

**The Business Case for Reducing
Patient-to-Nursing Staff Ratios
and Eliminating Mandatory
Overtime for Nurses**

Prepared for the
Michigan Nurses Association

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Introduction

In May 2004, Michigan State Senator Bruce Patterson (R-Canton) introduced a bill entitled the “Safe Patient Care Bill” to the Michigan legislature. The purpose of this bill is to amend Michigan’s Public Health Code (1978 PA 368) to incorporate standards that will assure that all Michigan acute care facilities will have sufficient registered professional nurses to provide and ensure safe patient care. This bill establishes minimum patient-to-registered nurse (RN) ratios through establishment of a staffing plan for each acute care facility and through the use of an acuity system to increase RN staffing capacity should the acuity of the patients treated warrant it. In addition, mandatory overtime as a staffing strategy is eliminated except in the case of a serious and unforeseen emergency situation.

Lowering the patient-to-RN staffing ratio is not an insignificant or routine task, either from a management point of view or from a medical treatment point of view. Over the past decade there have been a number of studies that have reached one or more of the following conclusions regarding the relationship of patient load to direct-care nursing availability in acute care facilities:

- Fewer patients per nurse is associated with higher job satisfaction, lower burnout, higher rates of retention, and lower rates of turnover among nurses.
- Fewer patients per nurse is associated with higher quality of care, especially as illustrated by lower mortality rates, complications, and adverse events.
- Fewer patients per nurse is associated with shorter length of stay and, ultimately, lower overall costs per discharge.

It is important to note, however, that any effort to reduce the ratio of patients to RNs who are engaged in providing direct care to patients entails a number of financial and other costs to acute care hospitals. The costs to hospitals for having lower patient-to-RN ratios are generally identified in terms of the direct and immediate costs of salaries and benefits for additional nurses, along with the indirect costs associated with recruiting, hiring, and orienting additional nursing staff. Reducing or eliminating mandatory overtime for RNs also fits into this equation, as a larger complement of full-time and regularly scheduled nurses is required to make this feasible. There is some documentation concerning the costs of reducing or eliminating mandatory overtime for nurses, although most of the analysis on this topic has focused mainly on the costs and benefits of reduced patient ratios for full-time staff RNs. The impact of reducing mandatory overtime for RNs on staffing issues and patient care will be addressed in a separate report.

On the other side of the ledger, a number of research activities reported on in the health care literature over the past decade indicate that there are significant benefits associated with lower patient-to-nurse ratios. Actions that reduce the number of patients per nurse in acute care hospitals can, and often do, produce outcomes that are beneficial in a number of ways. Operationally, these benefits are manifested in the quality of care provided to hospital inpatients, reductions in the use of hospital resources, and improvements in the quality of work life for nursing staff. The reported benefits include (1) fewer complications for patients during their course of care in the hospital, (2) fewer adverse events occurring to patients during their course of care, and (3) an improved work environment for RNs (and other personnel) that result in a

lower rate of RN turnover. Each of these benefits has specific financial or cost implications (see Table 1). The benefits of reducing or eliminating mandatory overtime for RNs fall within the same categories. Additionally, reduction or elimination of mandatory overtime also reduces the problems associated with fatigue and burnout that may also, subsequently, be manifested in reduced complications, fewer adverse events, and less nursing staff stress.

Table 1: Cost Benefits of Reduced Patient-to-Nurse Ratios

1. Fewer complications resulting in:
 - + Reduced costs of treatment.
 - + Reduced lengths of stay.

 2. Reduced adverse events resulting in:
 - + Reduced costs of treatment.
 - + Reduced patient risk and, indirectly, reduced liability costs.

 3. Reduced nursing staff turnover leading to:
 - + Reduced costs of replacing nursing staff.
 - + Reduced costs for temporary or traveling nurses.
 - + Reduced overtime costs.
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The following sections will quantify, to the extent possible, both the costs and the benefits that have been identified by reputable organizations and through credible research about nursing care and the ratio of patients to nurses in acute care hospitals. In some cases, the data that are cited identify professional nurses only. In such cases, the nursing cadre consists of both Registered Nurses (RNs) and Licensed Practical Nurses (LPNs). In other cases, the research cited refers to RNs only. These distinctions will be noted wherever necessary.

Financial Costs of Reducing Patient-to-Nurse Ratios

To date, only the state of California has implemented legislation that mandates the establishment of patient-to-nurse ratios in acute care hospitals. (www.calnurse.org/finalrat/ratio7103.html.) In California, this legislation identifies professional nursing staff ratios that do not distinguish between RNs and Licensed Vocational Nurses.¹ In an article that appeared in *Health Affairs* in 2002, Coffman, Seago, and Spetz estimated that the cost of implementing California's patient-to-nurse ratios would add an average of between 1.0% and 1.7% to the total operating costs of approximately 270 California acute care and community hospitals. Another study indicated that the additional cost to California hospitals to reduce the patient-to-nurse ratio was likely to be less than half the cost estimated by Coffman, Seago, and Spetz (Berliner, et al., 2002).

Using Coffman's estimates along with data on Michigan hospital finances published by the Citizens Research Council of Michigan (2003), the additional cost of implementing California's recommended patient-to-nurse staff ratios among Michigan hospitals would range between \$161.9 million and \$275.2 million in 2002, the latest year for which these data are available. As noted above, California's staffing ratio legislation applies to both RNs and LVNs. Although LPNs in all employment settings in Michigan in 2002 had a mean annual salary that was

¹ LVNs in California are similar to LPNs in Michigan.

approximately 69% of the mean annual salary for RNs in all employment settings,² we may conservatively estimate that the most realistic cost of implementing California-type staffing ratios in Michigan hospitals would be closer to increasing mean hospital operating costs by 1.7% (\$275.2 million) than by 1.0% (\$161.9 million). The impact of an increase of 1.7% in operating costs on Michigan hospitals is illustrated in Figure 1, below.

Although these costs are not insignificant and they would add to the financial stress that most Michigan hospitals have reported for the years 1998, 2000, 2001, and 2002 (CRC, 2003), these additional costs still only represent a very small portion of Michigan acute care hospital operating costs. Michigan hospital operating costs in 2002 as originally reported were \$14.01 billion. If implemented at these rates, the cost of lowering patient-to-nurse ratios in 2002 would raise statewide hospital operating costs in Michigan to \$14.25 billion.

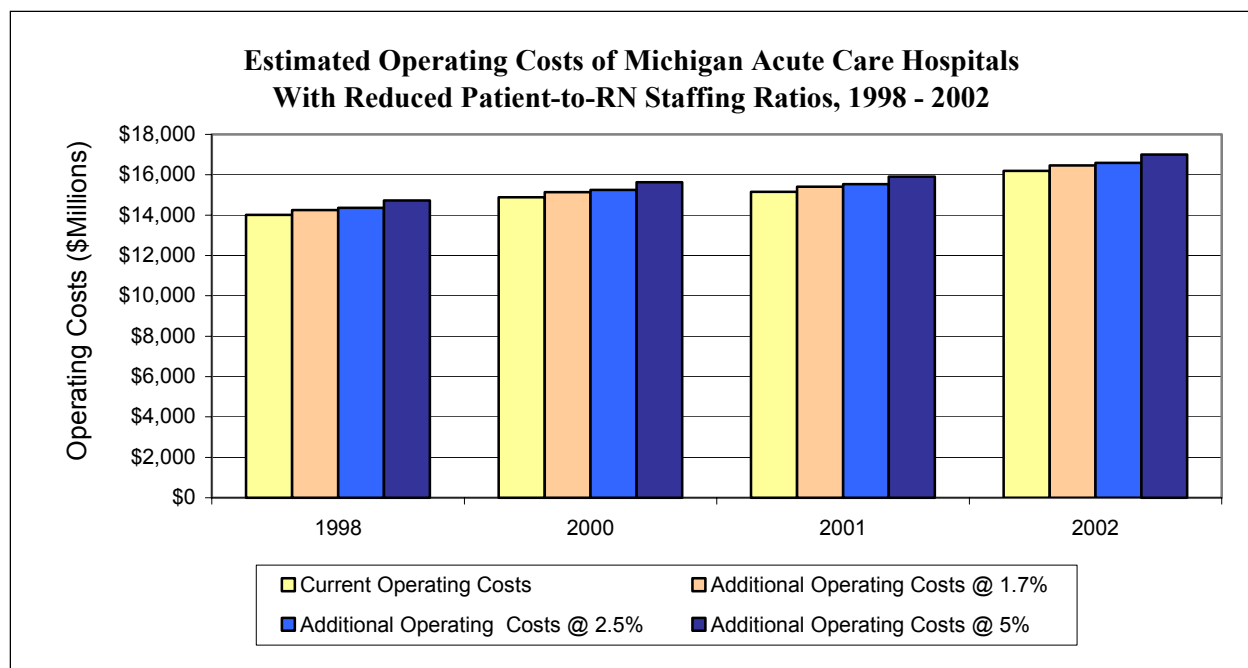


Figure 1

Source: Calculations applied to hospital operating expenses as supplied by the Citizens Research Council of Michigan (2003).

Another study approached this issue from a different perspective and was limited solely to the cost of adding RNs to staff. This Agency for Healthcare Research and Quality (AHRQ)-funded study reported that for every 1% increase in RN FTEs there was an increase of approximately 0.25% in hospital operating costs (McCue, Mark, and Harless, 2003). Assuming that the implementation of lower patient-to-nurse ratios in Michigan hospitals would require a 10.0% increase in average RN full-time equivalents (FTEs) in Michigan hospitals, this would translate to a 2.5% annual increase in hospital operating expenses. A 20.0% increase in RN FTEs would result in approximately a 5% increase in Michigan hospital operating costs. The impact of both

² U.S. Department of Labor, Bureau of Labor Statistics. Occupational Employment Statistics. http://www.bls.gov/oes/2003/may/oes_mi.htm#b29-0000, accessed May 12, 2004.

of these assumptions on Michigan hospital operating costs using data provided by the Citizens Research Council of Michigan for 1998 through 2002 are also illustrated in Figure 1, below.

This study, however, also stated that “. . . **increased staffing of RNs does not significantly decrease a hospital’s profit, even though it boosts the hospital’s operating costs** [emphasis added]. A 1% increase in RN full-time equivalents increased operating expenses by about 0.25 percent but resulted in no statistically significant effect on profit margins. In contrast, higher levels of non-nurse staffing caused higher operating expenses as well as lower profits” (Stafford and Rutherford, 2004).

Most other studies of the financial impact of nursing staff levels have been more narrowly focused. Instead of addressing overall hospital operating costs, several studies have focused on the transitive relationship between nursing staff levels, quality of work life and job satisfaction, nurse burnout and turnover, quality of care provided to patients, and the cost of changes in the quality of care. Figure 2A illustrates the basic premise illustrated by several of these studies. A second diagram, Figure 2B below, expands this premise slightly.

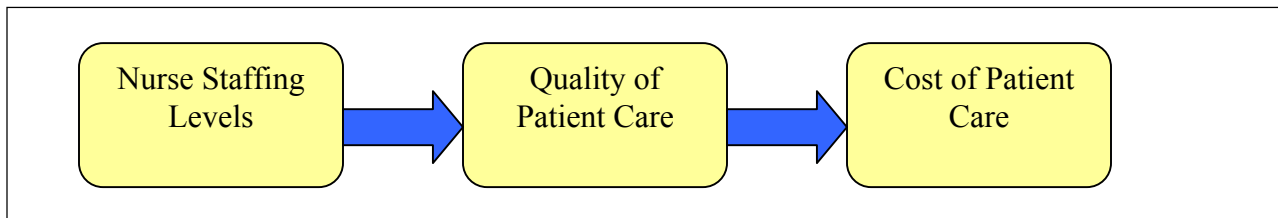


Figure 2A

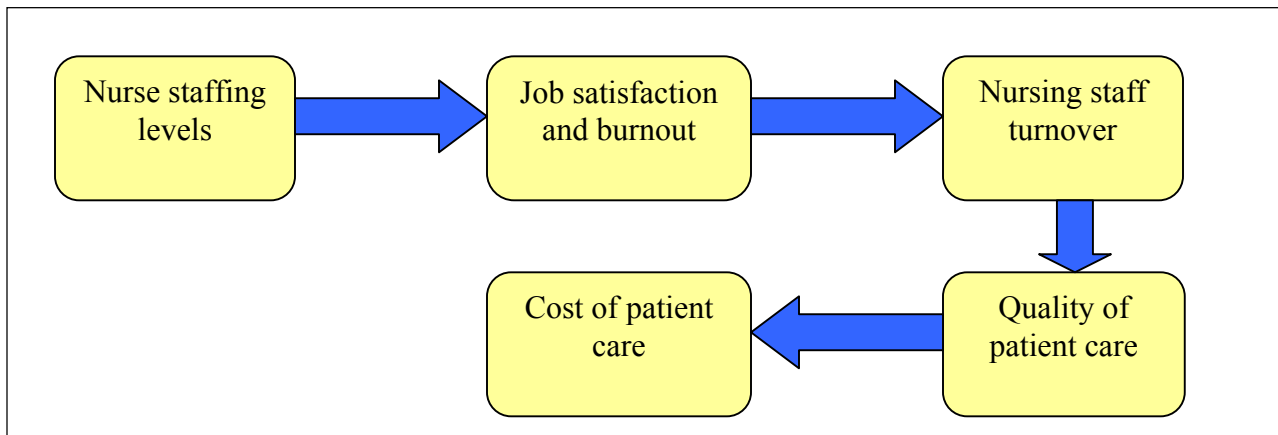


Figure 2B

In addition, although not illustrated in Figures 2A and 2B above, the cost of nursing staff turnover and the costs of hiring temporary, traveling, or agency nurses to fill are also likely to generate considerable additional costs.

Patient-Care Benefits of Reducing Patient-to-Nurse Ratios

The relationship between nurse staffing and patient outcomes is well documented. Large proportions of nurses in the United States consistently report that hospital nurse staffing levels are inadequate to provide safe and effective care. In one recent nationwide study of patient-to-nurse staffing ratios a principal finding was that three in five hospital nurses reported that the staffing level at their respective hospitals were having a negative effect on the quality of care that patients received (Peter D. Hart Research Associates, 2003). Linda Aiken, in a presentation to the Michigan Nurses Association in October 2003, specified the link between nurse staffing and patient outcomes. “Nurses are the surveillance system for early detection and intervention for adverse occurrences” and “Surveillance is influenced by nurse staffing ratios, nursing skill mix, and educational levels of RNs.” These observations are not isolated. A recent report by the Joint Commission on the Accreditation of Healthcare Organizations reported that a lack of adequate nursing staff contributed to nearly one-fourth of all the unanticipated problems that lead to death or injury to hospital patients (JCAHO, 2002). Another recent study reported that for every additional patient over four in a nurse’s workload, the risk of death for surgical patients increase by 7.0% (Aiken et al., 2002).

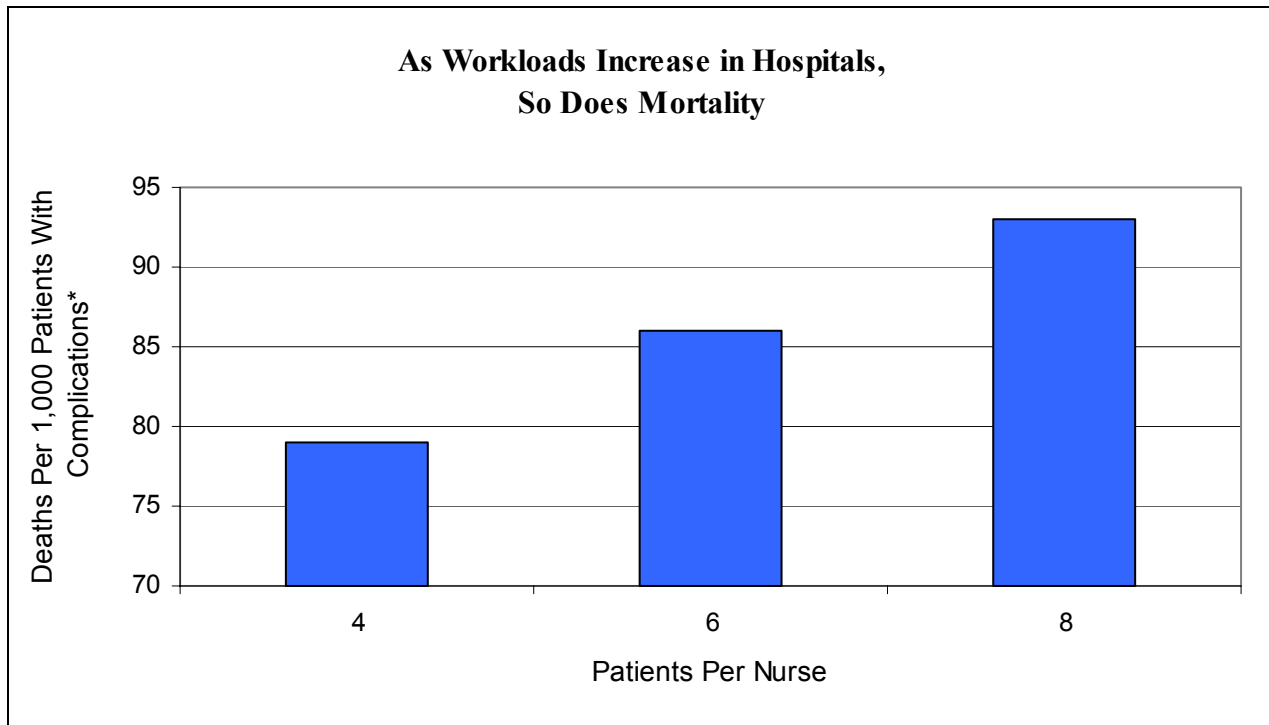


Figure 3

* Adjusted for patient and hospital characteristics.

Source: Aiken, 2003.

The Institute of Medicine 2004 report, *Keeping Patients Safe: Transforming the Work Environment of Nurses* put it this way, “research is now beginning to document what physicians, patients, other health care providers, and nurses themselves have long known: how we are cared for by nurses affects our health, and sometimes can be a matter of life or death” (p. 2).

Moreover, citing studies by Kahn et al., 1990, Mitchell and Shortell, 1997, and Rubenstein et al., 1992, the IOM observed that “nursing actions, such as ongoing monitoring of patients’ health

status, are directly related to better patient outcomes” (pp. 2-3). A study of medication errors at two hospitals in the mid-1990s demonstrated that nurses were responsible for intercepting 86% of all medication errors made by physicians, pharmacists, and others before those errors actually reached the patient (Leape et al., 1995).

The reasons for these findings are fairly obvious. Having too many patients reduces the time nurses can attend to and observe individual patients, and the extra workload often leads to fatigue, and in combination the two can lead to errors. In addition, understaffing means patients often have to wait longer times for medication or medical procedures, and there is often not enough time to educate patients and their families (Peter D. Hart and Associates, 2003, p. 5). The authors of an extensive review of several of these AHRQ-funded studies came to the rather blunt conclusion that “hospitals with low nurse staffing levels tend to have higher rates of poor patient outcomes. . . .” (Stanton and Rutherford, 2004).

A national study of 601 registered nurses who provide direct patient care in a hospital emergency room, operating room, or medical-surgical unit identified each of the following as a serious problem resulting from nurse understaffing.

Table 2: Problems as a Result of Understaffing

Proportion of Hospital Nurses Rating Each as a Serious Problem			
Problem		Rated as Serious	
		Nurses leaving the hospital due to burnout	
Nurses not having enough time to comfort and assist patients and their families		62%	
Nurses not having enough time to educate patients and their families		62%	
Patients having to wait for long periods of time for their medication and medical procedures		44%	
The frequency of medical errors, such as improper medication or dosages		26%	

Source: Peter D. Hart Research Associates, Inc., 2003.

Complications

As the relationship between patient-to-nurse staffing levels and quality of patient care has become better documented, research attention in recent years has increasingly focused on specific patient outcomes that are related to nursing staff levels and the costs of these outcomes, often through retrospective analysis of hospital patient databases in a number of states and elsewhere. The underlying assumption is that expansion of the nursing cadre performing hands-on patient care will result in better quality of care and better patient outcomes. While there are substantial costs associated with expanding the nursing staff to reduce the patient-to-nurse ratio and to minimize or eliminate nursing staff overtime, better patient care and outcomes will pay for

themselves through reduced costs associated with complications, adverse events, and reduced patient lengths of stay, not to mention reduced turnover costs and minimization of reliance on high-priced temporary, traveling, or agency nurses.

Specific adverse events or complications that are routinely associated with higher patient-to-nurse ratios include:

- Urinary tract infections
- Pneumonia
- Shock
- Upper gastrointestinal bleeding
- Longer length of stay
- Higher 30-day mortality
- Higher failure-to-rescue rates³

Another study (Dimick et al., 2001) also identified reintubation among surgical patients as an additional complication that is associated with high patient-to-nurse ratios.

The financial costs of some of these complications have been estimated by researchers in a variety of settings. Complications among intensive care patients in 33 hospitals following liver surgery, for example, were examined in relationship to patient-to-nurse staffing levels (Dimick, et al., 2001). Those patients treated in ICUs with higher patient-to-nurse ratios exhibited greater pulmonary complications and higher total patient costs than those in units with lower patient-to-nurse ratios. Specifically, higher patient-to-nurse ratios were associated with:

- Higher risk for pulmonary complications ($p < .01$)
- Increased risk for reintubation ($p = .001$)
- Increased individual patient cost by \$1,428

A study of 124,204 surgical patients in 232 nongovernmental acute care hospitals in California in the mid-1990s found that an increase in the amount of time spent by RNs with patients was associated with decreased likelihoods of several complications and adverse events and that “the occurrence of each adverse event was associated with a significantly prolonged length of stay and increased medical costs” (Cho et al., p. 1). Complications among surgical patients that were likely to be reduced as a result of greater RN care included pneumonia, urinary tract infection, wound infection, and sepsis.⁴

All of these events are associated with prolonged length of stay, increased medical costs, and increased mortality. Limiting discussion exclusively to hospital-acquired pneumonia:

³ Death of a patient with a life-threatening complication for which early identification by nurses and medical and nursing interventions can influence the risk of death. (Stanton and Rutherford, p. 2)

⁴ Contrary to the other findings, the incidence of pressure ulcers was shown to *increase* with greater RN care. The authors hypothesize that a greater proportion of RN care includes more observation of patients, thus resulting in greater likelihood of identifying and treating pressure ulcers.

- The greater the number of RN hours per patient day, the lower the likelihood of pneumonia among recovering surgical patients (2.17% to 1.33%).
- The greater the proportion of RNs to all nursing staff the lower the likelihood of pneumonia among recovering surgical patients (2.16% to 1.28%).
- Surgical patients with pneumonia exhibited an average 74.0% increase in total length of stay.
- On average, surgical patients with pneumonia exhibited an increase of between \$22,390 and \$28,505 in costs *per patient*.

In a review of five AHRQ-funded studies of the relationship between hospital nurse staffing and patient complications, Needleman, et al. noted that, “all five studies found at least some association between lower nurse staffing levels and one or more types of adverse patient outcomes” (Needleman, et al., 2001, p.3). One of the five studies examined approximately 5 million medical patients’ records and approximately 1.1 million records of surgical patients treated at 799 hospitals across the nation during 1993.

This study found that greater RN care (e.g., lower patient-to-nurse ratios) among medical patients is associated with lower rates of urinary tract infections (-4% to 12%), upper gastrointestinal bleeding (-5% to -7%), hospital-acquired pneumonia (-6% to -8%), and shock or cardiac arrest (-6% to -10%). Among surgical patients, more RN care was associated with reduced rates of urinary tract infections (-5% to -6%), failure to rescue (-4% to -6%), and hospital-acquired pneumonia (-11%). As noted above, each of these complications has an associated financial cost. (Needleman, et al., 2001).

Finally, a study of licensed nurses (RNs and LPNs) and the incidence of complications and adverse events among medical and surgical patients in Pennsylvania hospitals revealed that having more licensed nurses on staff was associated with lower incidence rates of almost all adverse events (Unruh, 2003). For example, a 10.0% increase in licensed nurses on staff was associated with an average decline of 1.5% in lung collapses, 2.0% decrease in pressure ulcers, and slightly less than a 1.0% decrease in urinary tract infections.

Adverse Patient Events

Much of the same research reviewed above also dealt with a number of adverse events, including adverse drug events, cardiac arrest, fall or injury, failure to rescue, and 30-day mortality. Although no estimates of the costs associated with these events were developed, the following findings are associated with an increase in the number of patients for each nurse (Aiken et al., 2002; Aiken, Sloane, and Lake, 1999):

- One additional patient per nurse is associated with a 7% increase in the likelihood of dying within 30 days of discharge.
- One additional patient per nurse is associated with a 7% increase in the likelihood of failure to rescue.
- An increase of as little as one-quarter nurse FTE per patient day resulted in a 20.0% decrease in the 30-day mortality rate of AIDS patients.

Summary: Complications, Adverse Events, and Costs Associated With High Patient-to-Nurse Ratios

1. High patient-to-nurse ratios are associated with higher rates or probabilities of:
 - Pulmonary complications, including hospital-acquired pneumonia
 - Reintubation
 - Urinary tract infections
 - Shock
 - Upper gastrointestinal bleeding
 - Wound infection
 - Sepsis
 - Failure-to-rescue rates
 - 30-day mortality
2. Higher patient-to-nurse ratios are associated with greater patient average length of stay.
 - For surgical patients, the average length of stay in the hospital may increase by as much as 74.0%. The average length of stay in Michigan hospitals was approximately 4.2 days in 2000. A 74.0% increase in average length of stay could potentially add as much as 3.1 days to the average surgical patient's stay in the hospital.
3. Higher probabilities of hospital-acquired pneumonia and other complications produce greater patient length of stay, and this leads to greater likelihoods of adverse events occurring and, ultimately, to higher hospital costs. Hospital-acquired pneumonia is the most common of the complications identified in the studies cited.
 - + Hospital-acquired pneumonia among surgical patients may add between \$22,390 and \$28,505 *per patient* to hospital costs.
 - + Michigan hospitals treat approximately 1.26 million patients per year: Excluding newborns, there were 1.16 million discharges from Michigan hospitals in 2000, and 29.7% or 345,219 were surgical patients.
 - + Approximately 2.59% of hospital surgical patients present hospital-acquired pneumonia, and reducing the patient-to-nurse ratio at Michigan hospitals is estimated to reduce this rate by 11.0%.
 - + Estimates of hospital costs savings vary depending on the per-patient savings estimate used. Note that the per-patient savings used in these estimates were determined in the mid-1990s. Current cost estimates are significantly higher.

Table 3: RN Staffing-Related Pneumonia Cost-Savings Estimates

An 11% reduction at \$22,390 per patient = \$22.03 million saved per year in Michigan hospitals.

An 11% reduction at \$28,505 per patient = \$28.05 million saved per year in Michigan hospitals

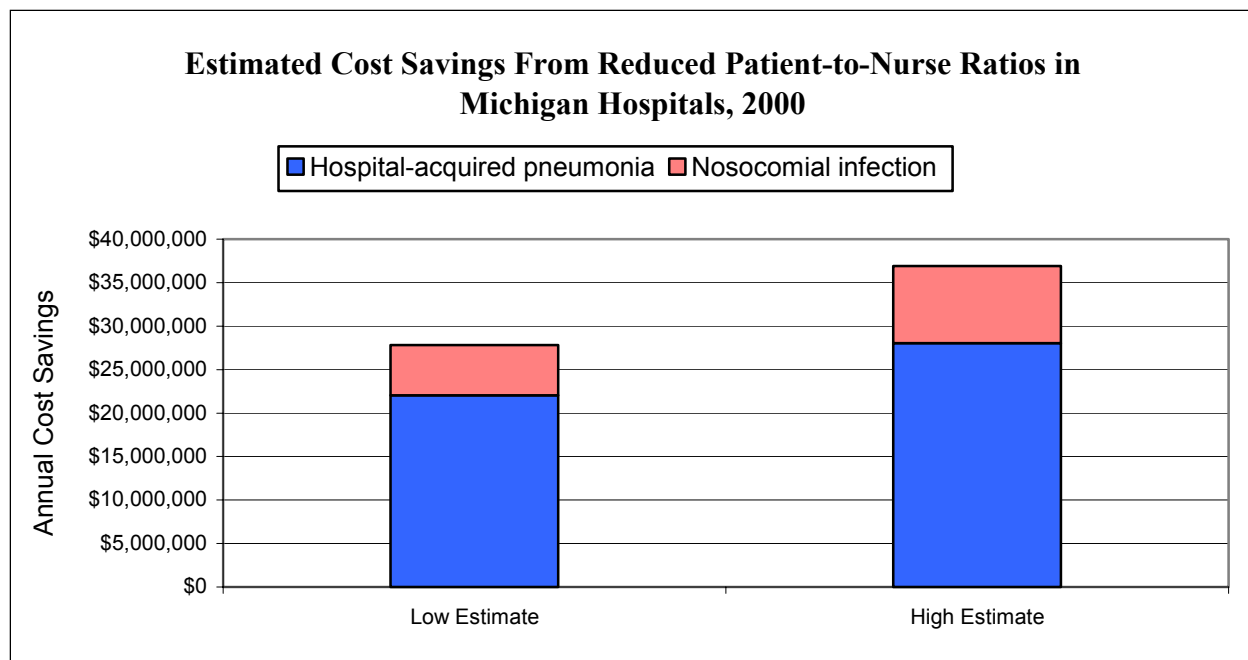


Figure 4

Source: Public Policy Associates, Incorporated, 2004.

- Nosocomial infection rates (urinary tract infection [UTI], wound infection, sepsis) affect approximately 1.36% of all surgical patients [Cho et al., 2003]).
- Using UTI as a marker for all nosocomial infection categories, Needleman et al. (2001) estimate a 5.0% to 6.0% reduction in infection rates associated with a lower patient-to-RN staffing ratio.
- Cho et al. (2003) also indicate that the occurrence of sepsis produced an even greater increase in patient costs, although a specific dollar amount was not identified. Regression coefficients indicate costs are more than 10% greater than the additional costs of pneumonia. Cost savings from reductions in nosocomial infections are estimated at between \$24,629 and \$31,356 *per patient*.

Table 4: RN Staffing-Related Nosocomial Infection Cost-Savings Estimates

A 5% reduction @ \$24,629 per patient = \$5.8 million savings per year in Michigan hospitals.

A 6% reduction @ \$31,356 per patient = \$8.8 million savings per year in Michigan hospitals.

Cost Benefits of Reducing Nursing Staff Turnover

A number of studies conducted over the past decade have demonstrated a clear relationship between patient-to-nurse ratios, staff turnover, and changes in the cost of hospital care. This is particularly important because the cost of nursing staff turnover is a major hospital expense that can be avoided, or at least reduced, by reducing the rate at which the RN staff—especially those RNs performing direct patient care—need to be replaced each year due to nurse burnout, poor working conditions, or other problems associated with relatively high patient-to-RN staff ratios.

The magnitude of this issue is illustrated by the findings of a nationwide RN study conducted in 2003 in which more than two-thirds of medical-surgical nurses reported they were responsible for six or more patients during an average shift, and these nurses indicated that the number of patients they *should* be caring for is no more than 5.2 (Peter D. Hart Research Associates, Inc., 2003). Patient-to-nurse ratios drawn from this study are illustrated in Figure 5.

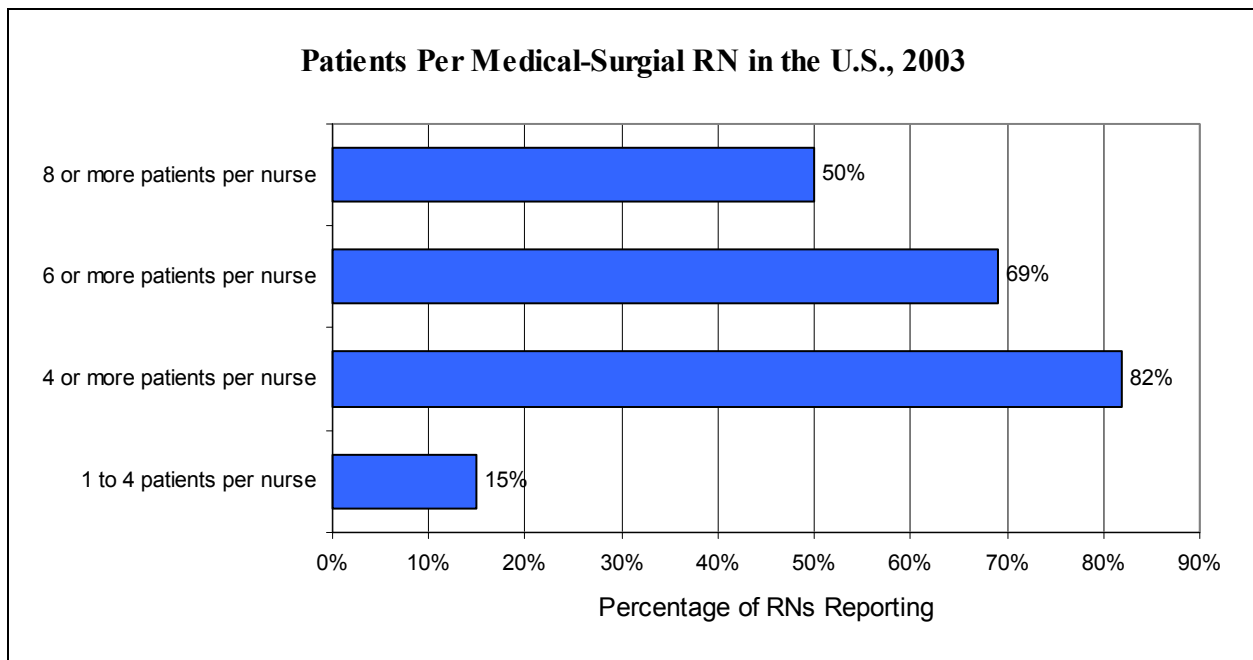


Figure 5

Source: Peter D. Hart Research Associates, Inc., 2003.

These reported levels of patient-to-RN ratios are significant, as much of the research on this topic in recent years has linked negative patient outcomes to ratios greater than four patients to each nurse. Moreover, staffing levels affect job satisfaction; “with the lowest levels of satisfaction among nurses who feel that they are responsible for more patients than they should be, as well as among nurses with higher patient-to-nurse ratios” (Peter D. Hart Research Associates, Inc., 2003, p. 5). The result is nurse burnout and nurses leaving patient care. Sixty-two percent of the nurses surveyed in 2003 indicated that they have considered leaving the patient care field in order to find work that is less stressful and physically demanding (Ibid., p. 7). In contrast, nurses indicate that improving nurse staffing levels would do the most to improve their jobs and to reduce nurse attrition (Ibid.). These results are consistent with an earlier study in which 89% of

nurses leaving patient care indicated they were doing this to reduce the stress and physical demands of direct patient care (Peter D. Hart Research Associates, Inc., 2000).

During the past two years, Voluntary Hospitals of America, Inc. (VHA) has undertaken several influential studies in direct response to the health care workforce shortages that have challenged their member hospitals in recent years.⁵ Among the most important aspects of this research has been VHA's interest in placing a dollar value on the lack of stability in the hospital workforce and, conversely, a dollar value on the reduction in costs to member hospitals that may be achieved if staff turnover—especially nursing turnover—is reduced.

- + Based on research conducted by the American Hospital Association, VHA anticipates that the RN vacancy rate for all hospitals has grown from 9.5% in 1999 to 12.7% in 2001, and that this rate will grow to approximately 17% in 2005. According to the VHA, “as turnover rates within health care organizations grow . . . high vacancy rates have a substantial impact on the organization's financial status and the situation is likely to worsen” (Kosel and Olivio, 2002, p. 5).
- + Analysis of 235 hospitals by VHA found that health care organizations with low staff turnover rates (annual turnover rates of 4.0% to 12.0%) have shorter patient lengths of stay than hospitals with higher turnover rates; conversely, those identified with medium staff turnover rates (12.0% to 21.6%), or high staff turnover rates (21.6% to 43.8%) have higher patient length of stay. (Gelinis, Bohlen, and DeJoy, 2002, p.8). Severity-adjusted length of stay varied from 3.81 days in low turnover hospitals in 2001 to 5.02 days for high turnover hospitals, as noted in Figure 6, below.
- + As commonly recognized, increased length of stay leads to increased costs. The same analysis of 235 VHA hospitals revealed that patient costs are directly associated with the amount of turnover. As illustrated in Figure 7, below, patient costs per adjusted discharge varied from \$5,268 for hospitals with relatively low staff turnover to \$7,190 for hospitals with relatively high staff turnover. (Ibid., p. 9)

⁵ Voluntary Hospitals of America (VHA) is a member-owned health care cooperative that provides its members with products and services that improve their clinical and operational performance. VHA has more than 2,200 member hospitals in 48 states and the District of Columbia. These members represent approximately 25% of all U.S. community or acute-care hospitals.



Figure 6

Source: Voluntary Hospitals of America, Inc., 2002.

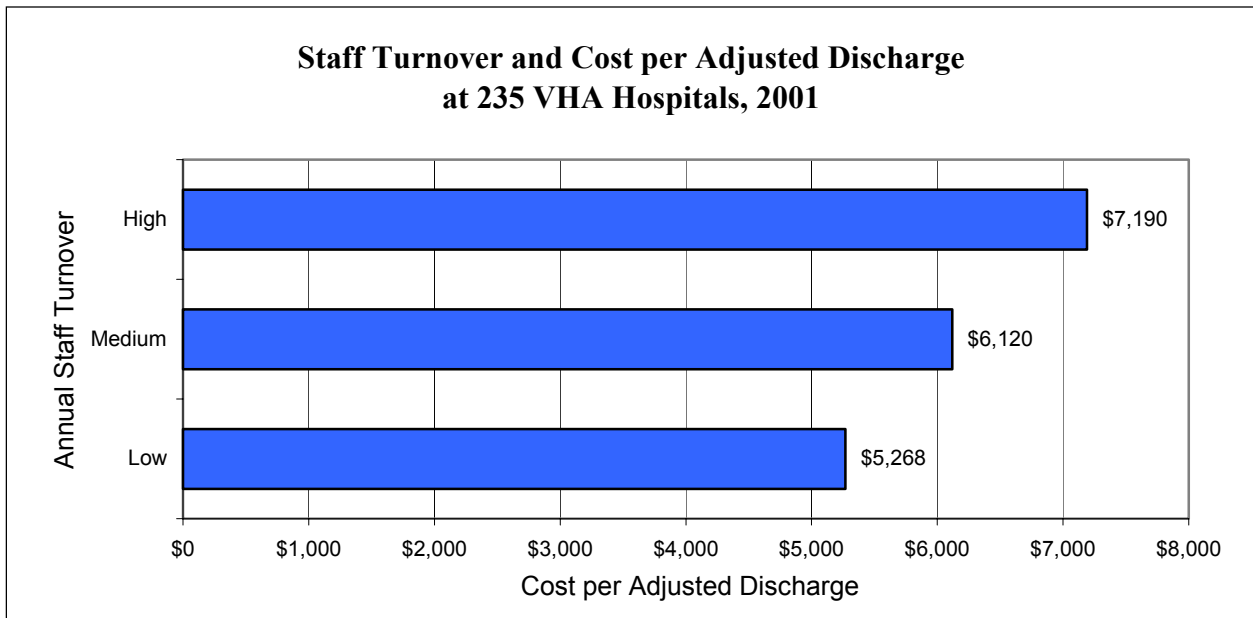


Figure 7

Source: Voluntary Hospitals of America, Inc., 2002.

Using these figures to estimate the costs savings that may be generated for Michigan hospitals' approximately 1.16 million discharges (excluding newborns) in 2000, any reduction in length of stay will produce a dramatic and significant impact on statewide hospital costs. As illustrated in Figure 7, even a modest decrease of hospital staff turnover could generate savings of almost \$1 billion dollars annually for Michigan's almost 150 acute care and community hospitals.

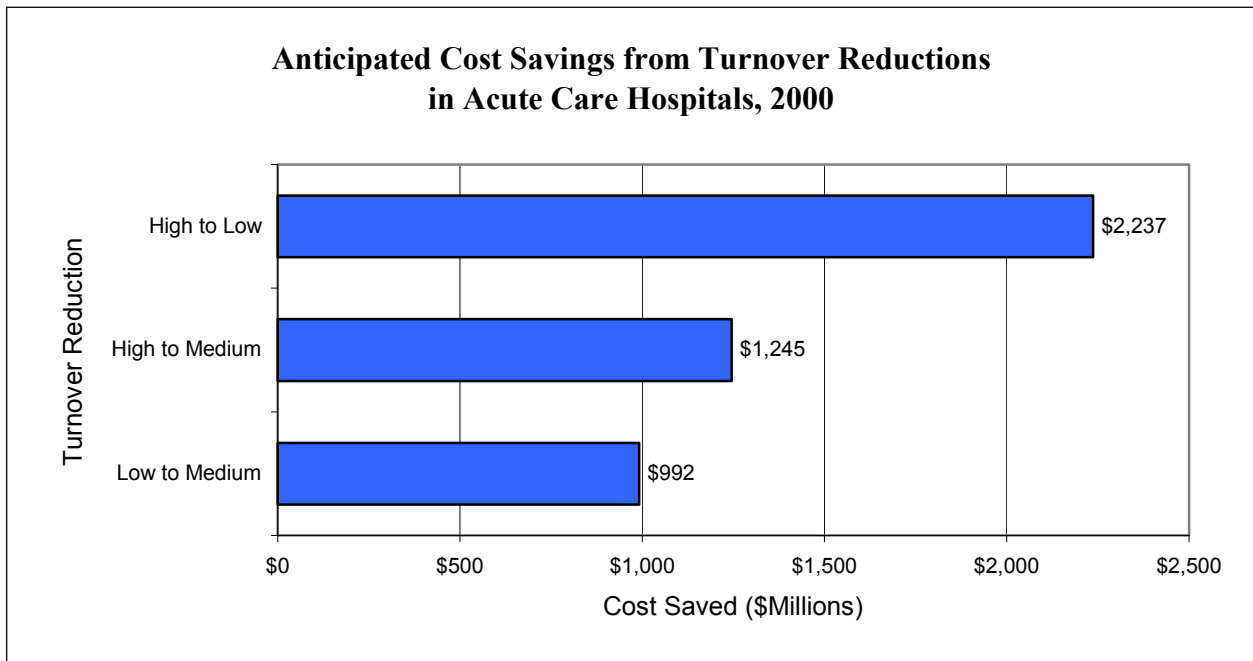


Figure 8

Source: Voluntary Hospitals of America, Inc., 2002.

Much of this reduction in annual costs is associated with the fully loaded costs of replacing hospital staff personnel. In the VHA's *The Business Case for Workforce Stability* (Kosel and Olivio, 2002), the entire range of costs associated with staff replacement are identified. These costs are illustrated in Table 5. Based on surveys conducted by the Maryland Association of Hospitals and Health Systems, the cost of replacing one hospital nurse was estimated at between \$30,000 and \$50,000. This is consistent with the VHA's finding that, on average, the cost of replacing a registered nurse is roughly 100% of the nurse's annual salary.

Table 5: Costs Associated with Replacing Human Capital

Direct Recruiting Costs	Advertising
	Agency fees
	Referral fees
	Signing bonuses
	Travel expenses
Indirect Recruiting Costs	Testing and profiling costs
	Interviewing costs (time)
	Employee training (interviewing)
Productivity and Training	Travel expenses
	Cost to fill in for lost employees
	Other employees' time
	Training and orientation costs
	Seminars, conferences, and e-learning
	Travel expenses
	Critical project involvement
Termination Costs	Exit interviewing costs (time)
	Severance pay
	Productivity losses

Source: Success Profiles, Inc., 2002, presented in Kosel and Olivio, VHA 2002b.

The 2002 VHA (Kosel and Olivio, 2002) report cited here reported the average salary of a medical-surgical nurse at \$46,000 and the annual salary of critical care nurse at \$64,000. The average RN salary provided by the Michigan Nurses Association (from www.salary.com) is \$48,941, and the average RN salary reported by the U.S. Department of Labor for Michigan in 2003 is \$51,000. Regardless of the specific RN salary used, even a relatively low rate of RN staff turnover at a small hospital will generate considerable costs.

For example, the Bureau of Labor Statistics reported that there were 75,870 employed RNs in Michigan in 2003. Assuming that approximately two-thirds of these RNs are employed by hospitals (50,000) and 80.0% of these RNs are engaged in providing direct patient care, this translates to roughly 40,000 direct-patient-care RNs. If Michigan's hospitals experience an average 10.0% annual turnover among its patient-care RN cadre each year and the cost for replacing each RN is approximately one year's salary, the cost of RN turnover will be approximately \$200 million per year. If, through reduced patient-to-nurse staffing ratios, annual turnover can be reduced to 5.0% each year,⁶ annual savings will be approximately \$100 million spread among Michigan's acute care hospitals.

To put these potential savings in greater perspective, a separate document has been prepared that estimates the costs of reducing RN turnover at a model 200-bed hospital and at a model 50-bed hospital. The net savings for a 200-bed model hospital that reduced RN turnover from 10% annually to 5% annually may grow from approximately \$7.6 million during the first year of

⁶ Based on conversations with nurse executives in Michigan, "magnet" hospitals typically exhibit relatively low patient-to-RN staff ratios and typically exhibit relatively low vacancy rates, often below 5.0%.

reduced turnover to as much as \$11.5 million the tenth year. The potential savings for a model 50-bed hospital is considerably more modest, but not insignificant. Cost savings associated with reduced RN turnover will likely exceed \$1.8 million in staffing costs during the first year of reduced RN turnover and reach approximately \$2.8 million in the tenth year out. These figures are provided in considerably more detail in a companion document entitled “The Model Case For Reducing Patient To Nurse Staffing Ratios In Michigan Hospitals: Two Scenarios.”

Conclusions

The information discussed in this report represents a fairly comprehensive summary of the research that has been conducted concerning the relationship of the staffing level of nurses in acute care hospitals to the quality of care provided to patients and the costs of specific aspects of care. The overwhelming conclusion of all of this research is that fewer patients per nurse and, where specifically examined, fewer patients per RN engaged in direct patient care, is generally associated with higher quality of care. As noted earlier, quality of care is operationally defined in a number of ways, including reduced mortality rates; lower rates of a number of complications and adverse events such as hospital-acquired pneumonia, urinary tract infection, and adverse drug events; and reduced patient stay in the hospital.

The relationship between reduced patients per nurse and reduced health care costs is not as direct, but is no less compelling. It is now widely recognized that reducing the size of the direct-care nursing staff in relation to the overall number of patients has been used as a management tool to reduce overall hospital costs over the past decade. While the financial benefits may be immediately apparent, over time, it has become evident that having fewer patient-care nurses has increased the stress and physical demands placed on nurses involved in direct patient care and this, in turn, has led to increased levels of nursing staff turnover. Nursing staff turnover alone is an expensive activity for hospitals as the total cost of replacing a medical-surgical RN may be as high as \$50,000, and the cost of replacing a critical-care nurse may be as high as \$65,000. Until nurses are replaced, temporary or agency nurses need to be hired, and these nurses often cost the hospital at least 10% more than they would be paying full-time employees for comparable work. In addition, higher patient-to-nurse ratios appear to contribute to raising the overall cost of health care, even while reducing or eliminating some direct personnel costs. As mentioned earlier, these are the costs associated with treatment for and extended hospital stays associated with various adverse events and complications.

Overall, the research that has been examined in this report indicates that the financial savings associated with higher patient-to-nurse staffing levels are more than offset by the cost of nursing staff burnout and turnover, threats to the quality of patient care, costs associated with longer patient hospital stays, and the additional costs and liability of complications and adverse events that may be prevented by fewer patients per nurse.

In more succinct terms, the annual cost of reducing the patient-to-RN staffing ratio in Michigan (estimated at \$275 million) and the one-time cost to recruit these additional RNs (another \$275 million), is more than offset by reduced costs associated with lower incidences of hospital-acquired pneumonia (\$22.03 million), reduced incidences of various nosocomial infections (\$5.8

million), reduced RN turnover (\$100 million), and overall reduced costs per discharge (\$992 million).

References

- Aiken, Linda. "Hospital Staffing, Work Environment, Nurse Retention, & Patient Outcomes." Presentation to the Michigan Nurses Association, October 2, 2003.
- Aiken, Linda, D. Sloane, and E. Lake. "Organization and Outcomes of Inpatient AIDS Care." *Medical Care* 37 (8): 760-72.
- Aiken, Linda, et al. "Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction." *Journal of the American Medical Association* 288(16): 1987-1993.
- Berliner, H., C. Kovner, and C. Zhu. *Nurse Staffing Ratios in California Hospitals: A Critique of the Final Report on Hospital Nursing Staff Ratios and Quality of Care*. SEIU Nurse Alliance, December 2002.
- California Nurses Association. "RNA Staffing Ratios—It's the Law." (<http://www.calnurse.org/finalrat/ratio7103.html>)
- Citizens Research Council of Michigan. "Michigan Hospital Finances: Fiscal Years 1998 – 2002." CRC Memorandum No. 1075. Livonia, MI: 2003.
- Cho, S., S. Ketefian, V.H. Barkauskas, and D.G. Smith. "The Effects of Nurse Staffing on Adverse Events, Morbidity, Mortality, and Medical Costs." *Nursing Research* 52 (2): 71-79.
- Coffman, J., J. Seago, and J. Spetz. "Minimum Nurse-to-Patient Ratios in Acute Care Hospitals in California." *Health Affairs* 21 (5): 53-64.
- Dimick, J., S. Swoboda, P. Pronovost, and P. Lipsett. "Effect of Nurse-to-Patient Ratio in the Intensive Care Unit on Pulmonary Complications and Resource Use After Hepatectomy." *American Journal of Critical Care* 10 (6): 376-382.
- Gelinas, L., C. Bohlen, and S. DeJoy. *Tomorrow's Work Force: A Strategic Approach*. VHA's 2002 Research Series. Irving, TX: Voluntary Hospitals of America, Inc., 2002a
- Institute of Medicine. *Keeping Patient Safe: Transforming the Work Environment of Nurses*. Washington, DC: National Academies Press, 2004
- Joint Commission on Accreditation of Healthcare Organizations. *Healthcare at the Crossroads. Strategies for Addressing the Evolving Nursing Crisis*. Oakbrook Terrace, IL: Joint Commission on Accreditation of Healthcare Organizations, 2002.
- Kahn K., et al. "Measuring the Quality of Care with Explicit Process Criteria Before and After Implementation of the DRG-Based Prospective Payment System." *Journal of the American Medical Association* 264 (15): 1969-1973.

- Kosel, K. and T. Olivio. *The Business Case for Work Force Stability*. VHA's 2002 Research Series. Irving, TX: Voluntary Hospitals of America, Inc., 2002b.
- Leape, L. et al. "Systems Analysis of Adverse Drug Events." *Journal of the American Medical Association* 274 (1): 35-43.
- McCue, M., B. Mark, and D. Harless. "Nurse Staffing, Quality, and Financial Performance." *Journal of Health Care Finance* 29 (4): 54-76.
- Michigan Health & Hospital Association. Michigan Inpatient Data Base, 2000.
- Mitchell P. and S. Shortell. "Adverse Outcomes and Variations in Organization of Care Delivery." *Medical Care* 35 (1): 19-32.
- Needleman J. et al. "Nurse-staffing Levels and Patient Outcomes in Hospitals." Final report for Health Resources and Services Administration. Boston, MA: Harvard School of Public Health, 2001.
- Peter D. Hart Research Associates. "Patient-to-Nurse Staffing Ratios: Perspectives from Hospital Nurses." Research conducted on behalf of AFT Healthcare. Washington, DC: Peter D. Hart Research Associates, 2003.
- Peter D. Hart Research Associates. "Reasons Nurses Left Patient Care." Reported in *Modern Healthcare* 17 (December): 27.
- Rubenstein L. et al. "Measuring the Quality of Nursing Surveillance Activities for Five Diseases Before and After Implementation of the Drug-Based Prospective System." *Patient Outcomes Research: Examining the Effectiveness of Nursing Practice*. Proceedings of the State of the Science Conference. Bethesda, MD: NIH, National Center for Nursing Research, 1992.
- Stanton, M. and M. Rutherford. "Hospital Nurse Staffing and the Quality of Care." Rockville, MD: Agency for Healthcare Research and Quality, 2004. Research in Action Issue 14. AHRQ Pub. No. 04-0029.
- Unruh, L. "Licensed Nurse Staffing and Adverse Outcomes in Hospitals." *Medical Care* 41 (1): 142-52.
- U.S. Department of Labor, Bureau of Labor Statistics. *Occupational Employment Statistics, 2003*. (<http://www.bls.gov/oes/2003/may/oesrcst.htm>).
- www.salary.com