TITLE: Chair Alarms in Residential Care and Acute Care: A Review of the Clinical Effectiveness and Safety

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CONTEXT AND POLICY ISSUES:

Falls are a common occurrence in hospitals and long term care residences, and may result in serious morbidity or even mortality. Chair or bed alarms are one strategy used to prevent falls. These devices consist of pressure sensors or infra-red beams that alert staff when the resident moves. Some guidelines recommend the use of alarms in patients at risk of falls however they may not be suitable for all patients. A recent report on in-hospital slips and falls reported that these devices are not able to prevent falls in patients who are very frail and who fall as soon as they move out of their chair or bed. This report will review recent literature on the safety and efficacy of chair alarms to help inform policy options on the use of these devices.

RESEARCH QUESTIONS:

1. What is the clinical effectiveness of chair alarms for patients in residential care and acute care?
2. What is the safety of chair alarms for patients in residential care and acute care?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, CINAHL, The Cochrane Library (Issue 5, 2010), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI (Health Devices Gold), EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between January 1, 2005 and June 2, 2010. No filters were applied to limit the retrieval by study type. Reference lists were hand searched.

HTIS reports are organized so that the higher quality evidence is presented first. Therefore, systematic reviews are presented first followed by randomized controlled trials.
SUMMARY OF FINDINGS:

The search identified one randomized controlled trial.4 A systematic review was found in the hand search of reference lists.1,5 No health technology assessments, controlled clinical trials, or observational studies were identified.

Information on a randomized trial in progress is listed in Appendix 1.

Systematic reviews and meta-analyses

A systematic review (Oliver et al. 2006)1,5 evaluated strategies to prevent falls and fractures in hospitals and care homes. The authors searched multiple electronic databases for randomized or observational studies on any intervention used to prevent falls. A total of 43 studies met the inclusion criteria, one of which evaluated fall alarm devices. This was a small before and after cross over study in 47 patients living in a nursing home. The study reported that the use of a fall alarm worn on the thigh reduced the number of falls. There was one fall in the intervention period and 28 falls in the historical control period (fall rate: 1.22 versus 13.27 falls per person-year in the intervention and control periods respectively, p<0.05). No data were reported on the number of patients who fell or the number of fractures. The review authors reported that due to the small sample size and the low methodological quality, it was difficult to draw conclusions from the study findings.

Randomized controlled trials

The study by Kwok et al. 2006,4 assessed if the use of bed-chair pressure sensor devices reduced falls and reduced the use of physical restraints among patients admitted to two geriatric rehabilitation wards in a Hong Kong convalescent hospital. A total of 180 patients at risk for falls were randomized to the intervention or usual care groups. Nurses caring for the patients in the intervention group were encouraged to use bed-chair pressure sensor devices in addition to standard fall prevention strategies for their patients. These fall prevention strategies included a fall risk sign at the bedside, encouragement to use the call bell when mobilizing, increased nursing supervision, and if necessary, use of physical restraints. The pressure sensing mat used in the study was designed locally. When the patient moved off the sensor mat, an alarm sounded at the nursing station and a light flashed in the patient’s room after a two second delay. Research staff observed if patients were using the pressure sensor mats and the incidence of falls was collected from medical records. Patients were followed for the duration of their hospital stay.4

The average age of patients was 77 years, 51% were male, 68% had a history of stroke, and 50% had dementia.4 Of the 90 patients in the intervention group, 50 (56%) used the pressure sensor mats. These patients were more likely to have cognitive impairment or dementia than the 40 patients in the intervention group who did not use pressure mats. The main reasons why mats were not used were as follows: patient was cooperative (75%), patient was immobile (10%), or there was no perceived need (7.5%). The number of falls was similar between groups. A total of 7 patients suffered a fall, 3/90 (3.3%) in the control group and 4/90 (4.4%) in the intervention group. In the intervention group, 3/50 (6%) patients who had a fall, had used the sensor mats, compared to 1/40 (2.5%) of patients who did not use mats. These differences in the incidence of falls were not statistically significant. The number of patients harmed by the fall...
was not reported. The authors concluded that there was no difference in the chance of having a fall, or the use of restraints, among patients using bed-chair pressure sensors with alarms, compared to usual care.

Limitations

The systematic review\(^1\)\(^5\) included one before and after study that evaluated fall alarm devices. This study was limited by the small sample size and the use of retrospective control period. The review authors stated the study was of low methodological quality.

In the randomized trial by Kwok et al.,\(^4\) only 56% of patients randomized to use the pressure sensor mats actually used the device. These patients had a different risk of falls and were more likely to have dementia or cognitive impairment, than the patients who did not use mats. There were no standard criteria to determine which patients were at risk of falls and therefore eligible for the study.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

One randomized controlled trial was found that evaluated the use of chair alarms to prevent falls. This study found no difference in the incidence of falls among patients using the bed and chair alarms, compared to usual care. No conclusions can be drawn from a second study included in the systematic review that evaluated a fall alarm worn on the patient’s thigh.

No studies were found that evaluated the safety of chair alarms.

There is little evidence available on chair alarms to guide decisions regarding the use of these devices for the prevention of falls.

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APPENDIX 1: Additional studies of interest


BACKGROUND: Falls in hospitals are common, resulting in injury and anxiety to patients, and large costs to NHS organisations. More than half of all in-patient falls in elderly people in acute care settings occur at the bedside, during transfers or whilst getting up to go to the toilet. In the majority of cases these falls are un witnessed. There is insufficient evidence underpinning the effectiveness of interventions to guide clinical staff regarding the reduction of falls in the elderly inpatient. New patient monitoring technologies have the potential to offer advances in falls prevention. Bedside sensor equipment can alert staff, not in the immediate vicinity, to a potential problem and avert a fall. However no studies utilizing this assistive technology have demonstrated a significant reduction in falls rates in a randomised controlled trial setting.

METHODS/DESIGN: The research design is an individual patient randomised controlled trial of bedside chair and bed pressure sensors, incorporating a radio-paging alerting mode to alert staff to patients rising from their bed or chair, across five acute elderly care wards in Nottingham University Hospitals NHS Trust. Participants will be randomised to bedside chair and bed sensors or to usual care (without the use of sensors). The primary outcome is the number of bedside in-patient falls. DISCUSSION: The REFINE study is the first randomised controlled trial of bedside pressure sensors in elderly inpatients in an acute NHS Trust. We will assess whether falls can be successfully and cost effectively reduced using this technology, and report on its acceptability to both patients and staff.