



Ratios

save lives

SUPPORTING RESEARCH



Foreword

Brett Holmes General Secretary

Members of the New South Wales Nurses' and Midwives Association have a professional responsibility to stand up for patient safety.

This booklet summarises compelling international academic evidence to support the fact that safe nurse to patient ratios are a matter of life or death.

Unsafe ratios increase the risk of dying and the literature now clearly shows a link between the number and skill level of nurses and the level of risk.

The nurses and midwives of NSW share a vision for safe patient ratios in all health sectors: public, private and residential aged care.

No matter where they live or the type of treatment they are receiving, the people of NSW deserve safer nurse to patient ratios from their current government.

A handwritten signature in black ink that reads "Brett Holmes". The signature is written in a cursive style.

Brett Holmes

General Secretary
NSWNMA

May 2018

Academic research shows better nurse-to-patient ratios save lives

Over 16 years of academic research has now provided an extensive body of research to show almost 20 common “adverse patient events” are significantly related to the number and education level of the nurses who care for those patients.

Unsafe levels of nurse to patient ratios are now academically proven to increase the risk of the following adverse events or complications:

- Urinary tract infection
- Pressure ulcers (commonly known as “bed sores”)
- Hospital-acquired pneumonia
- Shock or cardiac arrest
- In-hospital mortality
- Failure to rescue
- Upper gastro-intestinal bleeding
- Hospital-acquired sepsis (life threatening infection)
- Deep vein thrombosis (“DVT”)
- Central nervous system complications
- Pulmonary failure post-surgery (heart/lung)
- Metabolic derangement post-surgery (abnormal biochemical functioning)
- Adverse drug events (missed, delayed or incorrect medication)
- In-hospital falls.

Nurses are the only health professionals who provide a 24/7 presence at the patient’s bedside. Therefore, the nurse is the member of the healthcare team most likely to pick up deterioration in a patient’s condition, and initiate interventions to minimise the impact of adverse events, which can prevent negative patient outcomes.

In this booklet

The following tables summarise studies that demonstrate the benefit of improved nurse-to-patient ratios. By employing a high proportion of university-qualified Registered Nurses (RNs), there are better patient outcomes for a range of hospital treatments and surgical procedures.

Studies estimating the economic cost savings through funding increased nurse staffing levels are also presented.

TABLE ONE

Patient Outcomes Sensitive to Level of Nursing Staff

STUDY

FINDING

Urinary tract infection (UTI)

Dall *et al.*
(2009)

Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of hospital-acquired complications.

With respect to UTI it was shown that each incidence resulted in:

Increased Length of Stay (LOS):

Medical patient = 1.68 days

Surgical patient = 4.58 days

Increased cost:

Medical patient = \$1,582²

Surgical patient = \$4,636

Esparza *et al.*
(2012)

A study of 235 Californian hospitals found (1) that with increased nursing hours per patient day (NHPPD) the odds of UTI decreased 1.013 times, and (2) as the RN proportion of skill mix increased, the odds of a UTI decreased by 4.25 times.

Needleman
et al. (2002)

This study used data from 799 hospitals in 11 US states (covering 5,075,969 discharges of medical patients and 1,104,659 discharges of surgical patients) to examine the relationship between the amount of care provided by nurses and patient outcomes. It found that an increased proportion of hours provided by RNs and greater RN NHPPD was associated with decreased UTI.

Twigg *et al.*
(2015)

The sample included 36,529 patient admissions over a two-year period from October 2004 – November 2006. The prevalence ratio showed that for each of the nurse-sensitive outcomes there was an increase in prevalence for those who were exposed to an understaffed shift, with all ratios being greater than one. After adjusting for patient characteristics, nurse-sensitive outcomes found to have the understaffed variable significant in the logistic regression model were surgical wound infection, urinary tract infection, pressure injury, pneumonia, deep vein thrombosis, upper gastrointestinal bleed, sepsis and physiological metabolic derangement.

Pressure ulcers

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of hospital-acquired complications. With respect to pressure ulcers, each per patient incidence lead on average to increased:

LOS: Medical patient = 4.19 days Surgical patient = 6.59 days

Cost: Medical patient = \$5,032 Surgical patient = \$5,330

Duffield *et al.* (2011) This study, using data from 80 units in 19 NSW hospitals, found (1) increased RN/CNS (Clinical Nurse Specialist) staff to be associated with significantly decreased rates of pressure ulcers, and (2) increased RN/CNS (Clinical Nurse Specialist) staff as a proportion of nursing hours was associated with significantly decreased rates of pressure ulcers.

Blegen *et al.* (2011) Using data from 1.1 million adult discharges in the US and staffing for 872 wards in 54 hospitals, this study found that an increase in NHPPD was associated with lower rates of pressure ulcers in intensive care.

Pneumonia

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of hospital-acquired pneumonia. Per patient each incident, on average, lead to increased:

LOS: Medical patient = 2.79 days Surgical patient = 4.48 days

Cost: Medical patient = \$5,673 Surgical patient = \$8,273

Twigg *et al.* (2010) This retrospective study of three adult tertiary hospitals in Perth utilised 236,454 patient records and 150,925 nurse staffing records and found that increased NHPPD lead to a 17% decrease in pneumonia.

Duffield *et al.* (2011) Using data from 80 units in 19 NSW hospitals, this study found that an increase in RN/CNS (Clinical Nurse Specialist) staff was associated with significantly decreased rates of pneumonia.

Pappas (2008) Analysis of data from 3,230 patients in 6 inpatient nursing units in the US showed that the average incidence cost of hospital-acquired pneumonia in surgical patients was US\$1,631.

Mark *et al.* (2007) Administrative data (1996-2001) was used to examine discharges of 3.65 million paediatric patients in 286 general and children's hospitals in California. Increased RN staffing lead to significant decreases in postoperative pneumonia in hospitalised children.

Pneumonia

Needleman *et al.* (2002) The researchers used data from 799 hospitals in 11 US states (covering 5,075,969 discharges of medical patients and 1,104,659 surgical patient discharges) to examine the relationship between the amount of care provided by nurses and patient outcomes. It found an increased proportion of hours provided by RNs was associated with a decreased rate of pneumonia.

Kane *et al.* (2007) This US meta-study reviewed data from 94 studies conducted between 1990 – 2006 and found that every additional patient per RN per shift was associated with a 7% increase in relative risk of hospital-acquired pneumonia.

Cho *et al.* (2003) This US study of 232 acute care Californian hospitals and 124,204 patients found that an increase of one RN NHHPD (from an average of 6.3 RN NHPPD) was associated with a 8.9% decrease in the odds of getting pneumonia. Lower RN staffing levels increased the probability of acquiring pneumonia with increased:

LOS: 5.1-5.4 days

Cost: \$4,094 – \$5,115/day/patient or \$21,697 – \$27,623 per episode.

Deep vein thrombosis (DVT)

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of hospital-acquired complications. On average each incidence of hospital-acquired DVT lead to increased:

LOS: Medical patient = 3.09 days Surgical patient = 5.65

Cost: Medical patient = \$5,133 Surgical patient = \$10,062

Needleman *et al.* (2002) The researchers used data from 799 hospitals in 11 US states (covering 5,075,969 discharges of medical patients and 1,104,659 discharges of surgical patients) to examine the relationship between the amount of care provided by nurses and patient outcomes. An increased proportion of hours provided by RNs is associated with decreased incidence of DVT.

Upper gastrointestinal (GI) bleeding

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of hospital-acquired complications. On average, developing upper GI bleeding lead to increased:

LOS: Medical patient = 1.37 days Surgical patient = 2.64 days

Cost: Medical patient = \$2,730 Surgical patient = \$5,699

Twigg *et al.* (2010) This retrospective study of three adult tertiary hospitals in Perth utilised 236,454 patient records and 150,925 nurse staffing records and found that increased NHPPD lead to a 37% decrease in ulcer/gastritis/upper GI bleeds.

Duffield *et al.* (2011) Using data from 80 units in 19 NSW hospitals, Duffield and associates found increased RN/CNS (Clinical Nurse Specialist) staff as a proportion of nursing hours to be associated with significantly decreased rates of GI bleeding.

Needleman *et al.* (2002). This study used data from 799 hospitals in 11 US states (covering 5,075,969 discharges of medical patients and 1,104,659 discharges of surgical patients) to examine the relationship between the amount of care provided by nurses and patient outcomes. An increased proportion of hours provided by RNs and greater RN NHPPD is associated with decreased upper GI bleeding.

Central nervous system (CNS) complications

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of CNS complications. Development of CNS complications lead to increased:

LOS: Medical patient = 0.8 days Surgical patient = 2.99

Cost: Medical patient = \$1,071 Surgical patient = \$3,484

Twigg *et al.* (2010) This WA study utilised 236,454 patient records and 150,925 nurse staffing records and found that increased NHPPD lead to a 54% decrease in CNS complications in surgical patients.

Sepsis (life threatening infection)

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate patient risk of hospital acquired sepsis and the subsequent impact in terms of increased LOS and cost.

LOS: Medical patient = 5.51 days Surgical patient = 9.3 days

Cost: Medical patient = \$10,946 Surgical patient = \$19,830

Duffield *et al.* (2011) Analysis of data from 80 units in 19 NSW hospitals revealed that (1) increased RN/CNS (Clinical Nurse Specialist) staff is associated with significantly decreased rates of sepsis, and (2) increased RN/CNS (Clinical Nurse Specialist) staff as a proportion of nursing hours is associated with significantly decreased rates of sepsis.

Mark *et al.* (2007) Administrative data (1996-2001) was used to examine discharges of 3.65 million paediatric patients in 286 general and children's hospitals in California. It found that increased RN staffing lead to significant decreases in postoperative infection in hospitalised children.

Blegen *et al.* (2011). This study, using data from 1.1 million adult discharges in the US and staffing for 872 wards in 54 hospitals, found that an increase in RNs as proportion of skill mix was associated with fewer cases of sepsis.

Shock/cardiac failure

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the patient's risk of hospital-acquired shock/cardiac failure and the impact of increased length of stay and cost.

LOS: Medical patient = 0.56 days Surgical patient = 1.36 days

Cost: Medical patient = \$5,428 Surgical patient = \$8,989

The study found a 31% increased mortality risk in medical patients with shock/cardiac failure.

Duffield *et al.* (2011) Using data from 80 units in 19 NSW hospitals it was found that increased RN/CNS (Clinical Nurse Specialist) staff as a proportion of nursing hours is associated with significantly decreased rates of shock.

Needleman *et al.* (2002) This study found that an increased proportion of hours provided by RNs is associated with decreased shock/cardiac arrest.

Rochman (2012) This US study of 299 patients in 22 units in one US hospital found that one additional hour per patient day of RN care resulted in 28% greater odds of surviving to discharge post in-hospital cardiac arrest.

Postoperative infection

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the surgical patient's risk of post-operative infection and each incident, on average, increased:
LOS = 8.14 days **Cost** = \$14,164/patient.

Pulmonary heart/lung failure

Dall *et al.* (2009) Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate the surgical patient's risk of pulmonary failure while in hospital and was associated with increased:
LOS = 4.51 days **Cost** = \$14,717/patient.

Duffield *et al.* (2011) The researchers used data from 80 units in 19 NSW hospitals and found that increased RN/CNS (Clinical Nurse Specialist) staff as a proportion of nursing hours is associated with significantly decreased rates of pulmonary failure.

Kane *et al.* (2007) This US meta-study, using data from 94 studies conducted between 1990 – 2006, found that every additional patient per RN per shift was associated with a 53% increase in pulmonary failure.

Metabolic derangement

Duffield *et al.* (2011) Using data from 80 units in 19 NSW hospitals, it was found that increased RN/CNS (Clinical Nurse Specialist) staff as a proportion of nursing hours was associated with significantly decreased rates of physiological/metabolic derangement.

Failure to rescue

Wiltse Nicely *et al.* (2012) This US study had a sample of 25,625 nurses and 20,409 patients from 517 hospitals and found that when the Patient to Nurse ratio was changed from 8:1 to 6:1 there was a significantly lower rate of failure to rescue for patients undergoing Abdominal Aortic Aneurysm repair. This was more pronounced when the Patient to Nurse ratio was further changed to 4:1.

Aiken *et al.* (2003). This study analysed outcomes data for 232,342 general, orthopaedic and vascular surgery patients. It found that hospitals with higher proportions of RNs in the nursing workforce were associated with lower rates of failure to rescue in surgical patients.

Failure to rescue

- Aiken *et al.* (2002). Analysis of data from 10,184 nurses and 232,342 patients in 168 hospitals in the US found that each additional patient per nurse is associated with a 7% increase in failure to rescue for surgical patients.
- Blegen *et al.* (2011). This study, using data from 1.1 million adult discharges in the US and staffing for 872 wards in 54 hospitals, found that increased NHPPD is associated with lower rates of failure to rescue.
- Griffiths *et al.* (2013). Discharge data from 66,100,672 surgical admissions to 146 general acute hospital trusts in England showed that lower rates of failure to rescue were associated with a greater number of nurses per bed.
- Jianghua *et al.* (2013). For 284,097 patients discharged from 446 acute care nursing units at 128 acute hospitals, higher RN skill mix was associated with lower 30-day mortality across all three levels of risk adjustment.
- Park *et al.* (2012). Data from 42 hospitals (759 wards), and approx. 1 million inpatients showed that higher RN staffing was associated with lower FTR.
- Altares Sarik *et al.* (2016). Across 1,267,516 patients in 665 hospitals, logistic regression models showed that each 10% increase in proportion of RNs to total nursing staff was associated with a 7% decrease in the odds of 30-day mortality and FTR in the surgical patient population.

Hospital mortality rates

- Twigg *et al.* (2010). This retrospective study of three adult tertiary hospitals in Perth utilised 236,454 patient records and 150,925 nurse staffing records and found that increased NHPPD was significantly associated with a 25-26% decrease in mortality rates.
- Aiken *et al.* (2003). Nurse workloads of 22,336 hospital nurses in three US states were compared and examined against patient outcomes. Ratios established in California were associated with significantly lower mortality than those found in US states with less favourable NTPRs.
- Aiken *et al.* (2002). Analysis of data from 10,184 nurses and 232,342 patients in 168 hospitals in the US found that each additional patient per nurse was associated with a 7% increase in likelihood of dying within 30 days of admission for surgical patients.

Hospital mortality rates

- Rafferty *et al.* (2007) Patients in UK hospitals with the lowest NTPR had a 26% higher mortality rate. This study involved 30 acute care trusts; the authors concluded that 246 lives could have been saved if all of this subset of surgical patients had been nursed in those trusts with the most favourable staffing levels.
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- Wiltse Nicely *et al.* (2012) Hospitals with higher NTPR have lower rates of mortality for patients undergoing Abdominal Aortic Aneurysm repair, according to this US study.
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- Tourangeau *et al.* (2006) This Canadian study used discharge data from 46,993 patients and a survey of 5980 nurses. Lower 30-day mortality rates were associated with hospitals that had a higher proportion of RN staff.
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- Eastabrooks *et al.* (2005) A Canadian study of mortality rates from 18,142 patients in 49 acute care hospitals found hospitals with a higher proportion of RN nurses had lower rates of 30-day mortality.
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- Blegen *et al.* (2011) This study, using data from 1.1 million adult discharges in the US and staffing for 872 wards in 54 hospitals, found that higher nursing staffing was associated with lower rates of congestive heart failure mortality in general wards.
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- Kane *et al.* (2007) This US meta-study reviewed data from 94 studies conducted between 1990 – 2006 and found that every additional RN full time equivalent (FTE) per patient day would save 5 lives per 1,000 medical patients and 6 per 1,000 surgical patients. This study also found that an increase in total nurse hours/patient day was associated with reduced hospital mortality. The death rate decreased by 1.98% for every additional total nurse hour per patient day.
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- Eunhee *et al.* (2015) This study analysed 76,036 instances of surgical discharges and found that each additional patient per nurse is associated with an 5% increase in the odds of patient death within 30 days of admission and that each 10% increase in nurses with a degree level qualification is associated with a 9% decrease in patient deaths.
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- Aiken *et al.* (2014) Discharge data for 422 730 patients aged 50 years +, who had common surgeries in 300 hospitals in nine European countries was studied. An increase in a nurses' workload by one patient increased the likelihood of an inpatient dying within 30 days of admission by 7% and every 10% increase in bachelor's degree nurses was associated with a decrease in this likelihood by 7%.

Hospital mortality rates

- Silber *et al.* (2016) This study included 25 752 elderly Medicare general surgery patients treated at focal hospitals and 62 882 patients treated at control hospitals during 2004-2006 in Illinois, New York, and Texas. Hospitals with better nursing environments and above-average staffing levels were associated with better value (lower mortality with similar costs) compared with hospitals without nursing environment recognition and with below-average staffing, especially for higher-risk patients. These results show that patients undergoing general surgery at hospitals with better nursing environments generally receive care of higher value.
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- Wiltse *et al.* (2013) This study found that of 20,409 patients in 517 hospitals studied, each additional patient per nurse increased the odds on patients dying and being involved in a failure to rescue, by factors of 1.12 and 1.08 respectively.
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- Kutney-Lee *et al.* (2013) This Pennsylvania study found that every 10% increase in nurses holding a baccalaureate degree within a hospital was associated with an average reduction of 2.12 deaths for every 1,000 patients—and for a subset of patients with complications, an average reduction of 7.47 deaths per 1,000 patients.
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- Ozdemir *et al.* (2016) There were 294 602 emergency admissions to 156 NHS Trusts (hospital systems) with a 30-day mortality of 4.2%. Trust-level mortality rates for this cohort ranged from 1.6 to 8.0%. The lowest mortality rates were observed in Trusts with higher levels of medical and nursing staffing, and a greater number of operating theatres and critical care beds relative to provider size. Higher mortality rates were seen in patients admitted to hospitals with lower nursing staff ratios.

TABLE TWO

The impact of nurse staffing on adverse patient outcomes

STUDY	FINDING
Adverse events in intensive care	
Rothschild <i>et al.</i> (2009)	This US study found that an adverse event in critical care lead to an average increased LOS of 1.08 days at a cost of \$3,857/event. Estimated savings from prevented adverse events ranged from \$2.31 million to \$12.8 million. Nurse staffing for the same time frame cost \$1.32 million.
Marcin <i>et al.</i> (2005)	Paediatric patients are more likely to experience an unplanned extubation when there is 1 nurse for every 2 patients rather than a 1:1 ratio.
Length of Stay in hospital (LOS)	
Esparza <i>et al.</i> (2012) Needleman <i>et al.</i> (2002)	The higher the proportion of RN skill mix, the shorter the LOS according to two separate studies conducted a decade apart.
Blegen <i>et al.</i> (2011)	This study, using data from 1.1 million adult discharges in the US and staffing for 872 wards in 54 hospitals, found that increased NHPPD was associated with decreased LOS.
Kane <i>et al.</i> (2007)	This US meta-study reviewed data from 94 studies conducted between 1990 – 2006 and found that LOS was shorter by 24% in ICUs and by 31% for surgical patients for each additional RN FTE/patient day.
Outcomes for high risk infants	
International Neonatal Network, Scottish Neonatal Consultants, Nurses Collaborative Study Group (2000)	This comparison of risk adjusted hospital outcomes in Scottish and Australian Neonatal Intensive Care Units found reduced levels of cerebral damage and mortality where more nursing hours per patient are provided.

Emergency Department waiting time

Dall *et al.* (2009) A study of 30,404 patients in the waiting rooms of two US hospitals found that waiting time and care time were decreased in Emergency Departments with a mandated nurse-to-patient ratio.

Falls in hospital

Chan *et al.* (2010). **Increased Length of Stay (LOS) = 2.39 days/fall**
Cost per fall = \$6,919

Hinno *et al.* (2011). A survey of 535 Finnish RNs and 334 RNs from the Netherlands found that lower nurse staffing is associated with an increased number of patient falls.

Adverse drug events

Dall *et al.* (2009) This study found that each adverse drug event on average leads to increased Length of Stay (LOS) of 3.8 days at a cost of \$7,572/event.

Frith *et al.* (2012) From 31,080 patient observations, this study shows that increasing the number of RN hours and decreasing/ eliminating LPN (non-degree qualified nurse) hours can be a strategy to reduce medication errors.

Readmission to hospital

Bobay *et al.* (2011) In this US study researchers examined the impact of unit-level nurse staffing on unplanned readmissions and ED visits within 30 days of discharge from 16 adult medical-surgical units (1,660 patients). They found that the odds of an unplanned (related to initial admission) ED visit decreased by 45% with a 0.71 hours increase of RN NHPPD and by 32% with a 0.66 hours increase in non-RN NHPPD. Additionally, it was found that a 0.88 hour/RN increase in overtime worked increased the odds of an unplanned ED visit by 33%.

Kim *et al.* (2016) The aim of this study was to evaluate the effects of nurse staffing on hospital readmissions of COPD patients. A total of 1,070 hospitals and 339,379 hospitalization cases were included in the analysis. A higher number of RNs was associated with lower readmission rates of 8.9% and 7.9% respectively. A similar effect was observed as the proportion of RNs among the total nursing staff gradually increased, resulting in lower readmission rates of 7.7% and 8.3%. There were notable positive effects of nurse staffing by RNs on patient outcomes. In addition, the magnitude of impact differed between different sizes of hospitals. Thus, human resource planning to solve staffing shortages should carefully consider the qualitative aspects of the nursing staff composition.

TABLE THREE

Affordability of additional nurse staffing

STUDY	FINDING
Needleman <i>et al.</i> (2006)	This US study using data from 799 hospitals provides a business and social case for investing in nurse staffing. It analysed the costs of increasing nurse staffing to the 75th percentile for hospitals below this level to calculate cost benefits achieved by reduced length of stay and decreased adverse outcomes. It found that increased nurse staffing could have prevented 6,700 in-hospital patient deaths in these hospitals.
Rothberg <i>et al.</i> (2005)	This US study found that a staffing level of one nurse to 8 patients was the least expensive ratio but associated with highest patient mortality. Increasing staffing to 1:4 would save additional lives at a cost of \$131,795 per life saved. The study posited that this is a considerable saving compared to the cost of thrombolytic therapy in acute myocardial infarction at \$176,373 per life saved, or routine cervical cancer screening at \$418,645 per life saved.
Shamliyan <i>et al.</i> (2009)	In this US study, researchers analysed the savings-cost ratio of increased RN-to-patient ratios for patients in ICUs and patients in surgical and medical wards based on a meta-analysis of published observational studies. They estimated that an increase by one RN FTE in ICUs would save 327,390 years of life in men and 320,988 in women with a productivity benefit (present value of future earnings) of US\$ 4-5 billion. The productivity benefit from increased staffing in surgical units would be US\$8-10 billion.
Dall <i>et al.</i> (2009)	Discharge data from 610 hospitals (5.4 million patient discharges) was analysed to estimate patient risk of hospital-acquired complications, relationship with nurse staffing and LOS. It was estimated that in 2005 in the US, adverse events were associated with 251,000 in-hospital deaths, 22.6 million hospital in-patient days, and US\$41.8 billion in medical costs. The net present value of future productivity would average US\$222,400 per life saved. 34% of projected deaths averted would be in the 18-64 age group.
Twigg <i>et al.</i> (2013)	Hospital morbidity and staffing data were used to analyse nursing-sensitive outcomes and showed cost per 'life year' gained due to prevention of FTR events was AUD\$8,907 (in 2013 dollars).

TABLE FOUR

Missed Nursing Care (or care left undone)

STUDY	FINDING
Ball <i>et al.</i> (2016)	Lower registered nurse staffing levels are associated with higher levels of care left undone and with an increased risk of patient death, even when other factors are controlled for.
Ball <i>et al.</i> (2014)	In 401 NHS general wards of 46 acute hospitals, the number of patients per registered nurse was significantly associated with 'missed [elements of] care', most often comforting or talking with patients, educating patients and developing/updating nursing care plans.
Bruyneel <i>et al.</i> (2015)	In 217 hospitals in 8 European countries, higher proportions of nurses with a bachelor's degree reduce the effect of worse nurse staffing on more clinical care left undone.
Ausserhofer <i>et al.</i> (2014)	In 488 hospitals across 12 European countries, better nurse to patient ratios resulted in fewer instances of care left undone, especially 'comfort/talk with patients', 'Developing or updating nursing care plans/care pathways' and 'Educating patients and families'.
Ausserhofer <i>et al.</i> (2013)	Higher levels of implicit 'rationing' of nursing care in 35 Swiss acute hospitals resulted in significant increase in the odds of nurse-reported medication errors, bloodstream infections and pneumonia.

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