Targeted Fall Prevention Interventions and Wireless Technology Results in Successful Quality Improvement Intervention

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INTRODUCTION

Inpatient falls are reported to be one of the most common adverse events in hospitals,[1] but approximately one-third are thought to be preventable.[2,3] Falls are associated with increased risks of injury and mortality,[4] fear of falling,[5] increased length of stay and costs,[6] and limitation of activities and social engagement.[7]

Evidence-based fall prevention requires analysis of a complex interplay between intrinsic and extrinsic factors including the hospital environment, patient comorbidities, medication regimens, and demographics.[8] Hospitals often focus on multiple factors, including the emphasis on a culture of patient safety, patient and family engagement and education, and hourly rounding, to prevent inpatient falls.[2] Research has shown that targeted and multifactorial interventions may be successful in fall reduction if they are risk stratified and customized for the clinical setting.[9]

In 2008, the American Academy of Nursing initiated an investigation in conjunction with the Robert Wood Johnson Foundation to identify the etiologies of workflow inefficiency and nursing dissatisfaction to improve patient safety and quality of care (TD2 study).[10] The final TD2 study documented the need for ubiquitous, unobtrusive technology to improve workflow and increase nursing efficiency. The TD2 study reported, "Nursing-technology partnerships are vital to our future."[10] The TD2 study also found that "wireless systems that provide rapid, efficient communication, free up the nurse to spend more time on patient interaction, as well as higher-level cognitive functions such as planning and analyzing care are needed."[10]

In January 2013, the Agency for Healthcare Research and Quality published a fall prevention toolkit for improving patient safety and quality of care, which discussed the problems and challenges of fall prevention, evidence-based fall prevention interventions, organizational change management, and implementation and monitoring of fall prevention programs.[11]

Fall prevention technology and patient monitoring have advanced significantly in 2018. The following outcomes story describes the findings of a quality improvement (QI) initiative that incorporated wireless technology connecting patient beds with the alert management system, as well as other evidence-based fall prevention interventions.

METHODS

Clinical Setting: This house-wide QI initiative took place in a 261-bed hospital, and wireless technology was used in 210 beds.

Ethics Review: This QI initiative was reviewed and approved by the Edward-Elmhurst Health Institutional Review Board before data collection and analysis.

Root Cause Analysis: The hospital embarked on a high-reliability journey to create safe, seamless, and personalized patient care. Concern about the unreliability of bed exit alarms and messaging to caregiver phones was identified by clinical bedside staff and shared with the Chief Nursing Officer during safety rounding. In response to this, a root cause analysis was conducted to determine factors that contributed to bed-related falls. The results of this analysis validated the concerns of registered nurses (RNs) and patient care technicians (PCTs) and determined that the cause of the unreliability of bed exit alarms and messaging centered on the wired connections between the bed and the call light system. This finding highlighted the need for wireless technology, which was possible for the fleet of beds, originally purchased by the hospital when it opened in 2011. These beds were capable of upgrade to the S3® Bed with iBed® Awareness Communication System (Stryker Corporation, Kalamazoo, MI). The results of the analysis were given to the Chief Nursing Officer, who communicated this to senior leadership. The decision was made to leverage the bed technology and implement the wireless communication system. Alongside this technological

intervention, the hospital took the opportunity to re-educate bedside and ancillary staff, emphasizing identification of fall risk and adherence to risk-stratified, evidence-based fall prevention interventions, ensuring that patient safety is a shared responsibility.

Wireless Technology: Wireless bed technology ensures three things: 1) beds are reliably connected to nurse call without the worry of using cables or cords; 2) the hospital's bed configuration protocols for fall-risk patients are consistently applied; and 3) that bed exit alarms are reliably transmitted to RNs, PCTs, and the central call center. Each bed features an iBed® Awareness light that indicates when the bed configuration matches fall-risk protocol. When the bed is in the correct configuration, the light shines green. When configuration has changed (i.e., bed exit is disarmed) the light will flash orange. Simultaneously, the bed wirelessly notifies caregivers via orange dome-light outside the room, caregiver mobile devices and alerts the dashboard in the central call center. If a patient safety alert continues without being addressed for 5 minutes, an escalated alert is sent as an "overdue," and the call center contacts the primary nurse to ensure appropriate actions are taken to put the patient bed back into the correct configuration. These alerts are set for 5-minute reminders until the configuration of the bed is corrected and the fall-risk patient is deemed safe, indicated by a green iBed® Awareness light. Similarly, when a bed exit alarm goes off, the bed wirelessly notifies caregivers via a red dome-light, audible tones at the nurse station, mobile devices and the central call center. Bed Exit alarms are a higher priority alert compared to iBed Awareness alarms, so the differences in lights, tones and alerts allow nurses to quickly delineate the need for immediate reaction.

Intervention: The interventions implemented in this QI initiative were elements of a hospital-wide call to action and included the following:
- Clinical staff was educated on the appropriate use of iBed Awareness and wireless technology.
- A fall prevention awareness campaign was implemented for all team members in clinical areas.
- Fall prevention interventions were communicated at bedside shift handoff, RN-to-PCT report, and any patient

handoff (eg, rehabilitation services, transport services).
- Targeted interventions were implemented with "Call, Don't Fall" signs in bathrooms and risk-stratified bed settings.
- Interdisciplinary team collaboration increased compliance with fall prevention interventions.
- Evidence-based patient and family education were provided as appropriate.
- Fall packets were assembled and available in all unit supply rooms to ensure that they were easily accessible for staff. Previously, the items within the fall packets had to be gathered individually; packets assured that all items were readily available from a centralized location.
- Weekly fall audits were conducted to assess compliance.
- Audit results were used to provide real-time feedback to staff to ensure appropriate use of bed technology based on each patient's fall risk and to ensure accountability and compliance.
- A "no-pass zone" was instituted in the Emergency Department (ED), which meant if a call light was on, or a patient was calling out, everyone had the responsibility to address the patient's need or seek additional assistance.

Metrics: Quantitative metrics included bed-related fall rate per 1000 patient days. Qualitative metrics included nursing surveys to monitor the perception of wireless technology and how it affected quality, workflow, and efficiency.

Data Collection and Analysis: Weekly audits of iBed Awareness utilization and fall prevention interventions were initiated. Post-fall debriefs were reviewed, and if the fall was bed related, the nurse call report was reviewed for proper usage. The manufacturer surveyed staff satisfaction before and after implementation.

Fall Risk Audit

Room number:	Fall risk score#
Fall risk band in place:	☐ Yes ☐ No ☐ Corrected
Slipper available/on:	☐ Yes ☐ No ☐ Corrected
Call don't fall card:	☐ Yes ☐ No ☐ Corrected
Bathroom fall hangers in place:	☐ Yes ☐ No ☐ Corrected
Call light within reach:	☐ Yes ☐ No ☐ Corrected
Environment free of fall hazards:	☐ Yes ☐ No ☐ Corrected
iBed awareness on:	☐ Yes ☐ No ☐ Corrected
Fall risk >51, Zone 2 activated:	☐ Yes ☐ No ☐ Corrected

iBed Awareness is alerting — Dashboard in central call center is alerting — Dome light is alerting — Mobile device is alerting — If patient safety alert is not addressed in 5 minutes — Escalation to primary care nurse

Data Sharing: Electronic occurrence reports were reviewed to identify all falls, which were discussed at the Fall Committee meeting. Falls data were also shared at unit staff meetings, unit practice councils, central shared governance councils, and the annual nursing meeting and report, and with senior leadership and the hospital board. Safety stories open every meeting in the organization, reflecting on good catches, near misses, and opportunities for improvement.

Fall Prevention Team: The interdisciplinary fall prevention team included clinical RNs, PCTs, allied health professionals, risk professionals, educators, and representatives from the ED. Committee representatives brought recommended interventions back to unit director/manager meetings, and once approved, staff were educated on interventions.

The interdisciplinary fall prevention team, as well as the nurse call system administrators and users, were involved in designing the alert messages and escalation path. At the annual nursing meeting, staff was surveyed regarding what level of detail they would like to receive in the alerts.

Education: All RNs, PCTs, transporters, and rehabilitation staff were identified as primary users and were provided with in-depth training (eg, online, hands-on, return demonstration, audits). Online fall prevention computer education was provided in addition to education at staff meetings, daily huddles, and monthly shared governance council meetings. All education was assigned online via the electronic learning management system. The manufacturer assisted with hands-on return demonstration testing, and all primary users signed

off on competency testing. Members of the fall prevention awareness campaign ensured appropriate adherence to all fall prevention interventions on an ongoing basis.

Visual Aids: In addition to standard visual aids used for fall prevention (e.g., colored armbands and socks, cards on over-bed tables, communication boards, etc.), in 2017, "Call, Don't Fall" English/Spanish placards and bathroom signs were placed in all inpatient bathrooms, the ED, and ancillary testing areas.

Compliance Monitoring: Fall audits were performed on a weekly basis on each unit to assess adherence to all of the QI interventions. Rounding was conducted with unit champions and was followed by prompt discussions with staff to review bed configuration based on each patient's fall risk assessment score.

Pilot: A 3-week pilot trial took place on a 12-bed unit starting August 14, 2017, to assess wireless technology and interventions and to ensure that the QI initiative was effective and sustainable. RNs, PCTs, transporters, and rehabilitation staff were all educated for the pilot unit. Alerts, including the numbers of alerts, types of alerts, and levels of escalation, were monitored, and audits were completed. During the pilot trial, staff feedback helped redesign the alerts and escalations, and all technical issues were resolved. Education for the house-wide wireless plan was modified to reflect changes based on the pilot trial.

RESULTS

This QI initiative achieved a 64.8% reduction in bed-related falls and a 37.5% reduction in all falls (Figures 1 and 2).

Caregiver satisfaction surveys revealed overall satisfaction with the wireless technology (Figure 3).
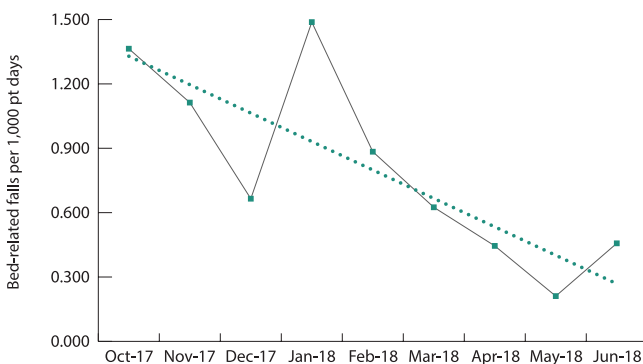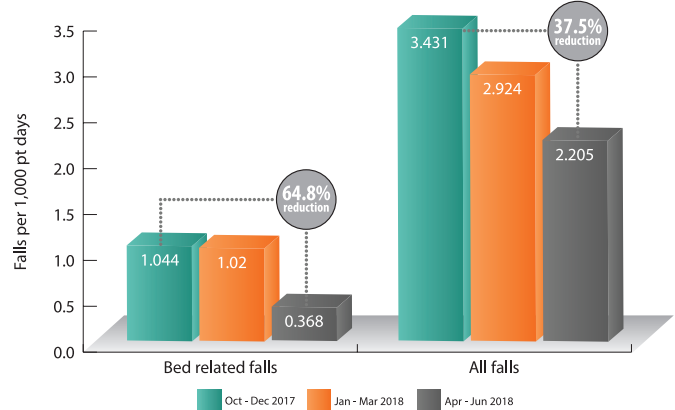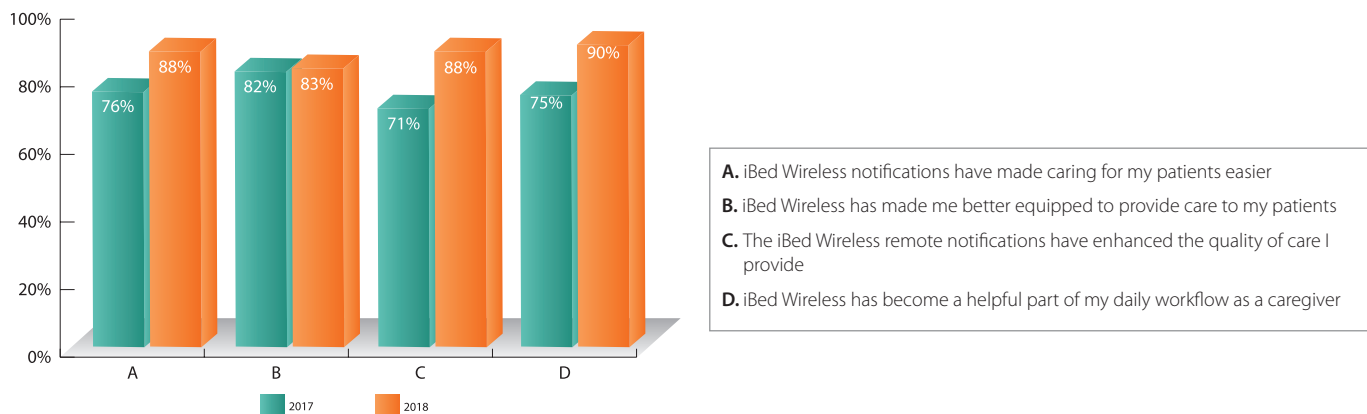
Figure 1. Bed-related falls per 1,000 pt days

Figure 2. Falls per 1,000 pt days

Figure 3. Caregiver satisfaction survey results

A. iBed Wireless notifications have made caring for my patients easier

B. iBed Wireless has made me better equipped to provide care to my patients

C. The iBed Wireless remote notifications have enhanced the quality of care I provide

D. iBed Wireless has become a helpful part of my daily workflow as a caregiver

CLINICAL IMPLICATIONS

- This multifactorial QI initiative resulted in a decrease in bed-related falls.
- Use of wireless technology in conjunction with fall risk-stratified interventions enhanced patient safety and improved staff efficiency.
- The support and guidance of senior leadership was an essential aspect of this successful QI initiative.
- Increased communication and education for patients and families on patient safety and fall risk interventions raised awareness of evidence-based best practices.
- Visual cues were useful, targeted fall prevention interventions for patients and their families.
- Interdisciplinary fall prevention teamwork enhanced collaboration and communications regarding fall prevention interventions.
- Real-time feedback held all members of the team accountable for adhering to best practices for fall prevention.
- The significant input of clinical RNs and PCTs, as well as interdisciplinary fall prevention team collaboration within the continuous QI process, helped ensure team "buy in" to the patient safety call to action.

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