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Effect of an evidence based quality improvement framework on patient safety

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Abstract

Objectives To investigate the impact of the introduction of The Productive Ward Program™ on two patient safety indicators; patient falls and medication errors.

Design Retrospective quantitative study.

Setting The study was conducted at a major metropolitan acute care hospital in Sydney, Australia.

Subjects This study was conducted in a medical, surgical and two aged care wards, with a combined total of 120 inpatient beds over a 32 month time period.

Main Outcome Measures The number of patient falls and medication errors for each of the participating wards.

Results The implementation of The Productive Ward Program™, did not have an overall significant statistical reduction in the number of falls and medication incidents. Aged Care 1, had a reduction of 13 falls between intervention and post intervention phase, these results were not statistically significant (OR 1.17; 95% CI 0.86, 1.59). For Aged Care 1 ward there was a statistically significant reduction in medication errors from 66 errors pre intervention to 27 medication errors post intervention (OR 2.73;95% CI 1.71, 4.38).

Conclusion The results of this small study indicate that the implementation of The Productive Ward Program™, did not have an overall significant statistical reduction in the number of falls and medication errors. This paper highlights the need for future research on the impact of the Productive Ward Program on patient safety.

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ABSTRACT

Key Words
The Productive Ward Program™, patient safety, quality, falls, medication errors

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INTRODUCTION

The acute healthcare environment is complex and rapidly changing in part due to increasing patient acuity, staff shortages, decreasing length of hospital stays, and the aging population (El Haddad et al 2013). In light of this, the provision of safe quality care remains an ongoing challenge for clinical staff. Patient safety is important to reduce harm to patients and prevent adverse consequences thus, it is important that ways are found to transform care cultures in an effort to provide safe and effective care. Better patient outcomes and quality of care have been attributed to improvements in hospital work environments and processes, for example staffing, decision making and multidisciplinary relations (White et al 2014; Aitken et al 2012; Lennard 2012). The Productive Ward Program™ (PWP) is one such strategy designed to empower the Multidisciplinary Team (MDT) to make changes towards improving the safety, quality and delivery of care (White et al 2014; Wilson 2009) with the main aim of improving clinical and safety outcomes for patients (Van Bogaert et al 2014)

BACKGROUND

Numerous indicators have been defined to monitor patient safety, however the commonly used indicators included the incident of patient falls and medication errors. (Burston et al 2014; DuPree et al 2014; Heslop and Lu 2014; Burston et al 2011; Dykes et al 2011). The literature is rife with studies relating to strategies to prevent incident of patient falls and medication errors. However, the focus of these studies has been mainly on the development of screening tools, patient self-efficacy, nurse to patient ratios, staffing numbers and the relationship between the care provided, patient outcomes and existing processes. Whilst these studies acknowledged the importance of patient safety indicators and the limitation of current studies they also noted the limitations of existing risk screening tools and challenges with the reporting and prevention of falls and medication errors. In order to draw attention to patient safety, two common key patient safety indicators, namely patient falls and medication errors, have been utilised to measure and determine the appropriateness, effectiveness and quality of care strategies (Burston et al 2011).

Falls

Falls are the most common and often preventable adverse component of acute hospital care. In a recent survey undertaken in England, there were 314,314 patient falls in the National Health Service (NHS) hospitals accounting for 19% of all incidents notified in the NHS reporting system (NHS National Reporting and Learning System, 2015). Similarly, the incidence of falls in the United States of America (USA) hospital system has been reported to be between 700,000 and 1,000,000 per year (Agency for Healthcare Research and Quality, 2013). In Australia, the number of patient falls were 298,709 across both private and public hospitals. (Australian Institute of Health and Welfare, 2014). The number of inpatient falls notified in New South Wales (NSW) public hospitals in 2013 was 27,073.

In New South Wales falls are classified according to the severity assessment code (SAC). SAC is a numerical score applied to an incident based predominantly on its consequence. SAC 1 and SAC 2 incidents are those that resulted in the death or serious injury or harm to the patient (NSW Clinical Excellence Commission, 2008). Of the 27,073 incidents of falls in NSW, 464 were classified as SAC 1 and SAC 2 incidents (NSW Clinical Excellence Commisssion, 2014).

The demographics of patients admitted to acute hospital in Australia is predominantly aged 65 years and older. This combined with the severity of illness and unfamiliar surroundings of hospitals are predisposing factors which add to the increased risk of patient falls and the consequences of falls (Healey et al 2014). Harm to patients from falls include fractures, head injuries, soft tissue injuries, psychological trauma, extended length of stay and cost for the health care services (Dunne et al 2014). A study undertaken with 250 patients

aged 60 years and over demonstrated a one-year cumulative mortality was 25.2% among those who have fall related fractures (Coutinho et al 2012).

Medications

Medication errors and intravenous fluid incidents account for the second most reported clinical event in Australian health contexts (Hayes et al 2015) with 10,475 medication errors and intravenous incidents recorded over a six month period between July to December 2010 and 11,132 in 2013 for the same period (Australian Commission on Safety and Quality in Health Care 2009).

Medication errors account for one of the most significant causes of harm to patient safety and are attributed to increased length of stay, readmissions, distress, mortality and, increasing financial costs (Wittich et al 2014; Flynn et al 2012; Evans 2009). Patient safety remains a concern for health care despite continual monitoring of medication errors (Folkmann and Rankin 2010). To decrease the likelihood of medication errors, strategies have been implemented to improve the practice environment. These include participation in decision making for staff, improved teamwork between the MDT, fostering continuity of care and ongoing educational opportunities (Flynn et al 2012). In addition, the introduction of electronic medical records with medication components has been reported to decrease the incidence of medication errors by up to 50% (Geneve et al 2015).

Strategies

Falls and medication errors prevention strategies in acute care are complex (Dykes et al 2011) hence, a number of evidence-based quality improvement frameworks have been implemented to address patient safety. These include 'Transforming Care at the Bedside (TCAB), and the 'Studor Group', both conducted initially in the USA. The TCAB is a nurse led initiative, where staff work in a supportive team and focus on four key areas: care that is safe, reliable and effective; patient-centred, efficient and minimal waste. These initiatives are key to sustainable healthcare in the future (Burston et al 2011).

Results from an observational study in Australia that utilised TCAB, noted an improvement in patient safety indicators with a reduction in the incidence of both medication errors and patient falls. However, the authors acknowledged that further evaluative studies were needed (Burston et al 2011). Comparatively, the Studor Group focused on creating purpose, making a difference and valuing the work undertaken (Braaf et al 2015). Rounding performed by nurses was one approach which had a positive result in improving patient safety by reducing the incidence of falls in a number of USA hospitals.

In Australia, the Essentials of Care Program is another evdience-based quality improvement framework that has been employed to improve patient care and outcomes. The Essentials of Care Program is focused on nine domains which link to clinical standards, including 'preventing risk and promoting safety'. The program is structured into six phases and is ongoing with a two year evaluation cycle. Research and evidence gained in the clinical context is used by the team to review, change practice and achieve improved patient outcomes (NSW Department of Health 2009).

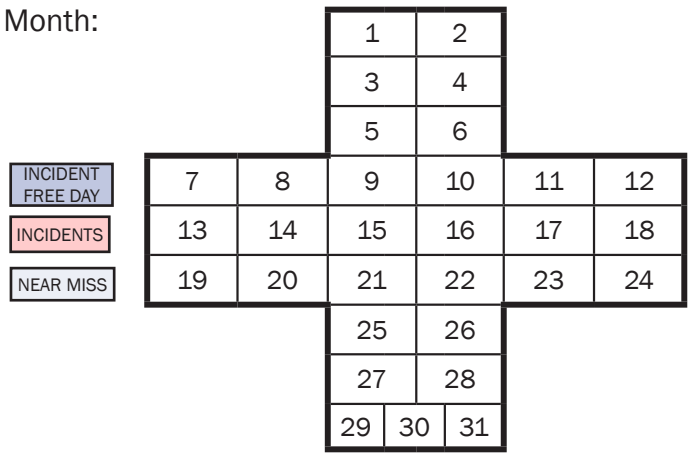
The Productive Ward Program™ (PWP) is another evidence-based quality improvement framework that has been implemented in Australia to improve patient outcomes, particularly in relation to the reduction of patient falls and medication errors. The Productive Ward Program™ is designed to assist wards to streamline work processes, reduce inefficient activities, declutter the work place and release more time to care for patients (Dunne et al 2014; White and Waldron 2014).

The quality improvement project reported in this paper is The Productive Ward Program™ (PWP). The PWP was developed by the United Kingdom's National Health Service Institute for Innovation and Improvement (NSHI) in

2005; with widespread implementation in 2008 (Wilson 2009). Since then, The PWP has been introduced in numerous countries including Australia, Canada, Denmark, Ireland, New Zealand, The Netherlands, Scotland and the USA (Oregon) (White et al 2014). The program utilises lean thinking methodology (Wilson, 2009) and principles of complexity theory to improve flow, reduce waste and empower staff to review the ward environment and clinical processes, in order to identify areas of improvement and initiate positive change (Dunne et al 2014). Complexity theory highlights the need for change at all levels of healthcare and seeks to explain the relationship between macro-structures and micro-level behaviour (Chandler et al 2016; Lanham et al 2013). The PWP attempts to address this complex relationship by aiming to involve all layers of the health care system in order to increase direct patient care time, enhance the staff and patient experience and, improve safety and efficiency of care (Burston et al 2011). The PWP was implemented at the major metropolitan acute care hospital with the aim of it becoming a long term evidence-based quality improvement framework involving all members of the MDT. For this reason, patient safety indicators involving a multidisciplinary approach to reduce harm have been applied as measures to determine the effects of The PWP.

The PWP is comprised of three foundation modules which are completed in order, followed by ten process modules (White et al 2014). Before beginning implementation, a selection of staff from the ward attend a two-day training program. The training has a strong focus on the processes of the three foundation modules and the basic principles of The PWP. Each module includes a prepare, assess, diagnose, plan, treat and evaluate cycle. The first foundation module required to be completed is 'Knowing how we are doing (KHWD)', which involves implementing measurement systems to collect baseline data regarding the ward's performance. The collection of baseline data informs the decisions that are made by the staff to improve performance (Lennard 2012; Armitage and Higham 2011). As a component of the measurement system, each ward undertakes an 'activity follow'. The 'activity follow' includes the observation of nurses for a 12-hour period as routine work is performed. The percentage of direct patient care time, the number of interruptions, inefficient activities and barriers to provide care are identified during this activity (Wright and McSherry 2013; Armitage and Higham 2011). Additional measurement systems include patient and staff satisfaction surveys and safety crosses. A safety cross (figure 1) is a visual tool representing each day of the month and is used to track the number of days in which a particular incident occurred.

Figure 1: A safety cross



The subsequent foundation module is 'Well Organised Ward (WOW)'. The aim of this module is to review and address environmental issues to streamline the location and holdings of stock and equipment. This is designed to ensure access and standardisation of strategies that will improve functionality and work processes (Armitage and Higham 2011). Data and information collected from KHWD assists ward staff identify the areas to 'WOW', resulting in staff spending less time looking for equipment and stock (Lennard 2012). The final foundation module is 'Patient Status at a Glance (PSAG).' The aim of this module is to ensure information regarding a patient's status and hospital journey is clear and accessible. Thus, as a result, there are less interruptions and time spent looking for patient information (Lennard 2012; Armitage and Higham 2011).

On completion of the three foundation modules, the ward teams identify priorities that inform their decision regarding what process module to commence. The process modules are all fundamental components of clinical care. They include falls, pressure injury prevention, patient observations, admissions and planned discharge, shift handovers, meals, medicines, patient hygiene, nursing procedures and ward rounds. The process modules follow a prepare, assess, diagnose, plan treat and evaluate continuous cycle based on the Plan, Do Study, Act (PDSA) methodology, to identify and eliminate activities that add no value to patient care and safety (Van Bogaert et al 2014).

METHOD

This retrospective study was conducted in a major metropolitan acute care hospital in Sydney, Australia in 2016. The PWP was introduced to the research site in 2013. Four demonstration wards were purposefully selected and included: an aged care ward without a rapid assessment unit (Aged Care 1), an aged care ward with a rapid assessment unit (Aged Care 2), a medical ward and, a surgical ward; with a combined total of 120 inpatient beds.

Aim

The aim of this study was to investigate the impact of The PWP™ on patient safety in regards to two patient safety indicators; patient falls and medication errors.

Inclusion criteria

The wards selected to participate in the study were The PWP start up wards. These wards were selected due to the availability of retrospective data.

Data collection

Data was collected for patient falls and medication errors for each of the participating wards at three time periods: pre implementation (13 months), implementation (6 months) and the post implementation period (13 months) to assess the effects of the PWP on falls and medication errors.

The data was retrieved from the Incident Information Management System (IIMs) which is a system utilised by all NSW Health facilities for recording and reporting healthcare incidents. IIMs was selected as the data collection tool in preference to safety crosses. The rationale for this decision was that the recording of data using safety crosses is solely reliant on staff recording the incidents daily. Because of this potential variability, the number of incidents per day cannot be accurately accounted for. This compares to the integrity of the IIMs data collected which is reflective of the reporting accountabilities of patient incidents. The number of falls per 1,000 occupied bed day (OBD), the falls rates and the total number of medication incidents for the study period were sourced.

Data Analysis

Data was entered into Excel and analysed using SPSS. The researchers were not able to conduct any further checks in data integrity as data was downloaded straight from IIMS. Data relating to patient falls were analysed

per 1,000 ODB to ensure standardisation. Frequencies and percentages were used to measure the number of patient falls and medication errors. Differences between pre and post data were measured using t-test. Results were considered to be significant if p=<0.05.

Ethics approval

Approval to conduct this quality project was obtained from the South Eastern Sydney Local Health District Research and Ethics Committee.

Demographics

Twenty-nine staff attended a two-day Productive Ward training program conducted on the research site. The participants included nurses, a physiotherapist and a ward clerk. Data was collected from the four participating wards and all had a profile of 30 beds. See table 1 for the data relating to the number of OBD for each ward during the three time periods.

Table 1: Number of Occupied Bed Days per ward during the three time periods

Ward	Pre intervention No of OBD (13 months)	Intervention period Monthly average of OBD	Post intervention No of OBD (13 months)	Post intervention monthly average of OBD
Surgical	11.130	856	10.892	838
Medical	11.193	861	11.118	855
Aged Care 1	11.725	902	11.608	893
Aged Care 2	9.408	724	11.324	871

FINDINGS

Falls

The combined total of falls incidents in the pre implementation phase was 337 per 1,000 OBD and in the post implementation phase this reduced to 307 falls per 1,000 OBD. However, overall, there was no statistical significant reduction in the incident of falls in any of the participating wards (p= 0.20).

For the surgical ward although there was an increase in the number of falls from 36 per 1,000 OBD to 39 per 1000 OBD, these results were not statistically significant (OR 0.92; 95% CI 0.58, 1.46) (figure 2). The medical ward had a reduction of only 1 fall per 1,000 OBD; 70 falls per 1000 OBD pre intervention to 69 falls per 1,000 OBD post intervention. These results were not statistically significant (OR 1.02; 95% CI 0.72, 1.43) (figure 2). Although Aged Care 1, had a reduction of 13 falls between the intervention and post intervention phase, these results were not statistically significant (OR 1.17; 95% CI 0.86, 1.59) (figure 2). For Aged Care 2 the results were not statistically significant, even though there was a reduction of 20 falls per 1,000 OBD; from 133 falls per 1,000 OBD pre intervention to 113 falls per 1,000 OBD post intervention (OR 1.20; 95% CI 0.92, 1.57) (figure 2).

Medications

For the surgical ward although there was a decrease in the amount of medication errors from 30 incidents to 17 incidents, the decrease was not statisticaly significant (OR 1.83; 95% CI 0.99, 3.37) (figure 3). The medical ward had an increase in medication errors from 24 incidents to 34 incidents, however, this result was not statisticaly significant (OR 0.69; 95% CI 0.40, 1.18) (figure 3). For Aged Care 1 ward there was a statistically significant reduction in medication errors from 66 medication error pre intervention to 27 medication errors post intervention (OR 2.73; 95% CI 1.71, 4.38) (figure 2). Aged Care 2 ward had an increase in medications from 27 errors pre intervention to 34 errors post intervention, these results were not statistically significant (OR 0.78; 95% 0.46, 1.32) (figure 3).

Figure 2: Incident of falls in all wards over the three time periods

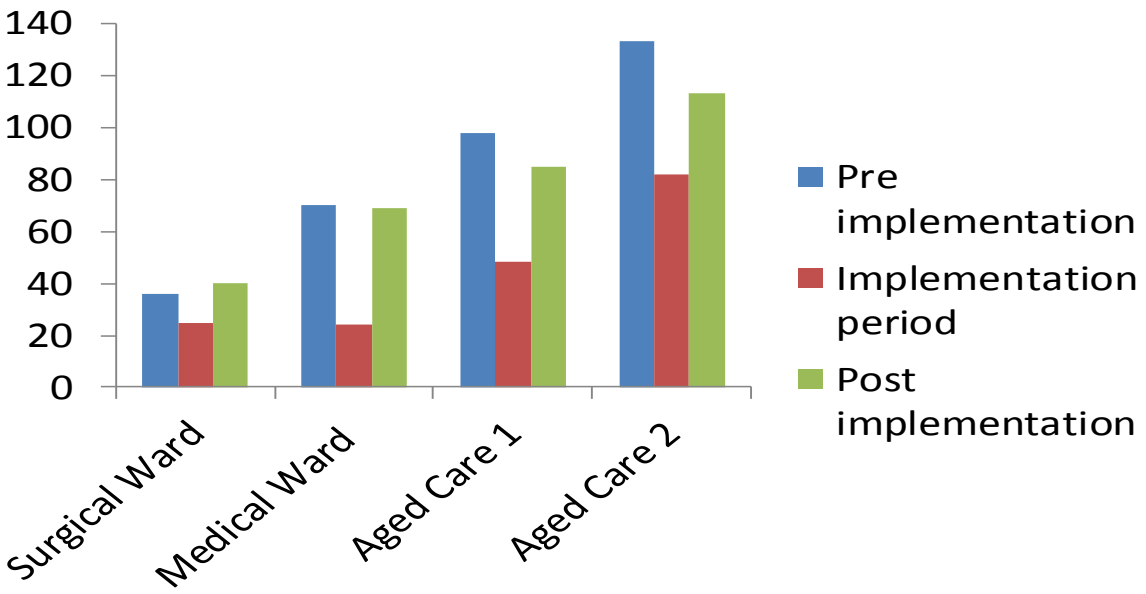
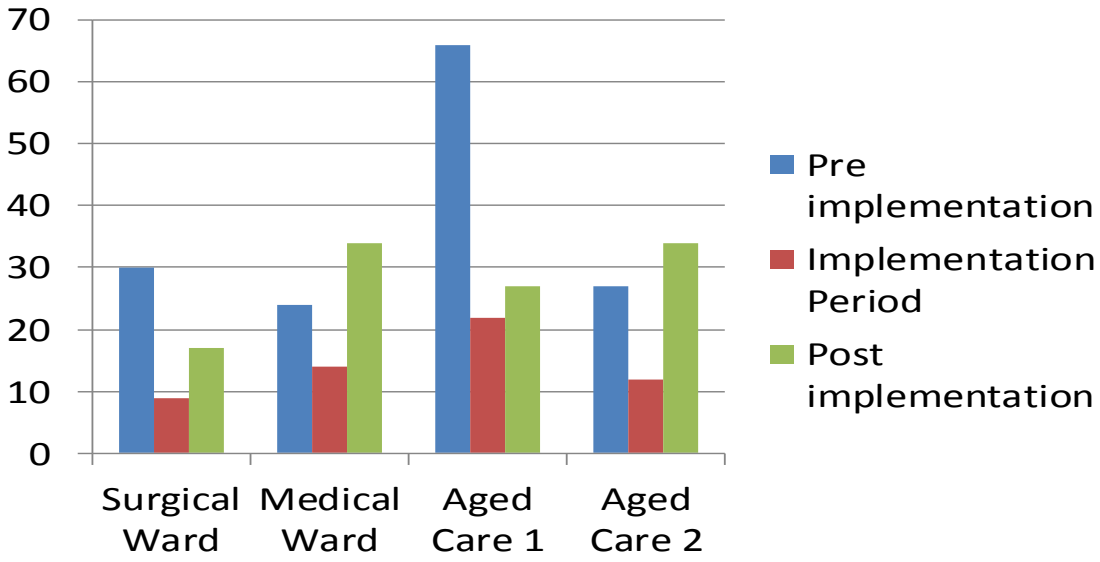


Figure 3: Medication errors in all wards over the three periods



STUDY LIMITATIONS

There were a number of limitations to this study. Only two patient safety indicators were analysed in the study. It would be beneficial to broaden the inclusion of patient safety indicators in further research for example, the inclusion of pressure injury incidence. Data for pressure injury incidence was not available for all wards in the PWP and hence was not included in this study. Another limitation of the study is the IIMS data relies strongly on staff entering the falls and medication incidents, thus, it is unknown if all incidents have been reported. As this research was retrospective, nurses and other staff who completed the IIMs reports were not research participants in this study. In addition, the study was conducted over a short period of time, and may not reflect an accurate trend in data related to the chosen indicators.

DISCUSSION

This study was undertaken to investigate the effect of The PWP™ on two patient safety indicators; patient falls and medication errors. In order to reduce adverse events and improve patient safety, various strategies have been employed at the research site.

There is a strong probability that the number of reported medication incidents increased for two of the participating wards due to increased reporting of incidents. This can be directly attributed to the visual display of the safety crosses and the supportive environment for staff to report incidents (Wilson 2009). Safety crosses are a visual tool used to display and draw attention to key clinical domains which have been identified by staff as priorities to measure and track incidences. The participating wards used safety crosses to measure the number of days on which a fall or medication error occurred. The safety crosses aim to enable positive discussion, review and feedback amongst staff regarding fall and medication incidents.

Overall, the number of reported patient safety incidents has increased at this site. This is consistent with a study by Flowers et al (2016) who noted that the supportive learning environment was a key factor in incident reporting. During the implementation period of The PWP, staff were encouraged to complete IIMs reports on patient falls and medication errors. The reporting behaviour of staff was maintained in the post implementation phase due to open communication and belief that patient safety if shared encourages incident reporting (Moon and Kyoung 2017). The PWP created a 'no blame' platform for feedback and joint discussion regarding patient safety incidents (Moon and Kyoung 2017; Hazan 2016; Lennard 2012).

Each ward had the benefit of a designated team leader to facilitate and drive the process of The PWP. As discussed by Dogherty et al (2013), an effective facilitator is vital to ensure success of quality improvement activities. However, as complexity theory argues, implementation of changes cannot be located to a single individual (Chandler et al 2016). A potential reason for the downward trend of some incidents may be contributable to the fact that change was allowed to occur from the micro level and all members of the MDT were encouraged to put forward their ideas for change in the workplace. Complex systems, such as the healthcare environment, are often resistant to 'top down' macro level changes but more responsive to small micro level changes that diffuse through the system, resulting in a more substantial change (Chandler et al 2016).

The WOW foundation module most likely contributed to the statistically significant reduction in medication errors for Aged Care 1. The wards as part of the WOW foundation module, streamlined, reorganised, and standardised the placement of equipment and stock. Thus, improving the work environment, reducing interruptions for the MDT and increasing direct patient care time (Lennard, 2012). Research has identified that a functional work environment has a positive impact on many safety, quality, experience and, value measures (Press Ganey Associates 2015). During the WOW module, Aged Care 1, had an emphasis on the redesign of the medication room. The redesigning of the medication room may have attributed to the reduction of medication errors. However, further studies would need to address the impact of the design of medication rooms on the occurrence of medication errors.

The foundation module has likely contributed to the downward trend of the number of patient falls for the two aged care wards. Both Aged Care wards had a reduction in falls in the post implementation period, this may be attributed to the removal of wasteful activities, interruptions and time spent looking for equipment. Both wards had a strong focus on the organisation of stock and the accessibility of observation equipment during the WOW module, thus, releasing time to care and providing closer supervision of patients at high risk of falls. Research has highlighted the success of increased observation in reducing the incidence of falls (Australian Commission on Safety and Quality in Health Care 2009). Another potential contributing factor to the downward trend in falls for both of the Aged Care wards was the implementation of a modified version

of Intentional Rounding (Flowers et al 2016) as part of the Ward Round module. The Intentional Rounding involved assessing patients for warmth, pain, hunger and thirst and, the need for toileting every two hours. Studies have reported that Intentional Rounding is effective in reducing the incidence of falls. However, not all studies have reported a statistical significant reduction (Flowers et al 2016).

The medical and surgical wards also had a strong focus on the WOW module and while the surgical ward had a reduction in medication errors, neither ward had a reduction in falls between the pre and post implementation period. This potentially suggests that organising and standardising the placement of equipment is not sufficient enough to reduce the incidence of falls and medication errors. The medical ward had a strong focus on the PSAG foundation module, after the activity follow highlighted numerous interruptions in the morning during handover and medication round. The medical ward had a strong focus on reducing interruptions during the morning medication period, with the aim of reducing adverse outcomes. However, the medical ward had an increase in medication errors between the pre and post implementation period. This suggests that further interventions are needed to reduce medication errors.

A literature review conducted by Raban and Westbrook (2013) found limited evidence that reducing interruptions assists in reducing adverse medication incidents. Raban and Westbrook (2013) argue that some interruptions contribute to patient safety and a greater understanding of the relationship between adverse incidents and interruptions is needed. The surgical ward undertook the observation module first and focused on standardising and streamlining the completion of post-operative vital signs. While this module would have contributed to increased patient safety on the ward, it is unlikely to have resulted in a reduction of medication errors and falls.

Strength

The strength of this paper is the diversity of the participating wards which included medical, surgical and two aged care wards. Additionally, these wards comprised a broad classification of nurses and other MDT members and patients with varying acuity and reasons for admission. Flowers et al (2016), examined the effect of transforming care strategies on nurse-sensitive outcomes on only two medical wards. The 13 month pre and post implementation period was also selected to incorporate a full year, ensuring both the quieter summer months and high acuity winter months were accounted for. Falls and medication errors were graphed as 12 month moving average rates to compensate for any potential seasonal variation of incidents (Danai et al 2007).

CONCLUSION

Overall, this paper found that the implementation of the evidence-based quality improvement framework, The PWP, did not have a statistical significant reduction in the incidence of falls and medication incidents.

RECOMMENDATION

Given the small sample size the findings from this research have highlighted the need for further studies on the effect of The PWP on patient safety indicators in multicentre sites. This study will provide a foundation for future work to review other wards undertaking The PWP within the hospital. One aspect of falls that was not assessed in this paper was the number of falls that resulted in harm. Whilst there was no reduction in falls on the medical and surgical wards there may have been a reduction in the number of patients who sustained an injury post fall. Future research should also investigate the number of SAC 1 and SAC 2 falls related incidences pre and post the implementation of The PWP. Further research must also address the sustainability of the PWP within the complex health system.

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