

# Linking Nurse Staffing to Nosocomial Infections: A Potential Patient Safety Threat

Sarah Cronin, Francesca Leo, & Margaret McCleary

Department of Nursing  
Georgetown University  
School of Nursing and Health Studies

## Abstract

*Purpose:* The goal of this paper is to inform the reader of the patient safety threat of nosocomial infections and its relationship to the nursing shortage. These elements are discussed in terms of the following: the decreasing nurse-to-patient ratios and the short-term remedy of float and agency nurses providing care. These elements are discussed in terms of their effect on the increasing rates of nosocomial infections and poor patient outcome. *Materials and Methods:* A review and collective analysis was conducted on published data pertaining to nosocomial infections and the nursing shortage. *Results:* The results from the collective analysis of evidence-based research concerning nosocomial infections and the nursing shortage indicate that the lack of adequate nursing staff contributes to the increased rate of infection. *Conclusions:* The nursing shortage decreases the nurse-to-patient ratio, increasing workload for nurses and decreasing time for infection control precautions. Float and agency nurses temporarily solve the gaps in staffing, but also create the problem of unfamiliarity with specific hospital and unit infection prevention practices. The consequences of the nursing shortage result in an increased nosocomial infection rate and poor patient outcome.

## Introduction and Overview

According to the Centers for Disease Control and Prevention (CDC), healthcare-associated infections, or nosocomial infections, “are infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting” (1). In recent years, nosocomial infections have reached epidemic proportions and are one of the main concerns in the health care arena (2). A continuously increasing prevalence, 10 % of patients on general hospital units will acquire a nosocomial infection during their hospital stay. The risk for infection escalates to 15-20% for those patients on intensive care units (3). Presently, two million patients each year acquire a nosocomial infection, approximately 90,000 succumbing to death. The risk for these infections poses a potential patient safety threat (4).

Nosocomial infections not only affect patient health and safety, but also the health care system as a whole. It is estimated that nosocomial infections increase the cost of health care between \$4.5 and \$5.7 billion in

patient care. In addition to monetary resources, nosocomial infections increase the number of days a patient spends in the hospital, requiring additional medical care and hours spent providing patient care. These costly infections divert funding and precious staff and nursing time from possible implementation of patient safety and infection control measures to protect patients (4).

One of the most pertinent factors leading to nosocomial infections is noncompliance with infection control measures by health care providers (5). Health care providers’ failure to abide by standard hand-washing procedures leads to 10% of all nosocomial infections (3). When the nurse-to-patient ratio declines, the amount of care and time allotted to each patient also decreases. The Institute of Medicine reports that the estimated 98,000 preventable deaths were partly attributed to insufficient staffing of nurses (6).

According to Stone, Clarke, Cimiotti, and Correa-de-Araujo, “In 60% of U.S. hospitals, vacancy rates for RNs have increased since 1999” (7). Fourteen percent of U.S. hospitals suffer from a severe nursing shortage with more than one-fifth of the registered nurse positions vacant. The American Hospital Association reports that of the 168,000 open positions in U.S. hospitals, 75% (126,000) are nursing positions. Already an immense health care concern, the scarcity of nurses is predicted by experts to increase in severity. Since 2004, the lack of and demand for nurses has grown by approximately 22%. By 2020, the nursing shortage is calculated to reach 800,000 vacant positions across the United States (7).

There are many topics within the potential patient safety threat of nosocomial infections and its relationship to the nursing shortage. Two important components of this threat to patient safety that will be analyzed in this paper include: staffing levels (nurse-to-patient ratios) and staff unfamiliar with the unit (float nurses and agency nurses). We will also discuss implications for nursing care within these topics, possible interventions and suggestions for future research.

## **Analysis of the Link Between Staffing and Nosocomial Infections**

### *Staffing Levels*

A consequence of the current nursing shortage is a decrease in nurse-to-patient ratio, thus increasing each nurse’s patient load. Numerous studies have associated short staffing and high nursing patient loads with increases in nosocomial infections. According to a study by the American Nurses Association that observed 1,500 hospitals spanning 9 states, infection rates were reduced by 0.3-0.7% with a mere 1% increase in hours of nursing care. This study supports similar results found in an earlier investigation conducted by the American Nurses Association (2). A third study published by Hugonnet, Uckay, and Pittet estimated that nosocomial infections acquired in hospital intensive care units could be reduced by 30% if the nurse-to-patient ratio was increased (8). Collective analysis of these studies provides evidence of the impact that the decrease in nurse staffing levels has had on patient acquisition of nosocomial infections.

In a case-controlled study conducted by Harbarth, Sudre, Sharan, Cadenas, and Pittet, a trend in decreased hand washing compliance was observed in times of understaffing (2). The decrease in available staff and subsequent decrease in nurse-to-patient ratio has been hypothesized to affect infection rate because the increase in work load decreases the amount of time for hand hygiene and other infection control practices (9). This inverse relationship has been shown to provide the nurse with less available time to observe strict hand hygiene – a practice that has been continuously reported as the leading preventative measure against nosocomial infections (10). During a standard shift, the time a nurse spends practicing proper hand hygiene could accumulate to at least an hour and a half of washing. With low staffing levels, this takes valuable time away that nurses would spend on direct patient care (6). Therefore, in order to maximize time spent on direct patient care, nurses may feel pressured to compromise proper hand hygiene techniques.

### *Float and Agency Nurses*

Some nurses will “float” to an unfamiliar floor to fill in where there are gaps in nurse staffing. Similarly, hospitals will pay agencies to send nurses unfamiliar to the hospital to provide coverage where needed. Studies have linked the use of float nurses and agency nurses to increases in the risk for nosocomial infections (2). Stone and colleagues conducted a study that analyzed the relationship between nurses unfamiliar with the patient unit to nosocomial infection (7). The results demonstrated that an increase use of temporary nurses was associated with an increase of nosocomial infection transmission. A case-control study conducted by Robert, Fridkin, Blumberg, Anderson, White and Ray found an increase in float and agency nurses to be a risk factor for bloodstream infection, the nosocomial infection of the study’s focus (2). Of more concern, this study was conducted in a surgical intensive care unit. Float and agency nurses who were not experienced in critical care were used in this critical care setting where risk for infection is higher than in less acute settings (2, 11).

Another study conducted in 2003 by Alonso-Echanove, Edwards, & Richards supported this evidence and found that among patients cared for by float nurses or agency nurses, the risk of the patient

acquiring a blood stream infection more than doubled (11). The Centers for Disease Control and Prevention conducted a study discovering that being cared for by float nurses 60% of the time was an independent variable to the patient susceptibility to nosocomial blood stream infection (2). The findings of these studies indicate an alarming trend of increase float and agency nursing, a popular short-term solution to the continual decrease in regular nursing staff. This becomes a problem when nurses unfamiliar and inexperienced to specific units, especially intensive care settings, are expected to provide the same level of care with similar competency as nurses experienced in the setting. This dangerously increases the infection rates, compromising patient care and outcomes.

### **Mechanisms to Alleviate the Threat to Patient Safety**

This alarming trend, if not remedied, will only worsen over time as the nursing shortage continues to grow. The implications for nurses and the health care system is a call to action for long-term resolutions to these issues. Solutions to these issues will not only positively affect nurses, but will have positive societal implications through the increase in lives saved (9). We propose different solutions supported by evidence-based research. These solutions could include, but are not limited to, standardization of nurse-to-patient ratio, improvements in the training and familiarity of float and agency nurses to specific units, maintaining consistency with unit assignments, changes at the hospital level to create and evaluate new staffing models, and of course, increasing the number of new nurses and the retention of current nurses.

#### *Standardization of Nurse-to-Patient Ratio*

There has been significant controversy pertaining to the exact nurse-to-patient ratio that is effective to improve infections and other negative patient outcomes (7,8). California is the only state, thus far, to have passed legislation mandating certain nurse-to-patient ratios (8). Even though the California Assembly Bill (AB) 394 was signed into law in 1999, not until 2004 were hospitals required to put into practice the regulations (12). Requirements of this bill began in 2004 to include a nurse-to-patient ratio of one licensed nurse to every six patients on general medical-surgical units. This ratio was updated in 2005

to increase the nurse-to-patient ratio to one nurse per every five patients (8). These ratios, although highly proactive, are still controversial in the health care system because optimal staffing ratios are still undetermined or proven by evidence-based research (12).

#### *Training and Consistency on Units Among Float and Agency Nurses*

As previously discussed, unfamiliarity of nursing staff, whether agency or float nurses, creates a concerning increase in nosocomial infection rates. Maintaining consistency on units could be beneficial to the outcome of patient care. In specialized units in which infection rates may be higher, it may behoove a hospital to decrease prevalence of float and agency nurses. Some hospitals have even banned float nurses from working in intensive care units (8). If maintaining consistency proves to be more complex than resources allow and float nurses are necessary in a hospital, a modified float system may be useful. In order to initiate the process of moving toward a solution, training float nurses to a limited number of units could be a useful tactic. Training could consist of the same number of hours of training and orientation for each unit as if training for permanent unit staff. The nurse would then only float to those specified units. In this way, the benefit of float nurses (to provide nurses for staffing gaps within hospitals) could still be utilized, but the familiarity with the unit and unit procedures would be increased.

#### *Changes at the Hospital Level*

Projections from a working group centered on the issue of infection control and its relation to nurse staffing concluded, "Nursing problems are symptoms of problems with the system...Good hospitals are linked to good outcomes" (2). Infection control and staffing needs to be approached by a multidisciplinary plan of action. During cutbacks on nursing staff in the 1990's, the position of infection nurses was eliminated in many hospitals (6). We propose that a revival of this position is imperative to a comprehensive approach to reform. Members of nurse staffing divisions in hospitals must be involved on the administrative level for effective actions. Without nursing representation on infection control teams, the team may not have an adequate understanding of the intricacy of nurse

staffing realities (2). Development and evaluation of different staffing models is a vital component of change.

Long-term solutions to the decline in patient outcomes related to staffing are to cease and reverse the nursing shortage epidemic. One way in which this can be accomplished is by the recruitment of new nurses and the retention of current nurses. For recruitment and retention methods and measures to be effective, hospitals must become involved. It has been shown to be in the best interest of hospitals to participate in nurse recruitment and retention. Estimated costs of increasing nurse staffing within hospitals are significantly lower than the current cost to hospitals of infections and poor patient outcomes related to short staffing (8).

### Conclusion

Although evidence-based research has been conducted on this topic and has illustrated that there is a definite link between the nursing shortage and rate of nosocomial infections, there are still questions left to be answered. Further research must be conducted to find the most efficient nurse-to-patient ratio, and detailed longitudinal studies must be carried out to find the optimal ratio for each hospital unit. Similarly, hospitals should investigate different staffing models for implementation.

The legislation of California and any upcoming pieces of legislation must be closely followed for the feasibility of implementation and the efficiency both in curtailing infection rates and in cost effectiveness of staff increases. A date is set for 2009 (five years after the California law was signed) for reviews to be completed. This review may provide significant insight into legislation for the future (12).

Although the problem is great, the solution is quite fundamental: more nurses equates to increased patient safety.

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