The Needs of the Many

A Phoenix-based medical center implements an automated patient acuity staffing and scheduling solution.

By Dave Kempson

Getting the right nurses in the right place at the right time goes a long way toward optimizing the efficiency and effectiveness of hospital care. That is why chronic over- and under-staffing is a vexing problem. Is it reasonable for one unit to have a surplus of nurses who possess the skills and credentials to work in another unit that is struggling along with too few? If two nurses on the same shift each have three patients, should one be assigned their unit's three patients with the most intense care needs while the other cares for three average patients?

Maricopa Medical Center (MMC) implemented specialized software in its staffing and scheduling system (a set of system interfaces) as well as management processes to match staffing to the needs of patients and thereby schedule nurses appropriately across units and balance workloads within them. We wanted to ensure that every unit has the appropriate number of nurses with the skill sets required to provide quality care given the complexity of patients' conditions and the intensity of services they are likely to require during the next shift. Moreover, Arizona law requires hospitals to account for severity. Our charge nurses in five of our 22 units had been documenting patient acuity for more than three years. However, the process of calculating the level of acuity for each patient was not automated, nor was it directly linked to staffing and scheduling. Consequently, it was not possible to use the definitions and measurements of patient acuity in real time to assign staff based on patients' clinical needs. Our primary objective was to automate the process and then extend it across the hospital so that we could start using patient acuity to guide staffing and scheduling.

Staffing and Scheduling System

MMC is a full-service acute care teaching hospital with 450 inpatient beds. It has approximately 20,000 inpatient admissions annually and some 50,000 patients count on MMC for urgent and emergency care each year. MMC is the flagship of Maricopa Integrated Health System (MIHS), a publicly-funded health system in Phoenix. MIHS functions as the healthcare safety net for many citizens of Maricopa County, Ariz., many of whom face major challenges such as lack of health insurance, complex medical problems and difficult socioeconomic situations.

Maricopa uses the RES-Q Labor Resource Management (LRM) solution from RES-Q Healthcare Systems for staffing and scheduling. It produces clinically sound, skill-matched, financially optimized and productive staffing in schedules that account for staff preferences. We have 475 active users of the system and use it to manage staffing and scheduling for 1,300 clinical employees. The system includes personnel management with profiles for each employee. Certifications, license renewal dates and special skill sets are among the information maintained. The software translates hospital-defined workload standards into specific staffing patterns by employee skill level. It then uses the calculated staffing model and schedules properly credentialed and licensed employees.

In August 2007, Maricopa added the RES-Q Patient Acuity module to automate the calculation of each inpatient's acuity level and to integrate the results with staffing and scheduling. The module provides an interactive acuity tool that enables nurses to document nursing interventions and other patient attributes by selecting

items from department-specific lists. Each attribute has an assigned relative workload value, defined in units of time such as an hour or a specific fraction of an hour. As attributes are selected, the module automatically calculates the acuity level (from one to seven) for each patient by shift. The system then utilizes the resulting patient classifications to automatically calculate optimal staffing for every unit by shift. Thus, we use the software to determine the correct number and skill mix of nurses that should be scheduled to provide appropriate patient care and to balance workload — based on the intensity of patients' medical needs and the amount of nursing time required to care for them. A total of 22 units are currently utilizing RES-Q LRM with the Patient Acuity module.

For more information on RES-Q patient acuity solutions, www.res-q.com

Matching Resources To Patients' Care Needs

To implement the process of matching staffing and workloads to patients' levels of acuity, each unit defined its baseline patient and identified their attributes, hours of care and staffing requirements. They then summarized the basic services required for their typical patient across four categories: Patient Care; Medication and Line Management; Procedures, and Other (e.g., communication with physicians and patients' families). Attributes were then identified that are associated with higher-acuity patients along with the additional time each attribute adds to patient care. The sum of attributes and associated workload values establishes each patient's acuity level and as the numbers of attributes and workload totals increase from the baseline, the acuity level increases appropriately.

Our vendor customized the Patient Acuity module's screens for each unit to establish department-specific attribute lists. The Surgical, Medical and Coronary ICUs use the same basic definitions of baseline patients. Interventions for higher-acuity patients in our ICUs include, among others: nursing services (such as two or more chest tube insertions at bedside and changing medication dosages every hour or more frequently); continuous renal replacement therapy (CRRT); and, behavioral restraint monitoring and documentation. These attributes increase the amount of necessary nursing time. For example, Acuity Level 5 patients in the ICUs require up to six hours of nursing care per 12-hour shift, and the nurse to patient ratio is 1-to-2.

Agency nurses, float nurses and new nurse employees use laminated copies of their unit's patient attribute lists as a tool to specify attributes for their assigned patients. Charge nurses, assistant nurse managers and nurse managers function as authorized users of the system and use the module screens to enter patient attributes into the system. Every shift, the charge nurse is responsible for completing acuity determination by four hours prior to the next shift. The system then calculates the number of nurses required and compares the optimal staffing to the baseline staffing scheduled for the next shift. That gives our staffing offices an overall view of staffing needs and variances by skill level across all units based on patient acuity. In coordination with the charge nurses, the staffing offices can assess "whole house" nurse staffing needs and quickly determine which units are under- or over-staffed for the next shift. Schedules are then adjusted accordingly to balance staffing among and within all units by two hours before the start of the next shift.

System Interfaces

Five automated interfaces, which were designed with vendor assistance, have already been developed and implemented with two more scheduled to be in place by the end of 2008.

Employee Demographics Interface: Sends employee demographics from the Human Resources module of Maricopa's hospital information system (HIS) to RES-Q LRM and to the time and attendance system once daily, populating the LRM employee database.

Agency Staff Interface: Sends demographics for both short- and long-term contract agency staff from the LRM to the time and attendance system twice daily.

Patient Admissions, Discharges and Transfers (ADT) Interface: A real-time, 24/7 interface using HL-7 messaging, the ADT interface sends admissions, discharges and patient transfers information from the HIS to the Patient Acuity module. This supports the entry of patient attributes, resulting in acuity level calculations and staffing to patient acuity every shift.

Actual Time Worked Interface: Once daily, the actual time worked interface sends thousands of transactions from the time and attendance system to the LRM system, modifying schedules within the system to reflect actual employee and agency clock in/out time, ensuring accurate productivity reporting.

Schedules Interface: Sends schedules from the LRM to the time and attendance system twice daily, enabling staff to see their future schedules when they badge-in for work and enabled Maricopa to implement cost-saving HR rules. For instance, we are able to restrict staff from badging-in for work more than 15 minutes before they are scheduled, thereby reducing incidental overtime costs. Managers also use data from this interface to produce reports on tardiness and other issues for employee counseling.

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Agency Hours Worked Interface: A planned interface to link the LRM system to a third-party vendor-managed application that logs the assigned shifts of agency staff. The actual agency hours worked will be sent from the time and attendance system to the LRM and to the third-party application, helping to ensure the accuracy of billing and auditing of this critical staffing expense.

Agency Costs for General Ledger: This final interface will send the actual dollars expended monthly for agency staff to the general ledger. Once implemented, this will provide accurate reporting of this critical, closely monitored expense and create an accurate accrual entry.

Results

MMC sought to automate the process of patient acuity calculation, extend it across all units of the hospital and link the results to staffing and scheduling. Before the process was automated, only five of the hospital's 22 units were using a manual process. Furthermore, our ICUs and behavioral health units had not been able to calculate patient acuity and instead used industry standards for staffing and assigning nurses to patients which are based only on census numbers and do not account for differences in acuity and care requirements among patients. Today, all 22 units utilize the automated process, making the extension of patient acuity determination across the hospital a success.

The units previously using the paper acuity system had been able to complete the process in a timely manner for about 60 percent to 70 percent of their shifts. Today, the inpatient units have this number at greater than 95 percent. The behavioral health units have achieved a 75 percent on-time completion rate.

Automating the process has improved our ability to use patient acuity in real time to assign staff based on patients' care needs. We have attained significant process improvements, and the automated patient acuity process is yielding results in terms of moderating under- and over-staffing. Our best-performing units now consistently staff their shifts at 95 percent to 105 percent of optimal staffing levels. Admittedly, others still have a ways to go. One of the most significant results is improved workload balancing among nurses. Decisions on patient assignments to nurses on each shift are now made on the basis of patients' documented acuity levels and the intensity of care they will need during the shift.

Going forward, we are continuing the work to complete the interfaces. We believe their implementation will help us better control the use and costs of agency nurses. In addition, we are exploring ways to improve the process, especially with the behavioral health units, and we are using the experience of the best-performing units for continuing education of our charge nurses.

With the shortage of registered nurses in the U.S. forecast at approximately 340,000 by 2020, every hospital will be increasingly challenged to optimize the productivity of its nurses and balance their workloads. Our experience matching staffing to patient acuity at MMC suggests this is a sound strategy for addressing this challenge and a practical one for other hospitals to pursue. Most healthcare organizations will already have the basic information required to implement our approach to acuity measurement within their ADT systems, making interfacing to staffing and scheduling systems a viable solution. **HMT**

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