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## Journal of Geriatric Oncology



## Risk factors and characteristics of falls among hospitalized adult patients with hematologic diseases

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## ARTICLE INFO

## Article history:

Received 28 January 2017

Received in revised form 10 May 2017

Accepted 6 July 2017

Available online xxxxx

## Keywords:

Fall

Fall-related injury

Hematologic disease

Chemotherapy

Allogeneic hematopoietic cell transplantation

Anemia

Thrombocytopenia

Older

## ABSTRACT

**Objectives:** Falls and fall-related injuries are major problems in hospitals. In hematologic patients, both disease and its treatment, including chemotherapy and allogeneic hematopoietic cell transplantation (allo-HCT), can cause anemia, febrile neutropenia, and bleeding tendency, which may result in falls and fall-related injuries.

**Materials and Methods:** We retrospectively analyzed 397 consecutive admissions to the hematology unit at our institute which included 201 adult patients with hematologic disease.

**Results and Conclusions:** A total of 56 fall events were observed in 43 patients, and the incidence of falls was 2.49 per 1000 person-days. The median hemoglobin, platelet, and serum albumin levels prior to fall events were 8.65 g/dl (range, 6.3–12.7),  $38 \times 10^9/l$  (range, 7–454), and 2.85 g/dl (range, 1.6–4.3), respectively. Despite the presence of thrombocytopenia among the majority of patients who fell, no serious injury was observed. Multiple variable logistic regression analysis demonstrated that age older than 65 years (hazard ratio [HR], 2.86; 95% confidence interval [CI], 1.17–6.99,  $P = 0.02$ ), admission for allo-HCT (HR, 9.48; 95% CI, 3.35–26.80,  $P < 0.001$ ), hypotonic medication (HR, 3.57; 95% CI, 1.56–8.20,  $P = 0.002$ ), urinary or intravenous catheter placement (HR, 2.34; 95% CI, 1.08–5.09,  $P = 0.03$ ), and hypoalbuminemia (HR, 2.30; 95% CI, 1.07–4.96,  $P = 0.03$ ) were significantly associated with increased fall risk. These findings indicated that special attention should be paid to patients with such risk factors during their treatment.

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### 1. Introduction

Falls and fall-related injuries are major problems in hospitals for both inpatients and outpatients. Approximately one-third of persons aged older than 65 years fall at least once a year [1–3]. Approximately one-tenth of the falls result in serious fall-related injuries including hemorrhages, fractures, dislocations, and head injuries [1–3]. Several factors, such as age, gender, race, comorbidities, physical and psychosocial functions, and medications, have been shown to increase the risk of falls [1–3]. These fall risk factors have been confirmed in studies among both the general population and older patients [1–3]. Additionally, several studies have shown that fall events are more common in older patients with cancer than in those without it [4,5], and both general and specific risk factors have been identified for falls in patients with cancer [5–7]. However, most of these reports have been based on older patients with advanced solid cancers or in a palliative care setting [4–10].

In patients with hematologic disorders, both disease and its treatment, including high-intensity chemotherapy and allogeneic hematopoietic cell transplantation (allo-HCT), can cause anemia, febrile neutropenia, and bleeding tendency, which may result in falls and fall-related injuries. However, studies regarding falls and fall-related injuries in patients with hematologic diseases have been limited [11–16]. Therefore, to examine the characteristics of falls and risk factors for falls in hospitalized adult patients with hematologic disease, we retrospectively analyzed 397 consecutive admissions to the hematology unit at our institute.

### 2. Materials and Methods

#### 2.1. Data Collection

This retrospective study included 397 consecutive admissions to the hematology unit at the Institute of Medical Science, The University of Tokyo, between April 2013 and March 2016. In all patients, the purpose of admission was the treatment or evaluation of hematologic diseases and their complications. The baseline patient and treatment characteristics were collected from medical records at the time of admission. Admission information included age, gender, body weight,

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body mass index, disease type, treatment type for admission, fall history within 6 months prior to admission, use of a walking aid (cane or wheelchair), hypnotic medication, non-opioid analgesic medication, opioid analgesic medication, body temperature  $\geq 38.5^\circ\text{C}$ , urinary or intravenous catheter placement, comorbidities of hypertension and diabetes mellitus, and laboratory data, including hemoglobin, platelet, and serum albumin levels. As for comorbidities, one patient had hemiparesis due to stroke, and one patient had chronic renal failure on hemodialysis. However, no patients had moderate to severe cardiac, pulmonary, hepatic, and renal diseases, and active solid tumor in our cohort. The most common comorbid conditions were hypertension and diabetes mellitus. Therefore, these two comorbidities alone were evaluated for risk factors for falls. At the time of admission, each

patient was interviewed with a structured questionnaire, including the information, conducted in the form of interview by both nurses and doctors.

A fall was defined as "inadvertently coming to rest on the ground, floor, or other lower level, excluding intentional change in position to rest on furniture, walls, or other objects," according to the definition of the World Health Organization [17]. Fall events were identified by the hospital's incident report system. Information about fall events included location, time, catheter placement, use of an infusion pump, body temperature, and injuries after the fall event. Levels of hemoglobin, platelet, and serum albumin within 2 days of the fall event were also included. This retrospective study was approved by the institutional review board of the Institute of Medical Science, The University of Tokyo.

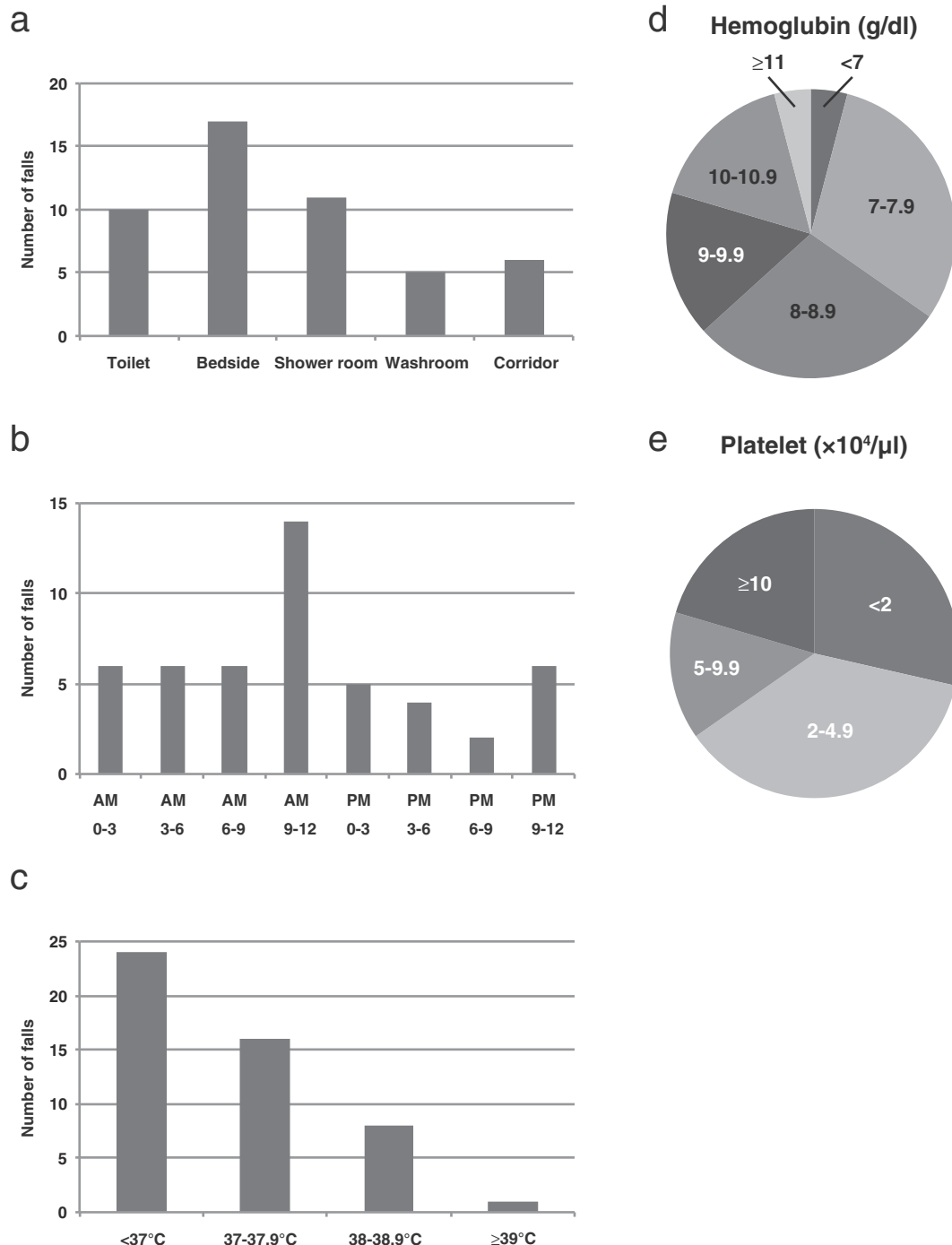


Fig. 1. Characteristics of fall events in hospitalized adult patients with hematologic disease.

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