

RN Staffing Ratios:

A Necessary Solution to the Patient Safety Crisis in U.S. Hospitals

□ **Authors**

Carmen Comsti, JD, Regulatory Policy Specialist, National Nurses United, USA

Gerard Brogan, RN, Lead Nursing Practice Representative, National Nurses United, USA

Michelle Mahon, RN, Nursing Practice Representative, National Nurses United, USA

□ **Contact**

Gerard Brogan, RN, gbrogan@calnurses.org

□ **Abstract**

Introduction:

There is a patient-safety crisis in the United States. Every day it is estimated that 700 people die from preventable errors in their medical treatment or complications from those errors. As the death toll continues, nurses are urging much needed action to save lives and prevent needless harm by implementing mandatory, minimum, nurse-to-patient ratios that are improved upon as individual patient needs warrant.

Objective:

To determine the efficacy of mandated nurse-to-patient ratios as implemented in California, in terms of patient-care outcomes and safety, as well as nursing safety and cost savings.

Methods:

A meta-review of studies and literature on the efficacy of nurse-to-patient staffing levels, including mandatory nurse-to-patient ratios over a twenty-year period was undertaken.

Results:

Research from the last few decades has overwhelmingly shown that safe-staffing levels and ratios help improve patient outcomes in mortality, adverse events, complications, failure to rescue, quality of care, costs, and length of stay. Safe-staffing levels also help decrease nurse burnout and increase job satisfaction.

Conclusions:

Registered nurse staffing levels that facilitate safe, competent, therapeutic, and effective care are vital to the safety of patients in U.S. hospitals. As examined in detail above, research reveals that these ratios are associated with lower mortality, lower nurse burnout, and better nurse retention.

RN Staffing Ratios: A Necessary Solution to the Patient Safety Crisis in U.S. Hospitals

□ Introduction

There is a patient safety crisis in the United States. Every day it is estimated that 700 people die from preventable errors in their medical treatment or complications from those errors. Conservative estimates place the annual death toll from preventable errors, errors that should never occur in a safe hospital setting, at approximately 250,000 per year (Markary & Daniel, 2016). Other estimates place this figure at an alarming 400,000 deaths per year (Classen, et al., 2011). When counted, preventable death caused by medical error is the third leading cause of death in the United States (Markary & Daniel, 2016).

Registered nurses (RNs) across the nation have been sounding the alarm over this crisis for nearly two decades. Nurses have witnessed preventable death and disability daily at their patients' bedsides in hospitals big and small from coast to coast. Despite these warnings, hospitalized patients remain at risk and the consequences are alarming. The long-held perception of nurses that there simply are not enough nurses present to provide the care needed has been validated by dozens of studies. Nurses know that one of the most effective ways to protect patients is through safe and effective staffing. Yet, in 49 states there is no limit to the number of patients a nurse can be made to care for at one time and the safety crisis continues. Throughout years of advocacy, the nation's largest healthcare workforce has witnessed the implementation of failed policy initiatives, ill-conceived schemes to replace nurses with less skilled and unlicensed staff, and attempts to redesign healthcare with a focus on experimental technology that has introduced the risk for additional types of preventable medical error. As the death toll continues, nurses now urge policymakers to take much needed action to save lives and prevent needless harm by implementing evidence-based, mandatory, minimum nurse-to-patient ratios that are improved upon as individual patient needs warrant. Research from the last few decades has overwhelmingly shown that safe staffing levels and ratios help improve patient outcomes in mortality, adverse events, complications, failure to rescue, quality of care, costs, and length of stay. Safe staffing levels also help decrease nurse burnout and job dissatisfaction (Bae, Mark, & Fried, 2010). While California is the only state that has such a mandate, other states

must follow to ensure continued quality patient care and nurse retention. The results of California's experience demonstrate that mandatory nurse-to-patient ratios increase patient safety and quality of care. Implementing this necessary protection is sound, life-saving healthcare policy.

□ Mandating minimum RN-to-patient ratios saves lives and improves patient-care outcomes.

Lawfully mandated minimum nurse staffing levels at hospitals in California have been proven to save lives and enhance patient care. The California Nurses Association (CNA), an affiliate of the nation's largest organization of registered nurses, National Nurses United (NNU), championed the development, passage, and enforcement of the nation's first mandatory unit-specific nurse-to-patient ratios for acute-care hospitals. CNA drafted and sponsored the legislation that became California's nurse-to-patient ratios law and was heavily involved in California's three-year rulemaking process to develop the final numerical ratios. After over a decade since California implemented its nurse-to-patient ratios law, NNU's experience indisputably demonstrates that legislative and regulatory mandates on minimum nurse-to-patient staffing improves patient care and saves lives.

□ Methods

A seminal study from 2010 on the impact of California's ratios compared California hospitals' post-implementation of the state's minimum nurse-to-patient ratios law to hospitals in New Jersey and Pennsylvania and found, unsurprisingly, that if New Jersey and Pennsylvania matched California's ratios in medical surgical units, then New Jersey would have 13.9 percent fewer patient deaths and Pennsylvania 10.6 percent fewer deaths. Compared to states without ratios, the study found that California RNs reported having more time to spend with patients and that hospitals are more likely to have enough RNs on staff to provide quality patient care (Aiken L. H., 2010). In fact, the lead investigator of this study reported to the *San Francisco Chronicle* that "The differences between California and the other states are striking," said Linda Aiken. "Nurses in California take care of two fewer patients on average than nurses in Pennsylvania and New Jersey in general surgery. These differences lead to the prevention of literally thousands of deaths." (Ornstein, 2010)

The study also found that California nurses were significantly less likely than their New Jersey and Pennsylvania counterparts to report that workload causes them to miss changes in patient conditions (Aiken L. H., 2010). A more recent study from 2016 that compared hospitals in Pennsylvania, New Jersey, Florida, and California confirmed the earlier findings that California's improved nurse-to-patient staffing ratios improved patient care (McHugh M. D., et al., 2016). This study focused on hospitals that saw ten or more cardiac arrest events during the time under study and found that for every additional patient assigned to a nurse, the likelihood of a patient surviving cardiac arrest decreased by five percent per patient.

The success of California's nurse-to-patient ratios law confirms what other more general studies on nurse staffing have long shown. For example, a 2013 meta-analysis of twenty-eight prior studies found a consistent relationship between higher RN staffing and lower hospital related mortality (Shekelle, 2013).

Similarly, a 2007 meta-study found that an increase in staffing equivalent to one full-time RN was associated with a 9 percent decrease in deaths in ICU patients, a 16 percent decrease in deaths in surgical patients, and a 6 percent decrease in death in medical patients (Kane, Shamilyan, Mueller, Duval, & Wilt, 2007). A 2006 study showed that if all hospitals increased RN staffing to match the best-staffed hospitals in the country, 5,000 in-hospital patient deaths and 60,000 adverse patient outcomes could be avoided (Needleman J., Buerhaus, Stewart, Zelevinsky, & Mattke, 2006). Yet another study found that increased RN staffing is associated with shorter patient stays, lower rates of urinary tract infections, lower rates of gastrointestinal bleeding, and lower rates of failure to rescue (Needleman J., Buerhaus, Mattke, Stewart, & Zelevinsky, 2002). As California's nurse-to-patient ratios law has demonstrated, minimum safe patient staffing levels unquestionably results in safe patient care and improved patient outcomes.

□ Inadequate RN staffing is dangerous for patients, increasing rates of infection, error, illness, and mortality.

When nurses are assigned too many patients, they are at higher risk of preventable medical errors, avoidable complications, falls and injuries, pressure sores, increased length of stay, and readmissions. Empirical studies have confirmed time after time that understaffing of nurses and high nurse workloads is dangerous for our patients.

“Nurses in California take care of two fewer patients on average than nurses in Pennsylvania and New Jersey in general surgery. These differences lead to the prevention of literally thousands of deaths.”

*—Linda H. Aiken
Ph.D., FAAN, FRCN, RN
Director, Center for Health
Outcomes and Policy Research
Senior Fellow, Leonard Davis Institute
for Health Economics*

One study found that higher patient workloads of nurses has an independent and direct effect on quality of care, contributing to reduced patient safety, medical errors, patient falls, and unfinished nursing tasks (Kane, Shamilyan, Mueller, Duval, & Wilt, 2007).

Other studies have found comparable results. One found that understaffing in intensive care units increases risk of medical complications. Another study found that for each additional surgical patient in an RN's workload above the baseline nurse-to-patient ratio of 1:4, the likelihood of patient death within 30 days increases by 7 percent. And yet another study comparing California, New Jersey, and Pennsylvania found that each additional patient assigned to a nurse was associated with 7

percent higher risk of readmission for heart failure, 6 percent higher risk of readmission for pneumonia, and 9 percent higher risk of readmission for myocardial infarction (McHugh & Ma, 2013).

□ California's ratio law sets a floor and is not a “one-size-fits-all” standard by accounting for additional staffing to meet individual patients' needs.

Contrary to the deceptive refrain by industry, laws establishing minimum nurse-to-patient staffing ratios are just that—floors on nurse-staffing levels that ensure safe patient care.

The ratio law as enacted is akin to other workplace and public health statutes and regulations that set baseline rules to protect the health and safety of both caregivers and the patients they serve. The ratio law demands merely what patients deserve—quality care when they seek healthcare at hospitals.

It is routine for the industry to respond to patient, nurse, and legislator calls for minimum safe nurse staffing laws with threats of staffing cuts, reduced hiring standards, or cuts to programs. As described above, however, these industry threats are merely a thinly veiled attempt by hospitals to protect their profits despite the harm to patients that results from inadequate RN staffing.

□ Results: Nurse-to-patient ratios increase nurse autonomy and stress the professional judgment of the direct-care registered nurse.

Nothing in the California minimum nurse-to-patient ratios law involves reduction in healthcare employer hiring standards or cuts in programs. Rather, the California minimum nurse-to-patient ratios law demands, *inter alia*, that

the individual care needs of each patient and the skill mix of healthcare staff be assessed by the assigned RN to determine whether circumstances require additional staffing above the minimum staffing ratios.

In California's experience implementing its mandatory minimum nurse-to-patient ratios law, these requirements were critical in the success of any minimum nurse-staffing law. In its lobbying against the California ratios, the industry repeatedly argued that hospitals would be "forced to compensate for the ratios by cutting other staff" (California Department of Health Care Services, 2003). Industry advancement of this argument that minimum staffing ratios would result in budget-driven staffing cuts was so prolific that the state's Department of Health Care Services directly addressed this issue in its Final Statement of Reasons in support of the ratio regulations, explaining that hospitals could not respond to the ratios by reducing overall staffing¹. To ensure that reduction in overall staffing did not occur, the California law required that each hospital establish an acuity system "to determine the amount of nursing care needed by each unit, on each shift, and for each level of licensed and unlicensed staff." (California Department of Health Care Services, 2003)

□ **Not just patient safety, the California RN staffing ratio law has improved nurses' health and safety**

A 2015 study, which examined occupational injury and illness rates before and after the California RN staffing ratio law was passed, showed what RNs already know — safer nurses means safer patients (Leigh, Markis, Losif, & Romano, 2015).

Researchers examined the rates of occupational injury and illness to registered nurses in California before and after the RN staffing ratio law was passed, looking at a range of years from 2000 to 2009. They compared this data to the occupational injury and illness rates for registered nurses in the other 49 states and D.C. that have not adopted minimum numerical staffing ratio laws. They found that the California RN staffing ratio law was associated with a 31.6% reduction in occupational injuries and illnesses among RNs working in hospitals in California.

□ **Discussion: California's ratios law demonstrates that compliance with minimum nurse-to-patient staffing laws is undoubtedly feasible, resulting in improved nursing work environments and hospital savings.**

California's success with implementation of its mandated minimum nurse-to-patient staffing ratios law belies industry arguments that there are not enough RNs to comply with mandated nurse-to-patient ratios. The comparative study of California after the implementation of the state's ratios law discussed above also found that California hospitals are in compliance with the ratios a super-majority of the time, just two years after the laws effective date. In fact, the study found that nurses in New Jersey and Pennsylvania had more patients than permitted by California's ratios as much as 81 percent of the time, depending on the unit, whereas California nurses are able to meet the ratios 81-94 percent of the time, depending on unit (Aiken L. H., 2010).

The comparative study of California to New Jersey and Pennsylvania also found that California's ratios have positively affected nurses' overall work environment and their corresponding ability to deliver patient care. The study went on to find that "[n]urse workloads in California hospitals in 2006, 2 years after the implementation of mandated nurse staffing ratios, were significantly lower than in New Jersey and Pennsylvania hospitals" (Aiken L. H., 2010). It also concluded that in medical and surgical units "where nurse recruitment and retention has long been difficult nationally, nurses in California on average care for over two fewer patients than nurses in New Jersey and 1.7 fewer patients than nurses in Pennsylvania" (Aiken L. H., 2010). Overall, compared to their nurse counterparts in New Jersey and Pennsylvania, nurses in California care for an average of one fewer patients and reported more favorable outcomes with respect to every work environment measure analyzed, including reasonable workload, adequate support staff, and enough RNs to provide quality patient care (Aiken L. H., 2010).

¹ • A copy of the Final Statement of Reasons is attached to NNU's amicus brief in *Oberlies v. Healey* and available at: act.nationalnursesunited.org/page/-/files/graphics/SJC-12472AmicusBrief_opt.pdf

Other studies support these findings that RN staffing ratios mean safer RNs, who have more time to provide quality and safe care for their patients. These findings include:

- Nurses from units with low staffing and poor organizational climates were twice as likely as nurses on well-staffed and better organized units to report risk factors for needlestick injuries and near misses (Clarke, Sloane, & Aiken, 2002).
- An increased patient load per nurse was associated with significantly higher likelihood for neck, shoulder, and back musculoskeletal disorders (Lipscomb, Trinkoff, Brady, & Geiger-Brown, 2004).
- Risk for workplace violence injuries was twice as high for lower-staffed hospitals as compared to higher-staffed hospitals (Lee, Gerberich, Waller, Anderson, & McGovern).

In other words, the provision of safe and therapeutic patient care depends on RNs having safe patient workloads. Safe working conditions for nurses improves the quality of patient care.

A different survey of California nurses after the implementation of California's ratios law also found that California nurses reported significant improvements in working conditions and job satisfaction (Spetz, 2008). In short, the study demonstrates that California's ratios have resulted in California nurses caring for fewer patients at a time, positively impacting both the working environment and patient care.

It is also important to note that the specter of outsized costs to industry is unfounded. Improved nurse job satisfaction and patient outcomes will reduce spending on temporary RNs and overtime costs and lower RN turnover (Bland-Jones, 2008). Ratios both attract and retain

registered nurses. A recent Texas Center for Nursing Workforce Study on hospital nurse staffing vacancy and turnover rates for registered nurses showed RN turnover rates in California to be dramatically lower than states without ratios, such as Florida and Texas (Texas Center for Nursing Workforce Studies, 2016). According to PricewaterhouseCoopers in its report, *What Works: Healing the Healthcare Staffing Shortage*, the cost of replacing one registered nurse is between \$40,000-\$85,000; given this it is evident that ratio implementation saves individual hospitals from both the expense and clinical disruption of a rapid turnover of its nursing staff. The report states that, "Every percentage point increase in nurse turnover costs an average hospital about \$300,000 annually" (PricewaterhouseCoopers' Health Research Institute, 2007).

Improved nurse working environment, likewise, translates into savings from improved patient outcomes (Encinose & Hellinger, 2008) and shorter patient lengths of stay (Needleman J. , Buerhaus, Mattke, Stewart, & Zelevinsky, 2002). After the implementation of California's ratio law, nurses in California experienced burnout at significantly lower rates than those in New Jersey and Pennsylvania, and reported less job dissatisfaction (Aiken L. H., 2010). Both burnout and job dissatisfaction are precursors to

turnover. A 2009 study estimated that adding 133,000 RNs to the U.S. hospital workforce—the number of RNs needed to increase nursing staff to the 75th percentile—would produce medical savings of \$6.1 billion, not including the value of increased productivity when nurses help patients recover more quickly (Dall, 2009).

Combining medical savings with increased productivity, the addition of 133,000 RNs would result in an economic value of \$57,700 for each of the additional RNs (Dall, 2009).

Mandatory minimum nurse-to-patient staffing levels are feasible, resulting in better nurse workloads and hospital savings from lower turnover and improved patient outcomes.

In short, the study demonstrates that California's ratios have resulted in California nurses caring for fewer patients at a time, positively impacting both the working environment and patient care.

□ Conclusion

Registered nurse staffing levels that facilitate safe, competent, therapeutic, and effective care is vital to the safety of patients in U.S. hospitals. Allowing hospitals to set staffing levels that are primarily budget driven, while not setting up a system of accountability, has created a threat to patient safety. Without necessary safeguards, hospitals may engage in nurse staffing cuts to save money, thereby adversely affecting patient outcomes (Aiken et al. 2014). The only way to ensure that all hospitals have safe staffing levels that are consistently adhered to is through mandated nurse-to-patient ratios. Currently, California is the only state in the United States that has mandated RN-to-patient ratios. As examined in detail above, research reveals that these ratios are associated with lower mortality, lower nurse burnout, and better nurse retention. Despite calls of alarm from the hospital industry, the ratios have not had an adverse impact on operations or quality of care. In fact, the evidence overwhelmingly demonstrates that in the face of an epidemic of preventable medical errors, RN staffing ratios must be implemented without delay to prevent disability and preserve thousands of lives.

Works Cited

- Aiken, L.; Sloane, D. M.; Bruyneel, L.; Van den Heede, K.; Griffiths, P.; Busse, R.; ... Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *Lancet*, 38(3), 1824-1830.
- Aiken, L. H. (2010). The California nurse staffing mandate: implications for other states. *LDI Issue Brief*, 15(4), 904-921.
- Bae, S. H.; Mark, B.; & Fried, B. (2010). Impact of nursing unit turnover on patient outcomes in hospitals. *Journal of Nursing Scholarship*, 42(1), 40-49.
- Bland-Jones, C. (2008). Revisiting Nurse Turnover Costs, Adjusting for Inflation. *Journal of Nursing Administration*, 38(1), 11-18.
- Boev, C. & Yinglin, X. (2015). Nurse-physician collaboration and hospital-acquired infections in critical care. *Critical Care Nurse*, 35(2), 66-72.

- California Department of Health Care Services. (2003). *Final Statement of Reasons*. Retrieved from act.nationalnursesunited.org/page/-/files/graphics/SJC-12472AmicusBrief_opt.pdf
- Clarke, S. P.; Sloane, D. M.; & Aiken, L. H. (2002). Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *American Journal of Public Health, 92*(7), 1115-1119.
- Classen, D.; Resar, R.; Griffin, F.; Frederico, F.; Frankel, T.; Kimmel, N.; & Whittington, J. C. (2011, April). Global “trigger tool” shows that adverse events in hospitals may be ten times greater than previously measured. *Health Affairs, 30*(4), 581-589. doi: 10.1377/hlthaff.2011.0190
- Dall, T. (2009). The Economic Value of Professional Nursing. *Medical Care, 47*, 97-101.
- Duffield, C.; Diers, D.; O’Brien-Pallas, L.; Aisbett, C.; Roche, M.; King, M.; & Aisbett, K. (2011). Nursing staffing, nursing workload, the work environment and patient outcomes. *Applied Nursing Research, 24*(4), 244-255.
- Encinose, W. & Hellinger, F. (2008). The Impact of Medical Errors on Ninety-Day Costs and Outcomes: An Examination of Surgical Patients. *Health Services Research, 43*(6), 2067.
- Halwani, M.; Solaymani-Dodran, H.; Grundmann, C.; Coupland, C.; & Slack, R. (2006). Cross-transmission of nosocomial pathogens in an adult intensive care unit: incidence and risk factors. *Journal of Hospital Infection, 63*(1), 39-46.
- Harless, D. W. & Mark, B. A. (2010). Nurse staffing and quality of care with direct measurement of inpatient staffing. *Medical Care, 48*(7), 659-663.
- Hugonnet, S.; Villaveces, A.; & Pittet, D. (2007). Nurse staffing level and nosocomial infections: empirical evaluation of the case-crossover and case-time-control designs. *American Journal of Epidemiology, 165*(11), 1321-1327.
- Kane, R. L.; Shamilyan, T. A.; Mueller, C.; Duval, S.; & Wilt, T. J. (2007). The Association of Registered Nurse Staffing Levels and Patient Outcomes: Systematic Review and Meta-Analysis. *Medical Care, 45*(12), 1195-1204.
- Lee, S. S.; Gerberich, S. G.; Waller, L. A.; Anderson, A.; & McGovern, P. (n.d.).
- Leigh, J. P.; Markis, C. A.; Losif, A. M.; & Romano, P. S. (2015). California’s nurse-to-patient ratio law and occupational injury. *Int Arch Occup Environ Health, 88*(4), 477-484.
- Lipscomb, J.; Trinkoff, A.; Brady, B.; & Geiger-Brown, J. (2004). Health care system changes and reported musculoskeletal disorders among registered nurses. *Am J Public Health, 143*1-1436.
- Markary, M. & Daniel, M. (2016, May). Medical error—the third leading cause of death in the U.S. *BMJ*(2139), 353-358. doi:10.1136/bmj.i2139
- McHugh, M. D.; & Ma, C. (2013). Hospital nursing and 30-day readmissions among Medicare patients with heart failure, acute myocardial infarction, and pneumonia. *Medical Care, 52*(1), 52-59.
- McHugh, M. D.; Rochman, M. F.; Sloane, D. M.; Berg, R. A.; Mancini, M. E.; Nadkarni, V. M.; ...Aiken, L. H. (2016). Better Nurse Staffing and Nurse Work Environments Associated With Increased Survival of In-Hospital Cardiac Arrest Patients. *Medical Care, 158*(5), 404-409.
- McHugh, M. D.; Rochman, M. F.; Sloane, D. M.; Berg, R. A.; Mancini, M. E.; Nadkarni, V. N.; ...Aiken, L. (2016). Better Nurse Staffing and Nurse Work Environments Associated with Increased survival of In-Hospital Cardiac Arrest Patients. *Medical Care, 54*(1), 74-80.
- Needleman, J.; Buerhaus, P.; Stewart, M.; Zelevinsky, K.; & Mattke, S. (2006). Nurse staffing in hospitals: is there a business case for quality? *Health Aff (Millwood), 25*(1), 204-211.
- Needleman, J.; Buerhaus, S.; Mattke, M.; Stewart, M., & Zelevinsky, K. (2002). Nurse-staffing levels and the quality of care in hospitals. *New England Journal of Medicine, 346*(22), 1715-1722.
- Ornstein, C. (2010, April 20). Study links nurse-patient ratio, mortality / Research shows death rate increases with workload, burnout. *San Francisco Chronicle*. Retrieved from www.sfgate.com/health/article/Study-links-nurse-patient-ratio-mortality-2780482.php
- Penoyer, D. A. (2010, July). Nurse staffing and patient outcomes in critical care: a concise review. *Critical Care, 38*(7), 1521-1528.
- PricewaterhouseCoopers’ Health Research Institute. (2007). *What Works: healing the healthcare staffing shortage*. Retrieved from council.brandeis.edu/pdfs/2007/PwC%20Shortage%20Report.pdf
- Rafferty, A. M.; Clarke, S. P.; Coles, J.; Ball, J.; James, P.; McKee, M.; & Aiken, L. H. (2007). Outcomes of variation in hospital nurse staffing in English hospitals: cross-sectional analysis of survey data and discharge records. *International Journal of Nursing Studies, 44*(2), 175-182.
- Sakr, Y.; Moriera, C.; Rhodes, A.; Ferguson, N. D.; Kleinpell, R.; Pickkers, P.; ... Vincent, J. L. (2015). The impact of hospital and ICU organizational factors on outcome in critically ill patients: results from the Extended Prevalence of Infection in Intensive Care study. *Critical Care Medicine, 43*(3), 519-526.
- Shekelle, P. G. (2013). Nurse-patient ratios as a patient safety strategy: a systematic review. *Ann Intern Med, 158*(5), 404-409.

- Spetz, J. (2008). Nurse satisfaction and the implementation of minimum nurse staffing regulations. *Policy, Politics & Nursing Practice*, 9(1), 15-21.
- Stone, P. W.; Mooney-Kane, C.; Larsen, E. L.; Horan, T.; Glance, L. G.; Zwanziger, J.; & Dick, A. W. (2007). Nurse working conditions and patient safety outcomes. *Medical Care*, 45(6), 1-8.
- Texas Center for Nursing Workforce Studies. (2016). *Hospital Nurse Staffing Study: Vacancy and Turnover*. Retrieved from file:///C:/Users/Michelle/Downloads/2016HNSS_Vacancy-and-Turnover.pdf
- Tourangeau, A. E.; Doran, D. M.; McGillis-Hall, L.; O'Brien, P. L.; Pringle, D.; Tu, J. V.; & Cranley, L. A. (2007). Impact of hospital nursing care on 30-day mortality for acute medical patients. *Journal of Advanced Nursing*, 57(1), 32-44.
- Tubbs-Cooley, H. L.; Cimiotti, J. P.; Silber, J. H.; Sloane, D. M.; & Aiken, L. H. (2013). An observational study of nurse staffing ratios and hospital readmission among children admitted for common conditions. *BMJ Quality & Safety*, 22(9), 735-742. doi:10.1136/bmjqs-2012-001610