Archives of Gerontology and Geriatrics 65 (2016) 122–127

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

The association between the utilization of long-term care services and mortality in elderly Koreans

Jung-kyu Choi[a], Euisin Joung[b,*]

[a] Institute of Health Insurance and Clinical Research, National Health Insurance Service Ilsan Hospital, Goyang, South Korea, South Korea
[b] Health Insurance Policy Research Institute, National Health Insurance Service, Wonju, South Korea, South Korea

ARTICLE INFO

Article history:
Received 30 December 2013
Received in revised form 11 March 2016
Accepted 15 March 2016
Available online 17 March 2016

Keywords:
Long-term care insurance
Mortality
Service use
In-home service
Follow-up study

ABSTRACT

It is necessary to confirm the effect of long-term care insurance (LTCI) by identifying changes in mortality, whether benefits are used or not, as well as the effects of in-home and institutional services on mortality. The goal of this study was to identify the association between service use and the mortality rate in elderly Koreans. We used Cox proportional hazard regression models and the Kaplan-Meier survival curve method to estimate the hazard ratio and survival probability for death while adjusting for covariates. We detected a 27.8% mortality rate at the 40-month follow-up period. Male gender, advanced age and activities of daily living were risk factors for mortality. In all models, the hazard ratio of participant death of those using long-term care services was significantly lower than for those who did not use these services. Among the service users, the hazard ratio for participant death of institutional service users was significantly higher than it was for in-home service users. This study also identified the impact of the transition from in-home services to institutional services. A primary goal of LTCI is to promote health and life stabilization in the elderly. To both delay and prevent institutionalization, it is necessary to develop assistive devices and effective in-home services and ensure access of these for elderly patients.

1. Introduction

Korea is facing increasing problems due to a rapidly aging society. The proportion of the population over 65 years of age was 11% in 2010 and is expected to reach 37% in 2050 (OECD, 2015). The social cost of aging is also continually growing (Tsuji et al., 1999). As a result, caregivers experience strains and burdens (Schulz, O'Brien, Bookwala, & Fleissner, 1995; Pinquart & Sorensen, 2003). Most elderly people experience serious limitations in activities of daily living (ADLs) and thus require daily assistance. Until the introduction of long-term care insurance (LTCI), the majority of this assistance was provided by informal caregivers, including adult children and spouses. In order to address population aging, it is important to understand the subject from both a broad and a long-term perspective.

The rapid aging of the population and the accelerating rise in medical fees for the elderly are increasing the demand for official long-term care (LTC). The Korean government introduced LTCI in July 2008 based on the experiences of several other countries. The goals of LTCI are to provide physical and social support for the elderly as well as to alleviate the financial burden imposed on non-paid family caregivers.

Those who eligible for LTCI over 65 or under 65 with geriatric disease including stroke and dementia have applied for assessment by National Health Insurance Service (NHIS). Trained employees of corporation and doctors are to evaluate the extent of need for LTC and status of the applicant's physical and emotional health. Grade was divided by score of LTC assessment evaluation. Applicants with score of over 95, 75–95, and 60–75 in LTC assessment evaluation were categorized into grade 1, grade 2, and grade 3.

Currently, LTCI covers 6.6% of elderly Koreans, all of whom have serious limitations in their ADLs (NHIS, 2015). A plan is in place to gradually expand coverage to elderly Koreans with less serious ADL limitations. In fact, LTCI already eased the criteria for assigning patients a grade of 3 in July 2013 so that grade 3 patients now make up more than half of LTCI beneficiaries; the number of grade 3 patients is steadily increasing. To sustain LTCI development in Korea, management of grade 3 patients is emerging as an important issue. It is therefore necessary to confirm the effects of LTCI by identifying changes in the mortality rate and whether these benefits have been used.

Abbreviations: LTCI, long-term care insurance; LTC, long-term care; ADLs, activities of daily living; NHIS, National Health Insurance Service; HR, hazard ratio; CI, confidence interval.

* Corresponding author.
E-mail address: eui0505@nhis.or.kr (E. Joung).

http://dx.doi.org/10.1016/j.archger.2016.03.013
0167-4943/

Literature related to LTC has mostly focused on study participants (general and frail/elderly) or interventions (living at home, nursing home care, hospital admission, etc.). The outcome variables that have been investigated include costs, death and physical function (Mann, Ottenbacher, Fraas, Tomita, & Granger, 1999; Kuzuya et al., 2006; Olivares-Tirado, Tamiya, & Kashiwagi, 2012). The risk factors related to death in the elderly, as identified in longitudinal studies, are environmental conditions, lifestyle, nutrition, and physical and psychosocial health (Trichopoulou et al., 1995; Vandentorren et al., 2006; Rizzuto, Orsini, Qiu, Wang, & Fratiglioni, 2012; Pack, 2009). Several risk factors have been found to predict death in this population, including age, gender, physical disability, problems with eating, use of medication and disease (Dale, Burns, Panter, & Morris, 2001; Flacker & Kiely, 2003; Sutcliffe et al., 2007).

The goal of this study was to confirm the characteristics of LTC service users and non-users as well as to identify any association between service use and mortality rate in the elderly. We also focused on the mortality of in-home and institutional service users to identify any effect of the services provided by the LTCI system. This study was designed to evaluate the impact of interventions for up to 3 years post-enrollment.

2. Methods

2.1. Data and participants

The participants were assigned to grades 1–3 and included people who had applied for LTCI in January and February 2009. They were enrolled in a follow-up investigation that lasted until April 2012. Trained interviewers collected data from the applicants or family members at the applicants' homes using a standardized instrument. The data included applicants' demographic characteristics and ADLs. Information about service use and death was added later on.

The final sample included 9599 participants: 2680 males (27.9%) and 6919 females (72.1%). Participants who had not used LTC services consecutively (n = 441), were under 65 years of age (n = 4830), were ranked as grades 1 or 2 (n = 9126) or were non-graded (n = 6228), or who died in 2009 (n = 1319) were excluded from our analyses. The National Health Insurance Service (NHIS) provided consent for use of the data and also approved the procedures of this study.

2.2. Variables

Confounding variables included gender, baseline age, income level, health status and ADLs. Income level was classified into 20 levels in ascending order. Participants' income level was recoded in 5 categories from level 1 (the lowest) to level 5 (the highest) according to the insurance premiums of everyone in the household. If the beneficiary was unable to afford the insurance premiums, the income level was defined as level 0. Information regarding health status included prior physician-diagnosed chronic diseases. We used a standardized instrument to determine the care recipients' degree of independence (Lawton & Brody, 1969). The ADLs were assessed using a 25-point scale, with a higher score indicating a greater need for assistance in daily life (range: 12–36).

To confirm the effects of LTCI services, we categorized these services into two groups: in-home services and institutional services (including a mix of both). In-home services included home-visit care, home-visit bathing, home-visit nursing, day and night care, short-term respite care and welfare equipment service. Institutional services were any services provided at LTC facilities. A mixture of both was defined as a change from in-home services to institutional services. Dummy variables for each type of service were created, and non-users were considered as the control group.

Deaths were confirmed by the staff of the NHIS. The mortality rate was surveyed over 40 months (January 2009–April 2012) using follow-up investigations at 3-month intervals. The survival time was defined as the number of days between the date at baseline and either the event of death or 40 months from the baseline, at which point the surviving participants were censored.

2.3. Statistical analysis

We compared the differences between service users and non-users using the chi-square test and *t*-test. After performing the preliminary analyses, we used Cox proportional hazard regression

Table 1
Characteristics of the services of non-users and users at baseline.

		Total	Non-users		Users		p-value
			n	%	n	%	
Total		9599	740	7.7	8859	92.3	
Gender	Male	2680	227	30.7	2453	27.7	0.0819
	Female	6919	513	69.3	6406	72.3	
Age (years)		79.1	79.1 ± 7.4		79.1 ± 7.4		0.9485
Income level	Level 0	1498	122	16.5	1376	15.5	0.1428
	Level 1	1383	118	15.9	1265	14.3	
	Level 2	960	76	10.3	884	10.0	
	Level 3	1136	92	12.4	1044	11.8	
	Level 4	1612	134	18.1	1478	16.7	
	Level 5	3010	198	26.8	2812	31.7	
Chronic diseases	Dementia	2480	229	30.9	2251	25.4	0.0007
	Stroke	2796	212	28.6	2584	29.2	0.8273
	Hypertension	5050	351	47.4	4699	53.0	0.0046
	Diabetes mellitus	2288	157	21.2	2131	24.1	0.0935
	Fracture	1443	129	17.4	1314	14.8	0.0498
	Cancer	355	33	4.5	322	3.6	0.2421
Activities of daily living (ADLs)		19.3	19.5 ± 3.1		19.3 ± 2.8		0.0359
Death during the 40-month follow-up period	Total	2673	251	33.9	2422	27.3	0.0028
	2010	1248	143	19.3	1105	12.5	
	2011	1105	84	11.4	1021	11.5	
	2012.3	320	24	3.2	296	3.3	
Survival time (days)		1052	1008 ± 278		1056 ± 236		<0.0001

Data are expressed as the mean (±SD) or n (%).