Using Science to Improve the Art of Staffing

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Nurse executives are required each day to balance the costs of human resources against the anticipated clinical outcomes produced by those resources. Using sophisticated analyses, landmark studies have repeatedly demonstrated the impact of nurse staffing on clinical outcomes.[1–8] Other studies establish the business case for a value-based nursing model that produces better outcomes with fewer adverse effects while minimizing total costs of care.[9–11] One author notes: "This is more than a staffing-level or nurse:patient ratio discussion."[11] The American Nurses Credentialing Center has identified that staffing levels, recognition of nurse competency and experience, and flexible care delivery systems are foundational components of a work environment in organizations that achieve Magnet® recognition.[12]

In addition to balancing staffing costs with clinical outcomes, nurse executives need to ensure a workplace that supports professional engagement, collaboration, and interdisciplinary relationships, all of which increase staff satisfaction. Research has demonstrated the correlation between poor staffing and nurse burnout, job dissatisfaction, and intent to leave a position.[13] Even though staff engagement and staff satisfaction would be assumed by most leaders to have a direct and positive correlation, nurse executives often presume that "the number of nurses" is the most important element of staffing.

This paper describes the complexity of the staffing system, and suggests how the infusion of contemporary science with the art of current staffing could significantly improve staff allocation and deployment going forward.

STAFFING DEFINED

The term *staffing* means different things to various organizational stakeholders. To a chief financial officer (CFO), staffing refers to the operationalization of a budgeted personnel target that typically is based on average demand patterns and a target workload measure (usually hours per patient-day). If a nursing unit is budgeted for 50 full-time equivalents (FTEs), staffing is the means by which FTEs are deployed. As long as the budget balances to 50 FTEs, the CFO considers staffing to be appropriate.

To a staff nurse, however, staffing has a very different perspective, which centers on the sufficiency of assigned resources for the current patient population given the acuity of those patients. Typically expressed in terms of a nurse-to-patient ratio, this staff assignment is often perceived as the organization's obligation to ensure that the nursing staff can provide safe and effective care. The human resource consequences of not meeting this obligation include an unfavorable working environment for nurses and poor staff outcomes, such as turnover, disengagement, and burnout. Neither perspective is right or wrong, but rather represent the complexity of staffing and a leadership obligation to develop solutions that address the requirements of different stakeholders.

STAFFING AS A COMPLEX SYSTEM

The staffing system is highly complex, characterized by multiple processes with multiple dimensions that interact with or are affected by other organizational processes. To date, a variety of solutions, such as enhanced scheduling technology and participative scheduling procedures, have improved components of the system, but have had limited success on the overall system. Staffing and scheduling remain tenacious leadership problems in search of a truly innovative and contemporary solution.

Industries with highly complex systems typically use systems theory (also called *systems science*) to carefully analyze the interactions among system components and other processes. The nurse staffing system can benefit from this holistic approach that would meld high quality human resource management and transformational leadership with innovative and scientifically robust analytical tools and computational methodologies.

A combined art and science approach to resource allocation and deployment identifies the interaction between the system's processes and many qualitative and quantitative elements. This view enables leaders to better understand the levers which can improve the efficiency and effectiveness of resource allocation, produce better clinical outcomes, and simultaneously improve nurse satisfaction.

ADVANCING THE SCIENCE

The approach begins with study of the core components of staffing in order to understand these processes and their interrelationships with each other and other organizational processes.

The 4 processes of the staffing system are *budgeting, scheduling, deployment,* and *assignment*. Each process has a unique set of customer expectations, inputs, interfaces, and outputs. This article focuses on budgeting and scheduling optimization to illustrate the advances available through solution modeling and simulation.

Optimization modeling provides a means of understanding demand patterns and the interaction of that demand with business constraints and environmental variables. Using computational and logistics methodologies that are common in business process optimization, its goal is to identify the *best* outcome among many *possible* outcomes. Quantitative components of the optimization model include multiple objectives (e.g., staff preferences, maximizing coverage while minimizing costs), millions of variables (e.g., skill mix, demand fluctuation, patient acuity), plus lots of constraints (e.g., time off requirements, staff availability). Use of high quality metrics related to objectives, variables, and constraints is critical to business optimization.

Unfortunately, the key demand metric used in nurse staffing, upon which annual budgets are based, is average daily census (ADC)—often marked at midnight. Although this metric has served the industry as an effective mechanism for billing Medicare and Medicaid, it does not adequately represent the complex demand patterns of a unit, which behave in both predictable and unpredictable ways. For example, it is not unusual for a busy surgical or telemetry unit to turn over 50% to 60% of its volume during the day, with midnight representing the lowest workload of the 24-hour period.

Data related to demand fluctuation and acuity adjusted demand must be included in the model. To accurately represent mathematically the business situation related to nurse staffing, an optimization model also must include decision variables and business constraints, such as work rules and staff availability. In an organization where staff work every other weekend versus every third weekend, staff configuration will look quite different in order to cost effectively meet staffing requirements. The optimal mix of full-time to part-time staff may diverge, based on operant work rules.

MERGING THE ART WITH THE SCIENCE

Mathematical and logistics science is critical in modeling the most cost-effective budgets in a complex environment. When this science is combined with the art of staffing using transformational leadership approaches, stakeholder needs can be met.