

Public Submission Cover Sheet

Please complete this sheet and submit with any attachments to the Sustainable Health Review Secretariat

Your Personal Details

This information will be used only for contacting you in relation to this submission

Title	Mr <input type="checkbox"/> Miss <input type="checkbox"/> Mrs <input type="checkbox"/> Ms <input type="checkbox"/> Dr <input type="checkbox"/> Other <input checked="" type="checkbox"/> Professor
Organisation	Edith Cowan University, School of Nursing and Midwifery
First Name(s)	Di
Surname	Twigg
Contact Details	████████████████████

Publication of Submissions

Please note all Public Submissions will be published unless otherwise selected below

- I do not want my submission published
- I would like my submission to be published but remain anonymous

Submission Guidance

You are encouraged to address the following question:

In the context of the Sustainable Health Review Terms of Reference listed below, what is needed to develop a more sustainable, patient centred health system in WA?

- Leveraging existing investment in Primary, Secondary and Tertiary healthcare, as well as new initiatives to improve patient centred service delivery, pathways and transition;
- The mix of services provided across the system, including gaps in service provision, sub-acute, step-down, community and other out-of-hospital services across WA to deliver care in the most appropriate setting and to maximise health outcomes and value to the public;
- Ways to encourage and drive digital innovation, the use of new technology, research and data to support patient centred care and improved performance;
- Opportunities to drive partnerships across sectors and all levels of government to reduce duplication and to deliver integrated and coordinated care;
- Ways to drive improvements in safety and quality for patients, value and financial sustainability, including cost drivers, allocative and technical efficiencies;
- The key enablers of new efficiencies and change, including, research, productivity, teaching and training, culture, leadership development, procurement and improved performance monitoring;
- Any further opportunities concerning patient centred service delivery and the sustainability of the WA health system.

Submissions Response Field

Please type your response into the field below. Alternatively you may provide your submissions as a separate attachment (Suggested Maximum 5 pages).

Safety of patients within the health care system has been linked to high quality nursing care, which is partly dependent on two nursing workforce dimensions; firstly adequacy of staffing numbers, and secondly, rich skill mix within the nursing team. We will address these two areas in turn, before discussing the cost and policy implications of these parameters.

In Western Australia, since 2002 and mandated in the current industrial agreements, the nursing workforce is calculated on a Nurse Hours per Patient Day (NHPPD) calculation. This was implemented to ensure that adequate provision of nursing staff is made for patient care. The NHPPD is determined by allocated nurse hours specific to ward categorisation. There are seven ward categories which are categorised depending on patient complexity, patient dependency, intervention level, patient turnover and elective/emergency patient mix. This introduction of this system resulted in an increase of 3.6% in nursing provision across the State (Di Twigg & Duffield, 2009).

This improvement in nursing levels was associated in improvements in nurse sensitive outcomes. Nurse sensitive outcomes (NSOs) are defined as “*a variable patient or family caregiver state, condition or perception responsive to nursing education*”. Fourteen NSOs were compared before and after the implementation of NHPPD nursing workforce levels and the analysis showed small significant improvements in outcomes in a number of areas. Overall, there were significantly fewer central neurological adverse events, pneumonias, and upper gastrointestinal adverse events, as well as location-specific or patient-specific (medical/surgical) reductions in rates of shock or cardiac arrest, sepsis, deep vein thrombosis and pressure ulcers. Importantly, there was an association between the increased levels of nursing staff and a 25% reduction in patient mortality. (Di Twigg, Duffield, Bremner, Rapley, & Finn, 2011). These findings are supported by international findings that explored patient mortality after surgery; Aiken et al. (2014) conducted a large study across nine European countries to find that by increasing a nurse’s workload by one patient increased the chances of the patient dying within 30 days of admission by 6.8%. Rafferty et al. (2007) assessed 30 National Health Service Trusts in England to find that hospitals with the greatest number of patients per nurse had a 26% greater mortality rate than those with the least.

Furthermore, it has been proven that in Western Australia, understaffing is associated with a small but statistically significant increased rate of adverse nurse-sensitive patient outcomes. Any patient exposed to a single understaffed shift at any time during their inpatient admission were 5-8% more likely to have a surgical wound infection, urinary tract infection, pressure ulcer, pneumonia, deep vein thrombosis, upper gastrointestinal bleed, or systemic sepsis. Whilst this increased risk might be deemed small, it is worth noting that the categorisation for exposure to understaffing in this analysis was very small; one shift during hospital stay with a mean length of stay of 5.9 days. Thus, this demonstrates the sensitivity of low staffing levels on adverse patient outcomes (D. E. Twigg, Gelder, & Myers, 2015). Therefore the evidence-based proof of the need for adequate numbers of nursing staff to ensure patient safety and to provide high quality patient care in Western Australia is unequivocal.

The second feature of importance is that of a rich nursing skill mix. A rich skill mix is characterised by higher percentages of Registered Nurses (RNs), Clinical Nurse Consultants (CNCs) and Nurse Practitioners (NPs) compared to Enrolled Nurses (ENs) and Assistants in Nursing (AINs). After the NHPPD system was implemented, the percentage of RNs in the nursing workforce in three major acute-care hospitals in Perth was 81.5-88.5%. A study

Submissions Response Field

Please type your response into the field below. Alternatively you may provide your submissions as a separate attachment (Suggested Maximum 5 pages).

assessing the predictive value of skill mix on nurse-sensitive adverse outcomes showed small but significant decreases in the rates of eight nursing-sensitive outcomes: pressure ulcer, pneumonia, deep vein thrombosis, ulcer, gastritis and upper gastrointestinal bleeds, sepsis, shock/cardiac arrest, mortality and failure to rescue in the three hospitals. However, there were significantly increased rates of three nursing-sensitive outcome indicators; pneumonia at Hospital 1, urinary tract infections at Hospital 2, and shock/cardiac arrest for medical patients at Hospital 3, (Di Twigg, Duffield, Bremner, Rapley, & Finn, 2012) which might indicate the influence of other factors such as patient acuity and the specialisations of each hospital, and the exact relationships need further investigation.

However, it is important to note that the benefits of higher nursing skill levels within the nursing team is supported by evidence-based findings across the globe. In the US, better quality of care which is associated with higher levels of RN staffing has been demonstrated by improved clinical outcomes for patients with myocardial infarction, congestive cardiac failure and pneumonia (Landon et al., 2006). Another US study showed that for every 10% increase in the proportion of nurses educated to the level of bachelor degree there was a 5% decrease in 30-day mortality rate, and also concluded that hospitals which had 60% of nurses with bachelor degrees and a nurse-to-patient ratio of 6:1 would have 30% lower mortality rate than the hospitals with 30% of bachelor-degree trained nurses and an 8:1 nurse-to-patient ratio (Aiken, Clarke, Cheung, Sloane, & Silber, 2003). In Canada, higher nurse education level, richer nursing skill mix, lower levels of casual or temporary nursing staff and better nurse-physician relationships were associated with improved mortality rates (Estabrooks, Midodzi, Cummings, Ricker, & Giovanetti, 2005), and in a separate study, a richer skill mix was associated with lower medication errors and lower rates of wound infection (Tourangeau et al., 2007).

Despite the evidence that higher proportions of more highly educated nurses results in better outcomes and less complications for patients, in 2008 unregulated workers were added in a complementary role in WA (D. Twigg, Pugh, Gelder, & Myers, 2016). Logically, additional staff resources should reduce the incidence of adverse events, however this was not found to be true for some indicators. In fact, negative impacts of this have been increased rates of failure to rescue (death from an avoidable complication) even though there was a decrease in mortality. Urinary tract infections (UTI) and patient falls with injury also increased. Every 10% of time a patient spends on a ward staffed by AINs, the risk of UTI increases by 1% ($p=0.035$) and the risk of pneumonia increases by 2% ($p<0.001$) (D. E. Twigg et al., 2016). Thus, this builds the evidence that a rich nursing skill mix is important for quality of care, patient safety and desirable patient outcomes.

The influence of these advantages on cost expenditure is variable, and studies have been done locally and globally. On a local level, there was a conservative estimate of 1088 life years gained from the 155 'failure to rescue' events prevented in the WA study. In this study, cost reductions were associated with the prevention of 1202 nursing-sensitive adverse events of surgical wound infection, pulmonary failure, ulcer/gastritis/upper GI bleed, and cardiac arrest and costs gains were associated with 493 extra pneumonia events. The cost of life year gained was \$8907 (D. E. Twigg, Geelhoed, Bremner, & M. Duffield, 2013) which is considered cost effective when the national cost effectiveness threshold at that time was between \$30,000 to \$60,000. In addition, the use of agency nurses dropped by 16.2% within two years of the introduction of the NHPPD system, resulting in substantial cost savings that is not represented in these figures (Di Twigg et al., 2011).

A further study in WA demonstrated the benefit of rich skill mix in orthopaedic care. The presence of an NP has been associated with a reduced length of stay for patients with hip fracture without an increase in complications or mortality rates and demonstrated a cost-saving of \$1178 per patient (Coventry et al., 2017). This is an example

Submissions Response Field

Please type your response into the field below. Alternatively you may provide your submissions as a separate attachment (Suggested Maximum 5 pages).

of how highly qualified nurse leaders can drive a safe, quality, cost-effective service. In fact, higher levels of nursing intervention can enable better use of technological advances in specific health care areas, such as Telehealth patient management, as used in burn care in WA. This service is led by the Clinical Nurse Consultant for that area, and has demonstrated significant cost savings (\$1.89m in 2012/13) from avoided admissions, reductions in transport costs, and management of acute burn wounds and long-term burn scars using a remote care model (McWilliams, Hendricks, Twigg, Wood, & Giles, 2016). This is an example of how highly qualified nurses can drive digital innovation for high quality patient care that treats patients in rural and remote areas, enhancing patient experience by providing quality care in their own communities.

On the global level, Kim et al compared patient length of stay and medical expenses by nurse skill mix and staffing level in South Korea. After adjustment for hospital and patient characteristics, the costs incurred by each patient were \$114 more by those who received care on wards with the lowest staffing levels (6:1 bed to nurse ratio) compared to those who received care on wards with the highest staffing levels (2:1 bed to nurse ratio) (Kim, Kim, & Ko, 2016). In another large US study nursing staffing levels and skill mix were associated with a shorter length of stay and fewer nursing-sensitive adverse events but were not associated with greater cost (Martsolf et al., 2014). A recent review of economic evaluation of NP and CNS roles show that the scope of these roles vary, and thus is difficult to integrate findings into a meta-analysis (Lopatina et al., 2017).

Activity Based Funding, the model used to finance health services in Australia, has been used in WA since 2012. More recently, a list of adverse events, or hospital acquired complications (HAC) (Independent Hospital Pricing Authority, 2016) has been compiled and will impact on funding. Patients with a HAC will be classified low, medium or high complexity and the lower the complexity the greater the funding reduction. Many of the HACs align with nursing outcome indicators and are sensitive to nurse staffing and skill mix (D. Twigg et al., 2016). Therefore, it is essential that adequately sized nursing teams with an optimal balance of suitably qualified registered nurses are maintained to provide safe, quality patient care with minimal HACs experienced by patients.

To summarise, patient safety and quality of care delivery is associated with adequate numbers of nursing staff with RNs making up at least 80% of the nursing workforce. This prevents costly adverse events for patients and is a cost-effective approach to managing patient care in the future. In addition, services provided by advanced nursing practitioners (NPs and CNCs) can reduce costs through the use of innovative care provision and strong leadership. It is important that the healthcare provision in WA maintains the nursing workforce this way and this should be reflected in the policy response. It has been suggested that a future nursing workforce of 70% RN mix is acceptable in the acute sector (Department of Health, 2014) but we provide evidence that this is not so, in fact the converse is true and that investment in the nursing workforce is essential for the sustainable future of health care in WA. Future health care policy will be more cost-effective and sustainable if it maintains adequate numbers of RNs in the workforce, and if it invests in nurse education to maintain a rich skill mix and to develop nurse leaders. The importance of these findings are integral to developing a more sustainable, patient-centred health system in WA, and it is important that this is recognised as a patient safety issue which is a shared responsibility between the policy makers and the nursing profession (Di Twigg, Duffield, Thompson, & Rapley, 2010). Attempting to reduce costs by reducing the size and skill of the nursing workforce is a false economy which will result in more HACs and longer patient stays leading to higher costs, whilst reducing funds obtained for patient care. It is important to find the right balance between investment in nursing and the revenue received for patient care through activity based funding arrangements.

Submissions Response Field

Please type your response into the field below. Alternatively you may provide your submissions as a separate attachment (Suggested Maximum 5 pages).

- Aiken, L., Clarke, S., Cheung, R., Sloane, D., & Silber, J. (2003). Educational levels of hospital nurses and surgical mortality. *JAMA*, 290(12), 1617-1623.
- Aiken, L., Sloane, D., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., . . . Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The Lancet*, 383, 1824-1830.
- Coventry, L., Pickles, S., Sin, M., Towell, A., Giles, M., Murray, K., & Twigg, D. (2017). Impact of the Orthopaedic Nurse Practitioner role on acute hospital length of stay and cost-savings for patients with hip fracture: A retrospective cohort study. *Journal Of Advanced Nursing*, 00, 1-12 doi:<https://doi.org/10.1111/jan.13330>
- Department of Health, H. W. A. (2014). *Australia's Future Health Workforce – Nurses Overview*. Retrieved from Canberra:
- Estabrooks, C., Midodzi, W., Cummings, G., Ricker, K., & Giovanetti, P. (2005). The impact of hospital nursing characteristics on 30 day mortality. *Nursing Research*, 54(2), 74-84.
- Independent Hospital Pricing Authority. (2016). *Consultation Paper on the Pricing Framework for Australian Public Hospital Services 2017-18*. Retrieved from Sydney, Australia:
- Independent Hospital Pricing Authority. (2017). *The Pricing Framework for Australian Public Hospital Services 2017-18*. Retrieved from Sydney, Australia:
- Kim, Y. S., Kim, S., & Ko, Y. (2016). Effect of nurse staffing variation and hospital resource utilization. *Nursing and Health Sciences*, 18, 473-480.
- Landon, B. E., Normand, S.-L. T., Lessler, A., O'Malley, A. J., Schmaltz, S., Loeb, J. M., & McNeil, B. J. (2006). Quality of care for the treatment of acute medical conditions in US hospitals. *Archives Of Internal Medicine*, 166(22), 2511-2517.
- Lopatina, E., Donald, F., DiCenso, A., Martin-Misener, R., Kilpatrick, K., Bryant-Lukosius, D., . . . Marshall, D. A. (2017). Economic evaluation of nurse practitioner and clinical nurse specialist roles: A methodological review. *International Journal Of Nursing Studies*, 72, 71-82. doi:10.1016/j.ijnurstu.2017.04.012
- Martolf, G., Auerbach, D., Benevent, R., Stocks, C., Jiang, J., Pearson, M., . . . Gibson, T. (2014). Examining the Value of Inpatient Nurse Staffing: An Assessment of Quality and Patient Care Costs. *Medical Care*, 52, 982-988.
- McWilliams, T., Hendricks, J., Twigg, D., Wood, F., & Giles, M. (2016). Telehealth for pediatric burn patients in rural areas: a retrospective audit of activity and cost savings. *Burns*, 42, 1487-1493.
- Rafferty, A., Clarke, S., Coles, J., Ball, J., James, P., McKee, M., & Aiken, L. (2007). Outcomes of variation in hospital nurse staffing in English hospitals: Cross-sectional analysis of survey data and discharge records. *International Journal Of Nursing Studies*, 44, 175-182.
- Tourangeau, A., Doran, D., Hall, L., L, P., Pringle, D., Tu, J., & Cranley, L. (2007). Impact of hospital nursing care on 30-day mortality for acute medical patients. *Journal Of Advanced Nursing*, 57(1), 32-44.
- Twigg, D., & Duffield, C. (2009). A review of workload measures: A context for a new staffing methodology in Western Australia. *International Journal Of Nursing Studies*, 46(1), 131-139. doi:10.1016/j.ijnurstu.2008.08.005
- Twigg, D., Duffield, C., Bremner, A., Rapley, P., & Finn, J. (2011). The impact of the nursing hours per patient day (NHPPD) staffing method on patient outcomes: A retrospective analysis of patient and staffing data. *International Journal Of Nursing Studies*, 48(5), 540-548. doi:10.1016/j.ijnurstu.2010.07.013
- Twigg, D., Duffield, C., Bremner, A., Rapley, P., & Finn, J. (2012). Impact of skill mix variations on patient outcomes following implementation of nursing hours per patient day staffing: a retrospective study. *Journal Of Advanced Nursing*, 68(12), 2710-2718. doi:10.1111/j.1365-2648.2012.05971.x

Submissions Response Field

Please type your response into the field below. Alternatively you may provide your submissions as a separate attachment (Suggested Maximum 5 pages).

- Twigg, D., Duffield, C., Thompson, P. L., & Rapley, P. (2010). The impact of nurses on patient morbidity and mortality - the need for a policy change in response to the nursing shortage. *Australian Health Review*, 34(3), 312-316. doi:10.1071/AH08668
- Twigg, D., Pugh, J. D., Gelder, L., & Myers, H. (2016). Foundations of a nursing-sensitive outcome indicator suite for monitoring public patient safety in Western Australia. *Collegian (Royal College Of Nursing, Australia)*, 23, 167-181.
- Twigg, D. E., Geelhoed, E. A., Bremner, A. P., & M. Duffield, C. (2013). The economic benefits of increased levels of nursing care in the hospital setting. *Journal Of Advanced Nursing*, 69(10), 2253-2261. doi:10.1111/jan.12109
- Twigg, D. E., Gelder, L., & Myers, H. (2015). The impact of understaffed shifts on nurse-sensitive outcomes. *Journal Of Advanced Nursing*, 71(7), 1564-1572. doi:10.1111/jan.12616
- Twigg, D. E., Myers, H., Duffield, C., Pugh, J. D., Gelder, L., & Roche, M. (2016). The impact of adding assistants in nursing to acute care hospital ward nurse staffing on adverse patient outcomes: An analysis of administrative health data. *International Journal Of Nursing Studies*, 63, 189-200. doi:10.1016/j.ijnurstu.2016.09.008