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Geriatric conditions as predictors of increased number of hospital admissions and hospital bed days over one year: Findings of a nationwide cohort of older adults from Taiwan

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ABSTRACT

The main aim of the present study was to determine whether geriatric conditions independently predict hospital utilizations after controlling for chronic diseases and disability among community dwelling older adults. We analyzed data from a nationally representative sample of older adults aged 65 years and above by linkage of 2005 Taiwan National Health Interview Survey data (including demographic characteristics, chronic diseases, disability, and geriatric conditions such as depressive symptoms, cognitive impairment, falls, and urinary incontinence), and 2006 National Health Insurance (NHI) claims data (including hospital admissions and hospital bed days). A total of 1598 participants who consented to data linkage, were successfully linked to NHI data, and had complete data for geriatric conditions were eligible for analysis. The prevalence of depressive symptoms, cognitive impairment, falls, and urinary incontinence were 20.6%, 26.1%, 21.3% and 23.9%, respectively. Overall, 18.2% (291/1598) of participants had at least one hospital admission during 2006. After adjustment for demographics, prior hospitalization, chronic diseases and functional disability, participants with geriatric conditions had significantly more hospital admissions (incidence rate ratio = 1.34; 95% confidence interval = [1.02–1.75]) and more hospital bed days (incidence rate ratio = 1.72; 95% confidence interval = [1.11–2.66]) than participants without geriatric conditions. Our results highlight the high prevalence (56.3%) of one or more geriatric conditions and their independent association with excess hospital utilizations. Thus, it is of critical importance to develop programs aimed at preventing or improving these conditions to reduce hospital use in this population.

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1. Introduction

Hospitalizations are an important outcome in older adults. A Taiwanese report found that approximately 20% of people aged 65 years and older had at least one hospitalization within one year (Li, Chang, Wang, & Bai, 2011). Previous studies investigating predictors of hospitalization in older adults have focused on demographics, prior hospitalization, comorbidity, and functional assessment (Dorr et al., 2006; Inouye et al., 2008). Geriatric conditions (so-called geriatric syndromes) such as cognitive impairment, falls, and urinary incontinence are common in older adults. These conditions have common features including shared predisposing risk factors, multifactorial causation, and the involvement of multiple organ systems. In addition, they have a substantial effect on disability (Cigolle, Langa, Kabeto, Tian, & Blaum, 2007; Tinetti, Inouye, Gill, & Doucette, 1995). There is increasing evidence to show that the co-occurrence of chronic diseases and geriatric conditions in older adults is common and their combination has an impact on physical function, social function, general health, and limitation of daily activities (Lee, Cigolle, & Blaum, 2009; Li et al., 2013; Rosso et al., 2011). A number of studies have shown that older medical patients have a number of geriatric conditions at hospital admission and that these conditions are associated with a higher risk for adverse outcomes

of hospitalization (Anpalahan & Gibson, 2008; Buurman et al., 2011; Lakhan et al., 2011; Laniéce et al., 2008; Satish, Winograd, Chavez, & Bloch, 1996). Given that geriatric conditions, chronic diseases, and disability are closely interrelated, a better understanding of the independent predictive value of geriatric conditions on hospital utilization from population-based studies would assist health care providers in the development of strategies to identify older persons at risk of adverse outcomes who may benefit the most from early intervention.

Most empirical research has tended to focus on the association between individual geriatric conditions and hospitalization. For example, Chodosh et al. (2004) linked hospital utilization data to data from the MacArthur Research Network on Successful Aging Community Study and concluded that high-functioning older persons who experienced decline in overall cognitive function were more likely to be hospitalized over 3 years. Satish et al. (1996) have reported that certain geriatric conditions such as falls are associated with total hospital days, and depression is associated with poor one year survival among acutely hospitalized male patients aged 65 years and over, even after controlling for limitation of daily activities. Anpalahan and Gibson (2008) have further demonstrated that geriatric conditions such as a history of recurrent falls is more strongly associated with increased hospital stays, and recurrent falls and incontinence are more strongly associated with admission to residential care than admission diagnoses or medical comorbidities among older patients aged 75 years and over in Australia. Recently, Wang, Shamliyan, Talley, Ramakrishnan, and Kane (2013) performed a systematic review of the association of eight geriatric syndromes with hospitalization or nursing home admission and concluded that multiple morbidity, frailty, disabilities, and cognitive impairment were associated with hospitalization and nursing home admission. Given that most older adults suffering from geriatric conditions live in the community and possibly go unrecognized (Cigolle et al., 2007; Lee et al., 2009), these abovementioned research findings highlight the importance of early identification of geriatric conditions among community dwelling older adults, so that early interventions to reduce the risk of further adverse events can be implemented.

Inouye, Studenski, Tinetti, and Kuchel (2007) have proposed a unifying conceptual model for geriatric syndromes to demonstrate that shared risk factors may lead to these syndromes and to the overarching geriatric syndrome of frailty. These geriatric syndromes may also feedback and lead to the development of more geriatric syndromes (Inouye et al., 2007). Given the growing interest in the study of geriatric conditions, however, consensus on the definitions, as well as a definite list, of geriatric conditions is still lacking and results in variation in the conditions included between different studies in the literature. In this study, we analyzed data from a nationally representative sample of older adults aged 65 years and above by linkage of 2005 Taiwan National Health Interview Survey (NHIS) data and 2006 National Health Insurance (NHI) claims data. We included all geriatric conditions (depressive symptoms, cognitive impairment, falls, and urinary incontinence) for which NHIS survey data were available. There is consensus that depressive symptoms (Buurman et al., 2012; Hajjar et al., 2009; Li et al., 2013; Rosso et al., 2011), cognitive impairment (Buurman et al., 2012; Cigolle et al., 2007; Kojima et al., 2012), falls and urinary incontinence (Cigolle et al., 2007; Inouye et al., 2007; Lee et al., 2009; Tinetti et al., 1995) are geriatric conditions. The present study was intended to explore whether geriatric conditions remained an independent predictor of hospital utilizations after controlling for chronic diseases and disability. Our study differs from most previous studies in that we classified participants into two groups based on the presence or absence of geriatric conditions. We hypothesized that older adults with one or more

geriatric conditions would have a significantly increased number of admissions and total hospital stay over one year, independent of chronic diseases and functional disability. We also aimed to describe the distribution of geriatric conditions among older adults and their associated factors.

2. Methods

2.1. Study population

This was a prospective study involving participants in the NHIS in Taiwan, 2005. The study sample was drawn from the National Registry Database through a complex multistage design, which has been reported in detail previously (NHIS Working Group, 2006). Ethical approval was obtained from the Institutional Review Board of the National Health Research Institutes. All participants provided signed informed consent. Participants were asked to provide consent for data linkage to the NHI claims database. The original sample comprised 27,726 participants (response rate 80.6%), including 2727 individuals aged 65 years and above. Out of these, a total of 1760 provided consent for data linkage. Of these, we excluded 16 individuals who were unable to be linked to insurance data and 302 with incomplete data regarding geriatric conditions, leaving 1598 eligible participants. We compared the characteristics of study participants who were included (N = 1598) and excluded (N = 1129) to assess the degree of respondent bias.

2.2. Demographic characteristics, prior hospitalization, chronic diseases, disability, and outcome measure

We assessed factors considered to be associated with medical service use in older adults including demographics, prior hospitalization (have been hospitalized in 2005, data from 2005 NHI claims database), chronic diseases, and disability. Trained interviewers used standard questionnaires to collect baseline data from participants on age, sex, years of education, marital status, and chronic diseases including diabetes, heart disease, hypertension, dyslipidemia, stroke, chronic obstructive pulmonary disease, and cancer. For each disease, participants were asked whether the diagnosis had been confirmed by a medical professional. Participants reported their ability to perform six activities of daily living (ADL) (eating, bathing, dressing, using the toilet, getting in or out of bed, and walking across a small room). Participants were asked whether they could perform these activities with no difficulty, some difficulty, much difficulty, or were unable to perform them. ADL disability was dichotomized as being able to perform these activities with no difficulty or some difficulty vs. much difficulty or being unable to perform one or more ADLs. The outcome measure in this study was hospitalization for any cause, obtained through data linkage to the 2006 NHI claims database.

2.3. Geriatric conditions assessment

Geriatric conditions were self-reported, with conditions chosen for the present study determined by the questions included in the 2005 NHIS (depressive symptoms, cognitive impairment, falls, and urinary incontinence). The 10 item version of the Center for Epidemiologic Studies Depression Scale (CES-D) was used to assess depressive symptoms (Andresen, Malmgren, Carter, & Patrick, 1994; Radloff, 1977). Participants with scores from 10 to 30 were defined as having depressive symptoms (Andresen et al., 1994). The Mini-Mental State Examination (MMSE) was used to assess cognitive function after obtaining permission from the Psychological Assessment Resources (PAR), Inc. This scale provides a total score ranging from 0 to 30 points, with higher scores representing better cognitive function (Folstein, Folstein, & McHugh, 1975).