Development of a Bed System to Improve Patient Access to Care

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Abstract

Access to care is a critical within healthcare. In order to provide access to care in a timely manner, it is necessary to effectively manage the allocation of hospital beds. Bed allocation provides a physical location for the necessary patient care and also provides the associated services. Therefore, when determining the proper allocations, it is necessary to consider the physical space and also the mixtures of available care from the physicians, nurses, necessary diagnostic work, and the appropriate treatment. In addition, this allocation must be performed in an efficient and flexible manner to allow for admissions, transfers, and discharges.

The purpose of this presentation is to provide the methodology developed to evaluate the numerous healthcare systems currently used to track patient flow, bed status, and service availability. The research project was to automate these systems to reduce both input errors and the delay of care. Incorporating automation into these systems will also enable the necessary information to be shared to the appropriate hospital staff. For this project, current and historical data of patient flow and bed control applications was statistically analyzed to develop a single, real-time, predictive tool for bed control management.

To develop an effective real-time, predictive tool, it was necessary to develop a systematic understanding of the various sources of variation stemming from the information available on bed status, the integration of the various data sources, and knowledge sharing and access. This information was utilized to develop a real-time predictive tool or robust scheduling tool. The predictive tool has the capability to dynamically show the actual demand and capacity of hospital beds in a rolling schedule horizon. Advanced logistics analysis, simulations, and other advanced industrial engineering analytics were also utilized as appropriate to develop the predictive tool.

In future work, a systems thinking model will be used to develop a causal loop diagram of key factors related to bed status in order to prospectively plan quality improvement interventions related to six key domains of clinical performance: mortality, effectiveness, safety, equity, patient-centeredness, and efficiency. The bed management system’s predictive features are expected to provide valuable insight on these interventions as well as parameters needed to assess cost-effectiveness.