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# Association between home-visit nursing utilization and all-cause hospitalization among long-term care insurance beneficiaries: A retrospective cohort study

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## ARTICLE INFO

## ABSTRACT

*Background:* Ensuring and improving long-term care services that use limited healthcare resources more efficiently is a major concern for many aging societies.

*Objectives:* The aim of this study was to investigate the relationship between use of home-visit nursing services and all-cause hospitalization in a home-visit nursing-recommended group.

*Design:* A retrospective cohort study.

*Setting:* Population-based sample of long-term care insurance beneficiaries from the long-term care insurance 2002–2013 claims database in South Korea.

*Participants:* Long-term care insurance beneficiaries who need one or more types of nursing care were defined as the home-visit nursing − recommended group (n = 4173).

*Measurements:* The dependent variable in this study was all-cause hospitalization in the home-visit nursing-recommended population. Multivariate Cox proportional hazards regression analysis was used to identify the association between home-visit nursing service use and all-cause hospitalization.

*Results:* A total of 3.8% of the subjects used home-visit nursing services. When participants who used home-visit nursing services were set as the reference group, participants who did not use home-visit nursing services had a higher risk of hospitalization (hazard ratio [HR] = 1.25, 95% confidence interval [CI] = 1.07–1.47). Additionally, participants who did not use home-visit nursing services and who did not have a caregiver showed a marked increase in the risk of hospitalization (HR = 6.81, 95% CI = 1.17–39.66). Participants who did not use home-visit nursing services with greater comorbidity showed a considerable increase in risk of hospitalization (HR = 1.36, 95% CI = 1.09–1.70).

*Conclusions:* Non-use of home-visit nursing services was associated with an increased risk of all-cause hospitalization in the home-visit nursing-recommended population. The present results suggest that the use of home-visit nursing services reduced the risk of hospitalization. Moreover, home-visit nursing may play an essential role in reducing hospitalization risk in the absence of caregiver support.

## What is already known about the topic?

- Home-visiting nursing programs covered by long-term care insurance can have favorable effects on many outcomes of the elderly.
- In studies of various programs, including nurse care coordination, health consultation programs, house-call visit plans, health promotions for frail elderly, and nurse home visiting interventions for older people with disability, the authors have found that home visits

by nurses favorably affect health outcomes.

## What this paper adds

- This secondary analysis of national claim data from a cohort of long-term care insurance beneficiaries demonstrates that home-visit nursing services non-use was associated with an increased risk of all-cause hospitalization among elderly who had the potential need for

home-visit nursing services.

- In particular, we suggested that in the absence of caregivers, home-visit nursing services may play an essential role in healthcare management.

## 1. Introduction

Healthcare systems in many countries have faced challenges resulting from rapidly aging populations. Those aged ≥60 years accounted for 524 million people or 8% of the world's population in 2010, and this figure is expected to exceed 20% by 2026 (National Institute on Aging, 2011). Moreover, medical expenses for senior citizens in developed countries have continued to rise quickly; a large part of these expenses stems from the cost of hospitalization (Centers for Disease Control Prevention, 2013). These concerns are particularly noteworthy in South Korea, which has one of the most rapidly aging populations in the world (Kwon et al., 2015). The medical expenses of the elderly population in South Korea increased from 12 billion USD in 2010 to 18 billion USD in 2015. Moreover, the medical expenses of the elderly population aged ≥65 years accounted for 35% of total annual medical expenses in 2015 (Statistics Korea, 2015). Ensuring and improving the long-term care services that use limited healthcare resources more efficiently is a major concern for many societies with aging populations and growing health expenses (OECD, 2013).

The long-term care insurance service was established to cope with these pressures and to support independence in the older population. Among in-home and community-based services based on long-term care insurance, home-visit nursing services provide educational support for clients, personal care, and medical treatment (Lim et al., 2014). Authors of studies on home-visit nursing covered by long-term care insurance have reported a reliable relationship between home-visit nursing use and favorable health and functional status, and use of hospitalization (Fortinsky et al., 2006; Oyama et al., 2013). Some authors also suggested that home-visiting nursing programs under in-home and community care can have favorable effects on many outcomes of the elderly (Markle-Reid et al., 2006a). In addition, home-based visiting-nurse programs that provide comprehensive nursing care for the purposes of promoting and maintaining health have been effective in reducing hospital utilization by elderly patients (Low et al., 2015; Oyama et al., 2013). Researchers in the United States of America (USA) and Europe have confirmed similar findings by focusing on specific subjects or evaluating the results through a diverse framework (Imhof et al., 2012; Liebel et al., 2009; Marek et al., 2006; Markle-Reid et al., 2006b; Mattke et al., 2015). However, there is little evidence on this topic from Asian countries.

Long-term care insurance was introduced in Asia relatively late. In 2000, Japan became the first Asian country to introduce compulsory long-term care insurance. In 2008, South Korea followed suit, becoming the second Asian nation to introduce universal long-term care insurance. In particular, the rate of home-visit nursing utilization is very low in these countries, regarding which there is a great deal of concern (Kang and Kim, 2014; Kashiwagi et al., 2013). For example, according to official long-term care insurance statistics, the home-visit nursing utilization rate in South Korea was 2.0% (National Health Insurance Service, 2015). In addition, only 13.1% of those who were recommended to use home-visit nursing services actually used it (Lee et al., 2008). Moreover, only a few studies of home-visit nursing services in South Korea have been reported. These studies focused mainly on reducing social costs and identifying the characteristics of users (Kang and Kim, 2014; Kim and Lee, 2015). Hence, there is a need for further study on the impact of home-visit nursing on healthcare service utilization including hospitalization. Thus, we examined the relationship between home-visit nursing service utilization and risk of hospitalization in the home-visit nursing-recommended group.

### 1.1. South Korean long-term care insurance scheme

As a form of social insurance, long-term care insurance aims at preserving and improving senior citizens' health and stable livelihoods as well as improving the quality of their lives by relieving the burden of care on family members.

#### 1.1.1. Eligibility and assessment

Those aged ≥65 years who need care/support or persons <65 years who have geriatric diseases are eligible for benefits, depending on the extent of their care needs. The care needs of all applicants for long-term care insurance benefits are assessed using a national care need-assessment tool, which is a 52-item screening tool containing five domains of physical functions, cognition, behavioral problems, demand for nursing, and demand for rehabilitation (Supplementary Table 1). Subjects' care needs are categorized into five groups, ranging from grade 1 (very severe) to grade 5 (near to normal). Those whose care needs are from grade 1 to grade 3 (moderate) are entitled to the long-term care insurance benefit.

#### 1.1.2. Benefits

The South Korean long-term care insurance scheme primarily provides three types of services: (i) *in-home and community-based care,* (ii) *institutional care services*, and (iii) *cash allowances* (Supplementary Table 2). Benefits are available with a monthly limit and are calculated according to the level of care needed and the type of services (Table 1). Beneficiaries are able to choose freely the type of service they wish to receive as well as service times, and they negotiate contracts directly with service providers without input from a helper, such as a care manager. No one helps with long-term care service planning in South Korea.

#### 1.1.3. Financing

The South Korean long-term care insurance program is financed by monthly premiums from enrollees, government taxation, and copayments by the actual users of long-term care under the long-term care insurance. The majority of long-term care financing comes from insurance premiums, which are mandatory for all adults registered under the National Health Insurance. Actual users receiving in-home and community-based care services and institutional care services pay 15% and 20% of the total costs, respectively (Francesca et al., 2011; Kang et al., 2012; Kim et al., 2013, 2010; National Health Insurance Service, 2015).

### 1.2. Home-visit nursing-recommended group

The home-visit nursing-recommended group was categorized based on the methodology of the standard benefit model for long-term care services, which identifies elderly people who have a potential need for home-visit nursing services. Long-term care insurance beneficiaries who receive a diagnosis from a physician, according to the national care need-assessment tool, that one or more types of nursing care of the 9 nursing treatment items (tracheostomy care, suction, oxygen therapy, sore care, tube feeding, pain control, urine catheter care, colostomy care, dialysis care) are needed are defined as the home-visit nursing-recommended group. Previous studies have successfully used this method based on Korean long-term care insurance claim data (Kang and Kim, 2014; Kwon et al., 2011).

### 1.3. Home-visit nursing services

Home-visit nursing services are performed as in-home and community-based care services under long-term care insurance. The nurses visit beneficiaries' homes and provide services such as administration of medication and injections, skin care, pain management, and arrangement of laboratory examinations or dental hygiene services according