

PREVENTING NEVER EVENTS

.....

EVIDENCE BASED NURSE STAFFING



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INTRODUCTION

“Not in our unit. Not on our watch. Not to our patients.”

AACN, 2009, p.15

Nurses sound this battle cry against preventable adverse events virtually every day, as part of their commitment to patient advocacy. Nurses implement evidence-based standards to protect patients from harm, but their efforts are effective only when they receive the support needed from sound staffing plans. These plans place nurses at the bedside in adequate numbers to deliver safe care and to permit nurses to obtain essential education for implementing standardized evidence-based practices.

This white paper describes the adverse patient events currently defined by various quality organizations, presents evidence to support the positive relationship between nurse staffing and prevention of adverse patient outcomes, and proposes two distinct calculations that support the financial commitment for additional staff.

QUALITY ORGANIZATIONS RESPOND

Never Events arose among the array of safety initiatives spawned by the 1999 Institute of Medicine (IOM) report, *To Err is Human*. Kohn, et al, (1999) reported the alarming finding that the number of Americans who die each year from medical errors ranges from 44,000-98,000. Subsequent reports have validated little improvement in quality outcomes (Landrigan, et al, 2010).

Understanding Never Events is confusing at best. Confusion arises because numerous organizations have authored quality guidelines similar to Never Events, but not precisely the same. We first examine two organizations involved in setting quality care standards and compare them.

CRITERIA FOR SERIOUS REPORTABLE EVENTS (NEVER EVENTS)

EVENTS THAT ARE
<ul style="list-style-type: none">• of concern to both the public and healthcare professionals and providers.
<ul style="list-style-type: none">• unambiguous, clearly identifiable, and measurable and thus feasible to include in a reporting system.
<ul style="list-style-type: none">• of a nature such that the risk of occurrence is significantly influenced by the policies and procedures of the healthcare facility.
<ul style="list-style-type: none">• usually preventable.
<ul style="list-style-type: none">• serious – resulting in death, loss of a body part, or disability, and any of the following:<ul style="list-style-type: none">• adverse; and/or• indicative of a problem in a healthcare facility's safety systems;• and/or important for public credibility or public accountability.

Source: NQF 2002

Understanding Never Events is confusing at best. Confusion arises because numerous organizations have authored quality guidelines similar to Never Events, but not precisely the same

AHRQ AND NEVER EVENTS

As a result of the 1999 IOM findings, the U.S. Department of Health & Human Services Agency for Healthcare Research and Quality (AHRQ) commissioned the National Quality Forum (NQF), a private not-for-profit organization, to create a set of patient safety measurements that would provide a model for a medical errors reporting system.

In 2002, NQF published *Serious Reportable Events in Healthcare: A Consensus Report*, which listed 27 adverse events that were “serious, largely preventable and of concern to both the public and health care providers” (NQF, 2002). These events and subsequent revisions to the list became known as Never Events. The concept of Never Events together with the need for the proposed reporting led to the development of NQF’s Consensus Standards Maintenance Committee on Serious Reportable Events, which maintains and updates the list.

The current list of 28 Never Events can be found in Table 1.

TABLE 1. SERIOUS REPORTABLE EVENTS IN HEALTHCARE, ALSO KNOWN AS NEVER EVENTS

CATEGORY	NEVER EVENT
Patient Protection	Infant discharged to the wrong person
	Patient death or serious disability associated with patient elopement (disappearance)
	Patient suicide, or attempted suicide, resulting in serious disability while being cared for in a healthcare facility
Care Management	Patient death or serious disability associated with a medication error (e.g., errors involving the wrong drug, wrong dose, wrong patient, wrong time, wrong rate, wrong preparation, or wrong route of administration)
	Patient death or serious disability associated with a hemolytic reaction due to the administration of ABO/HLA-incompatible blood or blood products
	Maternal death or serious disability associated with labor or delivery in a low-risk pregnancy while being cared for in a healthcare facility
	Patient death or serious disability associated with hypoglycemia, the onset of which occurs while the patient is being cared for in a healthcare facility
	Death or serious disability (kernicterus) associated with failure to identify and treat hyperbilirubinemia in neonates
	Patient death or serious disability due to spinal manipulative therapy
	Artificial insemination with the wrong donor sperm or wrong egg
Stage 3 or 4 pressure ulcers acquired after admission to a healthcare facility	
Environmental	Patient death or serious disability associated with an electric shock while being cared for in a healthcare facility
	Any incident in which a line designated for oxygen or other gas to be delivered to a patient contains the wrong gas or is contaminated by toxic substances
	Patient death or serious disability associated with a burn incurred from any source while being cared for in a healthcare facility
	Patient death or serious disability associated with a fall while being cared for in a healthcare facility
	Patient death or serious disability associated with the use of restraints or bedrails while being cared for in a healthcare facility
Surgical	Surgery performed on the wrong body part
	Surgery performed on the wrong patient
	Wrong surgical procedure performed on a patient
	Unintended retention of a foreign object in a patient after surgery or other procedure
	Intraoperative or immediately postoperative death in an ASA Class I patient
Product or Device	Patient death or serious disability associated with the use of contaminated drugs, devices, or biologics provided by the healthcare facility
	Patient death or serious disability associated with the use or function of a device in patient care in which the device is used or functions other than as intended
	Patient death or serious disability associated with intravascular air embolism that occurs while being cared for in a healthcare facility
Criminal	Any instance of care ordered by or provided by someone impersonating a physician, nurse, pharmacist, or other licensed healthcare provider
	Abduction of a patient of any age
	Sexual assault on a patient within or on the grounds of a healthcare facility
	Death or significant injury of a patient or staff member resulting from a physical assault (i.e., battery) that occurs within or on the grounds of a healthcare facility

Source: National Quality Forum (2007). *Serious Reportable Events in Healthcare – 2006 Update*. Washington, DC: National Quality Forum



CMS AND HOSPITAL ACQUIRED CONDITIONS

In 2008, the Center for Medicare & Medicaid Services (CMS) implemented policies that deny Medicare payment for treatment of specific hospital-acquired conditions (HACs). The HACs overlap to some extent with the Never Events, but not all HACs are Never Events and not all Never Events are HACs. See Table 2 for a side by side comparison of corresponding HACs and Never Events. Please note the table represents only those events that are similar and not the complete set of either HACs or Never Events.

TABLE 2. HACs AND NEVER EVENTS

HACs	NEVER EVENTS
Foreign Object Retained After Surgery	Unintended retention of a foreign object in a patient after surgery or other procedure
Air Embolism	Patient death or serious disability associated with intravascular air embolism that occurs while being cared for in a healthcare facility
Blood Incompatibility	Patient death or serious disability associated with a hemolytic reaction due to the administration of ABO/HLA - incompatible blood or blood products
Stage III and IV Pressure Ulcers	Stage 3 or 4 pressure ulcers acquired after admission to a healthcare facility
Falls and Trauma (Fractures, Dislocations, Intracranial Injuries, Crashing Injuries, Burns, Electric Shock)	Patient death or serious disability associated with a burn incurred from any source while being cared for in a healthcare facility
	Patient death or serious disability associated with a fall while being cared for in a healthcare facility
	Patient death or serious disability associated with an electric shock while being cared for in a healthcare facility
Manifestations of Poor Glycemic Control (Diabetic Ketoacidosis, Nonketotic Hyperosmolar Coma, Hypoglycemic Coma, Secondary Diabetes with Ketoacidosis, Secondary Diabetes with Hyperosmolarity)	Patient death or serious disability associated with hypoglycemia, the onset of which occurs while the patient is being cared for in a healthcare facility

RELATED INITIATIVES

The patient safety initiatives and nursing quality measures of other organizations also intersect with Never Events. Guidelines published by these organizations may also be related to the Never Events and are identified below:

JOINT COMMISSION

Because Never Events are also Sentinel Events, The Joint Commission (TJC) Sentinel Event standards mandate reporting and investigating these events when they occur. These reports and investigations contribute to the evidence of factors involved in Never Events.

AMERICAN HOSPITAL ASSOCIATION (AHA)

The American Hospital Association designed guidelines for reporting Never Events to patients and for billing purposes (AHA, 2007). AHA guidelines acknowledge that “Never Events are complicated issues and communication with patients must be well planned and specific so that the patient has a clear understanding of what adjustments will be made regarding billed hospital or related services.” (AHA, 2007). The guidelines recommend practices for adjusting the hospital bill, billing for physician charges, and involving Risk Management.

THE LEAPFROG GROUP

The Leapfrog Group (2009), a private voluntary program dedicated to quality and value in healthcare, gives public recognition to hospitals that agree to follow a five-point policy if a Never Event occurs within the facility. The policy provides for apology to patient and family, reporting, waiving of costs, root cause analysis, and making the policy public. In 2009, more than two-thirds of the over 1200 hospitals that participate in Leapfrog’s national hospital survey reported adopting Leapfrog’s robust policy (Binder, 2010).

PROFESSIONAL ASSOCIATIONS

Professional organizations have also addressed Never Events. The American Association of Critical Care Nurses (AACN) collaborated with the American College of Chest Physicians (ACCP), the Society of Critical Care Medicine (SCCM), the National Association for Medical Direction of Respiratory Care, and the American Thoracic Society (ATS) to identify four Never Events specific to the critical care setting:

- ventilator-associated pneumonia (VAP),
- iatrogenic pneumothorax,
- deep vein thrombosis/pulmonary embolism (when not related to orthopedic procedures), and
- delirium in critically ill patients (AACN, 2009).



CASE ONE

RETURN ON INVESTMENT CALCULATION: REDUCED TURNOVER / REDUCED DEATH

This case describes the financial investment required to bring RN staffing up to research recommended levels in order to reap the financial rewards in improved RN turnover and reduced patient deaths. It is an example only and relies on various assumptions as described within the case.

This sample facility has 320 RN FTEs, has reviewed staffing plans, ratios and HPPD rates resulting in identifying a need to increase RN staffing by 10% to meet research-recommended staffing levels.

\$60,000 annual RN salary
 21% addition to salary (taxes and benefits)
32 additional RNs
 \$2,323,200 (annual cost)

Sample facility had the following expectations for return on investment calculations. Every facility will be different and should adjust the calculations accordingly

REDUCED RN TURNOVER (JONES, 2005)

Current turnover rate 7% of 352 RNs x \$82,000 = total cost of \$2,020,480
 Reduce to 6% of 352 RNs x \$82,000 = \$1,731,840
 Savings - \$288,640

Reducing RN Turnover will contribute about 12.5% of the cost for additional staffing. The remaining will come from prevention of unnecessary deaths.

REDUCED PATIENT DEATHS ASSUMPTIONS:

1. IOM conservative end of range of unnecessary deaths in hospitals = \$44,000/year
2. Approximately 5,000 hospitals in the U.S.
3. Approximately 9 patients die unnecessarily in a hospital every year

Using the average of the future lost productivity cost from the table below, the reduction in costs approaches; \$7 million (\$770,000 x 9)

2008 COST OF FUTURE LOSS PRODUCTIVITY (THE BASIS OF WRONGFUL DEATH DAMAGES) (SCOTT, 2009)

AGE AND GENDER	COST OF FUTURE LOST PRODUCTIVITY
Male, 0 – 17	\$1,461,049
Male, 18 – 44	\$1,676,546
Male, 45 – 64	\$745,067
Male, 65 – 74	\$239,994
Male, 75+	\$105,169
Female, 0 – 17	\$1,184,349
Female 18 – 44	\$1,300,783
Female, 45 – 64	\$625,382
Female, 65 – 74	\$251,141
Female, 75+	\$119,066

While improving nurse's satisfaction with the job in order to reduce turnover is certainly a valuable goal, in the end this is not where the cost savings lies. Rather, it is in having enough staff available to safely and adequately monitor patients to keep them safe and provide the care that they need to improve their health situation.

ERRORS CONTINUE DESPITE PUBLIC ATTENTION

Despite the many initiatives addressing Never Events, consider the following:

- a) 1 in 25 patients suffer injury at a cost of \$17-29 billion per year (AHRQ 2008),
- b) 1.5 million injuries occurred in 2008 from medical errors at an average cost of \$13,000/injury or a total of \$19.5 billion (Shreve, et al, 2010),
- c) 7% of admissions had some type of medical injury according to inpatient billing records (Shreve, et al, 2010),
- d) 42,243 patients (0.2% of inpatients) developed a hospital acquired infection, and
- e) an estimated 1.7 million hospital-acquired infections, the most common complication of hospital care (McGlynn, 2008) occur each year in hospitals, leading to about 100,000 deaths (AHRQ, 2010).

The National Health Quality Report 2009 identified patient safety and healthcare-associated infection (HAI) as areas deserving urgent attention. The report spanning the full year 2009 identified that the only improvement shown was among adult surgery patients with postoperative pneumonia. No change was noted in bloodstream infections associated with central venous catheter placements, and in fact, several HAIs actually increased in frequency: selected infections due to medical care, adult surgery patients with postoperative catheter-associated urinary tract infection, and post-operative sepsis. The report concluded that overall safety had worsened during the annual reporting period (AHRQ, 2010).



Some believe the slight increase in infections may be the result of better reporting, and the number of errors actually may have decreased somewhat. But most patient-safety experts say the healthcare industry has done a poor job of reducing preventable medical errors in hospitals and nursing homes (Domrose, 2010). Even with all of the attention on adverse events in recent years, we have not managed to move the needle, forcing the hand of CMS to take action. Beginning in October 2008 CMS designated three National Coverage Determination (NCD) events and instituted payment denial for:

- a) surgery performed on the wrong body part;
- b) surgery performed on the wrong patient, and
- c) wrong surgical procedure performed on a patient.

In addition, ten categories of HACs receive reduced reimbursement.

THE ECONOMIC IMPACT OF NEVER EVENTS

The Centers for Disease Control (CDC) estimated costs of healthcare-associated infections in U.S. hospitals to be between \$28 and \$45 billion per year, adjusted to 2007 dollars (Klevens, et al, 2009). Costs of the ten most expensive medical errors are depicted in Table 3. The first five, alone, accounted for 55% of the total cost of errors.



TABLE 3. COSTS ASSOCIATED WITH THE 10 HIGHEST COST SPECIFIC MEDICAL ERRORS DURING 2008

MOST EXPENSIVE MEDICAL ERRORS

TYPE OF ERROR	NUMBER OF ERRORS	COST PER ERROR
Pressure ulcers	374,964	\$10,288
Postoperative infections	252,695	\$14,548
Mechanical complication of a device, implant or graft	60,380	\$18,771
Postlaminectomy syndrome	113,823	\$9,863
Hemorrhage complicating a procedure	78,216	\$12,272
Infection following infusion, injection, transfusion, vaccination	8,855	\$78,083
Pneumothorax	25,559	\$24,132
Infection due to central venous catheter	7,062	\$83,365
Other complications of internal (biological / synthetic) prosthetic device, implant and graft	26,783	\$17,233
Ventral hernia without mention of obstruction or gangrene	53,810	\$8,178

Source: Shreve, et al, 2010

CASE TWO

RETURN ON INVESTMENT CALCULATION: IMPROVE RN HOURS / REDUCE ADVERSE EVENTS

This case provides the calculation for the investment of improved hours per patient day (RN) and the return provided in reduction of hospital acquired pressure ulcers.

STAFFING ASSUMPTIONS

1. 20 bed medical unit
2. California ratios of 5 patients per RN so 4 RNs/shift (12 hours) $4 \times 12 \times 2 = 96/20 = 4.8$ HPPD.
3. All RN staffing
4. 4 RNs/shift (each RN has 5 patients)
5. 12 hour shifts
6. 4.8 HPPD
7. Pay: 32.57 per bureau of Labor Statistics for medical surgical hospital nurses. (Bureau of Labor and Statistics, 2010)
8. 1 day of pay to staff a full unit: \$3126.72 (excluding benefits etc)
9. 365 days to staff full unit: \$1,141,252.80

ADVERSE EVENT ASSUMPTIONS

1. Cost of HAPU to treat (Per CMS) = \$43,000. (Maryland Department of Health and Mental Hygiene, 2009)
2. Incidence of pressure ulcers 7-10% (Cooper, 2008)
3. Average LOS = 4.8 days. (Centers for Disease Control and Prevention, 2009)

LET'S DO THE MATH

- if the unit is full every day $\times 365$ days = 7,300 patient days
- divide that by 4.8 (the average LOS) = 1,520 individual patients
- if 8.5% of patients develop a HAPU (8.5 is mean of 7-10%),
- then 129 patients from this unit will develop a HAPU.
- if the cost per HAPU is \$43,000
- then $129 \times \$43,000 = \$5,547,000/\text{year}$ in HAPU cost (if a CMS patient, not reimbursed)

NOW, LET'S ADD MORE STAFF

- we started at 4.8 hours per patient day at a cost of \$1,141,252.80
- if we increase by 1 HPPD (so 5.8 HPPD)
- that means we need 4.85 RNs/shift
- 4.85×12 (hr shift) $\times 2$ (shifts in a day) $\times 32.57$ (pay for RN) = \$315.29/day increased cost
- $\$315.29 \times 365$ (days in year) = \$115,080.85 increased annual cost for RN.
- so.... If 129 patients developed HAPU with 4.8 HPPD, with increase of 1 HPPD we can decrease HAPU rate by 1.06%.
- $129 \times .016 = 2$ (approximately).
- we would decrease by 2 the number of HAPU. Since each HAPU costs \$43,000, multiply that $\times 2 = \$86,000$.

BUT our RN costs increased by \$115,000!!!! Remember, this is only one adverse event reduced by adding staff nurses. We will also save costs related to fall prevention, UTI prevention and catheter-associated bloodstream infection and other costly adverse events. In reducing HAPU alone, we have achieved 75% of our return on investment.

THE BUSINESS CASE FOR INCREASED NURSE STAFFING



Increased nurse staffing has a positive impact upon prevention of Never Events, however, increased nurse staffing also adds cost. Leaders in healthcare facilities must evaluate the cost of nurse staffing in the context of the potential benefits of preventing Never Events.

FEWER EVENTS, MORE NURSES

According to Needleman, et al, (2006) raising the proportion of RNs without changing licensed hours at an estimated cost of \$811 million would produce an estimated short term savings of \$242 million (based upon reduced length of stay). The remaining cost is further offset by 60,000 fewer adverse events and 5,000 fewer hospital patient deaths. (Needleman, et al, 2006).

REDUCED FREQUENCY OF 4 EVENTS

CMS reimbursement policy related to eight HACs (in addition to the three National Coverage Determination events) reduces Medicare reimbursement by \$20 million annually (Mattie & Webster, 2008). Although data have not yet become available to analyze full impact of CMS HAC regulations implemented in October 2008 (Kurtzman & Buerhaus, 2008; Welton, 2008), a hospital could net \$500,000 to \$5 million (depending upon the size and type of the hospital) by preventing four events (pressure ulcers, pulmonary embolism/deep vein thrombosis, sepsis, and ventilator associated pneumonia). Reducing the frequency of these four Never Events could potentially produce \$82.8 million in aggregated net income while freeing up 116,863 days of bed capacity (Robeznieks, 2008).

Although a hospital does not receive funds directly by preventing Never Events, the hospital reduces the losses it incurs when it treats the sequelae of Never Events without billing patients or insurers for these services. Freeing days of bed capacity theoretically offers an opportunity to occupy those beds with patients who will receive services that will prove more lucrative to the hospital than treating Never Events sequelae for free.

REDUCED NURSE TURNOVER

Additional cost reductions become available by reducing nurse turnover (Unruh & Fottler, 2006). Nurse turnover is related to dissatisfaction with staffing levels and to occurrence of adverse events (undesirable experiences associated with medical or surgical treatments). Curtailing nurse turnover could produce a savings of approximately \$7.8 million to \$8.4 million annually based upon a range of cost per RN turnover of \$82,000 for a vacancy filled by an experienced nurse to \$88,000 for a vacancy filled by a new graduate (Jones, 2005).

NURSE STAFFING AND NEVER EVENTS

Researchers have established the relationship between increased nurse staffing and four Never Events: pressure ulcers, falls with injury, bloodstream infections, and urinary tract infections (Buerhaus 2010). Several literature syntheses and meta-analyses have demonstrated the association between nurse staffing and patient outcomes, including mortality, complications, and length of stay (Kane et al, 2007; Lankshear, Sheldon, & Maynard, 2005; Lang, Hodge, & Olsen, 2004).

Inadequate nurse staffing has been associated with higher rates of adverse events, such as hospital acquired infection, shock, and failure to rescue. Systematic reviews of the published literature show that better nurse staffing is associated with less hospital mortality, less failure to rescue, and shorter lengths of stay. (Kane, et al, 2007).

IMPROVE NURSE EFFECTIVENESS

Nurses' effectiveness in preventing Never Events depends upon their ability to monitor, evaluate, and act upon emerging indicators of a patient's change in status. They need staffing plans that permit adequate time with their patients to perform these functions. They also need adequate resources available to them to implement necessary interventions (Laschinger & Lieter, 2006; McCusker, Dendukuri, Cardinal, Laplante, & Bambonye, 2004). Researchers have termed the ability of nurses to enact this process "surveillance capacity." (Kutney-Lee, et al, 2009). "The effectiveness of nurse surveillance is influenced by the number of RNs available to assess patients on an ongoing basis" (Aiken, et al, 2002, p. 1992).

RN judgment in recognizing early indicators of impending Never Events and other adverse events is critical to prevention. For example, early recognition of patients at risk for sepsis and septic shock via aggressive screening and the rapid implementation of evidence-based guidelines saves lives (Moore, 2010).



RESEARCH FINDINGS

An “overwhelming impression emerges from the literature that nurse staffing has been found to be associated with a wide range of positive patient outcomes” (Needleman, et al, 2008 p. 81). Researchers have documented the relationship between reduced adverse events and measures of nurse staffing including increased nurse-to-patient ratios, increased nursing hours per patient day, and increased RN fulltime equivalents (FTEs) per patient day.

RN TO PATIENT RATIO

In telling her story of intervening and rescuing a patient, one nurse wrote:

“That day, I had fewer patients to care for because this patient needed close monitoring; I had time to check in on him often. But what if I hadn’t? By the time he was given an every-four-hour vital-signs check, his blood pressure could have dropped so much that he may not have made it.” (Brown, 2010).

Researchers have identified a relationship between increased nurse-to-patient ratios and reduced adverse events, including: hospital-related mortality, failure-to-rescue (defined as death from pneumonia, shock or cardiac arrest, or upper gastrointestinal bleeding), sepsis, deep venous thrombosis, pulmonary complications, and medical complications. Fewer than 2.5 patients per RN per shift and 3.5 patients per RN in surgical units was associated with the largest risk reduction (Kane, et al, 2007).

Kane, et al, (2007) identified that one additional patient per RN per shift was associated with increased risk of:

- failure to rescue cases (7% increase)
- hospital acquired pneumonia (7% increase)
- pulmonary failure (53% increase)
- unplanned extubation (45% increase)
- medical complications (17% increase)

The relationships which researchers have documented are simply relationships and not proven to be causal. However, if the relationship were causal, researchers estimated that:

- reducing from 6 to 2 or fewer patients per RN could reduce deaths by 2.5% and by 1.5% among surgical patients. Further reduction from 2 to 4 patients per RN to 1.5 or fewer patients could reduce deaths by 9% among surgical patients (Kane, et al, 2007).
- implementing California ratios could reduce surgical deaths by 14% in New Jersey and by 11% in Pennsylvania (Aiken, et al, 2010).

The IOM Report, Keeping Patients Safe: Transforming the Work Environment of Nurses (Page, 2004) recommended specific ratios:

- hospitals and nursing homes should perform ongoing evaluation of the effectiveness of their nurse staffing practices with respect to patient safety, and increase internal oversight of their staffing methods, levels, and effects on patient safety whenever staffing falls below the following levels for a 24-hour day:

- In hospital ICUs—one licensed nurse for every 2 patients (12 hours of licensed nursing staff per patient day).

NURSING HOURS IN DIRECT PATIENT CARE

A greater number of hours of care per patient day provided by RNs was associated with lower rates of

That day, I had fewer patients to care for because this patient needed close monitoring; I had time to check in on him often. But what if I hadn’t?



failure-to-rescue, shock, cardiac arrest (Needleman et al, 2002), decreased risk of hospital-related death, and shorter lengths of stay (Kane, et al, 2007).

Increasing RN staffing has been associated with reduction of (Kane, et al, 2007):

- failure to rescue in medical and surgical patients (1% reduction)
- death rate (by almost 2%)
- hospital-acquired pneumonia (4% reduction)
- shock in surgical and medical patients
- pulmonary failure among surgical patients
- urinary tract infection in medical and surgical patients
- surgical wound infections and lower rates of sepsis
- pressure ulcers among surgical patients
- deep venous thrombosis in both medical and surgical patients
- nosocomial bloodstream infections among surgical patients (31% reduction)
- hospital acquired pneumonia among ICU patients (30% decrease)
- hospital-related mortality (reduction of 9% in ICU and 16% among surgical patients)
 - If the relationship were indeed causal, authors estimated that an increase by one RN FTE per patient day would save five lives per 1,000 medical patients, and six per 1,000 surgical patients
- cardiopulmonary resuscitation (28% reduction), unplanned extubation (51% reduction), and pulmonary failure (60% reduction) in the ICU setting.

Other researchers have also found that increasing RN staffing reduces adverse events, such as death rate (Page, 2004), pneumonia (Cho, et al, 2003); failure to rescue, shock, urinary tract infections among surgical patients, shorter length of stay among medical patients, and pneumonia (Needleman et al, 2002). Dunton, et al, (2007) found that:

- Every one percentage point increase in percentage of nursing hours supplied by RNs was associated with 0.7% lower hospital-acquired pressure ulcer (HAPU) rates and 0.7% reduction in fall rate, and projected that:
 - HAPU rates could be reduced by 11.4% by simultaneously increasing the percentage of hours supplied by RNs from 60% to 70% and increasing the average experience of RNs by five years.
 - Fall rates could be reduced by 7.7% by simultaneously increasing nursing hours from six to seven hours per patient day, increasing the percentage of hours supplied by RNs from 60% to 70%, and increasing the average experience of RNs by five years.

Whether measured by nurse-to-patient ratios, RN hours per patient day, or RN fulltime equivalents (FTEs) per patient day, the impact of increased RN power in staffing plans clearly relates to a decrease in Never Events and other adverse events.

CONCLUSION

Clarifying the relationship between nurse staffing and patient safety outcomes has generated much research. Although researchers have not directly examined the factors that influence nurse staffing policy (Kane, et al, 2007), there can be no denying that increased numbers of nurses strengthen patient safety

Ongoing research activities will continue to elucidate the contribution of staffing innovations to patient safety (Mitchell & Mount, 2009). Savitz, et al, (2005) encourage future research to explore contributions of nurse staffing not only to prevent adverse events, but also to enhance quality as evidenced by measures such as:

- unfinished or incomplete care
- use of standard technique, such as hand washing, skin preparation, wound dressing
- prudent monitoring of invasive medical devices, such as catheters, chest tubes, IVs
- systematic skin inspection, cleaning, and positioning
- adherence to care pathways/protocols
- other measures that reflect communications, collaboration, documentation, and teamwork.

The best available literature provides sound and repeated evidence linking staffing adequacy with improved patient outcomes. Yet, it doesn't seem to be enough to increase staffing levels likely related to daunting implementation costs.

Strengthening nurse staffing makes a significant impact on eliminating Never Events and contributes positively to a hospital's financial goals. Tools such as return on investment calculations and research-based findings will lead strategic leaders to an inescapable conclusion: **Increased numbers of competent nursing staff in the context of a culture of safety can prevent the devastating costs of adverse events.**

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