Prevention of falls in acute hospital settings: a multi-site audit and best practice implementation project

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Abstract

Objective: To assess falls prevention practices in Australian hospitals and implement interventions to promote best practice.

Design: A multi-site audit using eight evidence-based audit criteria. Following a baseline audit, barriers to compliance were identified and targeted. Two follow-up audit cycles assessed the sustainability of practice change.

Setting: Nine acute care hospitals around Australia, including a mix of public and private. One medical ward and one surgical ward from each hospital were involved.

Participants: A clinical leader from each hospital, trained in evidence implementation, conducted the audits and implementation strategies in their setting.

Interventions: Multi-component falls prevention interventions were utilized, designed to target specific barriers to compliance identified at each hospital. Common interventions involved staff and patient education.

Main Outcome Measure: Percentage compliance with falls prevention audit criteria and change in compliance between baseline and follow-up audits. Fall rate data were also analysed.

Results: Mean overall compliance at baseline across all hospitals was 50.4% (range 30.8–76.6%). At the first follow-up, this had increased to 74.5% (range 59.4–87.4%), which was sustained at the second follow-up (74.1%, range 48.6–84.4%). There were no statistically significant differences between compliance rates in medical versus surgical wards or in private versus public hospitals. Despite sustained practice improvement, reported fall rates remained unchanged. The focus on staff education possibly led to improved reporting of falls, which may explain the apparent lack of effect on fall rates.

Conclusions: Clinical audit and feedback is an effective strategy to promote quality improvement in falls prevention practices in acute hospital settings.

Key words: accidental falls, patient safety, clinical audit, evidence-based practice, quality improvement

Introduction

Admission to hospital is often associated with a change in physical or cognitive condition, which when combined with unfamiliar surroundings presents a high risk for falls [1]. Falls are one of the most common adverse events experienced in hospitals [2], however reported in-hospital fall rates vary significantly depending on the setting [3, 4]. In the acute setting, rates from 2% to 5% have been reported and in rehabilitation settings up to 46% of patients have been recorded as
falling at least once during their admission [5]. In general, fall rates are higher for medical wards than for surgical wards [6]. In Australia in 2012–2013, >27,000 falls resulting in patient harm were recorded as occurring in a health service area, representing a rate of 3.0 per 1000 separations [7]. More falls per 1000 separations were reported for public hospitals (4.0) than for private hospitals (1.5) [7].

In-hospital falls frequently result in injury, with injuries reported to occur in 44% to 60% of falls in hospital settings [8, 9]. Injuries resulting from falls can be serious and in some cases can lead to chronic pain, functional impairment, permanent disability or death [10]. Falls can result in increased length of hospital stay, reduced quality of life and can leave patients with emotional distress and fear of a repeat fall [1]. A 10-year cohort study assessed the risk and burden of in-hospital falls and fall-related fractures using data collected from public hospitals in Victoria, Australia [11]. The dataset included more than three million discharge episodes, with 0.64% of these recorded with an in-hospital fall. Of those falls, 17.6% were associated with a fracture, 44.4% of which were hip fractures. The proportion of in-hospital falls increased with age, with 79% of falls occurring in patients over 70 years of age. Younger patients also experienced falls, with patients aged 18–39 years accounting for 3.2% of falls and >11% of falls occurred in patients under the age of 60. In-hospital falls were shown to be associated with increased mortality [hazard ratio 1.3, 95% confidence interval (CI) 1.3 to 1.5] and length of hospital stay (median 19 days vs. 5 days, P < 0.0001) [11].

There are a number of factors that can contribute to in-hospital falls, including patient characteristics, staff behaviour and the hospital environment [12, 13]. The risk of a fall can be influenced by the number and type of medications being taken by a patient, and patients that have experienced a fall are at greater risk of a future fall [14]. Most current literature recommends a comprehensive and multifactorial approach to falls prevention, involving the use of risk assessment tools and targeted interventions [12, 15–18]. Evidence-based guidelines for preventing falls provide specific information for Australian hospital settings [16]. In addition, most Australian hospitals have fall prevention policies that include the use of fall risk assessment tools. Despite access to these resources, many preventable in-hospital falls continue to occur.

Clinical audit is an established method to identify which areas of current practice require change to improve the quality of care [19]. It seeks to compare current clinical practice against agreed standards of predetermined best practice [20]. We have previously developed audit criteria for in-hospital falls prevention based on the best available evidence [21]. The aim of this study was to use these criteria to assess falls prevention practices in public and private hospitals around Australia. Furthermore, this project sought to identify barriers to compliance with best practice and to implement and assess the effects of strategies to promote best practice in falls prevention.

Methods

Participant training

Staff members from hospitals were recruited for training in clinical leadership and evidence implementation. To obtain a diverse sample representative of Australian hospitals, one staff member was sought from a public hospital and one from a private hospital in each of the five mainland states of Australia. Suitable hospitals (acute care hospitals with 250+ beds) were selected by purposive sampling. Nursing directors at selected hospitals were contacted to invite the hospital to participate and to nominate an interested staff member. Nursing directors and nominated individuals were provided with an information sheet outlining the expectations of the project prior to deciding to participate. Ten participants were recruited; however, one participant withdrew during the first training week due to accreditation responsibilities at their hospital, leaving nine participants who completed the programme.

The training programme involved an initial intensive 5-day residency at the Joanna Briggs Institute (JBI). Clinical leaders returned to their practice sites to conduct audits and implementation initiatives over a period of 25 weeks. Following this, they returned to JBI for a second 5-day intensive residency during which they developed their project report and engaged in interactive discussion to consolidate the project achievements.

Clinical audits and implementation phase

Participating hospitals were asked to nominate one medical ward and one surgical ward, in which falls were a recognized issue, to be included in the study. Two hospitals did not have separate medical and surgical wards so one large or two smaller mixed wards were included. For auditing purposes, the anticipated sample size was 30 per ward for each audit criterion (or 60 in the case of a large mixed ward). Audit sampling was by convenience.

Previously developed audit criteria [21] were uploaded into JBI’s online clinical audit and feedback software, JBI Practical Application of Clinical Evidence System (JBI PAGES, http://paces.jbiconnectplus.org/). Clinical leaders established local multidisciplinary project teams at their hospital sites and undertook a baseline audit during June 2013. Interpretation of the audit criteria was agreed with the leaders during their first training residency, and they were provided with a reference guide (Table 1) to promote consistency in auditing across sites.

Baseline audit results were entered into JBI PAGES, which displays the data graphically indicating the percentage compliance for each criterion. To facilitate feedback, clinical leaders presented the audit results to relevant stakeholders, including staff in participating wards and hospital/ward managers. Local project teams used the Getting Research Into Practice framework within JBI PAGES for the process of identifying barriers to compliance for particular audit criteria and developing implementation strategies to overcome these barriers. Collaboration with key stakeholders within hospitals and participating wards facilitated the development of interventions. The implementation phase of the project was carried out over 3–4 months and during this period the project researchers maintained contact with clinical leaders by email, phone and group teleconferences.

The most common barriers experienced across hospitals included insufficient falls education for staff, leading to a lack of knowledge of when to conduct risk assessments and how to appropriately address identified risks, and inadequate delivery of education to patients and carers. The most common strategies implemented included multidisciplinary staff education sessions, development of staff education packages, and development of patient and carer education materials.

The first follow-up audit was conducted at each location during October/November 2013. Follow-up data were entered into JBI PAGES and compared with baseline data. Approximately 5–6 months after the initial follow-up, a second follow-up cycle was conducted to assess sustainability.

Fall rate data

Nursing directors were made aware of the intention to collect fall rate data prior to deciding to be involved in the project, with the understanding that only aggregated data would be published and that no
Table 1 Audit criteria for in-hospital falls prevention

| Risk assessment | 1. Fall risk assessment is done upon admission  
|                 | Did case notes show a risk assessment was completed within 8 h of admission?  
|                 | Desired sample: 30 medical patient and 30 surgical patient admissions  
|                 | 2. Fall risk assessment is done upon transfer  
|                 | Did case notes for patients who had been transferred show a risk assessment completed within 8 h of the transfer?  
|                 | Desired sample: 30 medical patient and 30 surgical patient transfers  
|                 | 3. Reassessment occurs when there is a change in condition or following a fall  
|                 | Did case notes for patients who experienced a change in clinical condition (likely to affect their fall risk status) or a fall include a reassessment performed within 8 h of this event?  
|                 | Desired sample: 30 medical patient and 30 surgical patient events  
|                 | 4. Patients who have experienced a fall are considered at high risk for future falls  
|                 | For patients who had a documented history of a fall(s), were they assessed as high risk for future falls?  
|                 | Desired sample: 30 medical patients and 30 surgical patients with a documented history of a fall(s)  
|                 | 5. Fall risk assessment is done accurately using a falls assessment tool  
|                 | According to case notes and/or direct patient evaluation, did the risk assessment appear accurate?  
|                 | Desired sample: 30 medical patient and 30 surgical patient risk assessments  
| Education       | 6. Healthcare professionals have received education regarding falls assessment and prevention strategies  
|                 | Did health professionals in participating wards report they had received falls prevention education in the past 2 years?  
|                 | Desired sample: 30 healthcare staff from medical ward and 30 healthcare staff from surgical ward  
|                 | 7. Patient and family education is carried out for patients at risk of falls  
|                 | Did case notes for patients at risk of falls document the occurrence of patient and/or family education?  
|                 | Desired sample: 30 at risk medical patients and 30 at risk surgical patients  
| Intervention    | 8. Targeted interventions are implemented according to risk factors  
|                 | For patients at risk of falls, was it documented in the case notes that there was implementation of targeted interventions to address each identified risk factor?  
|                 | Desired sample: 30 at risk medical patients and 30 at risk surgical patients

The development of audit criteria was informed by an evidence review, which identified and summarized the best available evidence regarding the effectiveness of acute in-hospital falls prevention strategies for adult patients. To promote consistency in auditing across participating sites, the interpretation and method of assessment for each criterion was agreed with clinical leaders who conducted the audits in their hospital settings. Responses to audit criteria were recorded as Yes, No or Not Applicable.

Data analysis and statistics
Project researchers extracted audit data for individual hospitals from JBI PACES. Graphing and statistical analyses were performed in GraphPad Prism (GraphPad Software, Inc., California, USA). For the comparison of follow-up audits to baseline, two-way analysis of variance (ANOVA) was performed to determine the mean difference and 95% CI in percentage compliance between audit cycles. Comparison of the first and second follow-up cycles showed no statistically significant differences, so the mean difference and 95% CI were not presented for these analyses. Mean differences with a positive value indicate an increase in percentage compliance and mean differences with a negative value indicate a decrease in percentage compliance. Two-way ANOVA was also used for the analysis of fall rates. Statistical significance was considered as a P-value of <0.05.

Ethics
Ethics approval for the overall project and site-specific ethics approval was granted for each participating hospital site by the relevant local ethics committees.

Results
Overall compliance for each hospital
The overall percentage compliance for each hospital was calculated by averaging compliance across all eight audit criteria, using the aggregated data from participating wards. Figure 1 shows the compliance for each hospital for the baseline cycle and two follow-up cycles (note that Hospitals A through E are private hospitals and Hospitals F through I are public hospitals). The mean overall baseline compliance was 50.4% (range 30.8–76.6%). Results for the first follow-up cycle showed improvement across all hospitals, with mean overall compliance of 74.5% (range 59.4–87.4%). At the second follow-up, mean compliance was maintained at 74.1% (range 48.6–84.4%).

Compliance for individual audit criteria
Compliance for individual audit criteria across all hospitals was assessed (Fig. 2). Criterion 7 (patient education) had the lowest baseline compliance, which was documented as occurring in <30% of cases. Other criteria that performed poorly at baseline were Criterion 2 (reassessment upon patient transfer) and Criterion 3 (reassessment following a change in condition or fall), both with compliance around 35%. Only 43.1% of healthcare professionals in the participating wards reported having received education regarding falls assessment and prevention strategies in the previous 2 years (Criterion 6). At first follow-up, all audit criteria showed an improvement in compliance, and this was sustained at second follow-up. Staff education (Criterion 6) showed the largest improvement, rising to 91.2 and 97.8% compliance at the first and second follow-up, respectively. Patient
Compliance in medical wards versus surgical wards

The overall compliance was assessed for medical wards and surgical wards (Fig. 3). Mean baseline compliance for medical wards was 51.1% (range 35.8–76.9%), which increased to 72.3% (range 60.9–83.6%) at first follow-up. At second follow-up, the rate of overall compliance was 69.6% (range 43.8–81.7%), indicating the improvement had been largely sustained. The overall mean baseline compliance for surgical wards was 44.7% (range 25.1–71.7%), which increased to 71.9% (range 51.3–92.5%) and 74.3% (range 55.4–89.6%) at first and second follow-up, respectively. No statistically significant differences in overall compliance rates between medical and surgical wards were observed at any of the audit cycles.

Compliance in private hospitals versus public hospitals

A comparison of overall compliance rates between private and public hospitals was conducted (Fig. 4). The mean baseline compliance for private hospitals was 51.3% (range 35.6–58.6%), compared with public hospitals at 49.4% (range 30.8–76.6%). At the first follow-up, compliance for private and public hospitals had increased to 75.8% (range 59.4–87.4%) and 72.9% (range 60.6–84.4%), respectively. These overall compliance rates were maintained at second follow-up, with private hospitals at 76.7% (range 70.0–84.4%) and public hospitals at 70.9% (range 48.6–83.2%). Statistical analysis revealed there were no significant differences in overall compliance between private and public hospitals at any of the audit cycles.

Fall rates

Fall rates in the 9-month period following the implementation phase (July 2013 to March 2014 – ‘post-implementation period’) were compared with retrospective fall rates from the corresponding period a year earlier (July 2012 to March 2013 – ‘pre-project period’) (Fig. 5). Fall rate data were collected hospital-wide and for individual participating wards. Some interventions were implemented solely in participating wards; however, some interventions (such as those with a focus on staff education) were implemented hospital-wide. The mean hospital-wide fall rates did not vary between the pre-project and post-implementation periods (3.17 falls/1000 patient days during both periods). The mean fall rates for medical wards were similar in both periods (7.43 and 8.02 falls/1000 patient days; mean difference not statistically significant). Surgical wards also showed similar mean fall rates during both periods (4.39 and 4.54 falls/1000 patient days; mean difference not statistically significant). When the data from medical wards and surgical wards were aggregated, the mean difference in fall rates between the two periods was not statistically significant (5.19 and 5.40 falls/1000 patient days).

Discussion

This project utilized evidence-based audit criteria and implementation interventions in multiple acute hospital settings to demonstrate quality
improvement in falls prevention practices. This approach was based on the JBI model for evidence-based health care, which provides a framework for the integration of the best available evidence within particular clinical contexts in order to increase the quality of care [22]. This model includes the intention to promote engagement, impact clinical practice and lead to improved outcomes and completes the cycle from research to implementation, with a focus on using evidence in practice to identify barriers and highlight interventions that are most effective in promoting best practice [23, 24].

The baseline audit identified a number of areas of falls prevention practice in need of improvement across all hospital sites, in particular staff and patient education. Considering the low percentage of staff that reported having received falls prevention education in the previous 2 years, it is not surprising to see low rates of compliance for other criteria. Drawing on this baseline data, local project teams developed specific strategies to promote best practice, with a focus on using evidence in practice to identify barriers and highlight interventions that are most effective in promoting best practice [23, 24].

The initial follow-up audit demonstrated that implementation of targeted strategies led to improvements in overall compliance at all hospitals and, in addition, showed improved compliance for every individual audit criterion. The improvements in compliance following the implementation phase show that practice change can occur relatively rapidly when appropriate strategies are used to target identified areas. By conducting clinical audit and feedback cycles at regular intervals, this can help improve and maintain evidence-based best practice standards [19]. Comparison of audit data from the first to second follow-up, conducted 5–6 months later, indicated that improvements in compliance were sustained over a time period well beyond the initial focus of the project. Comparison of compliance rates for medical wards to surgical wards, and for private hospitals to public hospitals, indicated that ward type or hospital type had little impact on falls prevention practice and suggests that quality improvement is possible in any acute hospital setting with the use of targeted interventions.

Fall rate data indicated that improvements seen in falls prevention practices did not translate into a reduction in reported falls. There were significant month-to-month variations in fall rates in some wards, and it may be necessary to monitor falls over a longer period of time to accurately gauge long-term rates within each ward. It is important to remember that true assessment of fall rates relies on accurate reporting of fall incidents. An evaluation of the best practice guidelines for falls prevention in Australian hospitals found that there was a tendency for many in-hospital falls to go unreported, with only 64% of all falls and 75% of falls with injury found to be documented in the incident reporting database [25]. Although not reflected in the data, many of the clinical leaders indicated during a focus group session that falls, especially falls resulting in injury, appeared to have decreased in participating wards. The staff education drive, which was a key intervention strategy implemented at all hospital sites, included education on requirements for reporting of falls. One of the clinical leaders indicated that education sessions at their hospital had a focus on reporting
follow-up auditing is used to facilitate continued compliance with
evidence and that are applicable for everyday clinical practice are needed
implementation of strategies that are informed by the best available evi-
manner. To tackle the ongoing issue of in-hospital falls, large-scale im-
porate best practice can be successfully implemented in acute hos-
ights to improve the quality and safety of care for all patients and reduce the
burden of in-hospital falls.

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Figure 5 Comparison of fall rates prior to and post the implementation phase.
Fall rates (number of falls per 1000 patient days) were collected from
participating hospitals for a period prior to the commencement of the project
(July 2012 to March 2013) and compared with the corresponding period
the following year (July 2013 to March 2014), after the commencement
of the implementation phase of the project. Results are presented as
mean ± standard error. Fall rates over the two time periods were compared
hospital-wide, for the participating medical and surgical wards separately,
and for the aggregated medical and surgical wards. The mean differences
for these comparisons are shown above. ns, not significant.

of all near-misses, which were historically poorly reported. Hence, it is
possible that reporting of fall incidents improved following the education
sessions and the fact that reported fall rates remained steady leads to
circumstances that may have been a decrease in the underlying rate.
This was supported by additional data collected at one of the hospitals
that showed the severity of fall-related injuries had decreased in the
post-implementation period.

There are a number of limitations associated with this research.
The study had a focus on changing fall prevention practices according
to the best available evidence and did not seek to identify common or
specific causes responsible for variation in fall rates, which may have
contributed to strategies for falls prevention. In addition, as the focus
of the study was on measuring practice change, the data collected on
fall rates were limited. This did not allow more detailed analyses on
outcome data to be conducted, such as data on injuries resulting from
falls and changes in reporting habits of minor or near-miss
incidents.

Some clinical leaders involved in this study, with support from
their hospital management, have begun to expand successful stra-
egies introduced in participating wards and roll them out for
hospital-wide uptake. Ongoing falls prevalence data will be moni-
tored over time with the anticipation that improvements in practice
will ultimately lead to a reduction in the number of reported falls.
The continued presence of clinical leaders should ensure that the
benefits observed during this project are ongoing and that regular
follow-up auditing is used to facilitate continued compliance with
best practice recommendations.

The results of this multi-site audit demonstrate that interventions
to promote best practice can be successfully implemented in acute hos-
itals to improve the quality and safety of care for all patients and reduce the
burden of in-hospital falls.


