

## **Scientific Research Linking Registered Nurse Staffing to Patient Safety**

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Dozens of objective, scientific studies provide evidence of the link between inadequate staffing levels of registered nurses and increased adverse outcomes for hospital patients. Requiring nurses to care for an unlimited number of patients and work excessive mandatory overtime puts patients at higher risk for complications such as hospital-acquired infections, falls, preventable readmissions and even deaths.

### **Safe RN staffing saves lives**

#### **Better Nurse staffing and Nurse Work Environments Associated with Increased Survival of In-Hospital Cardiac Arrest Patients**

*Medical Care, 2016*

Each additional patient per nurse on the medical-surgical unit was associated with a 5% lower likelihood of surviving an in-hospital cardiac arrest.

#### **Patient Mortality Is Associated With Staff Resources and Workload in the ICU: A Multicenter Observational Study**

*Critical Care Medicine, August 2015*

The risk of death in the Intensive Care Unit was increased by a factor of 3.5 when the patient-to-nurse ratio was greater than 2.5 to 1.

#### **Components Of Hospital Perioperative Infrastructure Can Overcome The Weekend Effect In Urgent General Surgery Procedures**

*American Surgical Association meeting, April 2015*

Patients who undergo surgeries on weekends tend to experience longer hospital stays and higher mortality rates and readmissions. Hospitals with increased nurse-to-patient ratios were 1.44 times more likely to overcome this “weekend effect.”

#### **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, March 2015*

Assigning a second patient to a nurse increases the risk of death on in-hospital death in Intensive Care Units. The U.S. ranked 11th in average nurse to patient ratio (Brazil was tops followed by France, Germany, Spain and Belgium).

#### **Increase in nurse numbers linked to better patient survival rates in ICU**

*Nursing Standard, 2014*

Higher numbers of nurses per bed are associated with better survival rates among patients in intensive care, and the benefits are greatest among the very seriously ill. A study determined that seven additional lives would be saved for every 100 patients if nurse numbers increased from four to six per bed.

#### **Nurse staffing levels linked to weekend death rates from stroke**

*PLOS Medicine, August 2014*

Stroke patients are 35 percent more likely to die on units with fewer nurses on duty at weekends. Deaths tended to be highest among stroke units where there was just one nurse for every 10 patient beds.

### **Nurse Staffing And Education And Hospital Mortality In Nine European Countries: A Retrospective Observational Study**

*The Lancet, February 2014*

An increase in a nurses' workload by one surgical patient increased the likelihood of an inpatient dying within 30 days of admission by 7 percent. The difference between death rates in hospitals with lighter nurse workloads can be up to 30 percent.

### **State-Mandated Nurse Staffing Levels Alleviate Workloads, Leading to Lower Patient Mortality and Higher Nurse Satisfaction**

*Agency for Healthcare Research and Quality, September 2012*

The California safe staffing law has increased nurse staffing levels and created more reasonable workloads for nurses, leading to fewer patient deaths and higher levels of job satisfaction than in other states.

### **Lower mortality for abdominal aortic aneurysm repair in high-volume hospitals is contingent upon nurse staffing**

*Health Services Research, June 2013*

A well-staffed nursing unit that performs a high volume of aortic abdominal aneurysms (AAA) repairs is associated with improved patient outcomes, decreased patient deaths, and fewer failure-to-rescues, but volume is not associated with better outcomes unless accompanied by higher nurse staffing. In hospitals with better nurse-to-patient ratios, the rates of patient death decreased by approximately 60%.

### **Nurse Staffing Effects on Patient Outcomes**

*Medical Care, April 2011*

Total hours of nursing care determined per inpatient day in general units was associated with lower rates of congestive heart failure mortality, failure to rescue, infections, sepsis and prolonged length of stay.

### **Nurse Staffing and Inpatient Hospital Mortality**

*New England Journal of Medicine, March 2011*

"Studies involving RN staffing have shown that when the nursing workload is high, nurses' surveillance of patients is impaired, and the risk of adverse events increases." The risk of death increased 2 percent each time a patient was exposed to shifts with low RN staffing.

### **Implications of the California Nurse Staffing Mandate for Other States**

*Health Services Research, August 2010*

The researchers surveyed 22,336 RNs in California and two comparable states, Pennsylvania and New Jersey, with striking results, including: if they matched California state-mandated ratios in medical and surgical units, New Jersey hospitals would have 13.9 percent fewer patient deaths and Pennsylvania would have 10.6 percent fewer deaths. California RNs report having significantly more time to spend with patients, and their hospitals are far more likely to have enough RNs on staff to provide quality patient care. Fewer California RNs say their workload caused them to miss changes in patient conditions than New Jersey or Pennsylvania RNs.

### **Survival From In-Hospital Cardiac Arrest During Nights and Weekends**

*JAMA, February 2008*

A national study found that the risk of death from cardiac arrest in the hospital is nearly 20 percent higher on the night shift, when RN staffing is typically lower. "Lower nurse- patient ratios have been associated with an increased risk of shock and cardiac arrest."



### **Impact of Hospital Nursing Care on 30-day Mortality for Acute Medical Patients**

*Blackwell Publishing, August 2006*

A study of 46,000 patients in 76 hospitals found the adequacy of nursing staffing and proportion of registered nurses is inversely related to the death rate of acute medical patients within 30 days of hospital admission. "If hospitals have goals of minimizing unnecessary patient death for their acute medical patient population, they should maximize the proportion of Registered Nurses in providing direct care."

### **"Nurse Staffing in Hospitals: Is There A Business Case for Quality?"**

*Health Affairs, January/February 2006*

Increasing the use of RNs and hours of nursing care per patient could help to avoid more than 6,700 patient deaths.

### **Improving Nurse-to-Patient Staffing Ratios as a Cost-Effective Safety Intervention**

*Medical Care, August 2005*

Cutting nurse to patient ratios to 1:4 nationally could save as many as 72,000 lives annually.

### **Association Between Evening Admissions and Higher Mortality Rates in the Pediatric Intensive Care Unit**

*Pediatrics, June 2004*

Children admitted to pediatric intensive care units at night are more likely to die in the first 48 hours of care; authors point to fatigue and lighter nurse staffing levels as contributing factors.

## **Safe RN staffing improves care**

### **'Care left undone' during nursing shifts: associations with workload and perceived quality of care**

*BMJ Quality and Safety, 2013*

Most nurses (86%) reported that one or more of 13 needed care activities had been left undone on their last shift due to lack of time. RN staffing level was significantly associated with missed care for 8 of the 13 necessary care activities. Nurses working on shifts with the worst staffing (11.67 patients per RN) were twice as likely to report inadequate patient surveillance.

### **A Phased Cluster-Randomized Trial of Rural Hospitals Testing a Quality Collaborative to Improve Heart Failure Care**

*Medical Care, May 2013*

Rural hospitals with more consistent RN staffing are more likely to implement all four measures central to optimal care for heart failure patients: smoking cessation counseling; instructions to patients being discharged from the hospital; assessing how well the heart pumps; and ensuring the patient receives proper medications.

### **Newly Licensed RNs' Characteristics, Work Attitudes, and Intentions to Work**

*AJN, September 2007*

A national study on the work experience and attitudes of newly licensed nurses in America showed that more than 45 percent reported having recently been given more than 6 patients to care for at one time - a patient load that the researchers said placed their patients at an increased risk of injury or death. More than 55 percent reported that they had to work too fast; 33 percent reported having little time to get things done and nearly a third of new grads reported they had too many patients to get their job done well.

### **Hospital Nurse Staffing and Quality of Patient Care**

*Evidence Report/Technology Assessment for Agency for Healthcare Research and Quality, March 2007*

Every additional patient per RN per shift was associated with a 7 percent increase in relative risk of hospital-acquired pneumonia, 53 percent increase in pulmonary



failure, a 45 percent increase in unplanned extubation, and a 17 percent increase in medical complications.

### **Quality of Care for the Treatment of Acute Medical Conditions in U.S. Hospitals**

*Archives of Internal Medicine, December 2006*

A national study of the quality of care for patients hospitalized for heart attacks, congestive heart failure and pneumonia found that patients are more likely to receive high quality care in hospitals with higher registered nurse staffing ratios.

### **Correlation Between Annual Volume of Cystectomy, Professional Staffing, and Outcomes - A Statewide, Population-Based Study**

*Cancer, September 2005*

Patients undergoing common types of cancer surgery are safer in hospitals with higher RN- to-patient ratios, with a reduced death rate greater than 50 percent. Smaller community hospitals that implement high RN ratios can provide a level of safety and quality of care for cancer patients can match standards of high volume urban medical centers just by increasing their RN ratios.

## **Safe RN staffing reduces infections**

### **Nurse-Physician Collaboration and Hospital-Acquired Infections in Critical Care**

*Critical Care Nurse, April 2015*

This longitudinal study found that Intensive Care Units with higher nursing hours per patient day were associated with a .42 decrease in the rate of CLABSI (central line (central catheter)-associated bloodstream infections). The authors estimate the costs of these healthcare-associated infections (HAIs) to be enormous, with CLABSIs contributing to 30,665 deaths per year and ventilator-associated pneumonias with 35,967 deaths per year.

### **Nurse Staffing and NICU Infection Rates**

*JAMA Pediatrics, May 2013*

Hospitals understaffed 31 percent of their Neonatal Intensive Care Units (NICUs) infants and 68 percent of high-acuity infants relative to guidelines. Understaffing is associated with an increased risk of hospital-acquired hospital infections and an increase in infant deaths.

### **Nurse Staffing, Burnout, and Health-Care Associated Infection**

*American Journal of Infection Control, August 2012*

For each additional patient assigned to a nurse, there was roughly one additional infection per 1,000 patients. Large patient loads and high levels of exhaustion among nurses were associated with greater rates of urinary-tract and surgical-site infections among patients.

### **Overcrowding and Understaffing in Modern Health-care Systems: Key Determinants in Meticillin-resistant Staphylococcus Aureus Transmission**

*Lancet Infectious Disease, July 2008*

Understaffing of nurses is a key factor in the spread of methicillin-resistant Staphylococcus aureus (MRSA), a dangerous hospital-acquired infection. Common attempts to prevent or contain MRSA and other types of infections such as requirements for regular and repeated hand washing by nurses are compromised when nursing staff are overburdened with too many patients.

### **Staffing Level: a Determinant of Late-Onset Ventilator-Associated Pneumonia**

*Critical Care, July 19 2007*

Understaffing of registered nurses in hospital intensive care units increases the risk of serious infections for patients, specifically late-onset ventilator-associated pneumonia, a preventable and potential deadly complication.

### **Nurse Working Conditions and Patient Safety Outcomes**

*Medical Care, Journal of the American Public Health Association, June 2007*



Patients cared for in hospitals with higher RN staffing were 68 percent less likely to acquire infections such as central line associated bloodstream infections, a common cause of death in intensive care settings. Patients were also less likely to die within 30 days in these higher-staffed units. Other measures such as ventilator-associated pneumonia and skin ulcers were also reduced in units with high staffing levels.

## **Safe RN staffing reduces errors**

### **Hospital Workload and Adverse Events**

*Medical Care, May 2007*

Overcrowded and understaffed hospitals that are pushing too hard to streamline and cut costs are putting their patients at risk for medication errors, nerve injuries, infections and other preventable mistakes. A 10% increase in the number of patients assigned to a nurse leads to a 28% increase in adverse events such as infections, medication errors, and other injuries.

### **Longitudinal Analyses of Nurse Staffing and Patient Outcomes - More About Failure to Rescue**

*Journal of Nursing Administration, January 2006*

Having better RN staffing increased patient satisfaction with pain management and physical care; while having more non-RN care "is related to decreased ability to rescue patients from medication errors."

### **The Working Hours of Hospital Staff Nurses and Patient Safety**

*Health Affairs, July/Aug. 2004*

Nurses working mandatory overtime are three times more likely to make a medical error. "Overtime, especially that associated with 12-hour shifts, should be eliminated."

## **Safe RN staffing reduces readmissions**

### **Hospitals With Higher Nurse Staffing Had Lower Odds of Readmissions Penalties Than Hospitals With Lower Staffing**

*Health Affairs, October 2013*

Hospitals with higher nurse staffing levels had 25 percent lower odds of being penalized for preventable Medicare readmissions compared with similar facilities with lower nurse-staffing ratios. Higher-staffed hospitals also had 41 percent lower odds of receiving the maximum penalty for readmissions. Researchers estimated that each additional nurse hour per patient per day reduced the odds of being penalized for readmissions by 10 percent. "Investment in nursing is a potential system-level intervention to reduce readmissions that policy makers and hospital administrators should consider in the new regulatory environment as they examine the quality of care delivered to U.S. hospital patients."

### **Hospital Nursing and 30-Day Readmissions Among Medicare Patients With Heart Failure, Acute Myocardial Infarction, and Pneumonia**

*Medical Care, January 2013*

Hospitals with manageable patient workloads have significantly better patient outcomes. When nurses have a patient-to-nurse ratio of 4.95 or less, they had more time for patient teaching and to prepare the patient to transition home. Lower nurse-to-patient ratios reduced heart failure readmissions by 7%, acute myocardial infarction readmissions by 6%, and pneumonia readmissions by 10%. "In all scenarios, the probability of patient readmission was reduced when nurse workloads were lower and nurse work environments were better."

### **An Observational Study Of Nurse Staffing Ratios And Hospital Readmission Among Children Admitted For Common Conditions**

*BMJ Quality & Safety in Health Care, May 2013*



Adding just one child to a hospital's average staffing ratio increased a child's likelihood of readmission within 30 days by 11 percent; for children with surgical conditions, the risk increased by 48 percent. Excessive patient assignments for nurses (anything above four patients per nurse) results in a significant increase in the risk for children being readmitted to the hospital due to inadequate care and patient education.