

Predictive analytics empower nurses

Quality care requires robust staff scheduling tools.

By James Fenush, MS, RN, and Rita M. Barry, BSN, RN

As nurse leaders, not only are we responsible for meeting current operational demands, but we also must look ahead to prepare for future challenges, including healthcare reform, an aging population, and an uncertain nursing workforce. One area with which we're regularly confronted is the balance between cost and quality of care. We must focus not only on how to manage costs, personnel, and resources, but also on having the right workplace culture, which includes having the right people in the right place at the right time. To stay ahead of the curve, we need to create a healthy work environment that produces quality outcomes for patients and families as well as staff, and that requires adequate nurse staffing and appropriate resource availability.

A spotlight on staffing

Nurse staffing adequacy is receiving significant focus nationally, and nurse leaders are beginning to use predictive analytics to assist in projecting patient demand months in advance of a shift. This takes the guesswork out of nurse scheduling and staffing and returns valuable time back to nurse leaders so they can focus their attention on patient care and supporting clinical nurses to enhance the work environment. Appropriately scheduling staff to

the forecasted patient demand optimizes the workforce by aligning schedules to patient volume, reducing cancellations and overtime, and



eliminating time-consuming and often expensive last-minute recruitment efforts.

Healthcare organizations that have adopted predictive analytics and advanced labor-management strategies have seen reductions in agency nursing, increased staff satisfaction scores, improved clinical nurse retention, and significant annual savings in labor spending. At a time when unfilled healthcare jobs continue to grow, predictive analytics aligned with advanced labor-management strategies offer a solution to the scheduling and staffing problems that frustrate nurse leaders and impact staff morale. (See *Predictive analytics defined.*)

Focusing on advanced labor-management strategies creates a solid staffing and scheduling foundation that includes standardized workflows

for building and maintaining unit-based position controls and master schedules that ensure alignment of necessary resources. With these foundational evidence-based tools, predictive analytics provides value to the forecast and allows for the appropriate use of contingency staffing resources (all hours, other than those worked by core staff members within their full-time equivalent [FTE]) to supplement core staffing (staff members who hold an ongoing FTE commitment within a department) that aligns with projected patient volumes.

Strategy and implementation

Data-driven software solutions, such as Smart Square®, Kronos®, and Clairvia®, offer nurse leaders a way to both automate staffing and scheduling and leverage predictive analytics.

The software we use at Penn State Health Milton S. Hershey Medical Center (Penn State Health) pulls years of past volume data in addition to other variables and hospital-specific information to refine and enhance predictive volumes, bolstering staffing plans and scheduling by forecasting needs up to 120 days before a scheduled shift. The result is a clinical nurse placed at a patient's bedside at the right time.

Accurate forecasting ensures the delivery of care in advance of a patient arriving. This, coupled with

Predictive analytics defined

Predictive analytics is the practice of extracting information from existing data sets to determine patterns and predict future outcomes and trends. It leverages processes and staffing data and then sorts the data with a standard algorithm. This creates a forecasting model that's validated over time. When combined with a technology solution, the data assists nurse leaders in staffing and scheduling by working behind the scenes to ensure a clinical nurse is placed at a patient's bedside at the right time.

systematic forecasting to project appropriate staffing levels, ensures that patients receive quality care while being fiscally responsible. This cost-effective approach to managing open shifts decreases "in-the-moment" staffing decisions and reduces time that managers spend on scheduling and staffing.

The forecasting tool we use evaluates FTE changes over a 12-week period, looking at several data elements—projected staff vacan-

cies, turnover, leaves of absence, and retirements. These elements are then evaluated against staff hires, staff completing orientation, and staff returning from leaves of absence. This enables nurse leaders to have proactive conversations with nursing staff about future personal plans that may impact the schedule.

These practical tools allow nurse leaders and clinical nurses on scheduling teams to actively participate

in staffing strategies, resulting in an overall 97% accurate staffing prediction 30 days in advance of the shift. An annual RN fill rate (number of clinical care hours needed to meet patient demand) to an adjusted demand of 95% and the development of a staffing plan for the upcoming quarter aids in determining if contingency nurse resources are needed.

Lessons learned

When a core clinical nurse leaves an organization, he or she typically gives a 2-week notice, creating a vacancy in the unit schedule for a minimum of 6 weeks. In today's marketplace, where clinical nurses are needed across the country, posting a position, awaiting applicants, interviewing, hiring, and then orienting a new clinical nurse to fill the gap takes time. The ability to predict core nurses who in-

Sample forecasting tool

The forecasting spreadsheet developed at Penn State Health Milton S. Hershey Medical Center is completed 3 months ahead of the scheduling period and provides a visual understanding of staffing gaps to determine how long building a 95% fill rate will take. Using this tool, the nurse leader can develop a cogent staffing plan and recruit contingency staff in advance of when RNs will be needed to meet patient demand.

Schedule period	Week #	Vacancy/FTE/shift/reason/recruit strategy	FTEs out	Additions/agency/short-term contract	FTEs in	Weekly FTE change	% fill
10/2/16 – 10/29/16	1			Jones/agency returns; Phillips short-term	1.3	48.70	79.00
10/9/2016	2	Smith to interim CHN/Bailey LOA	-1.80	Belle/agency 0.9 D	0.9	47.80	79.67
10/16/2016	3			Frankenfield 0.6 N	0.6	48.40	80.67
10/23/2016	4	Shuttles short-term ends/Heistand FMLA	-1.20			47.20	78.67
10/30/16 – 11/26/16	1	Webster short-term ends	-0.40	Wisener & Vernon off orientation 0.9 P	1.8	48.60	81.00

CHN = clinical head nurse, D = day shift, FTE = full-time equivalent, FMLA = Family and Medical Leave Act, LOA = leave of absence, N = night shift, P = night shift—12 hours

tend to leave or take family medical leave becomes powerful information to nurse leaders and others involved in the scheduling process.

At Penn State Health, in addition to the volume/demand forecasting tool available with the predictive analytics software we use, we created a simple forecasting tool using an Excel spreadsheet that documents clinical nurses resigning, taking leave, and coming off of orientation. The nurse leader completes tracking weekly; the input data calculates a unit fill rate and provides visibility of both current and future staffing gaps in the schedule. The tool helps nurse leaders focus on attaining an RN fill rate of 95%, the level of staffing at which units have the right number of core staff to handle the forecasted patient demand, without relying on costly contingency RN staffing resources. (See *Sample forecasting tool*.)

The forecasting tool, which has been in use for 2 years, is reviewed monthly by unit-based nursing leaders with the expectation that

they can project 3 months in advance. It's then evaluated by the manager of scheduling and staff deployment in the middle of every month to formulate a plan and highlight areas of concern. After the chief nursing officer and vice presidents of the nursing units review the plan, the information is placed in a shared folder for access by nurse leaders.

Leveraging this simple forecasting tool provides transparency so that nurse leaders can communicate with both clinical nurses and their associated scheduling teams, which builds trust and allows for planning. Nurse leaders and RNs who are scheduling can then facilitate peer-to-peer conversations and fill shifts. Clinical nurses feel valued as they engage with staff on their personal and career interests. These conversations take the surprise out of a transfer to another unit or resignation and provide nurse leaders with the time to develop a contingency staffing plan. Armed with this information, nurse leaders can share a timeline with

executive leadership, other leaders, and recruiters about when a projected 95% RN fill rate will be achieved. The bottom line is a robust labor-management plan.

A staffing blueprint

Although not a standalone solution, predictive analytics and the use of a forecasting tool can assist nurse leaders in strategically managing their workforce to deliver quality patient care. Adopting predictive analytics provides organizations with the blueprint needed to leverage their staffing resources while maintaining high-quality patient care. ★

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Selected reference

AMN® Healthcare. Predictive analytics in healthcare 2016 survey: Optimizing nurse staffing in an era of workforce shortages. amnhealthcare.com/2016AMNSurvey

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