Acuity-Based Nurse-Staffing Strategies for Inpatient Settings Using a Stochastic Modeling Approach

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The Health Resources and Services Administration (HRSA) projects a deficit of 36 percent of registered nurses nationwide by 2020. The national nurse shortage along with rising patient acuity levels have led to an increase in nurse workload, causing nurse workforce to experience high levels of burnout. There is growing concern that nurse burnout could adversely impact the quality of care provided. To address this concern, there are recommended nurse-to-patient ratios for different types of inpatient settings. However, patients in a hospital unit may have different acuity levels based on the severity of care needed. This may impact the staffing needs of the unit potentially rendering a fixed nurse-to-patient ratio ineffective. Using a finite-source queueing model, we develop a stochastic framework to determine nurse staffing strategies that minimize staffing costs while ensuring timely delivery of nursing care in an inpatient unit with heterogeneity in patient acuity and nursing skills.