Adding unregulated nursing support workers to ward staffing: exploration of a natural experiment.

Duffield, C., Roche, M. A., Twigg, D., Williams, A., Rowbotham, S., & Clarke, S. (2018). Adding unregulated nursing support workers to ward staffing: exploration of a natural experiment. *Journal of Clinical Nursing*. doi:10.1111/jocn.14632

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Acknowledgements

We wish to acknowledge the contributions of our industry partners Adjunct Professor Catherine Stoddart, Adjunct Professor Karen Bradley and Adjunct Professor Sue Davis; and our project staff Dr Judith Pugh, Ms Helen Myers, Ms Cathy Pienaar, and Ms Sofia Dimitrelis.

Funding

This study was funded by the Australian Research Council (LP110200271) and industry partners: The Western Australia Department of Health and Sir Charles Gairdner Hospital.

ABSTRACT

Aim

To explore the impact of an initiative to add unregulated nursing support workers to wards in acute care hospitals.

Background

Adding nursing support workers to existing nurse staffing may be one solution to reduce nursing workloads and improve outcomes. However, the effects of this addition on nurse, patient, and system outcomes are not well documented. In one state of Australia, a trial deployment of nursing support workers to wards across the public health system provided opportunity for the exploration of their impact in a natural, real-world, environment.

Design

Cross-sectional study.

Methods

A sample of 5 wards where nursing support workers had been added matched to a group of 5 wards where there were no nursing support workers. Data were collected via patient survey (n=141) and nurse survey (n=154). Analysis was comparative with regression models constructed for the different ward types.

Results

Nursing leadership, staffing and resources, and nurse experience were linked to outcomes on both ward types. Instability was a significant predictor of reduced quality of care and increased turnover intention on wards where support workers were added.

Conclusion

Adding nursing support workers to ward staffing did not lead to improvements in patient care. Findings suggest that staffing a nursing ward is a complex activity and that a simple approach to staffing is unlikely to be successful. Future research should explore the process of implementation and the conditions under which this strategy is likely to be successful.

Relevance to clinical practice

Ward-level factors are key in making appropriate staffing and skillmix choices to limit instability and to consequently avoid negative patient, staff, and system outcomes. Consideration of the ward context, alongside effective delegation processes, and integration into the care team, are imperative when adding nursing support workers.

Keywords: unregulated nursing support workers, model of care, patient outcomes, nurse outcomes, system outcomes

What does this paper contribute to the wider global clinical community?

- Internationally, the introduction of nursing support workers is increasing to address ongoing staff shortages, retention issues, and increased demand. These workers may be introduced to replace licensed nurses, or as additions to staffing.
- The addition of nursing support workers to selected wards was expected to improve patient care but analyses did not support this expectation.
- The impact of instability in staffing, nursing leadership, and nurses' experience, highlight the complexity of staffing and skillmix decisions.

INTRODUCTION

Nurses are the largest group of healthcare providers in most developed countries (Australian Institute of Health and Welfare, 2015; Department of Health and Human Services, 2013; World Health Organization, 2015) and their contribution to improving patient outcomes such as morbidity and mortality is widely recognised (Duffield et al., 2011; Twigg, Duffield, Bremner, Rapley, & Finn, 2011; Twigg, Duffield, Thompson, & Rapley, 2010). Over the past decade, the demand for nurses has increased internationally, often without a commensurate increase in supply (Auerbach & Staiger, 2017; Buchan, Twigg, Dussault, Duffield, & Stone, 2015). This, together with ongoing issues in retention (Hayes et al., 2012) has led to challenges in staffing hospitals with an appropriate number and mix of staff (Australian Nursing Federation, 2009). Nurses' workloads have increased as a result of these staffing issues and other factors, such as a growing ageing population, greater complexity of care required by hospitalised patients (Duffield, Roche, Dimitrelis, Homer, & Buchan, 2015; Krichbaum et al., 2007), and increased movement of patients through wards (Blay, Roche, Duffield, & Gallagher, 2017). These staffing and workload issues limit the time nurses have for patient contact (Duffield et al., 2011; Duffield & Wise, 2003; Williams, Dawson, & Kristjanson, 2008), and may be further compounded by ward instability (Duffield et al., 2015), difficult practice environments (Halpin, Terry, & Curzio, 2017) and violence towards staff (Phillips, 2016).

Increased nursing workloads and projected workforce shortages will challenge health care systems to provide the level and quality of nursing care required. One strategy to do so may be the addition of unregulated nursing support workers (known variously as unlicensed assistive personnel in the U.S., health care assistants in the U.K., and assistants in nursing in Australia) to ward staffing (Duffield et al., 2014). Nursing support workers account for around 25% of the health workforce in the U.S., U.K., and Australia (Australian Bureau of Statistics, 2013; Australian Institute of Health and Welfare, 2008; Department of Health, 2013; Squillace, Remsburg, Bercovitz, Rosenoff, & Branden, 2007) and perform a range of direct care activities such as bathing, feeding, mobilising, and monitoring of vital signs (Bureau of Labour Statistics, 2013; National Health Service, 2015). Nursing support workers can be utilised in one of two ways, either in a substitution model in which they *replace* registered nurses (RNs), or a complementary model whereby they are *added* to existing ward staffing. The substitution model dilutes the skill mix and reduces the number of hours of care provided by RNs, shown to negatively impact patient outcomes (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002; Needleman et al., 2011; Twigg et al., 2011). In contrast, the complementary model may reduce nursing workload while maintaining the level of care provided by regulated nurses and result in positive outcomes for patients and staff. For example, increasing the overall number of hours of care provided to patients may result in increased patient contact, fewer tasks delayed or not done and better quality of care, while decreased workloads may decrease intention to leave amongst nurses. However, incorporating nursing support workers in ward staffing generates mixed feelings among licensed staff and skills in delegation and teamwork may be required for licensed staff to work effectively with unlicensed workers. To meet increased demands for care, evidence-based strategies must be developed which optimise workforce flexibility.

This opportunistic study arose from an initiative of the Western Australia (WA) health department to trial the introduction of nursing support workers to acute care wards. In contrast to the substitutive approach these workers were introduced in a complementary role, additional to the usual ward staffing allocation. This afforded the opportunity to explore in a naturalistic setting whether restructuring nurse staffing by adding nursing support workers to ward staffing results in improved patient, nurse, and system outcomes.

The role of these nursing support worker was articulated in a state-wide document for consistency (Department of Health Western Australia, 2013). They perform their duties under the supervision of RNs and focus on basic patient care tasks in accordance with their skills and competencies (Nursing and Midwifery Board of Australia, 2015). Specific tasks included assisting with patient meals, mobility, hygiene, and other activities of daily living, taking basic patient observations, and patient surveillance. They commonly undertake regular 'rounding' of patients (Shepard, 2013), or potentially in one-to-one observation of patients deemed high risk (Dick, La Grow, & Boddy, 2009). In the present study, how these workers performed their role was managed on a ward or shift level, which, as noted in previous research, can vary widely (Duffield, Roche, Diers, Catling-Paull, & Blay, 2010). Therefore, similar to many studies undertaken in the real-world healthcare environment (Craig et al., 2013), little control was exercised over the 'intervention' (in this case, the addition of nursing support workers).

Conceptual framework

The Patient Care Delivery Model (PCDM) is the conceptual framework used to guide the selection of variables and associations in this study, described in detail by O'Brien-Pallas and colleagues (2011), and adopted by previous studies that have explored nursing work in Australia (Duffield et al., 2015; Roche, Duffield, Friedman, Dimitrelis, & Rowbotham, 2016). The PCDM posits that input factors (e.g. ward instability and nurse characteristics) interact with throughput factors (e.g. the practice environment), giving rise to outputs (e.g. patient outcomes, nurse outcomes such as intention to leave and systems outcomes such as tasks delayed) which feed back into the inputs, such that inputs can also function as outcomes (Jelinek, 1967, 1969; Meyer, Wang, Li, Thomson, & O'Brien-Pallas, 2009; O'Brien-Pallas, Doran, Murray, & Cockerill, 2001, 2002; O'Brien-Pallas et al., 2011). This model provides a useful framework for the present study as it recognises the many complex factors that contribute to healthcare environments and outcomes (O'Brien-Pallas et al., 2011). The authors have previously argued that factors which result in patient instability (high ward occupancy rates, low rates of planned admissions, ICU transfers, changes to patient acuity/work re-sequencing) or nurse instability (nurses changing units, fewer full-time staff, more temporary/casual staff) increase ward complexity, which in turn, may lead to potentially negative patient outcomes if not compensated for with more or richer levels of staffing (Duffield et al., 2015).

Patient outcomes

The international evidence base suggests that the *replacement* of RNs with nursing support workers impacts negatively on patient outcomes such as mortality and length of stay in hospital, as well as nursing sensitive indicators including pressure ulcers, urinary tract infection, wound infections, deep vein thrombosis/pulmonary embolus and failure to rescue (Clarke, 2007; Duffield et al., 2011; Flynn & Mckeown, 2009; Needleman et al., 2002; Van den Heede, Clarke, Sermeus, Vleugels, & Aiken, 2007), all of which are costly to hospitals (Twigg, Geelhoed, Bremner, & Duffield, 2013). However, less is known about the impact of increasing ward staffing through the *addition* of nursing support workers, as the majority of studies have compared existing nurse staffing levels and/or staffing mix at an organisational level (Buchan & Dal Poz, 2002).

Results from systematic reviews suggest that total nursing hours of care provided, including hours provided by nursing support workers, has a major influence on patient outcomes (Dabney & Kalisch, 2015; Pearson et al., 2006). Others suggest that the model of care (the distribution of work, communication patterns between staff and accountability for outcomes), and perhaps especially team work between RNs and unlicensed personnel (nursing support workers), are

more important factors (Buchini & Quattrin, 2012; Dahlke & Baumbusch, 2015). An early study by Sovie and Jawad (2001) found that an overall increase in hours per patient/day resulting from an increase in nursing support worker hours was associated with an increased rate of urinary tract infections. Moreover, a corresponding decrease in RN hours was associated with increased patient falls and decreased satisfaction with pain management. This finding indicates that increasing the number of hours overall is not sufficient to improve outcomes if an appropriate skill mix (i.e. number of RN hours of care provided) is not maintained.

Attending to the psychosocial needs of patients is important for ensuring the emotional comfort of patients and has been identified as a key factor in promoting recovery (Williams & Irurita, 2004). It has been suggested that challenges within the healthcare system such as nursing shortages, reduced staffing and a reliance on casual nurses have resulted in a reduced amount of time nurses are able to spend interacting with patients, providing emotional support and building relationships (Williams et al., 2008). In performing routine nursing tasks, nursing support workers spend considerable amounts of time with patients, cultivating interpersonal relationships and providing emotional support (Bosley & Dale, 2008). Thus, the addition of nursing support workers may lead to improvements in the quality of emotional care provided to patients. Although this has not been explored previously, early studies in Hong Kong (Chang & Lam, 1997) and the United States (Gould, Thompson, Rakel, & Jensen, 1996; Kostovich, Mahneke, Meyer, & Healy, 1994; Neidlinger, Bostrom, Stricker, Hild, & Zhang, 1993) have shown increased patient satisfaction as a result of the introduction of nursing support workers, suggesting there may indeed be a positive impact.

Nurse outcomes

Increased nursing workloads have been found to decrease nurses' job satisfaction, perhaps influencing decisions to resign (Duffield, Roche, O'Brien-Pallas, Catling-Paull, & King, 2009). By performing routine nursing duties such as bathing, cleaning and providing emotional support to patients, nursing support workers can allow RNs additional time to perform therapeutic, medication and administrative tasks, potentially reducing RNs' workload and increasing job satisfaction. Indeed, nurses in Ireland expressed satisfaction with the training, standard of work, role and education of nursing support workers, also indicating they were more readily located on the ward compared to qualified staff (Keeney, Hasson, McKenna, & Gillen, 2005).

System outcomes

The work environment is increasingly being recognised as having a major impact on nursing workload and therefore, tasks left undone. Many large-scale studies have demonstrated that fewer nursing care activities are left undone in hospital environments with favourable staffing (Aiken, Sloane, Bruyneel, Van den Heede, & Sermeus, 2013; Ausserhofer et al., 2014; Ball, Murrells, Rafferty, Morrow, & Griffiths, 2013) and when qualified nurses do not undertake non-nursing tasks (Ausserhofer et al., 2014). Indeed, Australian research suggests that the effective integration of a sufficient number of nursing support workers is associated with higher rates of task completion by RNs (Roche et al., 2016). Further, violence towards nurses is a key feature of negative work environments with reported episodes of violence towards nurses increased in ward environments with high patient to nurse ratios and a lower percentage of RNs (Roche, Diers, Duffield, & Catling-Paull, 2010). Given this evidence, it could be surmised that *adding* nursing support workers to the staffing mix will relieve RNs to attend to more complex nursing activities, improving the quality of nursing care and workplace safety.

Overall, the literature supports the contention that the introduction of nursing support workers has the potential to positively influence patient, nurse, and system outcomes.

METHODS

Aim

To explore the impact of an initiative to add unregulated nursing support workers to wards in acute care hospitals.

Design

As noted previously, this study takes advantage of an initiative within one Australian state to add nursing support workers to acute care wards. As a result, this was an opportunistic study that sought to explore the impact of a real-world change in workforce staffing. This paper reports on the cross-sectional component of a larger study which combined a longitudinal study design with cross-sectional data collection in a sample of wards with and without nursing support workers added (see Duffield, Roche, Twigg, Williams, and Clarke (2016) for the study protocol). For the cross-sectional component of the study reported in this paper, patient and nurse data were collected from the selected wards over a 6-month period in 2013.

Participants

Ward sample

The State-wide staffing initiative allocated nursing support worker positions to hospitals, with the hospital then deciding on ward allocations. The allocation was therefore not part of the study and was not systematically undertaken. Anecdotally, perceived workload and need for more staff appear to have been the driving factors. In the context of this non-systematic allocation, with the intention of comparing wards that had added nursing support workers to those that did not, the ward sample was selected by matching pairs of wards using the Western Australia workload classification system (Australian Industrial Relations Commission, 2002). This system classifies wards into 7 categories (A-G) based on patient complexity, dependency, and patient turnover characteristics. Each ward is allocated nursing resources (nursing hours of care per patient day [NHPPD]) according to the ward's category, ranging from 3 NHPPD (category G, e.g. ambulatory care unit) to 7.5 NHPPD (category A, e.g. tertiary step down intensive care unit). The ward sample was developed through scanning state-wide payroll data for wards where nursing support workers had been added. This list of wards was then grouped by workload category, and matched pairs of wards identified. For example, a Category B ward with no added nursing support workers was matched with a Category B ward where nursing support workers had been added (see Table 1). Ten medical-surgical wards across three hospitals were identified, five of which had nursing support workers added (NS) and five without (non-NS). Three pairs of wards were in one large teaching hospital, and two pairs were in two smaller non-teaching hospitals. Nursing support workers were introduced gradually in 2008 so at the time of data collection they had been in place for up to 4 years.

Patient sample

A convenience sample of 141 patients was selected and agreed to participate (71 patients from NS wards and 70 patients from non-NS wards). This was based on a power calculation indicating a minimum total sample size of 134 was required, using a medium effect size for a two-tailed, Wilcoxon-Mann-Whitney test, with a significance level of 0.05 and power of 0.8 (G*Power 3.1). Effect size was estimated based on previous use of the Practice Environment

Scale (Lake, 2002). Patient participants needed to be over the age of 18, able to read and understand English, and to have been an inpatient for at least 24 hours, consistent with previous use of the Patient Evaluation of Emotional Care during Hospitalisation (PEECH) instrument, described below. Research assistants were available to assist patients to complete the questionnaire if required (e.g. if patients did not have sufficient fine motor skills to complete the paper-based questionnaire). Otherwise, questionnaires were left with the patient and collected later.

Nurse sample

The nurse sample was taken by convenience with all 440 staff (regulated nurses and nursing support workers) on the 10 matched wards invited to participate by completing the nurse questionnaire. A response rate of 35.4% was achieved giving a total sample of 154, with 96 (38.47%) questionnaires returned from wards with nursing support workers (NS) and 58 (33.27%) from those without (non-NS wards).

TABLE 1 ABOUT HERE

Data Collection

Patient questionnaire

Patients' perceptions of quality of emotional care were measured using the Patient Evaluation of Emotional Care during Hospitalisation (PEECH) questionnaire (Williams & Kristjanson, 2009) which measures patients' perceptions of their interpersonal interactions with staff. Prior work with this instrument identified therapeutic emotional care in brief interactions experienced by patients during the first 24 hours of hospitalisation, consistent with the substantive theory upon which it is based (Williams & Irurita, 2004). The approach used in this study was consistent with previous utilisation of this tool, which measures the patients' evaluation of emotional care from all staff during their current admission. Patients were not asked to differentiate between different nursing grades, but to provide their perceptions of emotional care whilst on that ward. The PEECH consists of four sub-scales: Level of Security; Level of Knowing; Level of Personal Value; Level of Connection, as well as patient demographics. Patients rate their experience during their hospital stay on a four-point Likert-type scale for each question, and the average of the four subscales is used to calculate an overall score between 0 and 3, with a higher score indicating a greater level of emotional comfort. In previous testing (Williams & Kristjanson, 2009) the PEECH demonstrated acceptable internal consistency reliability with the Cronbach's alpha coefficients ranging from 0.59-0.86. In the present study the range was higher, from 0.69-0.89, with an overall alpha of 0.92.

Nurse questionnaire

The impact of adding nursing support workers on a range of nurse and system outcomes, was assessed using a nurse survey developed and used extensively by the team (Duffield et al., 2011; Duffield et al., 2009). This contained questions about demographic characteristics (e.g. age, sex, education, years of experience in nursing and on the ward), job satisfaction, intention to leave and absenteeism, as well as self-reported nurse activities completed, tasks delayed or not completed, perceived quality of care on the ward and their experiences of violence. Instability was defined as nurses being forced to leave their ward in the preceding 12 months, or expecting to be made to do so in the upcoming 12 months (Duffield et al., 2011; Duffield et al., 2009). The survey also contained the Practice Environment Scale (PES) (Lake, 2002), which measures characteristics of the work environment found to contribute to

nurse and patient outcomes. This instrument has been widely employed internationally and is considered reliable and valid (Warshawsky & Havens, 2011). In samples similar to that in the present study, Cronbach's alpha has ranged from .74 to .86 (Duffield et al., 2011; Roche & Duffield, 2010; Roche, Laschinger, & Duffield, 2015). These figures were higher in the present study, from .80 to.87 with an overall value of 0.94. The PES used in this study consists of 30 items across 5 subscales: Collegial Nurse-Doctor Relationships; Nurse Management, Leadership and Support; Staffing and Resource Adequacy; Nurse Participation in Hospital Affairs; Nurse Foundations for Quality of Care. Respondents are asked to indicate whether the items are present in their current job on a four-point Likert-type scale from 1 (strongly disagree) to 4 (strongly agree). Scores are averaged across items within each subscale to give the subscale scores, with higher scores indicating a stronger presence of a particular job factor.

Ethical considerations

This study was conducted in accordance with the National Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2007). Ethical approval was obtained from the two universities (approval numbers 2011-486 and 6404-T), the State Department of Health (approval number 2011/42) and the hospital designated as lead for the State (i.e. able to provide approval for other public hospitals in this study, approval number 2012-065). Informed consent was obtained from all participants prior to participation in the study. All data were aggregated and de-identified using study codes to prevent identification of units or individuals involved in the study.

Analysis

SPSS© version 21 and Stata© version 15.1 were used to analyse the data. Comparisons between NS and non-NS wards were undertaken using independent t-tests, Mann-Whitney, or chi-squared tests, depending on the type and distribution of the data. A two-tailed alpha criterion level of <.05 was employed throughout. The sequential Holm-Bonferroni step-down procedure (Holm, 1979) was utilised to control for multiple comparisons and reduce the probability of 'familywise' type I error (Abdi, 2010). The corresponding increased likelihood of type II error (Sinclair, Taylor, & Hobbs, 2013) was mitigated through application of this procedure to groups of related variables (Abdi, 2010), such as the group of PES variables. Multiple logistic regression models were developed for each nurse and system outcome: intent to leave, quality of care, one or more tasks delayed, and one or more tasks not done, to assess the strongest predictors of each outcome, for NS and non-NS wards. For patient outcomes, multilevel mixed models were developed for each of the PEECH subscales and the overall scale, with nurse and system variables aggregated to the ward level. In both regression approaches, full models were first developed with all predictor variables (input and throughput factors; Table 3) for each of the input and throughput variables (system characteristics, nurse characteristics, the practice environment, and violence; Table 3). A parsimonious list of important predictors was obtained through backwards elimination (Harrell, 2015): the iterative removal of the least significant explanatory variable until all remaining variables indicated $p \leq .05$.

RESULTS

Patient sample

The mean age of participants was 63.1 years (*SD*=15.80), and the gender distribution in the overall sample was 57.4% male, with a higher proportion on non-NS wards although there were no statistically significant differences noted in patient characteristics (Table 2).

TABLE 2 ABOUT HERE

Nurse sample

The majority (93.5%) of respondents were female, and gender distribution of NS and non-NS wards was similar. The average age was 38.5 years (*SD*=12.46) overall and nurses were older on NS (M = 40.6 years, *SD*=12.66) than non-NS wards (M = 35.0 years, *SD*=11.40). Across both NS and non-NS wards, most respondents were employed on permanent contracts (92.8%) and were working on their normal ward (98.1%). Most nurses worked more than 32 hours in the last week, with a fifth working 25-32 hours. Fewer nurses worked longer hours on the non-NS wards. Further demographic information is described in the 'Inputs' section of Table 3.

TABLE 3 ABOUT HERE

Comparison of NS and non-NS wards

A comparison between NS and non-NS wards (Table 3) suggested statistically significant differences in only one input factor; wards with nursing support workers had fewer nurses with a Bachelor or higher degree (47% vs. 71%) (nursing registration programmes have been degree entry since 1984 in Australia). Several other apparent differences were also seen, but although they appeared potentially important they were not statistically significant. These included differences in skill mix, with NS wards having a lower percentage of RNs (58% vs. 78%) but with greater experience (12.4 vs. 9.5 years). In addition, NS wards appeared less stable than their non-NS counterparts, with nearly 10% more staff on NS wards reporting ward instability (28% vs. 19%).

In terms of throughput factors, staff on non-NS wards reported significantly better staffing and resources (2.5 vs. 2.3). Conversely, many more nurses on NS wards reported physical assault (26.3% vs. 3.4%), threat of assault (39.1% vs. 19%), or emotional abuse (36.2% vs. 19%), with all these differences being statistically significant. The most common source of any type of abuse across both ward types was from patients.

Analysis of the PEECH data found that patients on NS and non-NS wards did not differ substantially in their perceptions of the quality of emotional care on any domain subscales or overall. Patients on both ward types rated their interactions with nurses as positive (i.e. > 2; Williams & Kristjanson 2009) on all aspects of emotional care except for Level of Connection (*M* = 1.82 for both NS and non-NS wards). More nurses on NS wards indicated they were intending to leave or actively looking for a job, and these wards also had higher rates of absenteeism. However, none of these differences were statistically significant. Most nurses described the quality of care as excellent or good during their most recent shift, with 14% more nurses on non-NS wards reporting high quality care (96.6% vs. 82.1%). Again, there was no significant difference on that outcome or between NS and non-NS wards in the number of tasks delayed or not done.

Regression models

Multiple logistic regression models for nurse and system outcomes are described in Table 4. Models for the PEECH were not found to be statistically significant and are not reported. Predictor variables retained in the models were instability, nursing experience (on the ward or broadly), nursing leadership, staffing and resources, and experiencing emotional abuse. Other nurse or system characteristics were not found to be significant predictors: employment status (full time or permanent), qualification (bachelor degree), being a registered nurse, experience in the hospital, or

working on their usual ward. Similarly, the experience of violence or threat of violence, and some features of the practice environment (nurse-doctor relationships, participation in hospital affairs, the foundations of quality care) were not predictive.

Of those variables retained in the final models, several were found to be significant across both ward types or for different outcome variables. On NS wards, greater instability more than doubled the likelihood of intent to leave (*OR*=2.88) and decreased reported quality of care (*OR*=.27). On both ward types, stronger nursing leadership was linked to decreased intent to leave with a similar level of magnitude (NS *OR*=.19; non-NS *OR*=.29), while staffing and resources predicted fewer tasks delayed and higher quality of care; found to be a particularly strong influence in quality on non-NS wards (*OR*=44.17). Nursing experience on the ward was linked to fewer tasks delayed (NS *OR*=.89; non-NS *OR*=.84) and, on NS wards, years of nursing overall to fewer tasks left undone (*OR*=.96) but also to more delayed tasks (*OR*=1.07). On non-NS wards, experience in nursing was connected to lower intent to leave (*OR*=.90), and there was a strong association between emotional abuse and tasks not done (*OR*=26.62).

TABLE 4 ABOUT HERE

DISCUSSION

There were several differences between ward types when viewed in direct comparison, and regression models identified key factors that can inform the future introduction of support workers and suggest avenues for future research. There was considerable variation across the full sample of wards in variables related to staffing composition (experience, qualifications, skillmix) and throughout factors (the practice environment, violence). The introduction of nursing support workers may influence these elements, and in turn, the contextual aspects may influence workers' model of implementation.

The picture which emerges of wards with nursing support workers added is one of a stable 'core' of staff, as evidenced by more full time and permanent staff, more years working as a nurse, fewer with a degree indicating many staff had come through a hospital-based nursing program (nurse education was transferred to the universities in the 1980s). Taken together with higher absenteeism, higher ward instability (staff required to change units more frequently) and fewer nurses working on their usual ward (not at significant levels), all of which are measures of nurse instability (Duffield et al., 2015), suggests core staffing supplemented by temporary staff (i.e. nursing support workers) brought in to cover vacancies. The decision as to where nursing support workers were to be added during the trial was made by nurse managers at their respective hospitals. It is possible that these wards were selected because they were known to be less stable (e.g. high vacancy rates) or because workloads were known to be heavy. The reason for a less rich skillmix (fewer RNs) may be that nursing support workers were added where there was an already low skillmix. Alternatively, while nursing support workers were theoretically to have been *added* to ward staffing, in reality this may have more closely resembled a substitution model.

Wards with nursing support workers added were rated as having as a poorer practice environment overall, particularly in terms of management, leadership and support, and adequacy of staffing and resources, and nurses on these wards reported experiencing greater levels of violence and abuse. Within the Patient Care Delivery Model these are all factors that may be influenced by the addition of nursing support workers, but it is also the case that these factors may impact the success of adding these employees. Coupled with substantial variation across output measures such

as levels of absenteeism and intent to leave, this suggests that the success of adding nursing support workers is likely to be dependent on, as well as influence, a range of ward level factors. Indeed, it is possible that these wards were included in the trial to add nursing support workers because workloads were known to be high and/or unmanageable due to high care requirements and/or multiple co-morbidities; or aggressive or abusive patients, evidenced by higher rates of threats of/actual assaults on the NS wards. Adding more staff who are less skilled may therefore have made the situation worse rather than better and as Aiken et al.'s (2012) results suggested, lowering patient to nurse ratios may have virtually no effect on those hospitals with poor work environments.

The findings demonstrated mixed results for the comparison between wards with nursing support workers added and those without, in terms of patient-related outputs. There was no significant difference in patients' perceived quality of emotional care, although positive ratings were noted overall. Tasks delayed or not completed were also similar across the ward types. This appears counter-intuitive within the complementary model of adding nursing support workers; having more staff should increase the capacity to perform all care activities required in a timely manner. However, these results would be expected if nursing support workers were added in a manner more consistent with the substitution model, and this is supported by the Practice Environment Scale results which indicated staff on wards where nursing support workers were added indicated a belief they were inadequately resourced. Replacing RNs with unregulated workers is likely to create a greater burden in terms of delegation and then supervision of tasks, potentially impacting the number of tasks performed and the quality of care perceived by both staff and patients. These findings are consistent with a Cochrane review that found that the addition of nursing support workers, other than dietary assistants, made little difference to patient outcomes (Butler et al., 2011).

The only outcome measure to indicate a significant difference between the two wards was quality of care, with a higher proportion of nurses on wards without nursing support workers reporting good or excellent care on their last shift. This phase of the study was not able to link Nursing Sensitive Indicators to the ten wards selected for this sample, but there is some evidence from other parts of this study that patients may be more likely to experience an adverse outcome consequent to spending time on wards with nursing support workers added. Twigg et al. (2016) showed that spending time on wards with nursing support workers added was a significant predictor for urinary tract infection and pneumonia. For every 10% of extra time patients spent on these wards there was a 1% increase in the odds of developing a urinary tract infection and a 2% increase in the odds of developing pneumonia.

Taken together, these findings suggest that to achieve optimal ward staffing we may need to go beyond simple approaches. In particular, while adding staff to support existing nurses makes intuitive sense, nursing wards/units are complex systems in which the impacts of staffing changes are unlikely to be straightforward (Park, 2018; Welton, 2016). In the present study, efforts were made to match NS and non-NS wards on available data (workload category) so as to isolate the influence of support workers. However, it would appear that the situation is more complex than simply adding these staff to a ward. It is important to consider the possible unintended consequences of adding unlicensed staff to nursing wards/units, which may result from insufficient integration and acceptance of unlicensed staff (Bellury, Hodges, Camp, & Aduddell, 2016), problems with communication and delegation of tasks (Magnusson et al., 2017), a poorer skill mix and damage to morale over time (Aiken et al., 2017). Importantly we must also consider the implications of initially adding unlicensed staff to existing staffing (i.e. the *complementary model*) but then not replacing RNs who subsequently leave (i.e. such that it ultimately becomes a *replacement model*). Our findings suggest

that if we are to achieve optimal workforce structures a more in-depth understanding is needed as to how the addition of unlicensed workers changes the nursing environment over time.

Limitations

This was an opportunistic study which capitalised on an initiative of the State health department to trial the addition of nursing support workers. We were unable to merge data obtained prior to the implementation of NS workers with the present data, and it was therefore not possible to perform more robust baseline matching of the NS and non-NS wards (e.g. on skill mix or stability factors, or practice environment). Similarly, the inclusion of Nursing Sensitive Indicators derived from administrative data (Needleman et al., 2011) would have provided a stronger set of outcome variables but these data were not available at the ward level. In addition, allocation of nursing support workers to wards was not controlled and undertaken by local managers without a defined systematic approach; a source of potential bias. For instance, it is possible that wards where staffing was unstable (e.g. high turnover), workloads were heavy or unmanageable and patients were aggressive or disruptive may have been selected for addition of nursing support workers. We have limited data about the specific patient populations cared for on these units and the comparability of the characteristics of patients, or the experience of patients and nurses on the two types of units on factors other than staffing cannot be assured. The inclusion of stronger baseline measurement and matching, and a broader set of outcomes, in future research will allow for more robust conclusions to be drawn about the possible impact of adding nursing support workers.

The scope of practice guidelines provided consistency across the state, with the assumption that common models of care would be used across all wards. Consequently, this study did not collect specific model of care variables and the actual models may have varied on a shift by shift basis as noted in previous studies (Duffield et al., 2010). It is therefore not clear whether nursing support workers assisted RNs with their workload in a team model; were assigned to a specific patient (i.e. to ‘special’ or to provide custodial care); or were given a full patient load. Future studies would benefit from obtaining data to explore these factors.

Finally, the response rate to the nurse survey was low and the relatively small sample sizes across all measures limited the ability to undertake multiple regression analysis with the data. There was also considerable variability between wards on many measures, which may have been linked to the lack of statistically significant results. Findings should be interpreted with these issues in mind.

The limitations of the present study also highlight the need for those undertaking research in real-world settings to establish an early and strong understanding of the details and influence of the context on planned initiatives. In practice settings the control inherent in many research designs is not feasible, emphasising the need to closely monitor and, where appropriate, measure, the process of implementation. This will provide stronger and more complete data on which to base interpretations and will enhance translation of findings for greater impact on service delivery.

CONCLUSION

While it was anticipated that adding nursing support workers to ward staffing would increase patient contact (more hours of care provided) and thereby improve the quality of care relative to control wards matched on workload classifications, results were inconclusive. However, the complex pattern of results here suggests that a simple

approach to staffing is unlikely to be successful and further reinforces the idea that staffing a nursing ward is a very complex and multifaceted activity. While adding staff to support the work of nurses logically makes sense, the manner in which this is achieved is not straightforward and may in fact increase ward instability and therefore complexity, which could have negative consequences for patients, staff, and the system. Furthermore, the strategies used to incorporate unlicensed staff into ward complements were not examined here nor could the validity of the comparisons be ensured. It is critical that we develop evidence-based strategies to configure optimal workforce structures, realising that solutions are unlikely to be simple. Increased patient acuity and the rising burden of chronic conditions coupled with workforce shortages, compel health care managers to use evidence to look critically at the staffing of clinical areas and how staffing decisions in their full complexity relate to health outcomes.

RELEVANCE TO CLINICAL PRACTICE

Ward-level factors are fundamental to appropriate staffing and skillmix choices. Effective implementation of staffing changes such as that explored in this study must be undertaken with a strong understanding of the ward situation so as to limit instability and reduce the risk of negative outcomes for patients, staff and the system as a whole. Further considerations when adding nursing support workers include clarity and shared understanding of scope of practice, effective delegation procedures and responsibilities, and models of care that integrate these workers into the patient care team.

Table 1. Sample Wards, by NHPPD Category

			NS Wards		Non-NS Wards	
Hospital[a]	**Hospital Type**	**Ward Cat. (NHPPD)[b]**	**Ward[a]**	**Ward Type**	**Ward[a]**	**Ward Type**
X	Small non-teaching	B (6)	W1	Surgical	W2	Surgical
Y	Small non-teaching	D (5)	W3	Medical	W4	Surgical
Z	Large teaching	B (6)	W5	Medical	W6	Surgical
Z	Large teaching	B (6)	W7	Medical	W8	Surgical
Z	Large teaching	C (5.75)	W9	Medical	W10	Medical

a Deidentifying codes allocated for study purposes
b Workload category and Nursing Hours per Patient Day (Australian Industrial Relations Commission, 2002)

Table 2. Demographic characteristics for patients on NS and non-NS wards

	NS (n=71)	**Non-NS (n=70)**	
	Mean (SD)	**Mean (SD)**	***t (df) p[a]***
Age	62.73 (16.08)	63.45 (15.63)	-0.267 (138) 0.79
	N (%)	**N (%)**	***X^2 (df) p[b]***
Males	34 (47.9%)	47 (67.1%)	5.346 (1) 0.17
Admission for new/recent illness/injury	51 (72.9%)	49 (70%)	0.14 (1) 1
First time in hospital	7 (10%)	9 (12.9%)	0.282 (1) 1
In hospital for more than 3 days	63 (90%)	60 (85.7%)	0.603 (1) 1
Friends and family that could provide assistance	62 (88.6%)	60 (85.7%)	0.255 (1) 1
In shared room in hospital	41 (58.6%)	33 (47.1%)	1.835 (1) 0.91
Health problems besides the one they were admitted for	45 (63.4%)	36 (51.4%)	2.06 (1) 0.91
Needed help with daily living	37 (52.9%)	26 (37.1%)	3.492 (1) 0.43

Note: N & % include only valid values
[a] t-test; [b] Chi-square test with Holm-Bonferroni correction

Table 3. Input, throughput and output measures for NS and non-NS wards

	NS	Non-NS		
INPUTS				
System characteristics	**n (%)**	**n (%)**	***X^2 (df)***	***p[a]***
Nurses working on their usual ward	94 (97.9%)	57 (98.3%)	0.024 *(1)*	1
Unit instability	27 (28.1%)	11 (19.0%)	1.632 *(1)*	1
Nurse characteristics				
Years worked…	**M (SD)**	**M (SD)**	***MWU***	***p[a]***
…as a nurse	12.42 (12.70)	9.46 (8.64)	2584	1
…in this hospital	5.87 (6.75)	5.89 (5.84)	2581	1
...on this unit	4.90 (5.56)	5.00 (5.35)	2715	1
	n (%)	**n (%)**	***X^2 (df)***	***p[a]***
Registered nurses	55 (57.3%)	45 (77.6%)	6.54 *(1)*	0.21
Bachelor degree or higher	45 (46.9%)	41 (70.7%)	8.316 *(1)*	0.09
Full time	68 (70.8%)	36 (62.1%)	1.267 *(1)*	1
Permanent	89 (93.7%)	53 (91.4%)	0.287 *(1)*	1
THROUGHPUTS				
Practice environment	**M (SD)**	**M (SD)**	***t (df)***	***p[a]***
Collegial Nurse-Doctor Relationships	3.05 (0.13)	3.02 (0.31)	0.327 *(147)*	1
Nurse Management & Leadership	2.78 (0.11)	2.97 (0.39)	2.335 *(147)*	0.36
Staffing & Resource Adequacy	2.30 (0.19)	2.51 (0.46)	3.07 *(147)*	0.07
Nurse Participation in Hospital Affairs	2.76 (0.11)	2.82 (0.21)	1.54 *(143)*	1
Nurse Foundations for Quality Care	3.04 (0.07)	3.13 (0.22)	1.879 *(143)*	0.99
Violence during last 5 shifts	**n (%)**	**n (%)**	***X^2 (df)***	***p[a]***
Physical assault	25 (26.3%)	2 (3.4%)	12.958 *(1)*	≤0.01
Threat of assault	36 (39.1%)	11 (19.0%)	6.723 *(1)*	0.02
Emotional abuse	34 (36.2%)	11 (19.0%)	5.094 *(1)*	0.02
OUTPUTS				
Patient outcomes	**M (SD)**	**M(SD)**	***MWU***	***p[a]***
PEECH	2.34 (0.12)	2.24 (0.30)	1928	1
Nurse outcomes	**n (%)**	**n (%)**	***X^2 (df)***	***p[a]***
Absenteeism (missed 5 shifts)	59 (60.0%)	27 (50.0%)	3.258 *(1)*	1
Intent to leave	23 (24.0%)	11 (18.9%)	0.524 *(1)*	1
Actively looking for new job	32 (33.3%)	12 (20.7%)	2.832 *(1)*	1
System outcomes	**n (%)**	**n (%)**	***X^2 (df)***	***p[a]***
Quality of care good/excellent	78 (82.1%)	56 (96.6%)	6.91 *(1)*	0.18
	M (SD)	**M (SD)**	***MWU***	***p[a]***
Number of tasks delayed	4.09 (0.73)	4.56 (1.96)	2638.5	0.85
Number of tasks not done	0.81 (0.24)	0.69 (0.45)	2621.5	0.85

X^2=Chi-square; MWU=Mann-Whitney U; t=t-test

[a] All p-values adjusted using Holm-Bonferroni correction within sub-categories

Table 4 Odds ratios and confidence intervals for Nurse & System Outcomes, by wards with/without Nursing Support Workers

	Intent to Leave		Quality of Care Good/Excellent		One or more Tasks Delayed		One or more Tasks Not Done	
	NS	**Non-NS**	**NS**	**Non-NS**	**NS**	**Non-NS**	**NS**	**Non-NS**
Instability	2.88 (1-8.462)*	--	0.27 (0.125-0.589)*	--	--	--	--	--
Years Nursing	--	0.90 (0.837-0.966)*	--		1.07 (1.001-1.144)*	--	0.96 (0.942-0.983)*	--
Years on Ward	--	--	--	--	0.89 (0.833-0.963)*	0.84 (0.833-0.879)*	--	--
Nursing Leadership	0.19 (0.089-0.417)*	0.29 (0.075-0.957)*	--	--	--	--	--	--
Staffing & Resources	--	--	6.09 (2.773-13.396)*	44.17 (3.175-614.637)*	0.28 (0.154-0.924)*	0.14 (0.205-0.534)*	--	--
Emotional Abuse	--	--	--	--	--	--	--	26.62 (5.865-120.814)*

**=Significant at p≤0.05; '--'=Not statistically significant*

Note: Presented as Odds Ratio (95% Confidence Interval), relative to no Intent to Leave, Fair/Poor Quality of Care or Zero Tasks delayed/not done)

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