

Integral resource capacity planning for inpatient care services

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Effectively organizing inpatient care requires simultaneous consideration of several interrelated planning issues, such as case mix, care unit partitioning and size, and staffing decisions. The workload on inpatient care units is mainly determined by the patient outflow of the operating theater and the emergency department. Predicting this workload and staffing nurses accordingly, is essential for guaranteeing quality of care in a cost effective manner.

First, we present a generic analytical approach to predict bed census on nursing wards by hour, as a function of the Master Surgical Schedule (MSS) and arrival patterns of emergency patients. Second, we introduce a stochastic method that uses these hourly census predictions to derive efficient nurse staffing policies. In particular, we explore the potential of flexible staffing policies which allow hospitals to dynamically respond to their fluctuating patient population by employing float nurses.

The methods are applied to a case study of the surgical inpatient clinic of the Academic Medical Center (AMC) Amsterdam. The results for this case study show that while the quality of delivered services becomes more reliable, the productivity of beds and staff can be increased by 10-20%. Inspired by these results, the AMC decided that the methodologies will be used during the upcoming years in supporting a complete redesign of the inpatient care facility.