effective improvements and transformation in healthcare [18, 19, 20].

Thus, without adequate explanations for the meaning of the competencies required by the relatively new and 'trendy' ML concept, enshrined within the notion of 'physicians as leaders', could trigger (Babylonian) misconceptions. It could, for example, kindle interprofessional boundary battles when physicians enacting ML are (mis)perceived as 'being the boss': possibly reinforcing healthcare's notorious hierarchical culture of professional power. Also, misunderstandings can arise from unclear distinctions between ML and other function-related forms of leadership e.g., 'clinical leadership' (implying all healthcare professionals), or 'managerial' ML (indicating physicians in hybrid leadership roles) [28]. Competency frameworks can help raise awareness of the meaning of leadership, by bringing a lexicon with which individuals, organizations, educators and others can further debate on the nature of physician leadership, and its associated value to organizations, professions and ultimately to patients [133]. Also, a precise definition of ML, as sought after in this Dutch project, could help mitigate such misapprehensions.

Framework Development

For various reasons, the construction of a national framework, suitable to function during times of unprecedented institutional change in a healthcare arena, can be a challenging task [5]. Firstly, although extant ML frameworks have proven their value in various countries, no generic process map for their development has been published to date. Secondly, defining professional competencies is often based on the existing generation of professionals' views and experiences, despite consultations of large groups of peers who are invited to score concepts of new 'best practices' that are predefined by those elites. Such an approach risks a continuous reinforcement of "the current thinking of a limited few who occupy dominant professional positions" [29: p. 452] within the medical community or the politics surrounding it. But professional competency frameworks are expected to be societally responsive [21]. Any new medical framework must thus function as a timely and appropriate illumination of patient care as well as societal needs and demands vis-à-vis physicians [10]. Thirdly, independence and efficiency are required from those who construct the medical frameworks. Moreover, 'policy community' type of project organizations (that comprise organizing various streams of discussion groups in and between professional, healthcare governance and other bodies and associations towards a series of consensus meetings etc.) has been noted to slow down innovation. Also, a politically tainted 'governing of the souls' (e.g., solely centrally organized, top-down approaches of designing new policy and practice) can influence physicians' subjectivism in re-professionalization processes [4, 5]. A fourth difficulty that can be encountered pertains to the roles of regulatory agencies and professional associations in deploying new frameworks. Involvement of these stakeholders can be crucial for the sustainability of any framework implementation [30] because they can delay new medical realities, due to competing priorities resulting from their relations with entrenched constituents. Finally, a competency framework is not static; it needs to be chaperoned over time to retain its accuracy and for it to remain contemporary [21].

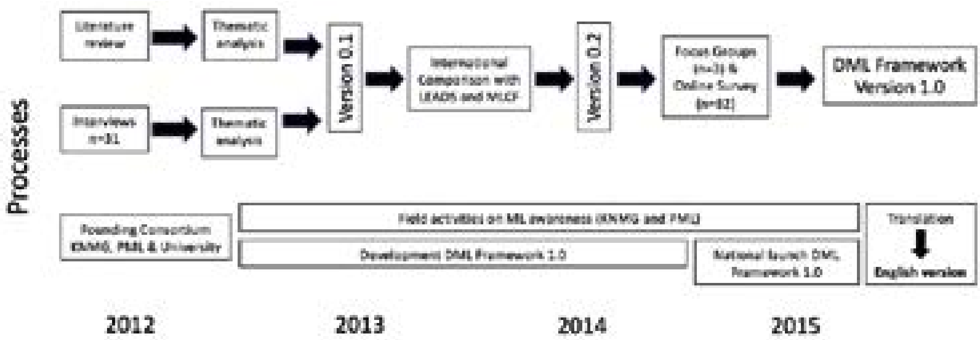
Objectives

In the absence of detailed publications explaining the development of a national ML competency framework, this paper's main objective is to provide a design-process description of the Dutch case study, to inspire or guide others contemplating to undertake similar work in other countries [31]. In particular, our community of practice approach might add to possible avenues of creating these national artifacts. Below we explain in detail the methodological foundation on which version 1.0 of the Dutch Medical Leadership (DML) framework was constructed. Supplement 1 yields the final version of the process depicted below.

METHODS & DESIGN PROCESS

The following design research methods were used: systematic literature review; individual interviews; Grounded-theory type data analysis and synthesis; comparison of the framework's initial 0.1 version with other national ML frameworks; validation of the 0.2 DML framework version through focus groups (FG) and an online survey; and translation of the Dutch version into English (see, Figure 2).

Figure 2. Developing the first Dutch medical leadership competency framework



Setting and Actors

Given the absence of a Dutch ML taxonomy and anticipating an increase in the use of unofficial translations of foreign (and especially UK) frameworks, this project was initiated in early 2013 by researchers from the University of Twente (UT) and members of the Platform Medical Leadership (PML). PML [(1)] is a non-profit Dutch foundation based on the (free of charge) membership of approximately 200 Dutch individuals (2014), primarily physicians. Since its establishment in 2012, PML in team with the research group has been functioning as a 'Community of Practice' (CoP) in ML: a group of people "who share a concern, a set of problems or a passion about [ML] and who deepen their knowledge and expertise in this area by interacting on an ongoing basis … [and] … create tools, standards, generic designs, manuals, and other documents" [127: 4-5]. A national consortium consisting of PML, UT and the Royal Dutch Medical Association (KNMG) began, with the objective to create and launch a national, evidence-based, open-access ML framework. PML and UT researchers agreed to engage in the collective long-term dual custodianship of the envisioned framework's development and ongoing maintenance. After its development, under the academic scrutiny of the UT, and under the auspices of PML and KNMG, this consortium launched the 1.0 DML framework version in December 2015 (Supplement 1) [20].

Based on the limited literature about resources and approaches used in the development of other frameworks as well as on input from international experts [1] [3, 18, 19], we contend that the way the DML framework was constructed differs in that it used an independent community or practice approach [127]. Before describing the methodologies, we applied, we first want to discuss the strategic rationale for this approach and the context in which the work was done.

[1] The authors were aware of approaches taken in the creation of ML frameworks by means of interviews (part of a preceding publication [1]) and personal communications with ML experts in the United Kingdom, Canada, Australia, New Zealand and Denmark, all being involved in national ML activities in these countries (see also: [(2)]).

Research Group

The framework's research group of 14 individuals had an active core of eight persons, including: six physicians (with backgrounds in: primary care (2); surgery (2); internal medicine (1); and change management and coaching (1)); one MSc-level registered nurse / MSc health scientist; and a full-tenured professor in organizational behavior and leadership studies. The additional six individuals were: a KNMG policy advisor; a medical-education expert; a statistician; and three UT student assistants. Except for the two topic experts (WK; CW), the core group members were mainly recruited from the PML network. Others were invited based on interest, pragmatism and required expertise. Twelve of the 14 participated on a voluntary basis; the other two were remunerated (i.e., the university statistician and the KNMG policy advisor). The composition of the core group did not alter throughout the framework's developmental process. Members of both groups engaged in specific tasks, in subgroups of varying sizes (Table 1); one core group member had a central coordinating role (WK). All eight researchers were involved in final consensus forming and prime decision making throughout all the phases.

Over a period of 2.5 years, the researchers convened during 34 sessions, mostly face-to-face, at central locations in the Netherlands (at the KNMG premises) or via teleconference (Skype™). These sessions involved either the entire core group or subgroups with various compositions of the entire group of researchers, lasting typically between approximately 1.5 to 5 hours (Table 1). During this period, consortium representatives convened on 5 occasions: to discuss the project's progress, relevant field activities, preparation for the framework's launch and for other specific issues such as, for example, to make a taxonomical distinction between medical management, medical leadership and clinical leadership; the pace of the developmental process; and to share relevant 'soundings' from the field.

Table 1. Researchers' work sessions and subgroup sizes*

	Number of sessions
Core group work (In total: 8 people)	
1. Research methodology & preparations	3
2. Literature review analysis	3
3. Interviews' analysis	2
4. Synthesis and editing	2
Subgroups (In total: 14 persons)	
a. Literature review (6 persons)	4
b. Interviews and focus groups (6 persons)	6
c. International comparison (3 persons)	2
d. Version editing (4 persons)	5
e. Definition (3 persons)	3
f. Translation (4 persons)	3
Total	**34**

*Core group members also participated in subgroups.

Modus Operandi

The researchers ensured an enactment of high-quality activities by building on prior experiences and expert advice(2). During three preparatory sessions, the researchers' set of modus operandi was enshrined in four principles that were executed throughout the cycle of framework making, encompassing:

1. **Autonomy**. Responsibility for scientific rigor and quality of the framework's design: the researchers operated according to academic autonomy, parallel to the activities of the other consortium members (KNMG and PML) who were dedicated to deploying various activities (conferences; publications; workshops; etc.) to raise awareness among Dutch physicians of the topic before and after the framework's launch [20, 23].
2. **Neutrality.** The researchers operated under the academic guidance of the UT (3), a university chosen for: (1) not harboring a medical school in order to guarantee independence and acceptability for all national medical universities by avoiding competition, (2) to reduce possible bias regarding the ML concept [5], and (3) having long-established international expertise in leadership research.
3. **Pluriform research group**. Most of the 14 researchers (4) were practitioners with various clinical backgrounds. They had no prior experience in (medical) leadership research or practice; except for two experts [29, 33].
4. **Topic expertise.** Two ML topic experts (WK and CW) led the development process, and also chaired most of the core and subgroup sessions. Neither participated in group voting procedures or consensus processes. Other authorities were asked for input where needed.

Although relatively small in size (in terms or financial resources as well as persons), the research group, which functioned according to the four principles, collaboration with other members of the multifaceted wider community of practice enabled a distinct balancing between inviting new ideas while nourishing existing 'ways of working'. The multiple sessions, with varying composition of people from various background, combined with numerous other ML related (national and local) activities and assemblies organized by the PML, KNMG and other groups (which were increasingly reported in professional and lay public media, during the period of the development [20]), importantly contributed to a collective and multileveled creation of the framework [128]. In fact, the development of the DML framework as described below, was couched in an intangible national 'knowledge interaction' [128]. Social science-oriented analyses of national ML discourses are being delivered by various scholars and contribute to an understanding of the dynamics of the emergence of new phenomena such as ML [1, 4, 20]. This paper's scope is the actual development process, to which we will turn to now.

Methodological Appropriateness and Quality

On disregarding the option to translate, adapt and validate existing foreign ML frameworks, we sought the highest possible (cultural) validity by constructing the Dutch ML framework from scratch [33]. In the absence of route maps for such a development [5], we first established a methodological approach and research plan. These were designed to ensure embedment of the framework's design in: (1) methodological rigor; (2) medical professionalism; and (3) future-proof societal relevance [21]. We set out to frame educational constructs and outcomes related to ML behavior which were applicable to Dutch physicians [23]. Therefore, we chose an unproblematized, realist approach providing a "direct window onto the world view" through various data sources and modes of synthetization [34: p5].

We collected data through 1) a literature review of scientific and grey literature; 2) field interviews; 3) focus groups of medical professionals; and 4) online surveys as discussed in detail below. We performed comprehensive data analysis and synthesis data which included comparison with international frameworks.

To account for the quality of the literature review, interviews and FGs, we applied 'ENhancing Transparency in REporting the synthesis of Qualitative research' (ENTREQ) [35] (Supplement 2); and 'COnsolidated criteria for Reporting Qualitative research (COREQ; Tong 2011) [36] (Supplement 3).

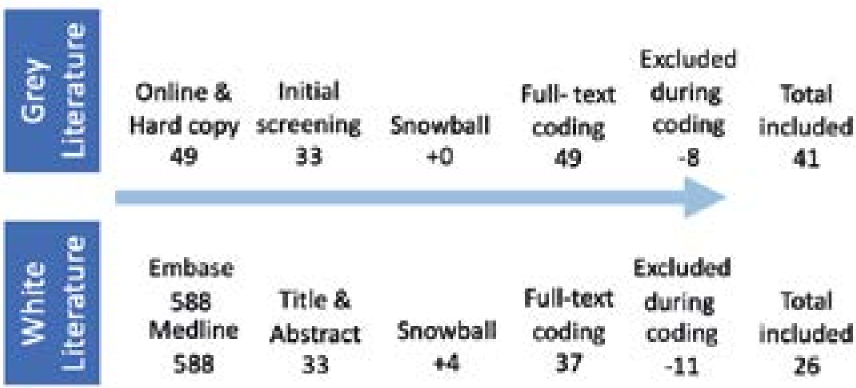
Triangulation was based on: a variety of researchers; various data sources (also reflecting diverse stakeholders); comprehensive data analysis through open coding; and iterative axial coding, and data synthesis [34, 37, 38]. Our main data sources comprised: literature; interviews' and FGs. We deliberately choose not to include, in these date sources, literature or expertise from outside the Netherlands. Since our objective was to develop a national ML framework (i.e., contextually appropriate to the characteristics of the Dutch culture, health system, healthcare field and its professions) we exclusively used Dutch (oriented) publications and sought for interviewees and participants working in Dutch healthcare (organizations). In a final phase, we did however compare a pre-final version of the framework with existing non-Dutch frameworks.

To ensure high validity of our analysis we deployed: individual data analysis by researchers; iterative cross-checking of results and open plenary discussions and consensus procedures; structured debriefing; audit trailing and logging; and nonvoting researchers: to expedite consensus forming or to resolve slight differences (WK or CW) [39, 40. 41, 42].

Literature Review

To assure appropriate data interpretation and optimal reflection of the relevant needs in the Dutch healthcare system, and to focus on outcome abilities, we chose to include both 'white' as well as 'grey' literature in our review [21, 43]. Following the guidelines for Cochrane Reviews, in- and exclusion criteria for 'white' sources and defined search terms were determined (Table 3) [43, 44]. To validate accuracy, the search strategy was verified with a similar prior review [13]. We applied a sensitivity-maximizing approach using EMBASE and MEDLINE data bases [43]. 'Grey' literature included records retrieved from: researchers' private libraries; consultations with topic experts; databases of relevant websites (e.g., government policy reports; medical association database); and online (GoogleScholar™) searches, using various search terms (Supplement 4). Inclusion-exclusion analysis resulted in a total of 67 records that were coded (Figure 3). One Flemish paper was deemed generalizable to the Dutch context [45] (Tables 4a and 4b). The 26 included 'white' records reflected five fields: improvement and innovation (8); training and education (6); administration and policy issues (5); integrated care and multi-disciplinary disease management (4); and human resources (3). The heterogeneity of the included 'grey' records' content disallowed similar categorization.

Figure 3. Literature review diagram



The researchers assessed, in pairs, all the records' titles and abstracts for eligibility; after an individual pre-assessment, both researchers convened for a discussion, and eventually reached a consensus on the initial 'white' literature inclusions. A review of a selection of included papers by selected international topic experts confirmed the search accuracy. Full-text eligibility was also assessed in pairs. 'Grey' literature inclusion followed a similar eligibility process. To increase sensitivity, in- and exclusion criteria were adjusted based on initial findings: a process called 'niche shaping' (5) [46]. During this process of fine-tuning criteria, it became apparent that publications mentioning 'leadership' (or related search terms), often entailed studies on clinical enquiries, not explicating meaning or use of ML in any form, resulting in the final set of criteria (Table 3). Backward citations or 'snowball' searches were performed on all the included 'white' and 'grey' records to complete the search.

To limit inter-coder bias and to increase reliability, subsequent open coding was also done by the researcher pairs. They analyzed all the included literature, first individually, then by convening to discuss: intermediate results; definition or adjustment of coding terms; and eventual consensus. Coded text fragments were recorded in a data base (Microsoft™ Excel) based on the data extraction questions and quality using: a) an adapted version of the JBI-QARI quality checklist [47]; and b) the American Association of Critical Care Nursing levels of evidence [48] (Supplement 5).

Although none of the included records disclosed explicit descriptions of ML competencies or an explicit definition of ML, they all provided features of ML's concept. Eventually, during three interactive sessions and using visual materials (cards with quotations, representing codes), we performed axial coding, and iteratively composed sets of interrelating codes, categorizing the 208 coded fragments into 14 competence themes (Table 6).

Table 3. In- and exclusion criteria for literature selection

Inclusion criteria	Exclusion criteria
• Concerns or has generalizable relevance to Dutch medical sector • Relates to the 'leadership' concept (involving behavior / personality traits / attitude / roles / tasks; not just related to financial or organizational structures or management contexts)	• Individual patient care* • Clinical work* • ML only in Conclusion or Discussion sections • Evaluation of cost-effectiveness of therapies • Non-Dutch context related studies • Publication date < 2004

*Not explicating ML or related concepts

Table 4a Characteristics of the included 'white' literature

1st author, publication year (nationality) (category*)	Article type / Method	Objective	Focus	Relevant findings
1. Fleuren, 2004[102] (Dutch)(1)	Literature study and Delphi consultation	Validate determinants of innovations with Dutch implementation experts	Innovations in large healthcare systems	Impact of opinion-leadership on innovation
2. Bloemen, 2005[103] (Dutch)(4)	Model development and evaluation; mixed methods	Study enabling factors and barriers for implementation transmural care in a Dutch region	Transmural care model implementation	Individual professional's (eagerness for) learning knowledge, skills and competencies for transmural care
3. Scholten, 2005[104] (Dutch)(3)	Mixed methods: document analysis and semi-open interviews	Study of executives' and medical staff's role in medical governance in Dutch hospitals	Policy implementation and effects of collective counteractivities of physicians	Challenges of and role of physicians in 'medical governance' in hospitals
4. Prince, 2005[105] (Dutch)(2)	18 months post-graduate evaluation of problem-based learning (PBL) re. general competencies	Compare PBL versus non-PBL among Dutch junior doctors	General educational competencies	PBL possibly preferable for some competencies
5. Van Raak, 2008[106] (Dutch)(4)	Case study; mixed methods	Study routines and cooperation in Dutch regional integrated care	Disparate matches between professional routines	(Transformational) leadership can facilitate routine divergence
6. Duckers, 2009[107] (Dutch)(1)	Multilevel analysis (physician data)	Study effect of leadership on participation in improvement programs	Leadership climate influencing (physician) engagement in innovation Dutch hospitals	Importance of leadership visibility and minimizing ambiguity on leadership intentions
7. Klopper, 2009[108] (Dutch)(3)	Mixed methods	Study of relative status, power, and goal incompatibility	Image Theory in Dutch physician-manager relationship	Need for physicians to understand management perspective
8. Berkenbosch 2011[109] (Dutch)(2)	Questionnaire	Study of residents' perceptions and understanding of management skills and knowledge	Management competency training for Dutch physicians	Management competency training for junior physicians needs improvement
9. Cramm, 2011[110] (Dutch)(4)	Validity and reliability (psychometric) testing	Validate Partnership Self-Assessment Tool (PSAT) in Dutch chronic care	Professional partnership synergy in disease management	Leadership competencies influence partnership functioning
10. Klopper, 2011[111] (Dutch)(3)	Semi-structured interviews	Study on influence of Dutch manager-physician and managers cooperation on hospital performance	Intergroup conflict theory and manager-physician cooperation	Medical-management culture influence, intra-hospital cooperation and performance

11. Schreuder, 2011[112] (Dutch)(5)	Cross-sectional study	Investigation of leadership-sickness absence relationship	Leadership styles and sickness absence in Dutch healthcare	Relationship-oriented leadership styles can facilitate efficiency and quality
12. Teunissen, 2011[113] (Dutch)(2)	Medical education related commentary	Editorial comment on publications	Transition from ‘learning’ to ‘performing’	Metacognitive skills can facilitate entry into medical practice
13. Van der Lee, 2011[114] (Dutch)(2)	Inductive analysis of semi-structured open-ended questionnaire	To test content validity of CanMEDS framework	Dutch physicians’ vision of future generic medical competencies	Curriculum design could benefit from (strategically planned) external influences
14. Berben, 2012[115] (Dutch)(4)	Qualitative: focus groups and interviews	Identification of determinants in pain management in Dutch emergency care	Changing protocols in care chains	(Physician) role modelling can facilitate professional communication and attitude
15. Buljac, 2012[116] (Dutch)(1)	Cross-sectional survey in Dutch long-term care	Impact of team member stability, team coaching, and error orientation on team safety and innovation	Team safety and innovation in long-term care teams	(Team) coaching leadership styles is related to stability and safety of care
16. Ovretveit, 2012[117] (Swedish/Dutch)(1)	Mixed-methods comparison	Evaluation of large-scale Dutch health and social care improvement programs	Success of national improvement initiatives	Clinical championing affects implementation success of improvement programs
17. Smith, 2012[118] (international)(3)	Structured survey	Governance arrangements in leadership and healthcare in developed countries	Leadership, governance and accountability in health systems	Awareness raising of national healthcare priority setting and performance indicators and monitoring
18. Van Daele, 2012[45] (Flemish)(3)	Symposium abstract	Conflicting priorities within responsibilities of clinical leaders, vis-a-vis management, staff and patients	Role of clinical department leaders	Conflicting priorities in clinical leadership and management roles can create vulnerability
19. Aij, 2013[119] (Dutch)(1)	Semi-structured, in-depth interviews in Dutch hospitals	Determinants of lean implementation from a leadership perspective	Lean improvement implementation	Leadership (competencies like) role modelling, visibility and vision across multidisciplinary shared learning facilitates lean implementation
20. Berkenbosch 2013[120] (Dutch)(2)	Online survey to Dutch medical specialists	Need for management training among Dutch residents	Manager competency training to residents	Management competency education should entail leadership skills
21. Cramm, 2013a[121] (Dutch)(1)	Cross-sectional survey in Dutch long-term care	Investigation of partnership synergy during innovations	Sustainability of innovations in community care settings	Leadership competencies, in relation to ‘boundary spanning’, benefit sustainability of innovations

22. Cramm, 2013b[122] (Dutch)(5)	Cross-sectional survey in Dutch long-term care	Organizational characteristics related to employee solidarity	Effect of employee solidarity on effectiveness and efficiency	Transformational leadership styles enhance employee solidarity
23. Elshout, 2013[123] (Dutch)(5)	Mixed methods design: interviews and document study	Investigation of association between leadership style, absenteeism, and employee satisfaction in mental health care institutions	Leadership style, employee satisfaction and absenteeism	Transformational leadership benefits employee satisfaction and absenteeism
24. Huis, 2013[124] (Dutch)(1)	Process evaluation of a randomized controlled trial	Association between hand hygiene improvement strategies and compliance	Quality improvement strategies	Effects of team leadership and role modelling on hygiene compliance
25. Ijkema, 2013[125] (Dutch)(1)	Semi-structured interviews in Dutch hospitals	Identification of determinants for successful implementation improvement initiative	Implementation of complex multi-component improvement programs	Importance of effective leadership in project management
26. Witman, 2013[126] (Dutch)(2)	Descriptive case study	Report of a pilot study	Professional identity and education in reflective practice	Reflection on practices: Balancing between conflicting responsibilities

*Category: (1) improvement and innovation; (2) training and education; (3) administration and policy issues; (4) integrated care and multidisciplinary disease management; and (5) human resources.

Table 4b. Characteristics included in the 'grey' literature

Record type	*Total of records*	*%*
1. Online web pages	11	26.8%
2. Opinion article	6	14.6%
3. Journalistic article	6	14.6%
4. Professional association paper / report	4	9.8%
5. Thesis (MSc or PhD)	4	9.8%
6. Professional journal (not indexed)	3	7.3%
7. Book chapter	2	4.9%
8. Essay	2	4.9%
9. Policy (research) report	2	4.9%
10. Healthcare organization report	1	2.4%
Total records	41	100.0%

Table 6. Medical leadership themes from axial coding of literature

Theme		Total coded fragments	Percentage
1.	Collaboration	37	17.9%
2.	Coach and guide	31	15.0%
3.	Personal development	26	12.6%
4.	Organize	16	7.7%
5.	Quality improvement	15	7.2%
6.	Role modelling and visibility	14	6.8%
7.	Responsibility & decision making	12	5.8%
8.	Entrepreneurship	11	5.3%
9.	Vision	11	5.3%
10.	Resources management	9	4.3%
11.	Integrity	7	3.4%
12.	Managerial / governance	7	3.4%
13.	Patient centered	7	3.4%
14.	Communication	4	1.9%
Total fragments white and grey literature		**208**	**100.0%**

Field interviews

Semi-structured explorative interviews were held [49]. Thirty-five persons were invited, representing two stakeholder groups (Table 7); 33 persons agreed to participate in the interviews (2 interviews were discarded: see below). The first group comprised Dutch medical professionals (n=21) across the practice domains of hospital, primary, public health and social care, including three medical students. These interviewees were identified from various networks linked to the 14 researchers, including the PML member data base. The second group encompassed (n=10) non-medical interviewees from: allied healthcare professions; healthcare management; the Dutch Patient Federation and KNMG. These interviewees were selected by contacting the noted organizations which provided two representatives each. Eligibility for inviting interviewees was based on creating a balanced heterogeneity in medical practice domains (first group), and other stakeholders in Dutch healthcare (second group). None of the interviewees had been involved specifically in prior (national) ML development activities or related research.

An open-ended questions' protocol was made after studying the extant literature and reports on existing ML frameworks [e.g.: 5; 19; 50; 51; 52] (Supplement 6). To enhance the interviewers' neutral position towards interview topics, and to minimize subjectivity (e.g., 'Heisenberg Effect') [53], all (nine) researchers who performed the interviews were briefed, using detailed instructions. Interviews were conducted preferably face-to-face, in a quiet place to diminish disturbances, recorded and transcribed verbatim (anonymized) [39, 53]. The interviewees' consent to use the interview's anonymized information for our study was provided before the start of each interview. All interviews lasted between 40 and 75 minutes; six interviews (23%) were held via telephone or Skype™. Two interviews were discarded (recording malfunctioning) and two were cancelled due to logistics, resulting in 31 interviews for analysis, thus remaining within recommended boundaries [54].

Interview transcript analysis involved semi-open coding with analytic software (ATLAS.ti, Scientific Software Development GmbH, 2012). Three researchers developed an initial coding list of 47 labels by independently screening a randomly selected sample of three transcripts, and subsequent discussions. Then, the list was tested by individually coding a fourth randomly selected transcript, revealing a satisfactory 90% inter-coder correspondence and resulting in two new labels. Hereafter, six researchers independently coded all the remaining transcripts in pairs, before openly discussing the results in pairs. After coding interview number 29, no new labels were identified, indicating 'saturation'

[55]. 1,396 interview fragments were digitally collected and categorized over 67 distinct labels. Finally, on applying axial coding during a final researchers' meeting all 67 labels were thematically distributed into 9 distinct overarching themes (Table 8).

Table 7. Characteristics interviews participants

Medical Interviewees	N=21	Non-Medical Interviewees	N=10
% Male	57.1%	% Male	70%
% Female	42.9%	% Female	30%
Average age	42.7 yrs.	Average age	51.2 yrs.
Hospital care	N=6	Para-medical	N=2
• Average age	35.5 yrs.	• Average age	47.5 yrs.
• % male	50%	• % male	0%
• % female	50%	• % female	100%
Primary care	N=6	Patient association representatives	N=2
• Average age	49.5 yrs.	• Average age	53.5 yrs.
• % male	53.3%	• % male	50%
• % female	16.7%	• % female	50%
Social care	N=6	Hospital administrators	N=2
• Average age	51.6 yrs.	• Average age	42.5 yrs.
• % male	66.6%	• % male	100%
• % female	33.3%	• % female	0%
Medical students	N=3	Managers	N=2
• Average age	25.6 yrs.	• Average age	51.5 yrs.
• % male	0%	• % male	100%
• % female	100%	• % female	0%
		Professional association representatives	N=2
		• Average age	61.0 yrs.
		• % male	100%
		• % female	0%

Table 8. Medical leadership themes from axial coding of interviews

Theme	Total coded fragments	Percentage
1. Collaborate	362	25.9%
2. Organize	273	19.6%
3. Coaching	145	10.4%
4. Self-reflection	137	9.8%
5. Responsibility	120	8.6%
6. Future perspective	108	7.7%
7. Quality	105	7.5%
8. Decision making	90	6.4%
9. Societal contract	56	4.0%
	1,396	100.0%

Synthesis Version 0.1

The literature synthesis and interviews were guided by Grounded Theory [34, 46, 56]. On discussing the initial analysis of the results, we decided to value the coded data from the literature and interviews as equals, and did not discriminate on, for example, the coding frequency. Then, while iteratively discussing the intermediate results during three sessions, we combined all the identified categories and themes into more homogeneous interpretable thematic groups. Next, based on this new collection of categories and their underlying content (i.e., coded fragments), an initial conceptual version of the framework was drafted by one researcher (WK). This was done to assure that all the themes identified from both the literature and interviews were accounted for as well as retrievable in the text. Subsequently, based on the initial draft, a version, the 0.1 version of the DML framework was designed by a subgroup of five researchers after a process of iterative discussing and intermittent editing of successive versions of the initial draft. During this process, whilst continuously consulting the original data, the researchers documented their comments and issues using online shared Excel™ forms for cross-checking.

Parallel to this, another subgroup systematically analyzed all the included literature and transcripts, selecting relevant fragments to compose an abstract definition of the ML concept, using analytic software (ATLAS.ti™). After individually coding fragments of components describing ML, its concept, or distinct competencies, three of the core researchers reached a consensus on the pre-final ML definition.

International Comparison

To validate completeness and to search for relevant (e.g., inter-cultural) differences, a subgroup reviewed foreign ML frameworks [e.g., 3, 18, 50, 57, 58], and provided their findings to the core group. Although this comparison did not reveal new ML-related themes or domains, it aided the researchers with more nuances to word the resulting 0.2 version, which was then used for face-validity testing.

Validation of Version 0.2

Face-validity testing of version 0.2 of the DML framework was done through an online survey and three FG discussions. After an open invitation to all PML members (February 2015), fifty-two persons (comprising approximately 25% of PML's membership) volunteered to participate in a FG. Based on the availability for the planned dates, forty-two were invited, and eventually twenty-seven participated (35.7%, due to no-shows or late cancellations). Prior to each session, all participants received, per e-mail, version 0.2 of the DML framework and a concise agenda of the FG session. One researcher facilitated the sessions (WK), using a topic list, by following a loose interactive structure, thereby allowing ample discussion; one researcher observed and took notes. Consent was collected from the participants at the start of each session, which lasted between 110 minutes to two hours and was recorded and transcribed verbatim (anonymized). Notes were compared during the research debriefing immediately after each session [42].

An online survey (SurveyMonkey™) was created to validate the 0.2 DML framework version, including the definition for ML, using a 5-point Likert scale as well as open questions [58]. The survey was sent to 142 individuals, including: PML members who had applied for FGs (n=52); past interviewees (n=32) ('member check' [59]); and a convenience sample of other PML members (n=68) (Table 8).

The survey respondents (n=82) represented various professional domains: family practitioners (32.5%); medical specialists (21.3%); non-clinical respondents (management; patient and professional associations; etc.) (27.5%); and medical students and interns (18.8%) (response rate: 65%; female-male ratio: 30/70%; average age: 40 years). The survey involved rating all the DML framework (version 0.2) domains in terms of recognition of the relevant value of the current practice (6). Respondents also offered written feedback on other (open) questions. Survey outcomes were stored on worksheets (Microsoft Excel™) and analyzed using SPSS™.

Table 8. Response validity survey (n=82)

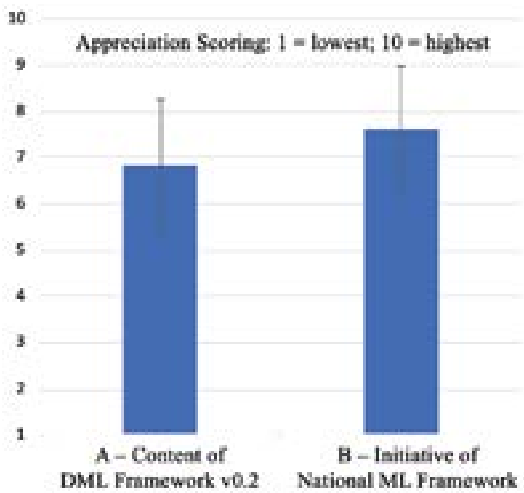
Response group	Invited individuals	Number of Respondents	Response rate (%)
Focus group #1	10	8	80.0%
Focus group #2	15	14	93.3%
Focus group #3	17	10	58.8%
Interviewees	32*	12	37.5%
PML members	68	38	55.9%
Total	**142**	**82**	**65.1%**

*Details of one interviewee were irretrievable.

English Translation

To ensure cultural integrity after completing version 1.0 (see Results section), four researchers took a three-pronged approach to translate the final 1.0 DML framework version into English. This comprised various sessions based on: (1) professional translation services (NEN-EN 15038 certified); (2) topical-expert translation; and (3) backward translation [60] (Supplement 1).

Figure 4. Respondents' average appreciation and SD of: (A) DML framework (v0.2) and (B) initiative national ML framework development (n=82)



RESULTS

The foregoing details the various phases and activities during the framework's development. Below we elaborate on the resulting 1.0 DML framework.

Final Version

The framework's final version used feedback from testing of version 0.2. The analysis of FG transcripts and the survey data did not provide new elements of ML, indicating a relatively high level of completeness. Yet, FG transcripts and survey data revealed that version 0.2 was not seen as completely sufficient. Survey respondents appreciated the initiative of creating a national framework with a relatively satisfactory score: 7.6/10 (SD 1.37) (Figure 4). Correspondingly, the perceived relevance criteria scores of the 12 ML competency domains were rated relatively high in the surveys (Figure 5), concurring with notions found in the FG transcripts. However, the content of version 0.2 was rated slightly lower (6.8/10; SD 1.42). Also, the survey respondents described the content as overly 'wordy' and long, which concurred with the descriptions in the FG transcripts. Thus, it was concluded that there was a need for improvement in the usability of version 0.2 in terms of: conciseness; clarity; and readability.

Face-validity concerns instigated a final round of textual editing of version 0.2. Superfluous and repetitive items were removed. Version 0.2 was refined to a more concise and less abstract version. It was shortened from 1890 to 1290 words, and competency items per domain were reduced by nearly 60% (from an average of 7 to 4 items per domain). The result was version 1.0.

Eventually, based on selective individual coding, during a final consensus session, the core group members constructed a graphical representation of any interrelations between the domains and three overarching dimensions: 'Me'; 'Others'; and 'Society' [61]. The final version consisted of 12 domains, each entailing 4 distinct competencies and a compact ML definition (Supplement 1) (Figure 4).

Figure 5. Face validity scores (mean and SD) of the 12 ML domains of the DML framework v0.2 (n=82 responders)

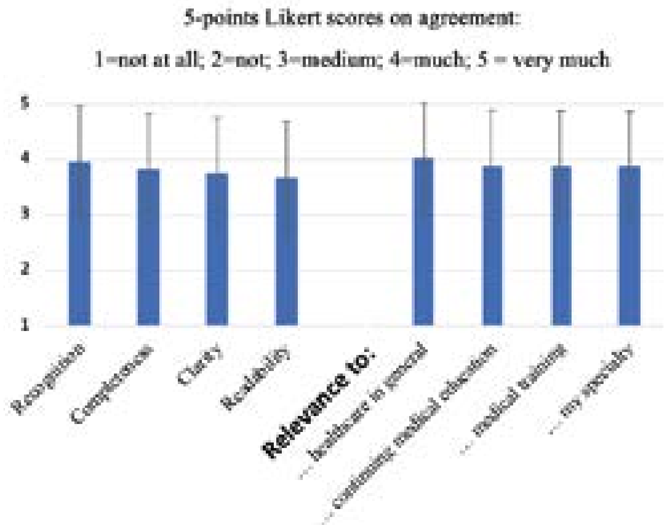
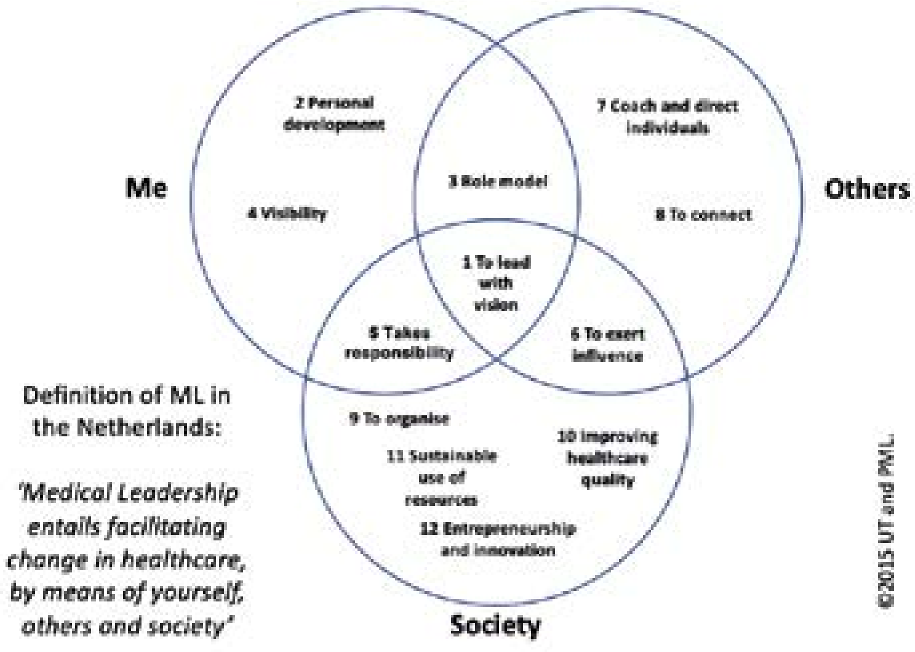


Figure 6. DML Framework v1.0: Dimensions, competency domains and definition



DISCUSSION

In this section, we reflect on our findings in the face of current scholarly understandings. First, we describe, from our frameworks' perspective, the changing nature of 'the' physician. Next, we reflect on possible uses of our study's results, and then discuss the study's strengths and limitations. We close with suggestions for related future research.

The 21st Century Physician

The three dimensions encompassing the 12 ML domains and their competences (Figure 6) correspond with extant literature on the re-professionalization of the medical profession.

Various managerial types of activities that are enshrined in the competencies represented in the 'Society' domain, have expeditiously become part of most physicians' daily activities. These also include expectations relating to physicians' active involvement in healthcare quality, safety, innovation and sustainability [4, 62, 63]. Unsurprisingly, the increased hybridity in the subsequent complexity of physician's work, allegedly cannibalizing on pure clinical work, patient-physician time, as well as physician's well-being, is often disputed and met with reluctance [64, 65].

The framework's dimension 'Others' embodies the paradigmatic shift in physicians' professional positions. Enhanced by a significant influx of information and communication technologies, and by the growing urgency to function within complex, collaborative networks that span pre-existing professional and other boundaries, physicians' interprofessional competences are more relevant than ever before [66]. Hence, physicians are increasingly being seen as agents of change:

beyond healthcare's historical professional silos. 'Going beyond the silos' is often referred to as vital in resolving wicked problems that arise from disruptive effects of, for example: system reform; integrated care; e-health; artificial intelligence; and robotics [25, 29, 67, 68, 69].

The 'Self' dimension in the framework reflects a rising awareness within the medical community of the significance of physicians' professional self-reflectivity and personal development [64, 65, 70, 71]. The focus on 'soft' skills is relatively new to the medical profession, which is historically educated in more factual-knowledge oriented medical sciences. Conceivably, this type of skills might prove beneficial for physicians' effectiveness by living up to their professional roles in dealing with the complexities in their daily activities.

Practical Implications

For ML discourse and practice

As in other countries, the discourses on integrating physicians' new roles are envisioned to strengthen the 21st Century Dutch healthcare workforce [62]. However, a transformation of existing tacit knowledge into explicit knowledge is needed to allow effective dissemination [24] of the new roles and accompanying norms, values and behavior as well as subsequent novel interprofessional arrangements that accompany healthcare's institutional change. Our findings indicate that not everyone in the Dutch medical profession is rethinking their professional identity. The DML framework holds the promise of a generation of highly collaborative, flexible, patient-centered, complex-system-ready and continuous-improvement-oriented physicians. Some argue this to be a renewal of physicians' decaying social contract with society, or reclamation of their historic authoritarian position [20, 72]. However, strong indications are found of the rise of a 21st century physician who is a medical 'boundary spanner' skilled in: (leading) co-creative, interprofessional collaboration; continuous improvement of quality; affordability; and personal development [65]. These medically trained 'agents of change' might actually help solve 'wicked problems' or 'grand challenges' that represent the unprecedented challenges accompanying healthcare transformation [66]. Such a more servant type of leadership, a new 'golden standard' incorporated in physicians' role [4, 73, 16], concurs with the idea that physicians are also able to take the 'back seat' and enact effective followership [74].

Besides the framework's applicability to institutional or (inter-)professional discussions, the DML framework seems to be ready for use in daily practice [20]. Also, a recent interview-based evaluation (7) revealed its use, varying from structural embedment in a Dutch family medicine residency program, to use during ML training courses, specialist conferences workshops and reflective-practice sessions by medical specialist groups, as well as its application by individual physicians (e.g., for personal development, or for their mentees/students).

For medical education

At best, for now, the Dutch ML framework provides a contextualized (i.e., national) 'leadership lens' for educationalists in refinements of redesigns of curricula, as well as to others offering various Dutch ML training programs, that have been burgeoning in the last decade [75]. In its current version, this generic set of ML competencies, which are closely related to safe and effective services in healthcare, might represent a kind of initial 'cognitive foundation' of ML competency development in the Netherlands. As such, it provides one of several stepping-stones for further elaboration of realizing contemporary Dutch physician's effective ML behavior and enactment [23, 76].

Concurring with others, we suggest that ML competency development might be importantly harbored within the realms of medical socialization processes [131]. Although these are much debated and dynamic fields of expertise, the arrival of a DML framework might be instrumental, for example, in designing (feedback) instruments for (e.g., behavioral) reflective practice on leadership, complementing more cognitive typed pedagogics [18, 77, 89]. Regardless, we are still far from in-depth know-how relating ML and its educational principles, for example, physicians' 'entrustable leadership activities' and associated behaviors (varying from patient-related, organizational, to political activities) [22, 25, 78, 79].

For ML framework development – a transferable route map?
Not much comparison data on how to compose a ML framework was available at the onset of designing our study. Our approach contrasts with more top-down, centrally coordinated national ML designs and implementations in other countries [5, 19, 75]. Rather than following a more political process of assembling various stakeholder groups and organizing national sessions, we chose a community of practice approach in which a dedicated research group analyzed various resources, including data from interviews and FG sessions with representatives of relevant stakeholders [4, 22, 23, 29].

To enhance realistic reflections of opinions and behaviors of healthcare's daily practices, critical and equally motivated practitioners from a CoP (PML) were mustered to join the research group [31, 32: p. 327]. Their independent work, without financial support, we contend, contributed to the group's high degree of autonomy. The long-term commitment of this large group of volunteering practitioners and topic experts was crucial for our goal to avert reproduction of conventional practices. It enabled us to execute a fully independent research group, instead of a 'policy community'. The entire design journey lasted approximately 2.5 years, a period that was characterized by abundant ML related 'knowledge interaction' in the Netherlands, also providing a fruitful 'gestational' phase for the maturing of ML in the field vis-à-vis the actual development of a competency set we named the DML framework version 1.0 [128, 129]. Within and beyond this timeframe, the two more entrenched institutional consortium partners, PML and KNMG, prepared for the framework's 'welcome landing', which contributed to the current appetite for ML across the Netherlands [20]. As a result, we think the approach described here was helpful in circumventing long and winding decision-making processes by having representatives of established institutions and authorities within the healthcare system [5, 29].

However, the question remains whether our approach has been more effective than alternative approaches elsewhere. A 'short cut' alternative to our approach could have been translating an existing framework, such as MLCF or LEADS [3, 18]. This has been done with the latter: the originally Canadian LEADS framework was introduced in New Zealand and Australia [3, 5]. A detailed comparison between various approaches would require further research.

It is conceivable that other approaches, such as more top-down or 'political' types, can be more effective or less demanding. Secondly, access to national typed published sources on ML might vary. In our case, most of the data that was actually used (in terms of coded fragments) did not come from published materials. This brings about our third consideration: cultural differences [80, 130]. Payment structures; (interprofessional) power distances; relational identities; physicians' economic position; national culture and other differences might affect the creation of a national ML framework [64, 80, 81, 82, 130]. Ultimately, those embarking for developing a national ML framework might wisely contemplate such possible factors and consider designing a tailored, hybrid approach, optimally fitting their context.

Strengths and Limitations
First, multiple sources were used for the literature review (snowball searches; topic expert consultation). Despite collecting a rich set of data, the uncharted character of ML was reflected in the absence of explicit definitions of the concept or related competencies in the Dutch literature. Our efforts to create a contemporary national taxonomy of a widely acknowledged (but still emerging, hence immature) concept might somehow have impeded our literature searches: through the absence of widely used and

homogeneous terminology as well as a relative lack of publications eligible for analysis. Regarding the quality perspective of included studies in our literature search: ML's newness might have resulted, not surprisingly, in the inclusion of primarily qualitative studies which could not offer any empirical facts yet on the content of ML (Table 4a). Overall, the literature review contributed only to some extent to our work, while the majority of data used to construct the framework came from interviews and FG sessions.

Furthermore, our use of relatively new phrases in the empirical research might have impacted respondents' feedback. Interpretations of ML's meanings tend to vary from person to person. Yet, the fact that neither comparison with other national frameworks nor feedback during FGs and in surveys provided additional elements of ML, corroborates the comprehensiveness of the framework that resulted from the literature review and interviews. Despite the high time-investments in the interviews and surveys, the respondents' participation was entirely voluntary and non-remunerated. Their relatively high degree of willingness to participate is based on a more-than-average interest in the potential of ML, many being PML associates [32]. Notwithstanding physicians' notorious busy and unpredictable work schedules, often resulting in last minute cancellations, no-shows and non-responses, involving larger samples in future studies may benefit a better understanding of physicians' leadership repertoires.

When reflecting on the survey used for face validity testing, it is relevant to note that perceived 'recognition', 'completeness' and 'relevance' of the 0.2 DML framework was high (Figure 5). Some of the responses, however, initiated a substantial shortening of version 0.2, resulting in the final 1.0 version. In our opinion, further work on the framework's validity, could be beneficial. Additional recommended validity-testing approaches include Delphi techniques, for example within various medical specialists' fields [83, 84, 85].

Future Work

Various questions are burgeoning due to the relative infancy of ML, possibly guiding further scholarly questions like: *How is effective ML best learned and trained? To what extent is effective ML related to personal traits, clinical settings, and medical specialties? How should the 'gap' between knowing-when and actually-doing be bridged? Who should teach ML, and when?*

Similar to other novelties or new approaches, the medical profession is more likely to accept changes if based on thoroughly grown evidence. In particular since a ML framework can instill critical reflecting on individual behaviors, it is vital that such frameworks and resulting instruments or tactics meet with highest professional standards. Providing a first generic set of ML competencies, the DML framework 1.0, we think, could impart further endeavoring integration of ML in daily practice as well as education. However, we acknowledge that much more work must be done to enable practical and effective application. Although our work might add to a variety of approaches in designing a national ML framework, more work could help understand which approach under what conditions is most appropriate in a country. Additionally, concurring with previous calls for further research on ML and competency frameworks [86], and reflecting on own research, we propose the following ideas for future research.

Notably, firstly, our framework could use further extensions, such as: 'examples of learning and development opportunities', and vignettes depicting 'examples in practice', such as in early versions of the MLCF in the United Kingdom [18]. Similarly, distinctions between undergraduate, postgraduate and continuing practice could be anticipated, which could instill interesting debate on expectations about ML at physician's various career levels. Desirably, future development of (sufficiently validated) instruments to adequately reflect on actual (micro-)behaviors are welcomed [23, 27, 87, 88, 89]. Prior work suggests that this is feasible [18, 51, 90]. Such advances might help to evolve ML beyond alleged arid and generic "long [wish]-lists of specific competences" [22, 23, 78: p.543].

Relatedly, secondly, effective incorporation of ML in medical education would require more detailed knowledge on what is relevant ('construct-relevant signal'), and what is not ('construct-irrelevant noise'), particularly when measuring or assessing individual ML competencies [23, p: 54]. In the educational perspective, one must take into account: various contextual clinical settings and specialties; physicians' various (clinical, managerial and other) roles; career phases; and variances in their traits and personal interests [23, 90, 91]. Following the statement "the person you are, the leader you are" [3: p.4], we note the importance to consider personal traits, demands and preferences when deliberating about ML competency assessments and development. Also, additional efforts to contextualize and personalize ML education might add to current frameworks becoming 'livelier', hence more appealing to physicians, whilst helping to bridge the current void in discipline-specific ML learning [85, 92].

Thirdly, we advocate more scholarly work on ML's embedment in the dynamics of medical socialization, self-conceptualization, identity creation and mimicry of personas across physicians' life-long phases of learning [93]. Enculturation of physicians relates to the often debated 'hidden curriculum', renowned for significantly contributing to medical professionalization. This might be one of the suiting pedagogic domiciles for ML development [131]. However, to date, medical enculturation has remained relatively understudied, despite various attempts to integrate ML in curricula and training [94]. The same holds for the effects of (leadership) personas and role models in professional identity development [95]. Thus, more theorizing on and understanding of the role of medical (re)professionalization in healthcare transformation could benefit from design types of research [31], ex-post evaluation implementation and practical use of effective ML related interventions [96], as well as from engaging ethnographically inclined researchers. Such studies might also provide more insights into answering this Catch-22 question: *How should ML be taught in the absence of a generation of trainers and mentors adequately educated and trained in ML?*

CONCLUSION

The case study presented in this paper intends to provide an accessible reference for others endeavoring a similar canonical knowledge artefact comprising a national vocabulary on ML as a "focal point for a critical discussion" [24, p. 67] within as well as beyond the medical community in their country [134]. With adequate adaptations, and considering national differences and local aspects, elements of the approaches we have described might be helpful in guiding such efforts [101]. To the best of our knowledge, this paper is the first detailed account of designing a national framework of leadership competencies for physicians, in particularly using a dedicated community of practice [100: p. 310].

As to how ML will evolve in the Netherlands and in other nations, relies on various factors [31, 32]. The high degree of similarities between leadership competency frameworks of various healthcare professions suggest that collective co-leadership among all healthcare professionals is on the rise [29]. Future research, in as well as outside of medicine and medical education, is required to better understand consequences of the coming of age of medical and other types of leadership, and how this can benefit the sustaining of quality and affordability of healthcare's complex interprofessional practices [15].

ENDNOTES

1. PML's mission: "A cultural shift is warranted in which physicians, from the start of medical training, are stimulated to and educated in engaging adequately in medical organizations".
2. Sources entailed: reports; publications and books on ML frameworks in UK, Canada, New Zealand and other sources as well as personal conversations with other scholars and international topic experts (expert names: on request).
3. University of Twente's strategic mission intertwines the realms of 'high tech' and 'human touch', also in pursuit of effective transformation and improvement of healthcare systems.
4. Members were recruited via the PML and UT researchers' networks.
5. Apart from finding some additional nursing leadership articles, niche shaping did not result in additional records.
6. Practical value indicators: 'acknowledgment'; 'completeness'; 'clarity'; 'readability'; and 'relevance' to: (1) healthcare in general; (2) continuing medical education; (3) medical training; and (4) respondent's specialty.
7. Unpublished findings from 21 exploratory interviews with Dutch physicians (2017), two years post-launch of the DML framework version 1.0.

ELECTRONIC SUPPLEMENTARY MATERIALS

1. Supplement 1. https://osf.io/qknds/. PDF file. Dutch Medical Leadership Competency Framework, version 1.0.
2. Supplement 2. https://osf.io/wdjax/. Word file. COREQ.
3. Supplement 3. https://osf.io/b2yeh/. Word file. ENTREQ.
4. Supplement 4. https://osf.io/kh2vx/. Word file. Details on the Summarized Literature Review.
5. Supplement 5. https://osf.io/r8ucj/. Excel file. Coding Data Extraction.
6. Supplement 6. https://osf.io/m93yq/. Word file. Interview Protocol.

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CHAPTER 3

Unlocking Medical Leadership's Potential: A Multi-Level Virtuous Circle?

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- Health system
- Learning organization
- Effectiveness

ABSTRACT

Medical leadership (ML) has been introduced in many countries, promising to support healthcare services improvement and help further system reform through effective leadership behaviours. Despite some evidence of its success, such lofty promises remain unfulfilled. This paper provides a conceptual framework to analyse ML's potential in the context of healthcare's complex, multi-faceted setting. We identify four interrelated levels of analysis, or domains, that influence ML's potential to transform healthcare delivery. These are: the healthcare ecosystem domain; the professional domain; the organizational domain; and individual doctor domain. We discuss the tensions between the various actors working in and across these domains and argue that greater multi-level and multi-stakeholder collaborative working in healthcare is necessary to re-professionalize and transform healthcare ecosystems.

INTRODUCTION

The main focus of this paper is to provide a context-specific 'thinking frame' that helps doctors and the wider healthcare community to understand medical leadership's (ML) potential to impact on the scope and pace of change and innovation in different kinds of healthcare systems. ML has emerged over the last decade as a thoughtful attempt to rethink medical professionalism by doctors and their associations and as a major initiative in reforming and improving healthcare service delivery, quality and safety[1]. However, much of ML's current discourse and practice has focused on individual doctors' competences, guided by the introduction of various national and regional ML competency frameworks and associated ML training programmes[2-4]. Although ML can and does contribute to healthcare transformation and system reform[5-7], we argue its current focus on individual level competences is both limited and limiting because, like traditional leadership theory in general, it risks emphasizing medicine's 'muscular individualism' of competences, traits and behaviours and 'one-size-fits-all prescriptions for development[8]. We further contend that understanding and realising ML's potential warrant a more multi-level and context-specific approach that places ML theory and practice in healthcare's multi-faceted, multi-stakeholder and multi-levelled perspectives.

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So, building on a short critique of the extant literature and contemporary changes in healthcare, we have developed a framework that can help practitioners understand and assess ML's potential impact on transforming different kinds of healthcare systems. Here, we distinguish four levels of analyses, which we call 'domains' (Figure 1). These domains represent most, if not all, relevant stakeholders, the multitude of formal regulations, processes, social interactions, and the habitual ways-of-working that govern how daily life in healthcare is constituted. We argue ML has to be understood as one key element of a healthcare ecosystem, which we define as a combination of political, economic and cultural institutions in a region that support transformative healthcare outcomes, where interdependent actors and factors are coordinated in such a way as to enable productive healthcare innovation. Moreover, since ML mirrors one of society's most esteemed profession's attempts at 're-professionalization', its future success will depend on other healthcare ecosystem actors' capacity to reflect on the(ir) current status quo and seek novel and significant ways forward. Our focus is on the region because within nation states, there are considerable differences on how healthcare and its professions are organized, such as the United Kingdom and United States[9]. Therefore, by developing this framework, we hope to contribute to the theory and practice of healthcare reform. We proceed by locating our framework in recent changes in healthcare, outline its theoretical foundations, and then discuss its nature and potential for analysing and advancing ML's promise.

BACKGROUND TO THE PROBLEM

Medicine's doctor-centred, hierarchically ordered, professional jurisdictions and primarily monodisciplinary education and enculturation have remained relatively unchanged since the times of Hippocrates of Kos[10, 11]. Accordingly, prototypical identity, status and power arrangements between healthcare professions still characterize much of healthcare's daily practices[12]. Recently, however, different types of Western healthcare systems are progressively struggling with economic constraints; complex demands of ageing populations; integration of health and social care; implementing information technologies; and more recent innovations such as artificial intelligence[13]. As a consequence, more hybridized forms of healthcare systems have developed, reflecting shifts in patterns of 'institutional logics'. These logics comprise templates of assumptions, beliefs, rules and practices that guide the interpretations, meanings and actions of various actors in the healthcare field[14-16]. In healthcare, changes have been triggered by shifting combinations of market, bureaucratic and statist (or political-democratic) logics, which have caused doctors to revisit the traditional medical professional logics that have historically governed national and regional systems of healthcare delivery[9, 16-19]. Such hybridization, which has led to a questioning of what it means to be a medical professional in increasingly complex healthcare systems, has been an important driving force behind the emergence of doctors' latest professional guise – that of 'medical leader'[20]. The 'promise' of ML, cloaked in doctors' emerging role as a 'leader', rests in the new non-clinical competencies with which they attempt to answer to growing needs of interdisciplinary (net)working, co-creative innovation and continuous quality improvement[5]. However, doctors are also well-known for their allegiance to professional autonomy, sovereign medical expertise, 'occupational closure', and the 'hidden curriculum' in educating the profession's new members[10, 11, 21, 22]. This status quo bias, often found among senior medical professionals, can and does provide significant opposition to hybridization[11].

Nevertheless, in theory at least, the emergence of ML has the potential to reform or transform national and regional healthcare ecosystems. But this potential will only be realised if there is a contemporaneous and substantial shifting of the status quo of rules and belief systems of other professions (e.g., allied professionals; healthcare management) and those who regulate and govern healthcare systems and organizations (e.g., policy makers; regulatory bodies; boards; professional associations). This seemingly paradoxical and reciprocal 'stand-off' is characteristic of the, often puzzling and wicked, challenges that accompany transformational healthcare change. Questions arise, such as: *(How) will ML change the nature of our healthcare ecosystems?* And, alternatively: *(How) can adequate healthcare ecosystem reform instil adequate ML? Or both?* Our answers to these questions are rooted in the non-linear and unpredictable character of transformational change, which often lies juxtaposed to the more linear and predictable ways of solution-finding that exemplify our bio-medical traditions.

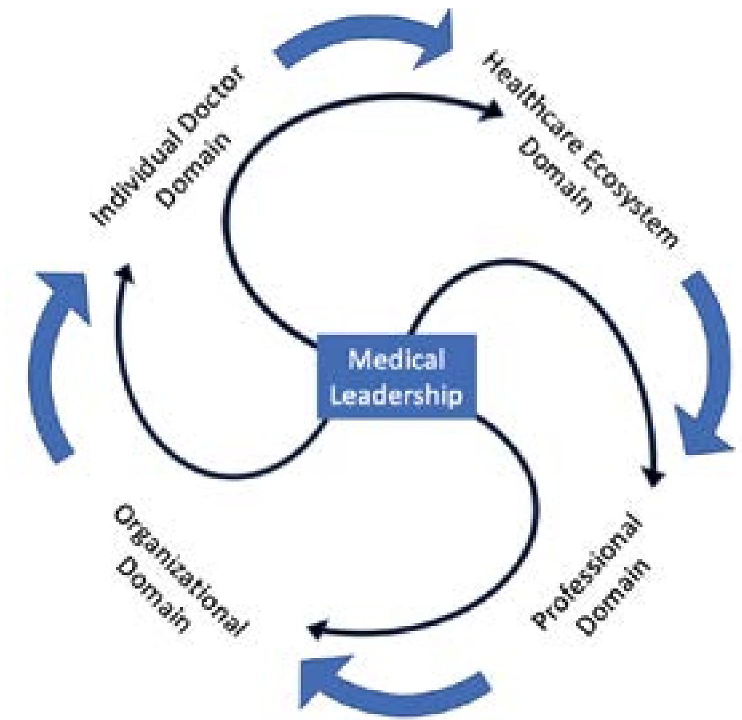
Present-day healthcare ecosystems are the product of different combinations of local actors and local political, economic and cultural factors established over many decades, and in some cases, centuries. Thus, the promise of ML in contributing to healthcare ecosystem reform necessitates a multifaceted, historically and contextually-sensitive approach at various levels to enable sustainable change and shifts in professionals' position and identities[23]. Such reform is also contingent on inter- and intra-system differences, which suggest that one-size-fits-all practices are unlikely to be universally effective. Thus, customizable strategies are probably required to address various local ecosystem contexts. These comprise differences in how healthcare is funded, in the emphasis placed on healthcare domains - e.g., acute care; primary care; mental healthcare; e-health services; public health; and social care - as well as in the differences found among medical specialties. Differences can also be found at the individual level, with doctors exhibiting very different identity motives and personal traits that shape their willingness and ability to accept ecosystem changes[11]. When considering the potential of ML and its development, these distinctions, including those induced by local organizational culture and professional siloes, suggest contextually-specific sets of needs, demands and (re)solutions.

Thus, comprehending the concept of ML as a response to contemporary changes in healthcare ecosystems requires more than just scrutinizing one single profession or viewpoint. Steering transformative processes into advantageous directions (including answering the question of *'How to unlock the potential of ML?'*) warrants a deep understanding of local healthcare ecosystem elements and their dynamics, which we now present in our conceptual framework.

A CONCEPTUAL FRAMEWORK

In developing a conceptual framework, we attempt to simplify healthcare's complexity by drawing on Scott's categorization of organizational life and its links with (re)professionalization[24, 25]. We do so by adopting a representation of four dimensions pointing to different levels of analysis. These four domains reflect the fundamental aspects of a healthcare ecosystem, and jointly represent dynamics of the endless sequence of change in the institutional field of healthcare and its professions such as medicine. These domains are: (1) the healthcare ecosystem domain; (2) the professional domain; (3) the organizational domain; and (4) the individual doctor domain (Figure 1).

Figure 1. Framework for analysing the potential of medical leadership at various institutional levels



These domains constitute the classifications of various institutional, organizational and professional forces responsible for the (re)creation and sustainment of frames of meaning and professional identities that jointly dictate what happens in daily-life[26]. Furthermore, the conceptual framework encompasses the various (and varying) interdependent actors and factors in a healthcare ecosystem. As we will show, the idea of ML interacts with all four dimensions. In the following paragraphs, we elaborate on our framework by describing the four domains, their interrelatedness and relationship with ML. We conclude with an overview of selected practical tactics and approaches that can further ML, and describe their potential impact, and relevance to the discourse of ML (Table 1).

Table 1. Selected practical tactics and approaches in unlocking ML's potential, their anticipated effects and relevance to ML

Domain	Tactics and Approaches	Effects	Relevance to ML
Healthcare Ecosystem	Incentivize more interprofessional performance and value-creation	Co-creative rethinking and execution of interprofessional arrangements	ML enables doctors to effectively co-design and -lead interprofessional practise
	Legislate for inter-sectoral and -organizational collaboration in healthcare delivery and professional education	Intentional agency to span old 'boundaries' and redesign processes fostering patient-centred care	Creation of practice-based 'spaces' for ML learning
	Induce principles of collaborate governance at all levels	Multi-level and homogeneous regulatory and managerial activities that instigate and sustain change and reform	Direct ML's discourse into profitable directions, in contrast to, for example, re-emergence of 'medical dominance'
Professional	Encourage non-medical professions to rethink their professional leadership	Multi-disciplinary contribution to collective 'clinical leadership' paradigm	Medical profession role-models re-professionalization towards shared leadership-based working
	Medical associations focus on renewing medicine's social 'contract' with society	Positioning and empowering medical professionals as ambassadors of transformation	Doctors well-positioned to facilitate and uphold (or resist …) change
	Coincide leadership development of healthcare professions and healthcare managers	Bridging the clinician-management 'gap' and strengthening of wicked problem-solving proficiency	Infusion of non-clinical management perspectives in ML development and vice versa
Organizational	Integrate ML development in organizational development and quality improvement initiatives	Medical engagement enhances success and reduces risk of tribal issues	Interdisciplinary projects provide learning platform for ML
	Invest in inter-professional education and inter-organizational learning	Optimal transition of modern workforce between pre-clinical education and clinical practice	Engraining both doctors' leadership potential and clinical patient-centred focus in patient-pathways
	Invest in research and development of quality directives relating ML training and certification of coaches	Contribution to (current thin) body of evidence for effective ML training and absent quality regulations	(More) evidence-based ML best practices and education
Individual Doctor	Tailor individual ML development activities to, for example, medical specialty or local organization	Augmenting effectiveness and return-on-investment of (often resource-intensive) ML training	Avoid unnecessary or inadequate use of clinical time (demotivating physicians)
	Use ML development portfolio	Adequate focus and monitoring of ML development activities	ML integrated in (continuing) medical education
	Stimulate doctors to identify with new medical professionalism and cultivate their most suitable ML styles	Doctors contribute to their best individual abilities as members of organization and team(s)	ML is not a 'Jack-of-all-trades' concept and is amplified by intrinsic motivation and identity change

The Healthcare Ecosystem Domain

We propose the Healthcare Ecosystem Domain as our framework's first and most 'macro' level of analysis. In this domain, we argue, more collaborative oriented governance regulations and arrangements are imperative to effective healthcare reform, as well as to unlocking ML's potential. Experiences from regions that have successfully legislated for large scale reform show this to be a complex and long-term proposition requiring investments and unconventional approaches in (re)engineering at the more 'macro' healthcare system-level[27, 28]. To expedite a successful transition from fragmented, siloed and mono-specialist processes towards systems of more flexible and fluid networks, various system-level aspects must be coordinated, such as: legislation; funding structures; accountability regulations; quality schemes; and educational programs. In contrast with changes that follow a one-element-at-a-time implementation approach, such multifaceted realignment of various system-level themes fosters a more collective, multi-stakeholder, thus ecosystem-type of reform. Ultimately, an ecosystem-level restructuring also provides a more safe 'landing strip' for various healthcare professions, including medicine, in finding a new and more adequate balance between "soft (trust, collaboration) and hard (financial incentives) levers"[29 p:54]. Without such synchronous adaptation of the various elements at the macro-level, existing organizational and professional arrangements will risk a continuation of a status-quo bias and traditional fragmented ways of working[10]. For example, legislating for adequately incentivizing collaborative avenues of change can empower (or, if necessary, oblige) medical, nursing, allied health professions and managers (and their linked regulatory and policy bodies) to co-create related intra- and interprofessional standards, mechanisms, policies and educational schemes in order to sustainably produce innovative ways of working. These effects signify the interrelatedness between the current ecosystem-level domain and the other three domains, which we describe in the next sections.

Some regions are investing in forms of intentional collective professional identity 're-creation', for example by implementing planned national clinical leadership programs[5]. Other efforts induce interprofessional collaboration by offering comprehensive and locally tailorable interprofessional teamwork curricula (e.g. TeamSTEPPS[30]). Using regional-level endorsed initiatives, governmental agencies encourage local change and institutional entrepreneurship in a non-formative and co-creative way. This also generates and elevates visible 'hot spots' experimenting and role-modelling promising new approaches. Moreover, these tactics support (e.g., regional) directorates in gradually introducing well-evidenced interventions that assist local, field-level change 'champions', in particular doctors enacting effective ML. Such top-down endorsement of bottom-level 'proven' and peer-supported initiatives can be inspirational, in particular to doctors.

Lastly, we believe that doctors are better placed than many other actors to play an important role in leading at the healthcare ecosystem level because of their education and training. Their analytic capabilities, combined with knowledge of health, disease, treatment and care-processes, as well as their subjective position in allegiance creation, provide indispensable capabilities for reconstructing ways of working[25]. However, while having the skill, they may lack the will because their powerful positions and professional socialization can also result in significant status-quo bias decision-making regarding significant reform efforts[11, 21]. This discrepancy embodies one of the most wicked of challenges in system transformation[31] and represents a further point of tension between the system and professional domains, to which we now turn.

The Professional Domain

Healthcare's daily routines are influenced through a continuous establishing and redesigning of professional norms, values, identities and behaviours. These dictate what *should* happen at healthcare's frontlines[24]. The ideas and identities held by professionals, which serve as their prescriptive, evaluative and obligatory requirements for professional social interactions and behaviours, are also influenced significantly by their professional structures and associations. Therefore, we use the Professional Domain as our second level of analysis, since it entails professional moral, rights, privileges and responsibilities that form doctors' daily reality, and comprises how they are educated, enculturated and trained throughout their careers and amidst their peers.

Increasingly, interprofessional practice and education are acknowledged as promising new routes towards a new collaborative professionalism[32, 33]. As a consequence, demands for interprofessional practices prompt redesign of formal as well as informal 'rules of the game' within and between healthcare professions. This includes anticipatory processes to effectively navigate the shifting of roles and responsibilities between professions[34]. Interdisciplinary healthcare teams, for example, incorporate non-hierarchical and non-linear working in their complex and multi-partner settings, through approaches like inclusive interprofessional sense-making and co-creation[16]. Various elements influencing the wished-for re-embedding of modern interprofessional arrangements that accompany these processes reside in this domain[35].

Followership theory, which stresses the relationships between leaders and followers[36], has given rise to more distributed or shared leadership models, resulting in a more inclusive leadership concept affecting all professions[37-39]. With evidence for interprofessional teamwork as a key-determinant for high quality care on the rise, elements that enhance or impede (shared) leadership's effectiveness in and across interdisciplinary teams is increasingly regarded as critical[30, 40]. Thus, it is no surprise that recent ML competency frameworks firmly emphasize doctors' 'soft' competencies aimed at collaborating with others, for example in multidisciplinary teams[41]. Inevitably, there is a growing need for new interprofessional principles and arrangements that exceed ancient mono-disciplinary paradigms in healthcare's education and practice, which have characterized healthcare's archetypical doctor-nurse dyadic nature for centuries[42]. These changes, we argue, require medical professional bodies in particular, but also policymakers and regulators, educational institutions, healthcare organizations and many other bodies to rethink various aspects of 21st Century's healthcare professionalism for the benefit of their pluriform constituencies and the public at large. These proposed changes demonstrate the relatedness between the Healthcare Ecosystem and Professional Domain as well as our next domain reflecting perspectives of healthcare services delivery: the 24/7 challenge of adequately synthesizing various professional activity that constitutes healthcare, scaffolded by appropriate resourcing and management.

The Organizational Domain

In the global pursuit for value-based and integrated care, day-to-day healthcare operations increasingly rely on smooth interdepartmental and organization networking[43]. Also, the quality, timeliness, inclusiveness and safety of contemporary healthcare services are gradually built on more intense interprofessional 'relational coordination' (i.e., sharing values; being respectful and trusting; communicating more accurately, frequently and timeously)[44], while the once widely-separated siloes of social care systems, healthcare organizations, and various community-based services are rushing to deliver on their collective responsibility for citizens' seamless care[43]. This new organizational perspective, focusing on the region where newly-constituted 'service users' (rather than patients) live, work and meet with professionals, digitally or physically, requires a divesting of the old ways of working. Here, ML's explicit focus on more collaborative forms of practice and innovation holds a promise of facilitating such wide-ranging integration. Moreover, doctors are well-positioned as change agents for having "first-hand experience of the work under consideration", being "trusted by fellow-workers (and patients)" and providing "to the organization of work a flexible, immediate, policy-oriented dynamism and pragmatic adaptability"[45 p:87].

However, realizing effective integrated care at an ecosystem level involves dealing with complex transformational change issue and the corresponding "diffuse unreliability, aversion to responsibility, rigid authoritarianism, rule-resistant incompetence and paternalism" associated with it[45 p:87]. A variety of researchers and practitioners have reported on the significance of creating a local receptive context for change as a prerequisite for such reforms[27, 28, 46]. This action decrees wise investments as well as role-modelling effective leadership at all organizational levels, including board, executive, clinical and managerial. Scholars also suggest that organizations and their executives have to devote considerable time and resources for adequate change management and infrastructures to implement new practices[47, 48, 49]. Eventually, organizations, regulators, managers and doctors who consider promoting ML as a cornerstone of forming modern regional care networks, are advised to create learning organizations that "adapt better to rapid environmental change and implement quality improvement practices more quickly"[49 p:287]. Incidentally, such transformative settings also provide excellent practice-based learning opportunities, essential to medical and other leadership development: a two-sided sword of organizations' investments in their 'social capital'[4, 10, 45]. The overarching aim and corresponding expectation is that contemporary top-down endorsed, middle-management enhanced and bottom-up co-created healthcare transformation will encompass improvement of organizational performances in various hard and soft dimensions[50, 51], which also requires individual doctors to have a strong voice in how they are led and how change is navigated. This focus on voice presages our fourth and last domain.

The Individual Doctor Domain

The Individual Doctor Domain echoes Scott's institutional 'cultural-cognitive' dimension of individuals and groups that, often unconsciously, agree upon various social as well as 'unwritten' aspects of their institutional life[24]. It is in this domain, that daily reality is reflected; in other words: what *actually* happens in work life. It is also at this level that doctors are being increasingly challenged to justify their position, status and knowledge sovereignty in healthcare and society. Patients and other stakeholders demand more time and attention, while bureaucratic accountability processes, intensified communication and information exchange within ever expanding interprofessional networks contribute to doctors' fatigue and burn-out[50, 51]. As a result, doctors have responded variously to these pressures, for example, through opposition, reluctance or willing acceptance to change or by taking up hybrid managerial-clinical functions and, ultimately, by incorporating ML in their professional repertoire of competencies and identities[11, 21]. Thus, growing numbers of doctors participate in ML competency trainings, offered at various stages during their careers [18, 37, 52]. Furthermore, new competency frameworks provide them generic taxonomies and a first generation of ML competency assessment tools supports benchmarking and monitoring of their ML proficiency and development efforts[21, 40].

Despite ML's appealing intentions, however, its emergence is accompanied by various forms of resistance and ambiguity at the individual doctor level. First, ML can generate negative emotions among some doctors, because they doubt the motivations of those peers who occupy or aspire to formal leadership positions[21]. Doctors enacting managerial leadership are sometimes seen as 'heretics', 'crossing lines in the sand' or going to the 'dark side'[1, 11]. Additionally, doctors often perceive competency frameworks as utopian, rendering them as super-professionals or as 'Jacks-of-all-trades' and deflecting them from their primary role of providing patient care[53, p1]. Thirdly, many clinicians see ML education as an unwelcome extra burden onto their already overloaded clinical work as well as obligations in continuous education and revalidation. Finally, ML encourages doctors at times to take a 'back seat' or share leadership with other clinical professions[16]. To some doctors these are awkward and unwelcome new propositions, especially among those at later stages in their career[37].

Arguably, the design, planning and delivery of ML training, often hosted by professional associations or 'in house' by healthcare organizations[3, 4, 6, 54], need to reflect on such contestations. These also need to take into account that generic or one-size-fits-all approaches can be inappropriate at the level of individual doctors. To be effective, ML development activities should be adequately tailored to the perspectives of doctors' specialties, varying from clinical setting (e.g., geography; payment structure; clinic size; population), medical specialty, career stage, experiential repertoire, to their individual traits and personal needs and interests. Ultimately, the often relatively time-consuming, hence highly-resourced and expensive ML development activities will gain greater legitimacy when well-aligned with the individual, but also when rooted in high levels of regional healthcare ecosystem appropriateness[6, 54]. Therefore, we reason, ML development at the individual doctor level is importantly informed by professional, organizational and ecosystem-level perspectives, illuminated in the preceding sections.

DISCUSSION

We have argued that doctors can help establish a new discourse of professionalism by role-modelling continuous patient-centeredness, interprofessional value-congruence and allegiance creation[42] and by leading in a co-constructing, inclusive way[37]. More reciprocal interprofessional collaboration can help professions to convene in discussing the abundance of paradoxical issues that characterize current modes of care that see service users as whole people rather than patients to be treated. Despite their historical origins as an elite, sovereign profession with a strong status quo bias, doctors' extended training and distinct patient-centred views render them capable of understanding and addressing contradictory arguments of clinical and managerial colleagues in shared decision-making and as potential innovators in healthcare ecosystems[11, 55]. This potential for ML to innovate helps counter an over-reliance on bio-medically oriented clinical protocols, policies, managerial enforcements and bureaucracies. Rightly positioned, organised and having identity motives consistent with ecosystem change, doctors who are trained in effective ML could trail-blaze more favourable professional ways of healthcare reform[11, 19]. Such ML can produce high degrees of medical engagement, which helps avert the often-disruptive, hence intimidating, changes and tribal reactions that accompany the re-design of interprofessional arrangements and related their logics and jurisdictions. However, doctors also need to be sufficiently supported in rebalancing their extensive patient-focused clinical expertise with such new skills in organizing leadership and improvement in healthcare ecosystems. Therefore, as we have tried to show in our paper, much remains in the hands of others at diverse levels, to facilitate this already overburdened group of medical experts. Ultimately, we contend, unconventional collaboration between the various stakeholders represented in the four domains, can prevent doctors' new cloak of ML from evolving into an undesirable 'Trojan horse' of a professional reclaiming of traditional institutional position, sovereignty and status quo bias.

In this paper we extend the scope of ML beyond individual doctors' training and performance in their relatively new role of 'leader'[2]. Explaining ML from four different, yet interrelated, viewpoints, we provide a framework that helps explain impediments in healthcare ecosystem reform that often sprout from deeply rooted medical professional embeddedness. Moreover, as we exemplified in Table 1, the framework helps identifying (often less-conventional) ways to mitigate those barriers, for example through collaborative, multi-level and multi-stakeholder approaches that overarch existing principles[29, 56].

Our framework is not a universalistic recipe: it is intended as a 'thinking model' for all healthcare's stakeholders to distinguish and rethink their individual, vastly changing, positions and enactments amidst their colleagues in local settings and in regard to other related groups or bodies. Central to this framework, we position the recently-emerged concept of leadership of the medical profession, which we find currently trail-blazing by redefining its professional identity[11]. In doing so, we propose medicine could be seen as role-modelling for other professions' agentic work and stimulating their non-medical colleagues to also courageously start or proceed in exploring their leadership potential. As we have tried to lay out above, those at the highest managerial, political and administrative positions could follow these trails by finding unconventional collaborative ways of governance and management. In return, this could facilitate other actors in the pluralistic field of healthcare, such as educationalists, administrators, legislators, management, directorates, coaches as well as doctors in taking up leadership to co-create well-aligned new ways of providing healthcare to our patients.

CONCLUSIONS

The logics that regulate tomorrows' healthcare are created while we work, re-think and re-create todays' routines. Attempts to steer this eternal process more deliberately are a difficult as well as a responsible task for all involved in healthcare service delivery, governance and management. We acknowledge that health systems and settings vary greatly, which is why we have used the regionally-focused healthcare ecosystems perspective. In so doing, we hope this paper contributes to reform efforts, for example by using our framework to differentiate between the various elements and stakeholders that reflect healthcare's complex, systemic nature. Unlocking the potential of ML, alike many other new concepts that arise during times of transformation, requires bold thinking and acting, daring entering new territories and creating new structures. Moving away from "relatively narrow, single-levelled programmatic change strategies"[49 p:282] towards multi-level and multi-stakeholder ecosystem reform, could offer us leverage for wise creations from which our service users will benefit.

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CHAPTER 4

Enacting Medical Leadership to Address Wicked Problems

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Key Words

- Wicked problems
- Medical leadership
- Institutionalization
- Professionalization
- Medical education

ABSTRACT

This paper argues that although physicians' established ways of working make them excellent clinicians, their education and experience make it difficult for them to address wicked problems. After defining wicked problems and illustrating them within healthcare contexts, we explain why physicians' institutionalized and professionalized ways of working leave them underprepared to address wicked problems. We then describe the emerging concept and frameworks of Medical Leadership (ML) and show how ML training could provide physicians with the skills and abilities they need to enact leadership in collaborative environments. We also explain how ML could help physicians become more comfortable in 'grey-zone decision-making' that is needed to address current challenging problems. Finally, we draw attention to changes that are warranted outside of ML training to bolster its potential: incentivize training and re-regulate top-down, empower the professional pipe-line and create bottom-up opportunities.

INTRODUCTION

Physicians face many challenges as part of their day-to-day professional work. Their clinical skills serve them well in many ways. But when faced with wicked problems they are generally ill-prepared. Moreover, physicians' training and established ways of working can result in physicians unwittingly becoming part of the problem when addressing wicked problems.

Wicked problems are those fundamental, challenging problems that exist within and between social sectors, are not solvable through linear planning or the application of causal models and tools, have no definitive problem formulations or solutions, and are impacted and changed when their intended solutions are implemented[1-3]. Wicked problems are "complex, intractable, open-ended, and unpredictable" such as "global warming, drug abuse, child protection or natural disasters, … [the] safety of nanotechnology or growing numbers of refugees" (see Head & Alford, 2017, for an overview)[3 p.397]. In healthcare, problems related to mental illness, palliative care, healthy ageing, sexual health, and cancer care have all been classified as wicked[4-7].

Because of their nature, addressing wicked problems requires the engagement of many stakeholders, each of whom can hold different, value-laden understandings and favored solutions[1, 8, 9]. As a result, healthcare reform and transformation and change management literatures point to the importance of bringing different stakeholders together to co-creatively reorganize healthcare services and service delivery so that wicked problems are governed and addressed more effectively[5, 10, 11]. Collaborative approaches that change organizing structures and processes can certainly improve our ability to address wicked problems; however, more lateral-type leadership from front-line professionals, such as physicians, is needed to change how day-to-day work is accomplished to better address wicked problems[12].

In this article, we examine how physicians' education, position, practice and approach to decision-making makes them excellent clinicians, but at the same time can inhibit their ability to lead initiatives designed to address wicked problems. We draw attention to the growing medical leadership (ML) movement, which encourages physicians to take training in areas such as human-factors design, organization, innovation, and change, which are not traditionally part of physicians' practice. We then ask and explore the question: *How can ML help to equip physicians to address healthcare's wicked problems and what else is needed*?

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WICKED PROBLEMS IN HEALTHCARE

The concept of wicked problems originated in the policy planning literature[1, 13] to describe social issues that cross sectors and which cannot be understood and addressed in isolation. They are problems whose formulations are often "grounded in value perspectives", meaning that stakeholders hold value-laden understandings of the issues and propose solutions based on these values; consensus across stakeholder groups is unlikely to be achieved by gathering more (e.g., scientific) information[14 p.3]. Because wicked problems are inherently "ill-defined" and imbued with political and value-laden judgments rather than "scientific certitudes", they are "resistant to a clear definition and an agreed solution"[14 p.3]. Furthermore, wicked problems are such that solutions proposed are often associated with better-or-worse options, and the introduction of these 'solutions' leads to outcomes that emerge over time, resulting in new challenges that can impact the problem itself[1].

Jointly, these characteristics make some problems "wicked" as compared to those that are more clearly definable or "tame", and to which "linear" and verifiable solutions can be applied[1 p.160]. Given the characteristics of wicked problems, solutions need to be designed around robust actions that support sustained engagement in ways that are non-committal and that keep future lines of action open[15].

Table 1. Four-dimensional overview of approaches to address wicked problems; traditional ways of working; ML competencies; and selected challenges

1 - Dimension	2 - Approaches to address wicked problems	3 - Traditional ways of working	4 - ML competencies supportive to addressing wicked problems*	5 - Selected challenges to enacting ML in addressing wicked problems
Organization of work and leadership approach	- Cross-jurisdiction and -profession collaboration - Co-creative and inclusive teamwork - Shared and collaborative leadership - Flattened hierarchy and searching together for new ways of working	- Mono-disciplinary, often fragmented (e.g., jurisdictional) orientation - Top-down and hierarchical organization - Pure 'professional' environment - 'Physician-nurse dyad' and 'doctor's orders' paradigms - Medical professional identity linked to 'we are what we do'	- Leading professionals[(a)] - Engage others[(b)(d)] - Develops coalitions[(b)] - Working with others[(c)] - Coach and direct individuals[(e)] - To connect[(e)]	- ML runs counter to physicians' identity, roles, and patient-related activities - Persisting enculturation iterating 'old' norms - Need for (re)balancing physicians' professional autonomy and interprofessional work-relations - Shift required away from delegative, hierarchy-based interactions - Allied professions must learn to 'speak up'
Problem solving and reasoning approach	- Creative thinking and problem solving - Continuously dealing with ambiguities and emergence of (more) uncertainties	- Bio-medical (i.e., linear, criteria-based) reasoning and judgement - Protocolization (e.g., Diagnosis → Treatment → Inference) - 'The solution will resolve the problem' paradigm - Scientific certitude in clinically trialed, verifiable approaches and solutions	- Leading change[(a)] - Leading quality[(a)] - Develops coalitions[(b)] - Achieve outcomes/ results[(b)(d)] - System transformation[(b)] - Improving services/ quality[(c)(e)]	- Creative and 'out-of-the-box' approach atypical for traditional clinical reasoning - Collective problem formulation and negotiation (e.g., time; facilitation) at odds with traditional work - Iterative (re)evaluation and continuous flexibility needed (e.g., 'street level' dynamics) and at odds with traditional work
Accountability orientation	- Solutions involve (quasi-) normative judgements (i.e., solutions have no stopping rules, are untestable and value-laden) - Solutions often unplannable, requiring unpredictable investments	- Focus on clinical/ technical skills - Peer group norms, standards, and regulations - Assessments of technical approach rather than (quasi-)normative judgements - Relatively 'rigid' evidence-based standardization	- Managing services[(c)] - Drives innovation[(d)] - To exert influence[(e)] - To organize[(e)] - Entrepreneurship and innovation[(e)]	- Responsibilities unclear (e.g. when solutions 'fail') - Uneasiness with collective and (quasi-)normative approaches - Legislation/ incentives hamper team- and network-based working (e.g., accountability; payment structures)

Governance paradigm	- Regulators' and executives' more 'hands off' stance - Networked and collaborative governance approaches that bring together stakeholders with different interests, perspectives, and approaches	- Physicians highly autonomous and politically sovereign in controlling own work - Physicians' duties, work scope and standards defined within their own professional associations - Bureaucracy to regulate and monitor	- Leadership in a political context[a] - Leading change[a] - System transformation[b] - Setting direction[c] - Shapes systems[d] - To lead with vision[e]	- Needed shift towards inter-professional learning - Traditions of self-governing restricting new forms of physicians' (non-peer) appraisal

*Competencies in this column are taken from these national ML competencies frameworks: [a]Leadership Competencies for Consultants Denmark[65]; [b]LEADS (Canada)[43]; [c]MLCF (United Kingdom)[66]; [d]Health LEADS Australia[67]; and [e]DMLCF (The Netherlands)[68].

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Ferlie et al., for example, described how networked arrangements could be helpful in addressing wicked problems because networks allow professionals to engage in shared leadership, interprofessional problem-solving, and continuous collaborative change[5, 16]. However, research has revealed that attempts to create networks can foster problems arising from perceptions of lost (or diminished) professional autonomy and resistance to shared forms of governance[5]. This resonates with the notion that addressing wicked problems requires deep knowledge and understanding of embedded social and cultural legacies that impact people's daily interactions. In Table 1 (column 2) we summarize approaches to addressing wicked problems. Throughout this paper, we refer to Table 1 to explain related concepts.

Health issues that could be considered wicked are those that arise not only from physiological (and possibly medically curable) factors, but also from continuously changing environmental, social and organizational factors, and political turbulence from the involvement of multiple parties (e.g., public, voluntary, private, charity, social and medical care) with conflicting values and interests[3].

For example, in health care, cancer care, sexual health, and healthy ageing have all been classified as wicked problems[5]. The wickedness of cancer care is visible in multi-faceted efforts to improve treatment and services. These efforts involve encouraging behavioral change among citizens; corporations (e.g., tobacco, alcohol, food and other commerce); preventive health services (e.g., screening to ensure early diagnosis); and the biomedical research industry, each of which brings different values and belief about cancer and cancer prevention to the fore. Organizations promoting sexual health must deal with stigmatization or isolation of their treatment clinics and potential resource scarcity because their clients' behaviors (e.g., unintended pregnancies, sexual transmitted infections) are deemed improper or inappropriate relative to broader value and belief systems. The aging population challenges health and social systems in many countries to organize more pluriform and aligned care for older citizens. Determining appropriate strategies for elder care can be classified as a wicked problem because living independently in communities stands in contradiction to commonly held negative attitudes toward elderly people, ageist stereotyping, and healthcare systems' traditional focus on "cure and rehabilitation" when various other foci and goals may be more relevant for aged persons[5 p119-120].

Addiction to drugs or alcohol, is another wicked problem shaped by multiple dimensions[3]: the addiction itself (a condition characterized by ineffectiveness of any rational interventions); drug trade (including production and availability); social determinants of health; trauma; and even, some suggest, capitalist society itself[17, 18]. Additionally, from the healthcare perspective, people who are addicted to substances present with a wide array of physical and behavioral concerns. Approaches in advancing care for people coping with addiction, thus, requires attention to social, physical, psycho-emotional, judicial, and other aspects of their lives, and necessitates involvement of diverse professional and social supports[3]. In addition, as is common with wicked problems, some treatment efforts may have negative and unanticipated effects on other efforts.

Finally, Periyakoil classifies palliative care as a wicked problem; she describes a study designed to improve "end-of-life decision making" and "reduce the frequency of mechanically supported, painful, and … prolonged process of dying"[4 p.658). During the study, communication problems among different professions arose and resulted in an increased frequency of aggressive treatments. To (re)solve this problem, nurses were trained in communication to facilitate patient-physician discussion around advanced care planning[4]. This solution then exposed aspects of the approach to palliative care that were "deeply and insidiously rooted in the culture of modern biomedicine"[4 p.658]. Periyakoil's description shows different ideas of what palliative care should look like, how it should be provided, and how standard, linear (biomedical) approaches can fail to address and incorporate patients' ideas and values, even though the study's approach to the provision of palliative care was specifically designed to involve both patients and medical professionals.

ESTABLISHED WAYS OF WORKING

The education, training, and enculturation of physicians and other healthcare professionals produces a life-long imprint on their ways of working, which are often resistant to change, especially in later career stages[19, 20]. Extensive clinical education and training contribute to processes of professional socialization and identity formation that create consequences for professionals' organization of work and leadership approach, problem-solving and reasoning methods, accountability orientation, and governance paradigm[19]. Considering each of these four domains (Table 1, column 1), we describe how they are reflected in physicians' established ways of working (see also: Table 1, column 3).

Organization of Work and Leadership Approach

Despite a variety of ongoing changes and attempts to reform healthcare, ever since Hippocrates of Kos, founder of contemporary Western medicine, healthcare has predominantly been organized in a physician-centric way. Physicians' current ways of working reflect their historical professional status and stance towards others. Physicians, to a high degree, function independently as sovereign experts located at the top of a professional hierarchy vis-a-vis other healthcare providers to apply their distinct medical knowledge to diagnose and solve health problems[21, 22]. With their sovereignty in the art of medicine (i.e., performing medical diagnosis and treatment within their patient-physician relationship) and exclusive knowledge[23], physicians bear the heavy-weight, end-responsibility of the majority of patient-related decisions and processes[14]. As a result, daily medical routines are often tightly connected to a 'doctors' orders' paradigm, which is illustrated in the way physicians delegate work to other professions[5, 21, 24, 25].

Problem-Solving and Reasoning Approach

Medical pre-clinical training and compulsory continuous education produces physicians who are highly skilled in scientifically-oriented problem reasoning and solving approaches. As Abbott (1988) showed, physicians, and other professions approach their day-to-day problem-solving work through a process of diagnosing, treating and inferring, and through decision-making informed by verifiable scientific methods (e.g., blood-tests in well-calibrated labs)[21]. Generally speaking, the practice of medicine relies on these complex but mostly linear processes of collecting information about patients' healthcare concerns, applying clinical evaluation and highly systematized scientific reasoning, investigating treatment options, applying treatment protocols, and monitoring progress. These are all based on standardized, mostly quantitative, clinical parameters[21, 26, 27]. Typically, the 'medical model' suffices to navigate 'critical problems', which demand instant action without time for pondering or procedures (e.g., acute myocardial infarction), and 'tame problems', which can be challenging but are likely to be resolved (e.g., open-heart surgical procedures)[28]. This well-established evidence-based way of doing clinical work informs and creates physicians' professional identity, which is strongly grounded in 'this is how we do things here'[29, 30].

Accountability Orientation and Governance Paradigm

As experts, physicians are taught and trained to make independent judgements about what problems they solve and how. Although physicians are increasingly obligated to respond to bureaucratic rules and regulations, in their professional practice, physicians turn to peers for recognition and evaluation of their work[31, 32]. Importantly, peer-assessment and -evaluation in the medical profession relies on medical colleagues' assessment of appropriate technical expertise while avoiding (quasi-)normative judgements about other's work[33]. From a governance perspective, the medical profession is highly represented and informed by professional associations. At (inter)national levels, these bodies are powerfully involved in establishing legislation and regulation that describe and delineate physicians' professional duties and occupational scope. Moreover, medical associations facilitate the standardization of work among specializations and help physicians organize and control their work and their professional position[31].

A MEDICAL ANTAGONISM?

We argue that physicians' (and other professionals') established ways of working create challenges in their ability to engage with healthcare's wicked problems. We debate that these challenges largely reside in the intertwined trias of physicians' knowledge, position and, ultimately, power.

Physicians' sophisticated, linear and bio-medically evidence-informed approaches to problem-solving and their scientific, clinical methods of diagnosis, reasoning, and treatment[21] lies in juxtaposition with the more experimental, emergent, and action-oriented approaches advocated for navigating wicked problems[1, 15, 34, 35]. For example, approaches to engaging with wicked problems have been described as 'distributed experimentation' that incorporates robust action and leaves open the option for other approaches and action, which together can result in clumsy types of solutions[15, 36, 37]. In contrast to applying clinical and scientifically derived end-solutions, addressing wicked problems involves steering and coping with solutions that often create new problems[4]. As Kyratsis et al. argue, physicians' deep allegiance to evidence-based medicine might prevent other potentially valuable, credible and relevant evidence and viewpoints from being considered, including the "experience, personal knowledge and expertise, perspectives and preferences of stakeholders, policy mandates and endorsement, and evidence from the local context"[38 pXXIV]. Unlike conventional medical problem-solving, wicked problems are not best addressed by applying a 'technology of guidelines' or through a common frame of reference[5]. Instead, their 'clumsy' solutions often lie in a collective approach and a stance of 'let's just start, try and see', which in many cases contradicts with medicine's most prominent paradigm of '*primum non nocere'* ('first do no harm').

Physicians' clinical work orientation, problem-solving, and sovereignty are deeply engrained, even taken-for-granted, and healthcare's widespread physician-centric practices and routines can be relatively impermeable to change[25]. Societal level norms and belief systems, as well, affirm physicians' unique position, placing them as unimpeachable, all-knowing healers in a 'doctor-knows-best' certitude. Additionally, the predominantly medically-controlled, evidence-based paradigm that dominates much of healthcare's contemporary practices, guidelines and regulations reinforces the 'medical model', which contributes even more to constituting its owners' (i.e., physicians') powerful position, also mirrored in their exclusive 'license to treat' by law: only physicians are authorized to 'perform' medicine. Consequently, in contrast with, for example, the nursing profession, physicians typically have more access to authoritative discourse on diagnosis and treatment[39]. This knowledge-position-power nexus governs many of healthcare's social relationships and work processes and has positioned professions that 'own' certain knowledge areas as ruling over other areas, for example: psychiatry over mental care; public health over preventive health[5]. Although more inclusive and collective ways of working, alternating between leading and following, and at times leading from 'back seat' positions[30], could improve physicians' engagement with wicked problems, they are very likely to challenge physicians' unique and powerful professional position, autonomy and self-regulation[40].

MEDICAL LEADERSHIP AND WICKED PROBLEMS

Recently, the medical profession has started to incorporate leadership competencies aimed at enabling physicians' to become leaders in health system transformation and change[41]. Several countries now have national-level ML competency frameworks that describe new non-clinical skill sets recommended for physicians including interpersonal and teamwork skills; organization and management skills; quality and innovation skills; and skills that encourage co-creation and entrepreneurship[42]. ML training programs endeavor to bolster physicians to become more proficient professionals, beyond their roles as healers[40], enacting leadership qualities that foster engagement between multi-disciplinary professionals in collaborative practice and transformation[42-45]. The swelling number of ML training opportunities (in pre-clinical and post-graduate education) indicates a growing interest among physicians and their associations, as well as among administrators, policymakers and educators[44, 46, 47]. Meanwhile, a steadily increasing body of evidence denotes ML's beneficial effects on, for example, quality and safety, sustainability of innovations, and employee well-being[42, 48].

Scrutinizing its discourse, we suggest that ML's emergence holds relevance for physicians' (potential) leadership role in addressing healthcare's wicked problems. Moreover, it signifies physicians' intentions in "opening-up" and exposing themselves more to others, in particular in their roles as boundary spanners[35, 49 p116, 50]. Building on the content of five national ML competency frameworks (Table 1, column 4) we illustrate how various ML competencies are supportive of approaches needed in navigating wicked problems. For example: physicians enacting ML through 'leading professionals', 'engaging others' and 'developing coalitions' should contribute to high(er) levels of trust and relational coordination and the emergence of networks among pluriform groups, which should help navigate wicked problems through collaboration and reciprocity in collective decision-making[5, 51, 52] (see: Table 1, column 2). Enhanced interconnectedness between physicians and others is also likely to be further advanced through ML competencies, such as: 'self-reflectiveness and self-development'; 'personal leadership'; 'demonstrating personal qualities'; and 'personal development' (Table 1, column 4).

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However, we argue that despite such promising notions, ML's potential may be challenged because of the difficulty associated with changing some of physicians' established ways of working, as we described earlier. Although ML training is a positive and encouraging step, it alone is unlikely to easily facilitate change in physicians' behaviors and daily practices[35]. In Table 1, column 5, we distinguish the challenges that may continue to limit physicians' ability to engage with wicked problems, even as they build competencies in ML.

BOLSTERING MEDICAL LEADERSHIP'S POTENTIAL

We now draw attention to additional supports that hold promise to bolster ML's potential. We recognize that these supports may not be needed to enable some physicians' enactment of ML competencies in addressing wicked problems. However, we believe that these supports will encourage broader attention to the importance of ML competencies and will help establish new, beneficial practices in contemporary clinical work in order to effectively address wicked problems.

Incentivize and Re-Regulate top-Down

Existing professional jurisdictions and payment schemes, rooted in system-level directives and legislation, tend to incentivize the status quo of hierarchical and fragmented care, thus disenfranchising the potential effects of ML in addressing wicked problems. We argue that a re-thinking and re-designing of legislation and regulation on financing (i.e., professional compensation), professional jurisdictions and accountabilities could help reduce perverse triggers that sustain established ways of working and which hamper the creation of new ways to address wicked problems[35, 53]. Altered payment and auditing schemes, for example, could open avenues to invest in ML training and certification. However, reworking of incentives and regulations must be conducted with deliberation of the values and beliefs that underpin physicians' and other professions' practice in particular contexts (e.g., countries and healthcare systems)[54].

Empower the Professional Pipe-Line

In healthcare professional norms and behaviors are almost endlessly iterated, starting in the early education of physicians and other health and social care professionals. Two alterations in traditional medical education, we argue, would provide opportunities to foster ML in better addressing wicked problems.

First, physicians' primarily uni-discipline educational structures and mentor-apprentice approach inculcate normative traditions that govern physicians' professional identity and behaviors in daily work and interactions[55]. Early and ongoing exposure to multidisciplinary oriented education (including collective problem and solution formulation) holds potential to restructure roles and responsibilities and instill a more open-minded and collaborative approach to problem analysis and decision-making[52, 56-58].

Second, physicians are principally and continuously taught to avoid creative or multidirectional solutions for problems: often wisely, to prevent inaccuracies and errors in clinical work. Inevitably, this challenges their ability to engage with wicked problems. Deliberately expanding physicians' repertoire of reasoning strategies beyond bio-medical rational could invite new ways of thinking and acting[35, 49, 52]. Therefore, we suggest that physicians should be educated more in navigating problems that "require adaptive solutions that are tailored to work in the local setting and need to be implemented by a group of local stakeholders and champions who are well acculturated in their organizational culture"[4 p658]. Incorporating curricular content entailing, for example, plan-do-study-act principles may be one way to help physicians' shift to more iterative and emergent decision-making and treatment approaches[59].

Create Bottom-Up Opportunities

Despite their often limited authority over physicians' work[22, 25, 30, 60-62], managers and administrators may also be able to facilitate and encourage physicians' enactment of ML in the context of wicked problems. In particular, managers could create 'spaces' (e.g., improvement projects) to provide opportunities for physicians to employ principles of ML and engaging with other professionals to experiment with collaborative approaches based on different problem formulations[24].

Managers and clinical professionals could find ways to protect such spaces from reiterating norms that govern status quo and to work through the conflicts and tensions that can arise when different professionals collaborate to develop creative solutions[22, 35, 61]. In these spaces, management could consider applying a "hands-off" approach and avoid intervening quickly with controlling measures which have the potential to reinforce interprofessional differentiation even as they facilitate the emergence of different ideas and problem formulations[4, 5, 7 p.221]. Finally, managers and leaders could also encourage inter-organizational learning and networking, and could link to the efforts of educational institutions, professional associations, and legislators/regulators to scaffold local efforts to macro forces, ultimately to help prevent professionals from falling back into old habits.

CONCLUSION

Finding new ways to approach wicked problems in healthcare is important and requires physicians' involvement. In this paper, we drew attention to physicians' established ways of working and showed how these create significant challenges for physicians' meaningful engagement with wicked problems. We also showed that emerging ML frameworks emphasize physicians' potential to develop competencies to help them collaborate and engage with others in the areas of coaching, continuous improving, and leading for innovation and change. National ML frameworks point to physicians' beneficial contributions to addressing wicked problems.

Additionally, however, enabling, incentivizing, and supporting physicians through different governance models, new educational formats, and organizational support would bolster the promise of ML and could reinforce physicians' ability to become effective partners in the multidisciplinary and cross-sectoral problem solving needed to address wicked problems.

We recognize that such changes require shifts in not only physicians' but other healthcare professionals' also deeply institutionalized ways of working. Nursing and allied health professionals' similarly enshrined ways of working, which include following 'doctors' orders', contribute to the perpetuation of physician-centeredness in health care[63]. With adequate supports, wicked problems such as those mentioned in this paper, as well as those that may arise on the horizon, such as robotics and artificial intelligence[64], must be engaged with collaboratively and flexibly by all. Ultimately, significant change relies on all actors, including professionals, managers, legislators, patients and, eventually, society-at-large, redesigning their views and values regarding how our healthcare services are created and delivered.

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CHAPTER 5

Best Practice Principles of Effective Medical Leadership Training Through Cross-Pollination

Key words

- (Medical) leadership
- Training
- Education
- Competences
- Narrative review
- Physicians

Abbreviations

CME, Continuing Medical Education
ME, Medical Education
ML, Medical Leadership
MLT, Medical Leadership Training
MSF, Multi-Source Feedback
PI, Professional Identity

ABSTRACT

Recently, the novel concept of Medical Leadership (ML) has gained wide-scale attention, accompanied by an abundance of new related training activities. The quality requirements and demanding schedules of medical education (ME) and clinical work warrant well-informed decisions when planning ML Training (MLT). However, high MLT quality and accurate analytic enquiries into training effectiveness are hampered by an absence of standards in training design and delivery.

This essay aims to contribute to improved prudence in ML(T) practices and precision as well as new MLT-relevant research. By placing MLT in the contexts of inter-disciplinary or multi-domain social-scientific theory, practice and research, it sets out to: 1) identify a number of conceptual fundaments (theory); 2) construct a framework of determinants of effective MLT design and delivery (practice); and 3) sketch knowledge gaps and a future-research agenda concerning high-quality MLT.
To attain taxonomical clarity, we first compared three national ML competency frameworks, and mapped out sub-disciplinary domains deemed relevant to MLT. This informed, secondly, our narrative review of relevant pockets of extant literature and reports on state-of-the-art MLT. On that basis, we developed a conceptual framework for effective MLT and formulated propositions.

The first[2] part of the results displays the conceptual 'geography' of MLT, providing taxonomical clarity of ML's meaning and the inter-disciplinary domains that govern MLT, all primarily interlinked by medical professionalization. Secondly, we present guiding principles for MLT, categorized into five dimensions: needs assessment; structure; modes and practices; implementation and delivery; and an evaluation, supported by propositions addressing what, we think, are thought-provoking issues.

Cross-pollinating from five theoretical academic domains and building on MLT-relevant literature, this study highlights that effective MLT is based on paradigms that exceed those of conventional ME and shows how inter-disciplinary collaboration could benefit MLT. More and more effective MLT is fostered by well-designed studies on MLT impact and efficient decision-making on these resource-intensive programs. In this paper, we derive a conceptual standard for MLT practice and input for future research.

[2] This thesis chapter is envisioned to be developed further into two separate peer-reviewed journal articles, with these foci: 1) multi-domain cross-pollination of contemporary MLT, and 2) a conceptual framework for effective MLT design and delivery.

INTRODUCTION

Increasingly, physicians are challenged to collaborate in addressing wicked problems sprouting from, for example, the diversity in patients' needs, the effects of organizational improvements and innovation, and system transformation (Dickson, 2009) (Sargeant, 2009b) (Till et al., 2016) (Keijser et al., 2019, This thesis: Chapter 4). Consequentially, besides their expertise as clinical experts, physicians are increasingly warranted to excel in 'hard' as well as in 'soft' types of organizational competences that foster more collective agency for reform as opposed to the medical dominated, fragmented and siloed nature of contemporary healthcare (Jorm & Parker, 2015) (Institutes of Medicine, 2001) (Mintz & Stoller, 2014) (Shouhed et al., 2019). However, physicians often feel unprepared for and reluctant to engage in non-clinical, organizational leadership activities, jointly represented by the new term 'medical leadership' (ML), and its associated competencies (Quinn & Perelli, 2016) (Hana & Rudebeck, 2011) (Baathe & Norback, 2013) (Spurgeon et al., 2011). Traditionally being clinically task-oriented, the already overcrowded medical curricula and equally demanding continuing medical education (CME) programs have only sparsely focused on ML, resulting in a preparation-practice gap, leaving physicians ill-equipped for leadership activities (Busari et al., 2011) (Till et al., 2017) (Frich et al., 2015) (Warren and Carnall, 2011) (Gunderman, 2009) (Berkenbosch et al., 2013). In this paper we focus on ML and its training (MLT) and report the increasing abundance of fresh approaches (Association of American Medical Colleges, 2012) (Frich et al., 2015) (Hopkins et al., 2018) (Sultan et al., 2019) (Onyura et al., 2019). We present here an essay type of scholarly work that draws from various educational as well as social-scientific domains to contribute to a better understanding of (the allure of) effective ML(T).

Emerging Field

Recent incorporation of the 'leader' role in physician's widely used competency model (i.e., CanMEDS) (Frank et al., 2015), and the arrival of standardized taxonomies for the new concept of ML (Keijser et al., 2019, This thesis: Chapter 1), have contributed to ML being part of the medical profession's current (re)professionalization discourse (McKimm, 2009) (Birden, 2013). Investments in ML development are associated with various positive outcomes, such as organizational performance, quality improvement and innovation, team work and related quality and safety, and healthcare professionals' wellbeing, including prevention of burn-out (West et al., 2015) (Becher & Chassin, 2001) (Porter & Teisberg, 2007) (Weaver et al., 2014) (Majmudar, Jain, Chaudry, & Schwartz, 2010) (Chesluk et al., 2012) (Montgomery 2016) (Husebø & Akerjordet, 2016) (Panagioti et al., 2017) (Onyura et al., 2019). MLT is also subject to controversy and debates resulting in a growing call for more evidence based and practicable activities and approaches (McKimm, 2009) (Frich et al., 2015) (Lees, 2017) (Stringfellow et al., 2015) (Malling et al., 2009) (Onyura et al., 2019). Apprehensions arise because MLT programs are reportedly insufficient as they often lack grounding in theory and solid educational strategies. MLT is often reported as patchy and under-resourced, with a poor evaluation and outcome measurement design, with a prime focus on leader training (opposed to leadership development) and on cognitive domains (and not so much on personal development). Its educational content is often unclear, mostly reflecting the subjective beliefs and assumptions of their designers (West, et al., 2015) (Frich et al., 2014) (Lees, 2017) (Sultan et al., 2019) (Onyura et al., 2019) (Frich et al., 2015) (Webb et al., 2014) (Neeley et al., 2017) (Miller et al., 2018). Some even describe MLTs as "a hodge-podge of classes and lectures lacking coherence, logical progression, comprehensiveness, and relevance" (Satiani et al., 2014, p. 542).

Evidently, MLT is an emerging field, in search of legitimation, adequate formats and efficient approaches, and evidence of its (cost and educational) effectiveness (Ireri et al., 2011) (Leslie et al., 2005). Although some contend that "there is no right or wrong" in MLT approaches (Till et al., 2017, p. 1), we concur with the notion that studies are needed to explore the mechanisms by which MLT can foster physicians' learning and change effectively (Frich et al., 2015) (Onyura et al., 2019), as well as actions to "standardize evaluation of outcomes, leading to better measurement of student competency and a better understanding of best practices" (Webb et al., 2014, p. 1568). In healthcare settings, interventions can fail to specify important content, which not only impedes progress, but also leads to a waste of resources such as research funding (Hoffmann, 2013) (Möhler et al., 2013) (Weaver et al., 2010) (Hariohm et al., 2017). Since leadership training can be resource-intensive (e.g., time; finance), it is high time to focus on the principles of effective MLT design and delivery (Rousseau & McCarthy, 2007) (Salas et al., 2012) (Wakefield et al., 2016).

A new, cross-pollinated domain?

The current paper was inspired by two notions. First, due to its novelty, we argue that the field of ML(T) has not found academic grounding in one distinct, or a set of domains. Moreover, the ML phenomenon, along with the concomitant changes in society and healthcare, brings new conceptual thinking and theorizing, reflected in the various scholarly streams on ML, narrating on topics like its discourse, potential, and the application of a variety of interventions. Assorted types of scholarly reports, embedded in the sciences of Medical Education (ME), Organizational Science/Behavior, various allied social sciences and other domains, provide a pluriform landscape of views and experiences. Typically, these works indicate physicians' new non-clinical roles and their related activities resulting from, as well as contributing to, healthcare system reform (Keijser et al., 2019, This thesis: Chapters 1 and 2). Since these new ML competencies have not been structurally part of physicians' education or training (Busari et al., 2011), we contend that the theories and practices of conventional ME might not suffice as conceptual underpinnings for MLT. Possibly, understanding the theoretical as well as the practical concepts for ML(T) better can be furthered by a cross-pollination, also including non-typical ME domains.

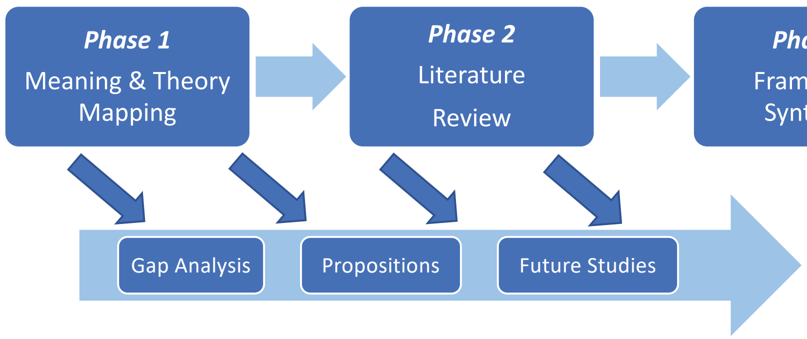
Secondly, we also contend that the contemporary heterogeneity of extant MLT has precluded attempts to answer specific research questions by following exhaustive literature review types of meta-analyses (Cook et al., 1997) (Whittemore & Knafl, 2005) (Gough et al., 2012) (Husebø & Akerjordet, 2016). Decisions on the design or funding of programs that can impact organizational development and performance should be made using substantiated evidence. To date, such research cannot build on a sufficient body of relevant studies with answers to specific questions on (effective!) MLT (Whittemore & Knafl, 2005) (Levac et al., 2010) (Husebø & Akerjordet, 2016).

In response to a need for more clarity or homogeneity and structure in the practice of effective MLT design and delivery, this paper sets out to: 1) identify taxonomical and theoretical concepts that may convey and explain effective ML(T); 2) isolate possible guiding principles for effective MLT design and delivery; and 3) ascertain propositions for a MLT research agenda. The undertaken literature review was guided by the primary question: *What constitutes an effective design and delivery of MLT?* Two sub-questions prepared us in our efforts to distinguish the principles for effective MLT: *How are ML and MLT taxonomically conceptualized?* and *Which theories can inform the design and delivery of effective MLT?* We attempt to address these questions by placing our efforts in three different contexts: theory, practice and research. Following David Day's work (2000), this triadic view denotes the multifaceted circumstances in which MLT is practiced. As to how we converged our assorted forms of enquiries and contexts in order to add knowledge to current thought, research and practice, is explained in the next section.

METHODS

We approached ML and its training in an interdisciplinary social-scientific manner, in search for areas in research and practice that are relevant for ML to progress towards a high(er) quality of related training. The relative scarcity and heterogeneity in the extant studies on MLT (Straus et al., 2013) propelled us to seek a method to review them (Gough et al., 2012) (Thomas et al., 2008) (Oliver et al., 2008). We followed a three-phased approach that involved (Figure 1): mapping of taxonomical and theoretical concepts (Phase 1); a narrative type of literature review (Phase 2); and a synthesis or framework of guiding principles for effective MLT design and delivery (Phase 3).

Figure 1. Schematic representation of the three study phases



Phase 1: Concept Mapping

We explored the conceptual dimensions of ML and MLT by interpreting and configuring a variety of sources (Gough, 2012). We took a bifold approach to identify extant pockets of literature to help in constructing a conceptual foundation for MLT: 1) thematic comparison of ML competency frameworks from various countries, and 2) theory mapping, both feeding into taxonomical concepts and the identification of relevant extant theoretical domains.

First, the national competency frameworks of three Western countries were compared through thematic analysis by a group of twelve researchers without prior involvement in ML-related activities[3]. The group members, with various nationalities and student backgrounds, were asked to independently review the frameworks and identify (mutually exclusive) coding labels that covered the frameworks' content and to look for similarities and differences between the frameworks. Subsequently, they convened to discuss and categorize together, as a group, their identified labels and (after facilitated, iterative group work, deleting redundant labels) they eventually synthesized and ordered them into a final set of themes representing the ML's meaning, and reached a consensus (in Results: Figure 2).

Secondly, we used a configuring type of literature synthesis that facilitated our scoping or 'mapping' of relevant theoretical and conceptual domains. The data sources, primarily from peer-reviewed articles, were retrieved by using Google™ Scholar type searches and off-line sources (e.g., personal libraries). Without discriminating for publication period, we explored these publications and applied ancestor searches. Consulting these key documents, we searched for 'pockets' in the literature containing theories, concepts and topics to infuse the idea of MLT with content from relevant extant

[3] Members (n=12) were participants of the University of Twente's extra-curricular Honors program (Class 'Processes-of-Change', 2016) who performed the comparison after an 8-week course 'Effective Leadership in Organizations' that was offered by the first author.

domains, while also exploring the relationships between them (Oliver et al., 2008) (Ritchie & Spencer, 1994) (Braun & Clarke, 2018).

Phase 2: Literature Review

Originally, we set out to obtain and review a heterogenic set of sources, including literature from both practitioners (e.g., educators, healthcare professionals, medical associations, etc.) and academic domains (e.g., healthcare management). We applied a non-exhaustive type of literature review to identify domains and content, using the theoretical and conceptual mapping in Phase 1 as an organizing principle (Tricco et al., 2015) (Maile et al., 2019).

We retrieved peer-reviewed literature via free-text searches performed in Google™ Scholar (February 2019), using (combinations) of search terms, such as: "physician", "doctor", "leader", "leadership", "education", "development", "teaching", "training" (and Mesh terms variants) and included relevant English publications with relevance to ML and MLT. Our initial online search was limited to publications after 2007, considering the significant increase in publications from 2009 onwards (Keijser et al., 2017), and performed backwards snowball searches on the included items to find relevant sources prior to 2007 (Greenhalgh & Peacock, 2005). We focused on high quality, internationally available, peer-reviewed publications. The sensitivity of our search results was checked against a set of recent peer-reviewed publications matching our criteria, which we identified in Phase 1 (Strauss & Corbin, 1990). The consulted papers were not quality appraised, since we deemed this did not contribute to the current study's objective (Green et al., 2006).

A "'descriptive analytical' method […] to extract contextual or process-oriented information" (Levac et al., 2010, p. 3) was used for data extraction and analysis, similar to a scoping study approach. We began the process of "abstraction and conceptualization" (Ritchie & Spencer, 1994, p. 179) of the consulted literature by thematically indexing items in an iterative manner, while keeping notes and coding abstracted texts that gave a meaning or referred to possible inter-item associations (Tricco et al., 2015). The headings and subject headings were classified whilst keeping records of the references to the original sources from which we had retrieved the information. During the entire study we followed this iterative thematic indexing process of analysis and charted the identified relevant (sub)components and restructured versions when new themes were retrieved from the data. We also sought for confirmation of identified themes as well as for new themes or dimensions, keeping notes on (common or unusual) patterns (indicating possibilities of e.g., clustering of themes into dimensions); contrasts and comparisons (possibly revealing e.g., inter-theme collusions); and intervening factors (Miles & Huberman, 1994) (Patton, 2002) (Green et al. 2006) (Whittemore & Knafl, 2005). When any information underpinning a topic was considered meagre, hand searches took place (Google™ Scholar) using the topic's term and its synonyms to find additional records. The analysis ceased after significant saturation was reached whereby all the identified topics were deemed sufficiently explained.

Parallel to the mapping process and building on our topical annotations, we demarcated various scholarly vacuities by composing statements reflecting our depositions of conjectural relationships between various subtopics that emerged from this study (propositions).

Phase 3: Framework Synthesis

Eventually we synthesized all the identified topics into a comprehensive overview of so-called guiding principles of effective MLT design and delivery. We organized these principles into a framework, with a concise description of them and their associated elements. The aim hereby was to use practical language, whilst not discriminating between specific professions in healthcare.

RESULTS

After presenting (A) the results of the taxonomical and concept mapping ('conceptual context') (Figures 2 and 3), we display (B) the 'practice context' epitomized by our framework (Table 1). Throughout, we provide thought-provoking propositions, informing an agenda for further MLT enquiry: the 'research context'.

RESULTS A - CONCEPTUAL CONTEXT

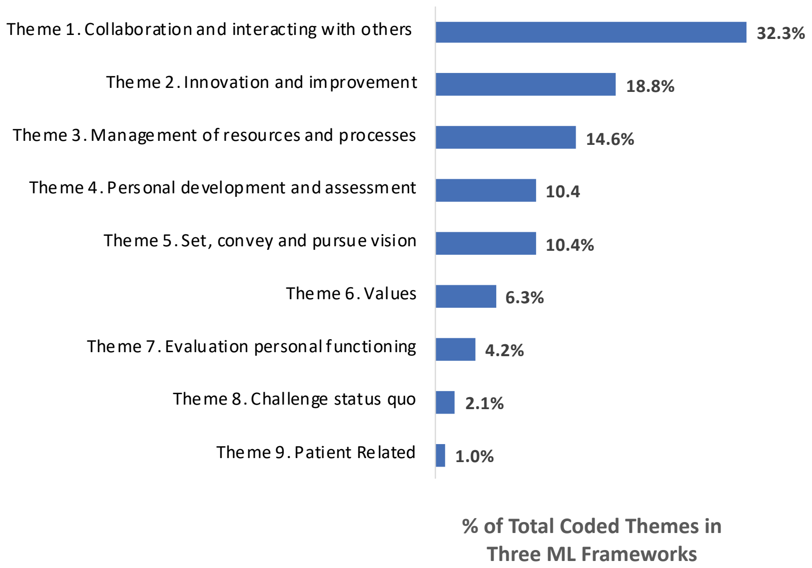
Our two-pronged approach, entailing comparisons of ML frameworks and theoretic concept mapping, provides 1) taxonomical clarity on how ML is currently defined and expressed ('expressive concepts') and 2) a 'geography' of theories in which, we argue, MLT is embedded ('theoretical concepts').

Taxonomical Concepts

After studying the frameworks from Australia, Denmark, New Zealand, Canada, the Netherlands, and United Kingdom, the last three were used for thematic analysis. The Canadian framework modelled both the Australian and New Zealand frameworks (Sebastian et al., 2014); at the time of analysis, the Danish framework was not available in English. Thematic labelling by the individual group members led to 96 labels. Subsequent consensus forming on the categorization of all the identified labels resulted in a set of nine mutually exclusive themes which, according to the group, were represented in all the frameworks (Figure 2). The group members unanimously concluded that the national frameworks' content showed no significant conceptual variances.

One theme (Theme 1) represents over 30% of the identified labels: 'collaboration and interaction with others' (Theme 1 in Figure 2). Another third of the data-analytical themes represent physicians' skills in change and innovation and in various managerial activities (Themes 2 and 3 in Figure 2). The remaining six themes pertain to various other (leadership) skills, about half of which relate to a physician's personal development.

Figure 2. Comparative analysis of national medical leadership competency frameworks



5

Mapping of Theories & Concepts

On scrutinizing pivotal literature on leadership and related theories, we identified four interconnecting conceptual domains: adult and physician learning or development; ME; leadership training; and organizational science/behavior (Figure 3). Our data suggest that MLT is primarily positioned within the physicians' professionalization context, comprising an imperative domain within educational science. Professionalization represents the process of 'becoming' a physician (Cruess & Cruess, 2008) and contains those elements that contribute to a physician's leadership identity and competences. Jointly, they constitute a fifth domain. Figure 4 illustrates how these five academic domains, informed by instruments like frameworks, co-constitute the realms of medical professionalization and may or should contribute, ultimately, to patient well-being (Figure 4) (Thistlewaith & McKimm, 2016) (Monrouxe, 2010).

Figure 3. Extant foundational academic domains for high-quality medical leadership training

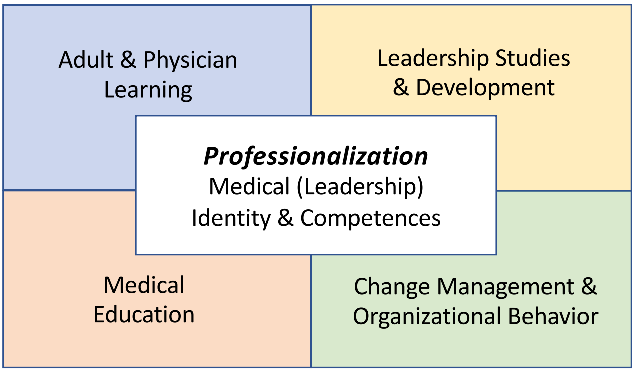
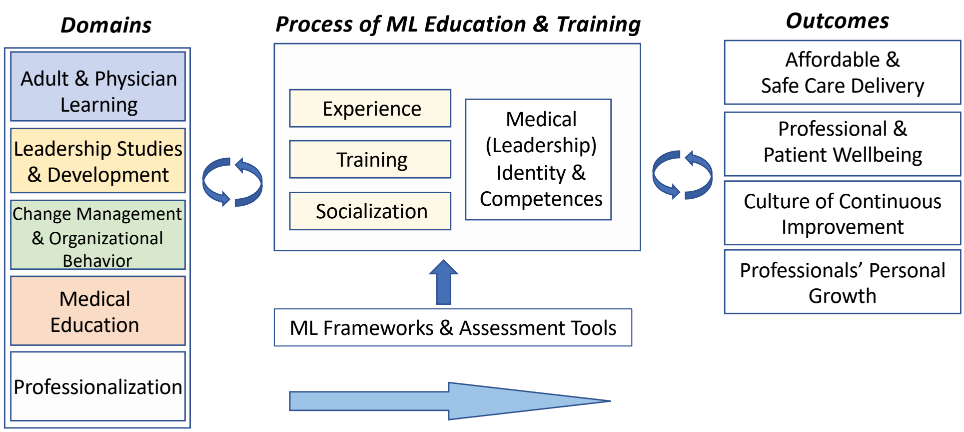


Figure 4. Medical leadership positioned in a schematic display of interrelations between theory, medical professionalization and healthcare practice



In the following paragraphs we further explicate how extant literature has led us to these social-scientific domains (entailing abstract depictions of theories and concepts) and their prospective implications for effective MLT. After laying out the overarching concept of leadership and its related concepts, we describe the domain of ME and adult learning, and particularly focus on professionalization after which we argue that the change management and organizational behavior domain should be brought into MLT's discourse, as well as relevant parts of organization theory.

Leadership Studies and Development

Historically, leaders were assumed to be 'born' (hereditary leaders) or were regarded as charismatic 'heroes' or 'great men'. Recent leadership theory and practice has gradually incorporated the notion that leadership can be learnt (Fielder, 1971) (Hersey et al., 1979). From this, theory and practice in leadership development have evolved into more relational leadership thinking, which refers to processes of 'becoming' and 'being' a leader (Souba, 2011).

Increasingly, leadership in healthcare is being influenced by social and behavioral sciences and new streams of organizational thinking. Despite significant resistance, primordially medically dominated, hierarchical and role-based leadership paradigms, that governed healthcare's professional life for centuries, are fading (e.g., Noordegraaf et al., 2016). In the meantime, programs preparing selected physicians for leadership positions have been operating for almost 25 years (Sonnino, 2016). While the most widely promulgated leadership styles in healthcare have been transactional ('reward-for-effort') and transformational leadership types (Avolio, & Bass 2001) (McKimm & Held, 2009), less conventional forms of leadership have been brought into the healthcare arena in the last two decades (Currie & Lockett, 2011). Contestations arise on the appropriateness of leader-oriented styles, suggesting opening up more towards contextual factors and shared forms of leadership (Lo et al., 2018) (Onyura et al., 2019). This concurs with an emerging line of leadership thinking focusing on interactions between people, as a part of fluid, complex and dynamic processes of daily (working) life (Day, 2000). Corresponding with people-centered leadership ideas, more shared, distributed, collective and collaborative leadership types are being mused in healthcare (West et al., 2014) (Jorm & Parker, 2015) (Onyura et al., 2019). These vary from, for example, 'servant leadership', 'LEAN leadership', 'value-based leadership', to 'compassionate leadership' (for an overview see, for example: Hartley & Benington, 2010; Swanwick & McKimm 2017). Concomitantly, in the discourse on leadership in healthcare, in particular ML, there is rising interest in mindfulness and emotional intelligence, reportedly also benefitting healthcare professionals' well-being (Neeley et al., 2017) (West et al., 2016) (Mintz & Stoller, 2014) (Shouhed et al., 2019) (Stoller, 2009), organizational 'sensitivity' or 'keenness' (McKenna & Rooney, 2008), and a more moral stance of appreciating others (for who they are, as well as for what they do). Jointly, these developments in effective leadership behavior denote a diversion from long established, more vertical and hierarchical standpoints (Greenleaf, 2002) (Moen & Prescott, 2016a) that tend to dominate healthcare practices in many situations around the world.

The growing acknowledgement of interpersonal processes that govern collectively created, shared and maintained leadership, is also referred to as 'inclusive leadership' (Howard et al., 2009) (Mannion et al., 2015). Consequentially, next to investing in the development of leaders (i.e., 'human capital'), there is rising interest in investing in 'social capital', also, in healthcare (Day, 2000) (Edmonstone, 2014) (Onyura et al., 2019). These are evolving in conjunction with the staggering (need for) transformative change in healthcare, resulting in seemingly unsurmountable wicked problems that accompany changes in established ways of working in social professional settings (Reay et al., 2016) (Keijser et al., 2019, This thesis: Chapter 4) (Keijser & Martin, 2019) (Onyura et al., 2019). In this perspective, effective leadership facilitates a higher level of "individual and collective adaptability" (Day, 2000, p. 582), instigates (co-)creative social processes among groups, and eventually results in the emergence of new logics and values through a collective remodeling of roles, tasks and meaning ('sense-making'), that are not only relational vis-à-vis other healthcare actors, but are also task- and change-related. Increasingly, the need for physicians' involvement at the system level is also pondered (Dickson & Owen, 2016) (Kyratsis et al., 2016) (Berghout et al., 2017). Inevitably, these ideas have implications for what is expected from physicians' leadership.

Juxtaposed to the old leader-subordinate dyads (e.g., physician-nurse) and 'doctors' orders' paradigms, physicians progressively function as equal members of clinical microsystems, that agilely change in composition, constantly following patients' needs and contextual requirements (Batalden et al., 2003). This reality mirrors an emerging significance of interprofessional teamwork and learning, demanding unprecedented adaptability and permeability between interprofessional boundaries, that have often inhibited knowledge sharing and learning (Day et al., 2014) (Brewer et al., 2016). Moreover, physicians' occupational and expert roles and responsibilities in this unstable setting warrant their proficiency in constantly alternating between archetypical leadership and stepping back to a followership position (Reay et al., 2017). This 'leadership dance' comprises learning when to step forward to play professional (i.e., medical), personal, or positional strength, versus when to step back to enable others to step forward (e.g., Moen et al., 2018; Denhardt & Denhardt, 2003). ML can thus be conceptualized as physicians' repertoires of knowledge, skills and abilities that, jointly, enable them to lead, manage and follow in the social contexts of (inter)professional and often swiftly changing healthcare settings they function in (Till et al., 2017) (Frenk et al., 2010). Moreover, the studied competency frameworks show a high prevalence of these so-called 'social capital' related elements (Figure 2). Hence, we position MLT in the context of physicians' developing competences in their practicing role as clinicians *in general*, and disregarding their formal (e.g., management or executive) assignments. Relevantly, physicians in formal leading roles are reported to require specific knowledge, skills and abilities (see, e.g., Goodall, 2011; Moen et al., 2018; Maile et al., 2019), although merely training in them does not automatically result in effective teams or better quality and affordable care (Thistlethwaite et al., 2014).

Leader development predominantly sets out for intrapersonal ('leader-centric') competence-oriented training, whereas leadership training refers to relational awareness and skills for building value through interpersonal interactions and creating interpersonal trust and respect to instill reciprocal collaborations (i.e., 'social capital') (Day, 2000). Although a relative majority of MLT training programs are leader-centric oriented, we suggest that the MLT premise is primarily found amidst interactions between the individual trainee as well as the social and organizational dynamics of work settings. We suggest that effective MLT significantly builds on understanding interpersonal competences, while (experimenting with) practicing leadership in socially inclusive processes amidst individuals and groups (Yukl, 2013) (Bohmer, 2010). Relatedly, Swanwick and McKimm (2014) propose that MLT addresses three interrelating levels. The first level reflects intrapersonal perspectives in which physician trainees get to know themselves through self-awareness and understanding of strengths and weaknesses in their "personhood", their personal leadership paradigm, and related behavioral patterns (Pololi et al., 2015, p. 194). The second, interpersonal level, involves training in and experiences and reflections of social interactions. At the third, organizational and/or network level, MLT entails understanding healthcare systems and organizations, and the associated politics, processes and dynamics. Analogously, the latter reflects a proficiency in "getting up on the balcony" to observe and necessitates physicians to enact a leadership "capacity to respond rather than react automatically to challenging events" (Atkins 2008, p. 91 and p. 99).

Leadership training warrants developing trainees' attitudes and identities through intensive (re)formation of self-awareness, -regulation and -motivation, in order to facilitate them to authentically elaborate the person they are (Day, 2000) (Edmonstone, 2014). Concurringly, since physicians "need to understand their power and influence" (Moen et al., 2018, p. 104), crucial elements in MLT comprise self-evaluation and -exploration of their personal leadership paradigm and relevant belief systems.

Moreover, the desirable MLT conditions facilitate trainees to learn from engagement in and confrontations with their daily work's profound mélange of interprofessional relations that are continuously mediated through various intersecting identities and social patterns (Lingard et al., 2002) (Monrouxe, 2015). MLT enables physicians to navigate their individual social and professional identities better within the interlocking systems of "everyday power relations and their consequences for services delivery" (Edmonstone, 2014, p. 283). The embedment of intrapersonal characteristics and self-leadership are imperative to MLT, since: "The person you are, is the leader you are" (Shannon, 2015, p. 57) (Goleman, 2012). This implies that standardized, one-size-fits-all approaches do not suffice MLT, since such a reductionist take on individualized and contextualized leadership development would neglect the leadership training fields' trend towards contextual and customized or personalized leadership enactment (Sargeant, 2009b) (Gurdjian et al., 2014).

Despite the high level of desirable customization, MLT's content regularly integrates formal activities (e.g., classroom lectures and workshops), practice-based interventions, and other opportunities for purposeful reflection (Till & McKimm, 2017) (Onyura et al., 2019) (Sultan et al., 2019). MLT involves integrating an accumulation of knowledge, skills and competencies (e.g., theories, concepts, models and tools) and various experiences (e.g., how to lead, follow and manage in various settings) (Petrie, 2014). Learning often takes place through a longitudinal set of iterative interventions placed in individual and/or group settings (Bohmer, 2010).

Frequently, formative and summative assessments are used to evaluate, improve and sustain leadership competencies (Warren & Carnall, 2011). Arguably, not all conventional ME principles, that have been proven successful in clinical competency and skills training, may apply to MLT assessments. Moreover, since situational and contextual factors can significantly impact human performance, the assessment of ML competencies at an individual level can be case-dependent, consequentially hindering attempts in the standardization and development of ML competency assessment tools (Sargeant, 2009b) (Lurie, 2012). Enquiries into alternative assessment methods, such as (video-based) analysis of trainee's leadership microbehaviors (Gordon et al., 2017), would certainly be welcome.

Specification of MLT outcomes is important and involves various levels (Kirkpatrick & Kirkpatrick, 2006), including trainees' behaviors (Turner at al., 2018). Relevantly, an increasing number of ML frameworks describe physicians' leadership competencies (Hargett et al., 2017) (Keijser et al., 2019, This thesis: Chapter 2). Notwithstanding that ML's multifaceted character can impart ambiguities through misinterpretations, these (often comprehensive) frameworks can also add to a "greater complexity in terms of thinking about leadership [that] may be a prerequisite for greater behavioral complexity that is needed" (Day, 2000, p. 605). There remains a scarcity in structured and validated formats and standards for MLT, for example specifying proficiency levels of ML competencies (Campion et al., 2011) (Sultan et al., 2019).

Proposition 1
Professionals working in the context of healthcare's bio-medical scientific paradigm often tend to disavow social-scientific evidence for MLT's relevance and effectiveness, possibly fueling resistance to MLT.

Medical Education and Adult Learning

Some research indicates that learning approaches known to be effective in ME are also successful when applied to MLT (Hopkins et al., 2018) (Till et al., 2018). Similarly, adult learning principles are reported to enhance training effectiveness (MacPhail et al., 2015) (Ten Have et al., 2013). We argue that in its process of becoming part of physicians' standard training, MLT is likely to be grounded in ME theories, adult learning and, in particular, in the pedagogical science of physicians' learning. Below we discuss elements from these theoretical views.

The learning of individual adult professionals is navigated through internal and external factors (Merriam et al., 2007). Internal -including intrapersonal- factors are, for example: self-directedness and curiosity in (the needs for) learning; readiness and self-motivation to learn; self-regulation and -awareness; orientation to developing tasks and social roles (Day, 2000). Prior experiences in various stages of private and professional life importantly influence these internal factors and also provide trainees with a reference for learning (Williams, 2019). These factors also importantly govern trainees' learning capacity, including their (un)willingness or (restricted) openness to learn (Knowles, 1968) (McPhail et al., 2015).

Physician learning is enhanced through contextual reflective practice and, in general, thrives best in the physicians' familiar contexts (Janssen-Noordman et al., 2006). Experiential and practice-based forms of learning are increasingly used in ME, providing trainees opportunities for active involvement in real live, socially 'rich' experiences and related critical reflection (Kolb, 1984) (Kolb & Kolb, 2005) (Jansen-Noordman et al., 2006) (Prather & Jones, 2003). Various external factors influencing physicians' learning also dwell in practice-based training, potentially supporting or hampering training outcomes. For example: goals, norms, culture, practices and resources of organizations in which trainees work and train, determine their engagement and participation in trainings, and the facilitation that they receive. MLT not only musters various perspectives of clinical practice, but also invites views from beyond conventional ME, including organizational factors and perspectives of physicians' non-medical colleagues (Slotnick, 1999) (Philibert et al., 2019).

When learning new knowledge and skills, physicians are pragmatic and improvement oriented. Research shows that physicians often engage self-directedly in the interlacing stages of learning (Slotnick, 1999) (Moore et al., 2009). Initially, they analyze any problems using archetypical clinical types of problem solving. Also, before deciding to actually engage in learning, they search for legitimization. Exemplary questions guiding them in this process are: *(Why) is this needed? Is this legitimate and evidence based?* As genuine practitioners, physicians are also keen on experiencing and experimenting, before transferring their new learnings into work-activities. Miller's (1990) seminal work, which provides a fundamental framework for the assessment of medical skills, competences and performance, demonstrates such a physician's stepped approach to learning. 'Millerian' pedagogy prescribes that physicians' learning is founded on acquiring 'declarative' knowledge ('*know* what to do') before becoming knowledgeable in 'how to do' ('procedural knowledge'). Eventually, physicians who can account for having acquired a (certain level of) competence, are able to '*show* that they can do it' (Moore et al., 2009) (Miller, 1990).

Relevantly, an important part of medical professionalization happens in the realms of medicine's so called 'hidden curriculum'. Next to the cognitive learning of knowledge and skills, this part of medicine's occupational training infuses professional behavioral and emotional norms and values (Haas & Shaffir, 1982) (Birden et al., 2013). This parallel reality is importantly governed by role-modelling and apprenticeship and involves a complex and temporal amalgamation of personal experiences, social interactions and reflections. Collectively, they contribute to the "melding of knowledge and skills with an altered sense of self that differentiates socialization from training" (Hafferty, 2009, p. 60). Importantly, educationalists often have little to no control over the hidden curriculum and its impact, since it involves practitioners outside the jurisdiction of a university and/or training faculty of a healthcare organization (Jaye, 2006).

Proposition 2
Provided that ML mentors and role models are adequately selected, trained and equipped, the medical 'hidden curriculum' can significantly benefit ML development.

The 'being' in medical leadership
The focus of the discourse on ME has shifted over the last few decades, similar to those on general leadership training (see above). In ME, emphasizing knowledge and activities constituting professional performance, competency-based education has been the golden standard (Lurie, 2012) (Boursicot et al., 2011) (Ruedy, 2007) (Miller, 1990)[4]. This prominence of proficiently demonstrating specific 'doings' resonates with conventional medical professionalism (Cruess et al., 2014). However, physicians' competence in metacognition and self-reflexivity is increasingly acknowledged (Westera, 2001) (Aukes et al., 2007). Using practice-based learning and the hidden curriculum, physicians learn and adapt through an individual process of experimenting with their 'provisional selves' and reflecting on internal and external feedback and standards (Ibarra, 1999). Given this process of professional or occupational standardization in ME, there is a growing attention for physician's professional identity (PI). PI formation importantly governs the 'being a physician' and ultimately fuels into medical professionalism (Jarvis-Selinger et al., 2012) (Hafferty, 2009) (Monrouxe, 2010) (Wilson et al., 2013) (Cruess et al., 2014) (Cruess et al., 2016) (Maile et al., 2019). This denotes, we argue, the relevance of physicians' PI formation as part of the conceptual 'burning platform' on which ML is explained and trained. Therefore, we placed PI centrally in our domain diagram (Figure 3). In the following section we explicate more on the essence of physicians' PI.

Identity and Awareness
As a crucial part of medical professionalism, physicians' PI, or 'proto-professionalism', is defined as their "representation of self, achieved in stages over time during which the characteristics, values, and norms of the medical profession are internalized, resulting in an individual thinking, acting, and feeling like a physician" (Cruess et al., 2014, p. 1447). Physicians' PI formation is crucial to their knowing who they are and importantly affects how they are perceived by others. PI formation involves a physician's professional development at an individual psychological and social level, comprising an individual process of applying her/his various identities to different settings, roles and interactions with others (Monrouxe, 2010) (Maile et al., 2019).

Informed by various theories, especially in psychology and sociology, PI formation is seen as being navigated by both conscious and unconscious processes, that eventually enables the display of appropriate professionalism vis-à-vis others (Figure 4). Hence, a physician's PI relates to an ongoing balancing between personal and contextual (f)actors that interrelate with the various aspects of professionalism (Cruess et al., 2014) (Jarvis-Selinger et al., 2012). Each physician's PI development involves a personal, hence unique, non-linear, complex and constant process of construction, moderation and re-construction that occurs within the realms of professionalism and psychosocial development (Holden et al., 2012). Indeed, this lifelong process is couched in pre-existing personal traits and characteristics, combined with internal and external moderators that persistently co-mediate an ongoing development of PI (Maile et al., 2019). We can display an abstract impression of various levels of factors and life domains that, collectively, make up physicians' professional as well as other identities (Figure 5). Similar to other professionals, physicians hold multiple identities, based on their roles, positions and activities. Also, their PI formation involves constant (re-)negotiation with other identities and their personal 'self'. Here looms 'identity dissonance' (e.g., when a former established personal identity conflicts with new one), as exemplified in Figure 5 (Monrouxe, 2010). Physicians continuously need to balance how pre-existing and new (medical professional) identities relate to each other and how they

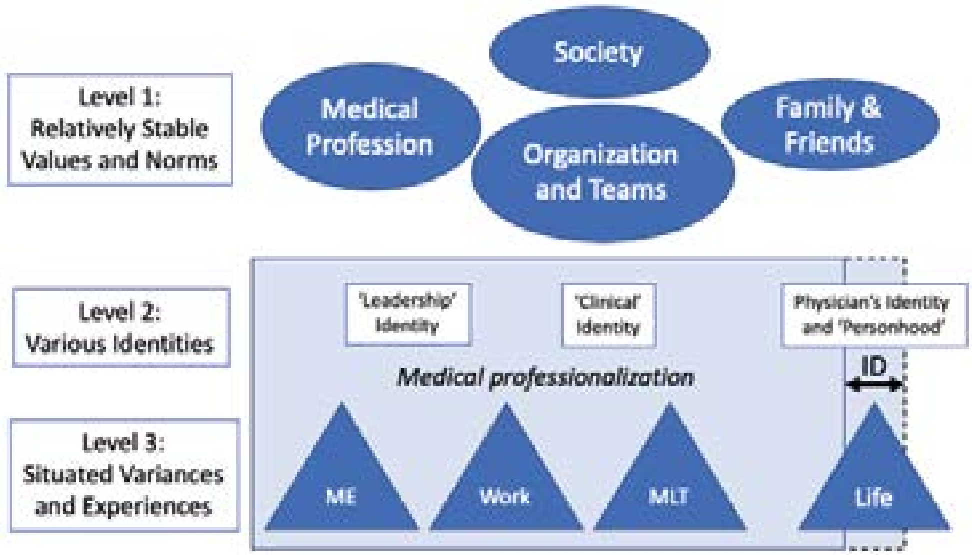
[4] We note that the competency trend also is suggested to embody a risk to reproducing and iterating conventional practices, resulting in a barrier to innovation, such as ML or enhanced interprofessional practice and learning (Reeves, 2009).

influence their feelings and interactions with others, including the groups they belong to ('in-groups'), and the ('out'-)groups they regularly relate to (Roccas & Brewer, 2002).

PI formation starts well before ME (e.g., through the influence of media, family and self-conception) and during physicians' life-long education, and it is fostered through various opportunities, including formal and programmed (team)training and simulation opportunities (e.g., case-based teaching and role-play) (Apker & Eggly, 2004) (Lingard et al., 2003). A lot of the PI is developed in the formational, pre-graduate years, during which most professional behaviors are established (Hilton & Slotnick, 2005). This formation tends to stabilize after longer periods of training and can be quite resilient to change in later career stages. Nevertheless, physicians' continuous transiting roles and positions, denoting their changing responsibilities and work settings, require ongoing investments in PI formation (Coulehan, 2005) (Stern & Papadakis, 2006). Expectedly, ML's recent emergence will significantly influence the PI of many physicians, since the relative medical dominance that has established over various centuries a widely acknowledged archetypical image of the medical profession will soon be outdated.

Proposition 3
MLT importantly speaks to contemporary physicians' expanding set of professional identities, some of which (e.g., financial; ethical) can conflict with patient-related work and confront ML trainees (and others) with enigmatic challenges.

Figure 5. Medical leadership identity formation and (exemplary) identity dissonance at the individual level



(MLT, Medical Leadership Training; ME, Medical Education; ID, Identity Dissonance)

Reflectivity and self-awareness

Physicians' PI formation is importantly regulated through self-awareness (Wilson, 2013) (Cruess et al., 2014). Self-awareness can be developed through critical reflection which stands central to tacit knowledge becoming explicit (Takins & Schultz, 2008) (Moen et al., 2018). Boud and colleagues (1985) distinguish three phases of critical reflection: (1) review of experiences and related processes from various viewpoints; (2) evaluation of feelings and their dynamics and impact as a response to context; and (3) re-evaluating and re-framing what happened.

Being knowledgeable about how external influences impact one's feelings and behaviors comprises having profound insight ('awareness') into one's subjective and unconscious interpretations of the related (f)actors and their effects. High levels of self-awareness contribute to healthy decision making, congruent to one's values, and eventually to imparting self-determination, self-confidence and, ultimately, physician well-being (Pololi, 2015). Also, dealing with ambiguities and mitigating the effects of medicine's perfectionistic dogma of being the perfect, 'good doctor', requires weighty self-awareness of one's strengths and limitations (Swanwick & McKimm, 2011) (Peters & King, 2012) (Moen et al., 2018). Moreover, physician's training in self-awareness also involves enhancing constructive behaviors in social encounters, interpersonal trustworthiness, professional demeanor, and the strengthening of PI (Monrouxe, 2010) (Day, 2000) (Pololi, 2015). Alike PI formation, developing self-awareness through reflection requires a longitudinal and personal experiential journey of learning about and understanding oneself, gaining practical wisdom ('phronesis'), and is cultivated by opportunities of individual(ized) reflective practices on actions and related responses (Sargeant et al., 2009a) (Till et al., 2017) (Aukes et al., 2007). This continuous journey of professional learning entails dealing with awkward feelings and anxieties stemming from past experiences, and often goes in tandem with releasing long-held beliefs and values. Such an intensive sustainment of high levels of self-awareness is sensitive and often comprises hard work (Merriam et al., 2007) (Sargeant et al., 2009a). Moreover, it requires physicians to be continuously open and emotionally capable of adjusting their belief systems (Clapper, 2010). A post-graduate ME physician increasingly harbors various forms of reflective practices (Mann et al., 2007) but optimally, the 'reflective practitioner' also searches for new conceptualizations, interpretations or thinking about situations or problems, aiming to improve responsive behaviors (Schön, 1987) (Mezirow, 2000).

Working with solitary self-reflection is less effective than active facilitation (e.g., use of a coach or mentor) and appropriate learning 'spaces' (Boud et al., 1985) (Wilson et al., 2013) (Clandinin & Cave, 2008) (Keijser et al., 2019, This thesis, Chapter CoP). Additionally, reflective practice, which profoundly hinges on social interactions, requires external input that supersedes 'in-group' perspectives, for example from 'out-group' members. Therefore, feedback from and dialogue with other professionals is crucial for effective reflection, provided it occurs in a confidential and non-punitive (in case one makes mistakes) setting and includes the "capturing of emotions" and working with them (Clapper, 2010, p. 11) (Pololi et al., 2015) (Edmondson, 1999) (Kluger & DeNisi, 1998).

Feedback and assessment

As an imperative tool during reflective practice, feedback is increasingly incorporated in physicians' professional education programs. It tends to enhance an integration of their meta-cognitive reflection during or after training interventions (Fernandez et al., 2016). Feedback on physicians' competencies can entail formative (i.e., monitoring of learning, to provide feedback) or summative assessments (i.e., more formal post-training evaluation of trainee learning, for example compared with a standard) (Moore et al., 2009). Sources for feedback can be the individual physician her-/himself (self-assessment) and others (e.g., direct colleagues; co-workers; managers; allied professionals), applying rating instruments (e.g., surveys; observation forms) or specific approaches such as audio or video recordings (Gordon et al., 2017). Self-assessment, which is relatively easy to construct and implement, has become customary in postgraduate medical training (Hildebrand et al., 2009), although its reliability is disputed (Davis et al., 2006) (Sargeant et al., 2010) (Chesluk et al., 2012) (Eva & Regehr, 2011). If physicians invite others to partake in comprehensive assessments, it can instill a 'trickle-down' effect, ensuing a higher sense of transparency or openness in terms of personal development, inclusiveness and collectiveness across hierarchical levels, which can be inspiring to others (Edmonstone, 2014) (Keijser et al., 2019, This thesis: Chapter 9).

Feedback from 360-degrees assessments or 'multi-source feedback' (MSF) instruments have particularly gained attention in leadership trainings (Lacerenza et al., 2017). Although there is still a lack of evidence for MSF's effectiveness in leadership training (Malling et al., 2009) (Lacerenza et al., 2017), its use is increasingly described in MLT and revalidation programs (Frich et al., 2015) (Pearson, 2018), as an aid in increasing self-awareness and intrapersonal competence development, including related ML competencies (Day, 2000) (Overeem et al., 2010) (Wilkie & Spurgeon, 2013). Some report that physicians hesitate to being 'measured' (Espeland & Sauder, 2007), and that they underrate their performance (self-assessment) in comparison to external feedback (Roberts et al., 2013) (Arora et al., 2011) (Mills et al., 2008) (Wauben et al., 2011) (Makary et al., 2006). ML competency frameworks are seen, moreover, as pre-requisites for developing validated ML (360-degrees) assessment tools to determine competency mastery, and for the application of meaningful competency thresholds (McClarty et al., 2015). Also, effective designs and implementation of such feedback instruments should be well-aligned with the objectives of the MLT programs they are linked with (Lacerenza et al., 2017).

Reportedly, practical issues like busy clinical work, perceived inaccuracy, lack of confidentiality or offensiveness (e.g., in response to open questions), can influence the applicability of MLT assessment tools (Telio et al., 2015) (Weinstein, 2015). Since ML competencies often mirror physicians' interpersonal capabilities as well as personal characteristics and traits, the related feedback can include affective components. Therefore, ineffective provision, receipt, acceptance and ultimately use of any feedback on such personal matters, can jeopardize self-awareness development (Sargeant, 2009b) (Kluger & DeNisi, 1998). Also, validity issues can accompany the design and implementation of assessment tools in ME, as well as the discussions on physicians autonomously choosing their assessors, instilling source-credibility issues that can influence their acceptance of the assessment outcomes (Telio et al., 2015) (Weinstein, 2015) (Stevens et al., 2018). The recent arrival of "low stakes/formative procedures" in physicians' personal development, might herald a promising future for assessment practices in MLT (Stevens et al., 2018, p. 267) (Chesluk et al., 2012) (Overeem et al., 2010).

Change Management & Organizational Behavior

Flanked by theories on learning, education and leadership (training), we classify a fourth domain in our conceptual mapping: change management and organizational behavior (Figure 2). Our data indicate various aspects of organizational types of competence training in MLT programs, varying from learning economics to being prepared in using negotiation and business skills (Lega & Sartirana, 2016) (Brouns et al., 2010) (Abbas et al., 2011) (Stringfellow et al., 2015). Moreover, on scrutinizing the literature on the foregoing domains, the organizational perspectives stand out as relevant to MLT since they represent MLT's focus on as well as relevance to non-medical topics that are contiguous to physicians' organizing types of activities and responsibilities.

Healthcare's mounting complexity and influx of disruptive innovations warrant physicians and other professionals to acquire more organizational and system-thinking principles and to accept that the linearity used to explain the multi-dimensional interactions of daily patient-related and other activities does not suffice in overcoming challenges instilled by system reforms (Stein et al., 2015) (Grady & Hinings, 2016) (Plack et al., 2018) (Onyura et al., 2019). Complexity science is advocated to help move away from medicine's typical linear way of thinking and the reductionist's views on ME and practice (Grady & Hinings, 2016) (Hoogeboom & Wilderom, 2019). These evolvements demand new learning models and training approaches to help blossom physicians' non-linear thinking and empower them to cope with old, often rigid and defensive routines that hamper the progress of collective solution finding, towards, ultimately, contributing to a culture of continuous improvement (Keijser et al., 2019, This thesis: Chapters 4 and 9). The content of novel MLT schemes includes, for example: evaluating system needs (instead of individual needs); understanding processes of complex change (versus stability); realizing adequate intra-, interpersonal, -team and -organizational behaviors (versus hierarchical physician-nurse dyads); addressing wicked problems (versus acute and tame problems); flexibly applying short-cycle evaluation improvement (versus linear problem-solving); collective decision making and problem solving (versus command-and-control approaches) (Mitleton-Kelly, 2003).

Proposition 4
MLT warrants the incorporation of new scientific streams, in particular system-thinking, complexity science, change management and organizational behavior, as well as leadership training effectiveness.

Contemporary MLT strategies facilitate physicians' in trading their traditional focus on controlling uncertainty, in their endeavor to gain (e.g., patients') stability by choosing acute, one-patient-at-a-time approaches, with more holistic 'complexity leadership' competences. Such new strategies help them to oversee various interconnected perspectives in and across organizations and to pursue collective improvements of the multi-level benefits for patients as well as for the organization, the system and society-at-large (Swanwick & McKimm, 2012) (Wegberg, 2012) (Webb et al., 2014) (Mianda, 2018) (Grady, 2016). From within the relative chaos of clinical reality, those physicians enacting effective leadership embrace, as well as instigate collective coping with the constant changes through the new 'stability'. Despite this, system-thinking and similar approaches only appear in a few ML programs (Webb, 2014) (Onyura et al., 2019). However, reports on the first experiences with such new approaches describe the opportunities for MLT within interprofessional and change-oriented contexts. Such initiatives typically harbors and advances a more social and experiential learning that incorporates contextuality, co-participation and -creation, collective problem-solving, in order to overcome common barriers and ultimately to result in sustainable improvements (Noordegraaf et al., 2016) (Prather & Jones, 2003) (D'Amour & Oandasan, 2005) (Marinopoulos et al., 2007) (Grady, 2016) (Mianda, 2018) (West & Lyubovnikova, 2013) (Keijser et al., 2019, This thesis: Chapter 6) (Ferlie et al., 2016). These programs uphold the principles of co-construction/-creation and prescribe the dynamic process of leader-follower interactions, in which physicians construe themselves as leaders as well as followers in their organizations by making and affirming iterative claims to lead or follow at an individual, relational, collective and organizational level (De Rue & Ashford, 2010) (Epitropkai et al., 2017) (Hoogeboom & Wilderom, 2019).

RESULTS B - PRACTICE CONTEXT

The theories and insights described in the preceding sections guided the development of our framework of principles in effective design and delivery of MLT, categorized as five distinct dimensions (Table 1). Our efforts were in particularly led by structuring the principles related to ME namely: adult and physician learning; competency development; identity formation; evaluation of training outcomes; and practice-based educational settings (Moore et al., 2009) (Caffarella & Daffron, 2013) (Miller, 1990) (Frich, 2015) (Hesselbein, 2004) (Snook, 2012) (Kirkpatrick & Kirkpatrick, 2006). Furthermore, we build our framework using the concepts and theories of instruction and learning (Green & Kreuter, 1991) (Merrill, 2002) and several structuring models underpinning contemporary training in general and ML (Day, 2010) (Lacerenza et al., 2017) (Merrill, 2002) (Hopkins, 2018) (Van Velsor et al., 1998) (Grunberg et al., 2018) (Vimr & Thompson, 2011). Table 1 exhibits our framework and these five dimensions. In the following sections we consider these dimensions and clarify their background in the contemporary literature.

Table 1. Principles for effectively designing and delivering medical leadership training, including elements

Dimensions	Description	Guiding principles	Elements
Needs Assessment & Goal Setting	*Objective* - Capture needs and demands at individual, group and organizational levels in order to identify and prioritize legitimate MLT goals and to make well informed choices on content and deployment tactics *Result* – Preparatory information for well-informed decision-making on aligning feasibility, appropriateness and outcomes	• A co-design approach, with input from all MLT stakeholders, enhances training endorsement, participation and objected outcomes • Organizational and medical specialty cultures can hold various facilitating and inhibiting determinants for MLT • MLT is best situated in a 'learning organization', integrating various forms and levels of education, practice, research and organizational perspectives • Effective assessment requires assessors to be politically neutral to all stakeholders	Well-balanced backward and forward planning of MLT content and delivery based on: 1. *Trainee perspective*: Customization to individual trainee levels (of e.g., experience, characteristics, expectations) 2. *Frame of reference*: Selection and use of a formal (e.g., local or national) ML standard or framework 3. *Contextualization*: Alignment with the organizational context (e.g., culture) and professional (medical) specialty 4. *Integrative and longitudinal design*: Alignment with phases of education, career and organizational development
Training Structure	*Objective* - Use of appropriate structuring principles for learning and training in how to govern MLT's interrelating components and development phases towards optimal outcomes *Result* – Effective sequencing and administering of MLT components and deployment tactics	• MLT programs are built on theories and principles of (medical) education, (adult and physician) learning and continuing education • Training design is governed by the closely interrelating phases of learning and continuous personal development, which are accounted for at all the MLT stages • MLT program structure is not static and must be continuously adaptable throughout its lifecycle and informed by close monitoring of the trainees and their progress/needs	Effective MLT program design is marshalled by: 1. *Informing and acknowledging*: Preparatory (e.g., sense-making) activities that facilitate buy-in of trainees and others and anticipation of implementation barriers (*pre-training*) 2. *Reforming and transforming*: Iterative and serial application of various forms of reflective practice contributing to trainees' behavioral changes (*per-training*) 3. *Transferring*: Trainees' actual deployment of newly learned leadership in practice (*post-training*) 4. *Personal development*: Process of (growth in) self-reflection and -awareness through experiences and related emotions, contributing to ML development (*continuously*)
Training Modes & Practices	*Objective* – Combining passive and active approaches to MLT learning, experiencing and reflecting *Result* – Well-balanced MLT program, providing adequate field-experiences in reflecting and experimenting with ML competencies and formation of ML identity	• Effective MLT programs are best footed on modes that help reflect real-life work settings • Medical PI formation comprises leadership identity, and requires learning in socially 'rich' contexts, such as local multi-disciplinary action projects • Effective reflection on own current practices requires sufficient space, time and resources	MLT comprises a mixture of elements signified by: 1. *Modes*: 'Passive' transfer of knowledge and 'active' practice-based approaches, including stretch opportunities; small group learning; and mentoring/coaching 2. *Action projects*: Real-life work settings for trainees to experience and experiment with leadership enactment in collaboration with others, working towards mutual (e.g., improvement) goals 3. *Reflective practice*: Various forms of reflection on leadership experiences

Implement & Deliver	*Objective* – Effective MLT through appropriate implementation, facilitation, trainee engagement and continuous (re)configuration and alignment with moderating factors *Result* – Sustained legitimization of MLT	• Trainee engagement hinges on their perceived meaningfulness of MLT • Practical issues, in particular clinical time constraints, influence attendance • Organizationally contextualized MLT provides opportunities for management to relay with physicians and mutually invest in leadership potential • Facilitators function as 'lighthouse' and 'lightning rod' vis-à-vis MLT group dynamics	MLT effectiveness depends on: 1. *Alignment*: With regulations, processes and arrangements, at national, professional and organizational levels 2. *Various moderators*: For example, training duration; mix of training interventions; location; and trainee enrolment 3. *Effective facilitation*: By internal and/or external trainers or coaches
Evaluate	*Objective* – Objectifying MLT outcomes *Result* – Evaluative feedback at various levels, informing on training progress and effectiveness	• A multi-level approach governs MLT evaluation • Ultimate MLT goals are couched in organizational and patient-level effects • Individual trainees' ML proficiency assessment is preferably qualitative and formative • Individual assessment requires a supportive organizational climate or readiness to improve	1. *Training evaluation*: Four levels of outcome measurements (e.g., Kirkpatrick and Kirkpatrick, 2006): Level 1: Trainee responses to training Level 2a: Attitudinal changes Level 2b: Knowledge and skills acquisition Level 3a: Behavioral change Level 3b: Trainee achievements Level 4: Patient- or organization-level outcomes 2. *Assessment*: Various approaches provide opportunities for trainee competency (self)assessment

Dimension 1 - Needs Assessment & Goal Setting
Needs assessment substantially governs the identification and prioritization of MLT objectives and informs choices related to curricular content, tactics and leadership training effectiveness (Wiggins & McTighe, 2005) (Lacerenza et al., 2017). The primary goal is to capture the needs and demands at individual, group and organizational levels in order to maximize the MLT outcomes. As a preparatory effort to MLT, needs assessment helps by informing decision makers to establish a feasible balance between training content and delivery formats, and the associated stakeholders' expectations as well as local organizational goals[5]. Assessment musters the various stakeholders' opinions, even to the extent of co-designing MLT, for example through interviews, surveys, or workshops with various stakeholders (Ward et al., 2018). They can also aid in identifying (and possibly modifying) any negativity in work settings or perceptions which, if allowed to emerge, could threaten MLT delivery or outcomes (Merriam et al., 2007).

Designing MLT through outcomes-based modelling should start "with the end in mind" (Moore et al., 2009, p. 6). Such 'backwards' planning goes from identifying the most distal outcomes (e.g., at patient, employee or organizational or network level) to the most proximal outcomes (e.g., the trainee). Most reports on outcome measurements of MLT programs describe the use of the Kirkpatrick and Kirkpatrick (2006) multi-level evaluation framework, which was recently adapted to the CME context (Moore et al., 2009). We also suggest 'forwards planning' tactics for MLT, which is based on trainee's distinct individual characteristics, preferences and work-settings. Due to the dependency on different (f)actors at various organizational or network levels, it is imperative to consider a physician's capability to reach all the intended ML competency levels, which can vary interpersonally, contextually as well as over time. Currently, the use of validated ML assessment tools or benchmark models for the individual physician's goal setting of ML competencies to-be-trained is arduous. Also, their current scarcity welcomes more qualitative approaches in determining the specifics of the needed training. Eventually, thorough needs assessment will result in a well-informed selection of what is actually to be trained (goals) and how the training will be delivered (formats, tactics, etc.). Since it informs the designing and implementing of the MLT, such assessment should be performed by or in close collaboration with trainers and implementors, using various perspectives, which we will discuss now.

1. Trainee
A detailed inventory of the physician's individual needs and possibilities importantly informs the personal developmental objectives which have to be addressed by the MLT. Building on a trainee's personal needs and demands increases the program's attractiveness, participants' motivation and attendance levels, and ultimately results in a higher transfer of new learnings into the work setting and more satisfactory training outcomes (Moore et al., 2009) (Lacerenza, 2017). Contrastingly, generic designs of 'one-size-fits-all' leadership programs often jeopardize the opportunity of incorporating such an individualized approach.

We distinguish internal and external types of trainee's prospects on their MLT. Internal needs assessment is generally done during intake procedures. Appreciative inquiry, mentoring and individual or small-group coaching can contribute to more in-depth specification of both individual ML developmental goals and possible challenges or barriers. The work context and prior experiences (e.g., coaching and training or other professionalization activities recorded in a ML-portfolio) and MSF assessment also provide valuable input for identifying a trainee's modifiable characteristics or attitudes in order to increase training effectiveness (Davis et al., 2006) (Sargant et al., 2009a). Physicians' formal

[5] We note the differences between 1) locally tailored MLT that necessitates contextual (e.g., organizational or departmental) appropriateness, versus 2) more basic types of MLT training, for example focused on students' pre-clinical education or on physicians that participate in generic MLT activities outside their work setting.

leadership roles (e.g., management; boards; committees) often provide external 'validation', imparted by the legitimization of these formal positions by peers and others. Contrastingly, MLT -as conceptualized here- (i.e., for all physicians, disregarding their formal leadership roles) often does not have such a foundation (Berghout et al., 2017). Understandably, trainees' expectations can comprise a desire for a sort of external legitimization, such as a MLT diploma, (CME) accreditation or another (symbolic) form of certification (Goldie, 2012) (Monrouxe, 2010) (Onyura et al., 2019).

2. Frame of reference
The competencies trained during MLT must be clearly defined (McClarty et al., 2018). Drawing from local (e.g., healthcare organization; region; or system) or national professional (e.g., ML competency) frameworks enables standardization. This would support optimal stakeholder endorsement of MLT programs (Webb et al., 2014) (Till et al., 2017). Moreover, these (eventual) formalized frameworks offer structuring principles on which MLT can be anchored (McClarty et al., 2018). Despite being criticized by some as "a collection of unrelated verbs, nouns and adjectives" that can instill confusions (Lurie, 2012, p. 52) (Ten Cate & Scheele, 2007), ML competency frameworks are perceived and defined as providing indispensable taxonomical structure and 'language' (McClarty et al., 2018). More importantly, such lexicons can inform valuable debates (e.g., sense-making) to collectively establish clarity about the expectations and perceived values of ML in various settings of (clinical) practice (Swanwick & McKimm, 2011) (McClarty et al., 2018) (Keijser et al., 2019, This thesis: Chapter 2).

3. Contextualization
Aligning MLT to a context comprises the appraising of local (organizational) settings and incorporating medical discipline-specific requirements, both of which influence how ML is or should be enacted (Turner et al., 2018) (Lurie, 2012). Since an organizational culture can harbor determinants to (un)successful MLT, facilitating or hampering (f)actors have to be analyzed in order to identify any deterrents to training effectiveness (Leskiw & Singh, 2007) (Geerts, 2018) (Vimr & Thompson, 2011) (Dickinson & Ham, 2008). The issues that sometimes arise during organization culture assessment dictate that it should be performed by experts with a neutral position towards all the stakeholders involved (e.g., an external facilitator).

Proposition 5
In depth research on physicians' ML microbehaviors can help fine-tune MLT needs assessments and training outcomes and will ultimately benefit interdisciplinary performance.

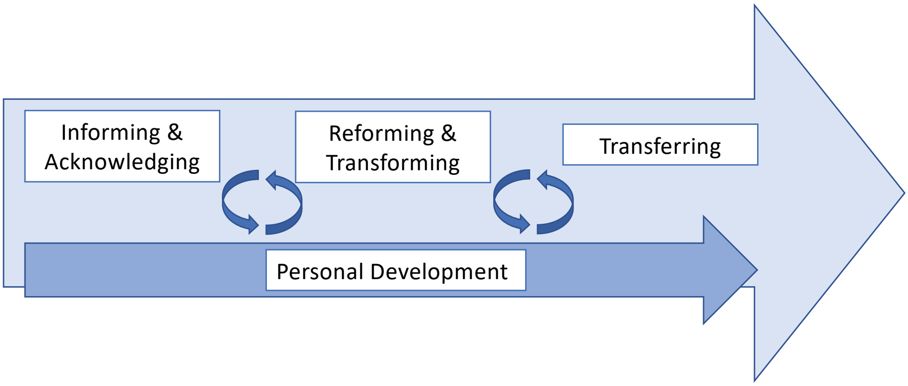
4. Integrative and longitudinal design and evaluation
The complex process of mapping various needs and requirements results in well-chosen, clear and adequate training objectives and outcomes, inserted within a strategically well-structured and -planned program. This is accompanied by the creation of a contextually appropriate and effective monitoring plan with various forms of training outcome assessments (see below) (Moore et al., 2009). Preferably, MLT is longitudinal in its duration and integrative in terms of educational strategies, for example connecting pre- and post-graduate training with CME and organizational setting (e.g., practice-based learning), while fostering ML development as an on-going process targeting both novice and veteran professionals (Stoller, 2008) (Webb et al., 2014) (Mianda, 2018) (Moen et al., 2018). Consequentially, comprehensive MLT programs will comprise various alternating interventions for individuals as well as for groups. The latter can vary in composition, for example: uni-professional peer groups; project groups; individual; multi-disciplinary sessions. Hence, it is imperative to invest in an ongoing clarification and alignment of various and often changing (sub)objectives and expectations at various

individual and organizational levels. When executing a MLT, a perceived 'mix-up' between the objectives can evoke unwarranted reservations amidst the trainees resulting in a loss of motivation or absenteeism, or in executives withdrawing resources. Such unwanted events can be mitigated by anticipating them timely, explicitly and wisely as well as through a well-prepared needs assessment for MLT and through the bold use of its results.

Dimension 2 – Training Structure

Informed by theories of learning and leadership training, as for the design of MLT structure we identified four, partly coinciding, segments that determine MLT structuring principles or segments: 'informing and acknowledging', 'reforming and transforming' and 'transferring', convoyed by a continuous process of 'personal development' (Green & Kreuter, 1991) (Slotnick, 1999) (Moore et al., 2009) (Merrill, 2002) (Marinopoulos et al., 2007) (Figure 5). This segmentation aids in the structured deployment of MLT interventions through designing an adequate and detailed planning for administering diligently defined training content and delivery tactics. Such a process ensures optimal pace and depth that enables effective learning, while continuously monitoring progress, particularly at the individual level (Figures 6).

Figure 6. Segments in effective learning and development informing design of medical leadership training



1. Informing and acknowledging

To enhance training effectiveness during the initial MLT phase, the engagement of the participating physicians (and others), or 'buy-in', has to be optimized through two categories of tactics. First, following enrollment or sign-up, the participants are, individually or collectively, informed on the envisioned program and asked about their expectations in order to augment alignment with the content and planning. Actively discussing as well as co-designing the content and learning opportunities is crucial to the process of 'predisposing' physicians to MLT (Moore et al., 2009) (Ward et al., 2018). It is widely acknowledged that trainees' optimal levels of satisfaction with the proposed objectives and activities can highly correlate with their engagement in the activities and eventual transfer of learning to practice (Green & Kreuter, 1991) (Slotnick, 1999). Secondly, investing in physicians' recognition of the benefits of MLT can be valuable. Since blunt attempts to convince these highly trained professionals often meets with skepticism, more sophisticated routines expedite physicians into 'unfreezing' their engrained incongruous perceptions about the fresh and relatively understudied concept of ML (Prather & Jones, 2003). Concurrently, thoughtful interpretation of MSF and other assessment outcomes can facilitate the progress of rethinking (or rejection of false) assumptions relating to MLT and can substantiate the potential beneficial effects of these outcomes. Ultimately, the aim of a contextually valid (re)framing of ML, particularly by the prime stakeholders such as physicians themselves, is to endorse the training's accurateness and applicability.

Both tactics can be supported by preparatory reading, lectures or small-group dialogue sessions about the program and its topics. Preparatory discussions with trainees can follow methods of 'appreciative inquiry' or 'world café' in rotating subgroups, discoursing for example a ML framework or other relevant material (Stoller, 2009). Overarching issues that evidence the need for ML, such as patient safety, quality improvement or employee well-being, can provide a mutual frame or focus of reference legitimizing MLT (West et al., 2015). Presenting and collectively considering the evidence on up-to-date organizational or team performance, employee satisfaction, and empirical studies on ML, can further activate such 'sense-making'. These 'priming' activities enable physicians and others to discuss and acknowledge what 'is' and what 'should be' and become more knowledgeable about factors potentially influencing ML (Keijser et al., 2019, This thesis: Chapter 9). Such processes can be enriched by contributions from local opinion leaders, champions, or administrators to ensure that the eventual MLT program aligns with the local or strategically intended values, aims and visions (Swanwick & McKimm, 2017). Ultimately, open-minded collective discussion can contribute to making valuable alterations to existing MLT programs that are more generic and, ultimately, to a consensus on the program's objectives and outcomes.

2. Reforming and transforming

The various 'enabling' activities can help the physicians participating in MLT gain relevant knowledge, experiment with and reflect on their attitudes, behaviors and competences, and gradually internalize their new learnings (Slotnick, 1999) (Moore et al., 2009) (Barry et al., 2018). Fundamental to this process is the sequence of 'presentation', 'demonstration', 'experimentation' and 'evaluation' of learnings (Merill, 2002). Preferably, the MLT curriculum consists of a comprehensive learning style mix (auditive, visual and kinesthetic) (Dunn & Dunn, 1978), administered through informing, demonstrating and practice-based learning interventions. Reportedly, practice-based, real-life and 'hands-on' approaches using experiences and relevant, practical examples are most effective, contributing to a prevention of post-training 'falling back' (Kolb, 1984) (Carnes, 2010) (Lacerenza et al., 2017) (Barry et al., 2018). In such a multifaceted and iterative cyclic process of reflective learning, physicians reform and progressively transform their older attitudes and behaviors, by building upon their new experiential cadres and ensemble of competences.

3. Transferring

Reportedly, transfer of MLT into practice can advance patient and population health status, employee wellbeing, organizational performance and innovation and change, in particular when physicians enacting effective ML receive top-down management support (Prather & Jones, 2003) (Moore et al., 2009) (Panagioti et al., 2017). Effective MLT programs challenge physicians to adequately self-organize their new leadership skills into their own work context with its unique organizational processes, characteristics and traditions. Successful transfer of MLT learning into daily practice can occur after or simultaneously with reaching certain levels of ML proficiency, supported by relevant experiences in personal development (Eid & Quinn, 2017).

Training transfer has various determinants, including varying aspects of (medical specialists') clinical work, organizational culture and physician's personal characteristics, all contributing to the challenge of mitigating the "transfer problem" (Baldwin & Ford, 1988, p. 63) (Caffarella & Daffron, 2013) (Eid & Quinn, 2017). Action learning projects foster opportunities to support and uphold effective learning transfer (see below). Post MLT reinforcement activities (e.g., personalized reminders; alumni activities; refresher training; and repeated MSF assessment) can help sustain this type of return-on-investment of MLT (Green & Kreuter, 1991).

Learning transfer can be encouraged by linking training with a formal degree or certificate, scientific follow-up on training effectiveness, managerial and the aforementioned management endorsement of the training program. Finally, alumni participants ‘paying forward’ their training involvements and providing a corps of ML faculty with experienced mentors, coaches and trainers, can reciprocally help sustain the gained levels in ML proficiency over time, as well as expand related activities within and between organizational and professional boundaries, while at the same time sharing best practices.

4. Personal development

Effective MLT ensures physicians’ use of own experiences and internal (emotional) responses as learning materials for personal and self-awareness development. This process primarily builds on the individual trainee’s traits (Burke & Day, 1986). As discussed earlier, and in tandem with PI formation, physicians’ personal development is based on deeper individual aspects (Maile et al., 2019). Recently, self-awareness, personal development and accompanying topics like emotional intelligence and mindfulness, are increasingly considered as crucial elements in MLT and regarded as promising organization-directed approaches to professional well-being (Stoller, 2008) (Frich et al., 2015) (Panagioti et al., 2017) (Barry et al., 2018) (Sultan et al., 2019). Physicians’ development of their emotional awareness and intelligence and mindfulness is progressively addressed as favoring employee satisfaction and retainment, organizational performance and patient outcomes (Lobas, 2006) (Hopkins et al., 2015) (Montgomery, 2016) (Shouhed et al., 2019). Such beneficial effects, however, do not come through a ‘quick fix’ by means of a generic, one-session-type course in, for example, self-awareness (Martimianakis et al., 2015). Increasingly, MLT programs provide self-development that is rooted in iterative and dialogic processes, supported by episodes of reflection and deep learning, with a focus on identifying and profoundly exploring personal hindrances to individual personal self-development, including the trainee’s upbringing, individual paradigms, misconceptions and stereotyping of leadership (Moen et al., 2018) (Williams, 2019). Since, MLT programs have, so far, primarily focused on conveying cognitive “know” and “do” elements, it is recognized that the incorporation of components related to “becoming” or “being” a physician who can enact effective leadership is warranted for effective MLT (Frich, 2015, p. 671) (Cruess & Cruess, 2016) (Sultan et al., 2019).

> *Proposition 6*
> *Effective MLT design and delivery also hinges on the program’s adaptability to continuously changing individual and contextual needs and demands.*

Dimension 3 – Training Modes and Practices

Effective MLT builds on a variety of educational methods. We identify a set of practices entailing three active learning ‘modes’ (stretch opportunities; group learning; and mentoring), and two specific practices: practice-based projects and reflection exercises.

1. Modes of training

Apart from providing trainees with a sufficient knowledgebase on ML(T) theory and practice, we suggest the use of practical methods as an imperative principle for MLT. Although ‘passive’ forms of learning (e.g., presentations and lectures) provide trainees with evidence on ML, and convey and explicate essential basic knowledge and abstract concepts that are indispensable to MLT, they are, by themselves, not sufficiently effective in enhancing trainees’ ML proficiency (Grimshaw et al., 2001)

(Procter & Sturgess, 2018) (Lacerenza et al., 2017) (Frich et al., 2015). Therefore, we discuss below three 'active' modes for elements of MLT.

Heat and stretch

Stretch opportunities in leadership development characterize practice-based learning, reflecting Days' proposition that "leadership is developed through the enactment of leadership" (Day, 2000, p. 60) (Till et al., 2017) (Taylor et al., 2008) (Bohmer, 2010). Physicians' exposure to different situations and perspectives challenges them to intensely experience how to enact competencies under varying circumstances. Stretching exercises (such as simulations, or specific assignments at work or in small-group settings - see next section), as well as their related reflection activities, help deepen the process of iteratively examining new situational information and accompanying, more tacit, perceptions and emotions, when applying new (leadership) techniques and subsequently reflecting on outcomes using various sources of feedback. Physicians' learning can significantly intensify when they are effectively confronted with such a multi-level mixture of internal, social, psycho-motor and other (micro)behavioral aspects that encompass their leadership competencies (Gordon et al., 2017). Experiences in practice-based stretch (or 'heat') enhances their purposeful (self- or assisted) reflections on actions, feelings and beliefs, ultimately challenging them to consider making suitable adaptations to old, less-effective cognitive and behavioral patterns and routines (Grimshaw et al., 2001) (Till et al., 2017). Stretch opportunities come in various educational formats and can be organized in various settings (for example: Webb et al., 2014; Mianda & Voce, 2018) (Table 2).

5

Table 2. Practice-based learning formats suitable for medical leadership training

- Narrative or reflective writing assignments
- Simulation / role-play
- Post-exercise video-analysis
- Case analysis
- Appreciative inquiry dyadic or (sub)group discussion
- Case based brainstorming
- Electives and rotations ('shadowing')

Small-group learning

Small group problem-solving assignments and simulation training are frequently used formats of practice-based learning in ME and MLT (Marinopoulos et al., 2007) (Hopkins et al., 2018). Such discussion-based interventions have also been reported as being effective for physician burn-out prevention (West et al., 2016). Comprising of mono- or interdisciplinary groups, these approaches help merge theory, provided through educational lectures, with practice (Clapper, 2010). Video recordings of these exercises can facilitate self-reflection through expert- (e.g., trainer) and peer-feedback and facilitation, or post-session reflective dialogue in small groups (Patel et al., 2015) (Ten Have et al., 2013). A variety of assignments for these group-based MLT practices have already been reported, for example: teamwork and -building; finance and logistics; change management and process improvement; business plan development; marketing; situational leadership; coaching and mentoring (Stoller et al., 2007) (Stoller, 2008).

(Peer)mentoring

Experiential learning often incorporates forms of mentoring, for example: senior-apprentice, peer-to-peer and group-peer (Taylor et al., 2008) (Straus et al., 2009) (Pololi et al., 2015). Training (near-)peers in mentoring individuals or small groups, in roles like facilitator or discussion leader, can be valuable to MLT (Till et al., 2017). (Near-)peer-to-peer mentoring among physicians from the same institution who are participating collectively in MLT and have common experiences and objectives, also has benefits. It can link training to local strategic priorities, foster the co-creation of a desired local leadership culture, and support training transfer through interpersonal reinforcement (Conger, 2010) (Hopkins et al., 2018).

The social proximity of near-peer mentoring in small mono-disciplinary MLT groups, or in multi-disciplinary teams engaging in action learning projects, fosters a relatively safe environment for physicians' (personal and leadership-ready) growth (Bennett et al., 2015) (Voogt et al., 2016). Dyadic forms of (near)-peer-to-peer mentoring can also benefit MLT, for example through ML (shadowing) rotations (Stoller, 2008) (Till et al., 2017). However, more hierarchical type clinical learning settings often uphold the more leader-followership set-ups, resembling the dynamics of the hidden curriculum (Martimianakis et al., 2015). Thus, dyadic peer-mentoring also holds challenges, for example: the perpetuation of 'old-school' ML behaviors ('cloning the mentor'); a mentor's lack of ML-proficiency; overdependency; inter-generational discrepancies; interpersonal tensions; or time-constraints (Solansky, 2010) (Pololi & Evans, 2015). Although more enquiries on its effectiveness are warranted, peer-mentoring advances the practicing of reciprocity, effective listening and receiving and providing feedback, all being related to effective ML skills (Straus et al., 2009) (Leach et al., 2014).

Proposition 7
Members of the current senior medical generation are inadequately (if at all) trained in contemporary ML, coercing the question: 'Who should / How to train ML-trainers and -mentors'?

2. Action learning projects
MLT embedded in practice-based, interdisciplinary action learning projects is suggested to provide valuable experiential and practice-based learning, whilst being convoyed by service delivery or patient safety improvement (Revans, 1980) (Mianda & Voce, 2018) (Voogt et al., 2016) (Eid & Quinn, 2017) (Noordegraaf et al., 2016) (Keijser et al., 2019, This thesis, Chapters 6 and 9). These real-life, 'microsystem' types of settings offer opportunities for (interprofessional) learning and co-creation within the practical and social perspectives that bolster transformational, political, and professional aspects of ML (Hess et al., 2015).

Project-based group interactions can help trainees to understand themselves better in varying situations and to amplify their behavioral toolbox, for example towards more co-creative solution finding or design of shared mental models, by scaffolding these interactions with other MLT components, such as small group reflection and mentoring (Prather & Jones, 2003) (Marquardt et al., 2012) (Keijser et al., 2019, This Thesis: Chapter 4). Going beyond physicians' renowned critical reflexes on change and reform initiatives (Bhattacherjee & Hikmet, 2007) (Stoller, 2004), physicians are more prone to display attitudes of curiosity, humility and resilience when they participate in a "project [that] links organizational responsibilities and medical professionalism" (Noordegraaf et al., 2016, p. 1111). Furthermore, locally contextualized action learning projects, addressing specific organizational challenges, and augmented by team-based approaches, provide a "practicum to consolidate various skills presented in the [MLT] and align with the institution's priority on improvement and innovation" (Stoller, 2008, p. 316) (Merrill, 2002) (Marquardt et al., 2012) (Wides et al., 2013). Intense interaction between the contextual setting and individual behavior imposes a specification of the individual trainees' goals in MLT, as well as personal development and organizational performance (Lurie, 2012) (Turner et al., 2018).

It is suggested that physicians participating in such projects can trail-blaze and role-model by questioning the status quo, and by problem solving, collective learning, or overcoming setbacks in projects (Voogt et al., 2016) (Eid & Quinn, 2017). Moreover, physicians who co-lead action learning projects can impart the break-through buy-in of others, since power dynamics and tribal issues often accompany healthcare innovation, improvement or reform initiatives, resulting in swifter coping with the hitherto insurmountable issues and resistance (Wierenga et al., 2013) (Mianda & Voce, 2018). Combining contemporary multi-disciplinary training curricula (such as TeamSTEPPS™) and MLT approaches, may enhance such crossings of interprofessional barriers, resulting in more effective team and ML performance (Parker et al., 2018) (Philibert et al., 2019) (Keijser et al., 2019, This thesis: Chapter 7 and 9). Moreover, 'MLT-inside'-type projects can also invite participants from various professions to expand their PI formation beyond their professional silo. Action-projects, as part of MLT, foster more interprofessional synchronicity (juxtaposed to rivalry) through collective (re)design of shared mental models (Burford, 2012). Relatedly, research suggest that the best chances for success in healthcare professionals' behavioral change are through collective interventions that emphasize the expectations of an 'external reference' (Johnson & May, 2015).

Recently, a broader scope of 'learning in action' was being mused as well, for example using experiential placements in which trainees become more acquainted with the challenges beyond the realms of micro-clinical work (e.g., executive 'shadowing'). Here, they are exposed to more macro-level healthcare system- and network-level challenges that often result in wicked problems that have to be addressed (Keijser et al., 2019, This thesis: Chapter 4). A Recent literature review signals the emergence of a new generation of MLT programs that incorporate curricular content on macro level system issues (Onyura et al., 2019).

3. Reflecting

Multiple forms of reflection represent a third active learning mode for MLT (Wald et al., 2015) (Moen & Prescott, 2016b) (Maile et al., 2019). MLT invites trainees to undertake a narrative reflection after performing or experiencing a significant event that includes some form of leadership. Reflection often follows a process of analyzing what happened, and what trainees could do differently in the future (Clapp et al., 2018) (Moen & Prescott, 2016b). Reflecting can comprise, for example: analysis of personal experiences and emotions; behavior and actions of those perceived as role models; and learning experiences and expectations (Wong & Trollope-Kumar, 2014). By contributing to physicians' ML 'identity capital' (Cote, 1997), reflection functions as a way of developing self-knowledge and -awareness, including an array of personal repertoire of strengths, weaknesses, beliefs, values, attitudes and behaviors. These elements govern trainees' internal emotional processes as well as external behaviors, including how they perceive themselves when enacting leadership (Ricoeur, 1992) (Goldie, 2012) (Moen et al., 2018). Reflecting also facilitates acquiring proficiency in 'switching' between leadership styles: the physician's ability to adapt her/his leadership style adequately to a specific setting or role. Importantly, medical PI formation is equally bestowed in the process of reflecting on and making sense of experiences and expectations from various social encounters. Reflective practice during MLT entails the iterative process of reflecting on common personal or professional scripts, and enquiring about the appropriateness of such stereotypes, during the various social interaction moments. The trainee's unique professional ML identity is embodied within these temporal sequences of reflection (McKimm et al., 2019).

Reflection necessitates adequate educational space, time and other resources to foster the process of understanding and synergizing the existing and evolving (ML) identities (Goldie, 2012). Preferably, MLT provides the trainees with opportunities of reflection on the experiences from interactional settings, entailing multiple (professional) perspectives, since these are most beneficial to gauge the deeper meanings and dynamics of the ML competencies that are being developed (Monrouxe, 2009) (Davies, 2012).

Group-based reflections, such as used for teambuilding, can harbor valuable reciprocal feedback loops among group-members to reflect on individual performance (Clandinin & Cave, 2008) (Wilson, 2013). In particular during practice-based learning projects, MLT related reflections incorporate the physician's potential to critically challenge the institutional status quo or habitus and to recommend alternative ways of dealing with or perceiving essential issues (Doyal, 2001) (Monrouxe, 2009).

Proposition 8
MLT requires a 'learning locus mix' fostering experiential and reflective practice in which common professional patterns or 'logics' can be challenged, without negative repercussions for the actors involved.

Dimension 4 – Implement and Deliver
In pursuit of meeting the MLT objectives, training outcomes depend on effective implementation, delivery and facilitation. Various strategies and moderators can play out at national, professional and organizational levels.

1. Aligning implementation strategies
It is important to align MLT implementation with (f)actors at various levels. First, MLT employment requires adequate understanding and application of science and practice related to professional engagement and empowerment (Miller et al., 2018) (Hess et al., 2015). MLT programs that effectively invest in physicians' engagement mitigate the risk of alienation from other activities in physicians' busy schedules. Also, local improvement and innovation initiatives represent a 'double edged sword': appropriate alignment of MLT with these activities is imperative for successful implementation, and equally, such activities often provide definite opportunities for practice-based ML development (e.g., Noordegraaf et al., 2016).

Similarly, to prevent tokenistic 'tick-box' attitudes, it is essential that trainees perceive MLT as 'meaningful' (Moen & Prescott, 2016a). Therefore, MLT programs must consider various (f)actors, for example: physicians' autonomic position and status; professional associations and their substantial influence; formal procedures, policies and arrangements (e.g., compensation and accountability regulations); national and local (e.g., healthcare organization's) strategies; and other education schemes (Reay & Hinings, 2005) (Denis & van Gestel, 2016) (Hopkins, 2018) (Keijser & Martin, 2019, This thesis: Chapter 3). Such (f)actors importantly govern how physicians perceive MLT and affect their motivation (or lack thereof) to engage in training.

Also, thirdly, MLT implementation can benefit from adequate alignment with contemporary strategies and regulations at national, regional and organizational levels, including activities and educational schemes from medical and other professional associations. Historically, the medical profession organized its education autonomously, mainly based on peer-to-peer learning, relatively outside direct influence of various organizational peculiarities. However, we note in the contemporary scholarly output on ML(T), a shift in ME from being 'professionally centralized', towards 'organizationally contextualized'. This shift is also marked by an increased attention to interprofessional education and interorganizational learning that parallels ML's emerging notion (Nembhard et al., 2012) (Brewer et al., 2016) (Forman et al., 2014).

Finally, MLT implementation can be furthered by adequate networking between policymakers, associations, educators, management and executives (Ferlie et al., 2016) (Philibert et al., 2019). Transformative change, comprising various organizations or networks, can considerably stimulate the learning and working across boundaries and result in the creation of innovative communities of practice among physicians, allied professionals, managers and others (Thistlethwaith, 2012) (Till et al., 2017) (Keijser et al., 2019, This thesis: Chapter 6). If organized well, these settings of change can provide effective opportunities for MLT.

2. Delivery moderators

Designing and planning MLT involves decisions on various moderating features, including for example: length; mixture and location of interventions; participants; and admission process. Extant MLT programs vary greatly in duration, ranging from days or weeks to several months. They comprise interventions ranging from one-stop-shop courses, short-bursts of experiential learning, to longitudinal (MSc or MBA eligible) programs (Fernandez et al., 2016) (Frich, 2015) (Onyura et al., 2019). Since time away from clinical duties is precious, we advise that the intensity of the interventions should align with the trainees' other (clinical) activities to mitigate negative effects on their motivation or attendance (Mianda & Voce, 2018).

Highly motivated adults are more likely to participate in training, despite its intensity or workloads (McClusky, 1963) (Hintzman, 1974) (Merriam et al., 2007). However, since clinical work can be very demanding, MLT designers and implementers should consider 'spacing' the MLT sessions adequately: using the temporal margins wisely between the various training sessions and interventions. Applying multiple sessions over longer periods of training can be more effective than, for example, one intense week of MLT training (Salas et al., 2012) (Lacerenza et al., 2017). Similarly, Frich and colleagues' (2015) recent review on MLT suggests that combining multiple sources of MLT learning is likely to have the largest impact on training transfer. This also concurs with reports on the adequacy of an 'intervention mix' aimed for effective behavioral change of healthcare professionals (Johnson & May, 2015).

With a high real-life fidelity and placed in physicians' work settings, 'home-grown', or 'in-company' MLT programs are reported to foster high physician engagement, organizational impact as well as training effects at psychological, task and physical levels (Vimr & Thompson, 2011) (Mianda & Voce, 2018). Moreover, on-site training activities enhance attendance and motivation (e.g., reduced work-floor absence, costs of travel, location and catering) and offer the (training)practice of navigating multi-professional settings. The latter entails the involvement of 'insiders' and other actors, all familiar with the local organizational dynamics and needs that can benefit these "intramural programs" (Stoller, 2008, p. 312). Contrarily, on-site training can also impart various unwelcomed distractions and lack of external influence, such as 'out-of-the-box' thinking and learning.

Admitting physicians to a MLT involves various additional considerations. ML trainees, with variances in career level, prior training and experiences, and formal positions, can develop a resistance to change and impede learning, especially senior level trainees who might experience a "ceiling effect" (Lacerenza et al., 2017, p. 1690). Contrarily, less senior trainees are possibly more inclined to learn (Merriam et al., 2007) (Avolio et al., 2009). Also, transfer problems, typical of highly institutionalized professions like medicine, can evolve from deeply entrenched behaviors (Baldwin & Ford, 1988) (Keijser et al., 2019, This thesis: Chapter 2 and 3). Other concerns when composing training groups relate to, for example: individuals' ML proficiency, medical specialty, gender and minorities (Hopkins, 2018).

Publications on MLT programs report the application of selection procedures (e.g., nominations), existence of committees applying diverse criteria, or an exclusive focus on organizations' 'rising stars'. Contrastingly, offering voluntary enrollment to MLT programs can affect participants' motivation, resulting in better training outcomes, while mandatory programs might meet with their resistance, especially since physicians are used to choosing their CME programs autonomously. Interestingly, a hybrid trainee-recruitment tactic is to create a moral obligation through, for example, opinion leaders who communicate their experiences with previous pilot trainings (Lacerenza et al., 2017).

Choosing MLT interventions, and composing an adequate intervention mixture, is also informed by trainee specifics and preferences. Trainees can have interdependent roles, such as expert clinician, team member, and formal leader (Moen et al., 2018). Also, personal interests and needs, as well as specific work setting requirements, importantly inform program selection, make-up and customization. So far, no reports are known of ML ‘stratification’ by, for example, offering trainees a selection of distinct ML ‘profiles’ or ‘personas.’ Thus, since contemporary MLT programs are mostly generic, there is a scarcity in MLT customizing its content to specific sets of ML competencies. Yet, since physicians are not ‘Jacks-of-all-trades’, imaginably, distinct ML profiles that fit individual physicians best could further the well-balanced composition of MLT programs servicing pluriform members of the medical community (Keijser et al., 2019, This thesis: Chapter 6).

3. Facilitation

Compared to training formats facilitated by an external or internal trainer, self-administration of leadership development is less effective; moreover, the latter might be perceived as ‘cheap’ (Clapper, 2010) (Lacerenza et al., 2017). Besides benefiting from the contributions of (guest) lecturers and local champions sharing personal experiences or executives endorsing the program, facilitators are reported to benefit from high levels of trainee engagement as well as MLT’s impact on organizational performance (Vimr & Thompson, 2011). MLT trainers and facilitators do not necessarily function as mentors, but primarily focus on trainees’ inclusion, timekeeping and structure, as well as on providing theoretical and evidence-based backgrounds (Pololi, 2015). As well as being proficient in individual and group coaching, preferably, a facilitator is adequately knowledgeable about the local organizational culture, and therefore capable of effective reflection on individual or group actions and dynamics. Although ‘in-house’ facilitators are reported to benefit physicians’ engagement and the organizational impact of MLT (Vimr & Thompson, 2011), being a member of the same organizational culture can hamper training effectiveness. While contracting an external a facilitator or coach can help mitigate the remnants of the old organizational culture, having a coach can, for some, be stigmatizing (e.g., allegedly implying their underperformance). Therefore, advisably, coaching and mentorship in MLT should be chosen, communicated and prepared for in a thoughtful manner (Day, 2000).

One imperative aspect of MLT facilitation is dealing with emotions and stress that often involuntarily force participants into their less-favorable ‘survival mode’ resulting in defensive and other negative responses. Facilitators must therefore be able to prioritize the acquisition and maintaining of psychological group safety and a non-intimidating atmosphere (MacLean, 1985) (Clapper, 2010) (Pololi, 2015) (Edmondson, 1999). Physicians’ feelings of being vulnerable to critique or falling short (e.g., in underperforming in certain competencies) can instill threats to their self-esteem, hampering their learning (Clapper, 2010) (Moore et al., 2009). By functioning as either a ‘lighthouse’ or a ‘lightning rod’ for certain dynamics that can spiral into unconstructive behaviors, a facilitator is capable of identifying and openly addressing emotional cues on undesirable processes towards more effective dialogue while at the same time pursuing the training objectives and common purpose. Given healthcare’s hierarchical character and entrenched PIs, experienced facilitators are proficient in identifying and coping with old and inundated grudges between people, professions and groups by rerouting them wisely and effortlessly, also exploiting them as ‘moments for learning’. The aim of MLT facilitators is creating and sustaining “a shared belief that the team is safe for interpersonal risk taking” (Edmonson, 1999, p. 354) (Prather et al., 2003). To be able to understand well how individuals deal with (inter)professional cultures, facilitators could build on personal experiences in (medical or related) training and practice, scaffolded by additional trainings in ML coaching and interdisciplinary teamwork development (Weaver et al., 2010).

Dimension 5 – Evaluation
Our framework's fifth dimension concerns structured and multi-leveled assessment and evaluation of the training and trainee.

1. Training evaluation
Evaluating and assessing MLT is crucial for appraising its 'return-on-investment'. Detailed MLT evaluation schemes also inform the faculty, trainees, facilitators and others in continuously refining the training program, including its content and objectives. With the current scarcity of distinct tools for assessing ML competencies and training (outcomes), contemporary evaluation approaches for general leadership assessment and training provide valuable input (Moore et al., 2009) (McPhail et al., 2015) (Keijser et al., 2019, This thesis: Chapter 9). Concurring with principles of adult and physician learning, these approaches suggest outcomes-based program evaluation, which explicitly links evaluation metrics to training goals, content and delivery.

An MLT outcome evaluation scheme is informed by the pre-training needs assessment, including physician's individual preferences, the organization's goals and objectives, and use of an appropriate ML competency framework or standard. Structuring a MLT evaluation typically involves a sequence of the following four distinct (sub)levels (Kirkpatrick & Kirkpatrick, 2006) (Moore et al., 2009) (Onyura et al., 2019): Level 1: Trainee responses to training (e.g., satisfaction); Level 2a: Attitudinal changes: Changes in attitudes and beliefs (affective learning); Level 2b: Knowledge and skills acquisition: Cognitive (e.g., concepts and insights) and skill-based learning; Level 3a: Behavioral change: Application of knowledge/skills in practice (i.e., training 'transfer'); Level 3b: Trainee achievements (e.g., academic, professional, positional accomplishments); and Level 4: Patient- or organization-level outcomes (e.g., procedural or organizational changes). This last, highest level of MLT outcomes, encompassing improvements in patient or community health indicators or of organizational performance and evidencing effective MLT transfer to practice, is often lacking in contemporary literature on MLT (Conger, 2010) (Stoller, 2013) (Frich et al., 2014) (McClarty et al., 2015).

2. Trainee assessment
Evaluation of ML at trainee level can involve various types of pre-, per- and post-training assessments (Table 3). With the current scarcity of validated ML assessment instruments, more generic (e.g., general leadership) tools have been applied so far to MLT (Chesluk et al., 2012) (Mianda & Voce, 2018) (Moen & Prescott, 2016a) (Keijser et al., 2019, This thesis: Chapter 9). Periodical use of formative feedback, like MSF, can help monitor progress and stimulate behavioral change (Eid & Quinn, 2017). Moreover, the personal and narrative-types of feedback that accompany MSF responders' quantitative scores can provide trainees with specific input, which they often perceive as valuable (Overeem et al., 2010). Detailed assessment of individual performance on specific ML competencies can be highly resource-intensive, for example requiring in-depth (e.g., video-based) analysis of various selected situations to clearly distinguish ML-related 'signal' from construct-irrelevant 'noise' (Lurie, 2012).

Among the various quality and usability aspects of ML assessments at the individual level (Hannum & Martineau, 2007), we consider two important issues. First, a "positive and supportive culture of assessment and trust" must be assured for scrutinizing individual physicians' competencies in ML (Barry et al., 2018, p. 1). Creating and sustaining such a culture often requires significant effort and time and might necessitate unexpected periods of contextual preparatory work (Keijser et al., 2019, This thesis: Chapter 9). Perceivably, this adds to the positively contributing effects of high-quality mentoring or coaching during the debriefing of assessment scores to the trainee and of their perceived knowledgeability and credibility of the feedback sources (Overeem et al., 2012) (Ferguson et al., 2014). Secondly, in order to benefit from the assessment, MLT participants must be adequately open to accepting feedback and to personal development in general. Similarly, they must be prepared for the often-winding processes that characterize personal development and to dare to discuss personal matters with colleagues and others who are involved in MLT.

Proposition 9
Designing and using quantitative MSF assessment tools for MLT is highly complex and resource demanding, enticing an investigation of alternative approaches.

Proposition 10
By trailblazing MLT, the medical profession can advance healthcare system reform by adding ML to their contemporary professional identity that fosters a further rethinking of traditional ro/ules, practices and behaviors.

Table 3. Medical leadership competency assessment types and key resources

Type	Description (and selected references)	Practicalities
Self-assessment	Self-scoring against ML competencies characteristics (Murphy, 2016) (MLCF, 2012) (Keijser et al., 2019, This thesis: Chapter 6)	Cognitive learning and goal setting, using (online) scoring forms
Cohort or group self-assessment		Same specialty cohorts or medical staff; Group discussions for team development
Multi-source feedback or '360°'	Self-rating versus responses from others (Chesluk et al., 2012) (Overeem et al., 2010) (Ferguson et al., 2014)	Meticulous confidentiality required; High quality guidance in interpreting feedback; Combine quantitative with narrative feedback from respondents
Observation	Simulation or practice-based performance observation (Oza et al., 2018)	Group simulation-based assessment; Use of role-play and actors; Observation scoring forms; Skilled observers required
ML 'Personas'	Self-scoring against distinct set of ML archetypes descriptions (Keijser et al. 2019, This thesis: Chapter 6)	Compare with group average self-scores; medical team development (e.g., optimal balance of ML archetypes within each team)
Narrative writing	Reflective writing to promote deep, meaningful reflection (Moen & Prescott, 2016b)	Personalized self-assessment comprising a 'journal' and integrated portfolio, including short fragments of reflective writing

CONCLUDING CONSIDERATIONS

This paper presents the results from “research examining processes and meanings” in the new area of ML, in order to contribute to relevant theory and practice on MLT (Gough et al., 2012, p. 3). By instilling more rapprochements between science and practice, we attempted to analyze and structure possible relationships between contemporary views and experiences in the context of established theoretical backgrounds (Barling et al., 2010).

Systematic literature reviews are time- and -resource consuming and can be hard to justify when the extant literature is relatively meagre (Khangura et al., 2012) (Tricco et al., 2015). In our case, the heterogeneity in the scholarly reports on MLT meant applying a form of literature review that was not intended to be exhaustive, or in a meticulous assessment of the sources’ quality. Therefore, we must note that caution should be taken when interpreting our literature-based essay for several reasons. First, by being enthusiast scholars and practitioners in the field of (medical) professional leadership development, our interpretations of the extant literature could have been influenced by a researchers’ bias. Also, possibly, our topic expertise might have blinded us from new ways of thinking that could otherwise have provided added value to the current paper. Thirdly, the expertise amidst the authors does not cover all fields and topics related to ML and its training. Therefore, we think, more scrutiny of our findings by, for example, consulting the wider community of expert peers, can further the journey of deciphering the principles of high-quality MLT (Green et al., 2006).

While identifying ‘pockets’ of relevant theory to illuminate high-quality MLT practice in a ‘clearheaded manner’ (Norman, 2004), our study reviews extant scholarly knowledge on practice-relevant MLT and discusses a new framework and principles for an effective design and delivery of MLT. Although the framework does not result in rules, its derived principles can co-guide educational planners, scholars, those responsible for commissioning investments in our healthcare systems’ workforce, individual physicians and those considering the various aspects of developing, providing or choosing high quality, context bound MLT and the effective scientific reporting thereof. Moreover, not necessarily empirically tested, our paper can help inform or provoke thought and controversial scholarly and/or practical dialogue on the phenomenon of ML and its training (Green et al., 2006).

Thus, presented as an ideal set, not a prescription to be followed, all the framework components require more study as our work only scratches the surface of a field that comprises an expanding number of ML-related initiatives. Therefore, we suggest this framework can serve as a starting point for more systemization that can guide decision making in the various phases of designing and administering ML training in various contexts. Building on the pioneering experiences of the current generation of MLT practices, we hope the above can help consolidate effective MLT practices, ultimately enabling more research on sustainability, portability and transferability of effective MLT.

In conclusion, our findings suggest that harvesting the potential of MLT hinges heavily on a well-synchronized agency between various levels of the healthcare industry (Keijser & Martin, 2019, This thesis: Chapter 3). Accordingly, synchronization between pre- and post-graduate programs and alignment between ML theory and practice will advance a smooth transition of new personnel from universities to front-line work settings. Also, it can facilitate the current professional generation into avenues of effective system transformation and re-professionalization (Reay et al., 2016). More intense collaboration within the triangle of professionals’ associations, educational curricula, and healthcare organizations in which professionals work and learn in practice, is likely to facilitate such complexity-proof leadership development of physicians who are proficient in imparting better organizational decision-making and improved patient outcomes. Additionally, more and better intersectoral collaborations will not only foster the needed improvement and reform of our healthcare systems (Hill & Stephens, 2005) (Stoller et al., 2007) (Shannon, 2015); it will strengthen the social capital in our organizations and navigate more shared forms of leadership within our healthcare workforce.

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CHAPTER 6

Leadership Personas in a Community of Practice Model for Contextualized Medical Leadership Development

Key words
- Medical education
- Community of practice
- Medical leadership
- Interprofessional learning
- Continuous improvement

Abbreviations
ME, Medical Education
ML, Medical Leadership
MLT, Medical Leadership Training
CoP, Communities of Practice
PI, Professional Identity
PIF, Professional Identity Formation
MLI, Medical Leadership Identity

ABSTRACT

The recent emphasis on Medical Leadership (ML), reflecting the non-clinical competencies required of doctors, has the potential to bolster inclusivity and (inter)professionalism at the frontline of healthcare delivery. However, traditional educational approaches risk ML becoming a new form of medical dominance.

Utilizing the promises of the ongoing conversations and associated practices of ML, a novel approach to the development of ML is introduced. Guided by the organizing principles of Communities of Practice, the educational concepts of professional (leadership) identity formation and personas, this paper describes a conceptual model for a more inclusive and collaborative approach to leadership development in multidisciplinary healthcare professionals' teams.

A set of twelve distinct ML personas has been empirically identified and we explain how they can serve as a practical tool to identify and co-create local needs and demands relating to shared forms of leadership as well as followership. Complementing uni- and multi-professional teamwork, this model uses a purposeful and inter-professional meaning-making approach, based on the leadership development of individual doctors and others.

Couched in the dynamics of workplace- and relationship-based collective reflective learning and facilitated by the valuable input from the various stakeholders collaborating in dynamic and fluid healthcare groups, the generic set of ML personas aims to inspire and motivate development of 'social capital' as well as building individual 'leadership capacity' throughout organizations.

INTRODUCTION

Contemporary healthcare professionals must deal daily with an increasing flow of ambivalences and 'intersections' arising from changing situations, groups and people. There is a growing need to better understand the multiple identities or "personas" of these social actors at healthcare's frontline of service. At the same time, there is a need for more effective approaches to daily clinical practices and how these activities are governed by the "substantively distinct experiences from the effects of inextricably connected roles and situations" (Richardson & Loubier, 2008, p. 143). As a result, over the past two decades, the concept and practice of medical leadership (ML) has witnessed a shift in the expectations of doctors in Western healthcare systems. Alongside other conversations related to doctors' leadership in formal (e.g., executive board level) leadership positions, ML has been described as the mandatory and basic non-clinical (or not directly patient-related) competencies and behaviors that *all* doctors should be able to demonstrate both within their clinical work and wider activities and roles within the healthcare system and society (GMC 2012; Frank et al., 2015) (Saxena et al., 2019).

The introduction of this new ML paradigm has also contributed to the ongoing identity shift of the medical profession and its members from doctor-centered ways-of-working towards more team-oriented, interpersonal interactions that foster continuous improvement and change (Voogt et al., 2016) (Eid & Quinn, 2017). The leadership competencies associated with this new paradigm of ML have been described primarily as advocating interpersonal relations that are in stark contrast with doctors' traditional patient-focused working and the historic nurse-doctor dyad (Barrow et al., 2011) (Barrow et al., 2015) (Keijser & Wilderom, 2019, This thesis: Chapter 5). These notions concur with reports on the significance of self-awareness, emotional intelligence and personal growth as fundamental elements of leadership capacity and how doctors' and others need to effectively function in larger groups and organizations (Stoller, 2008) (Mintz & Stoller, 2014). Although doctors often operate within relatively small units (Nelson et al., 2008), increasingly, their patients' journey is habitually spread out over various professional groups.

In this paper we explore how ML's promising intentions stand juxtaposed to contemporary educational formats which fall short of adequately supporting frontline leadership competency development. Also answering calls for more collectivist and practice-based learning, we present a conceptual model that is based on interdisciplinary work and leadership development. Combining the educational concepts of professional identity formation and personas and applying the guiding principles of community of practice theory, our model supports the promising notion of a holistic approach to ML and departs from the mono-disciplinary fragmentation of leadership development. By empowering professionals in becoming proficient in smooth switching between various professional (e.g., medical) contexts, ML warrants the interprofessional and continuous learning that is required in healthcare teams to provide those services that suit patients best (McCall, 2008).

BACKGROUND

In this section we start by outlining how ML has emerged and holds promise for more collaborative forms of healthcare delivery. We also describe how the current development of ML programs and training takes place and how their implementation might fall short of realizing the promise of an effective ML training. We end with some proposals for a way forward.

Medical Leadership's Emergence and Promise

Multiple factors have been described to explain the rise of the new concept of ML (Keijser & Wilderom, 2019, This thesis: Chapter 1), including: shifts of previously exclusive medical tasks to non-medics (i.e., task shifting) (Karimi & Shahanjarini et al., 2019); a shift away from doctor-centric ways of working; decay in professional autonomy (Voogt et al., 2016), and increasingly demanding bureaucratic processes aimed at risk- and cost-containment and the need for more accountability (Ewert, 2018). Further, relational tensions caused by system reforms and innovations have been noted across professional, jurisdictional and hierarchical boundaries between doctors and other health professionals, spurring growing attention on ML (Howard et al., 2012) (Onyura et al., 2019). The increased complexity of healthcare practices and systems requires doctors to be able to take on various non-clinical activities and roles and rapidly adapt to changing circumstances and demands (Fulop, 2012) (Noordegraaf et al., 2016). In an attempt to engage doctors more meaningfully in healthcare improvement and reform, some national bodies have promoted ML and its development as a means to equip doctors with the skills and knowledge to tackle and take leadership of these issues (Martin & Learmonth, 2012) (General Medical Council, 2012) (Frank et al., 2015) (Reinertsen et al., 2007) (Hess et al., 2015).

Increasingly, there is a move away from the traditional 'doctor-as-hero', or 'command-and-control-type leader' styles, to more collaborative forms of power-sharing and collective leadership approaches. These new forms of leadership are being promulgated as more appropriate for contemporary healthcare and other public services (McKimm & Held, 2009) (Lieff & Yammarino, 2017) (Saxena et al., 2019) (Onyura et al., 2019) (Sonnenberg et al., 2017). Such leadership approaches emphasize the need for more effective teamwork, aiming for higher level organizational performance and leading to improved employee wellbeing and improved health outcomes (West & Lyubovnikova, 2013) (West et al., 2014). A better understanding of complexity theory and system-thinking also supports doctors (and others) to effectively address 'wicked problems' (Keijser et al., 2019, This thesis: Chapter 4). These problems increasingly arise when innovation and reform clashes with deeply institutionalized professional and managerial cultures and are characterized by paradoxical tensions at socio-political, professional and frontline levels. Moreover, these approaches require a different mind-set and decision-making approach than the more linear (e.g., bio-medical) problem-solving approach that doctors are trained for (Heifetz et al., 2009) (Hanson & Ford, 2010) (Obolensky, 2017) (Juzwishin & Bond, 2012) (Keijser et al., 2019) (Saxena et al., 2019) (Onyura et al., 2019).

A more theoretical line of critique which offers ways forward for ML development has also emerged from the concept of followership and implicit leadership theories (McKimm, 2018). Archetypical and stereotypical ideas of 'leader' and 'leadership' are commonly found among members of professional groups, and society at large. Stereotypical notions are, for example: leadership implying being senior and the boss (Saxena et al., 2019); followership equaling docility (aligning with traditional 'doctor's rules'); or doctors engaged in management 'crossing the line in the sand' or 'going to the dark side' (Moen et al., 2018) (Dickinson et al., 2013) (Martin et al., 2015). These implicit leadership theories are very powerful, influencing deeply held beliefs and unconscious biases about who or how leaders should be. These beliefs influence the way in which followers see leaders (and vice versa) and how and whether they choose to follow them. For example, a recent study on how medical residents perceive their leadership roles shows a preference for less transformational and more authoritarian leadership

(Moen et al., 2019). If not anticipated and explicitly addressed, these beliefs can instill a reiteration of tribal tensions.

The way in which ML has been defined varies over time and between jurisdictions, with several specific ML types and roles having been described in the literature (Keijser & Wilderom, 2019, This thesis: Chapter 5). These ML types include hybrid leaders (Spyridonidis, 2015); expert, formal and/or team types (Moen et al., 2018); boundary-crossing ML, within, across and between services (Miller et al., 2018); doctors providing leadership through quality improvement initiatives (Noordegraaf et al., 2016) (McKimm et al., 2018); and medical 'health systems leadership', through which doctors participate in transformation of service delivery, resources and policy (Onyura et al., 2019). A general shift has also occurred from defining ML in terms of competency frameworks (McKenna et al., 2004) (Clak & Armit, 2010) (Keijser et al., 2019, This thesis: Chapter 2), to a broader emphasis on the expected standards, behaviors and knowledge base (FMLM, 2016). Alongside this, modest evidence is accruing of the beneficial effects of ML (West et al., 2015) (Lees & Armit, 2018), in terms of benefitting healthcare improvement and system transformation (Noordegraaf et al., 2016) (Voogt et al., 2016) (Morrow et al., 2014).

In alignment with the shift in generic leadership theory and practice, moving its focus from leader- to people-centeredness (Day, 2000) (Lacerenza et al., 2016), medical education (ME) has undergone significant curricular reform. This is reflected by the reevaluation of traditional bio-medically informed clinical reasoning and doctor-oriented, doctor-nurse dyadic formats of training (King et al., 2006) (Kirch & Boysen, 2010) (Lesser et al., 2010) (Earnest et al., 2017). In the UK for example, specific ML development programs have recently been established in undergraduate ME, enshrined in the regulatory bodies' outcomes (GMC, 2018), and further developed by a national Faculty of Medical Leadership and Management (FMLM, 2019). In the US, Australia, Canada and the Netherlands, similar initiatives have been undertaken, also informing revisions of postgraduate curricula (Keijser et al., 2017).

Failing Medical Leadership Training?

Ideally, ML training (MLT) should help to prepare doctors for future leadership activities and stimulate a mind-set shift from the traditional perceptions of the role as 'the leader' towards that of a co-actor who is proficient in adequately influencing and participating in shared efforts to take 'joint responsibility for collective problems' (Grint, 2010). Preferably, MLT delivers curricular content at three levels: (1) *intrapersonal* (getting to know yourself, developing self-awareness and understanding, e.g., strengths, weaknesses and responses to external triggers); (2) *interpersona*l (learning from working in teams, with other people, patients, colleagues, learning, building self-knowledge through dialogue and external feedback); and (3*) organizational* or *systemic* (understanding the health system at large and the political, economic, governance and other dynamics of organizations) (Swanwick & McKimm, 2014) (Onyura et al., 2019) (Miller et al., 2018). However, despite an emerging appreciation of what is required as well as the wide-ranging ML development activities in many countries, ML is still poorly integrated into the medical professional identity and doctors' daily routines. Furthermore, the 'preparation-practice gap' in conventional ML education, has not yet been bridged (Onyura et al., 2019) (Frich et al., 2014) (Sultan et al., 2019). We therefore argue that conventional formats of medical education (ME) fail to help doctors' acquire the needed ML capacities to optimally function in a complex and changing environment of patient-centered and team-based care (Grady, 2016) (Keijser et al., 2019, This thesis: Chapter 4) (Keijser & Wilderom, 2019, This thesis: Chapter 5). Our arguments for taking this position are as follows.

First, the growing emphasis on the development and practice of leadership in healthcare has been characterized as a 'hodge podge' approach (McAlearney, 2006). ML programs often lack sufficient theoretical underpinning in their content and fail to provide essential leadership approaches and opportunities to learners (Onyura et al., 2019) (Frich et al., 2016) (Sultan et al., 2019). Whilst competency frameworks offer competency-based 'lexicons' for ML, many of these are impractically comprehensive, particularly for short or one-off programs. (Ten Cate & Scheele, 2007) (Swanwick & McKimm, 2011) (Lurie, 2012).

Secondly, reviews of ML programs indicate that MLT is mostly uni-professional, mainly focusing on individual-level skill enhancement ('human capital'), emphasizing conceptual knowledge and skills: the 'know' and the 'do' (not the 'be' or 'becoming') (Frich et al., 2014). Only a few programs are described as focusing on personal growth and self-awareness or including content on system or organizational levels (Swanwick & McKimm, 2012) (McKimm et al., 2019) (Onyura et al., 2019).

Thirdly, despite the importance of aligning MLT efforts with the strategy, structure and culture of healthcare organizations and networks, current MLT interventions often fall short in addressing these dimensions (Onyura et al., 2019) (McLearney, 2006) (Lacerenza et al., 2016) (Keijser et al., 2019, This thesis, Chapter 3). Such lack of alignment between program content and local, organizational goals, only enforces the challenges to engagement of medical teams and their members in management and improvement initiatives (McKimm et al., 2019).

Fourthly, a cultural or generational 'lag' is evident in many ML programs. Many of the current set of senior doctors, faculty and mentors have not been exposed to contemporary formal MLTs. As a result, they unintentionally hold on to 'old-school' ideas about leadership (Noordegraaf et al., 2016). In addition, ML programs that are more 'people-centered' remain at risk of an outdated 'teacher bias' (Frich et al., 2014) (Day, 2000) (Lacerenza et al., 2016). The consequence of this is that many ML programs still focus on the traditional individualist, or heroic, notions of leadership that are misaligned with the current needs and challenges of value-based, collaborative healthcare delivery (Keijser et al., 2019, This thesis, Chapter 5).

Finally, we highlight the key issue that much ML development is carried out uni-professionally (i.e., just-for-doctors). Such a "doctors-only" approach in rapidly changing healthcare landscape, does not propagate diversity and inclusion in shared leadership practices, and will consequently result in the retention of professional siloes in which doctors mainly govern ML's meaning-making and practice between themselves. This, we argue, can result in a disadvantageous *l'histoire se répète* of medical sovereignty. A uni-professional, collegial approach may provide psychological safety (Edmonson, 1999). Yet, at the same time, it might induce a so-called 'isomorphism' or 'norming' of ML competencies that iterates prototypical leadership, risking a reiteration of the medical profession's traditional norms and behaviors. The process of incorporating new competencies in one's professional identity and repertoire and making sustainable behavior changes in response to new challenges is not straightforward and can lead to stress (Westerman et al., 2013). Nevertheless, such a process is regarded as vital for 'vertical development' and true personal growth (Till et al., 2016) (Petrie, 2014). Organizing doctors-only ML sessions or involving doctors who simply take a 'tick box' or 'tokenistic' attitude towards MLT, will not accomplish effective ML. Development programs need to provide structure and opportunities for participants to undertake a personal journey and discover their strengths and limitations relating to ML. In creating their own individual and interdisciplinary ML identity, participants will gain insight into the impact of their behaviors on others from within and outside the medical profession (Maile et al., 2019). The current relative lack of interprofessional learning opportunities might lead to ML becoming a new form of medical dominance or give doctors an excuse for "display(ing) hubris in the name of leadership" (Minzberg, 2004, p. 1). Moreover, if initiatives for ML development do not mature and reflect the needs of health systems and organizations, they risk jeopardizing the potential of doctors' new ways in leadership.

A Way Forward

In addition to the focus on leadership knowledge and individual leadership skills, leadership development should also be based on professional leadership identity formation and related workplace-based, collective learning. Such an approach ultimately strengthens both healthcare's 'social capital' as well as individual professionals' capacity to collaborate across professional lines through interprofessional and cross-sectorial relationship building (Juzwishin & Bond, 2012) (Mintzberg, 2004). More relationship-centered care, embracing team cohesion, reflective practice and organizational learning, improves workplace environments, healthcare quality and organizational performance (Soubhi et al., 2010) (Safran et al., 2006). These changes require both the medical profession and various healthcare organizations to seek "different ways of leading within healthcare systems that are different" (Grady, 2016, p. 261).

We propose that the way ML has been introduced and described in various countries and healthcare systems, so far, calls for more collectivist or collaborative approaches to leadership and that development of ML competencies should embrace alternative educational strategies, embedded in more 'socially rich' contexts (Matlow et al., 2016) (Chan et al., 2016) (McKimm et al., 2019) (Baker et al., 2019) (Cruess, et al., 2018). Since ME is "a social activity that takes place in communities and is heavily influenced by history and culture" (Cruess et al., 2018, p. 185), ML learning needs to provide real-life experiences to its learners, augmented by a range of intrapersonal, interpersonal and multi-professional activities. Individual doctors need such opportunities to scaffold their unconscious and conscious construction of professional leadership personas or identities, intertwining these mostly internal experiences with influences from their peers and co-workers (Petriglieri & Petriglieri, 2010) (Lesser et al., 2010) (Epitropaki et al., 2017) (Cruess et al., 2018) (Busari et al., 2018). Thus, non-medical health and care professionals (bringing their distinct perspectives) should be actively and routinely included in (and possibly co-lead!) leadership development activities and engage in the co-creative meaning-making way of how healthcare is or should be delivered (and led).

Envisioning leadership as a paramount activity of all social actors at the frontline of patient care, this paper sets out to answer: *What provides a practical approach for inclusive meaning-making and development of contextualized (medical) leadership in frontline healthcare settings?* We discuss how ML may need to be socially constructed to be optimally supportive to healthcare's increasingly pluriform and complex 'convolution' of professionals. Using the theory of 'communities of practice' and the educational concepts of professional identity formation and personas, we identify what ML may entail from both an adult-developmental and community perspective.

THE SOCIAL CONSTRUCT(ION) OF LEADERSHIP

Professional Identity and its Formation

Professional identity (PI) formation (PIF) is a social process of socialization through which doctors and other healthcare professionals develop a mostly clinical, "cognitive base" (Cruess & Cruess, 2016, p. 116) and higher levels of understanding of their environment, their place in it, and of relevant others, and their PIs (Jarvis-Selinger, 2012). PI evolves over time through mentoring, experiential learning and reflective practice into real-life actions and interactions and is increasingly acknowledged as equally important to doctors' clinical knowledge and skills acquisition (Burford, 2012) (Goldie, 2012) (Jarvis-Selinger et al., 2012) (Monrouxe, 2010) (Wilson, 2013). PIF entails an individual, iterative and temporal process of 'deep learning' through numerous opportunities in which medical students and doctors 'internalize' the features they see as reflecting their profession and assimilate their unique professional persona (Jaye et al., 2006) (Cruess et al., 2014) (McKimm et al., 2019). From before medical school and throughout life, each individual doctor's PI is created, shaped in alignment with their own experiences, needs, perceptions, beliefs and values, through interactions with others and situational or contextual determinants (Cruess et al., 2015) (Holden, 2010). Interestingly, it is argued that the postgraduate engagement in 'real-life' communities of clinical practice has a greater impact on PIF and is probably more profound than prior pedagogic activities (Ludmerer, 2014). Furthermore, if the professional identity of one group substantially changes (e.g., doctors), complex social processes of realigning views and expectations of all involved professional groups can be the result (Holden, 2010).

Like all professionals, doctors' PI intersects with their other identities during an ongoing reinterpretation of experiences, hence representing a contentious balancing of multiple sub-identities (Beijaard et al., 2004) (Holden et al., 2012). Through an iterative process of internalizing professional norms and personas, doctors learn about their professional strengths, weaknesses, motivations and values, becoming knowledgeable about their 'self', distinguishing who they are as a professional, who they want to be, and how they are expected to be (Bennis, 1989) (Jaye et al., 2006).

Medical Leadership Identity and its Formation

The social identity theory of leadership states that leadership can only be understood within the context of a specific group, team or organization (Epitropaki et al., 2017) and whilst many ML development programs provide participants with adequate knowledge about ML (Frich et al., 2015) (Onyura et al., 2019) (Sultan et al., 2019), they fail to adequately address wider contextual factors involved in the inextricably linked processes of PIF and leadership identity formation (Miller et al., 2019) (Maile et al., 2019). In terms of developing and forming a *medical leadership identity* (MLI), 'becoming and being' a doctor with a particular repertoire of (possible or intended) leadership competencies, complements the process of 'becoming and being' a doctor with clinical skills. Such identity (re)shaping is informed by (in this case: relatively newly emerging) expectations, role modelling, formal knowledge acquisition and feedback (Maile et al., 2019). As in general leadership practice, ML is signified by a coming together of behaviors and competencies as well as of personal characteristics; "the person you are, the leader you are" (Shannon, 2015, p. 55) (Souba, 2011) (Cruess et al., 2016). The effectiveness of leadership also relates to how group members perceive those enacting leadership aligned with what the group collectively envisions as (proto)typical (Hogg, 2001). Some argue that ML cannot be understood or developed without considering followership because both concepts interdependently interact (Mannion et al., 2015) (Uhl-Bien et al., 2014). Collective and shared leadership approaches also imply an important role for followers, with the 'leadership triad' being used to describe the interactive dynamic between clinical leadership, management and followership roles and activities (McKimm & O'Sullivan, 2016). In complex healthcare contexts, this does not necessarily mean docile, passive followership but that doctors who (aspire to) effectively lead sometimes actively assume a 'back seat' position (Yammarino et al., 2012) (Reay et al., 2017). Genuine shared and collective leadership entails the active creation of reciprocity and trust among those who choose to follow and those who choose to lead (Grint, 2010) (Day, 2000).

Providing nurturing social spaces for MLI formation requires opportunities for reflection to enhance personal growth and awareness, and encouragement. These conditions foster individuals in becoming the doctor who maintains and strengthens the positive attributes they bring as an individual to the clinical encounter and leadership activities (Jaye et al., 2006). Participation in authentic practice represents the premise of such social learning that helps create "the constitutive texture of an experience of the self" (Wenger, 2010, p. 186), ultimately resulting in the doctor's medical professional identity, including their MLI (Maile et al., 2019) (Billet, 2002). We contend that the concept of community of practice (CoP) supports understanding, design and analysis of such contextual learning.

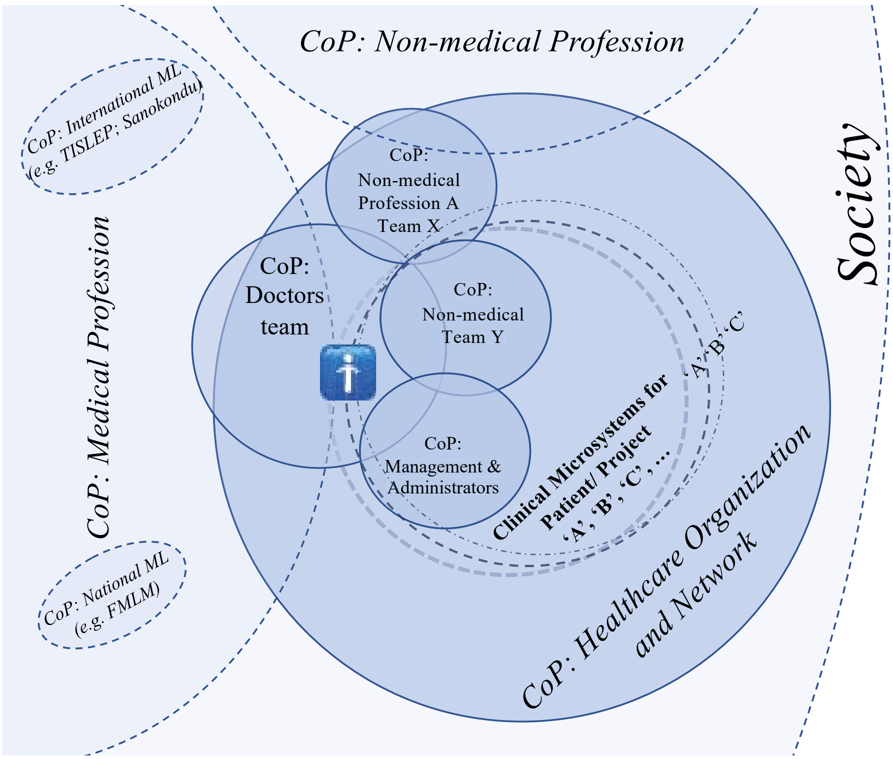
Communities of Practice

PI in healthcare helps explain how roles, tasks, responsibilities and procedures are navigated in and between individuals, groups and organizations. Different healthcare professions demonstrate and foster established, salient characteristics, which also direct how their individual members interact with one another and those outside their profession (Holden, 2010). Doctors' professionalization takes place in and outside the midst of various professional (clinical) groups, jointly forming a multiplicity of practices (Figure 1). They participate in different groups with distinct boundaries and functions: following their patients' care-journey as members of clinical teams; in their roles as members of professional associations; and often joining ad-hoc teams in their organizations, regional or (inter)national networks and other (e.g., research) committees or groups. Each of these groups is constituted by a distinct "social fabric" (Cruess et al., 2018, p. 186) that influences a doctor's individual PI(F). These multiple contexts require doctors to be able to continuously 'switch' between identities in order to adequately navigate and participate in each group, through compliance with the groups' norms, values, competences and accountability (Wenger et al., 2002) (Wenger-Trayner & Wenger-Trayner, 2015) (Gruen et al., 2004) (Figure 1). The wider leadership literature describes the numerous factors that inform how communities experience their leaders, often instilling a normalizing influence on the entire community's (or organization's) identity and its culture, and on the leadership identity of other individuals (Jaye et al., 2010) (Curry, 2002).

In this landscape of practices, a doctor's experiential journey of professionalization evolves through continuous, unique and personal experiences that are mediated by tacit and more formal influences from the groups and teams in which they work and belong. This 'belonging-to' also includes the 'inbound trajectory' through which aspiring members are brought into the community through 'legitimate peripheral participation' (Lave & Wenger, 2001). For example: medical students are 'allowed' to clerk patients under supervision while doctors are 'allowed' to provide leadership of small projects as part of their leadership development. Belonging-to is based on an iterative social process of adjusting and negotiating among group members, influenced by changes: from unplanned incidents to more deliberate temporal shifts, such as the implications of system reforms.

CoP theory studies the design, functioning and evaluation of such (systems of) groups of people "who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise by interacting on an ongoing basis" (Wenger et al., 2002, p. 4). It thus provides a collaborative strategy for change and improvement, originally designed to bring groups together in a process of continual, reflective system redesign through sharing common objectives, addressing mutual problems and participating in a process of collective learning and knowledge development (Wenger, 2010). Cruess et al (2018, p.185) describe CoP as a "robust and broad social learning theory" enabling an "integrated comprehensive, and coherent theoretical approach to medical education". It is suggested that since CoP embraces the practice of situated and reflective learning it has been used at all phases of ME and leadership development (Till et al., 2017) (Cruess et al., 2016) (Lave & Wenger, 1991). CoP suggests that "identity is a nexus of multi-membership" (Wenger, 2010, p. 185) which echoes intersectionality theory that highlights the range of multiple, layered social identities that people have, for example: a woman might be a mother, surgeon, committee chair and woman of color (Richardson & Loubier, 2008). For doctors, incorporating, and ultimately integrating, a medical leadership identity will modify existing social identities, which in turn will affect social relations within and between the groups in which they practice. In the context of this paper, we use CoP as the organizing principle that emphasizes the social nature of doctors' learning, requiring multi-perspective settings for experiencing and reflection on (ML and other) practices occurring in or across various CoPs (Kaufman & Mann, 2014) (Till et al., 2017).

Figure 1. Schematic representation of a doctor's position amidst an exemplary set of multiple (domains of) Communities of Practice (CoP) and clinical microsystems (i = individual doctor)



CoPs in healthcare

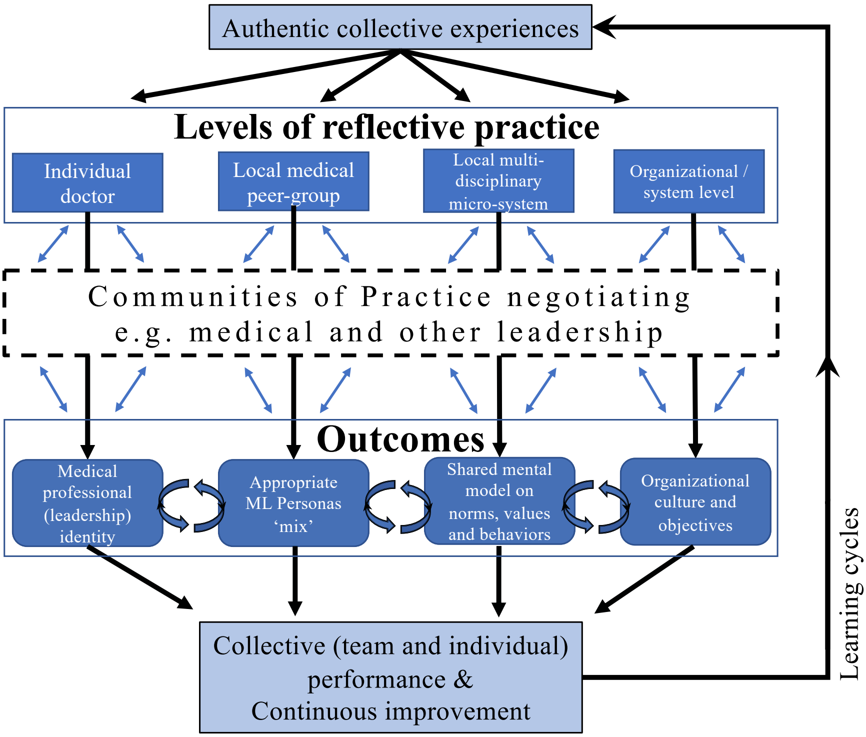
A clinical CoP fosters a social context for unified learning around a common concept or set of activities (e.g., patients or practices), through collaboration between its members over time. In such CoPs, people experience, build relationships, negotiate new ways of solving problems and engage in new learning and practices (Souhbi et al., 2009) (Cruess & Cruess, 2016). CoP members develop shared repertoires of experiences, narratives, tools and approaches to addressing problems which constitutes the group's collective knowledge and 'historic' memory (Wenger et al., 2002). Memory gradually forms over time, by the accumulation of shared experiences, conversations, discussion of concerns and improvement opportunities that are negotiated, experimented with and collectively reflected upon. Together these inform both the CoP's tacit know-how and more formal, tangible forms of knowledge ('artifacts'), such as standards of practice or clinical protocols.

In the context of healthcare, CoP theory has overlap with other theoretical constructs (for example: network theory; clinical microsystems; learning organizations and complex adaptive systems) (Franco & Almeida, 2011) (Mohn & Batalden, 2006) (Greenhalgh & Stones, 2010) (Paradis & Whitehead, 2018) (Prather & Jones, 2003). However, CoPs are uniquely characterized by their relational ties amongst members, which drive collective learning and bridge the gap between knowing and doing; processes that are highly relevant to healthcare's knowledge-intensive landscape. CoP membership focusses less on absorbing or debating information, and more on members' effective participation in the groups' practices. This participation is mediated through three modes of identification: *engagement* (members 'doing things'), *imagination* (members having an 'image' or interpretation about things, events, others and themselves), and *alignment* (a two-way process of balancing members' actions, behaviors, 'images' and context towards mutual expectations) (Wenger, 2010).

CoP members travel through various processes of identification with a group's regimes of competences and accountability. This journey involves a reciprocal modulation between the CoP's identity and the individual's various identities, constituting a unique personal process of the 'social becoming' of a CoP member (Monrouxe, 2013) (Souba, 2011). In CoPs, processes of accountability have a collective and horizontal character and are often negotiated in informal and implicit ways. As opposed to healthcare's increasing (often bureaucratic type) vertical accountability tensions (Roccas & Brewer, 2002), many healthcare teams, at least in part, already function based on horizontal types of accountability. These teams engage in joint activities and learn and negotiate according to mutually relevant objectives, shared identities and reputations, and standards of practice. Well-functioning CoPs also have the capacity to effectively navigate accountability imbalances and prevent negative tensions; for example, those that exist when multiple healthcare professions, with varying jurisdictions, collaborate in the care of one patient. The benefit of balancing vertical and horizontal accountability is seen when healthcare organizations actively support participatory learning and embrace CoPs as an organizing principle, emphasizing the significance of allegiance to the greater good of the larger social system that CoPs belong to (e.g., patient wellbeing; population health; organizational performance) (Ferlie et al., 2016). Effectively navigating accountability issues can also be seen when professionals who frequently travel across CoPs (e.g., doctors) can modulate their various identities and (motivate others to) participate in CoPs through effective aligning, negotiating and balancing the dissimilar local accountabilities' regimes.

Figure 2 demonstrates how ML development evolves through a cyclical process of 'real-life' experiences that stimulate reflective practices at distinct levels: the individual; uni-professional and multi-professional teams; and the organization or system. These CoP negotiations feed into participatory learning within other interconnected CoPs, ultimately resulting in a range of outcomes that collectively contribute to the effective participation, teamwork and organizational performance of doctors across various CoPs (Figure 2). In this model the concept of ML is molded based on contextual appropriateness, with input and efforts from various stakeholders into the participatory learning dynamics of a network of CoPs. This model, we argue, is applicable to a wide range of healthcare-related contexts, including multidisciplinary teams (units or departmental); hospitals and their networks; and regional or national healthcare systems.

Figure 2. Abstract visualization of medical leadership in the context of multi-level reflective practice learning cycles



Personas: Theory and Practice

A persona is a "fictional description of a person" (Wikberg et al., 2010, p. 286) whose characteristics are of importance for a certain objective or help explain certain situations. The use of personas comprises various processes of identifying needs and perspectives between stakeholders involved in accomplishing stated objectives and explaining situations.

Personas were originally used in user-centered design to understand and explain the interactions of different types of people with a new product or service (Wikberg et al., 2010) and are used in healthcare education, for example, in designing formats in nursing education (Walters et al., 2015) and gerontology education (Canham & Mahmood, 2018). In healthcare, personas have been primarily described in the social internalization psychological pedagogic process of professionalization (Nicoll, 1997) (Jaye, 2006) which is dominated by an implicit, yet powerful infusion of behavioral and emotional norms, mainly through experiencing apprentice relationships with and role modelling by senior peers and mentors (Haas & Shaffir, 1982) (Birden et al., 2013). In the generic leadership literature, the leader persona is an aspect of identity development acknowledging professional practice and instrumentation as integral to leadership, evolving parallel to explicit prescribed leadership artifacts, such as competency frameworks (Curry, 2002). Points of reference in the deliberate design of a person's leadership identity or persona are, for example: epistemological processes; opportunities of developmental experiences and their embedding in social contexts; and the translation of self-reflection and self-awareness into practice (Curry, 2002).

Applied in the context of professional practice, the construct of personas can help support reflective learning in individuals or groups, facilitating a process of re-framing of existing norms and perspectives of practice. Such intentional use of personas provides "another pair of glasses" (Wikberg et al., 2010, p. 288) to help reconstruct the way people think and reflect on the various rules, values and norms that direct all their collective and individual actions (Ghaye, 2007). Personas are powerful social phenomena that traverse, consciously as well as unconsciously, boundaries of professional, individual or systemic dimensions and can represent as ideal and desired ways of how members of particular groups think, feel and behave (Lord et al., 1984) (Epitropaki et al., 2017). In an archetypical and symbolic manner, personas represent norm systems within groups that create, use and recreate them. Therefore, personas are socially constituted within groups and reflect meaning and objectives of collective values and behaviors important to the groups' functioning.

The concept of personas also relates to 'prototypes' as cognitive representation of what individual group members believe are the values and behaviors of the group they belong to (Epitropaki et al., 2017). This can be seen in leadership (for example the 'hero leader') or in the process of professionalization, for example where Hilton and Slotnik (2005) describe medical students as 'proto-professionals'. Personas therefore help govern interdependent processes of individual as well as collective identity formation and it is with this purpose in mind that we developed ML personas as fictitious characters, modelling ML archetypes that reflect how national ML competency frameworks currently define ML. Thus, in the current study, we empirically constructed ML personas to provide an explicit and tangible instrument for groups (i.e., CoPs) as well as individuals (i.e., CoP's members) to develop a collective 'molding' of the concept of leadership, and ML in particular. The ML personas do not prescribe ML per se; they are instrumental in facilitating a collective dialogue on the contextualized meaning-making of (medical) leadership and related concepts (e.g., teamwork, management, followership).

Although theoretically personas may develop a 'life of their own' (such as the 'charismatic leader'), in our case we contextualize the use of ML personas within the organizational contexts of CoP's that operate in clinical (team)work. We apply personas theory as a tool to help differentiate the CoP-based processes of <u>social</u> (participatory) learning and creation of locally appropriate ML in conjunction with <u>individual</u> ML competency development in specific healthcare context.

DEVELOPING A MEDICAL LEADERSHIP PERSONAS INVENTORY

In this section we present a practical set of ML personas that represent understandable descriptors of (medical) leadership. Applied in the context of CoPs, these serve as a practical tool and starting point for activities that help establish clarity about expectations and perceived values relating (medical) leadership to local practice (Swanwick & McKimm, 2011) (Moen & Prescott, 2016). We also describe the development of the 'ML Personas Inventory' as a practical ML instrument.

We provide a fresh approach in collective and contextualized (medical) leadership development, fusing insights, evidence and practices from the domains of professionalization. These comprise of conceptualizations relating the 'being' of leadership (ontology); the ways in which (medical) leadership's values and ethics is influenced and governed (axiology); the extant knowledge base on ML in various countries (and in particular one nation: the Netherlands) (epistemology); and practice of (medical) leadership training (praxeology). We also describe how MLI formation relates to the use of a set of generic ML 'personas' as well as how it can serve as an instrument for navigating contextually appropriate ML development.

After confirming the absence of a similar approach through a review of existing literature, we identified a distinct set of personas and undertook face validation of these personas. Finally, we used them to develop a multi-source feedback instrument, or 'inventory', as a practical tool for assessing observed ML behaviors and perceived requirements relating to ML at individual and different group (CoP) levels.

Identifying Medical Leadership Personas

The development of ML personas was conducted as an additional activity of the Dutch Working Group responsible for designing the national Medical Leadership Competency Framework (Keijser et al., 2019, This thesis: Chapter 2). A pragmatic 2-stepped Delphi approach was applied (Diamond et al., 2014), entailing a subgroup of six members[6], who were all very knowledgeable about the concept and meaning of ML as well of the content of various international ML competency frameworks (Keijser et al., 2019). This subgroup was assigned the task to individually identify and concisely describe specific "archetypes of doctors enacting leadership in an above-average level compared with peers" (excerpt from written briefing with instruction to all group members). After collecting suggestions for personas from the subgroup members, all received the collected (anonymized) results for review, and were asked to respond with recommendations, for example for (re)phrasing of the personas' titles. After receiving responses, combining interrelating terms and rephrasing, all subgroup members agreed on the final set of 12 ML personas (Table 1). Without exception, all initial suggestions for personas provided by the individual subgroup members, were integrated in the final set.

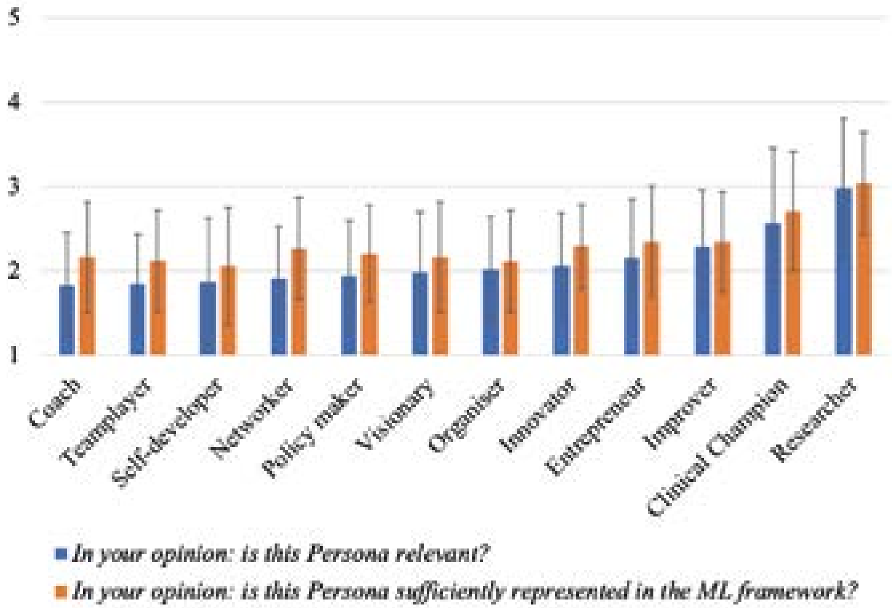
The 12 identified personas were then included in an online ML survey for face validity testing. Respondents of this survey comprised participants (n=63; response rate: 49/63=78%) of focus group sessions that were held as part of the Dutch framework development that were held as part of the Dutch ML framework development (Keijser et al., 2019, This thesis, Chapter 2). Survey respondents comprised representatives from stakeholder groups (e.g., doctors; allied professionals; healthcare managers; and patients) and were asked to rate their perception of the relevance of each of the 12 personas in regard to ML in general (Figure 3).

Respondents rated the majority of personas as 'relevant' or higher, with the 'soft-skills' type personas: 'coach', 'team-player', 'self-developer', and 'networker' (Figure 3) rated higher and the 'clinical champion' (Mean: 2,571; SD 0,8898) and 'researcher' (Mean: 2,980; SD 0,8289) being rated lower. Conceivably, doctors' archetypical clinical and scientific activities (reflected in these two

[6] Including: five physicians (with backgrounds in: primary care (2); surgery (1); internal medicine (1); and change management and coaching (1)) and one policy advisor.

personas) might be regarded as part of all doctors ‘clinical leadership’ activities and less related to doctors’ broader leadership of departments, organizations and systems.

Figure 3. Face validity survey ratings of Medical Leadership personas (n=49)



Survey Question: *“I rate the relevance of this Persona to medical leadership as …”*
5-point Likert scores: 1 = very relevant; 2 = relevant; 3 = relevant / not relevant; 4 = not relevant; 5 = not at all relevant.

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Table 1. The twelve medical leadership personas: descriptions, characteristics and possible impact

ML Persona	Description and characteristics	Impact of persona
1. Coach	Affiliative and person-centered, encouraging mentor and coach, with exceptional (clinical and other) teaching qualities	Improved personal and professional development of direct colleagues and others, aiming to augment collective and individual achievements/performance
2. Networker	Exploring and spanning (inter-personal, -disciplinary or -organizational) boundaries in order to influence extant relations or establish new professional contacts	Enabling and enacting valuable interactive, collaborative and actions among persons, groups and organizations, aiding stakeholders and patient care
3. Self-Developer	Feedback-prone, self-reflective professional continuously in search for cognitive and social emotional self-improvement	Role-model for staff, resulting in team and organizational climates / cultures that advance job performance and employee well-being/health
4. Team Player	Adequately performing a supporting role (e.g., co-leading) in groups or teams, in pursuit of team success	Effective (inter)professional teamwork enhancing both patient care and team-member satisfaction
5. Entrepreneur	Exercising initiatives to benefit from new products or services, while balancing risks and advantages for all stakeholders involved	New clinical ventures, benefitting from business-oriented approaches, resulting in various returns-on-investments for deserving patients and professionals
6. Improver	Expert in healthcare related quality and safety improvement science and practice	Continuous quality improvement-oriented instigation and implementation of enhancements at all levels of professional and organizational practice
7. Innovator	Unceasingly in search of and knowledgeable about useful innovations, improvements or novel possibilities	Continuous change or improvement, based on identifying options that go beyond conventional paths
8. Organizer	Exceptional planner and coordinator of (clinical, organizational and other types of) processes, projects and practices	Effectively managed processes, projects and practices that aim to accomplish a variety of patient-care related goals
9. Policymaker	Contributor to complex and multi-faceted decision processes that precede (clinical and other) policy, guideline and protocols making	Highest levels of appropriateness and quality of professional standardization and accountability at all aspects and levels of clinical practice, organization and governance
10. Visionary	Continuously overseeing and interpreting long-term objectives of clinical and other relevant stakeholders	Enhanced strategic or long-term thinking and acting at various levels of patient care
11. Researcher	Clinical scientific expert in design, deployment and evaluation of various types of relevant studies, at various levels of complexity	Continuous influx of new medical and other relevant scientific knowledge, based on solid research approaches
12. Clinical Champion	Exceptionally skilled and experienced clinical (topic) expert; continuously striving for the highest levels of patient care	Diffusion of highest standards of clinical excellence, including evidence-based and other best clinical practices

Use of Personas

In this section we describe how the ML Personas Inventory can be applied at three distinct levels of analysis within the CoPs that healthcare professionals work in. We also demonstrate how ML personas can facilitate the CoP-typical process of mutually identifying and co-constructing the local requirements for leadership. Furthermore, we depict how the ML Personas Inventory provides the basis for (leadership development) needs assessment at individual and group level. Such an assessment assists in distinguishing similarities or differences between perceived versus desired or expected leadership competencies, informing decisions on, for example, leadership development goals or selection criteria in hiring new staff. The section concludes by considering several practical issues relating the design and function of CoPs.

Co-creating meaning

In many clinical situations, particularly during emergencies or crises, it is widely recognized that developing shared mental models by all team members, describing 'what is going on' and 'what needs to be done', is essential for delivering the most appropriate care and for assuring patients are not put at undue risk (Gluyas, 2015) (McComb et al., 2017). Studies on shared 'technical' (protocol-driven) mental models (e.g., in simulation teamwork training) have contributed towards practice improvement in clinical settings that rely on maintaining situational awareness, facilitating role clarification and engagement of team members (Westlu et al., 2010) (Burtscher et al., 2011) (Weller et al., 2014). However, little has been studied to date regarding 'behavioral' types of shared mental models (which often require more tacit forms of meaning-making) in specific, often urgent, clinical situations.

Meaning-making is governed by both a CoP's history, type of work and processes (e.g., acute care; clinic-based care) and by its individual members' characteristics. These determinants (co-)inform how formal and tacit knowledge about leadership in the group is constituted and shared, what (composition of) ML types are needed, and how expectations about leadership are distributed among members and sub-groups, including doctors and non-medical members. The use of the ML Personas Inventory as an instrument in CoP collective meaning-making can serve assorted purposes.

As an easy to understand and compact set of description representing positive competencies, the ML Personas Inventory provides a generic 'language' for a group to use in discussing leadership related topics or issues. This could, for example, augment the generation of appreciative dialogue or meaning making about interprofessional working power, hierarchy and (medical) leadership or the co-creation and identification ('tagging') of situations in which medical or other leadership types is deemed relevant locally (Prather & Jones, 2003). Here, the generic ML personas serve as 'internal models': concepts for cognitive exploration that help group members express and objectify implicit understandings, ultimately guiding how they collectively decide to adapt to and implement new concepts and related practices, such as ML (Korzybski, 1951). Additionally, ML personas provide CoPs with a tool for discussing (e.g., individual) experiences or cases that help them co-create their local requirements of (medical) leadership, resulting in a shared mental model pertaining to when, how and by whom such leadership is to be enacted. Such a contextually appropriate leadership paradigm may comprise a specified set of competencies and related behaviors. For example, this can be enshrined in a local artifact fostering the group's 'regime of competence' as the basis for effective and full participation of its members (e.g., a statute).

Appreciatively discussing relevant case-based narratives and experiences while reflecting on descriptions of ML personas, can help modify group members' assumptions and perspectives relating to ML competencies (or the leadership of other professions) and any tendencies for ML to be seen as 'unique' and separate (Dematteo & Reeves, 2011). Using appreciative inquiry to inventory and discuss meaning of (medical) leadership also moderates the risk of leadership becoming something alien for the CoP's members or its subgroups, and the emergence of other forms of ineffective 'groupthink'.

6

Meaning-making sessions with dialogue and narrative reflection, can be assisted by other tools, such as serious gaming; creative thinking techniques (e.g., ‘thinking hats’; De Bono, 2017); visuals; or team role inventories. As an example, in the Venn diagram of ML personas (Figure 4) we have visually mapped the twelve ML personas onto Belbin’s three team role orientations: ‘thinking’, ‘social’, and ‘action’ (Belbin, 2001), with in its center doctors’ principal personas: clinicians and scientists.

Figure 4. Venn diagram visualizing 12 medical leadership personas clustered around one central dimension and three peripheral orientations of ‘Thinking’, ‘Action’ and ‘Social’

Assessing Medical Leadership
The use of the ML Personas Inventory as a questionnaire survey facilitates self-reflection or group dialogue to "reflect on individual and team performance for individual, as well as team, performance improvement" (IPEC, 2011, p. 25). The survey questions gauge the perceived versus desired or needed ML competencies (as described by the ML personas). The survey can be completed as a self-assessment by individuals, and additionally, by selected respondents (e.g., peers, co-workers) as part of a 360 (multi-source) feedback process. Results are analyzed by reviewing the uniformity and/or discrepancies between self-, peer- and 'non-peer'-responses. Table 2 provides examples of questions at these two levels. Figure 5 sets out the results of an individual self-assessment and of the medical and non-medical staff from a fictitious internal medicine department, illustrated in a radar graph. In Table 2 and Figure 5, 'A' to 'F' represent scores of the various types of the ML Personas Inventory respondents.

Individual level assessment
For individual doctors, reflecting on self-assessment scores (i.e., 'A' in Table 2 and Figure 5) helps them to identify their preferred ML personas or leadership style 'mix' and comparing (or benchmarking) their scores ('A') with the self-assessment scores of peers (i.e., colleagues in the same medical group: 'B'). The self-assessment results provide doctors a means to reflect on their individual performance and related beliefs in the context of other individuals and groups, thus helping develop more awareness of and insight into their leadership approach, as well as its possible impact on others. In turn, this helps in MLI formation (Maile et al., 2019) and in the identification of personal strengths and professional development goals.

As with many self-development instruments, there are no 'right' or 'wrong' scores. Also: people differ in their leadership effectiveness in various situations or groups. It is important therefore not to stereotype or frame certain ML personas or individuals as more or less effective and desirable. In the current absence of thoroughly tested and validated (ML) assessment instruments (Keijser et al., 2019) the ML Personas Inventory should be used as a tool for self-reflection and development, not as a formal assessment of individual doctors' leadership performance or potential. We see the further development of the Inventory to include 'open' questions which invite respondents (e.g., co-workers) to provide feedback in their own words, since doctors appreciate feedback containing such narrative comments and find this impactful on their practice (Overeem et al., 2010).

Group level assessment
Assessment at group level provides the aggregated ratings from doctors ('C' and 'D') and other professionals ('E' and 'F'), scoring the 'needed' versus 'perceived' levels of ML. Using these scores in (facilitated) group dialogue can help the collective exploration of differences and similarities between how ML is perceived versus what is needed, according to various subgroups.

At the organizational or system level, the assessment results provide a stratified, cross-organizational and inter-group analysis, fueling an exchange of experiences and practices, role-modelling between certain groups and horizontal or cross-discipline mentoring. CoP and ML development activities are resource intensive (Straus et al., 2013) (Keijser et al., 2019) and the Inventory results analysis can contribute to informed decision-making, also ineffective allocation of needed resources. The main value of the survey is about engaging professionals in (self)reflection, providing a stimulus for constructive discussion among the CoP members, and building on their ideas gathered through the survey's open questions. Regular repetition of surveys can help monitor progress and provide information about effectiveness of improvement interventions. We think however, never to use the survey for performance management (disciplinary) purposes.

Assessing ML in doctors' teams

Although most doctors' teams focus on a specific medical specialty, their team is unique due to the variety of members' personalities and individual characteristics. Groups of doctors often represent archetypical CoPs, characterizing the profession's distinctive medical collegiality and mirroring the strong sense of 'tribal' belonging among members (Cruess et al., 2002) (Jaye et al., 2010). Integrating and accommodating the diversity between individual ML personas 'typology' and personal traits, and individual characteristics can contribute to more effective team performance (Derven, 2016) (Bartz & Rice, 2017) (Gomez & Bernet, 2019).

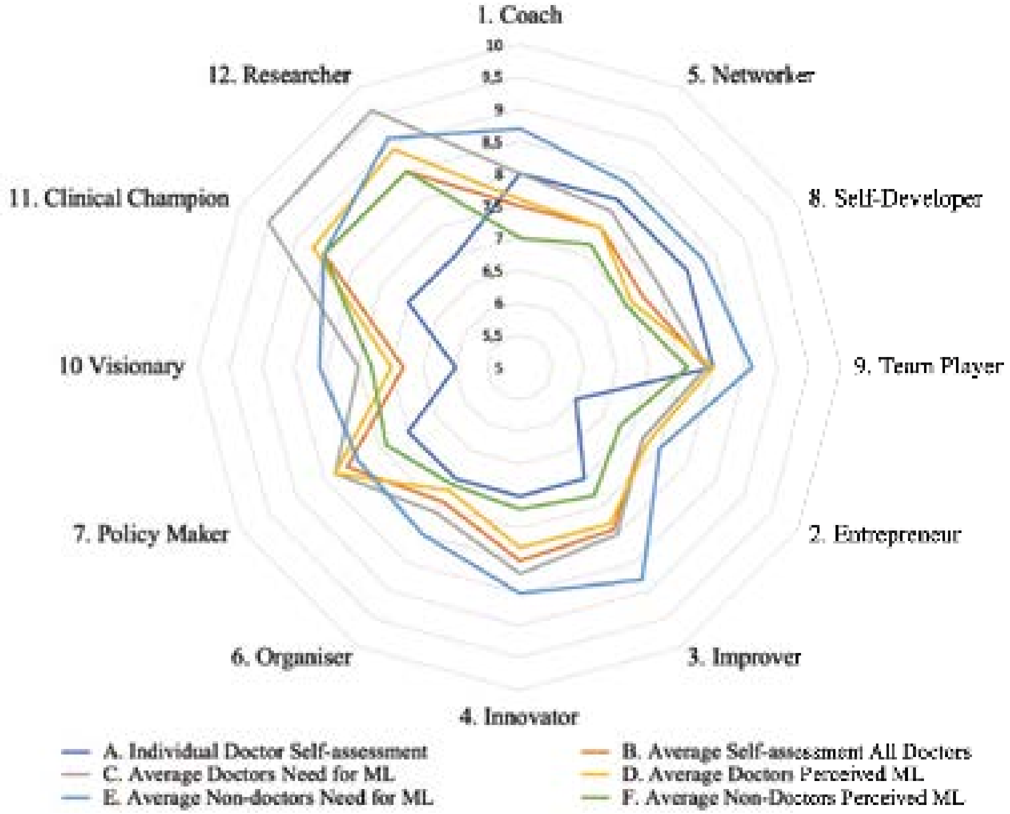
Analysis of ML Personas Inventory survey results among members of a specific doctors' team or group informs the understanding and navigation of topics including team composition; succession planning; and goal setting for teamwork development (Wikberg et al., 2010). Furthermore, alignment of doctor's team goals with those of the organization it functions in, helps enhance organizational capacity for innovation and improvement (Leonard, 2003). Therefore, the ML Personas Inventory can be used purposefully as part of the alignment process between goals of groups of doctors and those of the organization. Also, the Inventory can be applied alongside or as a replacement for other team-based assessments, such as the Team Performance Inventory (West et al., 2006) or Belbin's team roles (Figure 4) (Belbin, 2001) (Bonebright, 2010).

Table 2. Medical Leadership Personas Inventory multi-source assessment at the levels of individual doctor and the mono-disciplinary doctor's team

Level of Analysis	Respondents' Role	Exemplary Survey Questions	Radar Graph Representations*
Individual Doctor	Self-assessor	Self-assessment of ML - *How do you rate your own current competencies in regard to this ML Persona?*	A. Individual doctor self-assessment
			B. Average self-assessment all members doctors' team
Doctors' Team	Individual team member (doctor)	Need for ML - *How do you rate the current need for this ML Persona in your doctors' team?*	C. Average of how doctors rate the need for ML in the doctors' team they belong to
		Perceived ML - *How is this ML Persona currently represented in your doctors' team?*	D. Average of how doctors perceive the current ML in their doctors' team
	Non-team member (e.g., manager; member from another doctors' team; allied professional; patients)	Need for ML - *How is this ML Persona to this doctors' team?*	E. Average of how non-doctors rate the need for ML in doctors' team
		Perceived ML - *How is this ML Persona currently represented in this doctors' team?*	F. Average of how non-doctors perceive the current ML in doctors' team

*Note: 'A' to 'F' link to radar graph scores in Figure 5.

Figure 5. Illustrative graph of Medical Leadership Personas Inventory of an (fictitious) internal medicine department



(10-point Likers score: 1 = 'not at all'; 10 = 'extremely')
('A' to 'F' correlate with measurements in Table 2)

Use of ML personas (defining their own 'ML regime of competence') can also assist doctors' groups to, proactively and in an appropriately contextualized manner, navigate and understand the often quite comprehensive and prescriptive ML competency frameworks (i.e.: "distinguish practice from prescription": Wenger, 2010, p. 192). Working together as near-peer mentors can help foster the psychologically safe environment that is required for doctors' personal growth (Bennett et al., 2015). Ultimately, application of the Inventory as discussed above can feed into a deliberate and comprehensive assessment of the need for specific leadership competencies; fundamental to the design of effective ML development programs (Keijser, 2019, This thesis, Chapter 5).

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CoP Design and Functioning

Whilst numerous variations of both multi- and uni-professional CoPs exist, effective CoPs are all characterized by a number of key features. Members have cohesive relationships of trust and reciprocity, regular communication and contact, share common goals and values, and acknowledge shared skills. CoPs also have self-governance; voluntary participation; boundary crossing; and peer-to-peer connections (Wenger, 2010). A CoP's composition is informed by contextual factors and may change over time; however, learning is always relationship-based and adaptive, open to and appreciative of the perspectives of others (Wenger et al., 2002) (Soubhi et al., 2010). This reflects the implicit and tacit, yet powerful impact of horizontal accountability (see above), which is negotiated and affirmed at any moment in all social forms of communication and convening. Learning in CoPs also requires providing multiple opportunities and spaces for inclusive, respectful formal (e.g., meetings) and informal (e.g., huddles) conversations between group members, and/or the network or community groups they belong to. Some healthcare CoPs use natural 'spaces for learning', such as hand-over meetings, team sessions, or thematic group-work and training. People in non-hierarchical facilitating roles can be useful to oversee various group activities and promote 'evolutionary' group learning processes, without pre-set routes, progression or content, while members adopt emerging practices. 'Imitation' of role-modelling, in tandem with experiential learning, is a potent tool in CoP socialization processes, including medical professionalization (Cruess et al., 2018) (Wenger et al., 2010).

The use and allocation of resources to arrange and organize CoPs need adequate consideration, since they can be challenging, costly and logistically cumbersome. CoP learning activities require "purposely structured social" and workplace-based interventions (Cruess et al., 2018, p. 189) if they are to be effective. To ensure full participation of all members (in particular of doctors) (Hess et al., 2015), issues such as ensuring that groups can meet and undertake other collective activities (such as ML self- and group-assessment) within work time is essential, rather than expecting these to be squeezed into demanding clinical practices or outside routine office hours (Keijser et al., 2019, This thesis: Chapter 9).

Local Use of CoPs and Personas

Applying CoP theory in practice implies its integrative use in existing contexts of real-life (clinical) practices. Equally, using the ML Personas Inventory is most beneficial when integrated in existing local projects or groups requiring interprofessional proximity and engagement in mutual cross-boundary challenges (e.g., practice improvements; incorporation of new clinical standards; implementation of innovations; and system reform). These projects provide opportunities to discuss and negotiate the consequences of various behaviors, beliefs and actions on group's practices and performances, including ML and possibilities for change (Prather & Jones, 2003) (Voogt, 2016) (Hess et al., 2015).

Quality improvement projects based on CoP-theory which emphasize group members' relationships provide fruitful opportunities for reflective practice and for contextualized and collectivist approaches (Mohn & Batalden, 2006) (King, et al., 2008) (Thistlethwaite et al., 2014) (Earnest et al., 2017). The ML Personas Inventory provides a tool for group members to critically reflect on and identify determinants that contribute to the status quo (e.g., hierarchical behaviors between professions) or hinder the envisioned change or innovation (Neghandi et al., 2015).

Power issues in CoPs

By definition, CoP members engaging in situated, relationship-focused, participatory learning have "something common to struggle over" (Wenger, 2010, p. 189), often explicitly inculcated through power issues. CoPs are often driven by a collective challenge to navigate or contain external 'powers', such bureaucratic policies, standards or inappropriate interventions. This can be positive, resulting in the emergence of 'practice power', mitigating the need for external governance (Saxena et al. 2019) but can also lead to in-group versus out-group thinking and other forms of routinised group dynamics. Such tensions can be explained by contact theory (Allport et al., 1954). CoP members might show negative responses to being 'forced' into groups with others, instilling (or affirming) professional role stereotyping, and leading to difficulties in creating trust, reciprocity and inclusion of all members equally. An important challenge therefore is to explicitly address and effectively navigate "how issues of power, structures, and system limit and constrain healthcare professionals' ability to collaborate" (Paradis et al., 2018, p. 1461).

Wenger (2010) describes two types of governing power issues that can hamper CoP learning. Stewarding governance seeks agreement within the group, for example by individuals 'identifying with' a novel idea, such as a doctor role-modelling appropriate behavior by supporting a non-medical group member's idea. Emergent governance is an accumulation of the effects of group members' negotiating decisions. This ultimately results in the spreading of new practices, and the group's practices and identities become the collective power. In ML, an example of emergent governance would be discussing, experimenting and negotiating (medical) leadership types and competences, building on a generic set of personas, resulting in a leadership approach which resonates with all members. Power struggles that can arise from these processes can be mediated through vertical influences between the CoP and (actors in) the network (e.g., a healthcare organization or region) it belongs to. Their coexistence in the same social structure involves complementary strengths and weaknesses, instilling a vertical power-axis. The network, with its focus on 'connecting', can mediate communities becoming too introspective or exclusive, whereas CoPs, with their focus on 'relationship-based learning', can deflect networks from becoming too loose or disconnected through a diffusion of collective identities.

Psychological safety

In any assessment of personal qualities, psychological safety is essential to alleviate stress and discomfort, ameliorate perceived criticism, and enable true personal growth. Doctors engaging in personal and leadership development can negatively respond to a perceived lack of respect (e.g., being 'put on the spot' or challenged) from peers or others (Knowles, 1988) (Lipworth et al., 2013) (McAlearney, 2006). If not facilitated carefully, these and other factors can negatively impact group and CoP development. Such factors may enhance unconscious biases and reinforce group stereotyping that reinforces a doctor's allegiance to their personal sense of "self", which is closely tied to their professional identity, but not necessarily to an appropriate ML identity. This might lead to tokenistic responses to ML development without real personal change (Edmondson, 1999).

Depending on the CoP's group dynamics and resources, a coach or facilitator might be selected from outside the group or from its members. If the latter, all members need to still have access to their own development opportunities. Sometimes, interventions are required to improve the uni-disciplinary team climate before, or parallel to, the doctors' teams' engagement in potentially challenging group work or peer-to-peer-coaching (Keijser et al., 2019, This thesis: Chapter 9). Therefore, a comprehensive preparatory diagnostic work-up of team functioning and climate is advisable, before applying assessment tools, such as the ML Personas Inventory. This holds in particular for doctors' teams, in which a competitive atmosphere can impede the integration of new group members and change activities (Argyris, 1991) (Hafferty & Hafler, 2011) (Monrouxe, 2013) (Bartz & Rice, 2017) (Till et al., 2018).

Although use of the generic set of ML personas described above (or a similar, locally created artifact) can be instrumental to initiating and guiding the dialogue on and the effective development of (medical) leadership competence in a group, there is always a risk of reification. Therefore, investments in intra- and inter-group collective learning (the premise of CoP theory) can help mitigate the risk of ML imparting new tribal issues or becoming an undesirable re-emergence of a medical dominance type of leadership (Kuper & Whitehead, 2012).

CONSIDERATIONS

In the following sections we discuss our conceptual model by highlighting some potential benefits, challenges and limitations, and provide some suggestions for future study.

Professional Identity Formation

PIF is “an adaptive developmental process that happens simultaneously” at an individual (involving personal, psychological growth and development) and at a collective level (comprising socialization into communities) (Jarvis-Selinger et al., 2012, p. 1185). Because PIF is primarily constructed through participation in non-formal and ‘hidden’ settings (Jaye et al., 2006), our approach may help to support this process through its social embedding and explicit dialogue on issues relating to PIF (Cruess et al., 2018): i.e. making the implicit, explicit. However, the use of ML personas to identify tacit knowledge about (desired) leadership and to mitigate related ‘Babylonia’ (i.e., co-existence of ML’s interpretations) has limitations because the personas describe archetypes which are themselves based on cultural stereotypes of, for example, leadership and followership. Therefore, much is still to be discovered about how the contextual factors, which enable multiple CoPs to emerge, affect professional (medical) PIF (Maile et al., 2019) (Holden et al., 2012). Specific research is needed into how the interpersonal and intrapersonal dynamics of interactions between identities (e.g., intersection; dominance; compartmentalization or merging) evolve in CoP-based settings (Roccas & Brewer, 2002) and how contextual factors affecting a sense of self-efficacy and self-perception on leadership contribute to understanding the process of ML development (Moen et al., 2018) (Van der Zwet et al., 2010) (Holden et al., 2012).

Educational Perspective

Leadership development, training and education is an inclusive process, requiring inclusive types of practice-based approaches that meaningfully integrate theory with practice (Till et al., 2018). Medical practice is the production of a community through participation. Relatedly, doctors primarily develop their professional identity ‘personas’ through participation in various undeclared, non-formal and hidden elements of medical training, rather than the formal curriculum with prescribed educational objectives and assessments (Jaye et al., 2006). The ML personas presented here serve as an accessible, contextually tailorable artifact which educators can use with doctors to begin a dialogue about the elements that influence their participations and which practices help develop or undermine ML identity formation (Maile et al., 2019). The inventory can therefore help inform (1) the community’s efforts in defining its regime of competence about what is perceived by and expected from leadership enacted by doctors and others, and (2) specific individual doctor’s opportunities and needs for ML development. Through an explicit consideration of ML identity formation, the inventory can be used to explore longitudinal learning cycles associated with identity customization and individual self-conceptualization, in varying contexts (including CoPs), incorporating explicit facilitation concerned with identity enriching, patching and splinting, and influencing factors (Pratt et al., 2006).

Interprofessional Perspective

From the perspective of interprofessional learning (IPL), our approach (founded on applying CoP theory in concurrently existing uni- and multiprofessional groups) echoes contemporary contestations on IPL for interprofessional practice. This reflects a shift from a focus on “fixing individuals to fix healthcare” (Paradis & Whitehead, 2018, p. 1459) towards ‘fourth wave’ programs of uni-professional education combined with (multiprofessional) experiential learning. These focus on working in workplace (social) systems and structures which make explicit the various influences on collaboration (e.g., social systems, power, professionalism, attitudes) (Earnest et al., 2017) (Barrow et al., 2014).

ME needs to incorporate more workplace-based perspectives (Cruess et al., 2018) (Holden et al., 2015) (Earnest et al., 2017). For example, “new wave programs” (Onyura et al., 2019, p. 8) integrate new pedagogic strategies into clinical reality, utilizing more collectivist learning strategies to leadership development that go beyond the conventional paradigms of ME (Voogt et al., 2016) (Baker et al., 2019).

As discussed above, issues of 'power' are significantly lacking in most reports and practice relating to IPL (Paradis & Whitehead, 2017) (Baker at al., 2011) (Barrow et al 2011). Bringing multi-professional learners or practitioners together with differences in career phases, profession-specific tasks, experience, ways of learning, and history can lead to professionals being "hostage to professional silos" (Wenger, 2010, p. 188). And, whilst faculty ideally should feel able to address and challenge these issues in the IPL 'classroom', most healthcare education is still taught in siloes. It has been suggested therefore that logistically less complex uni-professional settings may be sufficient to educate professionals for a foundational understanding of power and social (and other) structures that can influence their collaboration and interprofessional arrangements (Paradis & Whitehead, 2018) (Nelson et al., 2017). These views, we argue, are in alignment with our approach of deploying a well-balanced mixture of uni- and multiprofessional CoPs which can help emerging leaders navigate the effects of their varying "capacity to develop professional identity" (Cruess & Cruess, 2014, p. 25).

Medical Leadership Development

Despite the relative new area of ML development and the widely varying MLT formats, we argue that that our model aligns with previous recommendations from experts and scholars in this field.

First, our model is applicable to the longitudinal, "personal and transformative journey" of ML development (Till et al., 2018, p.1), and to the wide variety of contexts in which doctors can experiment and develop personal traits and characteristics that influence their behavior and participations, interdependent with these contexts (Epitropaki et al., 2010) (Sazima, 2015).

Secondly, merely focusing on the development and acquisition of leadership 'competencies' is insufficient for the significant longitudinal development of a personal and professional leadership identity. A competency focus is usually time limited and can be reductionist, tends not to acknowledge the potential for individual development, and is not context-specific enough to incorporate the multiple dynamics of the workplace (its various actors and communities) in relation to the development of a repertoire of leadership approaches needed to lead effectively. ML development needs to be longitudinal and incorporate (self)reflective practice involving assessment instruments which enable doctors to develop their ML abilities. We contend therefore that our model acknowledges the complexity of 'learning leadership', providing opportunities for relevant forms of feedback and reflection in multiple CoPs (Thistlethwaite et al., 2014).

Thirdly, our model enhances the deliberate and organized exposure of doctors to complex social situations with "attributes [that] are most closely associated in everyday cognitive stereotypes and self-concepts" of their daily work (Jackson et al., 2003), including opportunities for collective (re)specifying, or (re)casting leadership (Johnson & May, 2015) (Lurie, 2012) (Turner et al., 2018).

Our approach, fourthly, incorporates realms of the hidden curriculum, through enabling peer influence within the context of a system of multiple CoPs, anticipating and possibly mitigating the risk of reiteration of old habits (Jaye, 2006) (Remennick & Shakhar, 2003).

Finally, needs' assessments are vital for the development of effective ML programs and initiatives (Leskiw & Singh, 2007) (Geerts, 2018) (Vimr & Thompson, 2011) (Geerts, 2018) (Dickinson & Ham, 2008). We suggest also that our approach aligns with recent experiences of co-designing healthcare leadership development programs (Ward et al., 2018) (Merriam et al., 2007). Because becoming a doctor includes considering the person the doctor is (Cruess et al., 2016), the ML Personas Inventory could be used in conjunction with assessment tools that explore personal characteristics (for example: MBTI) (Claes et al., 2018).

Challenges

It is essential to facilitate inclusivity and welcome diversity in CoPs, and whilst this can be very challenging in those with multiple actors and dynamics, such concerns need to be dealt with as part of reality (Cruess et al., 2018). Group members need to be aware that the enforcement of new group norms on individuals may lead to a "dissonance" between an individual's personal and professional identity formation and that of the 'group'. We recommend positioning ML explicitly as non-exclusive and espousing (facilitated if needed) the contextual co-creation of its meaning and enactment. Also, an actively endorsed organization or system-wide view on the leadership approaches that promote and sustain interprofessional collaboration will both inform ML sense-making and provide a general platform for leadership discourse in CoPs in a particular organization or system. However, since medical professionalization is also significantly affected by various factors outside clinical processes and education (e.g., medical associations or CoP dedicated to ML[7]; see also: Figure 1), effective ML development at local level requires extensive alignment between organizations and various other bodies (Paradis et al., 2018).

The introduction and implementation of the ML personas model may well be resisted by traditional views on medical leadership, wider cultural beliefs on the role of the doctor, and hierarchies in healthcare. Institutionalized tenacious behaviors and identities result from life-long enculturation can exhibit themselves in attitudes and behaviors that impede professional transformation at a later career stage (Jaye, 2006) (Good & Good, 2000) (Remennick & Shakhar's, 2003). Many of the current generation of senior doctors have "never (having) formally learned about leadership" (McKimm et al., 2009, p. 20) and therefore might lack relevant role-modelling or mentoring skills, or believe that doctors engaging in ML of organizations or systems are going to the 'dark side' of management (Spurgeon et al., 2017). The reality of the difficult challenges that accompany remolding of PI to incorporate a contemporary MLI in later career stages is often neglected or impeded by busy schedules and other factors (Coulehan, 2005) (Stern and Papadakis, 2006).

Limitations

This paper aims to contribute to the literature by providing theoretically founded descriptions of a new educational approach, however our ML personas model has also several possible shortcomings (Paradis, & Whitehead, 2018). First, similar to any framework that includes models for leadership development, the ML personas reflect an 'ideal' and the full repertoire of ML behaviors and competencies that doctors might attain. Doctors are not 'Jacks of all trades', therefore the potentially norming effects of ML personas need to be kept in mind as these might not reflect the wide diversity of medical professionals or how a MLI might be interwoven into an individuals' intersecting personal, social and professional identities. Secondly, despite high levels of similarity between the existing multitude of healthcare competency frameworks (Reeves et al., 2009) (Keijser et al., 2019, This thesis, Chapter 2), the current inventory is based specifically on the ML framework of one particular nation (the Netherlands), context specific, Euro-centric and therefore prone to cultural bias. Therefore, for use in different cultural contexts adjustments (e.g., reformatting, re-wording or adding specific ML personas) would need to be made. Thirdly, because patients receiving healthcare are the ultimate source for rating their needs for and how they see ML, the recipients of care should always be included in any feedback as the ultimate stakeholder.

Finally, our inventory is an experience-based and conceptual guide: not a fully tested and validated instrument and, whilst there is a lack of validated ML assessment tools (not excluding the ML Personas Inventory) criticisms on the effectiveness of tools such a like 360-degree feedback instruments in leadership development call for more enquiries (Lacerenza et al., 2017) (Keijser & Wilderom, 2019, This thesis, Chapter 5). To date, personas have not been explicitly used in ML development, other than in describing doctors in (or aiming for) formal leadership positions expressing a distinct leadership persona (Morahan et al., 2010). Hence, more research in this relatively new field of ML is required to investigate the applicability and effectiveness of such approaches.

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[7] For example: TISLEP (Grady et al., 2018), Sanokondu (Busari et al., 2018); FMLM (Lees & Armit, 2008), LEADS (Dickson & Tholl, 2014): See; Figure 1.

CONCLUSIONS

Healthcare professionals' professionalism is developed and maintained through continuous and multi-dimensional influences among the individual, the workplace, teamwork, and the wider healthcare system. For long, conventional thinking and practices have conceptualized professionalization in healthcare in terms of innate virtues and competencies, mainly in the domain of professional-patient interactions. Applying the concepts of PIF, CoP and personas, our new conceptual model responds to increasing calls for shifting to alternative conceptualizations in terms of identities, competencies and behaviors being experimented with, taught, trained and learned in the context of a variety of external forces (Lesser et al., 2010). This model can contribute to the development of new strategies to help overcome mitigating factors and strengthen those that support doctors' capacity to exhibit professionalism in practice. We argue that the use of ML personas in CoP contexts also aligns with calls for more shared and collective forms of leadership that embrace diversity and inclusiveness, jointly fostering more effective change, innovation and, ultimately, sustainable system transformation and reform (Baker et al., 2019) (Cruess et al., 2018). Moreover, improving interpersonal relationships helps foster the development of interprofessional understanding, strong levels of commitment, engagement and trust, and the increased use of shared mental models, which in turn improve health outcomes (Braithwaite et al., 2009). Finally, through shifting ML development from the relatively closed confines of medical collegiality, norms and values, the new approach helps mitigate the risk of ML becoming a doctors' new exclusive sovereignty (Kuper & Whitehead, 2012).

This paper builds on how doctors' shifting concept of their leadership focusses on proficiency in adapting and shaping professional identities. Through fusing a number of philosophical lines of thought, weaving together the 'being' of leadership (ontology), the existence and governance of leadership values and ethics (axiology), the cognitive knowledge base of leadership (epistemology), and the concrete actions and behaviors of leadership practice (praxeology) (Souba, 2011), our conceptual model aims to bolster interprofessional collaboration in healthcare. Reflecting collective and shared forms of leadership and using the emerging ML, the identified twelve distinct archetypes of ML can support healthcare groups and teams in better understanding, as well as furthering their interprofessional functioning. The personas model thus provides a new discourse on collective leadership design and enactment in contextually appropriate ways. Offering new practical paths for (M)L development, we hope this model can purposefully and pragmatically help to bridge existing educational gaps between the professions, through opening up their hidden curricula, beliefs and practices to new viewpoints.

To conclude, for many health professionals the formation of contemporary PIs incorporates both leadership and followership. In the social evolution of health professions, leadership and its development are couched in the CoPs members' communal objective to collaborate, supported by emergent types of workplace-based collective learning. Contemporary leadership development in healthcare should not be restricted to the confinements of one unique collegial setting or mono-professional group. The ML personas tool can support doctors in their individual leadership development, and at the same time stimulate more open conversations on the leadership and followership that various professionals take as part of their collective actions in delivering the high-quality care that patients and service users deserve.

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6

CHAPTER 7

Checklist for Reporting Complex Multi-Professional Healthcare Teamwork Training: Development and Validation with TeamSTEPPS Implementation Studies

Submitted paper

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Keywords
- Team training
- TeamSTEPPS
- Complex intervention
- Reporting checklist

Abbreviations

AHRQ, Agency for Healthcare Research and Quality
CTTI, Complex Team Training Intervention
ED, Emergency Department
ICU, Intensive Care Unit
L&D, Labor and Delivery.
NICU, Neonatal Intensive Care Unit
OR, Operation Room
ReCoMuTe, Reporting Complex Multi-Professional Healthcare Teamwork Training
TS, TeamSTEPPS
TT, Team Training

ABSTRACT

Multidisciplinary healthcare team training (TT) is regarded as a means to improve patient safety and quality of care. Current TT is increasingly characterized by complex interventions, challenging scholars and practitioners in effectively reporting evaluations of interventions. In the absence of existing reporting guidelines, we developed a new checklist for effectively reporting on complex TT interventions (CTTIs) and their implementation. Conflicting or weak evidence as to whether CTTIs ultimately affect patient outcomes suggests the need for more comparability, reproducibility, and transparency in scientific reports. Such efforts will further the understanding of intervention design, implementation, and evaluation, and inform decisions regarding investing in them.

The checklist was designed through pragmatically consulting relevant frameworks for evaluating complex interventional studies, as well as related key literature. To test the checklist's validity and usability, we performed a literature review of peer-reviewed journal articles describing TeamSTEPPS (TS) implementation. We used the checklist to evaluate the extensiveness of reporting in these articles, as well as to inventory elements for successful implementation.

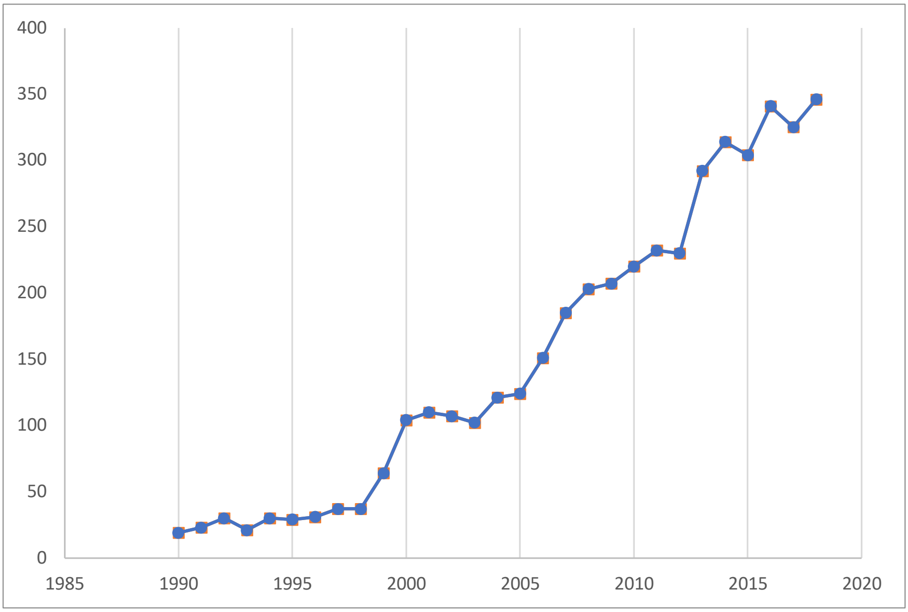
The Reporting Complex Multi-Professional Healthcare Teamwork Training (ReCoMuTe) checklist presented in this paper provides an instrument for evaluating TS-based evaluation studies. Despite its wide use and the increasing number of publications on its implementation, we found that the detail of reporting in papers on TS implementation is often inadequate. More standardized reporting of team training interventions, their implementation processes, and concomitant effects could contribute to more sufficient scientific scrutiny of CTTIs, such as TS. The ReCoMuTe checklist can assist authors, reviewers, editors, and others to further research on team training in healthcare.

INTRODUCTION

Since the publication of 'To Err is Human,' team performance in healthcare has increasingly gained attention as a serious potential threat to patient safety (Kohn et al., 2000). Over the last 20 years, valuable knowledge and experience has been added in this area, importantly having derived from aviation and other high-risk industries, trailblazing in science and the practice of organizational safety and quality (Aron & Headrick, 2002; Gross et al., 2019; Helmreich et al., 1999; Rosenbaum, 2019). During this period, teamwork training (TT) has also gradually become a more prevalent standard component of quality and safety schemes in healthcare (Weaver et al., 2014; WHO, 2011).

Despite the increasing use of TT approaches, there is still a dearth of well-defined and comprehensive schemes supported by a wide consensus (Salas et al., 2019). In the last two decades, mounting, only moderate scientific evidence has indicated positive associations among elements and effects of TT interventions, even at the level of patient mortality (Buljac-Smaradzic et al., 2010; Hughes et al., 2016; Rosen et al., 2018; Salas et al., 2018; Weaver et al., 2014). Notwithstanding the gradual opening up of TT's 'black box,' which disclosed various underpinnings of effective and safe teamwork, such as psychological safety and effective team leadership, much remains unclear regarding the effects of healthcare TT and implementation conditions (Salas et al., 2018). Since around 2000, the number of scientific studies on TT in healthcare have increasingly spiked (Figure 1); however, scholarly publications often lack adequate reporting regarding the elements, settings, and implementation processes of TT interventions. Without sufficient accounting for the 'what,' 'how,' 'when,' and 'who' in scientific reports on TT, meta-analytic studies cannot be performed satisfactorily, nor can interventions be replicated (Cook et al., 2011a; Golub & Fontanarosa, 2015). Thus, to face the challenge of sufficiently describing studies on TT ourselves, we embarked on designing a checklist for such reporting.

Figure 1. Per year trend of total per year indexed (PubMed) publications on 'team training' or 'CRM' (period: 1990 - 2019)



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Teamwork Training and Complexity

It can be argued that relatively meager reporting in TT-based publications is related to often neglecting the importance of context, the conceptualization of healthcare TT as 'just training,' and the relative dominance of biomedical over more social science-oriented methodologies in the clinical domain (Greenhalgh, 2012; Pfadenhauer et al., 2017). Moreover, based on our clinical and TT experience, we argue that TT should be placed in the context of complexity thinking. We believe this mirrors contemporary healthcare's daily reality in practice, as well as in science, as reflected by two considerations. First, healthcare teams function within a context characterized by an ever-increasing fragmentation of members, processes, and technologies, embedded in a myriad of professional systems and structures. This emphasizes the significance of TT in providing professionals with adequate knowledge, skills, and attitudes for optimal functioning in heterogenic, fast-paced, and fluid interactions and collaborations (Zwarenstein et al., 2009). Second, delivering TT in the relatively chaotic convolution of professionals' daily clinical, organizational, and educational activities conveys a scholarly challenge of applying a multidisciplinary view to TT (Salas et al., 2018).

Practically, these considerations concur with a tendency of TT-based initiatives to progressively develop into complex, longitudinal programs, often focusing on organizational change and improvement (Dixon-Woods et al., 2011; Romijn et al., 2019). Scientifically, modern studies on teams (and the multi-team and unit systems they often occur in) and their development through TT necessitate input from a variety of scholarly traditions and viewpoints, also introducing mixed methodologies that can contrast with medicine's historical bio-medical approach (Salas et al., 2018). Based on these considerations, we argue that those who report on TT-based scholarly work should strive for more adequate descriptions of potentially valuable, multifaceted streams of multi-level experiences, often concealed within their investigations. We believe a coming together of various scholarly streams will provide a better understanding of TT efforts, implementations, and wise decision-making in the allocation of resources. Therefore, in the present study, we position TT in the perspective of complexity, conceptualizing it as 'complex TT intervention,' or 'CTTI' (Craig et al., 2008; May et al., 2007).

After outlining the background, rationale, and methodological approach of our study, we present the checklist for reporting on CTTIs and discuss how it can be applied, so that we can collect simpler, evidence-based facts from future well-intentioned intervention-research efforts.

BACKGROUND & RATIONALE

In this section, we lay out the concepts of TT and complex interventions and describe the importance of elaborate reporting in scientific publications on CTTIs.

Teamwork and Training

TT aims to mitigate the risks of errors resulting from "natural limitations of human performance and the functioning of complex systems" (Helmreich et al., 1999 p. 29). Competencies underpinning effective teamwork have been identified in previous research, and their importance in healthcare settings has been validated (Salas et al., 2005; Suter et al., 2009). Although the trainability of essential teamwork competencies (i.e., attitudes, behaviors, and cognitions) has been established before, recent meta-analytic reviews have provided increasing evidence for the ability of TT to facilitate learning and lead to professional behavioral changes and improved patient and organizational outcomes (Hughes et al., 2016; Rosen et al., 2018; Weaver et al., 2014).

Generally, healthcare professionals often participate in various teams, engaging with others under continuously changing circumstances, while their individual professional roles mostly remain stable (Andreatta, 2010). Since patient-care pathways occur across many teams and professional boundaries, effective inter-team and inter-professional communication and collaboration is essential for patient safety. Moreover, healthcare settings often involve complex social networks of professionals with varying backgrounds, educations, viewpoints, work locations, and other characteristics that moderate the effectiveness of their communication and teamwork (Leonard et al., 2004; Marshall et al., 2009). Furthermore, teamwork in healthcare is affected by several characteristics that distinguish the field from other industries, including low temporal stability and short timespans, a deeply entrenched professional culture (e.g., tacit, complex hierarchical structures), rotating or fluctuating leadership, and protocols that impart high interdependency (Hollenbeck et al., 2012; Reay et al., 2016; Wildman et al., 2012).

In healthcare, TT importantly fosters improvement of interprofessional collaboration and communication as indispensable elements for continuous improvement of the quality and safety of care. TT is characterized by a plurality of teamwork-related topics, skill areas, training settings, instruments, and assessment procedures (Gross et al., 2019; Hughes et al., 2016; Salas et al., 2008). Scholars and practitioners have distinctive streams of knowledge and practices that provide extensive resources, such as crew resource management (CRM), Lean/Six Sigma, and simulation (Arora et al., 2015; Gross et al., 2019; Koning et al., 2006; Salas et al., 2007). Similarly, recent evidence-based training methods and validated measures provide practical instruments for addressing a wide variety of elements that comprise teamwork (Marlow et al., 2017; Salas et al., 2013). One example is the TeamSTEPPS (i.e., Team Strategies and Tools to Enhance Performance and Patient Safety) curriculum, which is a direct result of responses to the aforementioned 'To Err is Human,' and was developed by the United States' Agency for Healthcare Research and Quality (AHRQ) and Department of Defense (Clancy & Tornberg, 2007; Gross et al., 2019; King et al., 2008; Kohn et al., 2000).

Numerous moderating factors facilitate or impede team performance or influence TT implementation and sustainability, particularly contextual factors, such as organizational conditions, team climate/culture, and consequences of working in multi-team systems (Clay-Williams & Braithwaite, 2015; Sexton et al., 2000; West et al., 2015). Under growing attention in the field, TT is increasingly couched in the context of other, contemporaneous quality improvement activities, even providing components to large-scale organizational transformation programs (Gross et al., 2019; Robichaud et al., 2012). Hence, through this intertwinement with quality improvement efforts, TT becomes subject to a wide array of social behavioral, systemic, and context-related factors (Foy et al., 2011). In fact, healthcare TT comprises a complex area in which various types of scholars and practitioners must also acknowledge consequences of re-institutionalization and re-professionalization processes (Reay et al., 2016). These grand developments in particularly intertwine with each other in settings where professionals collectively work, train and learn. Relatedly, recent meta-analytical work revealed the essence of the learning processes of those participating in TT to its effectiveness (Hughes et al., 2016). Optimally, healthcare professionals' learning would follow tactics such as 'spacing' series of learning opportunities in near-real life settings (Keijser & Wilderom, 2019, This thesis, Chapter 5). In contrast to 'one-stop-shop' or 'single bullet' training sessions, more longitudinal programs combining TT with organizational quality improvement schemes that exceed the single-team perspective provide openings for such practice-based learning. Moreover, TT sessions alternating uni- and multi-professional composition, provide learning opportunities in which effective feedback can be shared in more psychologically safe settings among direct peers, mitigating less-positive effects of feedback exercises and reflective practices (Fluger & DeNisi, 1998; Hughes et al., 2016).

Much remains unknown about the impact mechanisms and dynamics related to the context and conditions that foster effective application of TT interventions (Gross et al., 2019; Salas et al., 2018). Multidisciplinary approaches, involving clinicians, scientists, experts, and others at the table, can further the field of TT through detailed study of clinical and organizational behavior, selection, development, and implementation of TT interventions, and the underlying mechanisms of change that accompany the effects (or lack thereof) of TT (Foy et al., 2011). Furthermore, theory-driven evaluations can enhance generalizability and help build a cumulative understanding of the nature of change. Therefore, we believe conceptually framing TT as a complex intervention accommodates a wider variety of theories and analytic approaches that could help govern further scientific work on contemporary TT.

Complex Interventions

A complex intervention (CI) refers to implementation or use of various intertwining elements, that are deployed in a complex or 'adaptive' setting or system, and interact following often unpredictable, non-linear causal processes (Booth et al., 2019; Petticrew et al., 2019). CIs consist "of multiple behavioral, technological, and organizational components" (May et al., 2007, p. 2). A CI comprises the governing of several interacting components that require distinct expertise and skill from those delivering or receiving the CI. Furthermore, a CI is targeted at several groups, professionals, or organizational levels, and is often tailorable to context (Craig et al., 2008; Hawe et al., 2009). The settings in which CIs are placed represent multi-layered environments comprising various social, cultural, political, procedural, and less-tacit dimensions, jointly structuring the daily reality of inhabitants (Dixon-Woods et al., 2011). In other words, implementing CIs results in a multifaceted interplay between an intervention's components and the context in which it is implemented (Petticrew et al., 2019). Causal relationships between a CI and its intended or unexpected outcomes, or the CI's 'active ingredient,' are hard to define, which complicates evaluation. Furthermore, a CI and its context coexist in an interplay in which the intervention often requires adaptation to context, or changes to the context itself (Øvretveit, 2011).

Various healthcare-related programs, such as multiprofessional care pathways that comprise mutual decision making and re-organization of care, are designed and studied as CIs (Möhler et al., 2015; Moore et al., 2015; Vanhaecht et al., 2010). Furthermore, a wide range of quality improvement approaches, including plan-do-study-act cycles, are designed as series of interdependent phases and activities that align with principles of CIs, and often comprise changes in social structures within groups that are affected (Berwick, 1998; Taylor et al., 2014). Change resistance can play a significant role in CI implementation. In general, healthcare professionals are reluctant to participate in improvement initiatives. This holds in particular for professions with a conservative, biomedical attitude toward adopting new ways of working, such as physicians (Audet et al., 2005; Wilkinson et al., 2011; Keijser et al., 2019, This thesis, Chapter 4).

Increasingly, CIs in which various professionals participate, can promote facets of a CTTI (Deneckere et al., 2012). Although, advisably, researchers should explicitly consider whether or not to view an intervention as complex (Booth et al., 2019), based on these definitions and extant use of CIs in healthcare, we contend that most contemporary TT can be depicted as CTTI.

Scientific Reporting

The main objective of CI evaluation studies is often to determine whether the goal of the intervention was met. However, how and why an intervention works are equally important questions (Brewster et al., 2015; Pettigrew et al., 2013). Meta-analytical systematic evaluation can contribute significantly to identifying the active ingredients of a CI, as well as factors impeding its implementation in context. An indicative criterium for appropriate reporting in CTTI evaluation studies could be to judge publications on "whether an expert proficient in [CTTI] research and practice could comprehend and reproduce the intervention based on the information given and the references provided" (Gross, 2019, p. 5). However, Weaver and colleagues reported in their literature review on healthcare TT, that "nearly all reviewed studies failed to specify important content" (2010, p. 1756). Failure to describe an intervention's context, design, and outcomes in scientific publications is also reported in systematic reviews scrutinizing healthcare simulation training, multi-professional team and leadership training, and CRM programs (Cook et al., 2011b; Gross et al., 2019; Husebo & Akerjordet, 2016).

Incomplete reporting has been mentioned in various domains of healthcare, including medical education (Cook et al., 2011a; Glasziou et al., 2014). Furthermore, evaluation, intervention, and implementation processes need to be comprehensively reported, and "sufficient information must be available for the judgement of the intervention's clinical benefits, for replication, or for adaption of an intervention to different settings or countries" (Möhler et al., 2013, p. 2). In evaluating CIs, it is imperative to understand the interplay between intervention and context to facilitate well-informed decisions for adequately choosing, resourcing, delivering, and evaluating a CI (Booth et al., 2019). Compared to conventional controlled studies, evaluating CIs is particularly difficult, due to unknown factors and interactions between components. Although these components may be different depending on the setting, an accurate description of an intervention and its implementation process, as well as impeding and facilitating factors, can contribute to effectively improving scientific quality (Foy et al., 2011).

Anticipating reporting on CTTI evaluation studies ourselves, and after consulting the wealth of extant guidelines and frameworks, we did not find an applicable reporting aid, suggesting a need to be addressed. Therefore, we developed a reporting checklist, attempting to answer this study's main research question: *What elements are crucial in adequately reporting the implementation of CTTIs?*

METHODS

Our work was done in two phases: development and face validity testing.

Phase 1: Checklist development

In developing the checklist, we followed a stepped approach to apply a configurative synthesis of data (Gough et al., 2009; Mohler et al., 2010; Figure 2). First, we pragmatically inventoried frameworks, guidelines, standards, and approaches relevant to the domains of our study, using online database searches and repositories (e.g., EQUATOR network) (Bragge et al., 2917; Simera et al., 2010). We applied a forward snowballing approach to search for publications using (or revising or extending) or referring to existing frameworks, and backward snowballing approach to identify key publications that could provide relevant evidence on the quality of reporting in published research (Möhler et al., 2010; Wohlin, 2014).

Next, we composed the initial main structure of our envisioned checklist, building on our prior search results. Iteratively, after reviewing retrieved sources and discussions between both researchers, we reached a consensus on the main structure. Then, using the categories framing this initial structure, both authors, individually, identified and recorded relevant sub-items describing elements of reporting and implementing CTTIs. Results were then discussed for relevance and eligibility, before being included as components or elements to our checklist.

We continued to search for relevant elements until saturation was reached and no more new aspects from other frameworks or reports could be found. During the development process, we iteratively checked for overlap and redundancy, and also used these feedback loops to confirm clarity in the checklist's wording. During the entire process, both researchers kept notes and convened at various points to compare findings and discuss overall checklist development, as well as inclusion and adequate descriptions of each element.

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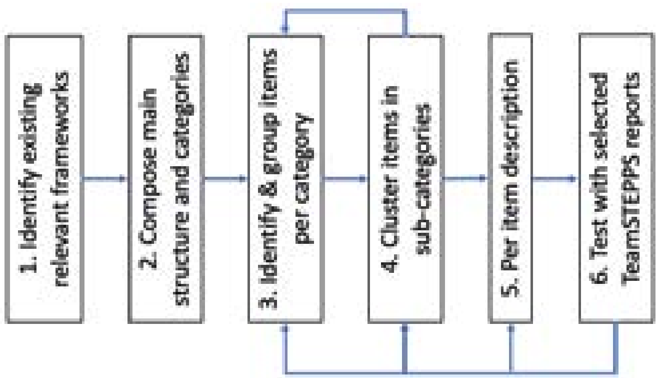
Figure 2. Phased development of the ReCoMuTe checklist (arrows depict feedback loops)



Phase 2: Face Validity

Face validity of the checklist was tested based on a literature review of publications reporting on the TeamSTEPPS (TS) curriculum. TS is a multifaceted, complex, evidence-based quality improvement intervention, which emphasizes enhancing healthcare team performance through tailorable training designed to enhance team knowledge, skills, and attitudes (Clancy & Tornberg, 2008; Ward et al., 2017). The curriculum provides a comprehensive set of connected, but independently utilizable, instruments and approaches that facilitate understanding and training of key actions for a culture of continuous change based on effective teamwork. TS focuses on elements such as team leadership, mutual performance monitoring, situational awareness, backup behaviors, reflexibility, adaptability, team/collective orientation, shared mental models, mutual trust, and closed-loop communication and feedback (Clancy & Tornberg, 2007; Clapper & Kong, 2012; King et al., 2008; Salas et al., 2018). TS was launched in 2006, and has been implemented in a significant number of U.S. healthcare facilities, as well as elsewhere, comprising acute to chronic care types, including: military hospitals (Deering et al., 2011); mental health clinics (Stead et al., 2009); emergency departments (Jones, 2013a); and primary care facilities (Treadwell et al., 2015). Reportedly, TS implementation contributes to improved staff knowledge, skills, and attitudes (Jones et al., 2013b; Sawyer et al., 2013), as well as clinical outcomes (Capella et al., 2010; Spiva et al., 2014).

Our rational for choosing TS as a 'test case' for feasibility was twofold. First, it enabled us to review a relatively new intervention, deferring a resource-intensive review of a relatively high number of publications featuring a wide variety of approaches. Second, TS is often viewed as an archetypical format for complex multidisciplinary team development interventions (Chen et al., 2019; Gross et al., 2019; Hughes et al., 2019; Rosen et al., 2018; West & Lyubovnikova, 2013), and variability in its implementation has been suggested to be relevant to understanding its effectiveness (Ward et al., 2017). We acknowledged, however, that the use of TS as a test case would not fully align with two elements on our checklist. First, underlying theoretical basis of a CTTI (Table 1: D1) is particularly relevant in new experimental intervention studies, but not for evidence-based interventions, such as TS. Second, reporting on pilot studies (Table 2: C3) might be less relevant, since TS interventions are tailored to local context in most cases. However, we could argue that TS could also benefit from small scale pre-testing as a preparatory activity.

We consulted five databases (PubMed, Web of Science, Scopus, Embase, and PsycInfo) to identify reports on TS, using the keywords "TeamSTEPPS" and "Team STEPPS." Searches were filtered by peer-reviewed journal articles or reviews, published in English, in the period starting from TS's launch (2007) until November 2017.

Inclusion/exclusion criteria

Eligible publications described TS implementation in multidisciplinary healthcare teams with the goal of improving teamwork and/or patient safety. Interprofessional educational settings, records only describing TS-based interventions (including those using only a single instrument or tactic, such as huddles or debriefing) were excluded, as were reports of monodisciplinary TS use (e.g., nurses), or QI programs using TS concepts or describing simulation interventions without accounting for the implementation process. To compare implementation methods, we chose studies conducted in western countries in Europe, North America, South America, or Oceania. Included literature reviews on TS implementation were used for snowballing to find eligible papers, according to procedures described by Wohlin (2014); however, no new records were found during this process.

After screening abstracts and titles, full-text versions of articles were retrieved and reviewed. In addition to inclusion criteria from the screening stage, in this stage we also excluded reports that failed to describe implementation phases or skills that were taught, as well as those that did not indicate facilitation by a TS 'master trainer.' Descriptions of implementation phases or stages we deemed to be indicative of a well-reported CI and its implementation. Since facilitation is imperative to team training (Salas et al., 2002), we regarded a dedicated TS master trainer role as suggestive for well-designed and well-implemented TS programs. A TS master trainer is a person knowledgeable and capable of guiding TS implementation, including performing site assessments to determine performance gaps, and coordinating, preparing, training, and providing process consultations at the unit, departmental, and organizational levels (AHRQ, 2014).

Data extraction
Full texts of articles were reviewed, and data were extracted on publication and study characteristics (e.g., country, organizational type, setting, study design, and type of data collection). All included publications were assessed using Atlas TI™ (version 8.0.33.0; Scientific Software Development GmbH, Berlin, Germany) for text coding based on the components of our reporting checklist. To identify codes and explicatory or exemplary quotations, we initially thematically coded a first batch (n = 12). Afterwards, we discussed coded quotes from the articles to be used for rating the level of reporting of each publication. Both researchers separately rated each article, using the selected quotes from the previous step. After the first three codes disagreements were discussed and resolved, the remaining codes were rated.

Rating classification was done using a 4-point scale: “0” = nothing reported regarding our checklist’s components; “1” = minimum reporting: general description, without details; “2” = moderate reporting: moderate description or specified report on one or more, but not all of the checklist’s components, and “3” = optimal reporting: specified and detailed reporting (zero to three: “0” or “1” representing “low” and “2” or “3” representing “high” score).

Furthermore, we coded all included publications for reporting of impeding and facilitating factors with a similar method, using Atlas TI. We used the four levels of training evaluation to assess how training effects were measured (Jones et al., 2013b; Kirkpatrick, 1994).

RESULTS

Checklist Development
In the initial developmental phase, evaluation frameworks and reporting checklists focusing on less linear processes than traditional randomized controlled trials (RCTs) offered us inspirational input from perspectives, such as: an “iterative phased approach that harnesses qualitative and quantitative methods” (Campbell et al., 2000, p. 696); the framework’s application to “assess fidelity and quality of implementation, clarify causal mechanisms and identify contextual factors associated with variation in outcomes” (Craig et al., 2008, p. 34; Medical Research Council, 2000); and evaluation of “more complex, less advantageous settings” (Glasgow et al., 1999, p. 1322). Eventually, this input led to our checklist’s ‘backbone’ that comprises four categories: context and preparation; description of intervention; execution and delivery; and mechanisms of impact. These main categories reflected to great extent the studied frameworks and resulted from a process of iteratively comparing our sources (Table 1).

Apart from frameworks evaluating worksite-based programs, including that which distinguished facilitating and impeding factors (Fleuren et al., 2004; Wierenga et al., 2016), we sought input from team training interventions targeting clinical healthcare providers (Marlow et al., 2017; Weaver et al., 2010; Zhu et al., 2015). We consulted several frameworks and guidelines describing how best to report on interventions, for example the CReDECI 2 guidelines (Criteria for Reporting the Development and Evaluation of Complex Interventions in healthcare), which build on the aforementioned Medical Research Council framework (Campbell et al., 2000; Möhler et al., 2015). In our investigation, we did search for resources focusing on specific study designs, since our objective was specifically to report on interventions and their implementation.

In addition to the aforementioned sources, to find relevant missing components or elements, we reviewed other reporting guidelines and frameworks (and extensions), such as TIDieR for reporting interventions (Hoffmann et al., 2014), CONSORT and STROBE for simulation (Cheng et al., 2016; Moher et al., 2010a), StaRI for reporting on implementation of CIs (Pinnock et al., 2015; Pinnock et al., 2017), PARIHS for evaluating implementation of evidence into practice (Rycroft-Malone et al., 2008; Kitson, 2008; Ward et al., 2017), RE-AIM/PRISM for evaluating implementation (Glasgow et al., 1999; Glasgow et al., 2019), SQUIRE for reporting quality improvement (Goodman et al., 2016), and CReDECI for reporting QI (Möhler et al., 2013; Möhler et al., 2015). These efforts contributed to textual adaptations and alterations, as well as some changes in composition and ordering of elements, but did not provide significant additional topics for our checklist.

During the final developmental stages, we formulated components by combining the terminology used in studied frameworks. Several papers described the prolific growth of terminology in implementation evaluation science and presented guidelines or 'meta-frameworks' to contain this growth (Bragge, 2017; Damschroder et al., 2009; Pfadenhauer et al., 2017). Therefore, in the development of the Reporting Complex Multi-Professional Healthcare Teamwork Training (ReCoMuTe) checklist, we aimed to use definitions and terminology provided by these guidelines as often as possible. However, more specific domain-related terminology (i.e., CTTIs) was also included in our final version (Table 1). Continuously, during the checklist's development as well as validity evaluation, while assuring no element was left out and the meaning of descriptions remained intact, we searched for overlap between elements and well-balanced appropriateness, clarity, and conciseness in wording. Based on using the checklist's first version during validity testing, conciseness and clarity in wording was enhanced until the final version. Although validity testing helped enhance conciseness of element descriptions, it did not reveal new categories, components, or elements for our checklist, suggesting completeness in our design for assessing reports on TS implementation.

Table 1. Categories, components and their elements of the ‘Reporting Complex Multi-Professional Healthcare Teamwork Training’ (ReCoMuTe) checklist

Category	Key components	Elements to describe in reporting
Context and Preparation	C1 Needs & barrier assessment	▪ Assessment informing tailoring design, deployment and evaluation ▪ Clear and aligned (e.g. organizational) strategies and justifications ▪ Specification of local problem/challenge
	C2 Engagement & endorsement	▪ Motivation, engagement and readiness of organization and participants (activities and assessment relating for example: sense-of-urgency; sense-making; shared understanding; coalition formation; resistance reduction; incentives) ▪ Endorsement and support (e.g., management; executives; medical staff) ▪ Clear communication and information (e.g., on program objectives)
	C3 Contextualization	▪ Context optimization (e.g., appreciative enquiry envisioned participants; organizational culture change) ▪ Anticipation on simultaneous (possible conflicting) interventions ▪ Intervention adaptations (e.g., design, content, planning) ▪ Feasibility assessment and pilot testing conceptual program
	C4 Organization	▪ Structure and roles implementation organization and members
Description of Intervention	D1 Objectives, content, planning & participants	▪ Objectives and outcomes* ▪ Participants (e.g., characteristics; selection; recruitment; enrolment); team(s) (e.g., authority differentiation; temporal stability; tasks and skills differentiation) ▪ Content and materials* ▪ Detailed planning activities* (e.g., timing; duration; location; frequency; timeline visualization) ▪ Required resources (e.g., time; finances; materials; location)* ▪ Anticipated causal relation objectives vis-à-vis content and activities* ▪ Metrics on progress and outcomes monitoring* ▪ Theories and evidence (e.g., effectiveness) underpinning rationale for design, deployment and evaluation *at various (organizational) levels
	D2 Facilitation	▪ Planned facilitation strategies, tactics and processes (during and outside of planned sessions) ▪ Main facilitator’s (e.g., master trainer) characteristics (e.g., background; position; selection; gender) ▪ Additional facilitation (e.g., individual leadership coaching) ▪ Informal facilitation (e.g., support to and from champions) ▪ Resistance/‘change fatigue’ reduction ▪ Implementation communication (e.g. progress; milestones; updates; materials, such as: pens, badges, (online) nudges)
	D3 Sustainability	▪ Sustainment strategies and activity (e.g., integration in organizational quality and educational cycles; periodical evaluation) ▪ Post-intervention (e.g., refresh or new-comers training)
Execution and Delivery	E1 Fidelity / adaptability	▪ ‘Reach’; dose delivered/ received ▪ Details of delivery activities (temporal; including (un)planned or -intended) ▪ Intervention vis-à-vis context interactions, including (longitudinal) accounts of: (a) (Psychological and other types of) fidelity to intended delivery; (b) adaptations to intervention; (c) changes in context (including those imparted by the intervention) ▪ Contextual detail (e.g., duration; unintended experiences)
	E2 Learning, training & transfer	▪ Used training and educational strategies, tactics and methods (e.g., simulation/ didactic sessions; multi-source feedback/ self-reflection; uni-/multi-professional approach) ▪ Reception and acceptance of activities (e.g., experiences; responses; satisfaction; feedback)
	E3 Faculty	▪ Trainers, coaches, guest lecturers, etc. (e.g., profession; background; (hierarchical) position; motivation; selection; tasks; experiences)
Mechanisms of Impact	M1 Evaluation & analysis	▪ Methodology for (process) evaluation (including theoretical rationale) ▪ Descriptions and/or selective narratives reflecting topics relating change management, organizational behavioral, social structures (*What happened?*) ▪ Impact mechanisms (e.g., anticipated versus unexpected) ▪ Mediating (expected and unexpected) factors, pathways and consequences ▪ Strengths and limitations of intervention’s components ▪ Lessons learned ▪ Possible (causal) explanations of activities’ impact on outcomes ▪ Description of control group and conditions (if applicable)

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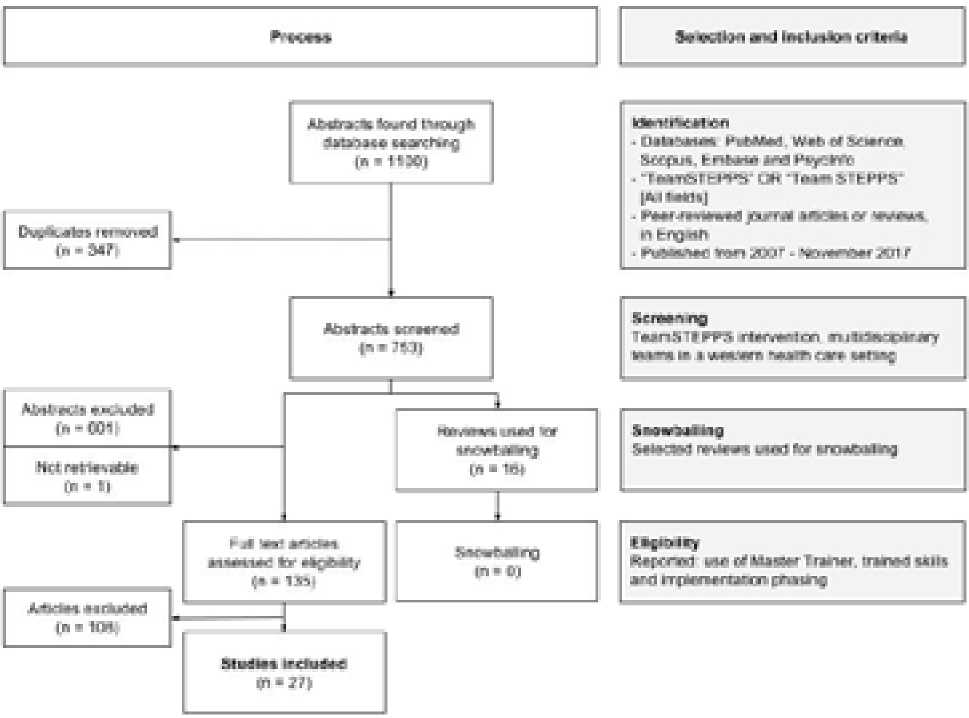
Face Validity Testing

Our initial search resulted in 1,100 potential abstracts (Figure 2). After removing duplicates (n = 347), the remaining abstracts (n = 753) were screened independently by two researchers (RW and WK), after which they discussed any disagreements. When criteria were not fully described in the title and abstract, or in cases where researchers doubted the nature of the QI, the article was included for full-text analysis. One article (Motley & Dolansky, 2015) in this literature review could not be retrieved. Snowballing reviews did not result in new records. Full-text papers (n = 135) were then assessed by two researchers (RW and WK) for eligibility, and disagreements were again discussed. During the process, a third reviewer (CW) was available for refereeing; however, that appeared not to be needed. This inclusion process produced a total of 27 articles for this review.

Figure 3. Flowchart of literature selection process



Study characteristics

The majority of the included studies originated from U.S. healthcare facilities (n = 24), or US-based organizations such as the U.S. military (n = 1; see Table 2). Further, studies were most often conducted in acute or surgical clinical settings (n = 18). Six studies described TS implementation across a hospital system or healthcare region. Additionally, about half of the included studies were conducted in university hospital settings (n = 14), with the remaining studies performed in mental health, rural hospital, military, or general hospital settings. Two publications did not report the setting.

Fifteen studies used a pre-post intervention study design. Other study designs used were longitudinal (n = 6), mixed methods, cohort study, cluster design experimental study, or combined cross-sectional comparison and pre-post interventional design. One study did not report its research design. Surveys were the most used data collection method (n = 22). Only four studies used qualitative data collection methods, such as interviews, focus groups, or anecdotal evidence. Observational data were used in nine studies.

Five studies reported applying all of Kirkpatrick's four levels of team training assessment as evaluation methods to measure intervention effects (Kirkpatrick, 1994; Table 2). Three articles measured three levels, nine measured two levels, and eight measured one level. Two papers did not report on any level of training evaluation.

Quality of reporting

Assessment of included publications' levels of reporting using the eleven elements of the ReCoMuTe checklist revealed that a majority of the studies, on average, scored low on most of the elements (Table 3). The most extensive reporting was within the checklist's second category, description of intervention, namely the element 'objectives, content, planning, and participants' (D1) for which more than half (52%) of the studies had moderate or high scores (Table 3). All the other components were, on average, reported insufficiently, scoring nil or minimum on elements.

Applying the four-level rating appeared difficult for elements E2 ('Learning & Transfer') and E3 ('Faculty'), due to absent or meager reporting details. Therefore, we decided to rate these elements based on a two-tier scoring system: 'reported' or 'not reported' (Table 3). Consequentially, the summed ratings for these two elements are less comparable with the others.

A study by Thomas and Galla (2013) was reported as optimal on almost all the checklist's components, followed by four others (Brodsky et al., 2013; Jones et al., 2013b; Stead et al., 2009; Turner, 2012).

Moderators

Facilitating and impeding factors are moderators that intentionally or unintentionally regulate or determine an implementation process and/or its outcomes (Fleuren et al., 2004). Such factors, or determinants, can be described by their characteristics, which can be classified in five categories: (1) socio-political context (e.g., other interfering interventions, regulations, ; professionalism); (2) organization (e.g., culture; leadership; resources); (3) facilitator/ implementer (e.g., skills; background; profession); (4) intervention program (e.g., timing; content; complexity); and (5) participants (e.g., participation; attitude; profession; prior experiences) (Wierenga et al., 2012; Wierenga et al., 2013). Our thematic coding of included studies using codes for 'facilitating' and 'impeding' revealed reporting of various, mostly facilitating, factors (Table 4).

Table 2. Study characteristics of included (n=27) studies reporting on TeamSTEPPS implementation, including their application of Kirkpatrick's levels of training evaluation (chronologically ordered)

Study	Country	Hospital type	Setting	Study design	Data collection method	Kirkpatrick's levels of training evaluation			
						Level 1: reaction	Level 2: learning	Level 3: transfer	Level 4: results
Stead et al. (2009)	Australia	Mental health clinic	Hospital wide	Pre-post training	Surveys/observation	●	●	●	●
Capella et al. (2010)	USA	Academic	Trauma Center	Pre-post training	Observations/clinical outcome data	○	○	○	○
Deering et al. (2011)	USA/Iraq	US Military Healthcare System	Multiple Combat Support Hospitals	Pre-post training	Clinical outcome data	○	○	○	●
Forse et al. (2011)	USA	Academic	OR	Pre-post training	Surveys/clinical outcome data	●	○	○	●
Mayer et al. (2011)	USA	Academic	Pediatric & surgical ICU	Longitudinal	Surveys/interviews/ observations/clinical outcome data	○	●	●	●
Mahoney et al. (2012)	USA	Mental health	Hospital wide	Pre-post training	Surveys	○	●	○	○
Turner (2012)	USA	Academic center	ED	Not reported	Anecdotal	○	○	○	○
Brodsky et al. (2013)	USA	Academic center	NICU	Pre-post training	Surveys	●	●	●	○
Jones et al. (2013A)	USA	Multiple hospitals	ED	Pre-post training	Surveys	○	○	○	●
Jones et al. (2013B)	USA	Multiple critical access hospitals	Hospital wide	Cross-sect., comparison; pre-post training	Surveys	○	○	●	●
Sawyer et al. (2013)	USA	Army Medical Center	NICU	Pre-post training	Surveys/observation	○	●	●	○
Sheppard et al. (2013)	USA	Non-profit hospital	Hospital wide	Pre-post training	Observations	○	○	●	●
Thomas & Galla (2013)	USA	Non-profit hospital	Hospital wide	Pre-post training	Surveys	●	●	●	●
Klipfel et al. (2014)	USA	Academic center	Urology surgery	Pre-post training	Surveys	●	●	○	○
Spiva et al. (2014)	USA	Unknown	Acute care	Longitudinal	Surveys/observation	○	●	●	●
Amaya-Añas et al. (2015)	Colombia	Unknown	OR	Pre-post training	Surveys	●	○	●	○
Beitlich (2015)	USA	Rural clinics	L&D and NICU	Pre-post training	Surveys	○	○	○	●
Fischer et al. (2015)	USA	Tertiary military center	OR	Cohort study	Surveys	○	○	○	●

Gupta et a. (2015)	USA	Academic center	Interventional ultrasound	Pre-post training	Surveys	○	●	○	○
Scotten et al. (2015)	USA	Academic center	Pediatric	Longitudinal	Surveys	○	●	○	●
Sonesh et al. (2015)	USA	Academic center	Obstetrics	Mixed methods	Surveys/observations	●	●	●	●
Treadwell et al. (2015)	USA	Primary care	Primary care	Cluster design experimental	Surveys	○	●	○	○
Gaston et al. (2016)	USA	Academic center	Oncology	Mixed methods	Surveys/focus groups	●	●	●	●
Lisbon et al. (2016)	USA	Academic center	ED	Longitudinal	Surveys	○	●	○	●
Rhee et al. (2016)	USA	Academic center	Peri-OR	Longitudinal	Observations	○	○	●	○
Wong et al. (2016)	USA	Academic center	ED	Longitudinal	Surveys	○	●	○	●
Peters et al. (2017)	USA	Academic center	ED	Pre-post training	Surveys/observations/clinical outcome data	●	●	●	●
						9 (33%)	16 (60%)	13 (48%)	17 (62%)

Legend to Table 2
Not reported (○); reported (●)
Percentages represent total of papers using the Kirkpatrick level for training evaluation compared with total (n=27).
OR, Operation Room; ICU, Intensive Care Unit; ED, Emergency Department; NICU, Neonatal Intensive Care Unit; L&D, Labor and Delivery.

Legend to Table 3
Note Table Four-level rating on 'reporting level'; 'nil' (○), 'minimum' (●), 'moderate' (●●), 'high' (●●●).
*Components E2 (Learning, training & transfer) and E3 (Faculty) scored with two-level rating: 'not reported' (□), 'reported' (■).
Low score percentages represent total scores on reporting levels 'nil' (○) or 'minimum' (●); high score percentages represent total scores on reporting levels 'moderate' (●●), 'high' (●●●).
Cells with summated percentages scores > 50 are accentuated grey.

Table 3. Scoring of included publications on TeamSTEPPS implementation (n=27) using the eleven ReCoMuTe checklist components, and summated percentage scores

Author year / Code	1 Stead et al. (2009)	2 Capella et al. (2010)	3 Deering et al. (2011)	4 Forse et al. (2011)	5 Mayer et al. (2011)	6 Mahoney et al. (2012)	7 Turner (2012)	8 Brodsky et al. (2013)	9 Jones et al. (2013A)	10 Jones et al. (2013B)	11 Sawyer et al. (2013)	12 Sheppard et al. (2013)	13 Thomas & Galla (2013)	14 Klipfel et al. (2014)	15 Spiva et al. (2014)	16 Amaya-Añas et al. (2015)	17 Beitlich (2015)	18 Fischer et al. (2015)	19 Gupta et al. (2015)	20 Scotten et al. (2015)	21 Sonesh et al. (2015)	22 Treadwell et al. (2015)	23 Gaston et al. (2016)	24 Lisbon et al. (2016)	25 Rhee et al. (2016)	26 Wong et al. (2016)	27 Peters et al. (2017)	Low score (0 or 1)	High score (2 or 3)
C1	●	○	○	●	●	●	○	●●	○	●●	○	○	●●	●●●	○	○	○	○	●●	●	●●●	○	○	○	○	●●●	●	70%	30%
C2	●●	●	●	●	●	●●●	●●	●●	●	●●	○	●●	●●●	●	●	●	○	○	●	●	○	○	○	○	●●	●●●	○	67%	33%
C3	●●	●	○	○	●●	●	●●●	○	●	○	○	●	●●●	○	○	○	○	○	○	○	●	○	○	○	○	●	○	85%	15%
C4	●	●	●	●●	●	●●●	●	●●	○	○	○	●●	●●●	●	●●	○	●●	●	●●	●	○	●	●	○	●●	○	●	63%	37%
D1	●●	●●	●●●	●	●●	●●	●	●●●	○	●●	●●●	●	●●●	●●●	●	●●	○	○	○	○	○	●●	○	○	○	○	●●●	48%	52%
D2	●●●	○	●	○	●	○	○	●	○	●	●	●	●●●	●	○	●	○	○	○	○	●	●	●●	○	●●	●	○	85%	15%
D3	●	●	○	○	○	●●●	●●	●●	○	●●●	●	○	●●●	●	○	○	●	○	○	●●	○	○	●	○	●●●	●●●	●	70%	30%
E1	○	○	●●	○	●	○	●●●	●	●	●	●●	○	●●	●	○	●●●	○	○	○	●	●	●	○	●	○	●	○	81%	19%
E2 *	□	■	□	□	□	■	□	■	□	□	□	■	■	■	■	□	■	□	□	□	■	□	■	■	□	■	■	52%	48%
E3 *	■	■	■	■	■	■	■	■	■	■	□	■	■	■	■	□	□	■	□	□	■	■	■	■	■	■	□	22%	78%
M1	●	●	●	●●●	○	○	●●	●●●	○	●●●	●●	●	●●●	●●	○	○	●	●	●	○	●	●	●	○	○	●	●	74%	26%
Low score (0 or 1)	44%	89%	78%	78%	78%	56%	44%	33%	89%	44%	67%	78%	0%	67%	89%	78%	89%	100%	78%	89%	89%	89%	89%	89%	5%6	67%	89%		
High score (2 or 3)	56%	11%	22%	22%	22%	44%	56%	67%	11%	56%	33%	22%	100%	33%	11%	22%	11%	0%	22%	11%	11%	11%	11%	11%	44%	33%	11%		

Table 4. Categories, subcategories and descriptions of characteristics of factors reported to (a) facilitate or (b) impede TeamSTEPPS implementation in included publications (categories based on Wierenga et al., 2013)

Categories	Subgategories	Facilitating factors	Impeding factors
1. Socio-political context		• Hospital-wide central meetings to share best practices [12]	• Other safety interventions interfering [16]
2. Organization	Culture	• Open communication and mutual respect [5]	• Work environment did not support training, learning, or transfer [5]
	Leadership	• Senior physician leadership met with other physicians [15] • Support by leadership [1, 2, 4, 5, 6, 7, 8, 12, 13] • Change team recognized need for change [2] • Ownership of change was taken up and driven by local change team [8]	• Difficult to convince leadership [13]
	Resources	• Plenty of time [10] • Infrastructure was already present [4, 27] • Overtime training hours were budgeted [12]	• Lack of resources (sufficient finances, training time) [4, 8, 10, 23, 26]
	Turnover	• Low staff turnover [4, 12]	• High staff turnover [10]
	Job position of the implementer	• Trainers from different disciplines [6, 8, 13, 19] • Physicians trained by other physicians [13]	
	Collaboration/interaction	• Allowing participants to contribute their own ideas/opinions [7, 8, 14] • Creation of video vignettes and scenarios achieved a high level of staff resonance and buy-in [6]	
3. Facilitator	Degree of rewards	• Encourage use of learned skills by handing out small aids [5, 27]	
	Preparation	• Participating in questionnaires about patient safety [10] • Providing information before training [5]	
4. Intervention program	Sustainment	• Encouraging use of learned skills by team leaders [5] • Additional learning opportunities (to classroom training) [10] • Repetition of training during iterative simulations and pre-shift briefs [17] • Coaching of staff in desired teamwork behavior [1] • Success stories narrated by staff ('storytelling') [18]	
	Complexity		• Lack of guidance on training deployment [2]

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	Timing of intervention activities	• Free from clinical duties to enable participation [1, 10, 19, 25] • Trainings scheduled at convenient times, minimizing work interruptions [1, 14] • Debriefings during lunch [12] • Sessions scheduled during department meetings to improve attendance [15]	• Difficult for physicians to attend training while on duty [25]
	'Fit' of intervention	• Teaching principles specifically targeted to adult learners [8] • Linking concepts of training to practice/clinical experiences [9]	
5. Participants	Participation	• Multidisciplinary participation [5, 8, 13, 24] • Physician participation [13] • Voluntary enrolment [1, 27]	• Lack of multidisciplinary participation [15, 16, 21] • Lack of physician participation [9, 12, 26] • Physicians had to be trained with abbreviated program [4, 12]

Note to Table 4: Numbers in square brackets correspond with numbers of included articles, as summarized in Table 3.

DISCUSSION

In the absence of a dedicated and practical standard, we embarked on developing a checklist for reporting complex interventions on multi-professional healthcare TT. Our effort was informed by existing frameworks for scientific reporting on the design, development, implementation, and evaluation of CTs in healthcare (Möhler et al., 2013; Möhler et al., 2015; Moore et al., 2015), as well as approaches to evaluating team training implementation (Weaver et al., 2010; Zhu et al., 2015) and worksite health promotion programs (Wierenga et al., 2014). Moreover, by consulting extant key literature on related topics and studying other frameworks and guidelines relevant to the domain or quality improvement and teamwork in healthcare, we synthesized data following an iterative method that resulted in the ReCoMuTe checklist.

The ReCoMuTe Checklist

During discussions on composing the checklist, we pragmatically chose a hybrid form using a temporal-oriented structure and concepts, such as context and design. The checklist does not directly provide structures derived from general theories, such as implementation (Damschroder et al., 2009) or teamwork (e.g., the input-mediator-output framework; Ilgen et al., 2005). Additionally, we did not include the various levels for training outcome assessment (Kirkpatrick, 1994). However, although only a few publications in our review used this approach for assessing their interventions' effectiveness, we contend that such a comprehensive method in training evaluation should be regarded as standard procedure (Gross et al., 2019).

During the checklist's development, we did not find applicable approaches for categorization team training in sub- types or domains. Despite some attempts, presumably, this field is too young for such distinctions (Husebo & Akerjordet, 2016). However, the need for improved classifying of teamwork development interventions is increased by recent reports discussing the wide variety of interpretations and jargon, which further impedes optimal reporting in publications (Gross et al., 2019). Therefore, we concur with West and Lyubovnikova (2013) that the concept of 'team' must be viewed with some caution, since teams in healthcare can vary widely in, for example, differentiation between skills, culture, task-focus, and temporal stability.

However, efforts in publishing scientific research primarily must align with author guidelines presented by journals. The ReCoMuTe checklist provides a structured overview of elements relevant to reporting on CTTIs and their implementation. With this focus in developing our checklist, we choose not to include standard items and sections, such as those provided by the IMRaD structure (i.e., introduction, methods, results, and discussion) (Moss & Thompson, 1999). Further, sections explaining, for example, a study's rationale, ethical considerations, methodological approaches, and statistical results, we viewed as outside of our checklist's scope, for which more appropriate frameworks exist. We chose developing a new checklist over alternatives such as amendments to or extensions of existing frameworks (e.g., Cheng et al., 2016; Golub & Fontanarosa, 2015). The rationale for this lies in our primary focus on reporting. In our opinion, extant frameworks provide excellent guidance on other essential elements of scientific publications. Moreover, we would encourage the combined use of ReCoMuTe and other frameworks and guidelines.

Below we briefly discuss the checklist's four categories.

Context & preparation (C1-4)

The first category describes the context and preparatory activities before actual deployment of an intervention. The environment or setting in which the intervention is implemented and deployed is referred to as 'context' (Booth et al., 2019; Pfadenhauer et al., 2017). Further, the checklist sets out to address four questions: *Did the implementers asses the needs and requirements?* (C1) *Is there support* *from leadership as well as from participants?* (C2) *How is the training intervention contextualized?* (C3) *How and by whom is the intervention organized?* (C4)

Local infrastructure, availability of resources, knowledge, and experience can vary significantly between healthcare organizations, subsequently affecting implementation potential and execution (Kitson et al., 2008). Moreover, the significance of barrier assessments to inform anticipatory sustainability efforts and the involvement of decision-makers and management have been discussed in previous studies (Kemper et al., 2014; Moffatt-Bruce et al., 2017). Further, adapting interventions to contextual settings has been described as a tactic to create shared ownership for improvement among staff (Haerkens et al., 2018).

Description of intervention (D1-3)

The checklist's second category provides an overview of elements pertaining to characteristics of the intervention and its participants, facilitation, and sustainability efforts. The following questions are addressed: *What are the intervention's objectives, content, and planning?* (D1) *Which team(s) and participants are involved and what characterizes them? How is facilitation planned and who will facilitate?* (D2) *What are sustainability strategies and activities?* (D3) This category also comprises planned and anticipated support outside of training sessions and sustainability activities.

Detailed descriptions of interventions' objectives, practicalities (e.g., content, planning, resourcing), as well as their theoretical rationale and related strategies and tactics are imperative for scientific meta-analysis and replicability of studies (Cheng et al., 2016; Golub & Fontanarosa, 2015; Mohler et al., 2010). Additionally, successful intervention implementation is contingent upon facilitation, scaffolding its roll-out and supporting participants' engagement and learning. Likewise, characteristics of the involved team(s) are essential, such as task types, the differentiation of authority across the team(s), and their stability over time (Hollenbeck et al., 2012; Wildman et al., 2012). Thus, effective reporting comprises detailed descriptions regarding strategies, tactics, and processes used by an individual (i.e., facilitator) to help others improve their knowledge, skills, or attitudes and thereby improve the intervention's likelihood of success, including specifications of the facilitator's qualifications and subject matter expertise (Kitson et al., 1998; Salas et al., 2002). Furthermore, contextual information can be relevant since, for example, small facilities can lack implementation strength, which has to be addressed and anticipated, possibly with more appropriate facilitation (Kitson et al., 2008).

Various frameworks also emphasize the relevance of describing sustainment, or maintenance, activities (Wierenga et al., 2014). Team training effects at various levels (i.e., reactions, learning, transfer, and outcome) often diminish over time (Arthur et al., 1998). Reports on TS implementation mention a decline of training effects within six months to a year Forse et al., 2011; Thomas & Galla, 2013). Strategies such as regularly planned competency refresher training can help mitigate such declines (Sonesh et al., 2015). Further, concurrent workplace-based coaching and mentoring of staff, as well as post-training sustainability activities, can be applied (Marshall & Manus, 2007; Morey et al., 2002).

Strategies and activities focusing on sustaining long-term effects of healthcare team training implementation have been suggested to be an underexplored part of implementation and research (Lee et al., 2017). Moreover, since "team training is not a one-day or single-session event" (Gillespie et al., 2010, p. 655), the sustainment phase of TS and similar interventions is imperative (AHRQ, 2014). However, in our study, only 15 of the 27 reviewed articles reported on sustainment activities.

Execution and deployment (E1-3)

The third category provides components and elements that facilitate effective reporting on what objectively occurred during intervention implementation, including related educational and pedagogical perspectives pertaining to training activities. This addresses the following questions: *What and how much was done—planned and unplanned? What were deviations from the planned implementation (and why)?* (E1) *How was it done and received?* (E2) *Who delivered the intervention?* (E3)

Our difficulties with rating the included studies' reporting on elements E2 and E3 might have been due to the fact that we selected studies in which a TS master trainer was present. TS master trainers follow a two-day standardized training, and their roles and tasks are well described in TS materials, which possibly kept researchers from extensively reporting on this issue. Additionally, we realized that the checklist's component E3 ('Faculty') had some overlap with elements from D2 ('Facilitation'). While comprehensive multi-professional team training curricula, such as TS, are on the rise, healthcare organizations increasingly apply customized 'self-made' approaches, using a variety of trainers, coaches, and other faculty members (Gross et al., 2019). Because of the essential role of these individuals in teaching, coaching, and assisting others, we suggest that reports describe these roles in detail, using both elements.

Mechanisms of impact (M1)

The fourth category of the ReCoMuTe checklist provides a set of elements to assist in detailed reporting on impact evaluation. These help to assess possible causal mechanisms and relationships between actual training and facilitatory activities vis-à-vis effects, or lack thereof. Such evaluations of interventions and detailed analyses of either facilitating or impeding mediators, unexpected pathways, and consequences help to answer, *Why and how did the change (not) happen the way it happened?*

Explaining the intervention's mechanisms of impact can comprise dynamics that interrelate or overlap across the checklist's categories and their components. Reporting observed or narrated facilitating and impeding factors as part of a process evaluation provides information essential to, for example, further successful replication. Additionally, initial inventory of determinants serves authors as a practicable instrument for more complex assessment of what happened. Explicating in detail the 'why' of observed and measured effects, as well as the often unexpected and tacit dynamics imparted by implementation efforts, requires authors to report based on a convening of viewpoints, including change management and implementation science. The table resulting from thematic analysis of the 27 publications included in our review on TS implementation provides an exemplary multi-study overview of determinants (Table 4).

Validity

Using the ReCoMuTe checklist for selected reports on implementation of standardized TS curriculum provided affirmation of our checklist's applicability and face validity as an overview of relevant elements in reporting. Assessing the 27 included studies using the checklist did not reveal new items; however, reviewing the included studies provided some added insights regarding their published reports.

While substantiating previous accounts (Husebo & Akerjordet, 2016), we found, not surprisingly, that the majority of studies originated from the U.S., where TS was originally developed. Furthermore, acute and academic settings seem to be popular for TS implementation. Possibly, this is due to the natural discourse of healthcare team training science and practice. In the last two decades, an important knowledge base has been sprouting from high-risk industries (e.g., aviation) into similarly risk-prone healthcare settings, in particular ORs and ERs (Gross et al., 2019; Table 2). Aptly, team training practices in other industries show an evolution that comprises several generations of experimenting and developing before reaching a wide consensus on best practices (Helmreich et al., 1999). Moreover, the initial TS version (v1.0) was aimed at such settings. TS is designed to provide a tailored-to-context set of approaches and building blocks in various settings and, recently, AHRQ has provided new versions adapted to non-OR settings (e.g., long-term care or office-based clinics). While our results corroborate previous mentions of TS interventions being primarily used in university hospitals (Ward et al., 2015), recent research on adverse incidents suggests that TS and similar interventions are relevant to regional hospitals as well (Langelaan et al., 2017).

Rating the sample of publications in our review using the ReCoMuTe checklist reveals a scarcity in reporting. Apparently, despite TS's highly standardized features, there is no consensus on the 'what-and-how' in reporting evaluations of TS or similar programs. Effective reporting might not be within the scope of those who report (Golub & Fontanarosa, 2015; Mohler et al., 2010). Arguably, this is due to the relative novelty and complexity of the field for these types of healthcare team training interventions and the young age of one of the field's pioneering programs (i.e., TS curriculum) (Clancy & Tornberg, 2007). Promisingly, however, authors reported in relative detail on elements regarding contextualization, facilitation, and fidelity/adaptability (Table 1, components: C3, D2, and E1).

Medical engagement and leadership

The importance of physician engagement in TS implementation was noted in several studies we reviewed. While the multidisciplinary character of TS was reported as an important determinant for implementation success in six studies (Amaya-Anyas et al., 2015; Brodsky et al., 2013; Lisbon et al., 2016; Mayer et al., 2011; Sonesh et al., 2015; Spiva et al., 2014; Thomas & Gala, 2013), the similar impact of physician participation was also explicitly mentioned (Jones et al., 2013a; Sheppard et al., 2013; Thomas & Gala, 2013; Wong et al., 2016). Moreover, difficulties in scheduling around on-call duties resulted in poor physician participation and a need to adjust programs into abbreviated, physician-only versions (Forse et al., 2011; Sheppard et al., 2013). Interestingly, one study mentioned the beneficial effects of peer-to-peer training among physicians (Thomas & Galla, 2013).

It has been acknowledged for some time that physician competence in effective engagement in quality and safety improvement requires a more integrated educational system (Aron & Headrick, 2002). Further, a "lack of training focus to address hierarchical differences and incivility" has been mentioned as an impeding factor for TS implementation (Clapper & Ng, 2013, p. 287). Soklaridis and colleagues (2007) found that a barrier to team collaboration was limited formalized education on interprofessional collaboration for physicians, and even fewer training opportunities for other healthcare professionals. As several studies reported lack of physician involvement as a possible reason for underperforming implementation success (Jones et al., 2013a; Sheppard et al., 2013; Wong et al., 2016), it seems important to address this issue.

Clapper and Ng recommend preparatory adjustment of existing team culture and improving physicians' leadership skills when implementing TS (Clapper and Ng, 2013). Interestingly, the recently emerged concept of medical leadership not only has gained significant attention inside the medical profession and beyond but also particularly directs physicians' education and training toward embracing behaviors and non-technical skills in teamwork (Dath et al., 2015; Keijser & Wilderom, 2019, This thesis, Chapter 1); Keijser et al., 2019, This thesis, Chapter 6). Healthcare teamwork and medical leadership have been suggested to be inextricably connected as bilaterally scaffolding principles (Husebo & Akerjorder, 2016; Salas et al., 2018). It is well-reported that physicians and their historically sovereign professional status have a significant impact on psychological safety and, consequentially, on engagement in quality improvement work, such as CTTIs (Nemhard & Edmondson, 2006). Contrastingly, new insights in medical education suggest more collective practice-based learning, such in CTTIs, as essential strategies in educating physicians (Cruess et al., 2018; Keijser et al., 2019, This thesis, Chapter 6). However, because of insufficient reporting in publications describing multidisciplinary teamwork training including physicians, it often remains unclear if and how the challenges regarding physicians' involvement and their leadership can be addressed.

Practical Implications

We posit the ReCoMuTe checklist could serve a purpose for different types of studies and interventions, including investigations addressing the efficacy of TT as an intervention for team performance improvement and studies using TT as an investigative approach to scrutinize specific topics, such as quality improvement, medical leadership development, interprofessional learning, or organizational transformation. Establishing and assessing research evidence supporting complex TT interventions might not always be the primary objective of field implementors and their teams (Ward et al., 2017); hence, we hope our checklist also provides a practical instrument for these groups.

The ReCoMuTe checklist aims to assist authors of papers involving TT and be instrumental to editors and reviewers in assessing the suitability of submitted work to enhance their readership's access to detailed accounts of experiences and learned lessons. Although we set out to facilitate the work of designers, implementers, and evaluators of complex, multidisciplinary TT interventions, we believe the current checklist also serves as a guiding instrument for simple and less complex types of multidisciplinary TT. Arguably, within the longitudinal perspective of a few weeks to several years as the range for implementing team training programs, any implementation effort comprising multidisciplinary and organizational dynamics can spiral into complexity at some point (Husebo & Akerjordet, 2016). Moreover, within the phases of implementation and sustainability activities, which is typically the period covered in reports, context as well as interventions tend to change. Hence, there is need to describe such evolutions and their related dynamics (e.g., unexpected changes impacting participants' engagement), for which we see as a role for the ReCoMuTe checklist.

Ultimately, well-constructed publications can feed into meta-analyses, substantiating the well-informed design and delivery of CTTIs. However, RCTs have only recently entered the field of healthcare team training (Dinius et al., 2019; Husebo & Akerjordet, 2016; Panella et al., 2012; Strasser et al., 2018). Since RCTs represent the 'Gold standard' in evidence-based practice, possibly, this heralds a certain timeliness for the ReCoMuTe checklist (Bhattacharyya et al., 2009; Craig et al., 2008). We hope that our checklist helps motivate those engaging in meta-analytic endeavors of meticulously comparing studies, and emboldens them in their demanding review processes to be rigorous in judging reports' eligibility, and maybe even disregard those that 'strip away' information on contextual matters (Booth et al., 2019; Greenhalgh, 2012).

Due to journals' wordcount limits, authors increasingly report details through an extra publication, (e.g., a study protocol) or a website (Möhler et al., 2015). Further, since almost no clinicians and only a few researchers have time to undertake the efforts in personally contacting authors requesting additional information, editors should encourage their submitting authors to allocate locations beyond their primary publication (e.g., online supplementary documents) (Hoffmann et al., 2014).

However, we emphasize that the ReCoMuTe checklist is not a 'recipe,' nor a comprehensive guideline. It is not a complete list of 'must-haves' to direct the design or implementation of CTTIs. Moreover, for some of its elements, scientific relevance to CTTIs' effectiveness is either not established or not disputed (e.g., team composition, work environment, training strategy) (Hughes et al., 2016). Instead, it is a starting point for those endeavoring to research CTTIs and their implementation. However, the checklist comprises a structured overview of known elements, for most of which only future research can reveal its causal relationship with impact mechanisms and effectiveness. Therefore, some caution in using the new ReCoMuTe checklist in further work is warranted, for which we provide the following considerations.

Limitations

We have several considerations regarding development and testing of the ReCoMuTe checklist. First, we used a non-exhaustive and pragmatic approach, which was not based on an extensive consensus building (e.g., expert group consultation) and addressed our own need for adequate reporting, suitable for our purposes, also facing the abundance of existing reporting standards (Bragge et al., 2017; Pinnock et al., 2015; Simera et al., 2010). However, a possible selection bias instilled by an incomplete list of sources was mitigated by our stepped development of iteratively adapting consecutive versions of the checklist. Further, the combination of extensive scholarly and practical experience in TT, organizational change, medical leadership, and healthcare transformation within our group, as well as including an initial validity test, we believe also mitigated bias. Follow-up work could comprise expert surveys and consensus meetings, as well as Delphic methods, which could build on our small-team results as presented in the present study (Hoffmann et al., 2014; Möhler et al., 2010b). Certainly, as the field of TT is expanding rapidly and in various dimensions, like most reporting guidelines, the ReCoMuTe checklist may need revision or refinement at some point.

Second, using one distinct type of CTTI (i.e., TeamSTEPPS) for face validation instilled a potential bias. Conceivably, using a wider spectrum of CTTI approaches for validity testing might reveal elements that were not identified in the present study. Although TS's unequivocal tailorable characteristics offer significant variability in its application in practice, using clear reporting criteria (i.e., the ReCoMuTe checklist) might help prevent publications on TS, or similar programs, from becoming a heterogeneous 'hodge-podge,' reducing its potential (Petticrew et al., 2013).

Third, our study focused on the perspectives of intervention, implementation, and process evaluation. This discrete focus included elements of the 'partial system perspective,' enabling the capturing of information on the interplay between environmental and organizational aspects, such as processes, cultures, and values, and the intervention. However, meso and macro system perspectives (e.g., economic, social, and political factors; regulatory matters; policies) must also be taken into account when consolidating results from various sources (e.g., reviews) to produce transferable findings (Booth et al., 2019). In particular, healthcare systems' endeavors in reform and transformation ultimately should align with the level of teams and their performance, since it is at this level that healthcare is created and delivered (Keijser & Martin, 2019, This thesis, Chapter 3).

We believe these considerations encourage eventual further testing of the ReCoMuTe checklist. Preferably, efforts should include settings beyond academic and acute types, since the significance of improving patient safety and healthcare quality certainly extends beyond these settings as well. Further work could entail publication of an 'explanation and elaboration paper,' providing exemplary research questions, discussing methodologies, advising on data collection, and discussing exemplary publications. Parallel to this, based on our current work, it is our opinion that the domain of TT is in need of a more established operational definition of teamwork and training approaches, including a glossary of concepts, terminology, and instruments that would aid future standardization and subsequent reporting.

In summary, we believe the status quo of TT reporting is in its early stages of growing toward maturity. Suggested future work should exceed the scope and depth of the present study and contribute highly to a more comprehensive type of reporting guideline or standard in this field. Until then, the current version of the ReCoMuTe checklist provides a structured set of elements that has been proven to be useful for analyzing reports on TS interventions, so that through more study and reporting on those interventions, more lives can be saved.

CONCLUSION

Incomplete descriptions of interventions in publications on CTTI encumber needed efforts to identify the effective use of resources invested in healthcare TT and evaluation of its implementation. The current quality of reporting is remarkably poor, urging more alignment regarding ‘what, how, who, when, and why.’ This paper originates from the authors’ recognition of inadequate reporting CTTIs, and an increasing call for standards to enhance completeness, reproducibility, and comparability of TT (Gross et al., 2019; Mohler et al., 2015). Moreover, operating TT in complex interventional approaches encompassing multiple professions, such as TS, creates added challenges in pinpointing causal relationships and dynamics relating to the failure or success of TT implementation. These complexity and multidisciplinary perspectives fuel the essence of adequately evaluating and reporting on such TT interventions.

In this paper, we presented the ReCoMuTe checklist to help enhance the completeness of reporting on multidisciplinary TT in complex intervention formats and, ultimately, the replicability of these interventions, fostering more adequate research in this field. The ReCoMuTe checklist can be used by authors to structure their reports on interventions, by editors and reviewers to evaluate the completeness of descriptions, and by readers or practitioners interested in effective implementation of TT. The checklist supports planning purposeful research agendas, while also contributing to wise spending of resources in the current generation of varied CTTIs and related research activities (Hoffmann, 2013; Möhler et al., 2013).

In the present study, we tested the ReCoMuTe checklist using publications reporting on the implementation of TS. We found that TS has been primarily implemented in high-demand settings in U.S.-based university hospitals, and that training effects were mostly researched using pre-post training and longitudinal research designs. Publications often report the importance of multidisciplinary participation and physician engagement. On average, included TS publications lacked sufficient reporting on the majority of the elements of the ReCoMuTe checklist.

Our study affirms that reporting levels need to more adequately foster scientific analysis, practical use, and replication. We also note a ‘tailorable-standardization paradox,’ using a comprehensive curriculum that is contextually adjustable to healthcare’s pluriform context, such as TS, implicitly imparts a variability in its local application. Despite the non-linear characteristics of quality improvement programs in healthcare, further work on standardization, such as for reporting, can help scholars and practitioners find a balance between adaptability and standardization (Chen et al., 2019). We contend that, similar to the evolutionary development of healthcare QI science and TT in other industries, the emerging science of complex and multidisciplinary TT interventions is gradually becoming ‘institutionalized,’ yet, it is not yet ‘professionalized’ (Audet et al., 2005). However, TT and related (e.g., leadership) developments are becoming integral elements of audits, professionalization, and educational schemes in healthcare, which is a similar process compared with how TT previously has evolved in the field of aviation (EASA, 2018; Rosenbaum, 2019).

Our study also signifies physicians’ crucial role and position in CTTIs, in line with their relevance to effective system reform and safety culture (Nembhard & Edmondson, 2006; Porter & Tesiberg, 2007). Physician involvement, or lack thereof, in CTTIs is important to the failure or success of implementation efforts. This indicates a need to investigate effective investments in assisting the medical profession and its members, for instance through enhancing their leadership competency development and a reciprocal adaptability between various professional identities (Bååthe et al., 2013; Jones et al., 2013b; Keijser et al., 2019, This thesis, Chapter 6; Sheppard et al., 2013; Wong et al., 2016).

Stepping back from the present study to a more macro-level perspective, we suggest decision makers strategically consider synchronous deployment of CTTIs across their organizations’ departments and teams. Since healthcare professionals tend to work with multiple teams, more strategically organized rollout of often highly resourced CTTIs initiatives could mitigate a potential dilution of TT's beneficial effects at individual and local team levels. However, high-level organizational support, top-down endorsement, and governance requires adequate multidisciplinary organizational knowledge and experience at executive and managerial levels (Lyubovnikova et al., 2018; Salas et al., 2002; Salas et al., 2018). This will contribute to more fruitful and collective sharing of experiences, expertise (e.g., trainers), and other resources between front-line units and teams. Ultimately, collective, multi-level investments in contextualized complexity thinking and behavior will benefit the creation of optimal collective teamwork and leadership required for system reform, transformation, and substantive improvement (De Brún et al., 2019; Keijser et al., 2019, This thesis, Chapter 6). For this, we hope, the ReCoMuTe checklist provides a beneficial contribution.

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CHAPTER 8

Review of Determinants of National Medical Leadership Development

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- Professionalism
- Clinical leadership.

ABSTRACT

INTRODUCTION Increasingly, physician engagement in management, quality and innovation is being recognized as vital, requiring 'medical leadership' (ML) competencies. Besides numerous local institutional efforts and despite the high level of autonomy of the medical profession and the education of its members, in some countries national level activities are focusing on developing ML competencies to guide physicians in more effectively engaging in these non-medical activities. Up to this date little is known about effective strategies and tactics for developing ML on a national level.

AIM: To systematically study existing literature on determinants and interventions for national ML development.

METHODS: Scoping review and subsequent systematic literature review of published reviews, using PubMed, Scopus, Web of Science, Ovid MEDLINE and Science in search for eligible papers between 2011 and 2016. Full text versions of 43 papers were studied and a snowballing method was deployed. Data extraction included grounded theory coding and synthesis of data was done iteratively during data clinics.

RESULTS: Review of 7 included papers resulted in 5 discrete categories of determinants of and ten distinct interventions relevant to national development of ML approaches. None of the papers reported on any specific phasing of national ML development.

CONCLUSIONS: Local and national level activities in ML development should consider multi-faceted and multi-level approaches, taking into account resistance to change and redesign of institutionalized logics that accompany changing positions and reconstruction of professional identities of physicians.

New Findings
• ML development at national level involves changes in institutionalized logics, including reconstruction of roles and positions of physicians • Five distinct categories of determinants influence proper implementation of national ML development • National ML development should be tailored and based on a bundle of multifaceted interventions and strategies • Topics for further research on effective ML development include the effectiveness and quality of ML training and proficiency of trainers/coaches

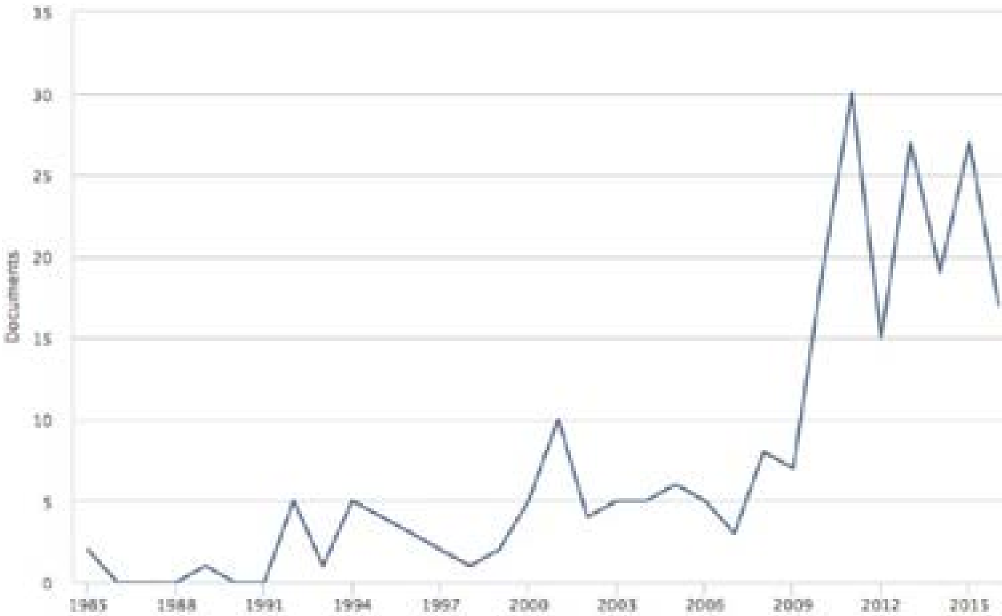
Strengths and Limitations
• In this article, we identify 5 determinants and 9 interventions relevant to national development of ML • Although literature on ML development is extensive, our methodology results in a state-of-the-art of recent experiences • Our review approach might have introduced the risk of not retrieving papers possibly relevant to our objective • The result of this study can be of aid to actors in nations that work on national ML strategies

INTRODUCTION

In line with various transformational activities in healthcare systems across the world, the role of leaders in healthcare changes and innovations, that are advantageous for patients, is increasingly being reported.[1,2] The beneficial effect of 'medical leadership' (ML) on healthcare quality as well as on patient and employee satisfaction is well documented and calls for doctors to engage in effective leadership development are on the rise.[3] Furthermore, patient safety, one of the cornerstones of high quality care, has now become a worldwide concern, and it needs stout (medical) leadership engagement.[4] Also, from an economical perspective, doctors have a great impact on the use of resources; they are being urged to be concerned with effective healthcare resource deployment and distribution in the face of budget constraints and rising costs.[5] The increasing complexity and interprofessional collaborations that propel task and boundary shifting between several healthcare actors, including patients and their families, have an unprecedented impact on medical practice.[6] Hence, there is also an explicit call for doctors' increased proficiency in multi-level 'organizational leadership': at team, organizational, system and even at societal levels.[7-12]

Since significant, ongoing healthcare changes cannot be achieved without their effective cooperation and support,[13] doctors are progressively seen as the natural choice to lead transformation.[1,14-16] However, the concept of 'leadership' often meets with resistance or scepticism within the (typically conservative) medical communities.[17-19] Post- and undergraduate medical education focus almost exclusively on clinical skills, also known as 'technical skills', while the training of 'soft skills' (like leadership skills) remains largely underrepresented.[20] Despite the increasing attention on medical leadership (ML), the construct itself is still in its infancy when it comes to operationalizing it in daily clinical practice and education.[17,21]

Figure 1. Search results on ‘medical leadership’ in Scopus electronic database from 1985 to November 1, 2016.



Recently, the internationally leading framework on medical competencies, Canadian CanMEDS Physician Competency Framework, further propelled the importance of leadership competencies, by changing the ‘manager’ competency category into ‘leader’.[22] This concurs with numerous other efforts to develop ML development schemes, reflected also in an increase in peer-reviewed scientific reports on ML (see, Figure 1). Until now scholars have primarily reported on regional and organizational level (e.g. hospitals) ML development initiatives. These are essential activities operating towards hands-on acquirement of ML competencies by (groups of) individual doctors and often focus on the local needs and demands in improvement and innovations and habitually enhancing collaboration within interprofessional settings [23]. However, ML developments at large also indicate a gradual reconstruction of professional role identity of physicians [24]. Having thrived on the "privileges of self-regulation and self-policing”[25, p673] for centuries, and positioned at the heart of the highly institutionalized healthcare industry, the strongly autonomous and prestigious medical profession is not likely to adjust to current societal and industry-specific curtails, only by means of local or organizational initiatives.

The more practical oriented ML activities executed at local, regional or organizational level are of great importance to create change and to better understand the dynamics of role identity shifts that physicians go through [26]. However, sustainable (national) reconstruction of professional identity of physicians will also require thorough ‘(re)rooting’ at a higher, central level; in particular within the context of various national medical specialists’ associations and a conglomerate of inspectorates and other high-level regulating stakeholders, that comprise a national healthcare system.[27] It is in this context that some highlight the importance of adopting a systematic, well-articulated approach to developing ML.[28] However, despite many rich reports of ML development on regional and/or organizational levels, little is known about effective ML strategies and tactics at a *national* level, including the entailed ML schemes or the factors that can influence these needed developments. Yet, although mainly based on early pioneering nations, the body of knowledge on ML development is growing. The countries currently embarking on ML development lack an overview of possible (national) approaches and influencing factors in this journey. The present report on the current state of affairs is specifically for the national actors, to aid them in taking the most adequate avenues while anticipating possible barriers, and to encourage them at the same time to tailor their national ML strategies to country-specific and other local needs and demands, including aligning strategies with preceding and simultaneous regional, local and institutional activities.

METHODOLOGY

We use a structured approach in this review to identify relevant publications and to extract the information from them in order to answer the research questions (Table 1 and 2). Our approach does not deviate from the methodology registered earlier (PROSPERO registration number: 2016:CRD42016048885).

Table 1. Review methodology

- Aims clearly identified and SPICE-based 'framing' of search strings →
- Scoping study: refining to final search strategy →
- Iterative title and abstract screening for selection →
- Forward and backward snowballing →
- Iterative data extraction and thematic coding of full text papers →
- Consensus between researchers on themes →
- Data analysis and synthesis →
- Consensus on final outcomes.

Table 2. Research question framed according to SPICE framework.[29]

Setting (where?)	Various national healthcare settings
Population (who?)	Doctors / Physicians
Interventions / determinants (what?)	Developments
Comparison (what else?)	[Not applicable]
Evaluation (what results?)	Leadership

8

Aim and Framing Literature Search

The primary aim of this review is to systematically synthesis the existing reviews of literature that dealt with the development of ML at a national level. The secondary objectives are to answer the following questions:

- Question 1: *How is ML defined?*
- Question 2: *How do the national ML development processes develop over time?*
- Question 3: *What determinants – facilitating or impeding – should be considered when developing ML at a national scale?*
- Question 4: *What 'interventions' have been deployed to facilitate the national development of ML?*

These research questions are framed according to the SPICE-principle [29] into four search constructs, including related synonyms and more specific search terms (Table 2). The most relevant sources for this study were selected from the electronic databases: PubMed, Scopus, Web of Science, Ovid MEDLINE, and Science Direct.

The search is based on publications from the preceding five years following the findings of our scoping review (see below): January 1st, 2011 until June 15th, 2016. We chose this period because ML is a fairly new subject and publications about ML increased rapidly from 2009 (Figure 1). Based on findings during our scoping review (see below), it was decided to begin searching as of early 2011 for relevant reviews of the literature just after this steep increase.

Scoping Review

Based on our initial search strings, a scoping review [30] was done to identify key articles about leadership development for health care professionals in general. This initial search resulted in a large number of citations (n=20,984) and a subsequent 'doctors only' search in 5,932 results. On studying publications that were relevant to our research focus, it was decided to delete generic leadership development related terms, like 'improve*', 'program(me)', 'engagement', as these terms resulted in citations not relevant to this study. Furthermore, it was determined to exclude papers on 'medical professionalism'; our focus was strictly on those reporting on ML and its national developments. Since the assessment of ML roles appeared to be an important topic, the search term 'assess*' was added. The initial searches revealed a multitude of reports on local or regional ML initiatives. It was decided to include only those studies that were related to national ML development initiatives, including those on a specific medical specialty in a country. Since our scoping search revealed that non-review type articles often describe non-nationwide (e.g., regional or local) initiatives, which are outside this study's national scope, and that review type articles often have a national scope, only articles indexed as reviews were regarded eligible for selection.

During several iterative data clinics, the researchers (MP, WK, JT) discussed the correctness of the in- and exclusion criteria based on a test sample of citations (n=50), resulting in the fine-tuning of the in- and exclusion criteria. After a final revision, a second test sample of citations (n=200) was used to check the adequateness of the revised criteria, using the recurrence of the earlier identified key papers as 'indicator'. The last data clinic finalized the set of in- and exclusion criteria and database-specific search strings (see: the online Appendices A, B, C and D*).

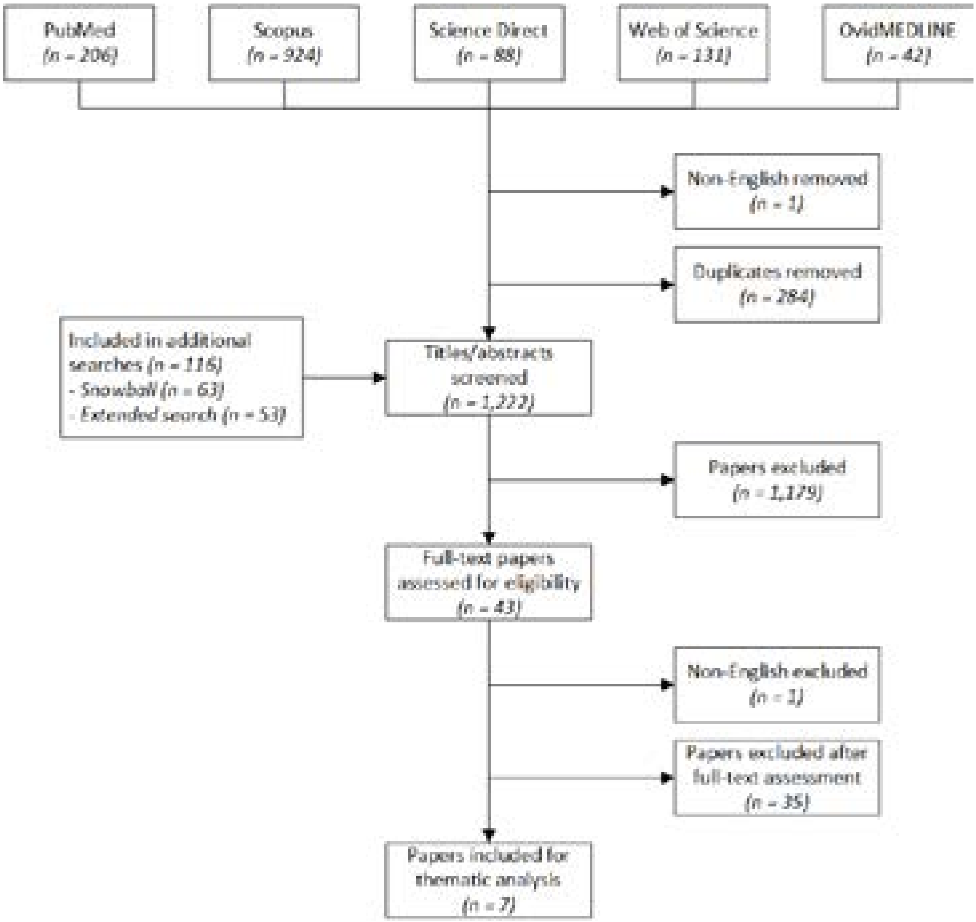
Selection Process

Records retrieved from the consulted databases were exported to Endnote™ to be processed for further inclusion analysis, and duplicate records were manually removed. To ensure no relevant articles were missed, forward and backward snowball techniques were used on key publications.[31] This resulted in 63 (backward and forward) citations and 53 additional records.

Three researchers (MP, JT, WK) independently checked all titles and abstracts on eligibility for inclusion against the pre-determined in- and exclusion criteria and coded them with '1' (Not include), '2' (Include) or '3' (Potentially include: insufficient information). The inclusion process followed an iterative approach, and the researchers convened in additional data clinic sessions to discuss and ensure consistency and validity of the findings, resulting in conclusive selection consensus between the researchers. A fourth researcher (CW) was available for consultation if a dispute were to arise during any of the study stages, with veto privilege. However, no use was made of this decision-making process.

It was concluded that 1,179 citations did not meet the pre-determined inclusion criteria and were therefore excluded. From the retrieved records, eleven (11) met the inclusion criteria, and were thus included. Records that did not provide sufficient 'eligibility' information in the title or abstract were retrieved (in full text) and analyzed independently by three (3) researchers (MP, JT, WK). After reviewing the full text versions of the initially included records, seven (7) articles were identified as meeting the pre-determined inclusion criteria (Table 3). Four (4) of the included papers originated from database searches; three (3) resulted from the 'snowball' search. For a complete overview of this in- and exclusion process, see Figure 2.

Figure 2. Diagram of the search process preceding this review



8

Data extraction

The full text versions of the seven included articles were then independently analyzed by three (3) researchers (WK, MP, JT). These articles were screened for: eligibility, inclusion, and the compilation of an initial coding scheme, based on the 'grounded theory' of open coding principles.[32] During the data extraction, themes from one or more of the specific research questions on 'definition', 'developmental processes', 'determinants', and 'interventions' were identified (see above).

The included seven articles were analyzed and discussed in an iterative manner; each researcher selected relevant quotations from each paper and noted them in a table (Microsoft-WORD™), including a short description and a suggestion for an appropriate theme ('code'). They discussed their findings during intermittent data clinics and differences in opinion were solved through negotiated consensus.

The three included ‘snowball articles’ were coded after the data extraction (‘coding’) of the initial four included articles was completed. Although the 26 themes identified in the first four articles were enriched with quotes from the ‘snowball articles’, the additional three papers did not provide new themes, which might indicate ‘data saturation’.[33] The full text data extraction, from the seven included articles, resulted in a ‘consensus table’ of quotations and themes.

In sum, our systematic literature review resulted in a list of characteristic quotes relating to the definition of ‘medical leadership’ (research question 1) and a ‘consensus table’ with quotes and short descriptions reflecting the 26 themes (research questions 3 and 4) (see: online Appendices E and F*). The articles included in this systematic literature review did not have direct references to developmental processes (research question 2), so no results are reported here for this research question.

Table 3. Characteristics of the included review articles

Author and publication year	Type of review article	No. of references	Countries
1. McKimm, Poole, Swanwick and Barrow, 2009	Comparative review of ML development	40	United Kingdom; New Zealand
2. O’Sullivan and McKimm, 2011	Case study-based review of ML development	16	Denmark; USA; Canada; Italy; Australia; New Zealand
3. Coltart et al., 2011	Literature search based ‘viewpoint’ on ML development for early career doctors	24	United Kingdom
4. Webb et al., 2014	Systematic literature review on medical curricula containing ML teaching interventions	34	Various countries
5. Jorm and Parker, 2014	Literature based ‘perspective’ on (lack of) evidence for ML development programs and education	25	Australia
6. Sebastian et al., 2016	General review on a national ML framework	65	Australia
7. Hartley, 2016	Literature review-based assessment framework for ML development across systems	70	Various countries

Data Synthesis

One researcher (WK) synthesized the collected data, grouping all 26 identified themes and their descriptions into a comprehensive set of main thematic categories and subcategories. This conceptual version of a thematic table with ‘determinants’ and ‘interventions’ was then shared with the other researchers and, after providing written comments on this table (MP, JT), the researchers convened in theme clinics to discuss the correctness and phrasing of this synthesis. Subsequently, this table was revised and redrafted and, after a final reviewing round and meeting, all the researchers agreed upon the two synthesized thematic tables (see: Tables 4a and 4b).

RESULTS

Within the scope of our search for papers on national ML development initiatives, including those within medical specialties, seven published papers report the results of various review methodologies (see: Table 3). Two of them discuss ML development based on case studies.[34, 35] One paper reports on a national ML program [21] and one reflects on the (lack of evidence on) return on investments of a national program.[36] Two papers focus on leadership development in medical education,[37,38] while the recent Hartley paper provides a framework for comparing and assessing national ML development among nations.[39]

Definition

Some authors place ML as part of the broader ‘clinical leadership’ paradigm, a term that refers to all health professions.[34] Although ML definitions remain unambiguous, the concept seems strongly related to doctors’ positions, which in effect are influenced by a variety of factors that vary per country. Some mention a national ‘style’ that characterizes the medical profession, for example the ‘continental’ versus ‘liberal’ style.[35] Others describe the influence of doctors’ autonomy and independence on the level of their engagement in (national) administrative roles.[37] However, some describe a gradual shift of doctors’ positions in healthcare and society away from the area of ‘power’ and that the ‘grooming of individuals for executive roles’ is related to the (emergence of) ML.[21,37] In the latter domain, ML development programs have more of ‘a focus on developing managerial and administrative competencies, rather than a focus on leadership per se’.[34, p19] Authors mention that this shift towards (distributed and more informal) leadership is a core competency of all clinicians and that the trend is moving towards defining ML for doctors at all levels.[36,38] According to the data from the studied papers, the ML definition also comprises managing change and working with other professionals. In this perspective, ML can be positioned as a social and/or societal construct, since it also entails aligning people to realize continuous improvement at all healthcare levels, e.g., through facilitating group sense making.[36,38] Excerpts from the studied papers relating to the various definitions of ML can be found in the online appendices (See: online Appendix E*).

Determinants

By answering the research question on ML’s determinants, the data-synthesis process provides five themes of factors that facilitate or impede the national development of ML (see: Table 4a).

Determinant 1 – Taxonomy

National ML development is propelled by a clear description, meaning and focus of the ML concept.[38] Sebastian and colleagues emphasize that not having a comprehensive and collective understanding of leadership is one of the reasons that ML development ‘has been problematic for those seeking to change practice’.[21,p362] A compelling and widely distributed taxonomy is essential for the recognition and acknowledgement of the influence of ML and the behavior of physicians on organizational effectiveness in healthcare services. Programmatic activities and well accepted instruments, like a national ML competency framework, come into play in such circumstances.[34] McKimm and colleagues argue that the Medical Leadership Competency Framework (MLCF) in the United Kingdom has reinforced the embedment of ML development in all UK specialty training curricula. Following the international comparative method provided by Hartley, such frameworks are seen as crucially fundamental to ML development worldwide.[39] Even so, gradual shifts in meaning and focus of the ML concept during specific phases of national ML development should be considered. And it is at such times that the popular distinction between ‘managerial leadership’ and ‘medical leadership’ emerges.[36]

Table 4a. Synthesis of results: Determinants of national ML development

(Sub)categories	Description
I – Taxonomy	**Definition, description and classification of the concept of ML and its underlying principles**
1. Meaning and focus	Clearly defined and described meaning and focus of ML during its developmental phases
2. Diffusion of meaning and focus	Level of (shared) understanding regarding ML and its development
II – Health system	**Combination of organization, resources, financing and management**
1. National approach	National strategy for ML development, based on systematic, system-wide, inter-professional and evidence-based approaches
2. Structural challenges	Organizational aspects in the healthcare system that can impede or facilitate ML development
III – Cultural aspects	**Characteristics and value systems of particular groups**
1. Professional culture	Values, beliefs and attitudes of the medical profession, impacting their engagement in ML development
2. Societal culture	Role of public opinion and/or media in ML development
3. Recognition	Recognition of ML as part of the career structure of all doctors
4. Mind-set	Level of interest in and attitude of doctors towards ML and its development
5. Subcultures	Power balance between groups (e.g., government versus medical profession; doctors versus managers)
6. Exposure	Influence of doctors in key positions (e.g., in national politics or management)
IV – Governance	**Establishment of relevant policies and monitoring of their proper implementation**
1. Political climate	National political acknowledgement of the roles of doctors and the importance ML development
2. Regulations and rules	Regulations requiring doctors to be active in management or to engage in (periodical, obligatory) ML development
V – Education	**Representation of ML in under- and postgraduate medical education and training**
1. Alignment	Alignment of ML development curricula and training programs across educational institutions
2. Standardization and quality control	Standardizing of ML development activities, identifying best practices and monitoring outcomes
3. Longitudinal and integrated training	ML development activities over extensive period of time (‘cradle-to-grave’) and based on career phase
4. Expertise of teachers	Clearly defined expertise and requirements for instructors, trainers and educators in ML development
5. Partnerships	Investment in education partnerships, e.g. researchers, universities and ML development providers
6. Conditions of education	Conditional requirements, e.g., timing, aims, duration, costs, accreditation, etc.

Table 4b. Synthesis of results: Interventions facilitating national ML development

Interventions	Agents, activities or processes that can facilitate ML development nationally
1. National rules and regulations	Specific governmental and organizational policies emboldening ML and its development
2. Nurturing environment	Conditions enabling and stimulating doctors to develop and deploy ML competencies in daily practice
3. Resources	Investments in for example research, conditions (payed time for training etc.), high quality training materials (e.g., assessments), and guidance (e.g., proficient trainers)
4. Champions	Trusted and knowledgeable role models inspiring others to engage in ML development
5. Professional organizations	Professional organizations actively supporting and facilitating ML development, nationally, locally and specialism specific
6. Support	Active supporting programs/schemes at all levels (e.g., individual; at work; in specialty) to enable ML development
7. Triggers	Certain activities or processes that trigger ML development (e.g., policy change; culture shift)
8. Framework	Presence, status of dissemination and quality of a national ML framework
9. Collaboration	Cross-sectoral and interdisciplinary collaborations and partnerships in (clinical) leadership development
10. Supportive information	High level administrative reports, documents and scientific work presenting evidence and background of ML and its importance

Determinant 2 – Health system

Important determinants for national ML development emanate from the method in which a national health system is structured and organized. Compared with more fragmented, local developments, a national ML development approach may be more effective in convincing and encouraging individual doctors to engage in ML.[21,34-37] Moreover, awareness and acknowledgement of the importance of ML can be enhanced by 'cradle-to-grave' programs, providing concrete ML development opportunities throughout all medical career phases. It is suggested that such approaches can gain from leadership strategies focusing on all clinical professions.[34,38] Hence, ML development should be positioned as an essential element in doctors' career structures, and made noticeable in medical school curricula as well as in the employment arrangements within the domain of human resources in healthcare organizations.[35-38]

A national process of embedding ML development within a healthcare system at large calls for active endorsement of high level administrators, adequate regulations, in combination with research and continuous dialogue with stakeholders.[21,35] Also, contextualization is required to meet particular needs and conditions. Geographical regions or subsystems, but also medical specialties, are characterized by specific needs and demands that require tailored approaches in order to create successful ML development schemes.[21]

Determinant 3 – Cultural aspects

A variety of cultural determinants are of importance as well. First, and most prominently, the deeply enshrined system of values and beliefs within a particular medical community must be considered. Since ML development has an impact on doctors' professional behaviors and logics, ML activities often meet with resistance. Sebastian and colleagues argue that promoting ML can be difficult due to the culture of the profession which can limit necessary innovation and change.[21] Secondly, culture in a broader sense (e.g., public opinion, influence of the press) can influence ML development. Thirdly, significant impact is attributed to the level of recognition of ML as an integral part of daily medical practice. Lack of such recognition can fuel disinterest and avoidance behavior among doctors towards ML and its development, resulting in significant barriers to implementation.[36] A fifth subcategory reflects the effects of power (re)balances between certain autonomy subcultures and doctors' motives to engage in ML (e.g., friction between management versus doctors; politics versus healthcare professionals).[34,39] Lastly, the positioning of doctors in specific high exposure roles (e.g., in politics and high-level healthcare administration) are acknowledged to spur national ML development.[35]

Determinant 4 - Governance
National policies that foster recognition of the importance of ML, and (peer-) encouragement of engagement in ML development, are noted as significant factors.[37] Moreover, positive effects are accredited to formal regulations which require doctors to be active in management and to take part in (mandatory) ML developmental activities. Over the last decade, formal policies have emerged about the future role of doctors in leading change and innovation in health services and, numerous other practices, documents and reports have been shown to be important in stimulating ML development in several countries. [34,38] Hereby, local as well as national professional bodies play an important role.[39]

Determinant 5 - Education
Most authors stress the importance of education in national ML development. Exposing early career doctors to ML development is emphasized to benefit the wider health care system.[21,37,39] Jorm and Parker argue that integrating a lot of leadership training into the medical curriculum is perhaps wasted because physicians often return to their daily clinical work settings where they are not encouraged or enabled to employ their new set of skills.[36] However, ML training ''drip fed' throughout the duration of medical education'[39, p36] could prevent such a 'wash-out' effect. However, training in stages is not the only factor to be considered. McKimm and colleagues emphasize the challenge of identifying the educators in ML.[34] The work of ML trainers and teachers should be continuously evaluated according to well-founded rigorous theoretical bases and best practices, that are proven to be effective in their appropriate context. Hence, specifying effective requirements for ML education are essential when developing, deploying and evaluating effective ML programs, and this includes a contingent of proficient educationalists.[39] Aligning leadership curricula with existing competency frameworks would create opportunities to not only standardize particular learning activities and assessment methods, but also to enable the comparing of the outcomes of such new elements of medical education.[21,38]

Interventions
Methods to enhance or facilitate ML development at the national level varied from: the development of a national ML competency framework (see above) to the identification and facilitation of champions (see: Table 4b).[36] Such methods exist in the form of agents, processes or practical activities that can be deployed formally or informally to promote ML development. Many authors stress the importance of substantial investments and resources, also in terms of time, at all career phases, to enable doctors to engage in a great variety of ML development activities. [34-35,38]

LIMITATIONS

Besides the strength of now having an overview of the various national ML developments worldwide, this study has limitations. The large number and variety of published ML related papers and the absence of an internationally recognized taxonomy of the concept of ML might have influenced the accurateness of our search strategy, possibly resulting in missing papers that are indexed with different search terms.

Moreover, our data extraction might have been biased because the ML literature offers a wide diversity of ideas and concepts related to ML and its national development. This is undisputedly a characteristic of any review examining a fairly new, multi-faceted and context-sensitive construct like ML. Also, regarding the young age of the ML field, as well as the fact that our methodology did not consider 'grey literature', many more insights and experiences might not have been captured here. Limiting our search to the English language, may have led to a cultural as well as a language bias. Finally, the decision to focus primarily on review type articles could have led to a selection bias. However, the young age of the concept of ML, as well as the intensive iterative snow-ball approach that was applied in our search, in our opinion provides confidence in having captured most, if not all, relevant publications to date.

DISCUSSION

We undertook this review to search in order to synthesize the existing reviews on ML development in a *national* context. Every single studied paper stressed the challenges that must be overcome to increase ML awareness of doctors, medical trainees and students. Doctors may need to engage unequivocally in small and large initiatives to develop leadership competencies to maintain their crucial roles and positions within the increasingly complex 'networks' in which they function.[34]

We found only few reports studying ML development from a national level perspective. Scientific reports on ML and its development for particular medical specialties, also do not reflect from a national implementation perspective. None of the reviewed papers provide detailed insight into processes, stages or phases that can characterize the evolvement of national ML development (research question 2). We believe that this indicates that ML development is still in a relatively early phase and various nations as well as medical specialties will increasingly embark on organizing ML development over time. This is also since, in our opinion, it requires time for national ML development to be 'translated' adequately to specific medical specialties in a country.

Our data suggests that deploying ML development at a national level should be 'multi-faceted', based on a bundle of different interventions and strategies. Additionally, selection of adequate strategies, tactics, and interventions as well as their planning and deployment, should, in all cases, be tailored to the given national context.

Like all changes and innovations in medicine, the level of evidence for new educational interventions, in our case ML training and education, must be taken extremely seriously, to convince physicians of the added value.[21] As with many other professionals, doctors should be regarded as a group of highly academically inclined, busy professionals that are quite critical about sensitive topics like the development of their professional identity [40,41]. At this point, the effectiveness of possible approaches and interventions used to facilitate doctors in ML development (as part of their medical responsibilities), remains largely unknown. Also, validated assessment methods for measuring and monitoring the development of ML competencies have not been defined well yet and several scholars mention the necessity of empirical evidence for the value of ML development, e.g., in terms clearly defined return-on-investment principles.[21,34]

Some scholars specify that ML development at all career levels should be based on interprofessional perspectives that increasingly characterize modern clinical practices.[34,37] Coltart et al. suggest that 'the strong challenge to the medical profession internationally is to move beyond traditional notions of hierarchy and leadership from an elite minority, and begin investing in the leadership attributes of all its future workforce.'[37,p1849]

The data presented in our study emphasize that the re-institutionalization of the essential position of doctors, who often bear the highest responsibilities within the care processes of patients, and enabling them to act accordingly, is a complex and non-linear process.[41] In our view, effective management is based on good leadership. Hence, 'effective leadership' of doctors is a qualification that is worth pursuing. Leadership scholars and practitioners may be of help for this cross-disciplinary endeavor. Further scientific scrutiny is needed to chart the consequences of these relatively new institutional dynamics, including all sorts of cultural shifts and changes in professional roles and identities that result from healthcare system transformations currently taking place across the world.[23] Currently, only 6 countries worldwide (Australia, Canada, Denmark, the Netherlands, New Zealand, and the United Kingdom) have established a certain level of national ML development. Further research on the experiences from these 'trail-blazing' countries could be advantageous for other nations that are novices in this field. Such studies could reveal more in-depth insight in the effectiveness of ML development interventions, in particular when combining and aligning local, institutional and national agency in the perspective of healthcare transformation.

CONCLUSIONS

To the best of our knowledge this is the first systematic review of the literature on ML development with a national perspective. Our study indicates that national healthcare transformation processes involve a rethinking and remaking of some of the oldest institutionalized logics within these systems and their clinical subcultures: the role and position of medical doctors. This includes the need to extend the behavioral repertoire of doctors: to enable them to play a key role in improving and innovating the processes of their own work. Over the years, the requirements for an adequate skill set of doctors have been altered, particularly relating to behavioral and 'managerial' competencies.[23,40] In our study, the reviewed ML authors share the insight that more doctors should become involved in these increasingly dynamic processes.

The data we present here provide nations that are contemplating ML development with some initial guidance, based on specific determinants and interventions used in countries that are currently involved in these activities. Our research also suggests that any national approaches aimed at meeting the challenges of engaging doctors in system transformation, should be robust, multi-faceted, intensely endorsed, and comprehensively resourced in order to bear any fruit. In particular, we think that current literature and experiences indicate that national implementation of ML development has to be well-tailored and well-deployed. Also, in our opinion, the studied literature convincingly shows the importance of investing in ML education across all levels and all phases of doctors' careers.

Our study also demonstrates that developing leadership competencies for doctors faces the myriad of perspectives that typify healthcare system transformations. Effective ML development seems, therefore, to be a part of larger scale changes and is far from 'just another training'. Moreover, sociology, organizational behavior, education, public economics, administration and governance are all relevant fields that should be considered when studying the so-called normalization processes underlying ML development at a national level. These scientific efforts can aid to better understand effective change and innovation in healthcare. They should comprise in-depth scrutinizing ML 'identity work' at regional, organizational, as well as at individual level, considering both the dynamics of institutionalization and professionalization.[42]

In the face of the numerous organizational and local activities, a focus on the national perspectives of ML is also of relevance given that ML might evolve with a certain stratification. A distinction can be made between vertical and horizontal levels of ML. Medical executives and other managers, front line medical innovation and quality 'champions' and physicians performing based on 'regular' day-to-day clinical leadership, encompass a vertical classification. On the other hand, the diversity between medical specializations can bring about a variety of (horizontal) ML types, characterized by specific activities and roles of physicians in a certain medical specialty. For example:

although both should be able to display 'regular' ML competencies, work and work setting of a family physician and a surgeon can demand different leadership skills and styles. Finally, also because ML competencies focus particularly on interdisciplinary collaboration, it is relevant to consider intertwinement of leadership education and training for the healthcare workforce at large. Defining and implementation such stratification principles of medical and clinical leadership in healthcare can prosper from effective national level coordination and collaboration between related professional associations and other stakeholders.

The myriad of multi-level factors that influence professional role identity (re)construction are well documented. These include 'macro' level institutional activities coming from governmental and health authorities, professional organizations, overarching regulations and (other) social, societal and economic factors that impact jurisdiction of physicians.[43] Building on these actors and related factors and on the experiences of trail-blazing countries in national ML development strategies, we hope to contribute to more in-depth understanding of the institutional forces that are to be taken into consideration here. We hope that our work adds to an ongoing cross-disciplinary and international movement, which enables (aspiring) doctors (and others) to develop adequate 21st century competencies that include effective ML. This is because if effective ML is not taught, ineffective ML may become the undesirable standard.

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CHAPTER 9

Organizational Culture Change in an Academic Cardiothoracic Surgery Setting: Longitudinal Case-study Integrating TeamSTEPPS and Medical Leadership Development

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Keywords

- Patient safety
- Team training
- Organizational culture
- Medical leadership
- Cardiothoracic surgery
- Longitudinal
- Mixed methods

Abbreviations

COR, Cardiothoracic Operation Room
CRM, Crew Resource Management
CRNA, Certified Registered Nurse Anesthetists
KSA, Knowledge, Skills and Attitudes
ML, Medical Leadership
MLC, Medical Leadership Coaching
ReCoMuTe, Reporting Complex Multi-Professional Healthcare Teamwork Training
T-TAQ, Teamwork Attitudes Questionnaire
TAQ, Team Assessment Questionnaire
TS, TeamSTEPPS™

ABSTRACT

The cardiothoracic operation room (COR) represents the apex at which multi-disciplinary team- and physician leadership-skills must excel. Alike other multi-disciplinary healthcare settings, COR team-performance is associated with organizational culture as a key determinant of patient safety, employee well-being, and compliance to new standardized protocols. However, creating and sustaining a culture-of-continuous-improvement is often challenging, since it is governed by an inextricable myriad of human, procedural and contextual factors in, as well as outside, the COR. This paper reports the execution and impact of a program combining TeamSTEPPS™ (TS) and medical leadership coaching, aimed at improving patient safety through sustainably implementing sign/out and debriefing in a COR setting.

We undertook a longitudinal mixed methods case study and report the multi-phased application of a complex intervention in a multi-disciplinary academic cardiothoracic team, comprising 82 clinical staff members. Comprehensive pre-assessment took place first informing the design and deployment of the program, which also comprised preparatory mono-disciplinary team interventions. We collected multi-level training effect-data in intervals over a 4.5-year period and twenty-nine (post-training) semi-structured interviews with staff were held to investigate the program-related team dynamics.

Compliance to the new post-operative sign-out and debriefing procedures was successfully maintained. We measured significant and sustained improvement in team structure, leadership and mutual support as well as a significant and lasting decrease in the total number of reported incidents during COR procedures.

We devised a contextually relevant, multi-faceted intervention-program, deployed by a primarily internal corps of five trainers and coaches. The multi-team, -level, -phased, and -intervention program sustainably generated blame-free and psychologically safe conditions required for continuous collective learning and improvement. We hope the comprehensive reporting of our study can inspire and inform others to embark on similar avenues of culture change towards safer and more affordable care in such intricate settings.

INTRODUCTION

In the last two decades there has been growing attention for improving patient safety and healthcare quality (Donaldson et al., 2000). Surgical procedures have been mentioned as accounting for over one third of the preventable adverse events causing patient harm (Langelaan et al., 2017). Surgical patient safety issues often represent cognitive, system or teamwork failures (Mazzocco et al., 2009). Although the essence of non-technical skills in surgical teamwork[8] has been widely recognized, sentinel events that result in per-/postoperative complications are often caused by failure in communication and other human factors (Awad et al., 2005) (Catchpole et al., 2008) (Gillespie et al., 2010) (Catchpole, 2018) (The Joint Commission, 2019).

The cardiothoracic operating room (COR), a complex and technology-oriented environment with several subspecialists treating complex patients with often serious cardiac conditions, is particularly challenged with surgical adverse events (Gawande et al., 1999) (Carthey et al., 2001) (Wahr et al., 2017). Research indicates, for example, that about one third of in-hospital coronary artery bypass graft deaths are preventable (Guru et al., 2008). Breakdowns in teamwork frequently occur in CORs and have been associated with adverse events (Fleming et al., 2006) (ElBardissi et al., 2008) (Barach et al., 2008) (Joy et al., 2011). These events are commonly attributed to limited interpersonal skills and communication issues, leading to role unclarity, waste of resources, emotional tensions, violation of procedures and preventable errors among COR-team members (Fann et al., 2016).

Increasingly, the cardiothoracic surgical community has invested significant effort in contemporary patient safety measures, including multidisciplinary, team-based approaches (Sanchez, 2016) (Shahian, 2019) (Crawford et al., 2017). Despite that, preventable events continue to yield suboptimal outcomes in cardiothoracic teams. As a consequence, the American Heart Association issued recently a comprehensive set of recommendations focusing on preventing surgical errors caused by human factors and teamwork failure in the COR (Wahr et al., 2013). Based on extensive analyses of evidence and experience, three 'Class I' categorized opportunities for improving COR patient safety have been promoted with the highest priority:

1. Post-operative debriefing implementation (e.g., Mawji et al., 2002)
2. Team training involving all COR personnel (e.g., Armour Force, 2011; Manser, 2009; Neily et al., 2010)
3. Commitment to a 'culture of safety', also comprising leadership that encourages and appreciates the input of all COR team members, in a non-punitive atmosphere (e.g., Schyve, 2013; Wachter & Pronovost, 2009).

These 'must-do-recommendations' imply embracing a culture of continuous efforts in error prevention, as a model for mitigating COR patient safety risks (Herzer et al., 2009) (Pronovost & Freischlag, 2010). In order to create and uphold such a culture, it is acknowledged that surgical team leaders, in particular physicians, are capable of facilitating 'speaking up' openly and of creating appropriate psychological safety within teams, also by acknowledging their own shortcomings and by emphasizing the value of good teamwork (Edmondson, 1999) (Edmondson, 2003) (Wahr et al., 2013). However, there is a relative dearth of studies reporting on comprehensive programs aimed at realizing COR safety cultures. Extant studies often focus on more <u>organization</u>-level (e.g., regulatory or procedural) interventions, such as checklists, signifying the vexing challenge of changing an organizational culture (Wahr, et al., 2013) (Catchpole & Russ, 2015). With safety procedures becoming well-established in COR settings, more <u>team</u>-level interventions are recommended (Recommendation 'Class IIa'). A system-approach type of team-level developmental interventions comprises close collaboration between front-line clinicians, management and non-clinical experts (e.g., in human factor training and system analysis) (Martinez et

[8] Key elements of effective teamwork (in CORs) comprise communication; cooperation; coordination; shared mental models; coaching; and leadership (see for example: Clancy & Tornberg, 2007; Wahr et al., 2013).

al., 2010) (Catchpole & Wiegmann, 2012) (Hughes et al., 2016) (Salas et al., 2018). Moreover, such 'complex intervention' types of COR safety initiatives generation has been accompanied by long-term studies of their impact, whereby more descriptive methodologies are advised to be applied in order to decipher "*What really happens, rather than what should happen*" (Wahr et al., 2013, p. 1156) (Keijser et al., 2019, This thesis, Chapter 7).

This paper evaluates impact and process of a longitudinal multi-disciplinary case-study in realizing cultural change in an academic COR setting, through reporting about a program combing multidisciplinary teamwork training and medical leadership (ML) coaching interventions.

BACKGROUND AND RATIONALE

Our study is rooted in the domains of safety culture, team training, leadership development and implementation science. Below, we briefly describe these domains and their interwovenness.

Safety Culture and Climate

COR teams and the prevention of adverse events must be understood in the perspective of organizational culture (Wahr et al., 2013) (Wiegmann et al., 2010) (Bognar et al., 2008) (Braithwaite et al., 2017) (Dahl et al., 2017) (Jones et al., 2013a) (Sacks et al., 2015). Organizational culture, such as in hospitals, can be seen as the aggregate value systems, professional norms, beliefs, assumptions and engrained processes, jointly affecting the people working in it. A 'safety culture' is defined as the product of elements that determine people's commitment to and proficiency in safety management (ACSNI, 1993). Culture improvement initiatives appear to be associated with better team effectiveness and patient outcomes (Sacks et al., 2015) (Braithwaite et al., 2017). Whereas culture is more paramount and tacit, a 'safety climate' signifies a staff's more micro-system-level deployment of and adherence to explicit safety procedures and directives (Wahr et al., 2013) (Hartmann et al., 2009). Distressed emotional team climates and failing communication skills among team members are associated with poor clinical outcomes (Nurok et al., 2011) (Mazzocco et al., 2009).

Teamwork in a high-risk COR setting demands high uniformity and adherence to procedures, protocols and hierarchical order. Typically, COR team-performance is prone to the detrimental effects of a suboptimal culture and climate on team member behavior (Sexton et al., 2006) (Makary et al., 2006) (Bognar et al., 2008) (Fleming et al., 2006) (Martinez et al., 2011). For example, in cases of (near) adverse events during COR procedures, COR team members are reported to be susceptible of having difficulties in speaking up, or feelings of incompetence in expressing differences in opinion, and of becoming 'second victims' (Bognar et al., 2008) (Merandi et al., 2017) (Vanhaecht et al., 2019). Moreover, explicit disruptive behavior has also been described as resulting from high-stress settings with high-risk for patient safety, including cardiothoracic surgery (Rosenstein & O'Daniel, 2006). Although disruptive behavior is suggested to be less prevalent in COR teams (compared with, for example, general surgery) (Rosenstein & O'Daniel, 2008), it can severely jeopardize patient safety and team-performance (Wahr et al., 2013).

Approaches to support the collective efforts of surgical teams to optimize patient safety related behavior and culture are often couched in models that enhance team-performance and communication (Rosen et al., 2018) (Wahr et al., 2013) (Hughes et al., 2016). These methods frequently express the importance of moderating the threatening effects of (perceived) hierarchy and lack of collective and individual self-reflection in such teams (Singer et al., 2009) (Fann et al., 2018).

Teams and Training

Team training is defined as a learning strategy comprised of tools and approaches to systematically acquire teamwork knowledge, skills and attitudes (KSAs) (Hughes et al., 2016) (Salas et al., 2008a). In healthcare, team training has been introduced by adopting practices of, for example, crew resource management (CRM) that permeated from other high-risk industries, such as aviation (Wiener et al., 1993). Over the last two decades, team training has been increasingly implemented in most healthcare environments, and mounting evidence attests to its effectiveness in cultivating teamwork competencies (Buljac-Samardzic et al., 2010) (Weaver et al., 2014) (Rosen et al., 2018). Efforts to ensure continued KSA proficiency also include adequate organizational policies; incentives structures; and an overall culture supporting specific values and behaviors relating to the team training objectives (e.g., Armour Force et al., 2011). Additionally, newcomers' and frequent refreshers' training are known to mitigate the post-training decay of KSAs (Arthur et al., 2013) (Clapper & Ng, 2013).

The success of team training implementation is determined by various factors residing in the social structure of multidisciplinary teams, their members, and in the organizational and professional systems they function in (Hughes et al., 2016) (Armour Force et al., 2011) (Rosen et al., 2018) (Haynes et al., 2011) (Catchpole & Russ, 2015). Emerging evidence indicates the potential of more complex types of patient safety interventions, comprising bundled strategies and interventions, implemented through a system-oriented approach (Dixon-Woods et al., 2011) (Weaver et al., 2013) (Ford et al., 2017).

Sign-out and debriefing

OR teams that are proficient in sharing information, reflecting on their professional actions, and discussing problems, can significantly mitigate issues before these spiral off to adverse events, Such teams also can support the unmasking of pervasive systemic flaws or weaknesses to be targeted for modification (Rudolph et al., 2006) (Farid et al., 2013) (Hamilton et al., 2018). Approaches, such as preoperative briefings, time-out procedures and surgical checklists, post-operative sign-out and debriefing (used in this study, see: Methods) can provide structured communication tools for reducing errors in (C)OR procedures (Neily et al., 2010) (Fann et al., 2016). Sign-out/debriefing facilitate quality and safety improvement after a procedure, by allowing team members to collectively discuss what went well and how their performance could be improved in the future (Papaspyros et al., 2010) (Rudolph et al., 2006) (Salas et al., 2008b) (Paull et al., 2009).

Effective sign-out/debriefings are reciprocal to a context of collective learning and have distinct requirements including, a short delay after team-performance, having a non-punitive character and trust, team members' attentiveness and participation, and leadership in running the debriefing process (Salas et al., 2008) (Paraspyros et al., 2010). Sign-out/debriefing, as a standard element to the Surgical Patient Safety System (SURPASS) checklist, has been reported to substantially reduce complication rates and preventable mortality (de Vries et al., 2010) (de Vries et al., 2011). These standardized communication methods have been described previously in general and cardiothoracic surgery as contributing to patient safety (e.g., Salas, 2008b; Rudolph et al., 2006; Papaspyros et al., 2010; Berrisford et al., 2011).

TeamSTEPPS

Based on practice and research in healthcare quality improvement, team training science, crew resource management, and change management, specific interventions have been developed, aimed at system oriented cultural shifts, such as 'Team Strategies and Tools to Enhance Performance and Patient Safety' (TeamSTEPPS™) (Clancy & Tornberg, 2007) (Clapper & Kong, 2012). TeamSTEPPS (TS) is a training curriculum for improving multidisciplinary healthcare team collaboration and communication, developed by the Agency for Healthcare Research and Quality and the Department of Defense of the U.S. TS offers training in four core competencies: team leadership, situation monitoring, mutual support, and communication, and is implemented by contextually tailoring its comprehensive curriculum. Since its introduction in 2010, TS has been used in various clinical settings, also outside the U.S., ranging from maternity care (Staines et al., 2019), nuclear medicine (Keijser, 2017a), military hospitals (Deering et al., 2011), mental health clinics (Stead et al., 2009), emergency departments (Turner, 2012) (Jones et al., 2013a), to primary care (Treadwell et al., 2015). Studies report an association between TS implementation and improved patient safety, including safety culture and team-performance in CORs (Rhee et al., 2017) (He et al., 2016) (Sanchez et al., 2016) (Dahl et al., 2017) (Willis et al., 2019) (Wilson et al., 2017) (Chan et al., 2018) (Figueroa et al., 2017) (Stevens et al., 2012). While team leadership is a fundamental element in TS programs, ML development has, to date, not been reported as being a part of TS implementation.

Medical Leadership Development

Physicians' behaviors can significantly affect other professionals, organizational performance, quality improvement, and team learning (Pisano et al., 2001) (Nembhard & Edmondson, 2006) (Leape et al., 2012) (Fann et al., 2016) (Niham & Gao, 2017). Also, physicians' renowned ambiguity to engaging in practice improvement and quality programs is widely documented and discussed (Shelleke, 2002) (Jorm & Kam, 2004) (Hess et al., 2015) (Fann et al., 2016) (Jorm, 2016) (Nigam & Gao, 2017). Relatedly, studies indicate that physicians can overestimate their interpersonal skills, leading to an attitude that no improvement is needed, thereby indirectly impeding improvement initiatives, for example the incorporation of new patient safety procedures (Braithwaite et al., 2013) (Pronin, 2008) (Wauben et al., 2011). Since many people are unaware of the self-serving biases that interfere with their degree of self-reflectivity, it has been suggested that training on these matters can diminish such obstructing attitudinal effects (Dyrbye et al., 2013).

While physicians' traditional power and authority-oriented professional identities are shrinking, ML has been suggested to empower them as potent leaders of change and improvement (Prather & Jones, 2003) (Keijser et al., 2019, This thesis: Chapters 1 and 6). However, many physicians lack well-trained leadership skills that are vital to improvement initiatives (Nembhard & Edmondson, 2006) (Grady, 2016). With increasing evidence for its beneficial effects on healthcare, quality and safety and on staff well-being (West et al., 2015), ML has gained international attention in the last decade (Frank et al., 2015) (Keijser et al., 2017b).

Cardiothoracic surgical work is progressively characterized by interdependent multidisciplinary collaboration (Wilson et al., 2017). Moreover, outdated views tying surgical outcomes primarily to COR physicians' technical skills are progressively being overtaken by broader avenues of thought also comprising COR's wider social environment (Wahr et al., 2013) (Aveling et al., 2018). This also has evoked the idea that COR physicians require team-oriented, nontechnical skills to be effective team leaders and communicators and to continuously promote safety for cardiac surgery patients (Hu et al., 2018) (Sanchez et al., 2016). Hence, COR anesthesiologists and surgeons hold an important key in furthering patient safety through adequate intrateam coaching, role modelling constructive feedback and encouraging others in open communication and speaking up (Fann et al., 2016) (Jacobs et al., 2018) (Wilson et al., 2017). According to recent ML competency frameworks, these skills resonate with high levels of physicians' self-awareness, shared authority, conflict resolution, and non-punitive critique: all typifying effective ML (Prather & Jones, 2003)(Keijser et al., 2019, This thesis: Chapters 1 and 6). Moreover, experts in cardiothoracic surgery argue that a 'safe physician' is "one who is able and willing to acknowledge his or her own errors" (Wilson et al., 2017, p. 1050). Furthermore, from a well-being perspective, physicians in high-risk and high-stress (C)OR settings are themselves more susceptible to depression, substance abuse, and burnout if they have insufficient introspection and self-awareness (Page, 2011) (Dahl et al., 2017). Thus, in the present paper we argue that ML development, which enables COR physicians to enact effective leadership supporting collective, non-retaliatory reflection and learning (also from mistakes), can be an empowering supplement to multidisciplinary team training.

Design for Sustainable Implementation

Implementing structured techniques or protocols is no assurance for success in teamwork and leadership development. Long-term studies have shown that the implementation of patient safety initiatives is difficult to sustain and that complying with new safety procedures can be challenging (Armour Force et al., 2011) (Nurok et al., 2010) (France et al., 2008) (van Klei et al., 2012) (Hughes et al., 2016). Additionally, although governmental, professional or organizational policies are essential influencers of effective change (Styer et al., 2011), merely imposing patient safety regulations does not automatically result in a staff's willingness to adapt the team behaviors and the eventual objected sustainable improvement (Espin et al., 2006) (Undre et al., 2006) (van Klei et al., 2012) (Wahr et al., 2014). Experiences also indicate that effective development and implementation of patient safety interventions require adequate grounding in daily work routines (i.e., 'customization') and full commitment from front-line clinical staff as well as from those facilitating them (i.e., management and executive endorsement) (Fann et al., 2016) (Clapper & Ng, 2013). Achieving a positive implementation climate entails addressing and governing various elements wisely as these jointly affect the effectiveness of the interventions (Damschroder et al., 2009) (Clapper & Ng, 2013) (Keijser et al., 2019, This thesis: Chapter 7) (TeamSTEPPS Implementation Guide, 2018).

Consorted efforts are often needed to explain the need for change and to create sufficient 'buy in' among participants. Without such preparation, implementation eventually results in the abandonment of new procedures or protocols (Bosk et al., 2009) (Conley et al., 2011) (Zhu et al., 2015) (Fann et al., 2016). Various other factors can impart surgical staff's resistance to change, for example: their perceived reduced autonomy; lack of confidence in benefits; initial discomfort with new procedures; and time constraints (Fann et al., 2016) (Calland et al., 2011) (Conley et al., 2011) (Bosk et al., 2009) (Clapper & Ng, 2013). Implementing comprehensive patient safety programs sustainably requires striving for minimal complexity and interruptions and the design of new practices which address the local needs and demands adequately. Therefore, it is essential that an assessment of the local settings, dynamics and influencing factors effectively informs the design and implementation strategies of such programs (Klampfer et al., 2001) (Whyte et al., 2009) (Allard et al., 2011) (Dixon-Wood et al., 2011). Optimal alignment with professionals' norms, values, perceived risks and needs, and existing workflows and systems can be obtained through applying co-creative program development (Bosk et al., 2009) (Wiegmann et al., 2007) (Pannick et al., 2016).

Objectives

In concordance with extant recommended and prioritized best practices for enhancing patient safety in an academic COR setting, we engaged in implementing distinct safety procedures (i.e., sign-out and debriefing). We embedded them in a complex intervention aimed at creating a safety culture (Ward et al., 2013) (Dekker, 2016). The objectives of this paper are to report the results of a longitudinal, mixed-methods case study on (a) the effects of the program's interventions at various levels and intervals, and (b) the experiences of implementing the program and its elements.

METHODS

Setting, Organization and Objectives

The program was implemented in an academic cardiothoracic surgery team in an academic hospital in the Netherlands, comprising five disciplines: two medical teams (cardiac surgeons and cardiothoracic anesthesiologists) and three specialized allied healthcare staff teams (certified registered nurse anesthetists (CRNA); perfusionists; and perioperative (incl. scrub and circulating nurses). At the time of the study all (n=82) individuals were employed by the hospital and all participated in the program.

Although the team was functioning at satisfactory high levels at the time of starting the program, an assembly of coordinators and management considered it important to invest in teamwork (Moffatt-Bruce et al., 2018). Endorsed by the hospital board, a 'more than just team training' solution was sought for enabling a sustained culture change towards mitigating human factor type adverse (near) events. A Working Group, including the mono-disciplinary team coordinators (5x), one internal team trainer, and the team's/departments' management (2x), eventually defined and endorsed the program. During its deployment, a multi-disciplinary steering committee continuously monitored the program's budget, quality and alignment with the organizational strategies.

The program's procedural objective was set on incorporating sign-out and debriefing as standard COR procedures, as part of the Surgical Patient Safety System (SURPASS) (Catchpole, 2015) (Boermeester, 2014). Sign-out pertains to a structured team huddle to exchange experiences during the surgical (or other clinical) procedure, before transferring the patient to another location (see figure 2); debriefing, on the other hand, pertains to a more lengthy session entailing team reflection on a per-operative averse (near) event (Garrett, 2016). Upon request during the sign-out, debriefs are done outside the operation facilities department, led by the operating surgeon, within a few hours or days after the operation.

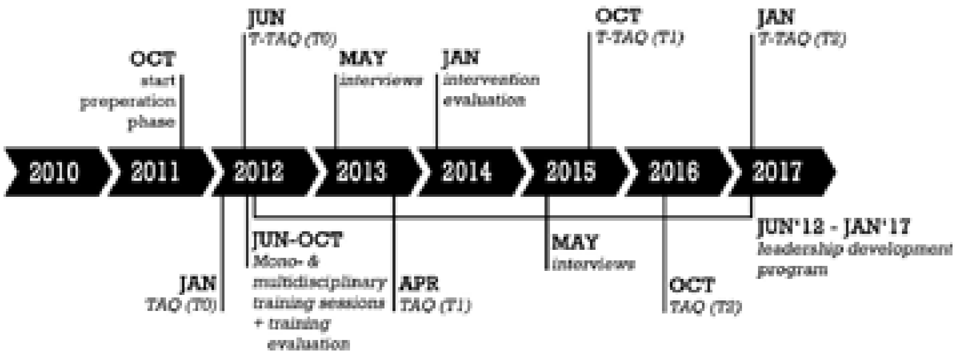
The program comprised three phases: Phase 1: need assessment and preparatory activities; Phase 2: team training; and Phase 3: sustainability actions (TeamSTEPPS Implementation Guide, 2018) (see: Figure 1). The preparatory work included: interviews; assessment; logistic scheduling of sessions; training of internal trainers; informing staff; and meetings with management and coordinators.

Needs assessment (Phase 1) was performed by an external facilitator (WK) (assisting the Working Group) and was based on a document study and 12 confidential interviews with individuals from all the clinical disciplines and management at all organizational levels. Phase 2 was initiated by a kick-off workshop to inform staff about the program's objectives, content, and planning and was attended by the complete staff and management except for one acute response COR team (Stevens et al., 2012). With endorsement from all management levels, the program was initiated early 2012.

All interviewees and participants in the surveys and assessments received information and consented to anonymized use of the data. The study approach was presented to the academic medical institution's Ethical Committee for ethical approval and was considered as not requiring formal ethical approval. Although our research was related to a clinical setting, our study fell outside the scope of the Netherlands' Medical Research Involving Human Subjects Act (WMO[9]): no patient data was involved, and the study content and methodology did not constitute an infringement of the physical and/or psychological integrity of the participants.

[9] See: https://english.ccmo.nl/investigators/legal-framework-for-medical-scientific-research/your-research-is-it-subject-to-the-wmo-or-not.

Figure 1. Timeline visualization of program's activities and data collection



Planning and Interventions

The preparatory phase 1 assessment identified three potential and interrelating impediments to the program: (1) variation in intra-team climate and psychological safety, (2) staff reluctance to participate in the program, and (3) physician engagement. This prompted the program's change management strategies, as well as two modifications to the standard TS curriculum, namely: (1) enhancing the program with mono-disciplinary team coaching ('priming'), and (2) individual Medical Leadership Coaching to improve physicians' interdisciplinary collaboration competencies and to incentivize participation. These two interventions and the 'basis' of the TS approach will be described in the next sections.

Priming for success

We organized auxiliary 'priming' sessions for the five monodisciplinary teams, during which the professionals were explicitly encouraged and challenged to share intra-disciplinary issues, prior personal experiences, and concerns or tensions with other professions. These sessions served two objectives.

First, before starting the multidisciplinary TS team training, the sessions aided in creating an equal 'level playing field' across all five teams, by addressing issues or submerged conflicts, solving them if needed and eventually increasing (or in some cases: re-installing) team cohesion (i.e., "the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives") (Tekleab et al., 2009, p. 174) (Tuckman, 1965) (Hur et al., 2011). As a preparation, the members of each team completed the 'Team Assessment Questionnaire' (TAQ) as a reflective tool for team culture assessment (Quality Values LLC., 2009) (Mahoney et al., 2012) (Figure 1), and discussed the outcomes during the team sessions (lasting about 1.5 hours) which were chaired by the external facilitator who applied an appreciative inquiry method (Ghaye, 2008). Based on the team's needs, additional sessions were planned as workshops on, for example, feedback or conflict resolution.

Secondly, the aims of the 'priming' sessions were to empower the members of the monodisciplinary teams in relation to their performance during the multidisciplinary "learn-how" training sessions, that could comprise their relatively high exposedness to "interpersonally risky" situations (Nembhard & Edmondson, 2006, p. 957 and 961).

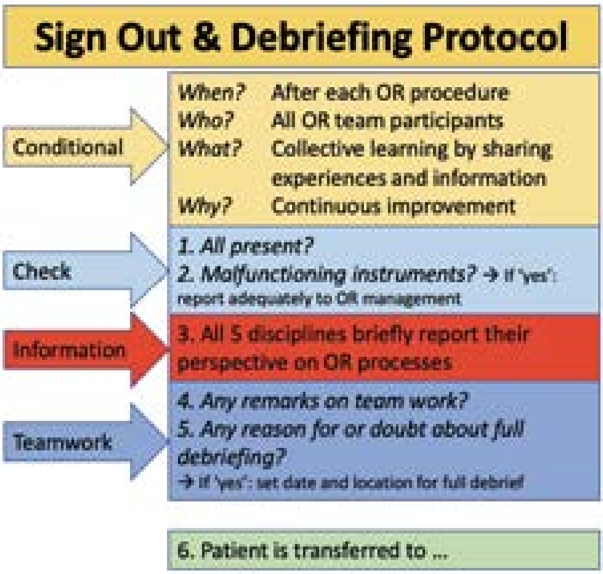
The initial mono-disciplinary team sessions were facilitated by the external facilitator; the follow-up sessions were embedded in routine team meetings, facilitated by the team's coordinator.

Multi-disciplinary sessions

The multidisciplinary sessions focused on implementing sign-out and debriefing procedures and on training related teamwork skills, attitudes, and knowledge to multidisciplinary groups of a maximum of 12 employees attending two 1.5-hour sessions, which were planned for the working hours. Sessions were rescheduled when one or more disciplines were not represented, due to unexpected absence (i.e., sickness).

Sign-out and debriefing procedures were trained through case-based role play simulation exercises, followed by reflective group discussions. Additionally, the small-group discussions focused on threats to optimal compliance to sign-out/debriefing procedures. These were alternated with class-room theory transfer, using TS modules on effective team communication techniques (e.g., feedback, leadership), followed by appreciative inquiry guided discussions. Pairs of team trainers facilitated the sessions, assuring that crucial issues were addressed, such as: effective communication, constructive leadership, and speaking up regardless of the hierarchical position within the team (e.g., to initiate a sign-out, or to call for a debriefing).

Figure 2. Sign-out & Debriefing protocol operation rooms (as displayed in full-color poster format in CORs)



Medical leadership coaching

All the surgeons and anesthesiologists were offered voluntary and individual medical leadership coaching (MLC), conducted through one-on-one coaching sessions with an external certified leadership coach (WK). The aim of MLC was to facilitate the physician's development of self-awareness and their role modelling of self-reflectiveness on attitude and behavior (Edmondson, 1999) (Edmonson, 2003) (Nembhard & Edmondson, 2006). The coaching consisted of three physician-coach sessions: one introductory and two sessions to discuss the outcomes of two successive multi-source assessment reports, both combining self-assessments and feedback from colleagues. The first assessment focused on identifying and discussing distinct individual thinking and behavioral styles (Human Synergistics

International, 2017). The second report assessed specific ML competencies relating to effective clinical teamwork with the Team Effectiveness Assessment Module (TEAM), developed by the American Board of Internal Medicine (Chesluk et al., 2012), combined with scales for: emotional intelligence (Wong et al., 2007); mindfulness (MAAS) (Carlson & Brown, 2005); and self-reflectiveness (Aukes et al., 2007). The TEAM assessment reports also provided (anonymized) narrative comments from the co-workers and colleagues on the beneficial ML competencies in the interdisciplinary teamwork (Overeem et al., 2011).

The physicians were asked to identify and personally recruit respondents who (after their consent) received access to the online assessment. Physician selection bias was discouraged by explaining the importance of selecting frank and critical respondents. Respondents were chosen based on pre-set criteria, following the assessment guidelines prescribing respondents from direct, same-profession colleagues and from other professions, all collaborating with the physician on a regular basis (Chesluk et al., 2012) (Human Synergistics International, 2017). The minimal response rates for processing the final assessment reports were set as follows: LSI: $\geq$75% of n=8; TEAM+: $\geq$80% of n=12.

The MLC sessions lasted up to 60 minutes each, were held without disturbance (pagers and phones were muted or handed over to an assistant) and facilitated by an external certified coach. During the sessions, the reports were discussed in search of strengths and weaknesses in leadership competencies and opportunities for improvement. The physicians were provided with opportunities to enroll for additional MLC sessions, at their request.

Facilitation and Conditions

The multidisciplinary team training sessions were delivered by an internal trainer (a CRM certified CRNA), who received a 3 half-day TS train-the-trainer session from the external facilitator (a certified TS master trainer) (TeamSTEPPS Implementation Guide, 2018). Also, three volunteer trainers (one CRNA; two anesthesiologists) assisted the internal trainer in preparing and facilitating the team sessions. After the program, this trainer corps also facilitated the newcomers' and refresher trainings (Clapper & Ng, 2013). Staff engagement and reiteration of the team sessions' content was reinforced by the involvement of 'champions' or 'change agents' from all 5 disciplines role modelling the desired teamwork behavior during work hours in and outside the CORs.

High power distance between team members can increase anxiety among participants (e.g., when providing feedback), potentially inhibiting learning and transfer (Lyons et al., 2015) (Salas et al., 2008b) (Hughes et al., 2016). Relatedly, revealing emotions or openly providing feedback (i.e., speaking up) in a multi-disciplinary setting (e.g., during sign-out/debriefing) can provoke substantial anxiety and awkwardness, potentially spiraling into silence or ineffective responses and behavior (Hughes et al., 2016) (Kluger & Denisi, 1998). As an anticipatory preparation to the training, the trainers were informed about the theory and practical tactics related to psychological safety. Also, they were instructed to direct team discussions into a collective reflection on the team members' shared responsibility of effectively sharing crucial information on patient safety, which included inviting or encouraging them to speak up. This empowered the trainers to (adaptably and creatively) recognize, exemplify and utilize unplanned opportunities arising during the training sessions (e.g., 'exemplary' behavior that is threatening to psychological safety) (Nembhard & Edmondson, 2006), without losing their grip on the session's process and aims.

To achieve optimal attendance levels, the employees were compensated in the form of time for the training and all the sessions were adequately catered. During the entire program's implementation, the staff was regularly informed and motivated by the coordinators and all the team management who also contributed actively to the program (Muffatt-Bruce et al., 2018).

All the surveys and assessments were kept confidential through a no-access policy for hospital management and coordinators (access was only granted to the external facilitator: not employed by and not contractually bound to the hospital). Furthermore, staff was ensured that program participation would not have managerial or corrective consequences, neither at individual nor at team levels.

The program's pace was held flexible to allow for reflection and discussions among the team members about the processes (Styer et al., 2011).

Data Collection and Analysis

The effect of the multi-disciplinary training was assessed at these four levels: (1) Reaction to training, including satisfaction and assessment of the utility of the training, (2) Learning, including post-training changes in attitude to the teamwork, (3) Transfer of learning to behavior in the work environment, and (4) Results from the patient safety data (Kirkpatrick, 1994) (Jones et al., 2013b) (Table 1).

Table 1. Overview of collected data

Level	Evaluation	Used method
Level 1	Reaction	▪ Training evaluation questionnaire
Level 2	Learning	▪ Teamwork Attitudes Questionnaire (T-TAQ)
Level 3	Transfer of learning to behavior	▪ Compliance of sign-out and debrief
Level 4	Results on patient safety	▪ Decentral Incident Notifications

Level 1. The participant's reaction to the training was assessed with a 15-item questionnaire, consisting of eight 5-point Likert scales[10], five open questions and one question for rating the training on a scale from 1 to 10. The surveys were handed out to the participants in paper form and filled in directly after the training sessions.

Level 2. To assess and monitor the progress of the training effect on learning, participants completed the 'Teamwork Attitudes Questionnaire' (T-TAQ), a validated 30-item questionnaire on a 5-point Likert scale[11] (Baker et al., 2010). The T-TAQ is a validated instrument for assessing specific needs within a healthcare institution's unit and monitoring the results of TS or similar approaches regarding the desired changes in attitudes towards teamwork (Sawyer et al., 2013) (Scotten et al., 2015) (AHRQ, 2017). T-TAQ measures five areas of attitudes toward teamwork: team structure, leadership, situation monitoring, mutual support, and communication (Baker et al., 2010). The T-TAQ was applied, online, 1 month before (T0), 36 months after (T1), and 51 months after (T2) the final multi-disciplinary training sessions (Figure 1).

Level 3. To assess the staff members' actual behavioral changes in the clinical frontlines (i.e., learning transfer), compliance with the sign-out/debrief procedure was measured 14 (T1) and 48 (T2) months after the program's delivery[12] (Paull et al., 2010). Sign-out or debriefing procedures were not part of the COR program protocols prior to the multi-disciplinary training sessions (T0).

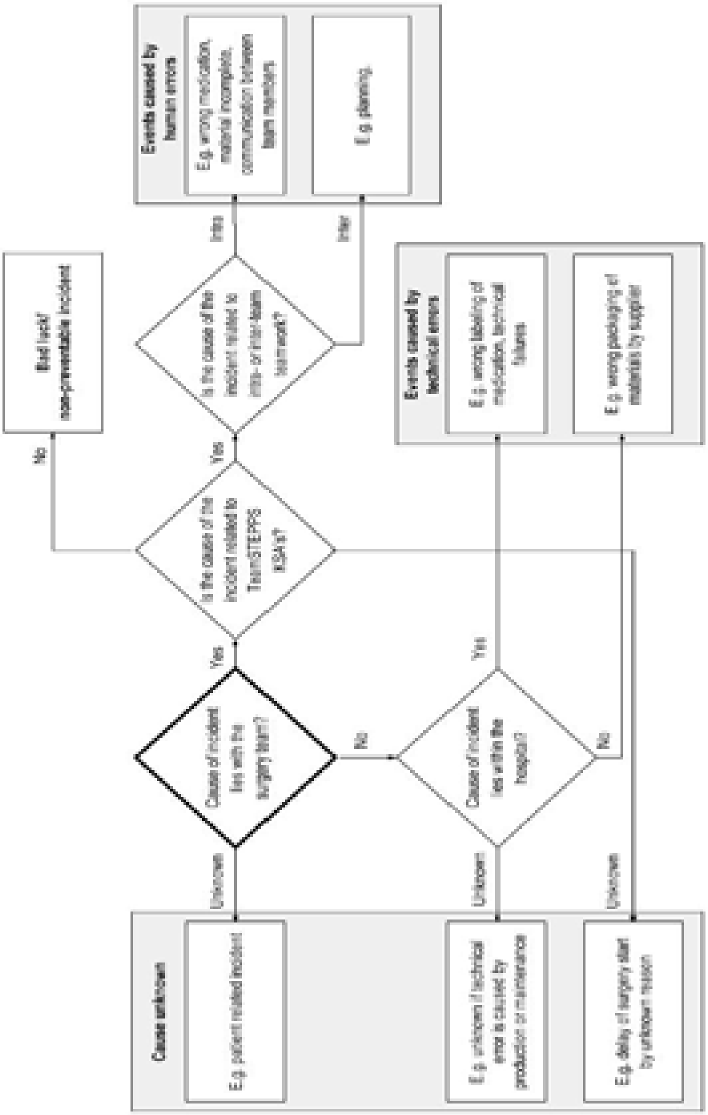
Level 4. We analyzed the training effects at a patient safety level using the hospital's incident notification system, that supports the institution's policy of encouraging employees to report (online and anonymously) any adverse (near) event or irregularities which (potentially) affected patient care. A Decentral Incident Notification (DIN) committee frequently reviews notifications and publicly publishes monthly and annual reports, in which notifications are placed in seven categories according to type and risk level. In this study, all the notifications related to the cardiothoracic surgical team (from

[10] Five-point Likert scale: 1 - Strongly disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly agree.
[11] Ibid.
[12] Ibid.

January 2010, 2 years prior to training, until December 2017) were analyzed (anonymized at patient, designated team and notifying individual levels) and individually categorized by two researchers after which any disagreements were discussed to come to a 100% agreement.

Figure 3 provides a flow chart representing the notification categorization process.

Figure 3. Flow chart representing categorization of incident notifications



Overall evaluation and interviews

A final evaluation questionnaire was digitally distributed to all the staff 14 months after the end of the final training session, consisting of 17 Likert score questions[13] and 3 open questions. Also, the transcripts of the semi-structured interviews with 29 staff members (Perfusionists: 3; CRNA: 4; scrub and circulating nurses: 6; anesthesiologists: 6; surgeons: 5; management and team coordinators: 4; internal trainer: 1) were analyzed for any factors expected to affect the training or its effects. Interviews[14] were held after the multi-disciplinary training sessions were delivered and focused on identifying the relevant processes, as experienced by interviewees, as well as to reveal unexpected beneficial or limiting factors. All the interviews were transcribed and analyzed using Atlas TI (version 8.0.33.0; Scientific Software Development GmbH, Berlin, Germany). Interview quotes that revealed relevant information on key program elements, its implementation (e.g., expectation, training sessions, influencing factors), and post-training experiences (e.g., behavioral changes, experiences with sign-out/debriefing) were coded with a coding table based on items from the ReCoMuTe checklist (Keijser & Wisse, 2019, This thesis, Chapter 7).

RESULTS

Level 1: Reaction

Written training evaluation questionnaires (immediately after training) were completed by 77 participants (Table 2), revealing a moderately positive overall appreciation of the training (7.36 / 10). All items scored between 3 (Neutral) or higher (Agree or Strongly agree), and at least 60% of the respondents agreed or strongly agreed with all statements.

Level 2: Learning

The T-TAQ measurements (T=0: n=68/89 (76%); T=1: n=71/91 (78%); T=2: n=73/89 (81%)) showed statistically significant difference between three of the five constructs (‘team structure’: $F(2,209) = 6.619$, $p < 0.01$; ‘leadership’: $F(2,209) = 5.767$, $p < 0.01$; and ‘mutual support’ $F(2,209) = 12.807$, $p < 0.01$) and time. The effect remained over time, as there was a statistically significant difference between pre-training (T0) and the second post training measurement (T2) (Table 3 and Figure 3).

Level 3: Transfer of learning

Compliance to sign-out and debriefing procedures, 14- and 48-months post-training, was high (between 4 and 5: Likert scale 1 - 5), with no statistically significant differences between T1 and T2 (Table 4).

Level 4: Results on patient safety

The total number of notifications per year, relating to thoracic surgical procedures, increased between 2010 and 2012, and then decreased greatly between 2012 and 2013 (Figure 4). After a minor increase in 2014, the total number of notifications declined steadily each year. Incidents with causes categorized as ‘outside’ the cardiothoracic surgery team remained relatively stable throughout the years (Figure 4 and Figure 6). Contrastingly, notifications categorized as being related to the thoracic surgery team (‘inside’) decreased significantly in the period following the program’s implementation in 2012, finally

[13] Ibid.

[14] As part of prior studies, a first series of (12) interviews was held to investigate psychological safety; and a second series (17 interviews) focused on medical engagement: both interview protocols provide sections which are relevant to the current study’s evaluation process.

stabilizing with two notifications per year (Figure 5). The decrease in notifications categorized as 'inside' can be mainly explained by a decrease in incidents related to TS KSAs, as shown in figure 5.

Finally, the incident risk-category scoring of notifications related to the thoracic surgery team showed a substantial decrease in high-risk classifications (i.e., incidents categorized as 'serious', 'very serious' or 'calamity), with only one notification being classified as 'very serious' after 2012 (Figure 7).

Evaluation training and implementation

The evaluation survey (14 months post-training) was completed by 40 respondents. Table 5 shows the mean scores and standard deviations of responses to survey items 'communication', 'speaking-up', 'teamwork', 'patient safety', 'job satisfaction', 'team culture', and 'sustainability' (Table 5 A, B, and C). Overall, the respondents perceived they had benefitted from the program in terms of their team-performance and climate, as well as patient safety. Fourteen months post-training, a majority of the respondents identified a sustainable effect of the training.

Despite the fact that some interview questions focused on detailed information on psychological safety, the semi-structured interview transcripts provided valuable additional data for analyzing implementation and post-training experiences. In particular, the interviews revealed how the staff had experienced the training sessions and how they perceived the differences in the teamwork before and after the training. Table 6 depicts exemplary quotes, categorized by the program's main elements.

Detailed reporting of the program implementation was documented using the ReCoMuTe checklist (Appendix 1). After completion, we performed a member check by requesting the internal program trainer to review, which provided some more detail (Birt et al., 2016).

Table 2. Results from training evaluation (directly after multi-disciplinary training)

Item	Mean	SD	% (strongly) agree
Before the training, the training goals were clear to me	3.74	0.880	77.9
The level of the training suited me	3.88	0.606	80.5
The level of the training suited my team	3.86	0.663	81.8
Practical examples and (case) assignments are connected to our work	3.82	0.739	76.6
The training has met my expectations	3.69	0.712	64.9
I would recommend this training to others	3.64	0.857	62.3
If I must give the training a grade [1 to 10]*	7.36	1.017	-
This training contributes to our teamwork	3.90	0.882	84.4
This training contributes to quality of care and patient safety	3.86	0.884	79.2

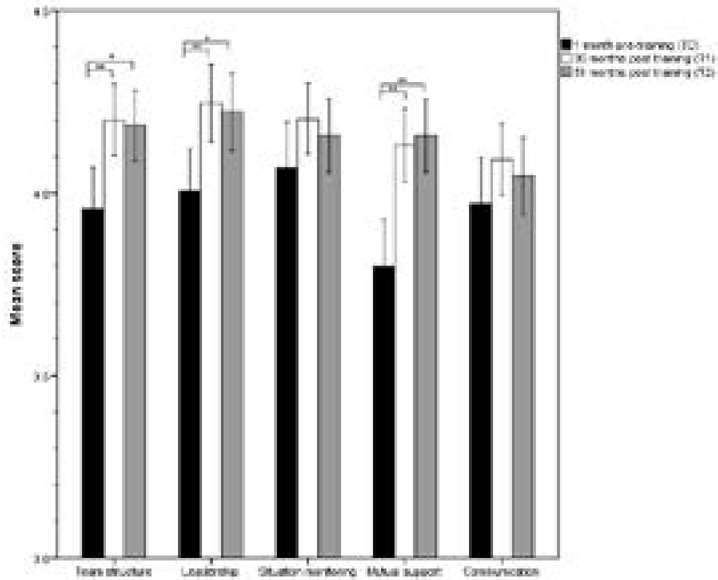
For all items n=77. Likert scale 1 to 5 (5.0 = strongly agree). *Score 1 to 10.

Table 3. T-TAQ mean scores and standard deviations (SD) per construct: pre-training (T0), 36 months post-training (T1) and 51 months post-training (T2)

	Pre-training (T0)		Post 36 months (T1)		Post 51 months (T2)	
Construct	Mean	SD	Mean	SD	Mean	SD
Team structure	3.96a	0.474	4.20b	0.407	4.18b	0.415
Leadership	4.01a	0.466	4.24b	0.439	4.22b	0.451
Situation monitoring	4.07	0.521	4.19	0.405	4.16	0.428
Mutual support	3.80a	0.525	4.12b	0.417	4.16b	0.427
Communication	3.97	0.526	4.09	0.411	4.03	0.465

Means with different superscripts are significantly different from each other at p < 0.05.
Likert scale 1 to 5 (5.0 = strongly agree).

Figure 3. T-TAQ mean scores per construct: 1-month pre-training (T0), 36-months post-training (T1) and 51-months post-training (T2).



Likert scale 1 to 5 (5.0 = strongly agree).
Error bars: 95% CI, *p < 0.05, **p < 0.01.

Table 4. Compliance to sign-out/debrief procedure at T1 and T2

	Post 14 months (T1)		**Post 48 months (T2)**	
	Mean	SD	Mean	SD
Sign-out	4.48	0.847	4.63	0.641
Debrief	4.32	0.747	4.38	0.704

T1: n = 40; T2 n = 81. Scale 1 to 5 (5.0 = strongly agree).

Figure 4. Total number (per year) of incident notifications relating the thoracic surgery team (left Y-axis), categorized per cause (‘unknown’; ‘outside’ or ‘inside’ thoracic surgery team) and the total of notifications for the entire operation facilities department (i.e., all surgical specialties) (right Y-axis)

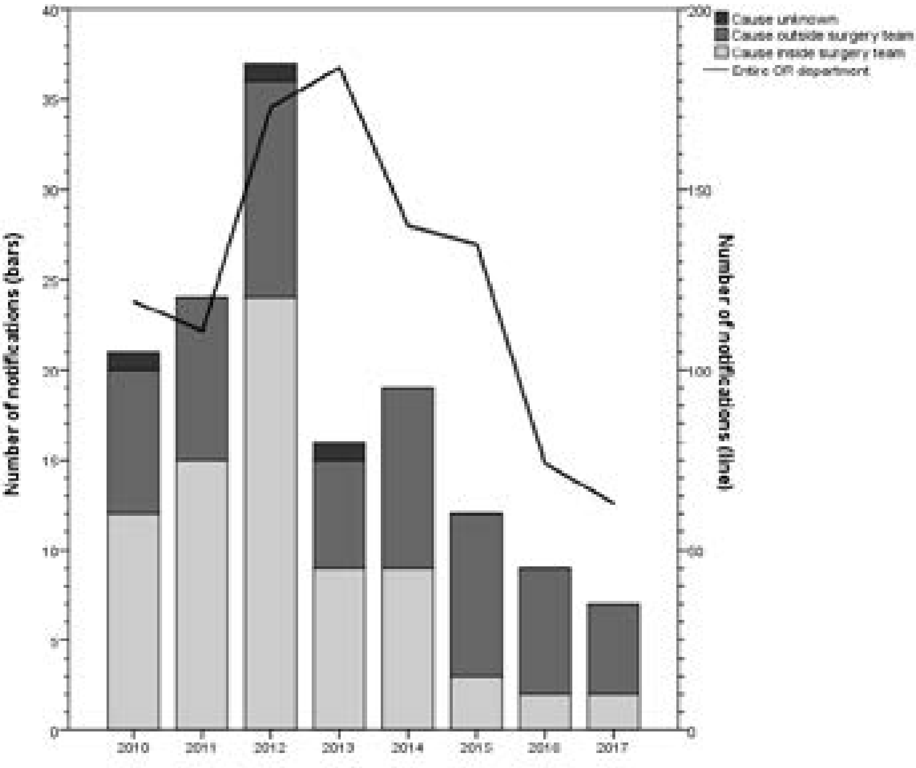


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Figure 5. Total number of notifications per year related to the thoracic surgery team, and cause as related to inter- or intra-team TeamSTEPPS Knowledge, Skills and Attitudes (KSA)

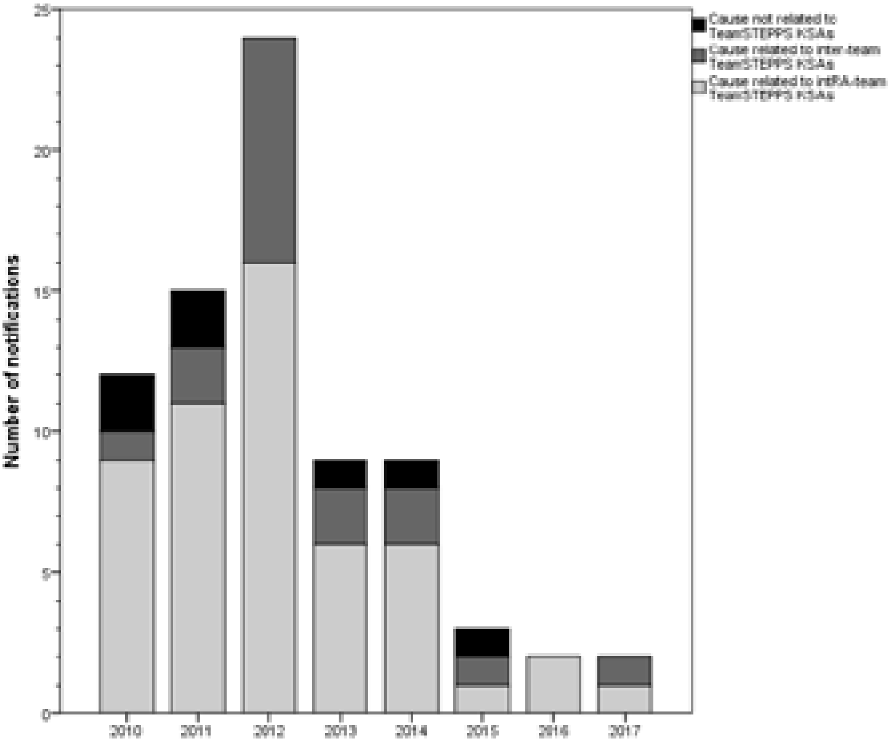

Figure 6. Total number of notifications per year with causes 'outside' the thoracic surgery team

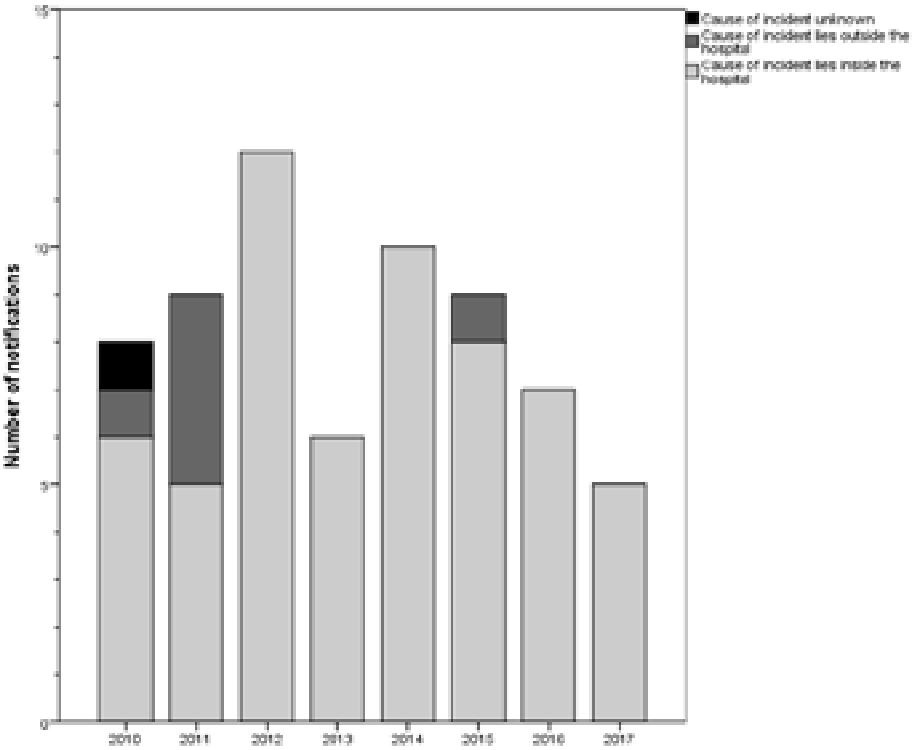

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Figure 7. Total number of notifications per year categorized by risk score

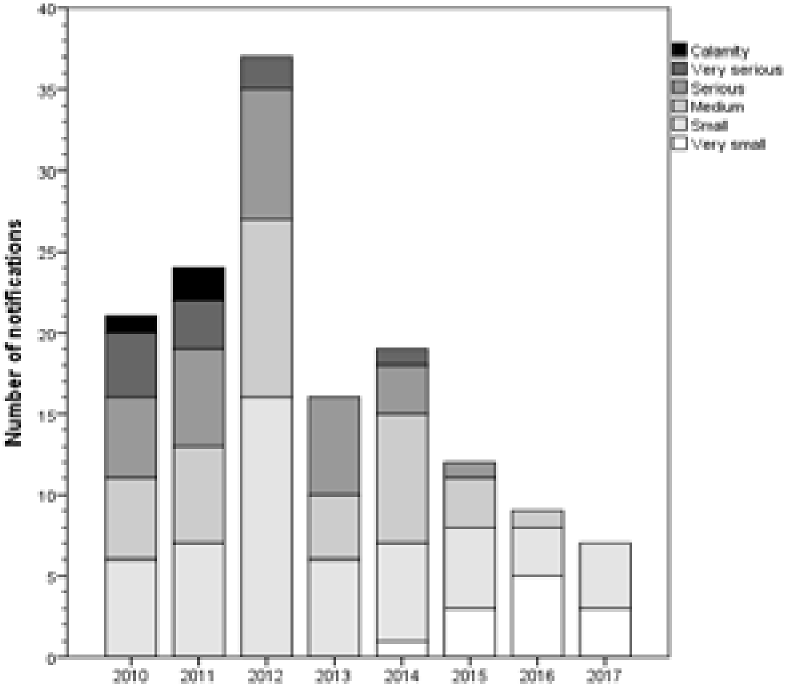

Table 5a, b and c. Responses to evaluation survey (14 months post-training) with means, standard deviation (SD) and percentage of responses scoring 'agree' or 'strongly agree'

5a - Communication, speaking-up and teamwork

Items	Mean	SD	% (strongly) agree	Mean	SD	% (strongly) agree
	Before the training, I was able to …			After the training, I was able to …		
… communicate clear with colleagues.	3.88	0 .911	75.0	4.13	0.853	92.5
… lead / coordinate certain (team)activities.	3.70	0.992	60.0	3.95	0.932	77.5
… speak-up about situations or behavior in interest of team and/or patient.	3.58	1.217	47.5	4.10	0.900	92.5
… offer help to a colleague in interest of team and/or patient.	3.83	1.035	70.0	4.03	0.920	87.5

5b - Patient safety, job satisfaction and team climate

Items	Mean	SD	% (strongly) agree
Due to the program …			
… patient safety is improved	3.65	1.762	82.5
… team climate on work floor is improved	3.08	2.080	70.0
… job satisfaction has increased	2.35	2.293	52.5
… a culture of dialogue has been established	3.50	1.826	80.0
… a blame culture has been reduced	2.83	2.171	62.5

5c - Sustainability

Items	Mean	SD	% (strongly) agree
The effect of the program is…			
… lasting	4.05	0.749	80.0
… temporarily and will decrease over time	2.78	1.165	25.0
… decreased since the last team training session	2.35	1.051	15.0
… lasting, provided certain actions on sustainability are taken	3.98	0.768	75.0

For all items n=40. Scale 1 to 5 (5.0 = strongly agree)

Table 6. Selected quotes from interviews on various topics, including: team sessions; medical leadership coaching; and sign-out/debriefing procedures

Monodisciplinary Sessions	**No direct effect on COR work** *The climate in the* [monodisciplinary] *team does not have any influences in the OR. But you notice it's better to collaborate and communicate with each other, since you still work together* [outside the OR]. (I-16) **Team climate improved** *Behind the scenes, outside the OR, there you see that more and better work gets done*. (I-1) *Before, our meetings went unsatisfactory: that's much better now*. (I-3)
Multidisciplinary Sessions	**Empowerment for speaking up** *Now, after the program, there is more consultation, mutual respect and communication. Everyone is open for feedback, both negative and positive. That's a big difference. There is more mutuality.* (I-23) *Because than you can say 'sorry for that', afterwards. It's tough and high-adrenaline surgery here. As is the communication at that time.* (I-4). *Open your mouth at the end, or during surgery. Know you are heard.* (I-16) *Threshold* [to speak] *is lower now, including for those that tend to shy away from it.* (I-10) **Physicians' role and awareness** *Colleagues* [surgeons] *not used to talk about their work, are now being forced to discuss out in the open, since others* [non-medical staff*] provide more feedback*. (I-9) *Everyone has a voice in the process.* (I-13)
Medical Leadership Coaching	**Physicians' self-reflectiveness and awareness** *You don't have to change really. It is more becoming aware of people around you.* (I-16) *That* [assessment] *has been a very important step: to think about yourself and how others think about you. A look in the mirror.* (I-3) *It is really interesting to know what people think of you.* (I-16) *I also found that physicians were more accessible in the COR* [post-training]. (I-23) *I can imagine not every thoracic surgeon is a born leader. Some might find it hard to develop that.* (I-6).
Sign-Out/Debrief	**Risks of checklists** *The danger of checklists is that you start working in 'cyberspace' and leave reality.* (I-4) **Improvement opportunities** [Sign-out/ debriefing] *will not affect the patient you just operated on. It is more about improving safety for next patients.* (I-7) **Debrief** *It is not sign-out. It is our debriefing that results in actual change*. (I-1)

DISCUSSION

In the following sections we discuss our findings and reflect on how the impact mechanisms might have contributed to these results through our evaluation of the implementation processes. Finally, we provide some considerations and discuss the limitations of our study.

Effects of Training

The participants perceived the program as positive and befitting their needs and situation (Level 1). A significant shift was found over time in how the COR team members viewed 'team structure', 'leadership' and 'mutual support', indicating an inclining learning curve in their views on safe teamwork (Level 2). The lack of change in their attitudes on the T-TAQ 'situation monitoring' items might be explained by the COR team's initial sufficient performance in their primary collaborative tasks during surgical procedures. Designed as a questionnaire applicable to all types of healthcare teams, the T-TAQ is, conceivably, less 'sensitive' in measuring the construct team 'communication' in specialized settings such as the COR.

The compliance scores of the two new patient safety procedures, sign-out/debriefing, were most satisfactory (Level 3), suggesting the beneficial transfer of the training to the clinical setting (Table 4). The final evaluation survey responses as well as the numerous comments in the transcripts from most of the interviewees unequivocally confirm these results (Table 5A and 5B; Table 6). Moreover, these sources explicitly indicate the program's contributing effect of a culture change within the team, that shifted from more concealed communications forms towards more constructive, open dialogue between all staff members.

The data from the interviews and evaluation surveys reflect the participants perceptions of the program's impact on patient safety, also substantiated by the positive training effects on incident reporting (Level 4) (Table 5 C; Table 6; Figures 4-7). Notifications of incidents, categorized as being related to the team's performance during COR procedures, decreased drastically. Although the total number of notifications (of all the surgical teams in the operation facilities department) declined, our data reveal that the number of incidents associated with KSAs in the cardiothoracic team ('intra-team'; see: Figure 5) decreased substantially. Additionally, the cardiothoracic team's risk categorization, as assigned by the DIN-committee, showed a beneficial shift away from calamities and high-risk incidents.

Despite these promising results, caution must be held in interpreting our data. Incident reporting is influenced by various factors, ranging from time constraints, deficiencies in knowledge, cultural norms, inadequate reporting procedures and directives, beliefs about repercussions, and a perceived lack of value of the process (Kingston et al., 2004) (Hartnell et al., 2012). We did not investigate the variety of incentives or barriers that can influence incident reporting in the current context. Also, changes in the hospital's incident reporting procedure might have influenced the observed decrease in registered notifications. However, such an influence would not explain the stagnancy in incidents reported by the other surgical teams (Figure 6).

Evaluating Implementation

In search for insights into the mechanisms of impact, determinants associated with successful program implementation and other, unexpected observations or facts, we analyzed and discussed the program's implementation process using various sources, including the survey ratings and responses to the open questions, the experiences verbalized in the interviews and the documents related to the program (e.g., e-mails; working papers).

Perceptions of team members

Although this was not made explicit to them at the start, to many interviewees it was apparent that the program importantly emphasized "[that it is] *also about communication outside the OR*" (I-10). Various interviewees mentioned the team members' growing awareness of the essence of speaking up to address patient safety issues and to prevent tensions from going 'underwater'. Since "*some people do not dare to speak*" (I-12), sign-out/debriefing provided "[…] *an instrument to speak up. But in the end, they must open their mouths themselves if they feel I was offensive during a difficult procedure*" (I-6). The latter reveals a preexisting empathetic stance among OR team members, as an unspoken mechanism to tolerate unpleasant behaviors due to stressful situations in the OR. This reciprocity was reflected in various, genuine ways, for example: "*I don't need so much voice. My profession is to listen, and to feel and see what the others do in order to assist them*" (D-8). And vice versa: "*They see things I can't see any more through my routines.* […]. *It is better to have 10 of their useless remarks than missing one that is critical*" (I-9).

The program's gradual pace, reflecting its overall change strategy, was noted. One interviewee affirmed that "*change should be cautious, evidence based, and thoughtful",* because "*to put clinical traditions overboard overnight, results in accidents*" (I-20)[15]. Nevertheless, the 'incubation time' of various months dedicated to 'priming' (i.e., mono-disciplinary sessions) was perceived as lengthy by some.

From a human resource perspective, the program was beneficial. Post-training, the team was "*perceived much more now as a team in which one listens to each other*" (I-20), resulting in re-installment of the team's attractiveness as a workplace, which also eased the processes of filling open staff positions (Lyubovnikova et al., 2015) (Dahl et al., 2017). The program also provided an opportunity for management to reinforce their relationship with some clinicians: "*During the program, trust returned as they* [management] *communicated their appreciation of our work. We did not have that before*" (D-17).

Various interviewees suggested that ongoing management support and endorsement of the program was essential to its success (Leming-Lee et al., 2005) (Paull et al., 2009) (Clapper & Ng, 2013) (Mofatt-Bruce et al., 2018).

Team sessions

The mono-disciplinary sessions focused on team climate and, using the TAQ results, discussed issues and potential improvements. In some cases (i.e., disciplines), this process was hampered by, for example: initial distrust in the program or its facilitator, fluctuating team composition, the appointment of a new coordinator, or managerial ambiguity. During the sessions, team members were encouraged to share their experiences with other disciplines and to discuss these in the perspective of the program's objectives. Two teams reported that the mono-disciplinary sessions contributed to resolving intra-team tensions and old grudges ("*There was no real quarrel [before the intervention], but now the past is the past*" (I-3).

The multidisciplinary sessions were all organized according to a preset design and selection of content, which was delivered by two-trainer teams. They coordinated and coached the sessions, also assisted by colleague champions who provided (personal) narratives on patient safety experiences (Styer et al., 2011). The mutual task of implementing the two new safety procedures "*provided a tangible goal*" (I-7) and "*functioned as a coat hanger for imparting a culture shift*" (I-24). Also, the 'all-involved strategy' was noted by many. Next to delivering the planned training elements, the trainers sought to encourage appreciative inquiry-type-discussions that frequently resulted in acknowledging the collective viewpoint, often expressed as the adagio: "*It is also MY patient*". Narrating the various perspectives collectively among the different professions infused an increased sense of shared

[15] Interviewee's quotes are purposely anonymized, also disguising their discipline.

responsibility in assuring patient safety during COR procedures (Cunningham, et al., 2018). The accelerated mutual awareness of the importance to speak up about any event which could, potentially, compromise patient safety, healthcare quality and teamwork, also reported as associated with patient morbidity and mortality, spurred a higher level of familiarity among the team members: "*In the 20 years of working in the OR, until now I have never seen the hairs of many colleagues; only their eyes*" (D-11) (EIBardissi et al., 2008).

Remarkably, several interviewees noted differences between generations. Younger staff members were seemingly more willing or capable of speaking up than older staff members. Furthermore, younger physicians were perceived as being more open to feedback than their older colleagues. This reflects an understudied phenomenon in the domain or in multidisciplinary healthcare team training (Busari, 2013).

Sign-out and debriefing procedures

The interviewees noticed that the more checklist-based sign-out procedures do not impart tangible improvement, whereas debriefs result in reports and recommendations for furthering patient safety (Catchpole & Russ, 2015)). However, as a positive consequence of sign-out, they reported that suppressed tensions during surgery can be openly discussed. One interviewee commented: *"Before the program such situations* [near accidents] *were not spoken about. Everyone only silently thought: 'That was a close call!'. But nowadays, we talk about it."* (I-09). Long COR procedures resulting in staff's shifts, were mentioned as an impediment to sign-out, since sign-out during such shifts were not applied.

Physician coaching

Although the vast majority of the physicians participated in the MLC program, some were not involved due to absence, part-time appointments, or personal reasons. In the beginning, some "*were afraid that the assessments would be used to identify and get rid of bad communicators*" (I-04), but then the physicians as well as non-physicians noted the appropriateness of self-reflection: "*Often they* [physicians] *are not well aware of their behavior"* (I-24), and "*The higher you are in hierarchy, the more difficult it gets to find feedback. You have to reach out for it actively*." (I-09). MLC and multi-disciplinary sessions made physicians more aware of non-physician team members' reluctance to speak up (against physicians), also inculcating an awareness that their own behavior can enhance those barriers. Since "*even for physicians this* [open] *way of communicating is new*" (I-06), conceivably, the program was challenging and even confronting for some of them (Table 6). The MLC activities remained enclosed in one-on-one sessions with the external certified leadership coach (a trained physician, which *"... also contributed, since that makes talking easier than with a management consultant*" (I-24).

Post-hoc research considerations

There are several considerations, including possible shortcomings in how the program was organized and how the chosen methods were deployed.

First, while continuously attempting to prevent the emergence of 'survey fatigue', the numerous sets of data we acquired for assessing teamwork (TAQ), team training effect (Level 1 to 4), implementation evaluation (survey) and MLC assessments, demanded a significant amount time of clinicians' time. Notwithstanding the methodological benefit of data triangulation, our multi-method approach also resulted, at times, in burdensome tasks of iteratively sending out reminders to complete online surveys and assessments. Similarly, although all the interventions were delivered successfully according to the designed format, planning the team and individual MLC sessions was demanding. This was further complicated by our 'all-disciplines-present' requirement for the multidisciplinary sessions; the cancellation and rescheduling of some sessions contributed to the long periods between kick-off and the final sessions. Despite our efforts to embed activities as suitably as possible into the staff's schedules, we think that such organizational challenges are often integral features of complex interventions in busy and prioritized clinical work settings. Here, we note the relevance of considering 'saturation' in delivering team training: beneficial effects are gained from team training when enough participants are trained in a short time (Clapper & Ng, 2013). Although our study indicates the feasibility of integrating MLC successfully in an enhanced TS curriculum, our experiences also recommend ongoing investments in diligent and iterative negotiation of preparation and planning to adaptably mitigate any unnecessary burdens on the professionals and their primary task of caring for patients.

Secondly, we reflect on the various measurement tools related to teamwork. Although the tools provided by the TS curriculum served us with means for collective reflection (i.e., TAQ) and progress monitoring (i.e., T-TAQ), alternatives can be considered for assessing behaviors and skills at an individual (physician) level (e.g., Non-Technical Skills in Surgery (NOTSS) (Yule et al., 2008), and at team level (Observational Teamwork Assessment for Surgery (OTAS) (Hull et al., 2011), or Oxford Non-technical Skills (NOTECHS) (Mishra et al., 2009). Recently it was emphasized that distinguishing team training targeted at true team competencies from training focused on individual level team competencies, is important in order to comprehend this emerging field better (Hughes et al., 2016). Furthermore, since self-assessments of teamwork by surgical team members are known to be influenced by professional differences, observation-based assessments tools could help circumvent this (Li et al., 2018) (Arora et al., 2011) (Mills et al., 2008) (Wauben et al., 2011) (Makary et al., 2006).

As a third consideration, we note the relative novelty of individual physician leadership competency coaching and the associated comprehensive MSF assessments. Despite the initial hesitance among some, our interview data suggest that physicians predominantly had positive experiences creating more self-awareness about their impact on others. Yet, the direct effects of our MLC efforts on the physicians' behavioral changes were not objectivated through, for example, through repetitive MSF measurements because of our constraints in resources and time. Although a lack of validated ML assessment tools mirrors the relative infancy of ML (Frank et al., 2015), we contend that formative use of MSF assessments can be an acceptable alternative in facilitating physicians in these relatively uncharted waters.

Fourthly, while the 'holy grail' of healthcare team training effect resides at patient outcomes level, such as post-surgery complications or mortality, we deemed that the use of incident reporting was acceptably sensitive to investigate COR team related patient safety. This progresses our approach beyond studies in which changes in attitude or climate towards patient safety (Level 3) were used as a surrogate to team training outcomes, many of which indicate the effectiveness of non-technical skills team training (Gore et al., 2010) (Makary et al., 2007) (Makary et al., 2006) (Nundy et al., 2008) (Nurok et al., 2011a) (Nurok et al., 2011b). Ultimately, mortality (an often-used end-point indicator for scrutinizing clinical interventions) of cardiac surgical patients is rare, warranting large study samples to provide sufficient power to discern improvement (Ward et al., 2013). Also, we argue that OR-time only reflects a small fragment of a (cardiac) patient's journey. Other highly risk-prone settings, such as handovers from (C)OR to intensive care, have been documented as being particularly vulnerable to communication breakdown, resulting in direct patient harm (Raiten et al., 2015) (Wilson et al., 2017). Extending the program from COR to other components of the cardiac surgical patient's pathway, such as intensive cardiac care units, would require a more integrated policy and central allocation of resources across hospitals to further its potential beneficial effects on safety and quality (Petrovic et al., 2012) (Joy et al., 2011).

As a sixth possible limitation, we consider influences interfering with the program. To our knowledge, during the period our data was collected (2012-2017), the team did not engage in any major follow-up patient safety enhancement activities or programs other than the planned refresher and newcomer sessions. However, since T-TAQ re-measurement was at 36 months post-training, conceivably, other factors than the program's interventions might have contributed to the effects (e.g., team composition).

Finally, there might have been researcher bias in our study. All but two (CW and RW) of the authors were actively involved in the program and one author (WK) functioned as external facilitator/coach. We attempted to mitigate bias through inter-researcher discussions, use of various data sources and non-author peers reviewing the data (Morse, 2015).

CONCLUSION

It is suggested that the complex social features of CORs provide an ideal setting for multifaceted interventions directed at culture change (Catchpole & Wiegmann, 2012). In this paper we present a case study aimed at analyzing the implementation and impact of a comprehensive TS program in an academic cardiothoracic surgery team, that was preceded by mono-disciplinary team development and paralleled by MLC. The four levels of evaluating team training effects resulted in significant and sustained improvement, signifying the program's long-term effect.

An analysis of the program's processes denotes that the program's success is associated with a collective reframing of tacit patterns of interpersonal expectations and behaviors on implementing new communication procedures. Prior to the program, many team members associated speaking up with ingrained, personal traits and, in some cases, even regarded any efforts of feedback as useless. This old attitudinal and behavioral pattern governed how team members responded to distinct situations or people which did hamper valuable learning while inflicting sentiments to submerge (Grint, 2010). The program facilitated increased notions of shared responsibility for patient safety in tandem with speaking up as well as receiving feedback effectively to become a widely accepted, procedurally legitimated and morally obligated (and trained) skill for all staff, regardless of their individual role, position or character.

Instrumental to the program's success was the multifaceted attention given to a continuous 'trickling in' of new behavioral frames, through a wide array of planned as well ad-hoc elements, ranging, for example, from putting champions 'on the spot' during training sessions, situational role-modelling, and sharing of narratives to direct coaching at the front-lines. In particular, a gradual increasing momentum of proficiency in adequate communication among team members was noted. This enabled them to reroute moments of tension or conflict and arousals of hierarchical 'bloating' and to apply those respectfully as opportunities for collective reflection, as well as consider them as a reaffirmation of the program's necessity (Dankoski et al., 2014).

Since most safety protocols are associated with leadership (Paull et al., 2009) (Moffat-Bruce et al., 2018) (Fann et al., 2016) and because physicians' habitual lack of involvement in the implementation of quality improvement, including TS programs, is widely reported (Jones et al., 2013b) (Sheppard et al., 2013) (Wong et al., 2016), our program entailed significant time and resource investments in MLC. Without exception, all the MLC participants were interested in learning from their assessments' outcomes. While the interviewed non-medical staff repeatedly noted the importance of the engagement of the anesthesiologists and surgeons (e.g., "*We* [allied professionals] *need them* [physicians] *on board. If not, it* [the program] *would have remained an empty hull*" (I-8).), we argue that on partaking in the MLC, the physicians emphasized their commitment to the program and role-modelled self-reflectivity, which, implicitly, invited constructive feedback from non-physicians.

Arguably, the program described here can be transferrable to other teams and, ultimately, to all adjacent and interdependent micro-systems that constitute the cardiac and other patients' 'journey'. Such a venture, aimed at increasing the numbers of professionals populating a wide network-community sharing a mutual goal to improve patient safety, could follow similar routes (Dixon-Woods et al., 2011). However, such endeavors should be considered in the perspective of the multi-faceted character of culture change. Moreover, a system level culture change would warrant considerable collaboration between many teams that are all characterized by their own typical social systems and peculiarities. Although, allegedly, the medical profession seems to be warming up to their leadership development, adequate organizational and regulative changes are also needed to realize such welcomed, yet ambitious improvements at healthcare's frontlines (Keijser & Martin, This thesis: Chapter 3) (Keijser et al., 2019, This thesis, Chapter 4) (Onyura et al., 2019).

Despite its relative unfamiliarity among more bio-medically oriented clinicians (Wahr et al., 2013), we integrated a traditional quantitative evaluation with qualitative, process evaluation type research, using a structured guide for complex interventions (Keijser et al., 2019, This thesis: Chapter 7). We hope the current case-based study contributes to a better understanding of the mediating pathways or mechanisms affecting patient safety in the studied type of settings (Hughes et al., 2016) (Wahr et al., 2013). This study may spur further research on complex team interventions to prevent errors in patient safety and the various encumbrances for COR personnel (Catchpole & Wiegmann, 2012) (Gurses et al., 2012).

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APPENDIX 1

ReCoMuTe Checklist.

APPENDIX 1

Checklist: Reporting Complex Multi-Professional Healthcare Teamwork Training (ReCoMuTe)

Reported program: Cardiothoracic Surgery Team: TeamSTEPPS implementation, combined with mono-disciplinary teamwork development and medical leadership coaching

Used sources for ReCoMuTe checklist:
1. Experiences of the authors, including program participants, internal trainer, external facilitator
2. Data files: interviews; surveys
3. Correspondence (e-mail and working papers)

C - Context and preparation

C1 - Needs & barriers assessment

Activities to inventory and analyze needs and demands:

- Briefing to external coach by internal Steering Committee
- Series of confidential 1-on-1 interviews between external TeamSTEPPS™ (TS) coach and representatives of all stakeholder groups
- Mono-disciplinary team sessions

Strategic deliberations:

- Justification of the program investments: decision makers discussed the importance of improving internal (climate and culture) issues based on concerns with:
  (a) patient safety
  (b) employee satisfaction
  (c) external pressure (Dutch Inspectorate; organizational top-management) and the image of the team/department (in and outside hospital)
- Criteria for choosing the program: extended version of a CRM or similar training program, capable of sustainable improvement of internal inter- and intra-disciplinary issues and overall safety-culture.
- Change management strategy: Process-redesign and quality improvement, accompanied by individualized, appreciative type skills training and coaching
- Full support at all organizational level is considered a ‘sine-qua-non’ for implementation success (support from: departments of anesthesiology, thoracic surgery and COR and organizational top-management.

Tailored intervention based on assessment:
Based on a preparatory inventory of needs and barriers across all team/departmental levels, a process redesign intervention was identified as the procedural guiding principle to the program (i.e., implementation of sign-out and debriefing as part of the Surgical Patient Safety System (SURPASS) procedures) entailing training (soft) TS knowledge, skills and attitudes (KSA) in concurrence with TS implementation strategies.

C2 – Engagement & endorsement

Identification of barriers to sustainable change and activities to reduce resistance and to motivate and engage participants

Potential barrier A - Interdisciplinary atmosphere and variations in psychological safety causing issues and stress (e.g., blaming for adverse events; low compliancy to team sessions)
Tactics to overcome or neutralize a barrier:

(1) 'Mono-disciplinary priming phase': Before an interdisciplinary session, invest in optimizing intra-team issues and climate in ALL disciplines, resulting in an equal 'level playing field' among the monodisciplinary teams that constitute the wider COR team.
(2) Confidential mono-disciplinary sessions with independent external coach for 'depressurizing' and 'reframing' issues related to other disciplines, including appreciative inquiry, provocative confrontational coaching and empowering the team to speak up/provide feedback.

<u>Potential barrier B</u> – Staff reluctance to participate
Members of staff regarded the program and its interventions as:

a) managerial punishment or retaliation for prior (near) adverse events
b) unsafe/not confidential: 'Big-Brother is watching' (e.g., distrust towards external TS master trainer/coach, measurement and assessments)
c) extra burden to existing workload (also: training-fatigue)
d) not applicable: 'not-for-me' phenomenon, based on long work-history; underestimation of risks; etc.

Tactics to overcome or neutralize a barrier:

(1) positioning the program as an investment
(2) time compensation and COR planning adaptation in favor of team session participation
(3) active communication of support by team management and organizational top-management
(4) external coach operating confidentially and independently (e.g., no formal contract with management)
(5) actively promoting a team-spirit through champions and informal leaders ('we are one team'; 'we all invest'; etc.)
(6) facilitating and active communication of role modelling by (medical) leadership (e.g., assessments; 'mandatory' participation)
(7) minimizing time investment by optimizing preparation.

<u>Potential barrier C</u> - Physician engagement
Issues:

1. Historically hierarchical, physician-oriented team/departmental culture → skepticism among non-medical disciplines regarding physician participation in team sessions
2. Some physician team(s) are affected by top-down intervention in the aftermath of adverse event → skepticism towards the confidentiality of the program (external coach; measurements/assessments)

Tactics to overcome or neutralize a barrier:

(1) Both medical disciplines are represented by a physician 'champion' (1 surgeon, 1 anesthesiologist) participating in the program development team and actively endorse the program
(2) 'All-disciplines present'-rule during the multidisciplinary sessions (if not: cancellation, despite COR program adjustments etc.)
(3) Investment in an external coach building rapport with physicians.

<u>All-levels of management support</u>

- Support from three management levels: team management, hospital's sectoral administration and organizational top-management.

<u>To build sense of urgency, sense making and shared understanding:</u>

- Storytelling during team sessions, enhancing shared goals of patient-centeredness
- Mandatory kick-off session entire team/department.

<u>Clear communication and information on objectives</u>

- Frequent communication (e.g., newsletter)
- Uniform information team sessions
- Program progress reports issued to all teams.

C3 - Contextualization

Preparatory context improvement
- ‘Level playing field’ team atmosphere: See: ‘mono-disciplinary priming’.

Anticipation of parallel (conflicting) activities and interventions
- No significant parallel activities present at the time the program started

Pre-selection of implementation site (based on local context) to optimize implementation
- Pre-selection not applicable

Assessment of local situation/context in order to tailor complex intervention implementation (e.g. delivery model)
- Acute, high-risk healthcare setting → anticipate deviations in planned activities, e.g.,
  (a) impossibility of 100% simultaneous presence of all personnel (kick-off)
  (b) necessity of 24/7 stand-by
  (c) COR programs’ duration interfering with planned team sessions
- Team-performance, based on multi-disciplinary collaboration: promulgation of ‘all-disciplines-present’–rule for the planned team sessions.

Anticipatory planning (e.g., implementation postponement)
- In case disciplines are underrepresented: postpone training session (‘all-disciplines-present’–rule).

C4 - Organization

Structure and roles of the implementation organization
Implementation organization consists of:

(a) Steering committee
Function: endorsement and monitoring of the program; budget; quality and alignment with team/department strategy
Composition: dual management (clinical and non-clinical), internal coach and representatives from the disciplines)
Role: strategy and decision making

(b) Working group
Function: development of tailored program plan; initiating activities; planning
Composition and roles:
- Team/department management: chair
- Program trainers/coaches (1x internal; 1x external): development of and coordinating the program deployment
- Team coordinators (5x): liaison with mono-disciplinary teams; team related operational tasks

(c) Team training and coaching
Function: actual deployment, training and coaching
Composition and roles:
- 1x external coach: (medical) leadership coaching; coaching mono-disciplinary teams; coordinating measurements; assist in multi-disciplinary training sessions
- 1x internal program coach: multi-disciplinary training sessions
- 2 internal team trainers: assist in multi-disciplinary training sessions
- 4 team coaches: post-intervention role modelling on the work floor.

(d) External TS master trainer and coach (1 person)
Function: guidance, training and coaching at (a), (b) and (c) levels.

D - Description of intervention

D1 - Objectives, content, planning & participants

Interventions in three dimensions: (1) mono- and (2) multi-disciplinary teams, and (3) (medical) leadership.
Overall program objective: Applying interventions to institute a sustainable culture of continuous improvement, enhancing intradisciplinary team atmosphere, interdisciplinary collaboration, ultimately resulting in the optimal prevention of human factor caused (surgical team related) adverse (near) events.
Overall measurement of objective effectiveness (Kirkpatrick Level 4): the number of surgical thorax team related notifications of (near) adverse events.

Clear and well-communicated causal relation objectives-activities - also based on metrics for measuring progress and results
The overall objective is communicated throughout the program, and is translated into objectives and measurements at the 3-dimensional levels:

1. Mono-disciplinary teams

Objective (1): Improve team atmosphere and teamwork
Metrics (informal use): Teamwork Assessment Questionnaire (TAQ)

2. Multi-disciplinary team

Objectives (2x): (a) improve inter-disciplinary teamwork, (b) 100% compliance to sign-out and debriefing procedures
Metrics: Ad (a) online TeamSTEPPS Teamwork Attitude Questionnaire (T-TAQ) (Kirkpatrick Level 2); Ad (b) online survey (Kirkpatrick Level 4),

3. (Medical) leadership development

Objective (2x): (a) interprofessional collaboration competency development of physicians, (b) incentivize physician engagement.
Metrics: Qualitative and quantitative (online survey).

Content of the actual training/coaching activities
1. Mono-disciplinary teams: Team sessions tailored to the needs and demands of the discipline, including group discussions and team coaching on: (a) TAQ results, (b) team climate related issues, (c) inter-disciplinary collaboration issues, (d) introduction to medical leadership assessments (physician teams), (e) workshops on teamwork and communication skills (e.g., feedback; conflict resolution)
2. Multi-disciplinary team: Team training sessions on the implementation of (a) sign-out and debriefing procedures and related (b) teamwork skills, attitudes and knowledge
3. (Medical) leadership development: Individual 1-on-1 coaching with an external coach, including: (a) introduction and (b) debriefing of individual assessment (TEAM+; LSI) reports.

Detailed planning (and implementation guide)
1. Preparation Phase (months 1 – 9): Program organization, planning and content interventions; baseline measurements (TAQ); communication, sense-making and coalition forming; ‘priming’ sessions (mono-disciplinary teams); starting medical leadership development assessments and coaching
2. Training Phase (months 9 – 12): Multi-disciplinary team training session; ongoing leadership development assessment (ongoing throughout mid-2017)
3. Sustainability Phase (months 12 – 18): Evaluation; adaptations; refreshers’ and new-comers’ courses; re-measurement metrics.

Required resources (e.g., time; finances; materials; location)

- Leadership (360 degree) assessment tools: 'LSI' (Life Style Inventory™, HumanSynergistics©: license fee applies) and 'TEAM+' (Based on Team Effectiveness Assessment Module, developed by the American Board of Internal Medicine) (Chesluk, 2012)
- Multiple team sessions: locations and catering (on hospital premises)
- Kick off session: location (off hospital premises) and catering
- Fee external coach/trainer
- Kick-off: Closing all the elective COR programs (1/2 day) → all staff present, minus 1 acute COR team
- Multi-disciplinary training: Time compensation for and/or planning out from OR/clinical tasks of the entire thorax staff during subsequent multi-disciplinary team sessions (all staff: 2x team sessions (approx. 2 hours/session) (90x4 = 360 hours)
- Mono-disciplinary sessions:
    - All staff 1.5 hours dialogue session (90x2 hours = 180 hours)
    - Approx. 50% staff additional 2x 1-hour team sessions (45 x 2 = 90 hours)
- Medical leadership sessions: 36 x 1-on-1 coaching sessions = 36 hours
- Internal trainer: approx. 0.2 full time employment for 1 year.

D2 - Facilitation

Support to and from 'change agents'

- Periodic and ad hoc input to and coaching of executive level actors towards active promoting and endorsement of the program
- Deliberate identification and recruitment of 'champions' within the clinical teams
- Individual coaching support to champions, to support effective role modelling during working hours.

Resistance/fatigue-reducing activities

- Time compensation/planning out during the sessions
- Active communication of 100% response and participation expectancy ('we all participate') in measurements/assessments and in participation sessions
- Continuous management endorsement and role modelling
- Transparent communication of program development, planning and content throughout the program
- Active requests for participation of and feedback from all staff about the program development and content
- Confidentiality
- Sufficient catering facilities during team sessions.

Implementation related communication (e.g., progress, milestones)

- Kick-off session preparation
- Timely announcement and effective planning of team sessions
- Evaluation survey.

Ongoing and active leadership and management support

See: C2.

D3 - Sustainability

Activities on sustainment of intervention

- Formally embedding new procedures (sign-out and debriefing) in protocols + posters in CORs
- Implement team competencies empowering team members in speaking up for procedural compliance.

Securing change after training activities

- Refresher and newcomers' training
- Periodic metrics measurements in the mono- and multi-disciplinary teams.

E – Execution & delivery

E1 – Fidelity/adaptability

Possible deviations / adaptations

- Training sessions not within the initial timeframe due to summer holiday period
- Medical leadership development exceeded the initial planning due to initial reluctance to participate (final fidelity of >90% physicians).

Acceptance of activities

- Overall program and mono-disciplinary activities: initial resistance, in particular from mono-disciplinary teams directly involved in prior adverse event(s)
- Multi-disciplinary activities: as planned.
- Medical leadership development activities: as planned.
- Overall evaluation program: completed.
- Program organization: due to its novelty, the program encountered some inefficiencies due to, for example: lack of pre-set templates (e.g., medical leadership program); difficulty with forecasting impact/response combinations and planning various interventions; relative excess of surveys ('survey fatigue').

Location, fidelity, dose delivered and received, and 'reach'

Interventions:

- Mono-disciplinary:
    - 2 to 5 sessions/team
    - Location and duration: on premises, max. 1 hour
    - Staff participation: >90%
- Multi-disciplinary:
    - 1 kick-off event; 2 training sessions
    - Location and duration: kick off = 75 min., off premises; training: 1 hour, on premises;
    - Staff participation: kick-off: approx. 95% (with exception of acute team); training: session#1=85%; session#2=75%session
    - Participant composition of the groups during sessions 1 and 2 varied (not same individuals) because of planning challenges
    - All sessions demonstrated 100% adherence to the 'all-disciplines-present-rule'
- Medical leadership: several (2-4) individual coach-coachee sessions (max. 60 min.); 100% participation of active physicians;
- Internal TS trainer: 3 half-day train-the-trainer sessions with an external TS master trainer.

Response rate measurements:

- (3x) TAQ:
    - 2012: 71/89 = 79%
    - 2013: 54/89 = 61%
    - 2016: 84/92 = 91%.
- (3x) T-TAQ:
    - 2012: 68/89 = 76%
    - 2015: 71/91 = 78%
    - 2017: 72/89 = 81%
- Training evaluation:
    - Evaluation forms completed: 77/(2x89) = 44%.
- (1x) Evaluation (2013): 40/89 = 45%.

- Leadership 360-degree assessment of respondents' response rates:
    - LSI: ≥ 6/8 = 75%
    - TEAM+: ≥ 10/12 = 83%.

360-assesment participation:

- Medical 1:
    - LSI: 12/15 = 80%
    - TEAM+: 10/15 = 67%
    - Both: 7/15 = 47%
- Medical 2:
    - LSI: 11/13 = 85%
    - TEAM+: 13/13 = 100%
    - Both: 11/13 = 85%

E2 – Learning, training & transfer

<u>Training methods (e.g., simulation, didactic, video)</u>

- Kick-off session: subgroup teamwork exercise; presentations
- Mono-disciplinary: group dialogue; appreciative inquiry; (confrontational & team) coaching
- Multi-disciplinary: presentation; simulation and role play; sub-group discussion and work; homework assignment; story telling (with a focus on shared goals (patient-centered care)
- Medical leadership: individual coaching sessions using assessments
- Internal TS trainer: one-on-one 3 half day tutor sessions and tactical discussion on program development.

<u>Duration of training sessions</u>

See: E1.

E3 - Faculty

<u>Information about the trainer(s) (e.g., profession, number of trainers, hierarchy level)</u>

- 1x external coach:
    - Change management expert and certified leadership coach
    - Experienced TeamSTEPPS™ master trainer
    - Education: physician
- 2 internal team trainers:
    - Trainer 1:
        - Experienced simulation training expert
        - Education: RN
    - Trainer 2:
        - Education: RN
- 4 team coaches:
    - 2x paramedical staff
    - 2x physicians.

M – Mechanisms of impact

M1 - Evaluation & analysis

<u>Description of the process evaluation and its underlying **theoretical basis**</u>

Process evaluation was based on the description and/or measurement of the qualitative and quantitative components:

a. Quantitative: training outcomes measures (4 levels Kirkpatrick); recording of actual participation during the interventions; response rates to surveys and assessments.

b. Qualitative: experiences and feedback captured from progress reports and correspondence (organizing team), evaluation surveys (handed out and online), interviews, observations (of implementers)

ReCoMuTe Checklist was applied to structure the reporting and inventory (missing) components.

<u>Change management and/or organizational behavior related descriptions or narratives **reflecting what happened**</u>

Descriptions/narratives:

- Initial cynicism: “You are the 7th coach they have sent upon us” [response to external coach during initial mono-disciplinary team session]
- Over time, positive shift within all the teams: “Something has definitely changed here” [interviewee: non-medical]; “In our hospital, the popularity to work at this department has increased” [interviewee: manager]
- Sustainability:
    - o Daily routines can overwhelm sustainability: disputable embedment of sustainability interventions in the team’s/department’s quality management cycle.
    - o Programs’ stand-alone position in the overall organization: no structural embedding, spread across other teams/departments or foreseen alignments with other programs; this might result in secluded effects of the program.

<u>Evaluation of **impact mechanisms** during implementation</u>

Impact on coalition forming and trust:

- ‘Grapevine’ effect: relatively slow start or program; constant and transparent (verbal) communication
- Allow a build-up of trust: “The program is no quick fix: it's here to last and your opinion is needed for its development” [interviewee: medical]; “The program is an investment in all of us’ [interviewee – non-medical]
- Bottom-up actors: champions and team coaches/trainers embedded in teams
- Top down management endorsement and active management endorsement and participation
- Effective organization, e.g.: proactive and well-networked internal trainer/implementer
- Independent external change management expert/coach with a medical background
- Continuous emphasizing of confidentiality of sessions and measurements

Impact on inter-disciplinary tensions:

- Mono-disciplinary de-pressurizing and empowerment sessions
- ‘Physician inside’ engagement tactics, e.g., ‘all-disciplines-present-rule’ during sessions; physician role modelling (assessments)

Impact on intervention fatigue:

- Mitigate staff intervention-burden by adapting the clinical schedule
- Team training sessions are well-organized and -facilitated and short in duration, minimizing the impact on the clinical process

Impact on adherence to new processes:

- Training sessions well received
- New processes visualized with flow charts in all ORs.

<u>Evaluate mediating factors</u>

Expected mediators of change

[see above]

<u>Unexpected mediators of change</u>

1. Change in mono-disciplinary team coordinator → instability and discontinuity of team’s interventions
2. Organization wide implementation of the (mandatory) ‘Dedicated Teams’ project

3. Duration of medical leadership (ML) development: ML assessments were deployed at the onset of the program (beginning of 2012) and continued for about two years after the last scheduled training session (early '17). Possible influencing factors: physicians' motivation to engage in individual coaching and assessments; clinical work is prioritized; majority of physicians are unfamiliar with non-technical (leadership) competency development; confidentiality issues; reluctance to time and task commitments. Time intensity of completing the online assessments resulted in long lag times between inviting the respondents and actual reports' processing and debriefing.
4. Operational mediators:
   Underestimated program's life cycle due to:
   (a) unfamiliarity with the adapted TeamSTEPPS™ program among hospital staff
   (b) planning: delays due to difficulties in planning of (team) sessions (training sessions, planned for the end of the working day, had to be re-planned due to delayed COR sessions and hence the absence of participants)
   (c) summer break (at start Phase 2): no team sessions possible during (two) summer months (relative understaffing and incomplete teams)
   (d) long period of building trust and 'de-pressurization' among the members of specific mono-disciplinary teams

   <u>Consequences:</u>
   (a) mono-disciplinary 'priming' period (preceding the multi-disciplinary team training) → delay in starting the multi-disciplinary team sessions
   (b) time required from external coach → budget excess
   (c) Extended period of multi-disciplinary team training due to rescheduling → actual implementation of SO and DB postponed several months and was implemented with an 80% participation level at training session #1
5. High survey response rates (T-TAQ and TAQ response rates average = approx. 80%), possibly because of accommodating staff attitudes, created through optimal transparency and diligent communication (e.g., tone-of-voice; frequent reminders).
6. Unexpected external mediators:
   (a) Implementation of dedicated teams resulted in uncertainty about roles in certain disciplines
   (b) The program was preceded by the hospital wide introduction of the time-out procedure about a year earlier. The time-out is a procedure which is executed before the start of the surgery. During the time-out, the complete surgery team discusses the planned surgery and any possible changes with the use of a checklist. The introduction of this procedure possibly eased any resistance against the introduction of sign-out and debriefing protocols. The staff mentioned the introduction of the latter was a logical consequence of time out.
   (c) During program implementation, the so-called Faculty Hour was introduced (hospital wide): a weekly 1-hour mandatory meeting. Once every 6 weeks, multidisciplinary teams from different teams/departments meet to discuss patient safety and healthcare quality issues; in other weeks, the meetings are monodisciplinary. Due to the compulsory and top-down nature of the meetings, various staff members mentioned the Faculty Hour as ineffective and as a (due to redundancy) disturbance to the TS program.
7. Other (training) activities already in use by the hospital were training days for surgeons, residents and perioperative nurses where participants train on (new) techniques using a simulation (1 day, 10-15 times/year) and team-/department-wide multidisciplinary complication/incident meetings (2 hours, 3 times/month). These activities are mainly focused on technical skills hence there was probably no interference with the TeamSTEPPS intervention.

<u>Limitations of the implementation activities</u>

ML assessments:

- Operationally arduous
- Long process of ML assessments (2012-2017)
- High staff turnover in some mono-disciplinary teams

Lessons learned

1. Importance of committed and actively participating leadership members
2. Average program life cycle: 1.5 years
3. Substantial challenges in implementing and operationalizing individual physician's assessments
4. All-levels endorsement is important to facilitate collective decision making (e.g., needed in a dispute, based on a myriad of stakeholder perspectives)
5. Challenges in planning can be met with beforehand planning of team sessions at start of program.

Explanation of activities versus results/impact of activities

1. Mono-disciplinary team sessions: might have contributed to a decrease in intra-disciplinary tensions through (a) facilitated team discussions, (b) debriefing of TAQ scores
2. Multi-disciplinary team sessions: might have contributed to improved T-TAQ sub-scores and reported higher levels of 'speaking up' competencies and mutual staff and patient safety (DIN)
3. Leadership competency coaching: might have contributed to physicians' awareness of the importance of non-technical leadership skills and subsequent improved team leadership competencies when collaborating with other staff.

Description of control conditions and reasons for selection

No control conditions.

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CHAPTER 10

Physician Leadership in e-Health? A Literature Review

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Keywords

- E-health
- Virtual teamwork
- Interdisciplinary collaboration
- Medical leadership
- Implementation
- Human factor

Abbreviations

AHRQ, Agency for Healthcare Research and Quality
HIH, Institute for Healthcare Improvement
HIT, Health Information Technology
PeL, Physician e-Leadership
VT, Virtual Team.

ABSTRACT

To systematically review the literature on roles of physicians in virtual teams (VTs) delivering healthcare for effective 'physician e-leadership' (PeL) and implementation of e-health. The analyzed studies were retrieved with explicit keywords and criteria, including snowball sampling. They were synthesized with existing theoretical models on (1) VT research; (2) healthcare team competencies; and (3) medical leadership. Six domains for further PeL inquiry are delineated: (1) resources, (2) task processes, (3) socio-emotional processes, (4) leadership in VTs, (5) virtual physician-patient relationship and (6) change management. We show that to date PeL studies on socio-technical dynamics, and their consequences on e-health, are found underrepresented in the health literature; i.e. no single empirical, theoretic or conceptual study with a focus on PeL in virtual healthcare work was identified.
E-health practices could benefit from organization-behavioral type of research for discerning effective physicians' roles and inter-professional relations, as well as their (so far) seemingly modest but potent impact on e-health developments.

Whereas best practices in e-health care have already been identified, this paper shows that physicians' roles in e-health initiatives have not yet received any in-depth study. This raises questions such as: *Are physicians not yet sufficiently involved in e-health; if so, what (dis)advantages may this have for current e-health investments and how can they best become involved in (leading) e-health applications' design and implementation in the field?* If effective medical leadership is being deployed, e-health effectiveness may be enhanced; this new proposition needs urgent empirical scrutiny.

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INTRODUCTION

The relevance and potential of health information technology (HIT) in healthcare delivery is widely acknowledged and positive effects of e-health initiatives are reported over the last two decades (May et al., 2011; Institute of Medicine, 2012), HIT can significantly improve communication and sharing of information; hence improving effective collaboration between often geographically as well as disciplinary dispersed (silos of) healthcare professionals (Eikey et al., 2015; Dickson, 2009). Patients and their informal caregivers who increasingly participate as members of integrated care teams also benefit from the positive effects of HIT (Koch, 2013). Reports on virtually collaborating multidisciplinary teams describe the advantages of HIT as reduced time, effort and costs, while also providing patients and informal carers unique benefits (Rothschild and Lapidos, 2003; Emery et al., 2012). In the face of healthcare's increasing complexity, there is demand for effective HIT solutions, as well as for their sustainable implementation, to facilitate interdisciplinary team collaboration for better patient outcomes.

Like most innovations, implementing HIT entails a myriad of factors that can facilitate or block deployment; in the last decade, the enigmas of successful HIT adoption have been the object for many researchers (Mair et al., 2009). Health professionals often swiftly acknowledge the advantages of HIT but act more hesitantly during actual implementation when changes in their roles, responsibilities and routines must emerge. Habitually, unintended consequences can occur when HIT is not appropriately aligned with collaborative processes, resulting in underestimated impact on daily routines, often leading to ambiguity and undue stress (Melby and Hellesø, 2014; Ozbolt, 2012; Park, 2006). HIT research has mainly focused on technological aspects and sustainable integration within clinical workflow, but its effect on people and effective collaboration between healthcare professionals and others has received little attention (Eikey et al., 2015; Sittig and Singh, 2010). Not until recently have researchers shifted from a mere technological and organizational orientation towards attention to socio-technical and human-factor dynamics, and in particular to a focus on how effective day-to-day work processes and collaboration between people and in teams is affected by HIT (Callen et al., 2008; Mair et al., 2012). Clearly, research on how health professionals' roles may change (including the required specific skills for effective virtual teamwork in healthcare) is still in its infancy (Park, 2006).

Since numerous e-health initiatives have underperformed or failed, more scientific insights into factors that facilitate or inhibit user engagement and participation could be beneficial (Mair et al., 2012). It is in this light that the relevance of medical leadership competencies may emerge, especially relating to change management, healthcare system innovation and HIT use. There is increasing evidence on the importance of leadership, and in particular physician leadership, on healthcare quality and innovation (West et al., 2015; Ingebrigtsen, et al, 2014). Moreover, currently all major leadership competency frameworks in Europe and North America foresee or reflect a role for physicians in HIT and its implementation (Dickson, 2009; FMLM, 2015; Keijser et al., 2015). Fundamentally, transformation in healthcare entails imperative changes in group norms and behavior (Johnson and May, 2015). Based on recent experiences and current literature, one would assume that physicians play crucial roles in successful HIT facilitated healthcare transformation. Our aim was to examine the extent to which knowledge on leadership related to VT-work had permeated into the field of healthcare, and in particular related to physicians. Therefore, the current review study addresses the question: *What kinds of leadership roles do physicians play in VTs in healthcare settings?* Before we consider leadership issues in this paper, we include in this review the virtual team context in which more and more physicians operate. Before we synthesize the content of what we know thus far, we delineate the way in which the 44 included papers that we review were being targeted.

METHODS

The aim of this systematic review was to provide an overview of recent literature on physician leadership related to VT-work in healthcare, by identifying and synthesizing currently available studies in this particular area. The method of this systematic review follows the grounded theory literature review approach of Wolfswinkel, Furtmueller and Wilderom (2013), building on what these authors describe as the iterative stages of systematic reviewing: define, search, select, analyze and synthesize.

Define. The first review step involved carving out the review's scope before the actual search was performed; based on iterative discussions between the authors, it was revisited and reformulated during the search for studies. Defining includes identifying relevant databases, determining appropriate outlets, and deciding on specific search terms and queries per selected database. Based on initial exploratory searches, PubMed, Scopus, Web of Science, PsycINFO and ScienceDirect were selected as electronic databases. Choice of specific search terms was based on main constructs within the research question (i.e. physician e-leadership, telemedicine, e-health implementation, VT-work and interdisciplinary collaboration) as well as on an examination of a sample of articles (n = 20) fitting very well the research area of interest. Synonyms for these terms were extracted from other published work, until saturation was reached.

Search. Comprehensive electronic searches were conducted between September and October 2015 and were repeated in March 2016 to include latest publications. Database limitations were set to articles published between 1995 and 2016, and to papers in the English language. As part of an extended search strategy, reference lists of eligible records were screened for additional literature, based on: forward citation screening, backward citation screening and hand searching. Lastly, the authors hand-searched the Internet for additional records, such as databases of Institute for Healthcare Improvement (IHI) and Agency for Healthcare Research and Quality (AHRQ). All references found were exported to Endnote software version X7.4, including information about title, authors, outlet, key words and abstract; duplicate results were removed.

Select. Titles, abstracts and keywords of all records identified by the search were independently double screened by two authors (LP and JS) to ensure consistency and agreement. Eligible studies had to refer to: (1) healthcare setting, (2) virtual collaboration between actors (including, but not limited to, physicians, allied healthcare professionals, informal carers, and patients), and (3) aspects of leadership (e.g. characteristics or attributes). Papers were excluded if reflecting: (medical) leadership but not generalizable to a physician's workplace; virtual leadership in non-healthcare settings; education, (virtual) simulation or training curriculums; solely patient-patient interaction (not including any healthcare professional).

During the abstract-screening process, an average inter-rater reliability of 98.1% (Kappa = .88) was established, which can be considered as good agreement between the two reviewers (Landis and Koch, 1977). Any variation between the reviewers was resolved through discussion and a third reviewer (WK). Full texts were retrieved for articles deemed eligible for further analysis. Retrieval rate was augmented by requesting articles from original authors, only when a text could not be immediately retrieved electronically. In addition, the help of a librarian was sought to obtain the few remaining missing records.

Analyze. Retrieved full-text articles were divided equally between three reviewers (LP, JS and WK), who successively analyzed their assigned papers independently, using the process of open coding, meaning that each finding, insight or concept deemed relevant to the scope of the review and research question was marked.

Synthesize. One author (WK) synthesized the data into higher-order themes and categories, using a combination of axial coding (i.e. further developing categories and sub-categories) and selective coding processes (i.e. integration and refinement of concepts and themes) (see, Wolfswinkel et al., 2013). Additionally, WK consulted original articles in case more contextual information was needed to interpret the extracted data.

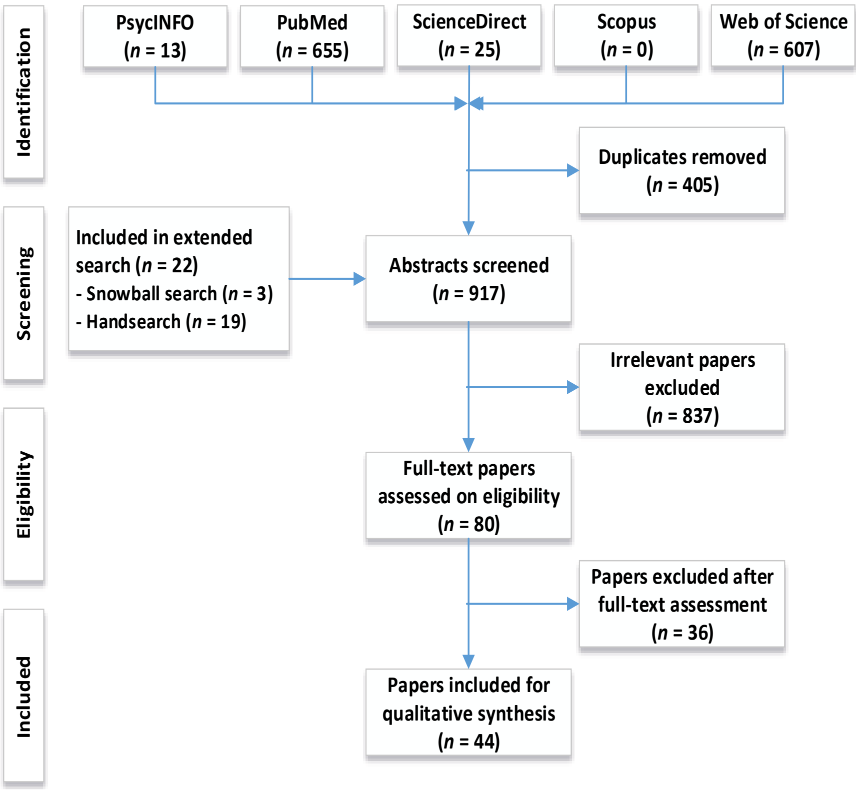
Following Sadoughi et al. (2013), no assessment was made of the quality of the selected articles; given that the data analysis was done on words and phrases, valuable insights from methodologically 'weaker' but conceptually sound articles would otherwise have been lost.

RESULTS

Based on titles and abstracts, the initial search resulted in 917 records; full-text assessment of their eligibility came to 80 publications, out of which 44 papers were included for data analysis (Figure 1).

The final search results yielded a wide range of text types (e.g. empirical studies, literature reviews, case studies, conference reports, dissertations, book chapters). Included papers reflected VT-work in a variety of healthcare settings, including: integrated healthcare (e.g. chronic disease management; home telecare programs; multidisciplinary team consultations; virtual integrated practice), thematic collaborations (e.g. healthcare quality improvement initiatives; communities or practice); and patient centered online programs.

Figure 1. Flow diagram of systematic review steps



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All abstracted data from included (initial, snowball and hand searched) records were thematically synthesized, resulting in six themes described below. The thematic synthesis was based on three themes proposed earlier by Powell et al. (2004): Theme 1: Resources, Theme 2: Task processes and Theme 3: Socio-emotional processes. All included papers were also screened for any specific leadership content (Theme 4: Leadership in VTs). Additionally, to these four themes, two new themes emerged: Theme 5: Physician-patient relationship, and Theme 6: Change management.

Table 1. Themes 1, 2 and 3: Characteristics of VTs in healthcare (based on Powell, 2004)

Subthemes	Items	Papers
Theme 1: Resources		
Design, Technical Expertise & Training	Standards and guidelines on e.g. processes, quality, problem solving	(Cowan, 2014) (Kvamme *et al.*, 2001) (Rothschild and Lapidos, 2003) (Rothschild *et al.*, 2004)
	Training targeting necessary skills, based on real-world conditions	(Bhandari *et al.*, 2011) (Butler *et al.*, 2014) (Cook and Whitten, 2002) (Jarvis-Selinger *et al.*, 2008) (Prahl *et al.*, 2015) (Kildea *et al.*, 2006) (Saliba *et al.*, 2012)
	Strategies and creative adaptations for team and resources constraints	(Butler *et al.*, 2014)
Theme 2: Task Processes		
Communication, Coordination & 'Task-tech-fit'	Standardized pre-selection of communication modality	(Rothschild *et al.*, 2004)
	Clear roles and responsibilities	(Kvamme *et al.*, 2001) (Rothschild and Lapidos, 2003)
	Skills, norms and regulations	(Bartz, 2014) (Fielding *et al.*, 2005) (Kane and Luz, 2006)
	Communication device specific skills	(Bartz, 2014) (Lankshear *et al.*, 2010) (Ozbolt, 2012)
	Effective information exchange	(Cowan, 2014)
	Synchronization of work routines and rhythm	(Bartz, 2014) (Kane and Luz, 2006) (Jarvis-Selinger *et al.*, 2008)
	Preparing, chairing and attending teleconferences	(Jarvis-Selinger *et al.*, 2008) (Kerfoot, 2010) (Kane and Luz, 2006) (Bartz, 2014) (Probst and Borzillo, 2008) (Barnett *et al.*, 2012)
Theme 3: Socio-Emotional Processes		
Relationship Building, Cohesion & Trust	Relationship between members	(Cowan, 2014) (Minnick *et al.*, 2008) (Holland *et al.*, 2009)
	Investing in team trust	(Bhandari *et al.*, 2011) (Rothschild and Lapidos, 2003) (Kvamme *et al.*, 2001) (Kane and Luz, 2006) (Bartz, 2014) (Chopard *et al.*, 2012)

Theme 1: Resources

In the studied papers, several authors report that clearly outlined roles and responsibilities and the use of standardized work processes and (quality) procedures are essential 'resources' for VTs in healthcare (Table 1). These pre-set resources are vital for a shared mental model, facilitating day-to-day team operations, effective information sharing and team dynamics. Additionally, internal and external resources are fundamental for team members' embracing of each other's roles and responsibilities and consequential needs related to tasks and actions, including effective task delegation (Rothschild and Lapidos, 2003).

Moreover, several papers depict training as an important resource for team members. Adequate training is preferably organized during early phases of team development, should be based on real-life situations and address technical tasks (e.g. efficient e-mail use). Also, training should be organized jointly for all members of an interdisciplinary VT (e.g. physicians, allied healthcare and social care professionals) (Prahl *et al.*, 2015).

Theme 2: Task processes

Technology used for communication and information sharing should be well fitted to the task, and clear procedures must be set and upheld about the conditions under which team members communicate synchronously or asynchronously ("planned communication") (Rothschild *et al.*, 2004). Additionally, all team members must know of and adhere to clear team norms, roles and responsibilities, and consensus on task divisions and job sharing in VTs helps to establish the balance between (shared) tasks and team goals (Kvamme *et al.*, 2001).

Several authors stress efficient technical communication skills for VT-work in healthcare, including use of phone, text messaging, e-mail and teleconferencing (Lankshear *et al.*, 2010; Bartz, 2014; Ozbolt, 2012; Prahl *et al.*, 2015). Authors describe the technology-related aspects of virtual teamwork in healthcare that contribute to a variety of dissimilarities with conventional teamwork in healthcare. In daily practice, mainly temporal and coordinative types of concerns seem to challenge effective VT-work. Both asynchronous and synchronous virtual communication and information sharing require: timely response on electronic enquiries (Ozbolt, 2012); effective use of information exchange methods (Cowan, 2014); effective VT meeting skills and attitudes, as well as adherence to norms and regulations for virtual meetings (e.g. turns to talk; silences; adherence to starting time) (Kane and Luz, 2006; Bartz, 2014; Fielding *et al.*, 2005). For instance, basic HIT solutions, such as e-mail, facilitate low-cost and easily accessible, asynchronous communication (Prahl *et al.*, 2015). Nevertheless, e-mail can generate friction between sender and receiver, in case of unmet expectations relating to response times. Likewise, increasingly used teleconferencing applications hold many advantages for multidisciplinary collaborating over geographical distances. Being a synchronous communication method, work rhythms across all participating entities must be synchronized to the designated time of such a virtual session. Teleconferencing also presents practical challenges inhibiting multidisciplinary care provision, e.g. planning of synchronous presence of participants (Kane and Luz, 2006; Jarvis-Selinger *et al.*, 2008). Moreover, experience has shown that lack of pre-meeting preparations often detracts significantly from teleconferencing efficiency (Kerfoot, 2010). For effectiveness of multidisciplinary teleconferencing, authors emphasize the importance of optimal preparation (Jarvis-Selinger *et al.*, 2008; Kerfoot, 2010; Kane and Luz, 2006; Bartz, 2014), efficient chairing (Probst and Borzillo, 2008; Barnett *et al.*, 2012), and synchronization of work routines and rhythms (Bartz, 2014; Jarvis-Selinger *et al.*, 2008; Kane and Luz, 2006).

Theme 3: Socio-emotional processes

Working relationships in VTs are disposed to be weaker than those in conventional teams, because of the lack of non-verbal clues and (informal) contact frequencies that can foster relation building. Lack of close interpersonal contact potentially destabilizes the team through misunderstandings in communication between team members, consequently causing problems in task performance and confusion between and isolation of team members (Cowan, 2014). Some authors suggest regular face-to-face encounters between VT members to sustain optimal relationship. Alternatively, 'socializing moments' during virtual interactions, whether ad hoc or more structured, often initiated and facilitated by team leaders, can support development and maintenance of team trust (Rothschild and Lapidos, 2003).

Theme 4: Physician VT Leadership

None of the set of papers described specific (leadership) roles of physicians in VTs. Several authors do list characteristics and required attributes (i.e. knowledge, skills and attributes) of persons leading VTs (Kerfoot, 2010; Lankshear *et al.*, 2010; Park, 2006), but none specify roles or responsibilities of physicians. Leaders of VTs are seen to be responsible for establishing and maintaining communication and team norms; they must be able to virtually establish their "presence" for team members, so that the latter can perceive a sense of leadership (Cowan, 2014).

Some authors reflect on leadership during the implementation of HIT and identified effective leadership as knowledgeable about the HIT potential as well as capable of enthusiastically communicating a vision on e-health, as an aid to healthcare transformation (Cook and Whitten, 2002; Ingebrigtsen, *et al*, 2014). From the studies, five physician VT leadership roles emerged (table 2).

Table 2. Theme 4: Physician VT leadership roles

Subthemes	Items	Papers
Knowledge	Human resource management, service delivery processes, team culture development and coaching	(Park, 2006) (Kerfoot, 2010) (Cowan, 2014) (Lankshear *et al.*, 2010)
Skills	(Virtual) communication, technology use, conflict management, providing constructive feedback, team spirit, planning, risk and time management	(Park, 2006) (Kerfoot, 2010) (Cowan, 2014) (Lankshear *et al.*, 2010)
Attributes	Adaptable, flexible, enthusiastic, emotional intelligence, sense of humor, follow-up/follow-through, honestly, engaged, consistent, courageous	(Park, 2006) (Kerfoot, 2010) (Cowan, 2014) (Lankshear *et al.*, 2010)
Virtual presence	Realize perceived-leadership presence in team	(Cowan, 2014)
Transformation	Knowledgeable of and enthusiastic about the transformative potential of e-health	(Cook and Whitten, 2002) (Ingebrigtsen, *et al.*, 2014)

Theme 5: Virtual physician-patient relationship

Increasingly, HIT applications are also used by patients and informal carers to communicate with each other, as well as with their physicians and other care professionals. Modern integrated care teams often comprise active roles for informal care and self-care, making patients and their families and carers participants in the grander multidisciplinary healthcare team and in shared decision-making (Catan *et al.*, 2015; Ozbolt, 2012; Rothschild and Lapidos, 2003). Our study found several reports describing four subthemes relating to this new domain of patient centered healthcare, as it also exposes new issues and concerns for physicians (Table 3).

Information sharing. Although online healthcare-related information potentially empowers patients, e.g. in shared decision-making, it can also lead to information overload (Catan *et al.*, 2015). Shared access to individual, patient-related information (e.g. personal electronic health records) could cause uncertainties for patients according to some clinicians, due to the possible absence of adequate interpretation (Ancker *et al.*, 2014; de Lusignan *et al.*, 2014; Ozbolt, 2012).

Effective planning and coordination. Patients who are actively involved in virtual communication and planning are at risk of encountering unexpected delays (e.g. tardy e-mail response from their physician) leading to much frustration (Beard *et al.*, 2012). Mishaps in online planned or scheduled (clinical) activities could also frustrate patients' expectations of their care team's performance, as patients are often unaware of the many events and uncertainties that may cause delays or deviations to plans (Caligtan *et al.*, 2012).

Choice of modality. Well balanced 'task-tech-fit' seems to apply also in the patient-physician relationship. From the perspective of a patient's feelings and comfort, face-to-face meetings remain fundamental to patient-physician relationship, but also because of medical procedures and quality (e.g. physical exam) (Catan *et al.*, 2015; Dedding *et al.*, 2011). It is argued that physicians must be able to judge for each patient and situation the appropriateness of the use of virtual communication (Ozbolt, 2012).

Quality and risks. Bearing the final responsibility, physicians must also ensure healthcare quality in both virtual and face-to-face consultation with patients. It is suggested that they must also become well trained in HIT related limitations, such as confidentiality, and be knowledgeable about the great variety of relevant regulations (Chopard *et al.*, 2012; Jarvis-Selinger *et al.*, 2008; Saliba *et al.*, 2012).

Table 3. Theme 5: Virtual physician-patient relationship

Subthemes	Items	Papers
Information sharing	Effects and adequateness of lay public online healthcare information	(Catan *et al.*, 2015) (Townsend *et al.*, 2013) (Dedding *et al.*, 2011)
	Adequate level of information sharing	(De Lusignan *et al.*, 2014) (Ancker *et al.*, 2014) (Ozbolt, 2012)
Effective planning and coordination	Adherence to standardized response times	(Beard *et al.*, 2012)
	Response back-up protocols	(Caligtan *et al.*, 2012)
Choice of modality	Patient- and situation 'task-tech-fit'	(Catan *et al.*, 2015) (Dedding *et al.*, 2011) (Ozbolt, 2012)
Quality and risks	HIT limitations	(Jarvis-Selinger *et al.*, 2008) (Saliba *et al.*, 2012) (Chopard *et al.*, 2012)

Theme 6: Change management

Papers studied reveal a significant relation between successful HIT implementation and the role of physicians, in particular within the domain of change management. Furthermore, many authors reflect the unambiguous tension between innovations and physicians, and physicians are frequently being seen as either facilitator or impediment to implementation efforts. Experiences are reported of physicians who: are slow to accept changes; are not used to HIT; have unrealistic or suboptimal expectation of HIT; criticize HIT quality (Catan *et al.*, 2015; Kvamme *et al.*, 2001; Mair *et al.*, 2009; Emery *et al.*, 2011). Furthermore, HIT leadership on different organizational levels seems to be associated with successful implementation outcomes, throughout different implementation phases (Ingebrigtsen, *et al.*, 2014). Implementation topics in relation to PeL resulted in the four subthemes (table 4).

Table 4. Theme 6: Change management

Subthemes	Items	Papers
Physician champion	Encouraging others in HIT use	(Kvamme *et al.*, 2001) (Greenhalgh *et al.*, 2010) (Rufo, 2012) (Mair *et al.*, 2012)
	Facilitating complex clinical pathways redesign	(Nasir *et al.*, 2013) (Horton, 2008) (Rufo, 2012)
Implementation training	Skilled in implementation related leadership	(Cook and Whitten, 2002)
	Knowledgeable about change management strategies	(Rufo, 2012)
Optimal support	Executive sponsorship	(Catan *et al.*, 2015)
	Dedicated and protected time	(Butler *et al.*, 2014) (Cranley *et al.*, 2011) (Rogers *et al.*, 2014) (Emery *et al.*, 2012) (Barnett *et al.*, 2014) (Boushon *et al.*, 2006) (Calciolari, 2011)
End-user-based design	Involvement in design, implementation and evaluation	(Butler *et al.*, 2014) (Bhandari *et al.*, 2011) (Rufo, 2012)

DISCUSSION

To the best of our knowledge, this paper is the first that systematically reviews the literature on the role of physician leadership in virtual collaboration in healthcare contexts; we did so with the aid of a systematic review method.

Most prominent in this study is the lack of insightful academic writing on physician e-leadership. To date, no single empirical, theoretic or conceptual study with a focus on physicians in VT-work was identified. Even though the literature reveals meaningful similarities and differences between conventional and virtual teamwork in healthcare, little serious attention is paid so far to the entirely different roles physicians are likely to play within the various, rapidly emerging digitalized team contexts.

Our study reveals many similarities of healthcare VTs and characteristics depicted in the literature on general virtual teamwork as described earlier by Powell *et al.* (2004) and several other authors. All three themes, fundamental to virtual teamwork in general, were substantially represented in the literature scrutinized in the current study. The authors therefore argue that from a research perspective (Powell *et al.*, 2004), VTs in healthcare are similar compared with VTs outside the healthcare domain. However, building further on the primary question of this study, *What kinds of leadership roles do physicians play in VTs in healthcare settings?* our synthesis of data reveals three new themes.

'Physician VT Leadership' (theme# 4 in the above) describes a series of knowledge, skills and attitudes necessary for persons leading VTs in healthcare. Nonetheless, without exception, the described leaders in healthcare VTs had primarily nursing backgrounds. Although most physicians do not have coordinating HIT tasks, like nurse-managers (Cowan, 2014), one may assume that some (similar and different) leadership tasks identified herein are generalizable to physicians in their roles as VT members. In some VT settings, it might even be beneficial for those who take on the leadership role to have had medical training.

A fifth, new, theme 'Virtual physician-patient relationship' emerged based on several authors reporting on the effects of HIT on physician-patient relationship. Not only are some physicians less information technology savvy than their patients, many show a reluctance to share information or use electronic messaging because of the risks such as inadequate interpretation (Ancker *et al.*, 2014; de Lusignan *et al.*, 2014; Ozbolt, 2012). Besides the beneficial role of online healthcare-related information to patients (e.g. in shared decision-making), some authors describe concerns about the extra time needed to explain Internet information that patients looked up, shared decision making procedures or other HIT related impacts on their traditional levels and mechanisms of power and authority (Catan *et al.*, 2015; Mold *et al.*, 2015; Townsend *et al.*, 2013; Walker *et al.*, 2009; Dedding *et al.*, 2011; Kurki *et al.*, 2011). In contrast to probably all VTs in general, the uniqueness of the physician-patient relationship brings about several specific subthemes that have to be taken into account in healthcare VT. Some papers describe a change in liabilities and responsibilities of physicians using HIT in their patient encounters. For example, for each patient and situation, physicians should be able to judge the appropriateness of the use of HIT ('task-tech-fit') (Catan *et al.*, 2015; Ozbolt, 2012; Dedding *et al.*, 2011). These new issues and concerns for physicians and their organizations call for consideration when (contemplating) using HIT for communication or information sharing with patients.

We identified a sixth theme, 'Change management', presenting several new competencies and skills as well as prerequisites applicable to physician's leadership role in HIT development, implementation and sustainment. Studies describe 'champion' physicians leading HIT implementation, and promoting its use to colleagues (Kvamme *et al.*, 2001; Rufo, 2012; Greenhalgh *et al.*, 2010; Mair *et al.*, 2012). Physicians sometimes experience deficient organizational support and 'top-down' executive leadership. Furthermore, distrust or (cultural) conflict between physicians and their healthcare organizations can hinder HIT adoption (Catan *et al.*, 2015). Organizations must invest in dedicated and protected time for clinicians to engage in and move forward with practice improvement work, also to prevent staff burnout and 'innovation fatigue' (Butler *et al.*, 2014; Cranley *et al.*, 2011; Rogers *et al.*, 2014; Boushon *et al.*, 2006; Calciolari, 2011; Emery *et al.*, 2012; Barnett *et al.*, 2014). Active analysis by and input from front-line professionals, such as physicians, is highly needed. Their expertise is deemed essential for optimal design and evaluation of HIT, and not least its implementation strategies (Bhandari *et al.*, 2011; Butler *et al.*, 2014; Rufo, 2012).

Practical implications

The deeply inborn physicians' motto '*primum no nocere*' ('first, do no harm'), cultured all along medical training and practice, is the foundation for safe healing, but can also prompt physicians' defensive attitudes towards the impact of HIT in their entrusted relationship with patients. Bearing an end-responsibility for their patient's wellbeing, physicians must be able to ensure healthcare quality in both virtual and traditional teamwork with colleagues and other disciplines, as well as in face-to-face and virtual interactions with patients. Regarding the swift pace of HIT developments, the current generation of physicians might be inadequately prepared for a leadership role in VT-work, using HIT in virtual patient interactions, and for managing the changes that HIT implementation requires.

Our study suggests a triple aim in educating and training the current physician workforce:

1. VTs in healthcare resemble 'networked teams', in which membership is frequently diffuse and fluid (Kaboli *et al.*, 2006). Because patients' status can change at any moment, healthcare teams often work like adaptive networked systems. This type of collaboration requires leadership skills that support a constant possibility of shifts in complexity of tasks and collaboration (Bohmer, 2012; Sittig and Singh, 2010). It may well be that the relative centrality of the physicians in traditional healthcare settings may go overboard in the increasingly virtual-team settings. Hence, the degree to which or how physicians are effective in shifting to different *modus operandi*, along with the increasing digitalization of their work-team settings, must be a topic for new research and practical experimentation.
2. Physicians must be trained in HIT usage and be facilitated in adequately responding to the potential disruptive effect of HIT on daily clinical work. Moreover, their training should comprise effective handling of HIT related limitations, such as confidentiality, and being knowledgeable about the great variety of relevant regulations, policies and procedures, e.g. related provider agencies and health insurance plans, that could conflict with HIT use (Chopard *et al.*, 2012; Gantert and McWilliam, 2004; Jarvis-Selinger *et al.*, 2008; Saliba *et al.*, 2012).
3. Historically, having acquired a leadership role, with adequate competencies, physicians should be able to provide guidance to others on how HIT systems should best be designed and deployed. In such a coaching role ("broker" or "boundary spanner"), physicians are potential champions and facilitators in HIT implementation (Page, 2003). These developments often necessitate delicate trade-offs at individual (micro-), team (meso-) as well as at organizational (macro-) levels (Kuziemsky, 2015). If empowered with the necessary understanding of change management theories and in influencing socio-technological dynamics (Rufo, 2012), physicians can bridge a multiplicity of interests within and between disciplines, facilitating the demanding dynamics related to process redesign and transformation of roles and responsibilities during HIT implementation.

Future research

Research on socio-technical aspects in HIT, including the effective roles that physicians may play, is clearly in its infancy (Saliba *et al.*, 2012; Mair *et al.*, 2012; Ozbolt, 2012). There is a need for systematic study of physicians' experiences, their (possibly shifting) roles and responsibility, as well as of the dynamics of the various types of VT-work in healthcare. Much needed, in our view, are studies aiming to chart the potential constraints and facilitators of involving and educating physicians in HIT design and implementation, so that we come to better understand: HIT user experiences; potential harm to patients; impact on workflow, roles and responsibilities; best practices in change management; and content and conditions of effective training in HIT use (Bartz, 2014; Guise *et al.*, 2014; Hsiung, 2000; Weppner *et al.*, 2010; Mair *et al.*, 2009).

Based on current insights gained from reviewing the intra-team dynamics of virtual healthcare work, we foresee a new term: 'physician e-leadership' (PeL), depicting the physician's roles as formal team member, balancing medical content leadership and process-type-of-followership. Such dual practices and research will need to be translated to contemporary training and (continuing medical) education. This is also imperative in order to prevent unnecessary "expensive administrative, commercially driven and government-led implementation disasters" (Hannan and Celia, 2013: 1160).

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Reflections, Summary & Final Model

The preceding ten chapters addressed ML's nascence, meanings, positioning, value, and utilization. Collectively providing a wide array of possible contributions of ML on how healthcare is transforming, as well as offering tangible approaches and tools, this thesis answers its main question: *(How) can ML contribute to healthcare transformation?* In what follows next, I reflect on the results of this interdisciplinary thesis, in an attempt to consolidate the main points and to add concluding considerations and suggestions. I also present a novel conceptual model (already presented at the Academy of Management Annual Conference, August 2019) in which the medical professional is -in essence- stretching one's professional identity: to include shared leadership behavior in the context of the healthcare system, in future-proof, patient benefitting manners, and in tandem with other professions which are all undergoing the turbulence of (transformative) change.

Complementing or competing theories?

If one studies a single phenomenon (with a lot of promise) through the lenses of distinctly different academic schools, one needs to take into account the differences between various invoked paradigms. Here, language can impart confusions. Several of my thesis' chapters are building on academic concepts which are highly valuable in better understanding as well as traversing grand social change in healthcare. By 'zooming out' from the pluriform dynamics and daily realities of healthcare's frontlines, these non-biomedical typed theories are exceptionally helpful in describing the complex processes of re-institutionalization that encompass the current changes or transformation. At the same time, however, these often highly abstract concepts, especially those deriving from institutional theory, risk an under-nuancing of mundane life itself. After all, there is a multitude of aspects (change-)relevant to everyday professional education and work. Hence, some of the chapters in this thesis, and especially those that view the phenomenon of ML as a type of 're-professionalization' of the medical profession, needs real-life or behavioral nuancing.

Attempting to understand the institutional theory derived term 're-professionalization' in more concrete terms, requires inviting various equally distinguished scholarly domains, including organizational behavior, (medical) education and learning, (medical) leadership and teamwork (training), change management, etc. In these domains one finds much complementary richness for diligently studying concrete approaches medical professionals can take in navigating societal, systemic, technological and other significant forces leading to stretching the scope of the (aspiring) medical professional into adding (medical) leadership in one's identity (Keijser & Wilderom, 2019). Hence, if we 'translate' the institutional theory's key term, re-professionalization, to the various careers of physicians, and bridge the myriad of present-day demands on physicians, ML can empower medical professionals to offer effective leadership: not exactly like the village doctor of the past, but as the smart and agile professional who is proficient in contributing to the co-constructive healing and preventive services in ways that are beneficial for all concerned (Pratt et al., 2006). Incorporating the concept of ML in the medical profession requires a diligent, and at times fragile process which is predominantly characterized by gradual professional identity change, while mundane work and life proceeds uninterruptedly.

This thesis attempted to examine ML both in an institutional theory informed manner as well as using a collection of more close-to-home scholarly avenues that are more recognized in the medical professional domain. Both (in essence, sociological and psychological) perspectives relevantly add to what we need to understand to further healthcare and its professionalism. A model that harbors all of these perspectives, and possibly aids thinkers (and doers!) of healthcare transformation from the perspective of the professions will be presented shortly. Before I explain that model, I discuss what I think are main points of the work done; given the dynamic nature of the phenomenon of this thesis' study, necessarily, they include ideas for *'what's next'*.

Meaning of medical leadership

My first research question, <u>*What exactly is the meaning of ML?*</u>, was addressed in **Chapter 1**. A review of the international literature on ML, and the use of theories on structuration and institutional change, for interviews with national experts on ML in six Western countries revealed three ML dimensions: 'interconnectedness'; 'openness and reciprocity'; and 'adaptively organizing for inclusive change'. These three reflect a consolidation of physicians' work foci brought on through ML. In **Chapter 2,** this outcome is corroborated by an entirely different, design-type study carried out at the national level (the Netherlands). Comparing several national ML competency frameworks (**Chapter 5**, Figure 2) also indicate that the medical profession in various Western nations is defining its leadership competencies in similar ways. Based on these findings, I argue that this current meaning of ML fosters an altering medical professional identity; it is incorporating skills that promote collaboration and continuous, inclusive and diversity-proof change. Interestingly, for many years now these skills are being flagged as crucial for safe and high-quality healthcare delivery. However, this thesis clarifies how ML goes beyond the promotion of teamwork and evidence-based change-management insights. The phenomenon of ML invites the individual physician into a (life-long) process of continuous self-reflection and -awareness on non-clinical, mostly behavioral, aspects of the work, which are essential to effectively engaging in human collaboration. Hence, it is the concept of professional identity (see, e.g., **Chapter 6**), which importantly marshals how professionals feel, think and behave, that can be useful in explaining how ML is likely to evolve in physicians' professional life.

Transient fad or here-to-stay?

Regarding the second research question, <u>*Is ML here to stay?*</u>, this thesis is indecisive, although I suggest that ML has a here-to-stay character. ML reflects the medical profession's search for her new 'fit' into our swiftly changing society and healthcare systems. Its spiking popularity and the numerous ML training offerings for physicians, as well as educators' current attempts to formalize ML training, indicate an initial embedment of ML in medicine's educational and clinical routines (i.e., becoming 'institutionalized'). ML's (new) non-clinical behaviors and competencies provide physicians with a relatively safe and distinctive transformative 'cloak' that radiates substantial professionalism on non-clinical topics.

Contrastingly, however, some physicians still seem ill at ease with this new professional 'apparel', since it also embodies their professional agency as a response to re-establishment and re-construction of interprofessional relationships. Especially members of the residing medical generation are likely to experience uneasiness in such institutionalization forces, not allowing new behavioral aspects into their professional identities. No wonder, a majority of published papers on ML focus on the younger generation of physicians (e.g., residents) or on physicians in executive positions; much fewer publications focus on the current generation of established physicians. Nonetheless, the findings imply that ML is likely to be developed further towards a robust sub-curriculum for physicians' life-long learning at *all* career stages (see, for example, **Chapter 5** and **6**).

One of the reasons why I think ML is here to stay, perhaps not as a term, but as a skill set that is likely to be imprinted onto all health professions, is that there are similar 'shared leadership' processes (for example in the nursing profession) being studied; some possibly having an even longer history than ML (Aspinall et al., 2019). The distinctions in leadership types and enactments between the various healthcare professions, cannot but evolve further over time. Meanwhile, physicians' highly responsible individual patient-related roles and tasks, which are reflected in their long training and education, will need to contribute as well to the forms and norms of future healthcare professionals' leadership. Looking at this larger playing field, urges attention for new questions, such as: *Is some sort of new generic professional (leadership) identity related to all healthcare professionals emerging at the horizon?* In **Chapter 6** of the thesis a set of concrete tools that facilitate the co-creation of contextualized shared leadership, relevant to all professionals, is offered. It is, of course, not only the health professionals themselves who are deemed responsible for shaping the newer, leadership parts of their work identities (and the accompanying competencies that fit the changing healthcare's needs and demands). Those managing and governing healthcare organizations must also effectively enable professionals to co-create the most effective new ways of network-based healthcare delivery (**Chapters 3**). Similar considerations can be found in the results of the literature study on national-level ML development activities (**Chapter 8**) as well as in the implementation of modern time integrated care, as explained in the **Appendix**.

Medical leadership in practice
Addressing the third thesis' research question, *How can we use ML best?*, three considerations must be added in regard to the practice of effective ML education and training. First, not all (aspiring) physicians are perceivably capable, willing or suitably situated to invest sufficiently in ML training (**Chapter 5**). Moreover, current ML does *not yet* distinguish between individual physicians. For instance, to date, there is still very limited evidence of highly sophisticated ML development practices that are tailoring their program to the individual physician, in any of the countries that were studied or in any of the consulted publications. Secondly, there is a scarcity in knowledge about the distinctions relating ML development in specific medical specialty settings. These observations call for more attention to forms of ML 'stratification': identifying and organizing most adequate ML development activities that align best with personal or work specific requirements. More research can fuel our understanding of effectively deploying ML competencies in widely varying clinical and organizational settings, with an eye to the highly diverse population of individual physicians. That research should help steer ML's discourse into more effective person-centered (as opposed to leader-centric, in **Chapter 5**) education and training. Ultimately, customization of ML development approaches could help guide ML away from uniformity and also from an undesirable reiteration of medical dominance (**Chapter 1**). The 'ML Personas Inventory' (in **Chapter 6**) is an initial attempt to consider the context-informed requirements for appropriate and efficient training-and-coaching approaches in local leadership development. Finally, the relevance of national and regional culture and other local specificities must be noted that can influence decisions on ML training design (see, for example, **Chapter 5** and the **Appendix**).

Thirdly, in order to become effective at all, ML requires a multi-professional and -sectoral approach. Moreover, physicians working on developing their ML skills need genuine, at times intense, reciprocal interactions with non-physicians (e.g., in **Chapter 5** and **6**). In my view, the phenomenon of ML can only deliver on its promises when other healthcare professionals are also successfully facilitated in comparable processes of professional identity work. The 'virtuous circle' model, presented in **Chapter 3**, illustrates the complexity of networked settings with its various closely interrelated stakeholders, in which ML should be placed in order to analyze its potential, before reaping from it. Eventually, these efforts are to converge at the efficient frontlines of healthcare's micro-systems: where solid patient care is to be delivered.

Thus, in my thesis I describe ML as an 'all-professions-included' approach, which is shown implemented, for instance, in a cardiothoracic surgical team (**Chapter 9**), ideally flanked by active 'communities of practice' (**Chapter 6**). As illustrated in **Chapter 3** and **4**, effective ML requires adequate collaboration with and among the various non-clinical actors in the healthcare system, including, for example, those in legislation; management; governance; and financing (**Chapters 3** and **8**). Hence, a co-creative network approach is indispensable to muster all parties involved in effectively aligning and operating the various forms and stages of our patients' journeys.

Next steps in ML
My thesis provides additional suggestions, at various analytical levels, for further employment of ML. Foremost, I argue that physicians themselves should be prepared and facilitated to (learn how to better)

reflect on their non-clinical (leadership) competencies and related attitudes and behaviors (**Chapter 2**, **5** and **9**). Similarly, educators and mentors in the field must be advised to consider the guiding principles of effective ML training and coaching. These principles require them to reflect on their own experiences and competencies (**Chapter 5**). Furthermore, creating practice-based learning opportunities for ML experiences and training also necessitates those managing healthcare organizations and networks to collaborate more closely and facilitate the involvement of educationalists and change management experts in innovation and improvement programs that can harbor opportunities for (M)L development (**Chapter 6** and **7**). Possibly the most challenging prerequisite for developing ML effectively resides at the levels of governance. Incentivizing (practice-based forms of) ML training and re-regulating top-down procedures are critically warranted. Therefore, it is promising that ML also heralds increased attention to have physicians represent the medical professions' perspective at executive and board level positions. At all of these hierarchical levels, it is the wise, and at times bold thinking and acting that is required in order to enter new territories and to create evidently better structures (**Chapter 3, 4, 8,** and **9**).

New socio-technical frontiers

Although my thesis zooms in on one single aspect of one profession within healthcare's profusion of professions, it is part of what is known as contemporary disruptive innovations. Mostly since the arrival of the Internet for non-military users in 1995, healthcare, like most industries, is flooded by promising, yet often disrupting, technological innovations. They can bring together pluriform actors of (often sizeable) health and care organizations, policy makers and sellers of novel technologies, jointly in search of better healthcare. These developments are also contributing to the emergence of ML. Moreover, numerous large-scale e-health enabled intergrated care (eHEIC) programs, aimed at frail elderly living at home, are resulting in the market-release of highly sophisticated new systems (**Appendix**). Further roll-out of these and other innovative forms of healthcare will soon affect how healthcare is operated, contributing to even more shifts in many nations' healthcare regions. As I have been involved in various European Commission funded eHEIC programs, I have closely witnessed how these programs inculcate transformational change in healthcare regions of several European Union Member States. Many other countries are reorganizing their health- and social care services, in support of the mounting numbers of elderly citizens. As with other similar healthcare innovations programs in Western countries, the regional eHEIC initiatives require a profound understanding of the best ways of encompassing local intra- and inter-professional change dynamics. It is these types of transformational dynamics that physicians are increasingly part of; in my view, they need to understand more of ML so that they can play a more effective (leadership) role in them (**Chapter 10**).

Relatedly, many hospitals are currently scrambling to find out how to deal with the prospect of their square meters of buildings becoming obsolete. Their innovations are likely to have tremendous impact on shifting roles and responsibilities, that altogether force health professions to renegotiate their interprofessional arrangements and relationships. It is in the context of these happenings that ML might herald or trailblaze a grand social-professional movement that welcomes or deals with such innovations, as opposed to offering the resistance to change which we often see in innovative programs (**Chapter 10** and **Appendix**). Besides the unavoidable digitalization of our society, the various economic and environmental challenges increasingly affect all the members of healthcare's multi-stakeholder ecosystem who in turn have to anticipate reform (**Appendix**). Beyond such outlooks, which might be futuristic to some, I expect that artificial intelligence and robotics will have even more impact on the swiftness with which healthcare professionals will need to evolve.

ML1.0 and ML2.0 in practice

The current medical arena consists of two kinds of views on ML. One ML connotation is the function of physicians in dominant, managerial positions (e.g., a hospital CEO or a medical manager), which I would label as 'Medical Leadership 1.0' (ML 1.0). ML 2.0 considers ML as related to all physicians, regardless of role or position, hence: 'Medical Leadership 2.0'. The majority of published literature on ML training is focused on educating young physicians, for which the current established generation of physicians is expected to role model effective ML; and a variety of trainers and coaches, many from outside the healthcare setting, provide all sorts of leadership education1. Undeniably, ML 2.0's young age does not come with the evolutionary patience that harbors the development of evidence-based ML-training. Nor is the growing and maturing current cohort of established physicians skilled and experienced in ML 2.0. The latter cohort never had the opportunity of a formal ML education. This situation is part of ML's (curiously underreported) 'education-practice paradox'. Further scrutiny of this situation could advance the development of robust standards to ensure the quality of ML's educators, trainers and coaches.

TOWARDS NEW UNDERSTANDINGS OF PROFESSIONALIZATION IN TIMES OF TRANSFORMATION

Welling from my thesis' work is the notion that well-designed research is needed to illuminate how physicians, their colleagues and patients can benefit from effective ML 2.0. This raises an imperial question, which I try to answer in this very last part of this thesis:

In the face of healthcare's profound and increasing complexity: how can scholarly efforts on ML 2.0 advance a better understand of the professionalization of its various 'inhabitants'?

The 'wicked problems' that accompany the phenomenon of ML is not an isolated, 'physicians-only' topic that is primarily residing in medical education or work (**Chapter 5** and **6**). Since ML does not only affect physicians' and their work, and since physicians who want to develop their ML skills need non-physicians to do so, the concept of ML 2.0 goes beyond physicians and their clinical activities. ML 2.0 embraces and is rooted in deep knowledge of healthcare and those that work within it (**Chapter 1** and **6**). Contemporary medical professional identity appears to be incorporating being also a proficiently collaborating 'influencer' of continuous change and innovation. Appropriating ML 2.0, through utilizing physicians' sovereign societal positions and analytic skills, will therefore benefit the entire system (**Chapter 3** and **4**). Thus, I argue that more progress on ML 2.0 will contribute to more effective healthcare transformation, including improved patient as well as provider well-being. Although outside the scope of this thesis, I suggest that other front-line professions should be subjected to leadership 2.0 studies, similar to the current ones. Moreover, this thesis suggests the need for a profound rethinking of how we conceive, scrutinize and accomplish current professionalism in healthcare. Therefore, below I explicate a new conceptual model for studying and navigating healthcare's 'wicked' multi-layered and -professional transformation.

Unsuitable old paradigms

Based on the findings in my thesis and experiences in the field, I argue that healthcare transformation is in the progress of passing the initial phases of (pre-)theorizing experimenting with, for example, new technologies (e.g., e-health) and process redesign (e.g., Lean strategies) (Figure 1: stage I to IV). Disruptive innovations and system changes, envisioned to inculcate the widely wished-for, more effective, affordable, value-based and seamless patient-centered care, increasingly demand sustainable adjustments at both the professionals' and institutional levels. Interprofessional relationships have often been entrenched in centuries old professional habits, processes, symbols and other this-is-how-we-do-what-we-do-here 'logics.' Therefore, these relationships require going through an intense process of re-establishing or re-constructing to come to different, more patient-benefitting new interprofessional arrangements (Figure 1). It is the depth with which such institutionalized logics have resulted in healthcare as we know it, and the scrupulousness with which they, often unaltered, have been passed on to new generations, that imparts a relatively rigid reiteration of professional behaviors and attitudes, often reported as very difficult to undo or redesign.

Figure 1. Stages of institutional change and shifts in professional roles and practices (based on: Greenwood, Suddaby and Hinings, 2002)

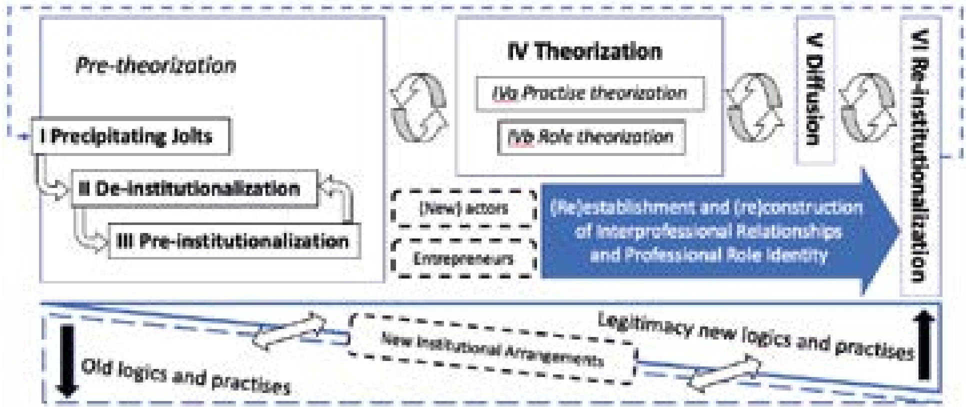
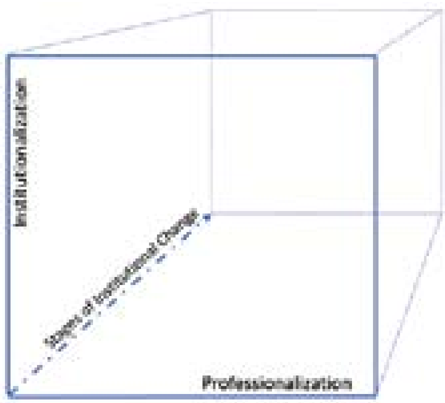
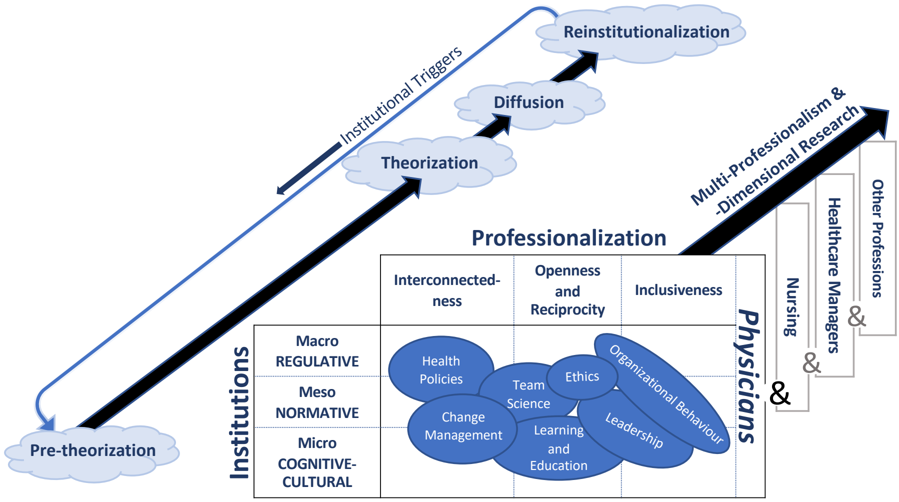


Figure 2. Multidimensional perspective of professions and institutions in transformation



Further theorizing, legitimizing and, ultimately, diffusing acknowledged new professional logics and practices sufficiently (Figure 1: Stages V and VI) takes considerable time and effort, also requiring professionals who dare to lead toward new role identities. This is typically an unplannable and unpredictable journey into which all professions, individually as well as collectively, are to be engaged, while the context in which they are living, and working is also rapidly changing. Therefore, the unprecedented high levels of interwovenness of today's professions, the various distinctions that characterize each of them, as well as diverse innovations and several newcomers (e.g., 'patient as partner'; artificial intelligence; self- and informal care), call for a new way of viewing the complex transformational processes at hand. Figure 2's schematically visualizes the three major axis with which such complex grand social change can be studied, comprising: (1) (re)professionalization, (2) (re)institutionalization, and (3) stages of institutional change. This multi-dimensional model underpins the re-design of various aspects of healthcare as well as how the professions rethink and remodel how their members are brought up and mature (implying invocation of the concept of professional identity in it). At the same time, the model visualizes the interrelatedness between these sets of two intense processes (re-professionalization and re-institutionalization), as well as their relatedness with the temporal aspect, visualized by the stages of institutional change (Figures 1 and 2).

Figure 3. Conceptual model for studying reinstitutionalization in healthcare in the various stages of institutional change in tandem with multi-dimensional research on shifts in professionalization, featuring the three aspects of medical leadership



This thesis analyzes various institutional changes that convoy the process of the altering professionalization of physicians (e.g., **Chapters 1**, **3**, **4**, **10**, and **Appendix**). New institutional paradigms at (a) macro, (b) meso and (c) micro levels, all significantly influence the medical professional (see, Figure 3), as well as most other healthcare professionals. Various chapters in his thesis reveal how ML 2.0 is constituted by three aspects of physicians' professional identity: (a) 'interconnectivity', (b) 'openness and reciprocity', and (c) 'inclusive change' (see, Figure 3). I argue that studying contemporary healthcare's multi-professionalism requires the *concurrent* regarding the institutional changes and dynamics within *each* of the health- and social care professions (i.e., medical; nursing; para-medical, and social care; etc.), as well as of all other significant stakeholder groups (e.g., healthcare managers; governance bodies; policy makers; payers). Figure 3 presents in fact a more detailed depiction of Figures 1 and 2. Reflecting the medical profession as this thesis' main topic, Figure 3 features how ML 2.0 can be placed in the perspectives of institutionalization ('institutions') and of the professionalization of physicians, encompassing their profession's new notion of ML (2.0).

Study on ML 2.0 invokes various scholarly viewpoints, such as the rich subdomains in the social sciences, for example Leadership Studies and Change Management, as is visualized in Figure 3. Such a variety of relevant angles requires an interdisciplinary and deeply collaborative approach among scholars and practitioners for true progress. Accordingly, besides the medical profession (which is featured in Figure 3) all other professions and relevant groups must become part of 'multi-professionalism and multi-dimensional research' (see, Figure 3). Hence, as we attempt to schematically show in Figure 3, interdisciplinary scholarly reflections on professions in transformation, also consider the dynamics *between* the professions and groups that comprise the healthcare domain. It seems to become an almost impossible mission, yes. Meanwhile, the entire healthcare system evolves towards new and complex realities.

Since this model places the aforementioned in the temporality of institutional change and professionalization, it can facilitate further thought, also because it takes into account national and regional or local cultural and other meaningful differences. Such contextual dissimilarities often significantly influence (for better or worse) transformational processes (see, also, **Chapter 10** and this thesis' **Appendix)**. Unsurprisingly, the model has already aided the European programs described in the **Appendix**: exploring new ways of working more efficiently between various healthcare professionals and organizations who incorporate innovative healthcare concepts in several 'pockets' of daring local European healthcare professionals.

Neither the challenge of opening up a profession, such as medicine, nor the process of professionals opening up themselves to effective leadership, will evolve with a 'big bang'. Thus, understanding and, ultimately attempting to fruitfully steer what initially may look like rather small individual transformative processes, requires diligent study of the changing professional as well as deep knowledge of the contextual characteristics and peculiarities with (and in) which they operate. Hence, simply developing new standards, like competency frameworks (with which the adventure that led to this thesis started out with) or organizing training sessions, will not suffice. Eventually, it is the individual physician who could ask herself: *Should I add ML 2.0 to my professional identity?*

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EPILOGUE

The medical field, chronicled to deliver a 'medical scientist' during the 1950's (Shorter, 1985) and in subsequent decades a 'reflective, patient-centered doctor' (Wear, 1997), is providing us, in the 21st Century, with an interconnective, networked and improvement-prone physician who practices ML 2.0 and also dares to influence the healthcare system. ML 2.0 reflects physicians' professional identity work as a response to their changing position and the modern requirements of the 'Good Physician', who is in the process of renewing her social contract with society. If the current and next medical generations succeed in accomplishing the envisioned inclusive, diversity-embracing and technology-assisted multiprofessional collaboration, skilled at navigating change-for-the-better, physicians will have effectively used their powers to help move healthcare forward, also by contributing to 'healing' the system. The discourse on ML and its intrinsic promises of physicians becoming highly proficient by going beyond their core skills of highly trained clinical healers, deserves follow up. It includes striving for (self-)reflective capabilities and agency by *all* actors in the healthcare arena. Time and further (action or field) research will reveal in what forms or dosages effective ML 2.0 will eventually become assimilated into healthcare-at-large and into the Art of Medicine. Meanwhile, the latter, having done so for over 2000 years, will continue to provide the best possible physicians, whose personal attention, professional skill and societal touch we, at times, will require.

Wouter A. Keijser

Appendix

DG CONNECT Funded Projects on Information and Communication Technologies (ICT) for Old Age People: Beyond Silos, CareWell and SmartCare

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Key words

- E-health
- ICT
- Integrated care
- clinical pathway
- Health technology assessment
- Predictive model
- Change management
- BeyondSilos
- CareWell
- SmartCare

Abbreviations

ICT, Information and communication technologies
HTA, Health Technology Assessment
DG CoNECT, European Commission Directorate General for Communications Networks, Content & Technology
MAST, Model for Assessment of Telemedicine
ASSIST, Assessment and evaluation tools for telemedicine and telehealth
RAIL, Risks, Actions, Issues, Lessons Learned site operations tool

ABSTRACT

Information and communication technologies (ICT) are promising for the long-term care of older and frequently frail people. These innovations can improve health outcomes, quality of life and efficiency of care processes, while supporting independent living. However, they may be disruptive innovations. As all European member states are facing an increasing complexity of health and social care, good practices in ICT should be identified and evaluated.

Three projects funded by DG CNECT are related to Active and Healthy Ageing (AHA) and frailty: (i) BeyondSilos, dealing with independent living and integrated services, (ii) CareWell, providing integrated care coordination, patient empowerment and home support and (iii) SmartCare, proposing a common set of standard functional specifications for an ICT platform enabling the delivery of integrated care to older patients.

The three projects described in this paper provide a unique pan-European research field to further study implementation efforts and outcomes of new technologies. Below, based on a description of the projects, the authors display four domains that are in their views fundamental for in-depth exploration of heterogeneity in the European context:

1. Definition of easily transferable, high level pathways with solid evidence-base;
2. Change management in implementing ICT enabled integrated care;
3. Evaluation and data collection methodologies based on existing experience with MAST and MEDAL methodologies; and
4. Construction of new models for delivery of health and social care.

Understanding complementarity, synergies and differences between the three unique projects can help to identify a more effective roll out of best practices within varying European context.

INTRODUCTION

Chronic diseases are complex, and often more than one coexists in the same patient (multimorbidity) (1). Frail older people with multimorbidity require comprehensive, personalized and anticipatory delivery of care, focused on a holistic view of the individual. Health care increasingly needs to address the management of individuals with multimorbidity. In European countries, patients with multimorbidity cost up to 5.5 times more than patients with only one disease (2) or even more when there are multiple comorbidities (3). However, the provision of social and health care is often fragmented between numerous actors, usually with different institutional, operational and technological dependencies (4). The lack of a common governance model that establishes comprehensive, agreed and binding protocols to set the responsibilities often leads to fragmentation, duplication and care gaps (5). Novel 'integrated care' strategies try to deal with discontinuities in systems and delivery that allow individuals to 'fall through the gaps' in care (primary/secondary care, health/social care, mental/physical health care) (6). Informal care and self-care are increasingly considered to play a significant part within integrated care teams (7), introducing the relative new challenge of integrating 'non-professional' with professional care in this field.

Information and communication technologies (ICT) have been shown as promising for the long-term care of older and frequently frail individuals (8). These innovations can improve health outcomes, quality of life and efficiency of health care processes for older patients, while maintaining their independence. However, implementing these innovations in day-to-day practice may also contain disruptive consequences. Therefore, longitudinal studies, focusing on clinical as well as organizational outcomes, should evaluate their feasibility and applicability, the implementation strategies used, as well as cost-effectiveness to health systems (9).

Many approaches are used to evaluate ICT technologies. The so-called Health Technology Assessment (HTA) models (10) often include safety, efficacy, patient-reported outcomes, real-world, effectiveness, cost, and cost-effectiveness as well as social, legal, ethical, and political impacts (11). HTA can assess treatment methods, medical equipment, pharmaceuticals, rehabilitation and prevention methods (12). However, the implementation of 'e-health applications' is rather complicated. E-health applications do not (often) provide direct benefit that can be easily measured (13). Therefore, e-health is often characterized as a disruptive innovation and its adoption by organizations, teams and individual users (professionals and / or lay public) is often insufficient. Incentivizing further technological development without putting enough emphasis on and properly supporting, even financially, its adoption is likely to widen the serious 'technology consumption gap' that we all witness (14). In-depth involvement from scientific domains such as implementation science, change management science, and team dynamics are gaining interest in the field of HTA (15). Also, there is a growing awareness that in modern HTA processes, single evaluation methods, based on evidence-based medicine practice, can be less adequate, whereas multifaceted evaluations may be more appropriate (16), although more difficult to appraise. Some multifaceted solutions have already been found to be effective such as The Lower Saxony Research Network Design of Environments for Ageing (GAL) (17, 18) or the European Rosetta project (19, 20).

The Digital Agenda of the EU is managed by the European Commission Directorate General for Communications Networks, Content & Technology (DG CNECT). It contributes to EU goals in the Digital Age: human advancement, fairness, jobs and growth. To help achieve its goals, DG CNECT funds high-quality ICT research and innovation that delivers imaginative and practical solutions to both technological and societal challenges through the EU research and innovation strategy.

Three projects funded by DG CNECT are related to Active and Healthy Ageing (AHA) and frailty: (i) BeyondSilos, dealing with independent living and integrated services, (ii) CareWell, providing integrated care coordination, patient empowerment and home support and (iii) SmartCare, proposing a common set of standard functional specifications for an ICT platform enabling the delivery of integrated care to older patients.

As all European member states are facing an increasing complexity of health and social care, good practices in ICT should be identified and evaluated. Knowledge and experience from the three projects can help to understand the 'do's' and 'don'ts' in sustainable implementation. Insights gained during these relatively large-scale 'trail blazing' projects provide tangible, practical strategies and tactics for regions in Europe (and beyond) embarking to initiate similar implementation projects. Additionally, the predictive models currently under development in the context of these projects, and which will be validated with real data from the trials within the projects, will provide decision makers in the health and social care sector with the required data to take an informed decision without the need to repeat expensive and time consuming trials in their own specific context. The three projects described in this paper provide a pan-European research field for the further study of the implementation and the effects of new technologies as well as new healthcare and care delivery methods. This first of a series of articles provides an overview of the three projects and the synergy between the underlying research and implementation strategies.

BEYOND SILOS

(ICT PSP, grant agreement N° 621069)

Start Date:	01-02-2014
End Date:	31-01-2017
Website:	http://beyondsilos.eu/project/

Background

The vast majority of EU older people wish to live independently at home as long as possible; meeting their needs can be a major challenge (21). Integration of service delivery in a citizen-centered perspective remains difficult in most countries. The different providers often work "in silos", with fragmentation of service delivery and poor coordination both between professionals, and between professionals, patients and families. Provision of complex health and social care requires a wide range of supply organizations, budgets, legal frameworks and insurance schemes. (22-25).

Scope and objective

The aim of "BeyondSilos" is (i) to overcome institutional and technical barriers enabling delivery of integrated care in the community setting by providing the ICT tools necessary to join up care pathways across health and social care organizations, and (ii) to set-up cross-sectoral teams with common access to user data (Figure 1). Beyond Silos is built around 8 Work Packages (WPs) (Table 1).

Workflow

BeyondSilos will test and demonstrate the sustainability of its integrated services through the deployment of pilots established in 7 EU regions with more than 10.000 older people: Northern Ireland (UK), Sofia (Bulgaria), Badalona (Spain), Valencia (Spain), Campania (Italy), Amadora (Portugal) and Kinzigtal (Germany).

The pilots will help the partners to determine the impacts of their services and to optimize service provision. They will also generate empirical evidence and practical experiences to support other European regions in the realization of care integration across the sectoral boundaries of health care, social care and third-sector care. The ICT platform will enable regionally customized integrated care models based on common care pathways aligned and in synergy with the SmartCare project. Pathways will be supported by workflow tools activating the most appropriate resources including informal carers. The ICT platforms will be based, whenever possible, on open standards.

A specific HTA-based multi-dimensional evaluation methodology, MAST (Model for Assessment of Telemedicine) (26), and a cost-benefit analysis using the ASSIST tool (Assessment and evaluation tools for telemedicine and telehealth), as well as the RAIL tool (Risks, Actions, Issues, Lessons Learned site operations tool), will expand the evidence base on integrated care impacts from predecessor projects to support informed decision making for sustainable Europe-wide deployment at all levels.

Figure 1. BeyondSilos integrated care programs

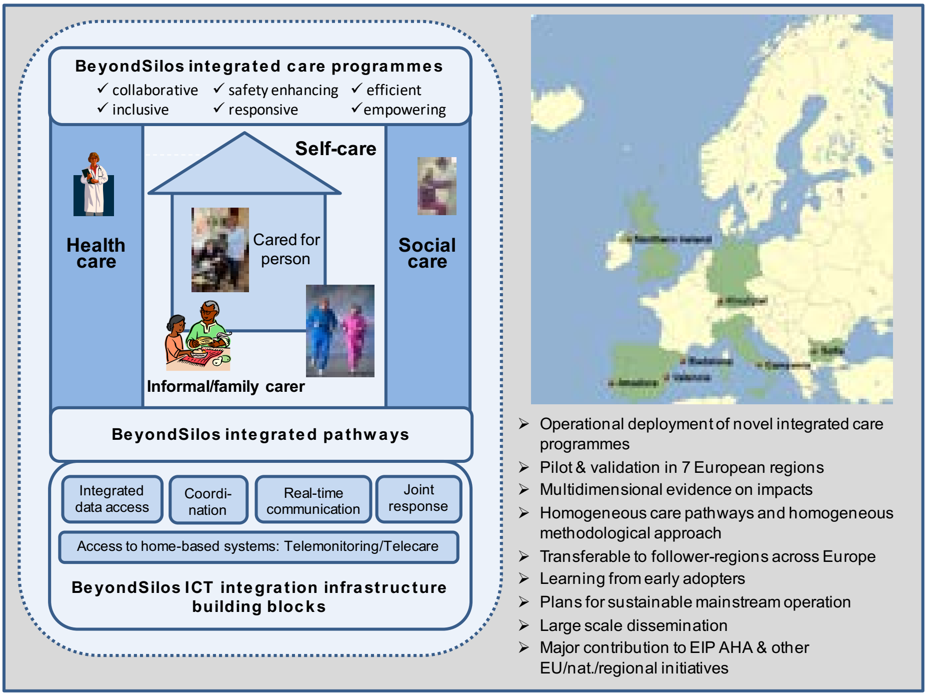

Table 1. Work Packages of BeyondSilos

WP	WP Title	Description
WP1	Requirements and integrated care pathway	Define all requirements relating to the specific characteristics of key user groups (older people with social care and healthcare needs, health and the social care professionals, informal carers, third sector organizations), systematize and design short-term and long-term home support pathways.
WP2	Organizational models and service process	Develop organizational & service process models for integrated short-term and long-term home support pathways, as well as an integrated set of service process definitions.
WP3	Integration Infrastructure Architecture and Service	Draft the BeyondSilos architecture and draw up specifications for integrated short-term and long-term home support services. Based on these, elaborate the BeyondSilos architecture.
WP4	System implementation and test	Implement integrated short-term and long-term home support services; implement prototype ready for testing services and component interfaces; acquire and deliver all hardware and software for the pilots; test full system on pilot sites.
WP5	Pilot site preparation and operation	Draw-up operational work plans for system and services introduction; recruit the planned number and type of users to participate in the pilot at each site; ensure staff are empowered to carry out service provision operations; set up services at all pilots sites; maintain the operation of systems and services throughout the pilots; and set up and provide help services to pilot users.
WP6	Pilot evaluation	Detail and finalize the methodology for pilot evaluation, to improve the current evidence base on implementation barriers/facilitators and outcomes for/of integrated BeyondSilos services, to ensure that evaluation data collection is carried out according to the common methodology across all pilot sites.
WP7	Exploitation support and dissemination	Guide the project towards successful joint exploitation of results; define appropriate viability or business models for social care, healthcare, integration and component providers; prepare materials to support external dissemination; inform public authorities, healthcare and social care providers, local and regional government about the project; finalize guidelines for Pathways and Integration Infrastructure procurement and uptake; set up regional / national deployment plans.
WP8	Consortium management and performance	Ensure smooth operation of all aspects of the project and proper implementation of the consortium agreement; finalize management plans including quality plans; comply with provisions of the contract and consortium agreement in respect of reporting including financial reporting; ensure project activities and service content conform to ethics and data protection principles and that project work achieves the highest quality measured against defined objectives.

CAREWELL

(ICT PSP, grant agreement N° 620983)

Start Date: 01-02-2014

End Date: 31-01-2017

Website: http://www.carewell-project.eu/home/

Background

Care systems face important challenges related to ageing, but, within older people, frail patients raise specifically difficult problems to health care systems, health and social care providers, and to patient's carers (22, 27-30).

Scope and objectives

CareWell aims to support the integration of care and improve support to frail older people through multidisciplinary programs facilitated by ICTs. CareWell predominantly focuses on the provision of care and support to older people with complex health care needs, high risk of hospitalization, and requiring a range of high-level interventions due to their frailty and multiple chronic diseases. Six territories are involved: Basque Country (Spain), Zagreb (Croatia), Lower Silesia (Poland), Veneto region (Italy), Puglia (Italy), and Powys (Wales-UK). In practice, CareWell is based on two ICT-supported pathways: integrated care coordination and patient empowerment & home support (Figure 2). CareWell is organized around 8 WPs (Table 2).

Workflow

These ICT-supported pathways cut across organizational boundaries and will activate the most appropriate healthcare and social care services available (both for scheduled and unscheduled care) together with information sharing. This will be achieved through ICT platforms, enabling (health)care coordination, monitoring, patients' self-management and informal care givers' involvement.

Important added value is expected at two levels: organization and workload for patient management (diagnostic, therapeutic, rehabilitation, monitoring, support) but also treatment compliance, self-care and self-management as well as patient and carer awareness of their health status. Likewise, improvement of clinical outcomes and quality of life is expected. Moreover, technologies support the patients' informal caregivers, highlighting when respite care or additional professional input is required. The ICT platforms will be based, whenever possible, on open standards and multi-vendor interoperability; collaboration among ICT suppliers will be strongly encouraged.

Figure 2. CareWell domains of integrated care

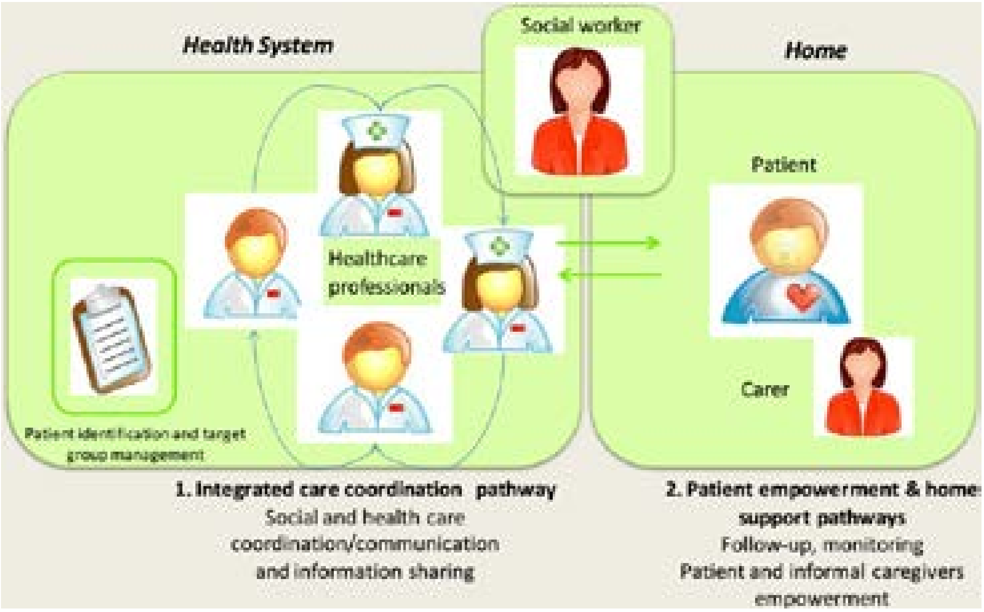

Table 2. Work Packages of CareWell

WP	WP Title	Description
WP1	Project coordination, management and quality assurance	Ensure effective management of the project in all its aspects and that project goals are achieved within the financial and human resources allocated to the project; coordination of the consortium activities; management of the contractual issues and of the relationship with the European Commission; quality assurance.
WP2	Integrated care programs: user requirements and use case definition	Ensure all relevant requirements relating to the specific characteristics of key user groups (older people and care professionals) are met to the fullest feasible extent (e.g., in data sharing, coordination, real-time and patient communication, home support); capture, systematize and document for design the requirements of each service delivery organization; document legal and regulatory factors in pilot regions; and draw up use cases for integrated care coordination pathway; for patient empowerment and home support pathways.
WP3	Organizational models and CareWell pathways	Represent and analyze the current organizational models for integrated care coordination pathways, for patient empowerment and home support pathways; identify improvement areas in the current organizational models and study the feasibility of incorporating them into the new/adapted CareWell pathways; develop the new/adapted CareWell organizational models for integrated care coordination pathways, for patient empowerment and home support pathways which include the improvement areas previously detected.
WP4	Integrated care architecture and service specification	Catalogue legacy applications relevant to the provision of CareWell services; draft the CareWell architecture; draw up specifications for Integrated care coordination services, for Integrated patient empowerment & home support services; elaborate the CareWell architecture; test the initial prototype.

WP5	Testing and pilot preparation	The ICT infrastructure adapted in WP4 together with the pathways developed in WP3 will be tested to ensure the correct pilot implementation in WP6. All hardware required for the pilots according to the site plan is acquired, including platforms and devices to the specified numbers. This task provides any dedicated systems required for a particular service. Network access and other preparatory work are located in the pilot site preparation tasks. Test protocols based on the defined use cases are drawn up. Sets of data are created for use in testing.
WP6	Pilot site operation	Draw-up operational work plans for system and services introduction; recruit the planned number and type of users to participate in the pilot at each site; ensure staff are empowered to carry out service provision operations; set up services at all pilots sites; maintain the operation of systems and services throughout the pilots; and set up and provide help services to pilot users; coordinate empowerment activities and coach on experience between sites and early adopter coaching region.
WP7	Evidence gathering and modelling	Detail and finalize the methodology for pilot evaluation; improve the current evidence base on implementation barriers/facilitators and outcomes for/of integrated CareWell services; ensure that evaluation data collection is carried out according to a common methodology across all pilot sites; report on the results of all pilots according to common scientific standards and to feed evaluation results into exploitation support activities; and represent by simulation modelling the pathway followed by frail older patients to test different possible interventions in order to maximize health benefits and throughput of scarce resources from nowadays to the 2020 horizon.
WP8	Learning from each other & exploitation of results	Guide the project towards successful joint exploitation of results; perform cost benefit analysis with the *ASSIST* tool*;* define appropriate viability or business models for social care, healthcare, integration and component providers; set up networking activities between the pilot sites; prepare materials to support external dissemination; finalize guidelines for Pathways procurement of technology solutions and uptake.

SMARTCARE

(ICT PSP, grant agreement N° 325158)

Start Date:	01-03-2013
End Date:	31-08-2016
Website:	http://pilotsmartcare.eu/home/

Background
Care systems across Europe face important challenges due to adverse demographic trends and increased specialization. Integrated health and social care is essential in meeting the long-term care needs of older people with complex chronic conditions. Evolution towards innovative ICT-supported delivery patterns can bring a major contribution (31-33).

Scope and objectives of SmartCare
SmartCare aims to define a common set of standard functional specifications for an open ICT platform enabling the delivery of integrated care to older patients, and specifications for procuring, organizing and implementing patient-centered services. SmartCare should provide solutions for more sustainable and integrated care delivery systems to the benefit of patients and carers (Figure 3). SmartCare is organised around ten WPs (Table 3).

Workflow
SmartCare will test and demonstrate the viability of its integrated services through an extensive pilot programme. Out of the 44 partners, 23 are regional partnerships and 9 of these are deployment sites: Friuli Venezia Giulia (Italy), Aragon (Spain), Scotland (UK), Southern Denmark, Tallinn (Estonia), Kraljevo (Serbia), Attica (Greece); South Karelia (Finland), North Brabant (Netherlands). SmartCare services will provide full support to cooperative delivery of care, integrated with self-care, including data sharing, care pathway design and execution as well as real time communication support to care teams and multi-organization access to home platforms (Figure 3). System integration will be based, whenever possible, on open standards, and interoperability will be strongly encouraged. This will allow efficient cooperative care delivery and will empower older people in the effective (self)management of their health, and in maintaining their independence, despite frailty. Further analysis, based on lessons learned and transferability, will be performed to support long-term sustainability and upscaling of the services.

Figure 3. The SmartCare services

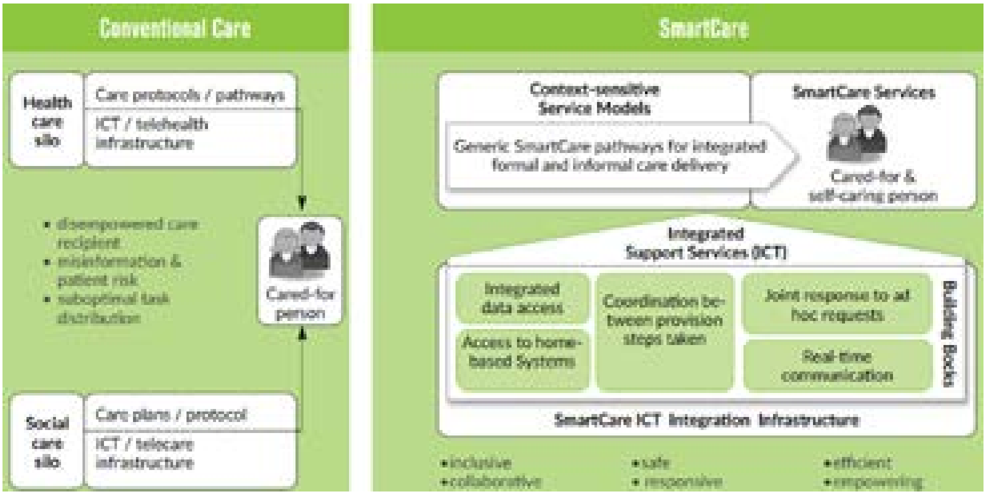

Table 3. Work Packages of SmartCare

WP	WP Title	Description
WP1	Requirements and use case definition	Define all requirements relating to the specific characteristics of key user groups (older people with social care and healthcare needs, health and the social care professionals, informal carers, third sector organizations), capture, systematize and document for design the requirements of each service delivery organization.
WP2	Service process model	Develop organizational & service process models for healthcare centered and social care centered pathways and develop an integrated set of service process definitions.
WP3	Integration Infrastructure Architecture and Service Specification	Draft the SmartCare architecture; draw up specifications for SmartCare services; catalogue legacy applications relevant to the provision of SmartCare services. Based on these, elaborate the final SmartCare architecture and services specifications for delivery of integrated long-term home care support and integrated home support after hospital discharge.
WP4	System implementation and test	Define the integration architectures for each of the deployment sites; integrate the existing ICT system at each of the deployment sites; test the compliance to the service specifications and the fitness for purpose and implement the integrated service infrastructure at each of the Deployment sites.
WP5	Deployment site preparation	Draw-up operational workplans for system and services introduction; recruit the planned number and type of users to participate in the pilot at each site; ensure staff are empowered to carry out service provision operations; and set up services at all pilot sites.
WP6	Service Deployment	Maintain the operation of systems and services throughout the service deployment phase in the deployment sites; set up and provide help services to users recruited; provide rich and timely feedback from issues dealt with by deployment sites already active to the deployment sites not yet active / early adopters.
WP7	Synergy exploitation	Develop synergies between SmartCare on the one hand and BeyondSilos and CareWell on the other hand; and develop

		synergies between SmartCare and the EIP AHA B3 Action Group - Integrated Care. Extend the field of applicability of MAST to ICT-supported integrated care and mental care. Develop predictive models to extrapolate experimental results from real trials to different contexts with the aim of overcoming the limitations of the best practice replications concept, speeding up decision making for the deployment of innovative ICT-based integrated care services. Develop an evidence-based change management toolbox to facilitate the handling of soft, people-related factors in the implementation of innovative services in the care sector.
WP8	Deployment sites evaluation	Detail and finalise the methodology for sites evaluation, to improve the current evidence base on implementation barriers/facilitators and outcomes for/of integrated SmartCare services, to ensure that evaluation data collection is carried out according to the common methodology across all deployment sites; carry out the evaluation baseline for the deployment sites; follow-up evaluation and report on the results of all deployment sites according to common scientific standards and to feed evaluation results into exploitation support activities.
WP9	Exploitation support and dissemination	Guide the project towards successful joint exploitation of results; define appropriate viability or business models for social care, healthcare, integration and component providers; set up networking activities between the pilot sites; constitute/manage the Project Advisory Boards for the project; prepare materials to support external dissemination; finalise guidelines for pathways and integration infrastructure procurement and uptake and deployment.
WP10	Project management and performance monitoring	Ensure smooth operation of all aspects of the project and proper implementation of the Consortium Agreement; finalise management plans including quality plans; comply with provisions of the Contract and Consortium Agreement in respect of reporting including financial reporting; ensure project activities and service content conform to ethics and data protection principles.

DISCUSSION

(How) does digital change challenge European healthcare?

The three projects are in line with the digital agenda of the EU

In the management of people with multimorbidity, information silos prevent an efficient sharing of crucial information, hence optimal care coordination. It is essential to identify possible synergies of ICT solutions by bridging over existing silos and making information available on time to all members of the integrated care team. However, realizing the full potential of these ICT solutions in improving the delivery of care to multimorbid patients requires not only interoperability between ICT systems but a redesign of a complex framework on legal, organizational, technical and semantic levels.

As indicated by DG CNECT, ICT has been instrumental in disruptive innovation that is radically transforming ourselves as well as our planet with unprecedented rapidity (34-36). Science, society and ICT are therefore intimately connected. Moreover, today's debate has focused on the economic potential and disruptive impact of digital change (37). The three projects discussed in this paper appear to hold important experiences and insights to close many gaps in the challenge of sustainable implementation of ICT for the ageing population.

Synergy between the three projects - and beyond

The management of chronic diseases, that are closely associated with aging and frailty, often result in challenges in maintaining well aligned and high-quality health care and social services. Using e-health solutions while re-designing processes and pathways in the local context, the three projects described above approach these common challenges in different, tailored ways, based on specific local needs and demands across the almost 20 implementation sites of the European member states involved. This richness in diversity as well as in complementarities makes it important to consider these projects in a combined manner, in order to determine commonalities and synergies.

Combining experiences and results obtained in the 3 projects will reinforce a shared research agenda on integrated care in the aging population and will facilitate an effective scaling up of best practices in individual European regions. Thus, for the common benefit of the 3 consortia, this synergy logic will bring better and quicker solutions by (i) screening and identifying subjects of common interest, (ii) identifying the key facilitating and blocking factors to implementation, and (iii) proposing subsequent change management needs and solutions in a more systematic way, although 'tailor-able' to local settings. In practice, synergy work is not just about coordination and combining of individual components. The efforts ad hand will involve an important knowledge and experience exchange between as well as common reinforced ownership from all stakeholders involved to serve their mutual interest: the European (heath)care. The majority of topics covered by the 3 projects are scientifically and technically complex, for which common reflection and experience sharing will be highly beneficial. Therefore, the authors describe 4 domains of mutual activities within and between the projects. These activities can help to establish a more homogeneous view on the complexity outlined above, while establishing practical 'handholds' for effective implementation.

1. Redesign of Pathways

Experiences within the projects will convey well-tested pathways with a solid evidence-base that should be easily transferable into EU regions. In that regard, it is essential to identify common and replicable elements and principles at each step of the pathway, especially:

- Precise roles and responsibilities for (members of) Multi-disciplinary Teams: diagnosis, referral processes, follow-up, etc.
- Definition of coordination role(s): primary-secondary care / health-social strand, etc.

- Definition of common clinical and non-clinical data sets crucial in different steps in clinical pathways and from the perspectives of all disciplines involved.
- Identification of the range of services and intensity of care necessary to support the patient as well as informal carers.

2. Change Management in Implementing eHealth Enabled Integrated Care

Successful deployment and sustainable implementation entail initial assessment of and subsequent dealing with local influencing factors that can be facilitating or obstructive. Managing the change that is needed for effective implementation is not a one-shot intervention, but always requires a locally tailored and culture sensitive approach while working in close collaboration with all stakeholders involved. A comprehensive analysis of experiences within the projects and best practices already defined in the literature will result in a generic 'implementation toolbox'. The combination of an evidence and practice-based set of measurement tools, interventions and strategies will focus on change management domains, such as:

- Implementation strategies
- Engaging professionals
- Team dynamics in multi-disciplinary (virtual) teamwork
- Cultural change
- Leadership (in particular 'medical leadership in virtual teams')
- Recruitment and retention of patients and professionals.

The effective application of such a diverse change management 'curriculum' is based on an initial assessment of local characteristics, needs and requirements that is founded on a valid set of implementation indicators. Current experiences in the projects, combined with scientific insights (a systematic literature review), hold the key to such an implementation indicator set that aids in preparing effective implementation as well as continuous monitoring during implementation and post-implementation evaluation. Well founded in the sciences of organizational development, team dynamics, human factors and implementation and change management, the proposed toolbox (including the indicator set for assessment and monitoring) will add relative new perspective to well accepted health technology assessment. Combining 'the best of several worlds', this will flow into the new version of the MAST methodology (MAST2.0).

3. Evaluation and Data Collection Methodologies

MAST (26) and MEDAL (http://www.medicalalgorithms.com) methodologies are of importance. MAST was developed in 2010 under contract with the European Commission (MethoTelemed project) by a multinational team led by the Odense University Hospital (South Denmark) using the EUnetHTA HTA Core model (http://www.eunethta.eu/hta-core-model) as the starting point. The evaluation using MAST is seen as a multi-disciplinary process that summarizes and evaluates information about the medical, social, economic and ethical issues related to the use of eHealth services in a systematic, unbiased and robust manner. Furthermore, the use of one single methodology for EU projects will be beneficial in terms of comparability between projects. Likewise, MEDAL (Medical Algorithm) Methodology proved to be successful in collecting, standardizing, and categorizing a large array of clinical data and, in doing so, in supporting the setting up of a clinical repository and subsequent knowledge/data sharing.

4. Building up New Models

The following two-step process is considered:

- Identifying accurate experience in existing projects, whereby robust data can already demonstrate actual benefits for a specific pathology. Within the past 4 decades, an epidemic of allergic diseases and asthma has been observed globally in children and adults. The expected epidemic wave of asthma and rhinitis in older adults is an insufficiently recognized problem (38, 39). In Europe, over 20% of adults suffer from allergic rhinitis, and over 5% from asthma (40, 41). These patients are now reaching the age of 65, and a new health problem in older people will be to understand, detect and manage these patients. Asthma and rhinitis in older adults have specific symptoms. These patients also suffer from chronic disease multimorbidity and polymedication. There is an urgent need to have a simple tool allowing individualized and predictive medicine. AIRWAYS ICPs (42) is tackling this expected health problem, based on systems medical principles, in accordance with guidelines proposed by the European Commission (https://www.casym.eu) using MASK. Allergic rhinitis will be a starting point, since a precise methodology has already been built up at the B3 level (43) and is currently being deployed in 15 EU countries. MASK-rhinitis (MACVIA-ARIA Sentinel NetworK for allergic rhinitis) is a simple system centered around the patient which was devised to fill many of these gaps using ICT tools and a clinical decision support system (CDSS) based on the most widely used guideline in allergic rhinitis and its asthma co-morbidity (ARIA 2010 (44) and 2015 revision). It is one of the implementation systems of Action Plan B3 of the European Innovation Partnership on Active and Healthy Ageing (EIP on AHA). Three tools are used for the electronic monitoring of allergic diseases: a cell phone-based daily visual analogue scale (VAS) assessment of disease control. From this allergic rhinitis experience, it will be possible to build up a programme in another region and for another disease (respiratory or chronic disease).
- Performing population stratification and setting up a predictive model to demonstrate retrospective impact on health conditions but also on cost/efficiency dimension.

CONCLUSIONS

The EU promotes a strong and structured synergy between the 3 projects to reinforce integrated care logics, improve dissemination of best practices and experiences across European regions, promote the use of predictive models to speed up and facilitate decision processes, and reinforce common ownership. This experience sharing will be highly beneficial on key topics:

1. Definition of easily transferable, high level pathways with solid evidence-base that can be transferred into a large number of EU regions. In that regard, it would be essential to identify common and replicable elements / principles at each step of the pathway, especially:

- Precise role for Multi-disciplinary Teams: diagnosis, referral processes, follow-up, etc.
- Definition of coordination role: primary-secondary care / health-social strand, etc.
- Definition of common clinical and non-clinical data sets at crucial steps.
- Identification of the range of services and intensity of care necessary to support the patient but also the carers.

2. Effective management of the change needed to mentor teams, people and organizations into new pathways and ways of collaboration, including the use of ICT solutions facilitating this.
3. Evaluation and data collection methodologies based on existing experience of MAST and MEDAL methodologies.
4. Definition of Retrospective models, based on the experience already acquired in COPD, and population stratification in order to demonstrate retrospective impact on health condition, but also on cost/efficiency dimension.

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Curriculum Vitae

Wouter A. Keijser MD is scholar, practitioner and aficionado in healthcare transformation. Wouter studied medicine at the Radboud University, Nijmegen, and Free University, Amsterdam and received his medical degree in 1997. Since his academic training and after several years of clinical work, he dedicated his professional activities to innovation and change in healthcare. As an entrepreneur, Wouter was engaged in several Dutch and European start-up initiatives. Serving in consulting, management and expert reviewing he participated in various multi-national European Commission funded consortia endeavoring wide-scale implementation of e-health enabled integrated care programs in various regions, in particular focusing on transforming interdisciplinary healthcare for the elderly and (self)management of chronic diseases. Keijser's main professional focus is organizational behavior and professionalization in healthcare and the research, development and deployment of related interventions to improve collaborative governance, interdisciplinary teamwork and leadership. A multi-certified coach, interprofessional teamwork facilitator and experienced field-expert in (medical) leadership development, Wouter works within an international network of scholars and practitioners. His academic and consultancy work has resulted in various scientific as well as field-practice contributions on diverse topics. Certified with the University Teaching Qualification Wouter teaches BSc and MSc students in the University of Twente, including those in the Honors Program and Transdisciplinary Master Insert, and supervises (MSc and PhD) research students. In collaboration with several international partner organizations, including University of Twente, Wouter Keijser co-founded the non-governmental organization DIRMI Institute in 2018. Besides these activities, Wouter Keijser is an active policy advisor, board-room consultant and a member of advisory and governance boards to several (healthcare) organizations. Wouter lives in Utrecht, the Netherlands and is the proud father of Paulus, Berend, Bobbie, Lola and Finn.

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The DIRMI Institute provides a platform for sharing and developing science, knowledge and evidence based (e.g., coaching and training) practices that further transformation in healthcare. DIRMI activities focus on collaborative governance, interprofessional behavior and (medical/healthcare) leadership.
DIRMI is a not-for-profit spin-off of the Change Management & Organizational Behavior (academic) department of the University of Twente, the Netherlands.

Tell & Transform!

What If More Physicians Were Contributing to Healthcare Transformation?

Wouter Keijser MD (1967) sheds light on this question by studying - from many angles - the recently much debated and written about phenomenon of medical leadership (ML). ML is not just a set of old and new non-clinical competencies that physicians have to be trained in. In the face of mounting innovations and systemic changes, staggering bureaucracy and other healthcare challenges, ML represents a profound adaptive professionalization of the intensely institutionalized role of physicians. Through engaging more self-reflectively, inclusively and co-creatively with their non-medical colleagues, this well-positioned group of medical healers holds an important key in navigating the wicked problems of healthcare transformation. Thus, ML also embodies the 21st Century physicians' augmented vocation of 'healing the system'.

Keijser scrutinizes, in interdisciplinary ways, a whole host of promises and challenges of ML. This includes the field of e-health, necessitating physicians to better learn to effectively collaborate in ingenious ways with local representatives of other professions. Next to theoretical contributions, the thesis provides clear practical guidance for healthcare professionals, leadership mentors and coaches, as well as for those responsible for governing healthcare systems and policies, and managers of healthcare teams. This thesis -written by a physician, turned social-scientist- identifies and organizes what is required to harvest the potential of thoughtful and effective medical leadership in everyday healthcare's frontlines. This book will be of interest to anyone endeavouring a nuanced approach to the changing roles of physicians and other healthcare professionals in solid healthcare transformation.

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