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State Nursing Staffing Laws Related to Hospital Acquired Infections (HAIs):

Final Paper

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State Nursing Staffing Laws Related to Hospital Acquired Infections (HAIs): Final Paper

1. Introduction

High nurse to patient ratios have been problematic across the United States for nurse and patient outcomes. Title 42 of the Code of Federal Regulations, which calls for “adequate numbers” of staffing, is ill-defined leading states to act. This research analyzes the various nurse staffing models that strive to achieve better patient outcomes. How do various state nurse staffing laws in acute care settings correlate with health outcomes regarding hospital acquired infections (HAIs)? There has been much research on the impacts of this law over time within California, and the literature is promising. This research suggests favorable patient outcomes with nurse empowered and directed staffing plans for specific units compared to laws that strictly enforced ratios for all hospitals, at all times, and under all circumstances.

2. Literature Review

In the past, ratios were unregulated and nurses were often placed in unsafe staffing ratios that left nurses more susceptible to burnout, medication errors, and even patient death. Within the last 14 years, nursing practice has drastically changed to generally incorporate nursing ratios, a staffing committee, or accountability through public disclosure or reporting into state law. The campaign for safe patient ratios took 13 years to win and have been in effect since then. These ratios have proven to improve nursing retention and increased quality of care in California hospitals.

Both nurses and patients have been positively affected by the change. Prior to the implementation of specific ratios, nurses were often put in unsafe situations where hospital administrators, seeking to reduce costs, would place high numbers of patients with a single

nurse. First implemented in 1999, California passed Assembly Bill (AB) 394, which established minimum registered nurse-to-patient ratios for acute care hospitals. The standards today were finalized and implemented officially in 2004 (Kasprak, 2004). California became the first state -- and remains the only state -- to enact a specific nurse-to-patient ratio law. There has been much research on the impacts of this law over time within California, and the literature is promising.

AB 394 and Title 42 are the two largest policies affecting this debate. AB 394 only allows licensed nurses who provide patient care to be included in the ratios. This does not account for licensed practical nurses (LPNs) and licensed vocational nurses (LVNs) which can represent up to 50 percent of nurses on the unit. These along with state staffing laws for other states have been pivotal in starting the discussion on what safe patient handling is. Nurses have been advocating for legislation such as those to be passed for decades. From the healthcare provider perspective, more specific regulation is favorable, yet there is still hesitation on the side of administrators as lower ratios are more costly. Leaders in this area have had to reduce budgets, reduce services, and seek other cost-saving options. There is a prominent debate as to whether the improved outcomes are enough of a benefit to the increased hospital costs facilities are taking on. In this literature review, we will examine how staffing laws have affected outcomes for both nurses and patients.

2.1 Outcomes for Nurses

Due to more specific ratio laws, there has been a significant trend of better health outcomes. Nurses had their time divided among too many patients, resulting in careless errors. In hospitals with higher ratios, one study found negative ramifications affecting nurses including a higher degree of burnout, job dissatisfaction, and intent to leave (Shin, Park, & Bae, 2018).

Nurses were 7% more burnt out, 8% more dissatisfied, and 5% more likely to have an intent to leave with greater nurse-to-patient ratios (Shin et al., 2018). This shows us that optimal ratio levels are necessary to reduce adverse effects for both nurses and patients. Higher ratios lead to negative nurse outcomes which is why it is critical to address ratios to reduce adverse events for nurses and retain nurses in the hospital.

California's important law created a rippling effect with millions of nurses, patients, families, and hospital administrators. Nurses are allowed more time per patient, leading to better outcomes for nurses. On the other hand, research in this area has demonstrated positive outcomes for nurses in the workforce through lower job dissatisfaction, occupational injury, and illness rates (Aiken et al., 2010; Leigh, Markis, Iosif, & Romano, 2015). Nurses working in California under mandated staffing ratios were found to have a lower job dissatisfaction compared to other states with 74% of staff nurses, 68% of managers, and 62% of nurse executive administrators supporting an increased quality of care in California as a result of legislation. California nurses also reported the lowest job dissatisfaction at 20% compared to New Jersey at 26% and Pennsylvania at 29%.

Nurses also evaluated their work environment more highly. They reported that they had a reasonable workload, adequate support to spend more time with patients, enough registered nurses on staff to provide quality care, and enough staff to get work done. Most significantly, they found that nurses in California were less likely to report that their workload caused them to miss significant changes in the patient's condition (Aiken et al., 2010).

Workplace conditions contribute to occupational injury. The demands of the job can be hazardous and physically demanding. Nursing is a physically demanding occupation as staff

frequently have to reposition patients and support patients walking. One difference-in-difference study compared pre and post differences in occupational illness and injury rates in California and across the United States. The study found that implementing the specific nurse-to-patient ratio led to reduced injury rates and illness among nurses. Prior to the law being implemented, occupational injury and illness rates decreased by over 31.6% compared to after law differences (Leigh et al., 2015). This finding is consistent with Aiken's, as discussed earlier, which found that California law was associated with improvements in job satisfaction and workplace injury.

As noted in *Figure 1*, this law also aided in the California nursing workforce shortage by nearly doubling the amount of registered nurses licensed from implementation in 1999 and 2004 to 2012 (California Board of Registered Nursing, 2012). This encourages more nurses to enter the workforce because of the high demand, job security, and consistent salary. Nurses are facing a huge workforce deficit in states outside of California. This is likely why other states have not adopted specific ratios like California in order to prevent a workforce deficit. Hospital groups have argued against expanding the California law to other states. There are significant additional costs to hiring more nurses (Schultz, 2013). There is also limited research on evidence that legally mandated ratios result in positive patient outcomes, which was the intended purpose of the law.

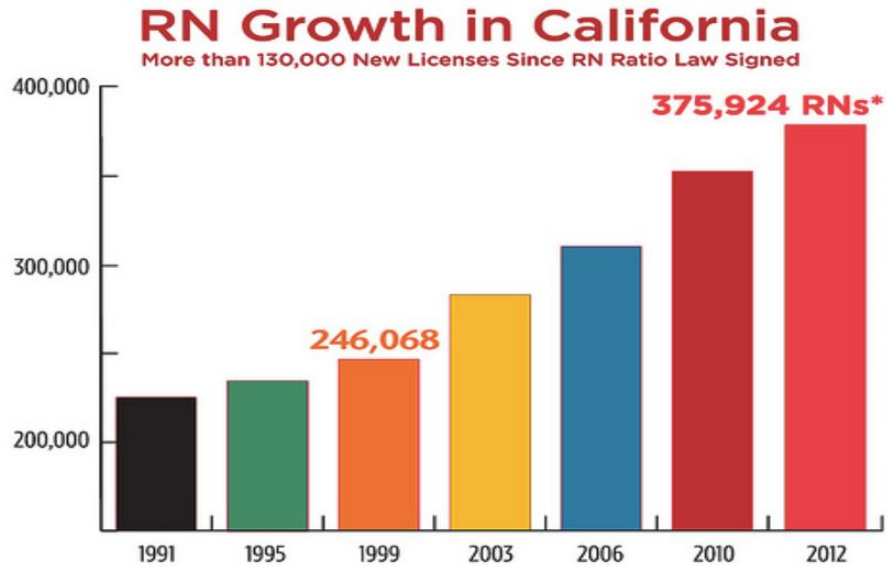


Figure 1. Registered Nurse (RN) Growth in California: More than 130,000 New Licenses Since RN Ratio Law Signed *Active RN Licenses as of May 31, 2012 (California Board of Registered Nursing, 2012)

Additionally, hospitals face obstacles such as weaker unions and occupational environments that do not support government regulation in the hospital. Mandated ratios also do not allow much flexibility. It does not account for varying skill levels, hospital resources, or other supports in providing care. Moreover, specific ratios may lead to layoffs for unskilled personnel such as housekeepers and other supporting staff. Fewer unskilled staff may lead to more nurses completing non-nursing labor. However, for California, doubling the number of nurses graduating has countered the negative effects of a nursing shortage (Manjlovich, 2017). For states facing financial constraints or complex healthcare, it is unlikely that this expensive legislation would be adopted. Hospitals with more issues, called “deficiencies,” are often

penalized and charged a fee for frequent and worse deficiencies. Healthcare leaders are still learning how to absorb the costs of ratios and employing cost-saving measures.

2.2 Outcomes for Patients

Moreover, California nursing staffing laws are correlated with positive patient outcomes such as lower patient mortality. This renewed focus on what makes up adequate nurse staffing levels was due in part by high mortality rates and failures leading to a loss of life. Research has shown lower mortality rates (Aiken et al., 2010; Dorning, 2013; Aiken et al., 2002). In one study, they compared staffing laws in California, New Jersey, and Pennsylvania to analyze the implications of California Nurse Staffing laws. After the implementation of nurse-to-patient ratios in California, only 29 percent of California nurses experienced high burnout, compared with 34 percent in New Jersey and 36 percent in Pennsylvania (Dorning, 2013).

On average, California nurses consistently cared for one patient less than New Jersey and Pennsylvania. California nurses had two fewer patients than New Jersey and 1.7 in Pennsylvania. California nurse staffing ratios complemented a decrease in the likelihood of in-patient death within 30 days of hospital admission (Dorning, 2013). Each patient added to the workload of nurses led to a 7% increase in mortality (Aiken et al., 2002). The reduction in mortality rates were associated with higher staffing at hospitals with the highest staffing ratios.

One notable study found decreased medication errors, pressure ulcers, use of restraints, pneumonia, and infections (Driscoll et al., 2018). This systematic review examined the relationship between nurse staffing levels and patient outcomes in acute units. Patients were 68% less likely to have central line bloodstream infections and 78% less likely to experience pneumonia. Also, they had a 31% decrease in pressure ulcers and lower failure-to-rescue rate.

Perhaps most significantly, the study found that each additional patient for one nurse meant that patients were 22% less likely to have “excellent or good quality care” and were 35% more likely to have a longer hospital stay (Driscoll et al., 2018).

Like Aiken and Dorning’s studies, Driscoll also looked at mortality rates among patients. In intensive care units, lower ratios decreased the risk of mortality by 14% (Driscoll et al, 2018). This was a pooled analysis from 19 studies examining mortality. However, this finding had a high heterogeneity and one of the studies had a large confidence interval that no recommendation could be made by the author regarding optimal ratios for patient outcomes.

2.3 Previous Research on Hospital Acquired Infections (HAIs)

Previous research has looked at hospital acquired infections, but only in limited types. One study noted the association between nurse-to-patient ratios and urinary tract infections (UTIs) and surgical site infections (SSIs). The relationship was significant for UTIs at 0.86 and SSIs at 0.93. This study also found out that burnout was associated with UTIs (0.82) and SSIs (1.56) (Cimiotti, Aiken, Sloane, & Wu, 2012). Other studies in the literature have generally focused on general infections (Schwab, Meyer, Geffers, & Gastmeier, 2012; Archibald et al., 1997) and do not address HAIs that I hope to fill the knowledge gap for.

HAIs I hope to examine in my study include central line associated blood infections (CLASBIs), catheter-associated urinary tract infections (CAUTIs), ventilator-associated events (VAEs), surgical site infections: abdominal hysterectomy (SSI, AH), surgical site infections: colon surgery (SSI, CS), laboratory-identified hospital-onset *C. difficile* events (*C. diff*), and laboratory-identified hospital-onset bloodstream events (MRSA bacteremia).

3. Methodology

Title 42 of the Code of Federal Regulations 42CFR 482.23(b) is a federal regulation which requires “*adequate* numbers of licensed registered nurses, licensed practical (vocational) nurses, and other personnel to provide nursing care to all patients as needed” in acute care hospitals (American Nurses Association, 2015). What defines “adequate” has been left to hospital administrators to decide and often led to decisions that were not in the best interest of safe patient care with as many as fifteen patients to one nurse. Nurses overseeing more patients impacts ultimately the quality of care provided. States have taken it into their own hands to further define what is sufficient staffing (American Nurses Association, 2015).

This quantitative comparisons observational analysis study compared various staffing laws across all 50 states in the United States plus the District of Columbia (DC), Guam, Puerto Rico, and the Virgin Islands (VI) in 2017. The goal was to analyze how various state staffing laws were correlated with health outcomes and the ratio of infections. This data was collected through the Centers for Disease Control and Prevention (CDC). The CDC analyzed numerous infection types, yet not all states were reporting across all infections. Information on this data is based on acute care hospital program evaluations.

Through conducting a comparative observational analysis, the research could isolate these indicators and analyze with accuracy how successful each law was at lowering the standardized ratio of hospital acquired infections. Conducting research for HAIs can provide more information that can lead to a stronger correlation between staffing ratios and patient outcomes. For my research, I only included those with at least 50% of states reporting in a particular category and excluded those with major gaps in the data.

3.1 State Nursing Staffing Law Categories

There are five main categories of state nursing staffing laws that I used to categorize states into: (1) stipulates specific nurse-to-patient ratios in law to be maintained at all times, (2) public disclosure or public reporting for public accountability, (3) staffing committees consisting of hospital administrators and healthcare providers responsible for nurse-driven ratios plan and staffing policy, (4) a Chief Nursing Officer (CNO) or designee designs the plan with feedback for others -- this is similar to Joint Commission standards, and (5) no state regulation (American Nurses Association, 2015).

The “stipulates ratios in law” category includes one state: California. The second “public disclosure and/or reporting” category has five states including Illinois (recognized under two different categories), New Jersey, New York, Rhode Island, and Vermont. The third category “staffing committees” has seven states which includes Illinois (the second category this state is recognized under), Connecticut, Texas, Nevada, Ohio, Oregon, and Washington. The fourth category of “chief nursing officer” also includes only one state which is Minnesota. The last category is “no state regulation” which includes 39 states, the District of Columbia, the Virgin Islands, Guam, and Puerto Rico. *Figure 2* shows a map of the United States and visually highlights states with state nursing staffing laws in orange.

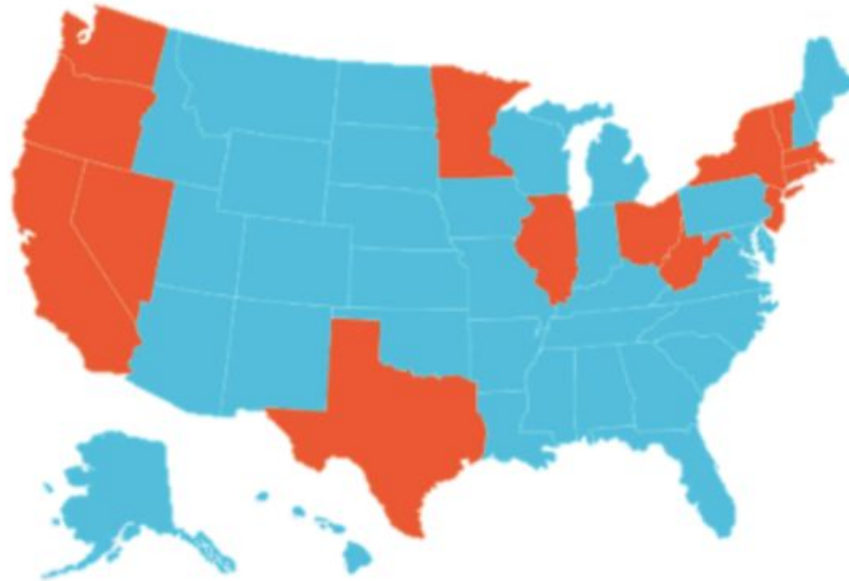


Figure 2. Nursing Staff Legislation. Orange states have passed legislation on nurse staffing whereas blue states do not have state legislation on nurse staffing (American Nurse Today, 2015)

3.2 Hospital Acquired Infections

HAIs are infections patients can get secondary to the initial disease they come into the hospital for. These can be contracted while receiving hospital treatment. Having nurses spread out among too many patients often results in malpractice or negligence that could have been prevented (i.e. misreading dosages, missing changes in vital signs, inaccurately documenting data, or incorrectly using medical terminology or abbreviations). Common nursing data for the number of HAIs was specifically measured by a standardized infection ratio (SIR). The data only includes acute care hospitals that reported to the CDC's National Healthcare Safety Network are included in the SIR calculation. The SIR is a summary statistic that can be used to monitor HAI prevention progress over time. In this case, the lower the SIR ratio, the lower the number of

infections, thus the better the health outcome. This number may vary across HAI types. Some hospitals do not use central lines or urinary catheters or ventilators (Centers for Disease Control and Prevention, 2015).

This paper will cover Central Line-Associated Bloodstream Infections (CLASBIs), Catheter-Associated Urinary Tract Infections (CAUTIs), Ventilator-Associated Events (VAEs), Surgical Site Infection (SSI) Colon Surgery (SSI, COLO), Surgical Site Infection (SSI) Abdominal Hysterectomy (SSI, HYST), Surgical Site Infection (SSI) Hip Arthroplasty (SSI, HPRO), Surgical Site Infection (SSI) Knee Arthroplasty (SSI, KPRO), Laboratory-Identified Hospital-Onset *C. difficile* Events (*C. diff*), and Laboratory-Identified Hospital-Onset Bloodstream Events (MRSA Bacteremia). These infections were selected because they had not been studied before and because they are among the most commonly reported.

The state SIR was taken from each location and compiled into a bar chart in *Figure 3*. The states in the staffing law category were averaged and analyzed against state staffing laws. Compared to the national average, we can note places where HAIs are above (worse) or below (better) the national average.

4. Results

Average Hospital Acquired Infection Standardized Infection Ratio

Note: This data represents the distribution of all hospital Standardized Infection Ratios for each HAI type.

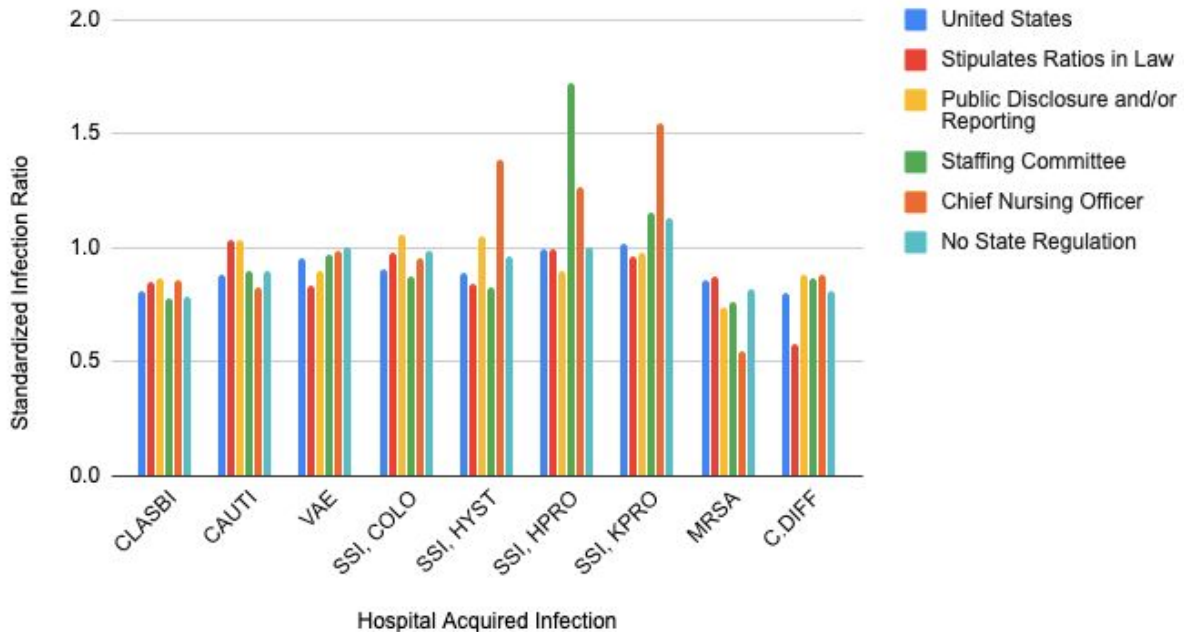


Figure 3. 2017 HAI ratios illustrating scores above (worse) or below (better) the national average (Centers for Disease Control and Prevention, 2015)

Overall, the data is not conclusive as to whether there is causation between state nurse staffing laws and HCAHPS scores and HAIs. California, a state in which they stipulate ratios in law, showed a SIR less than or equal to five out of the nine categories. States that had public disclosure and/or reporting and staffing committees showed SIRs less than or equal to four out of nine categories. States that used a chief nursing officer or had no state regulation generally performed the poorest with only two out of nine SIRs less than or equal to the national average. There was no significant relationship between state nurse staffing laws and hospital acquired infections. However, the data does show that some state regulation is overall better than no state

regulation. There is a positive impact on infection acquisition even if it does not have a significant impact.

5. Discussion

Mandating low ratios may not be important for HAIs. However, it does have a positive impact among nurses. This continues to establish the argument for maintaining low ratios despite the little effect it has on infections. While low ratios had little impact on infections in my study, that evidence still suggests that other states adopt similar policies for its benefits for nurses and staff members. This research could provide further evidence to make future recommendations for nurse-to-patient ratios in acute care settings.

While the data is promising, there are many other factors that can affect patient outcomes. Other confounding variables can influence the data. It is difficult to see if the correlation is causation as a more in depth study would be necessary. Future researchers would need to examine more about how California is different from other states and analyze how well the data represents California. Variables such as charge nurse leadership, varying nursing skill level, systemic hospital design, and unpredictable complications can all affect HAIs. It is very possible that all of these variables affect health outcomes and the implementation of staffing ratios are not directly correlated or lead to causation.

It is likely that many states have not followed California with specific ratios for several reasons. First, ratios regulated statewide do not allow much flexibility. It does not account for varying skill levels, hospital resources, or other supports in providing care. Moreover, specific ratios may lead to layoffs for unskilled personnel such as housekeepers and other supporting staff. Fewer unskilled staff may lead to more nurses completing non-nursing labor. However, for

California, doubling the amount of nurses graduating has countered the negative effects of a nursing shortage.

5.1 Potential Bias

It is extremely difficult to control for all factors that affect health outcomes. Additionally, there are many other confounding factors that influence infection rates. Major determinants of health include language barriers, high costs, insurance, accessibility. One of the most difficult factors to measure is leadership. While the staffing laws are in place for several states, the data does not show how those in power to set ratios make decisions about how they did so. For example, a Chief Nursing Officer seeking input on ratios from others may value profit margins less than a staffing committee that included hospital administrators. A Chief Nursing Officer setting ratios may have lower infection rates, yet compromised profit for patient care. Because values change from person to person, this study cannot say with confidence that there is a causation relationship between staffing laws and outcomes. All of these confounding factors can result in health needs not being met, lack of access to preventative services, delays in receiving care, and preventable hospitalizations. It would be optimal to look at this through a lens where all else was equal and the policy's effects are in a vacuum. While difficult to control all factors, research such as this study can contribute to finding a stronger correlation between various factors.

Another difficulty is ensuring high response rates. HAIs only accounted for hospitals that reported data (Centers for Disease Control and Prevention, 2018). The data compiled may not represent each state as a whole and thus each staffing law. Statistics show that subjects are more likely to respond to a survey if they have the best (to demonstrate they are the best and improve

hospital rankings) or worst (those that need improvement and are monitored) health outcomes.

There are many hospitals not accounted for in this area and may not be a true representation of hospitals in the United States. The exclusion factor of at least 50% states reporting in a particular category could limit those that are reporting well and not provide the most accurate information for the data available. I noted that certain types of infections where ratios tended to be reported less frequently. Infections that could have been represented, but were excluded from this study could impact the overall results.

Lastly, to me, this was not a purely academic study. There was a personal nature to this through my lived experience as a nursing student and as a care partner in the hospital. I had a passion to research this because I personally understand the difficulty of poorly balanced ratios or seeing coworkers ill-equipped with the skills to successfully take care of some of our most difficult patients.

5.2 Implications for my Community Partner

My community partner can use this information to both validate their findings and also use this latest evidence-based practice to encourage similar implementation in hospitals outside of California. It is expensive and challenging to maintain California's statewide nurse-to-patient ratios at all times and under all circumstances. If there is enough supporting information and advocates seeking safe nurse-to-patient ratios, it may be possible to enact. The nursing union is powerful and quite a force, yet there is still a business culture nurses must be adamant about addressing.

This information also affects the whole public community. It affects all of us. Every person has sought access to healthcare resources or knows someone who has benefitted from

healthcare resources. Hospitals that are staffed appropriately ensures safe patient care for all in the community and the public.

As a researcher, I hope that this information inspires and continues further research in nurse to patient ratios. There are many stakeholders in this area of research and it needs more understanding to better support and guide future legislation. This can provide a greater understanding so that our lawmakers can create social change on the state and federal levels. Locally, we can begin in our own hospitals in California by ensuring our hospital administrators are educated. Oftentimes, it is those in administration who have not worked bedside nursing who lose touch with what it is truly like at the bedside. They are not familiar with the daily obstacles of being at the frontlines and right at the bedside of each patient.

6. Conclusion

Safe staffing laws are an incredibly important aspect of patient care. The federal law does call for “adequate” staffing; however, because that word is so nebulous, states have taken it into their own hands to establish legislation regarding safe staffing. Several states have implemented these laws and found varying results in how it affects healthcare. Safe-staffing legislation is a growing trend with more states pursuing these concerns. While the data showed that the relationship between state staffing laws and hospital acquired infections was not significant, it is important to note that lower ratios still have significant benefits in other areas. It may not be significant in relation to these infections. To improve the well-being of nurses and patients, states should re-evaluate safe staffing laws or implement new ones if there are none established. Lower ratios allow nurses to focus on fewer patients and make fewer errors. Additionally, nurses need to help advocate for themselves by documenting these situations to serve as a testimony and

support safe patient ratios. Nursing affects all communities from the beginning of life to compassionate care at the end of life. Safe patient staffing laws ensure the well-being of all lives.

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