Ensuring Evidence-Based Practices for Falls Prevention in a Nursing Home Setting

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Objective: To evaluate the effectiveness of an ad hoc multifaceted program to improve structure, professional behavior, and outcomes related to falls prevention.

Design: Internal quality improvement cycle.

Setting: Nursing home in Spain.

Participants: An institution with 130 residents.

Intervention: Local building of quality criteria, audit and feedback, and a specific intervention to improve based on educational and sensitization activities and changes in the process and recording systems.

Measurement: Quality of falls prevention was assessed using reliable evidence-based criteria (4 of structure and 9 of process), at baseline and 6 months after a specific intervention to improve. Number of falls was recorded in a random sample (n = 60) of residents (≥65 years) during a 1-year follow-up and summarized fortnightly as an indicator analyzed using a statistical control chart.

Results: Baseline structure and fall prevention practices were poor. After the intervention, all structure criteria were present and 8 of 9 process criteria improved significantly. Thirty-two falls occurred 6 months before and 21 after the intervention started, showing a significant decrease in the fortnightly incidence ($P < .01$).

Conclusions: Adherence to evidence-based recommendations was poor in our setting, but the internal quality improvement cycle was useful in ensuring safe practices and in achieving better outcomes. (J Am Med Dir Assoc 2011; – – – –)

Keywords: Quality improvement; falls prevention; nursing homes

There is currently ample evidence on falls prevention in nursing homes. Meta-analyses of randomized controlled trials have shown that multifactorial intervention programs involving a multidisciplinary team are effective in reducing both the risk and the rate of falls. Based on this knowledge, several international organizations recommend better organization and clinical practices directed toward prevention.

However, it has been suggested that both poor safety culture in nursing homes and the need for effective interdisciplinary activities hinder the successful implementation of this body of evidence. We do not know to what extent this new health technology is currently being implemented in clinical practice or whether it is effective outside the experimental environment. The general lack of valid and reliable measures of structure and process related to patient safety is likely delaying the closing of this knowledge gap.

The quality improvement (QI) cycle is a useful multifaceted tool to translate evidence-based knowledge into practice. It has been shown to be effective in changing professional behavior in industrial and service sectors, but there are few studies applying it to falls prevention. Additionally, even though these studies consistently report safe practice failures at baseline, their results are generally nonconclusive in relation to the effectiveness of the quality improvement cycle both in improving falls prevention practices and particularly the outcomes thereof (rate of falls).

Understanding the mechanisms of success and resolving the uncertainties arising in these studies is important, because each failure in falls risk management (structure, process or outcome) is a likely preventable safety incident, which increases the probability of potential harm to patients.
Within this context, the purpose of this article was to describe and analyze the implementation of a proactive safety improvement initiative consisting in an internal QI cycle aimed to ensure safe practices for falls prevention in a nursing home. The specific objectives were (1) to know current compliance with selected evidence-based safe practices related to falls prevention; and (2) to assess the effectiveness of an internal approach to improve falls prevention practices and their outcomes.

METHODS

Setting and Design

The QI cycle reported in this article was performed in a nursing home located in a region of Spain (N = 130 residents; mean age: 81.6 years; 58.4% women). The QI cycle model implemented includes an internal consensus process on the appropriate evidence-based practices, audit and feedback, and design and implementation of specific interventions to improve quality.14

Local Consensus of Quality Criteria and Measures

After a qualitative analysis of the problem (using a cause-and-effect diagram) and an extensive literature review on the causation and prevention of falls in nursing home settings (including randomized controlled trials and practice guidelines), 5 staff representatives and 1 quality management expert in the health services area defined and adopted evidence-based quality criteria and their corresponding measures (October–December 2007). A total of 16 measures were developed and further analyzed for validity and reliability. Three were rejected by group consensus for being unrealistic in the current facility context (they were related to “prescription of vitamin D,” “use of hip protectors,” and “environmental hazard reduction”).

The 13 criteria eventually defined are based on multifactorial interventions provided by a multidisciplinary team,1–3 and were considered to have satisfactory face and content validity. An external physical therapist piloted the measures for reliability using a test-retest design (2-week interval) and calculating the kappa coefficient (n = 20). In the process of pilot testing, one of the measures was redefined to improve its reliability (kappa was not good enough). Four criteria are related to structure (having in place guidelines for falls prevention; presence of a falls risk assessment tool; presence of a gait and balance assessment tool; and existence of specific material for falls prevention such as canes, walkers or wheelchair, and bedrails). The other 9 are process criteria measured as percentage of cases in compliance (performance of falls risk assessment; gait and balance assessment; orthostatic hypotension assessment; eyesight evaluation; medical assessment after a fall; correct recording of relevant fall characteristics; review of medication currently taken by the patient; strength and balance training; and review of assistive devices).

Quality Measurement

All criteria were measured twice: at baseline and 6 months after the intervention was implemented to improve baseline quality. Compliance with process criteria related to assessment of risk were assessed in 2 (before and after the intervention) cross-sectional random samples of medical records from the 127 residents that could walk 5 meters independently. Patients at risk were targeted to evaluate the criteria related to strength and balance training and review of assistive devices. Finally, the process criteria related to recurrent falls prevention were evaluated in all residents with a history of falls in the previous year. All measurements were performed by an external and independent physical therapist.

Falls occurrences in a randomly selected cohort of 60 residents were recorded by the staff using an ad hoc registry during a 1-year period encompassing 6 months before and 6 months after the intervention for improvement was implemented. Fortnightly aggregated number of falls was used as the key outcome indicator to analyze the effectiveness of the improvement in prevention. The definition of fall was the same used by Tinetti et al.15

Intervention to Improve

A specific intervention was planned to address the quality gaps found at baseline evaluation. Strategies were designed and approved by the stakeholders involved in the intervention process. The intervention was organized using an affinity diagram in 3 groups:

(1) Changes in registration systems: inclusion of orthostatic hypotension assessment in the overall geriatric assessment; inclusion of a reminder in the falls registry indicating that a medical assessment after a fall should be made immediately; and putting together falls risk and gait-and-balance assessment tools.

(2) Education and sensitization of health personnel: aimed at modifying the culture of safety and falls prevention, with five 1-hour multidisciplinary meetings. The objectives were to review the causes of falls, raise awareness, and emphasize the relevance and validity of the quality criteria adopted, in addition to emphasizing the importance of recording the incidents and the nonpunitive nature of the activities. Bimonthly meetings were also conducted to solve problems and review the criteria adopted.

(3) Work organization: implementation of a modified guideline on falls risk management, indicating the responsibilities of each professional; changing the location of the falls registry, for easy access; introduction of assessment campaigns of all residents (falls risk, gait, and balance, postural hypotension, and so forth).

Data Analysis

For process criteria, estimates of compliance were calculated with exact binomial 95% confidence intervals (95% CI). To analyze the effect of the intervention, absolute and relative improvement of criteria compliance were estimated. Differences in compliance before and after the intervention were tested for statistical significance calculating the z value (1 tail) for the alternative hypothesis of existence of improvement, which is accepted when the probability of the null hypothesis is P < .05.
The sample size was small for some of the criteria, particularly in the first evaluation, even though we evaluated all available cases at the time of the assessment. This occurred with sequential criteria, where cases for subsequent criteria are compliance cases of a precedent criterion. In any case, the sample of these criteria only limits the accuracy of the estimates of compliance, but not the positive result of the hypothesis test related to the existence of improvement.

The evolution of the fortnightly number of falls was analyzed with a statistical process control chart to identify significant trends \( P < .01 \) before and after the intervention. The chart was constructed and analyzed using SPSS, version 15.0 (SPSS Inc., Chicago, IL).

RESULTS

At the baseline assessment, the institution met 3 of the 4 structure criteria. The falls risk assessment tool was the Downton Index, 16 and gait and balance were evaluated by Performance-Oriented Mobility Assessment. 17 The facility had prevention devices (walkers, canes, wheelchairs, and bedrails). However, the institution did not meet the criterion “having in place guidelines for falls prevention,” because, even though a document existed, it was neither known nor used by the nursing home staff. Compliance with process criteria was generally poor (Table 1). The most problematic criteria were “orthostatic hypotension assessment” (0%; 95% CI 0–6), “review of assistive devices” (0%; 95% CI 0–31), and “strength-and-balance assessment” (10%; 95% CI 8–29). Only one criterion had an acceptable compliance (“correctly recording fall characteristics” 84%; 95% CI 71–94).

After the intervention, all structure criteria were present and all process criteria improved significantly, except the “eyesight evaluation” criterion (Table 1). Relative improvements were most prominent in “correctly recording fall characteristics” (100%; \( P = .026 \)), “falls risk assessment” (96%; \( P < .001 \)), and “gait-and-balance assessment” (83%; \( P < .001 \)). There were 53 falls in 1 year, 32 in the 6 months before the intervention, and 21 in the 6 months after. Variation in the fortnightly number of falls is analyzed in the control chart represented in Figure 1. According to the rules of statistical control, the second half of the chart shows a pattern of significant decrease \( P < .01 \).

DISCUSSION

This study provides information on the feasibility of improving the implementation of evidence-based safe practices for falls prevention in nursing homes. They were poorly implemented at baseline, but the internal, ad hoc, QI cycle significantly improved the quality of care, and achieved better outcomes (lower falls rate). Previous studies in similar settings also showed improvement in health care quality (structure and process), but to a lesser extent than in ours. 10,12 Our greater success is likely a result of 2 main factors.

First, baseline compliance levels provided wide room for improvement, whereas the managers and staff of the facility thought that their prevention level was adequate. The unsatisfactory result of the assessment was used in the educational program to sensitize staff on the need for change. Second, the
improvement may have benefited from the advantages of quality management using an internal approach.\textsuperscript{18,19} The quality measures constructed were considered valid, realistic, and measurable by the health care professionals, who also agreed with the intervention designed. This active involvement may have been essential to ensure adherence of the professionals and to overcome resistance to change.\textsuperscript{18}

We did not design to evaluate, but rather evaluated to design. This approach allowed a specific intervention for the particular needs of the institution. In contrast, Colón-Emeric et al\textsuperscript{10} achieved only a slight improvement in 36 nursing homes in North Carolina, likely because of the disadvantages of the external approach of their program. Although they trained representative stakeholders, the quality indicators used and the intervention plan were not designed with them. Considering the complexity of multifactorial interventions,\textsuperscript{1,3} this could have caused some disagreements in the centers and professionals concerning the relevance of the program adopted, and it may have hindered their level of improvement.\textsuperscript{9}

On the other hand, we found that the implementation of the modified process was successful in reducing the falls rate, a key fall-related safety outcome. This result suggests that the selection and number of criteria adopted were appropriate. Moreover, it confirms the effectiveness of the evidence-based recommendations in this “real world setting.”

Some previous studies did not detect a reduction in falls after implementing a quality program to improve prevention practices.\textsuperscript{10,12} In our opinion, this may have been because of, among other possible factors, the failure to improve a number of quality criteria\textsuperscript{10} or because of the use of statistical tools not powerful enough to identify significant changes.\textsuperscript{12} As an example and in relation to the latter aspect, Rask et al\textsuperscript{12} detected significant QI in falls prevention but not in the rate of falls, although the reported incidence curve was very similar to ours. However, looking at their data, if they had monitored the fortnightly falls incidence using the statistical control chart approach, they would have detected the same significant falls reduction that we identified in our study. It is noteworthy that in spite of the great potential of statistical control charts for process analysis and quality management, they are far from being routinely used in health services.\textsuperscript{20}

Because of the wide variability in nursing homes (eg, characteristics of the residents, staff, environment, prevention infrastructure), extrapolating the results of this case report to other institutions may be questioned. However, our data provide a rather new and promising approach to solving one of the most important problems affecting nursing home residents. Consequently, it may be reasonable to recommend that the methodology described here be tested in other centers.

The decrease in the number of falls was statistically significant, albeit still improvable. Further improving this and other outcomes is a challenge; however, after current criteria are stabilized, others can be established (eg, “reduction in environmental hazards”) to continuously improve the process and to enhance outcomes. In addition, future studies can quantify the falls rate in a parallel control cohort to ensure that the variation of this indicator is not attributable to factors unrelated to the intervention (eg, adaptation of the residents to their environment).

In conclusion, we found that adherence to evidence-based recommendations was poor in our setting, but an internal QI cycle was useful in ensuring safe practices and in decreasing the number of falls. This result demonstrates the relevance of evaluating and improving falls prevention in nursing homes, in addition to confirming the effectiveness of the practices recommended. The 3 main methodological lessons demonstrated in our project are the following: (1) Falls prevention outcomes can be monitored by analyzing the fortnightly falls incidence using statistical control charts. (2) To start a QI initiative it is preferable to evaluate rather than design, because this sequence allows institutions to design specific interventions focused on the particular gaps identified in the baseline evaluation. (3) Behavioral changes are more feasible when quality improvement has an internal rather than an external focus and institutions define realistic criteria and interventions. As R.H. Palmer states, “from the outside we can evaluate, but internally we can evaluate and improve.”\textsuperscript{21}

\textbf{REFERENCES}


\begin{figure}[h]
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\includegraphics[width=\textwidth]{fig1.png}
\caption{Fortnightly number of falls before and after the intervention. UCL, upper control limit; LCL, lower control limit. *Eight successive points below the mean.}
\end{figure}


