Use of a Wireless Nurse Alert Fall Monitor to Prevent Inpatient Falls

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Abstract

- **Objective:** To describe our experience using the Posey Sitter II wireless nurse call fall monitor to reduce falls among elderly inpatients.
- **Setting:** Three telemetry floors and 1 neurology floor at a 500-bed acute care university-affiliated community hospital in suburban Philadelphia.
- **Methods:** Nurses completed surveys that asked about the occurrence of falls and their opinion about the new alarm system. The number of falls during the intervention period November 2004 through February 2005 was compared with the number of falls from November 2003 through February 2004.
- **Results:** There were 64 falls during the study period and 78 falls during the comparison period, representing an 18% reduction in falls. Most patients who fell were not using a bed alarm. 91% of nurses surveyed thought the bed alarm helped to prevent falls.
- **Conclusion:** Use of the wireless nurse call fall monitor bed alarm was associated with a reduction in falls.

Falls are a common occurrence among elderly inpatients. They have been reported to affect 13% to 32% of admitted patients in rehabilitation settings [1,2] and up to 47% of patients in stroke rehabilitation units [3]. In the nursing home setting, the incidence of falls is approximately 1.5 per bed per year, with 10% to 25% resulting in hospital admission or fracture [4]. In addition to sustaining physical injuries, patients who fall experience psychological consequences [5] and have longer hospital stays [6]. The total direct cost of all fall injuries for people aged 65 years and older in 2000 was more than $19 billion [7].

It is clear that inpatient falls result in substantial morbidity and additional health care costs and need to be prevented. Yet interventions to reduce falls in the hospital have not been well studied. We identified only 4 randomized controlled trials that have been published [8–11]. Two trials investigated single interventions—bed alarms [10] or alert bracelets [9]—in conjunction with usual care. A third trial examined whether leg strengthening exercises or vinyl flooring could prevent falls [8]. None of the studies showed a significant reduction in fall rates, although the sample sizes were relatively small (54–134 participants). One study by Haines and colleagues [11] showed that a targeted, multiple intervention falls prevention program reduced the incidence of falls by 30% in a subacute hospital setting.

A nonrandomized clinical study evaluated the NOC·watch device (Crystal Bay, NV), a credit card–sized device contained within an adhesive patch that can be worn on the thigh continuously for many days. The device sounds an alarm when the patient stands up. A 91% relative reduction in fall rate was found with use of this device compared with the predevice period [12]. Another study involved the use of a pressure-sensitive pad on the patient’s mattress that activated an alarm at the nursing station when the patient rose from the bed. Although the results failed to demonstrate a statistically significant difference between the experimental and control groups, there was a trend toward reduced falls in the experimental group [10].

While our facility has programs in place to reduce the incidence of patient falls, including the use of bed alarms for patients at high risk of falling, nurses are not always able to hear when an alarm sounds due to background noise on the floor or being too far away from a patient’s room. Thus, bed alarms sometimes go unnoticed. In an effort to address this problem, we sought to introduce an alarm system that would alert a nurse of an imminent fall by beeper. We were able to obtain 24 such alarms from the Posey Company (Arcadia, CA), who loaned us 24 Posey Sitter IIs at no cost for the duration of our study. In this article, we report on our evaluation of this alarm system in reducing falls at a 500-bed acute care university-affiliated community hospital in suburban Philadelphia, PA.

Methods

Fall Monitoring System

Three telemetry floors and 1 neurology floor were selected to test the new wireless bed alarm system for the 4-month period November 2004 to February 2005. Each floor received 6 alarms that could be used for any patient identified by the nursing staff to be at high risk for falls.

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The bed alarm system consists of an alarm unit, mattress pad sensor, a wireless transmitter, and a beeper, which is carried by the nursing staff member responsible for the patient. The pressure-sensitive pad is placed between the patient’s mattress and the bed sheet. When the patient tries to sit up, the pressure on the sensor pad is relieved, activating both a bedside alarm and the nurse’s beeper. The alarm announces a previously recorded message (eg, “please stay in bed”). Anyone can record or change the message, thus allowing the announcement to be recorded and heard in the patient’s native language. The beeper is programmed to beep immediately after the person tries to get up as well as to display an informative text message (eg, “2 West 18 out of bed”).

**Data Collection and Analysis**

We collected data about fall occurrences and use of the alarm system from the nursing staff using 2 forms. First, we asked nurses to fill out a fall report form at the same time at which they completed a mandatory hospital incident report. This form asked about circumstances surrounding the fall, the patient’s condition, and whether the alarm system was in use. We also asked nurses with a patient who was using the new alarm system to complete a form at the end of their shift. This form asked about the patient’s condition and the nurses’ experience using the alarm system. Surveys were completed during this 4-month period that the alarm system was being tested.

To assess the utility of the alarm system, we compared the number of falls during the study period with number of falls during the 4-month period 1 year earlier (November 2003–February 2004; **Figure**), which equates to an 18% reduction. If compared with the mean number of falls for the 4 periods for which data were available between January 2003 and April 2004, a 22% reduction is seen (82 falls down to 64).

**Results**

The patient safety department reported 64 falls occurring on the study floors during the 4-month study period. This is in contrast to 78 falls occurring during the same period 1 year earlier (November 2003–February 2004; **Figure**), which equates to an 18% reduction. If compared with the mean number of falls for the 4 periods for which data were available between January 2003 and April 2004, a 22% reduction is seen (82 falls down to 64).

**Figure.** There were 64 falls during the study period compared with 78 falls for the same period 1 year earlier. The average number of falls over the previous 4-month periods for which data were available was 82.
With regard to the location the patients were found in at the time of the fall, we obtained survey data for 36 falls. In 61% of falls, the patient was found on the floor, 25% were found on the floor by the bed, 8% were found in the bathroom, 2% were in the hallway, and 2% were found on the bed.

In addition, the survey asked what the patient was trying to do at the time of the fall. For this question we obtained data for 38 falls. In 21% of falls, patients were transferring from the bed to the bedside commode or to a chair, 21% were trying to go to the bathroom, 18% were too confused to explain, 10% wanted to ambulate, 2% were getting out of bed, 8% gave other reasons (eg, to get a blanket), and for 18% the cause was unknown.

Nurse Experiences with Alarm System
During the study period, there were 49 surveys completed by nurses who had used the alarm system. Not all of the survey questions were answered for each survey; the frequencies we report are relative to the response rate for each question.

Ninety-one percent of respondents thought that the device helped to prevent falls. A low number of false alarms (beeper going off when patient is not really attempting to get out of bed) were reported when the alarm system was being used properly (ie, components not damaged, right side of the sensor pad facing up). We asked about location of the sensor pad, which can be positioned higher or lower along the back of the patient depending on the “sensitivity” desired. Forty-three percent of respondents said the pad was positioned at shoulder level for higher sensitivity and 57% said it was at the buttocks level for lower sensitivity.

A large majority of respondents (80%) said that the patient did not operate the bell call system to ask for help before the bed alarm went off. However, 44% of respondents judged that the patient had the ability to operate it. Among survey respondents, 92% said that their patient had had some degree of confusion, 81% said that the patient had dementia, and 80% had poor mobility. Six of 47 patients (13%) were on a low bed. Regarding the location where the patient was found when the nurse arrived to the room, 32 of the 42 patients (76%) were found on the floor or at the edge of the bed, 4 of 42 patients (10%) were standing at the bedside, and 6 of the 42 patients (14%) were found ambulating. Forty-two respondents reported the location they found the patient in upon responding to an alarm. Thirty-two (76%) were found on the bed or at the edge of the bed, 4 of 42 patients (10%) were standing at the bedside, and 6 of 42 patients (14%) were ambulating.

Discussion
This study is the first that we know of to evaluate the use of the Posey Sitter II with wireless nurse call system in the inpatient setting. In our hospital, we saw an 18% to 22% reduction in falls during the 4 months that we used the alarm system, suggesting possible efficacy of the device in the prevention of falls. A randomized controlled trial is needed to adequately evaluate the efficacy of this alarm system.

An interesting finding of this study is that most patients who fell (87%) were not using a bed alarm. While there were a limited number of bed alarms available (6 per floor), this finding may suggest that health care providers need to be more diligent in identifying patients at risk for falls. Despite educational efforts on all 3 shifts, many nurses indicated that they were unaware of the availability of the alarm system. Had there been greater awareness, there might have been even fewer falls during the study period. In many cases, a patient was given a bed alarm after they had fallen.

In addition, nurses might have known about the availability of the alarm system but chose not to use it because of inexperience or lack of familiarity with its use. However, nurse managers attempted to schedule at least 1 nurse who knew how to use the device on each floor for every shift. Another possible barrier to use of the alarm system may be the amount of time (approximately 10 min) required to program the wireless nurse call system with the patient’s information. Write-in survey responses indicated that this added task was sometimes viewed as burdensome in an already busy nursing schedule. Nonetheless, 91% of the nurses who used the bed alarm believe it helped prevent falls, and the nursing staff overall expressed a positive attitude toward its use.

It should be noted that when the nurses were asked whether the patient was able to operate the call bell system to ask for help, 44% responded that their patients seemed to be able to operate it; however, 80% did not operate the call system to ask for help before the bed alarm went off. This might indicate that the nurses overestimated the patient’s ability to use the call system. On the other hand, despite recommendations to use the nurse call system, many people like to be independent and attempt to get up by themselves.

Not surprisingly, a large percentage of patients fell at night, which emphasizes the need for additional attention during these hours. Patients may try to get up to use the bathroom while under the effects of sleeping pills or diuretics, may experience orthostatic hypotension, or the room might be dark. In addition, there are usually fewer people in the hallways during these hours and fewer nurses on the floors than during the day.

There are several reasons why the decrease in falls may not be due entirely to the use of the alarm system. As seen in the Figure, the fall rate was already trending downward prior to the introduction of the alarm system. This trend undoubtedly reflects the many interventions the hospital introduced during this time period, such as low beds, socks...
that are less prone to slip, and better assessment of fall risk.

In conclusion, use of the Posey Sitter II with wireless nurse call system appears to be effective in the prevention of falls. Further research should be conducted to decrease the occurrence of this adverse event, which is often associated with increased morbidity, particularly in the elderly population.

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References

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