Editorial

Nurse Staffing: The Knowns and Unknowns

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This issue of Nursing Economic$ is devoted to examining a diverse set of topics in nurse staffing. These include examining staffing levels in hospitals and creating methodologies for staffing at levels that assure safe and reliable care can be delivered; examining other aspects of the work environment that can affect performance, including shift lengths; examining the financing and payment for care; and discussing some of the operational issues in managing staffing levels. The articles in this issue (and several in the March/April 2015 issue) also offer insight into the changing labor market for nursing and look outside of acute care to reviewing our understanding of the role of registered nurses (RNs) in assuring patient safety in nursing homes.

This collection builds on over 2 decades of research and reflects both the gains in our understanding of nurse staffing and nurses’ work environment and the tasks still ahead to effectively manage staffing. In this editorial, I want to review the key findings from staffing research, identify some outstanding issues in staffing, and place the articles in this special issue into the context of these open issues. I will discuss nurse staffing levels and work environment and the delivery of safe and reliable care, the challenges of modeling safe and appropriate staffing levels, financial analysis of the costs and value of nurse care, and the changing labor market for nurses.

Nurse Staffing Levels

In 1996, in its report Nurse Staffing in Hospitals and Nursing Homes: Is it Adequate?, the Institute of Medicine (IOM) “found that little empirical evidence is available to support the anecdotal and other informal information that hospital quality of care is being adversely affected by hospital restructuring and changes in the staffing patterns of nursing personnel....” (p. 9) and that there was a “serious paucity of recent research on the definitive effects of structural measures, such as specific staffing ratios, on the quality of patient care...” (p. 9). It set forth a substantial research agenda to fill the gaps in the understanding of the changing hospital environment and the impact of staffing on patient outcomes (Wunderlich, Sloan, Davis, & Institute of Medicine, 1996).

In the years immediately after that report, the levels of nurse staffing and their association with patient outcomes became a major focus of health services researchers, with several landmark studies published in leading medical and nursing research journals including the New England Journal of Medicine (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002), JAMA (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002), Nursing Research (Blegen, Goode, & Reed, 1998), and Image: The Journal of Nursing Scholarship (Kovner & Gergen, 1998). The volume of research on staffing and outcomes increased substantially. For the most part, these studies have used data on hospital-wide staffing to compare outcomes in high-staffed hospitals to low-staffed hospitals. A 2007 systematic review and meta analysis of the association of nurse staffing levels and patient outcomes identified 96 studies with sufficient rigor to be included in the analysis (Kane, Shamliyan, Mueller, Duval, & Wilt, 2007). That review, conducted by researchers at the University of Minnesota, concluded there were statistically significant and substantively large associations of nurses per patient day and a wide range of outcomes including mortality, failure to rescue, pulmonary failure, hospital-acquired pneumonia, and the length of hospital stays, among other outcomes (Kane et al., 2007). The Kane meta analysis focused on RN staffing, but studies have also examined total staffing from licensed personnel or hours provided collectively by RNs, licensed practical nurses (LPNs), and nursing assistants. These studies regularly found an association between overall staffing hours and patient outcomes and the proportion of hours or licensed hours provided by RNs and outcomes, with more staffing and greater proportions of RNs associated with better outcomes (Needleman, Buerhaus, Stewart, Zelevinsky, & Mattke, 2006; Needleman et al., 2002).

The 1996 IOM report addressed concerns about staffing in both hospitals and nursing homes. Paralleling the research on staffing and patient outcomes in hospitals has been substantial research on staffing in nursing homes. Much of this research has focused on the role of RNs in nursing homes, generally but not consistently finding an association of greater RN staffing and better patient outcomes. In the March/April issue of Nursing Economic$, Dellefield, Castle, McGilton, and Spilsbury will note that over the past 8 years, 10 literature or systematic reviews examining these issues have been published. Dellefield and co-authors (in press) provide two key services: updating the available systematic reviews to include literature from 2008-2014, and offering reflections on how the research on these issues has evolved in response to earlier criticisms and concerns.

Nurses’ Work Environment

Paralleling the questions about staffing have been questions about the work environment of nurses and its impact on patient care, safety, nurse satisfaction, and retention. Indeed, among the earliest focus on work environment was the original work to identify the factors that made some hospitals better able to retain nurses, that is, magnet hospitals (McClure, Poulin, Sovie, & Wandelt, 1983; McClure & Hinshaw, 2002). That work led to the identification of the factors that contributed to good work environment, subsequently incorporated into the 14 Forces of Magnetism reflected in the Magnet® program, and into standard measures of work environment such as the Nursing Work Index (Aiken & Patrician, 2000) and the Practice Environment Scale (Lake, 2002). It also sparked research demonstrating that a good nursing work environment is associated with higher levels of patient safety and fewer adverse events. Indeed, in a key study, Aiken and colleagues (2011) found a strong interaction between work environment and staffing, with the benefits of lower patient-to-nurse ratios sharply diminished when the work environment was poor.

Work environment, as much as staffing levels, was the focus of the 2003 IOM report Keeping Patients Safe: Transforming the Work Environment of Nurses (Page & Institute of Medicine, 2003). One of the issues examined in that report was fatigue and the contribution of overtime and long shift lengths to nurse fatigue. The 12-hour shift has been
widely adopted in part because it appears to be preferred by many nurses but questions have been raised about whether it is good for either nurses or patients. Moving away from it will be a challenge, however, and the need and value of moving from the 12-hour shift needs further assessment. In the March/April 2015 issue of Nursing Economics$, Martin will present a pilot study assessing the impact of a shift length reduction on nurses’ fatigue and between-shift recovery times.

Is the Association of Staffing and Patient Outcomes Causal?

The general research strategy for assessing the impact of nurse staffing and work environment on patient outcomes has been to compare outcomes in hospitals with high staffing or positive work environments to hospitals with low staffing or negative work environments. This research is extensive and utilizes a wide range of measures of staffing and environment, and many different data sets with different patient populations and different hospitals. The findings are robust to alternative measures and samples. Still, for some observers, because these studies compare high and low-staffed hospitals, questions linger about whether the results are truly causal or whether other factors associated with nurse staffing – physician quality, technology, commitment to high-quality care, financial resources, differences in patient acuity or need for nursing – are the real source of the observed association.

Several researchers have attempted to address these concerns. There has been interest in using the natural experiment in California to mandate hospital nurse-to-patient ratios to assess whether patient care in low-staffed hospitals forced by regulation to improve staffing has become safer or more reliable. Some of these studies use the same cross-sectional high-staffed/low-staffed comparisons of the earlier work, with the weaknesses associated with this research design. Some studies exploited the pre-post transition to study whether staffing has increased at hospitals that were low staffed before the regulation and whether quality improved in these hospitals more than quality at hospitals that required smaller improvements in staffing. One notable study using this design is by Spetz, Harless, Herrera, and Mark (2013). The researchers divided California’s hospitals into four quartiles based on their staffing in the pre-mandate period. They found staffing increased in hospitals and the increases were higher in hospitals most likely to be subject to the staffing mandate. Results for changes in patient safety measures were mixed. Mortality following complications (failure to rescue) declined more in hospitals with the largest change in staffing but there was “little evidence of significantly different changes in other [patient safety indicators] across preregulation staffing levels” (Spetz et al., 2013, p. 393).

While this work is thoughtful and well done, there are two issues that suggest this study’s negative findings regarding improvement in other patient safety indicators be interpreted guardedly. First, the pre-post comparison implicitly assumes all else was held equal across hospitals as they changed staffing. But it is possible other resources than nurses and nursing assistants were reduced or nurses’ workloads were expanded in other ways as low-staffed hospitals attempted to accommodate to the demands for more staff. This would reduce the impact of staffing on outcomes. The second is the study does not have available critical measures of nursing work environment. As noted earlier, Aiken and colleagues (2002) found the association of higher staffing with better outcomes was substantially attenuated in hospitals with poor work environments. If low staffing in the pre-mandate period was also associated with poor work environments, the gains from improved staffing would also be attenuated. The Spetz and co-authors (2013) study is an important one, trying to make effective use of the California mandate to study staffing and outcomes, but for the reasons noted, its conclusions should be treated cautiously. The limitations in interpreting its findings suggest research studying the California mandate and staffing regulation in other states will need to be even more sophisticated to allow us to fully understand how these regulations affect quality of care. This will include incorporating more data on work environment, non-nurse resources, and hospital financial status in the analysis.

An alternative approach to addressing the causality question has been to control for other factors by using variations in staff levels within hospitals. In a 2011 study, my colleagues and I used data on nurse staffing and nurse staffing targets at the unit level in a large academic medical center to examine whether patients who were exposed to more shifts on which the targeted RN staffing was 8 hours or more below targets had higher mortality risk (Needleman et al., 2011). We found mortality risk was increased for those patients, and at levels that were comparable to those observed in the cross-hospital studies based on high and low staffing. Given the hospital had low baseline mortality, a reputation for high quality, and that care being studied looked at staffing variations within units, and therefore for care delivered by the same staff, same physicians, same treatment protocols, and same technology, this study provides some of the strongest evidence that the association of staffing and adverse outcomes is causal.

Setting and Achieving Appropriate Staffing Levels

Staffing matters. But even accepting this conclusion, the question remains: what is the appropriate level of staffing to assure care is delivered safely and reliably and nurses have the time to meet the needs of their patients? A wide range of systems are available for making staffing decisions in hospitals ranging from simple unit-based grids based on census to data-driven systems that assess individual patient nursing need using substantial patient-level data and then aggregating these needs up to the unit level. Simple grid systems are insensitive to day-to-day variations in patient need or the training and experience of nurses on the unit on a given shift, while the data-driven systems may be too costly or complex for smaller hospitals or those with less acutely ill patients. The need for effective, reliable, credible, usable systems for projecting appropriate staffing is increasing, driven in part by state requirements that do not mandate minimum staffing but do require hospitals to have staff projection systems that have been vetted by management, staff, and sometimes outside agencies.

success in implementing an internal nursing agency to accomplish this goal.

The Financial Models to Support Improved Nurse Staffing

The importance of the business case for staffing is underscored in this issue with Hill and associates (2015) discussing staffing in the context of budget and the Welton and Harper (2015) describing value-based payment models for nursing care. Earlier research examining the business case for nursing, or assessing whether improved staffing paid for itself in lower costs due to reduced length of stay and avoided adverse outcomes, priced staffing increases and cost offsets separately and generally drew two conclusions. The first was that while a higher RN-to-LPN ratio would pay for itself, increasing nursing hours would not, although savings covered much of the cost. The second was that the proportion of savings hospitals would realize depend on the systems for paying hospitals, with diagnosis-related group or per admission or other bundled payments allowing hospitals to retain savings, while per diem or proportion of charge-based payment systems shifted gains to payers. These researchers called for ongoing analysis of the actual savings hospitals would realize and how these would be changed by new initiatives in value-based purchasing (Dall, Chen, Seifert, Maddox, & Hogan, 2009; Needleman, 2008; Needelman et al., 2006).

Martsolf and co-authors (2014) examined the net costs of higher staffing using an alternative model and were more optimistic about the ability of higher staffing levels to pay for themselves. They used state hospital discharge data and state-level hospital staffing reports to examine the impact of higher staffing levels on adverse events, length of stay, and patient care costs. As in prior research, they found higher staffing associated with lower adverse event rates and shorter length of stay, and that a richer RN-to-LPN mix would be cost saving. In a notable departure from the prior business case studies, however, they found higher nursing hours were not associated with increased patient care costs. If this finding is confirmed in other studies, it is an important addition to the debate about whether increases in staffing to assure safe and reliable care are affordable.

Changing Labor Market for Nursing

Much of the staffing literature focuses on the impact of staffing on patient care and individual hospitals and nursing hospitals. But there is other literature that looks at the labor market for nurses. This research was fueled, in part, by projections of a substantial nursing shortage as the baby boomers age and need more medical care, as boomer nurses retire, and as entry into nursing appeared to slow. Auerbach, Buerhaus, and Staiger have been major contributors to this literature. As entry into nursing appeared to slow. Auerbach, Buerhaus, and Staiger (2015) examine the changing market for associate degree RNs, finding shifts in demand by hospitals and apparent shifts in employment for associate degree nurses in long-term care settings. Enjoy the issue. $