Over the past year, published research has drawn increased attention to issues of hospital nurse staffing and adverse patient outcomes. Among the published articles that have appeared are those by Aiken et al. [1], Kovner et al. [2], and Needleman et al. [3]. The article by Aiken et al. focused on post-surgical mortality, and received substantial attention because of its conclusion that, controlling for patient and hospital characteristics, the addition of one patient to a registered nurse’s workload was associated with a 7% increase in mortality.

Research examining the association between nurse staffing and mortality has reached mixed conclusions. Needleman et al. found an association between nurse staffing levels and ‘failure to rescue’, defined in that study as death among patients who had one of five complications (pneumonia, sepsis, shock or cardiac arrest, upper gastrointestinal bleeding, and deep vein thrombosis), in surgical patients and to a lesser extent in medical patients. While Needleman et al. measured nurse staffing in a different way to Aiken et al., reanalysis of the study generates an estimate of the magnitude of the impact of nurse staffing on failure to rescue similar to that reported by Aiken and colleagues. Needleman et al. did not, however, find an association with overall in-hospital mortality and nurse staffing.

At least four other studies have found an association between nurse staffing and hospital mortality [4–7], while others have not [8–10]. How should these conflicting findings be viewed? Firstly, it must be recognized that because many factors influence hospital mortality, it can be difficult to tease out the effect of an individual factor. Many of these studies have used administrative data, including the three studies cited that were published in 2002 [1–3]. The problems associated with conducting studies of patient outcomes using administrative data have been well documented [11–14]. The measurement error present in these data is likely to make observing associations that exist in the population more difficult. Secondly, risk adjustment is critical to disentangling the effects of patient and hospital characteristics, including staffing, on patient outcomes. Although researchers have become more aggressive in controlling for differences in patient risk, even with risk adjustment it is more likely that an association may be observed between nurse staffing and mortality in subpopulations in which risk is more homogeneous or where patients are more sensitive to lapses in care. Thus, Aiken et al. [1] observed an association among post-surgical patients, and Schultz et al. [7] examined mortality among patients with acute myocardial infarctions. Both Aiken et al. [1] and Needleman et al. [3] found an association between staffing and mortality among patients with severe complications. Therefore, on balance we believe the conclusion that should be drawn from these studies is that there is a strong, but not yet conclusive, case for an impact of nurse staffing on mortality.

Beyond mortality

Research has also examined the association between nurse staffing and adverse outcomes other than mortality. Even more so than with the mortality studies, studies of other outcomes have used a variety of data sources and measures, including many nursing unit-based studies involving small samples of patients [15], and more than a dozen large sample, hospital-level studies. The studies have used a mix of administrative data, i.e. data from chart abstracts or data collected directly, and a range of alternative measures of staffing. Studies have found associations between nurse staffing and hospital-acquired pneumonia [3,16–21], urinary tract infection [3,16,19,22], sepsis [17,18,20,23], nosocomial infections [24–26], pressure ulcers [19,21,22], upper gastrointestinal bleeding [3], shock and cardiac arrest [3], medication errors [22,27], and falls [27–30]. Studies have also found an association between nurse staffing and longer than expected length of stay [3,7,17–20,24,31], which is interpreted as a general measure of complications and delays in treatment. For these studies, the data limitations and measurement problems noted with respect to examining mortality also apply. However, given the breadth of methods and data sources, these studies, taken together, provide a strong evidence base for concluding that there is an association between nurse staffing and adverse outcomes.

Efforts to improve nursing-related patient safety

The link between nurse staffing and adverse outcomes has been noted in the field and has led to some action. The American Nurses Association began its nursing safety and quality initiative in 1994 to develop hospital quality indicators and methods with which to implement them, and to recruit
nurses and hospitals to collect data in six states [32–34]. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has added a new standard for accreditation, requiring organizations to use ‘data on clinical/service screening indicators in combination with human resource screening indicators to assess staffing effectiveness’. The indicators chosen by JCAHO draw heavily on the literature regarding nurse staffing. In its report entitled In Our Hands: How Hospital Leaders Can Build a Thriving Workforce [35], the American Hospital Association calls for changes to bring workloads and staffing into better balance and to assure staff more time with patients. The Robert Wood Johnson Foundation has focused on improving nursing performance and has funded the National Quality Forum to develop a set of nursing performance measures.

Ultimately, the initiatives of these organizations will translate into pressure to implement change at the hospital level to measure and improve nursing performance. To accomplish this, hospitals will face both conceptual and practical problems. The greatest conceptual problem is that nursing processes are not well documented, and failures in these processes that lead to adverse outcomes are often neither charted nor observed. Unlike efforts to improve conformance with specific standards of treatment, such as ensuring that post-AMI patients are discharged with beta blockers unless they are contraindicated, or that surgical patients receive timely prophylactic antibiotics, efforts to strengthen nursing will rely on a combination of research-identified links between variables such as staffing levels, mix, or working conditions and patient outcomes, root cause analysis of adverse events with limited documentation of the process of care, and professional judgment of staff nurses and others about the level of safety they are providing. Methods for carrying out quality improvement projects in the face of these limitations need to be developed quickly.

On a practical level, quality improvement with respect to nursing will require setting up mechanisms for collecting and interpreting nursing data. The American Nurses Association’s efforts have already provided some lessons in how this can be done [36,37], but more work is needed, as are forums for sharing the experience in measuring and improving nursing systems.

Nurses are extremely good at on-the-spot problem solving, but this success often allows the hospital and nurse to avoid investing the time and effort in addressing the system-level root causes that generate the problems to begin with [38,39]. Research on nursing and patient safety in general underscores the need to attack system problems at the system level, and the range and magnitude of effects associated with nurse staffing should generate an urgency to act. Some actions will involve those outside the hospital, such as payers, regulators, and accreditors; however, action is also required inside the hospital. Those involved in quality improvement must give higher priority to improving general processes of care. They must find effective ways to monitor outcomes and learn from experience related to nursing, and they must free up resources and create opportunities to enable change in nursing systems.

These efforts will be accomplished best using a team approach, involving nurses, physicians, pharmacists, administrators, and human resources and medical records personnel, and even the new graduate nurse starting his or her first clinical position. Working as a team, members can: (i) ascertain which outcomes to measure; (ii) determine how such outcomes can best be measured; (iii) develop data-gathering processes and analyze results; and (iv) feed information back to clinicians (so that they may learn how to improve care) and administrators (so that they may make more informed decisions). Team-oriented processes will emphasize systems level thinking, bring forth new ideas and hypotheses, foster collaboration, build awareness and respect for what nurses and others on the patient care team do, and, most importantly, ensure that at the end of the day real efforts are made to improve the quality of patient care, promote a safer and more rewarding patient care environment, and minimize the risk of patients experiencing a preventable adverse outcome.

Researchers have made important discoveries about the relationship between nursing and patient outcomes. Indeed, these discoveries have pushed the field a very long way in a relatively short period of time, have generated much attention inside and outside health care, and have highlighted the vital contribution of nurses to the quality of patient care. The goal is now to broaden the involvement of clinicians and non-clinicians, payers, regulators, and consumers in interdisciplin ary collaborations, and to find new ways to use what we now know to fuel tomorrow’s discoveries regarding the link between nursing and patient outcome, and put the results of these efforts into practice for the good of the patient.

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Acknowledgements

We thank Mary Blegen for providing us with her list of published studies on nurse staffing and quality of care. Funding was provided by grant R01 HS09958 from the Agency for Healthcare Research and Quality.

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