

Measures and effects on prevention of fall: the role of a fall working group at a university hospital

Kazuyoshi Kobayashi¹, Kei Ando¹, Yuko Inagaki², Yusuke Suzuki³, Yoshimasa Nagao², Naoki Ishiguro¹ and Shiro Imagama¹

¹Department of Orthopedic Surgery, Nagoya University Graduate School of Medicine, Nagoya, Japan

²Department of Quality and Patient Safety, Nagoya University Hospital, Nagoya, Japan

³Centre for Community Liaison and Patient Consultations, Nagoya University Hospital, Nagoya, Japan

ABSTRACT

Fall in hospitalized patients can cause trauma and fractures, which can reduce ADL and QOL, whereas prevention of fall decreases medical expenses. The purpose of this study is to examine prevention of fall due to intervention from a fall working group established in our hospital. The working group focused on three main points. First, colored wrist bands for patients classified as grade 3 risk for fall are used to alert medical staff. Second, information on fall prevention was distributed to patients. Third, standardization of two bed fences and reduced use of slippers for inpatients have been introduced. We investigated falls during hospitalization for 5 years from April 2012 to March 2017. The risk of fall was evaluated as grade 1 (mild) to grade 3 (severe) using an assessment sheet developed by the working group. The incidence of fall decreased over time, with a significant decrease from 2.1% in 2012 to 1.3% in 2016 ($p < 0.01$). Slipper use in fall cases showed a significant decrease from 45.8% in 2012 to 11.0% in 2016 ($p < 0.01$). Among all falls, the percentage of cases with fall risks grade 1 and 2 decreased, while that for grade 3 risk increased from 32.0% in 2012 to 40.3% in 2016 ($p < 0.05$). These results support the efforts of the fall working group have reduced the overall incidence of fall. However, fall in patients with grade 3 risk has not decreased, which suggests that better sharing of information is needed for patients at high risk for fall.

Keywords: elderly patients, fall, fall working group, hospitalization, prevention

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INTRODUCTION

Japan has become a superaging society and the rate of elderly hospitalized patients is increasing. Injuries and falls in hospitalized patients cause trauma and fractures, which greatly affect activities of daily living (ADL) and quality of life (QOL)¹. Patient safety is the most important issue in medical institutions, and falls are among the major categories of medical accidents^{2,3}. Falls require additional examination and treatment, which extends the length of hospitalization, increases medical expenses, and may lead to lawsuits⁴⁻⁶. Therefore, prevention of fall is an important issue for medical safety.

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Corresponding author: Shiro Imagama, M.D.

Department of Orthopedic Surgery, Nagoya University Graduate School of Medicine

65 Tsurumai-cho, Showa-ku, Nagoya 466-8550, Japan

Phone: +81-52-744-1908, fax: +81-52-744-2260, e-mail: imagama@med.nagoya-u.ac.jp

Our institution is an advanced treatment hospital and emergency medical center with 1,035 beds, an annual outpatient number of 590,000 (an average of about 2,400 a day), an occupancy rate of about 90%, and an average hospital stay of about 13 days. In 2002, we founded the Department of Quality and Patient Safety at the hospital, and this department now has 22 persons, including full-time professors, full-time doctors, nurses, pharmacists, lawyers, information management technicians, and administrative staff. As an approach to fall, the department established a fall prevention working group consisting of doctors, nurses, physiotherapists, pharmacists, information management technicians, and administrative staff. This group meets every three months and emphasizes prevention of fall, verification of fall cases, evaluation and analysis of fall risk, manual development, and training of staff.⁷⁻⁹⁾ The purpose of this study is to examine the efforts and results of prevention of fall due to interventions made by this working group.

MATERIAL AND METHODS

There were a total of 212,617 inpatients in all wards in our hospital from April 2012 to March 2017. Incidents of fall were examined prospectively using a database in the hospital event reporting system. In our institution, a clinical error or event is submitted as an incident or event report, regardless of whether it results in harm to a patient. A web-based reporting system is used to maintain anonymity and produce a blame-free system. All reports are submitted to the medical safety management office for analysis. A fall was defined as an involuntary change of posture whereby a patient ended up lying on the floor. An adverse event was defined as any fracture or life-threatening injury. A case requiring suturing of a wound was excluded if not accompanied by fracture. All patients with a fall were subsequently followed up until discharge.

For assessment of fall risk, we used a fall risk score that was originally developed by the fall working group. This score was evaluated routinely on admission, in each week of hospitalization, at the time of a fall, and as the medical condition changed. The risk was determined using a fall assessment score sheet comprising 33 items, including age, history of fall, ADL, and cognition (Table 1). The sum of the scores for these items served as the risk score. Patients were classified as grade 1 (low risk), grade 2 (moderate risk), and grade 3 (high risk) based on scores of 0-5, 6-15, and ≥ 16 and including at least one of all the major items, respectively. Demographic data (incidence of fall, sex, and age), fall risk score, and adverse events (an injury due to fall that required any treatment) were obtained from the database. In figures showing annual data, the label "2012" covers the period from April 2012 to March 2013, and similarly for subsequent years.

The working group performed three major types of intervention. First, as a warning to medical staff on wards, colored wrist bands were issued for patients classified in fall risk grade 3 (Figure 1). Second, information on fall prevention was provided to patients using DVDs, pamphlets, and a self-check list. Third, to address fall risk factors, standardization of two bed fences and prohibition of use of slippers were introduced for inpatients. The working group met every three months to review progress on these interventions.

The protocol of this study was approved by the Ethics Committee of Nagoya University Graduate School of Medicine.

Statistical analysis

Differences between two groups were analyzed by Student t-test, and those among three groups were analyzed by Kruskal-Wallis test. All analyses were conducted using SPSS ver. 23 for Windows (IBM Inc., Chicago, IL), with $p < 0.05$ considered to be significant.

Fall prevention in a university hospital

Table 1 Risk assessment score sheet.

Assessment	Yes	No
Past history		
History of fall	1	0
History of syncope	1	0
History of convulsions	1	0
Impairment		
Visual impairment	1	0
Hearing impairment	1	0
Vertigo	1	0
Mobility		
Wheelchair	1	0
Cane	1	0
Walker	1	0
Need assistance	1	0
Cognition		
Disturbance of consciousness	1	0
Restlessness	1	0
Memory disturbance	1	0
Decreased judgment	1	0
Dysuria		
Incontinence	1	0
Frequent urination	1	0
Need helper	1	0
Go to bathroom often at night	1	0
Difficult to reach the toilet	1	0
Drug use		
Sleeping pills	1	0
Psychotropic drugs	1	0
Morphine	1	0
Painkiller	1	0
Antiparkinson drug	1	0
Antihypertensive medication	1	0
Anticancer agents	1	0
Laxatives	1	0
Dysfunction		
Muscle weakness	1	0
Paralysis, numbness	1	0
Dizziness	1	0
Bone malformation	1	0
Rigidity	1	0
Brachybasia	1	0

Note: Patients were classified into three groups: Grade 1 (low risk), Grade 2 (moderate risk), and Grade 3 (high risk) based on total scores of 0-5, 6-15, and ≥ 16 and including at least one item in each category, respectively.



Fig. 1 Wristband with a specific color used to show a high risk for fall.

RESULTS

Patient demographics are shown in Table 2. There were fall incidents involving 3,925 patients (2,221 males and 1,704 females) among 212,617 admissions over 5 years, giving a fall rate of 1.85% (3,925 / 212,617). Most patients (45.0%) were in grade 3 based on the fall risk score, and fall was most common in patients with neurological disease as the main primary disease, followed by gastroenterological, ophthalmological, and respiratory disease. Adverse events occurred in 60 patients, giving an incidence of adverse events caused by fall of 1.5% (60/3925). Most falls involved patients in their 70s, followed by patients in their 60s and 80s (Figure 2).

The incidence of fall by year is shown in Figure 3. There was a decrease over time and a significant decrease over 5 years from 2.1% in 2012 to 1.3% in 2016 ($p < 0.01$). The rates of footwear types in fall patients over 5 years are shown in Figure 4. Slipper use in fall cases showed a significant decrease from 45.8% in 2012 to 11.0% in 2016 ($P < 0.01$). The incidence by grade is shown in Figure 5. The percentage of fall in cases with risk grades 1 and 2 decreased, while that for risk grade 3 patients increased from 32.0% in 2012 to 40.3% in 2016 ($p < 0.05$).

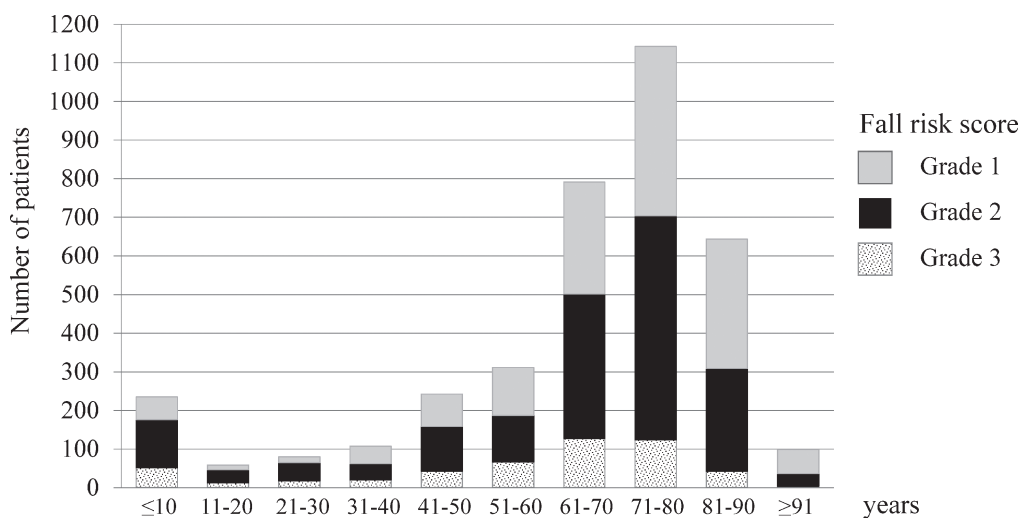
DISCUSSION

With aging of the population, hospitalization for elderly people has increased in many acute-care hospitals. In addition to aging, fall during hospitalization may occur due to drugs for Parkinsonism, psychotropics and diuretics, cognitive deterioration, reduced ADL, frail, and sarcopenia.

Several approaches to prevention of fall were used by the working group. First, information on prevention was provided to patients using DVDs, pamphlets, posters showing “dangerous movements”, and guidance using a self-check list on the ease of fall to promote behavior changes and increase understanding of fall prevention behavior. Second, the importance of fall prevention was disseminated to medical staff. We use various medical safety training posters and meetings in which many staff members participate and at which we share data on safety initiatives. Working group members accompany hospital ward nurses, consider risk assessment and countermeasures, and notify the ward of the results. The color-coded indication of the risk of fall on the patient’s wrist band, especially the use of yellow wrist bands for patients with a grade 3 risk, is important. In addition, display of precautionary measures was standardized in the electronic medical record and these measures were also displayed on a bed side tag to emphasize the danger of fall.

Table 2 Demographics and characteristics of fall cases.

Variable	n=3,925
Incidence of fall	1.85% (3,925/212,617)
Demographic	
Age	62.8 (3-94)
Sex (M/F)	2,221/1,704
Fall risk score	
Grade 1	431 (10.9%)
Grade 2	1,727 (44.0%)
Grade 3	1767 (45.0%)
Primary disease	
Neurological	1,060 (27.0%)
Gastroenterological	746 (19.0%)
Ophthalmology	451 (11.4%)
Respiratory	275 (7.0%)
Orthopedics	230 (5.9%)
Cardiac	222 (5.6%)
Pediatrics	208 (5.3%)
Otolaryngology	176 (4.5%)
Gynecology	151 (3.8%)
Others	406 (10.3%)
Footwear	
Shoes	1,853 (47.2%)
Slippers	901 (22.9%)
Others	1,171 (29.8%)
Adverse event	60 (1.5%)

**Fig. 2** Bar graph showing the patient population stratified by age.

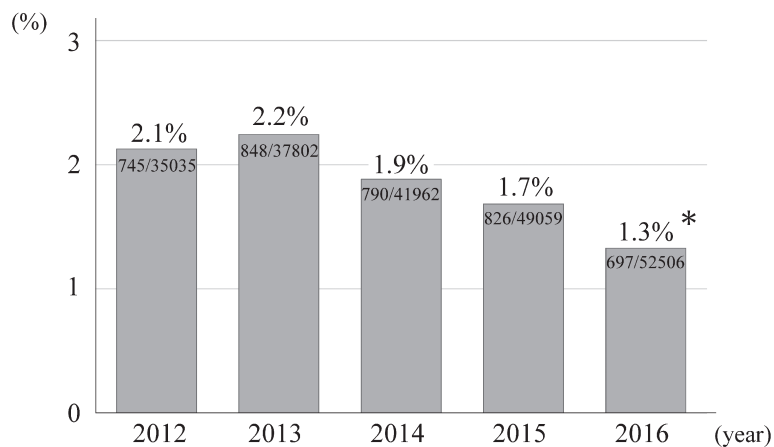


Fig. 3 Trend of fall incidence during the study period.
* $p < 0.01$ for 2012 vs. 2016.

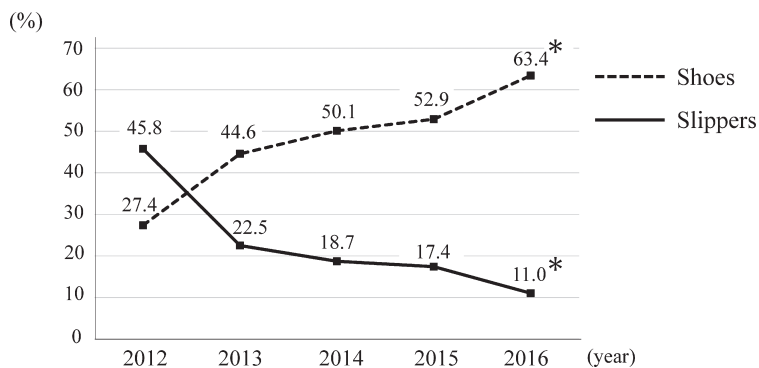


Fig. 4 Trends in footwear in fall cases during the study period.
* $p < 0.05$ for 2012 vs. 2016.

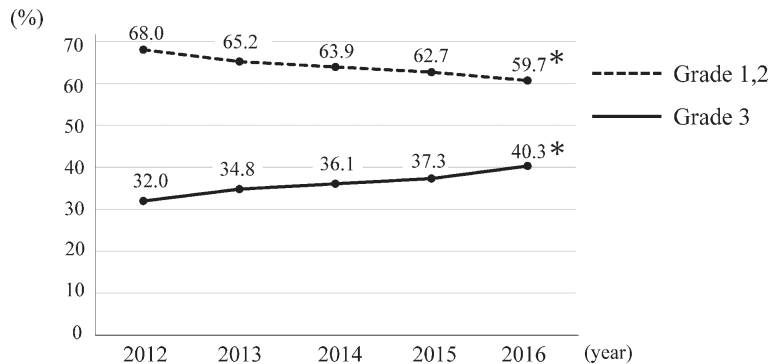


Fig. 5 Trends in fall risk score in fall cases during the study period.
* $p < 0.01$ for 2012 vs. 2016.

The third approach involved changes in risk factors for fall. For prevention of fall around the bed, environmental improvements, footwear changes, and other actions to be taken by the patient were used. Bedside movement was improved by standardization of two bed fences. Use of an appropriate bedside sensor may also be useful. Efforts during rehabilitation included introduction of flexible belts. Thus, even if the patient unexpectedly loses posture, the physiotherapist can lift the belt to prevent fall, and wearing of the belt itself causes awareness of the risk of fall. Slippers were discouraged because they are associated with a high risk of fall, and use of footwear with heels was encouraged. This was a particularly important initiative because we have shown that use of slippers increases the rate of severe cases of fall.^{7,8)} Slippers were not completely prohibited, but reduction of their use reduced the incidence of fall.

We also used a risk assessment sheet to evaluate the risk of fall. We have previously reported that the incidence of serious accidents rises in grade 3 patients with a high risk of fall^{7,8)}, however, even in patients with a low risk grade, cases of fall may occur. In our series, the total number of falls decreased, but the proportion of grade 3 cases increased. Thus our efforts seem to have been effective for grade 1 and 2 cases, which led to an overall decrease in fall, but the measures were insufficient for grade 3 patients, and prevention of fall in these patients may require further measures. For high-risk hospitalized patients, active exercise, behavior assistance and guidance that reflect individual patient characteristics may be important. Intervention by a physiotherapist for high-risk patients may also improve medical care.

There are several limitations in this study, including the difficulty of evaluating whether the efforts of the fall working group are directly associated with the decrease in fall, since various factors may have contributed to the decrease in the number of falls over the last few years. Also, we did not consider cognitive function through evaluations such as the Mini-Mental State Examination or Functional Balance Scale. However, this is the first report on initiatives to prevent fall at a university hospital, and the first to provide evidence of the effectiveness of a working group for fall prevention.

In summary, due to the efforts of the fall working group, the incidence of fall has decreased over time in our hospital. Initiatives to reduce use of slippers, which are associated with a high risk of fall, resulted in a reduction in the fall rate. However, the percentage of fall cases among patients with a grade 3 risk has not decreased, and we believe that it is necessary to share information on fall with patients at high risk. Fall prevention is an advanced safety technique and the working group is continuing to improve methods for prevention.

DISCLOSURE STATEMENT

The authors declare no conflict of interest.

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