



Original Article

Postdischarge rehospitalization and in-hospital mortality among Taiwanese women with hip fracture



Hei-Jen Jou^a, Ruo-Yan Siao^b, You-Shih Tsai^c, Yi-Tui Chen^d, Chung-Yi Li^e,
Chu-Chieh Chen^{d,*}

^a Department of Obstetrics and Gynecology, Taiwan Adventist Hospital, Taipei, Taiwan

^b Department of Healthcare Development, Taiwan Adventist Hospital, Taipei, Taiwan

^c Department of Orthopedics, Taiwan Adventist Hospital, Taipei, Taiwan

^d Department of Health Care Management, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan

^e Department of Public Health, College of Medicine National Cheng Kung University, Tainan, Taiwan

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ABSTRACT

Objectives: To explore the factors concerning postdischarge rehospitalization and in-hospital mortality among Taiwanese women older than 50 years with hip fracture.

Materials and methods: The National Health Insurance database from 2000 to 2006 was used to identify relevant cases. Women inpatients aged over 50 years with new-onset hip fracture in 2003 were identified. We analyzed the factors affecting postdischarge rehospitalization and in-hospital mortality.

Results: In 2003, there were 9467 new-onset hip fracture inpatients claimed among Taiwanese women aged over 50 years. The 3-year cumulative rates of rehospitalization after discharge and in-hospital mortality rate were 11.01% (1043) and 7.10% (672), respectively. The factors determined to be related to rehospitalization were patient age, hospital level, length of stay of the initial hospitalization due to hip fracture, and Charlson comorbidity index (CCI) score. The factors determined to be related to in-hospital mortality were age, urbanization level of region where patients were insured, hospital level, length of stay of the initial hospitalization due to hip fracture, and CCI score.

Conclusion: Characteristics of women aged over 50 years with hip fracture remain an important issue based on high rehospitalization and in-hospital mortality rates. We have identified related risk factors that may be helpful in treating hip fracture among this population segment.

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Introduction

Taiwan is undergoing a significant demographic shift in its population. Like many developed countries, its elderly population is rapidly growing. The increased life expectancy of its people has engendered higher incidences of several chronic diseases, including osteoporosis. Another disease, hip fracture resulting from osteoporosis, is a major global and national health problem among elderly [1–3]. In 1990, the prevalence of hip fracture worldwide was estimated at 1.26 million, and is predicted to reach 6.3 million by 2050 [4,5].

Although urgent care and surgical techniques for hip fracture have improved, mortality and morbidity following hip fracture remains high, with 1st-year mortality rates following hip fracture between 26% and 33% [6–9]. In addition, >50% of patients who experience hip fracture do not regain normal body functions [10–12]. Moreover, up to 25% must stay in a dependent residence or long-term care facility for >1 year [9,12].

Compared to male instances, hip fracture rates in females are much higher [13]. The population of Taiwanese women aged over 50 years has grown rapidly from 1.74 million in 1992 to 3.25 million in 2008 [14]. Hip fracture in elderly women imposes a heavy burden on the health care delivery system, and during this period, has increased in incidence at an annual rate of 2.8%. Inpatient services for fractures cost the National Health Insurance around NTD 6 billion annually, with hip fractures accounting for 20% of all fractures. Such high costs have illuminated this issue to the public, meriting thorough investigation [15].

* Corresponding author. Department of Health Care Management, National Taipei University of Nursing and Health Sciences, 89 NeiChiang Street, Wan-Hua District, Taipei City 108, Taiwan.

E-mail address: chuje@ntunhs.edu.tw (C.-C. Chen).

Previous studies have focused on the incidence and prognosis of hip fracture in females [16,17], treatment strategies for hip fracture [18], prognosis of hip fracture in terms of various prehospitalization variables [19], and health care expenditures including costs of rehospitalization, and inpatient services associated with hip fracture [20]. However, few studies have adopted a national database to identify factors associated with rehospitalization and in-hospital mortality regarding hip fracture in females. This study is an investigation of the short- and long-term rates of rehospitalization and in-hospital mortality for Taiwanese women older than 50 years who were discharged from a newly onset hip fracture. In addition, it reveals possible factors affecting in-hospital and rehospitalization mortality.

Materials and methods

Study design and data sources

The present study was based on a retrospective cohort design whose data were extracted from a registry of beneficiaries, contracted medical facilities, and inpatient expenditures between 2000 and 2006 in the National Health Insurance (NHI) database. Information concerning illness, e.g., hip-fracture hospitalization and in-hospital mortality during the follow-up period was retrieved from inpatient expenditures by admissions files between 2000 and 2006. Moreover, the hospital level of the medical institutions—sites of the first hip-fracture hospitalization of the study participants in 2003—was acquired from the registry for contracted medical facilities files in 2003. Finally, the gender, dates of birth, urbanization of the insurance locations, and potential cancellation dates prior to the end of 2006 were obtained from the registry for beneficiary's files.

The NHI database has been routinely collected by the National Health Research Institutes and supervised by the state-run Bureau of NHI, which has implemented a universal health program in Taiwan since March 1995. By the end of 1996, approximately 96% of the Taiwanese population had enrolled in the NHI program, with 97% of hospitals and clinics contracting with NHI throughout Taiwan [21].

Study participants

Firstly, 10,620 patients were selected as qualified samples based on a selection criteria of females with the diagnosis codes of hip fracture (ICD9 820.0, 820.1, 820.2, 820.3, 820.8, 820.9, 820.20, 820.21, 820.30, and 820.31) in one primary diagnosis or four secondary diagnoses in the detailed National Health Insurance inpatient expenditures by admissions files in 2003. Secondly, some samples were discarded based on exclusion criteria, including: (1) hospitalization death at that time (74 patients); (2) age < 50 years (455 patients) - because osteoporosis-induced hip fracture usually occurs in women aged < 50 years, especially those experiencing menopause; and (3) previous hospitalization due to hip fracture (ICD9 820) or pathological fracture (ICD9 733.14, 733.15) between 2000 and 2002 (624 patients), in order that patients were selected with a new-onset hip fracture. In total, 9467 patients were chosen.

A registry of beneficiaries contains data involving the location of each member's NHI unit. It may be detailed as the beneficiaries' residential area or simply their location of employment. Thus, the area of each member's NHI unit is divided into four geographic areas (i.e., northern area, central area, southern area, and eastern area) or three urbanization statuses (i.e., metropolitan area, satellite area, and rural area) according to the National Statistics of Regional Standard Classification [22].

Comorbidity severity

The Charlson Comorbidity Index (CCI) is a measurement of hip fracture severity. Deyo coding [23] was used to group severity based on the hospitalization data in the year prior to hospitalization due to hip fracture in 2003. Comorbidity severity increased with increasing score [24]. For this study, the CCI score was divided into three groups (0, 1, and ≥ 2).

In-hospital mortality and rehospitalization incidence

In this study, the in-hospital mortality was based on the patients with new-onset hip fracture in 2003. The cumulative incidences of in-hospital mortality (including all causes of mortality) occurring during each period (30 days, 1 year, and 3 years) were calculated accordingly. By contrast, the rehospitalization is defined as the patients with a new-onset hip fracture discharged from the hospital. The cumulative incidences of rehospitalization due to hip fracture during each period (14 days, 30 days, 1 year, and 3 years) were calculated.

Statistical analysis

At first, a descriptive statistics package described the mean values and standard deviations of continuous variables (age, length of stay, CCI, and medical costs), and the case numbers and percentage distributions of categorical variables for the fundamental attributes of the study participants. In bivariate analysis, the *t* and Chi-square tests were performed for the continuous and categorical variables described above to investigate the difference between a group of women aged <75 years and a group aged ≥ 75 years.

The multiple variable Cox proportional hazard model was used to analyze the relationship between the personal and institutional levels of in-hospital mortality and rehospitalization risks of patients with hip fracture. Moreover, the relative risk of each variable for in-hospital and rehospitalization was estimated.

A Cox regression analysis used data starting from the discharge date of the patient with a hip fracture and being hospitalized for the first time until the ending time (t_1) that was determined based on: (1) the date that the patient died or was rehospitalized; (2) the patient's insurance cancellation date, if it came prior to the date of in-hospital mortality or rehospitalization due to hip fracture during the study period; and (3) the date that the data were censored when in-hospital mortality or rehospitalization owing to hip fracture occurred if the participant did not cancel the insurance during the study period.

Results

As shown in Table 1, a total of 9467 females in Taiwan aged >50 years and hospitalized due to new-onset hip fracture in 2003 were selected and categorized into two groups: those aged from 50 years to 74 years and those over 75 years. The age 50–74 years group included 3391 patients (35.82%), with 6076 patients (64.18%) in the other group. Using a *t* test, this study discovered that no significant differences exist between the two groups regarding geographic regions, length of stay, and 30-day in-hospital mortality. By contrast, the level of urbanization and other variables displayed significant differences. With respect to the CCI score, the 50–74 year group was significantly higher than the elder group (aged over 75 years), although the elder group demonstrated higher incidences of 14-day, 30-day, 1-year, and 3-year cumulative rehospitalization, higher incidences of 1-year and 3-year cumulative mortality, and lower medical costs for first hospitalization. The

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