Iran J Public Health, Vol. 49, No.6, Jun 2020, pp.1129-1137

Original Article

Inpatient Service Use by Type of Health Coverage Scheme in South Korea: A Secondary Analysis of National Data

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(Received 06 Oct 2019; accepted 21 Dec 2019)

Abstract

Background: Healthcare utilization has progressively increased, especially among Medical Aid (MA) beneficiaries in South Korea. Recently, the focus of MA policy is shifting to long-term inpatient management. We aimed to identify the factors associated with inpatients' medical service use among MA beneficiaries compared to National Health Insurance (NHI) beneficiaries.

Methods: This secondary data analysis study used raw data collected from 2012 to 2014 by the Korea Health Panel Study, which is a national health survey conducted annually. Data from 3,869 participants were analyzed: 3,621 NHI beneficiaries and 248 MA beneficiaries. Multiple regression analysis and difference and slope difference tests were performed.

Results: Age, education level, marital status, living with family, employment, disability, and unmet medical needs significantly influenced the length of hospital stay. Living with family, employment, disability, chronic illness, and unmet medical needs significantly influenced hospitalization costs. MA beneficiaries had longer hospital stay than did NHI beneficiaries (F=5.99, P=0.003); however, there was no difference in hospitalization costs. Among those with low education, longer hospital stay length was more frequent among MA beneficiaries.

Conclusion: A future intervention model for MA inpatients should consider their service use patterns and characteristics. Most importantly, healthcare education should be provided according to MA patients' education level to enable patients to make informed health-related decisions. An effort is needed to change the current hospitalization system by encouraging patients to utilize local community care service and by expanding community care and in-home healthcare services.

Keywords: Health insurance; Medical aid; Hospitalization; Length of stay; Healthcare costs

Introduction

South Korea has universal health coverage, with citizens using either the National Health Insurance (NHI) or Medical-aid (MA) scheme (1). The NHI scheme was implemented in 1963 by the Health Insurance Act to provide a social safety net to meet the healthcare needs of all Korean citizens. MA is a public assistance program provided by the government for citizens with low income, allowing them to receive medical services at little to no cost (2). In 2017, MA beneficiaries accounted for only 2.8% of the total population; however, their annual medical expenditure amounted to 5.8 billion dollars, which is nearly 10% of the country's total medical expenditure

(3). Their inpatient costs comprised 53.5% of the total medical cost, dwarfing that of NHI beneficiaries, which stands at 36.7%. Moreover, the hospitalization fees per person for MA beneficiaries have been increasing yearly at the rate of 7%–9%, from $1,500 in 2012 to $2,100 in 2017 (3).

Medical expenditure, defined as out-of-pocket costs to the patient, are a major factor associated with access to health services (4), and MA beneficiaries account for higher medical expenditures than do NHI beneficiaries (5-8). According to Andersen's healthcare utilization model (9), one's health service use is influenced by predisposing factors such as sociodemographic characteristics, enabling factors such as income level or family support, and need factors such as health status and disease severity. Most MA beneficiaries belong to the low-income bracket, have low education levels, and are older adults with multimorbidity (8). Such individual and social factors, coupled with low or zero out-of-pocket costs, explain why MA beneficiaries use more medical services than do their non-MA counterparts.

There are mechanisms designed to reduce the unnecessary use of outpatient medical services, such as co-payments, the gatekeeping arrangement system (i.e., assigning patients to hospitals for primary care once their benefit payment days have surpassed the designated quota), case management, and benefit restrictions. While such interventions have contributed to lower use of outpatient medical services (10, 11), the consistent increase in inpatients necessitates policies to manage patients admitted for long-term care (12, 13). Fiscal pressures due to increased hospitalization are likely to worsen over time, as more services requiring out-of-pocket expenses are replaced with emergency or inpatient care (14, 15).

Hospitalization in acute care hospitals is usually necessary for acute diseases. If patients use inpatient medical services for their low out-of-pocket cost, measures should be taken to direct them towards primary care in their local communities to reduce their dependence on hospitalization services provided by acute care hospitals.

Recently, "community care" has been established in Korea, where individuals who need care live in the community and receive residence-based health and social care services (16). Inappropriate hospitalization or social hospitalization, which refers to unnecessary hospitalization for low medical needs, needs to be managed. Previous studies have compared healthcare use among NHI and MA beneficiaries, as well as the outcomes of utilizing these healthcare services (5,6,8). However, no study has compared how each factor influences patients' medical service use and their outcomes. Thus, it is necessary to examine the factors that influence MA beneficiaries' inpatient medical service use and to compare these factors with those affecting NHI beneficiaries' inpatient medical service use based on the national health survey data.

The main question of this study was whether factors influencing MA beneficiaries' inpatient medical cost (length of hospital stay [LOS] and the amount of medical bill) differ from those of NHI beneficiaries. This study aimed to examine the factors influencing inpatients' medical service use by the type of health insurance scheme based on Andersen's healthcare utilization model (9), using data from the Korea Health Panel Study. The findings can be used as baseline data for intervention and policy amendments addressing MA beneficiaries' appropriate use of inpatient services.

Materials and Methods

Design and participants

The Korea Health Panel is a survey jointly carried out by both the Korea Institute for Health and Social Affairs and the National Health Insurance Service. The two organizations have been conducting annual nationwide surveys since 2008 and providing basic data on individual healthcare behaviors, health status, usage pattern of healthcare services, and healthcare expenditures (17). This secondary data analysis study used raw data from the Korea Health Panel Study, which was conducted from 2012 to 2014.

This study used stratified cluster sampling. The first step consisted of extracting sampling enumeration districts (clusters) based on the stratification variables (administrative divisions). The second step involved extracting sample households within the enumeration districts. In the raw data collected from 2012 to 2014, after eliminating the duplicated participants, data on individuals whose health insurance type (i.e., NHI or MA) was specified were used, amounting to a total of 3,869 participants: 3,621 of whom had NHI and 248 had MA.

Measures and procedure

Medical utilization was measured using LOS and medical expenditure. Medical utilization refers to receipt of healthcare services. The more frequent the utilization of medical services, the higher the medical expenditure (18). Based on this, LOS and medical cost (cost) were used as alternative measures of medical care utilization in this study (19). LOS was measured using the number of hospitalization days in a year. Medical expenditure of hospitalization was measured with the sum of medical costs during a year.

Andersen's behavioral model is a multilevel model that incorporates both individual and contextual determinants of health services use (9). This model categorizes the determining factors of health service use into predisposing (demographic, social, and mental factors), enabling (financing and organizational factors), and need (health-related conditions and the perceived need for health services) factors. This study examined sex, age, education level, and marital status as predisposing factors, and living with or without family and employment as enabling factors. Presence of chronic illness, disability, and unmet medical needs were examined as need factors.

The Korea Institute for Health and Social Affairs approved the study protocol. No identifiable information was collected from the respondents. The authors signed a data usage consent form on the Korea Health Panel website prior to receiving approval and downloading the data. The study was exempt from ethical review as confirmed by the institutional review board of the university to which the authors are affiliated (No. 2018-07-032).

Data analysis

Statistical analysis was performed using SAS 9.4. Descriptive statistics were used to compare the general characteristics of the NHI and MA beneficiaries. A homogeneity test using chi-square distribution was performed to analyze qualitative variables such as sex, education level, and marital status. A t-test was conducted to analyze quantitative variables such as age, LOS, and inpatient expenditure. Multiple regression analysis was then performed to determine the factors influencing participants' length and cost of hospitalization. Lastly, a difference test was performed for each group in the regression model, along with a slope difference test for each independent variable, in order to test the differences in the factors affecting length and cost of hospitalization by health insurance type.

Results

Participants' general characteristics

All general characteristics except sex were found to be significant (Table 1). Compared to NHI beneficiaries, MA beneficiaries were more prone to have low levels of education, be married but separated, living alone, having employment, being chronically ill or having disability, and having experienced unmet medical needs. They were also found to be older and prone to longer LOS and higher medical costs.

Factors influencing LOS

Age, education level, and marital status were the predisposing factors found to have a significant influence. LOS was longer among older respondents, those with low education levels, and those who were married but separated or single. Regarding the enabling factors, respondents who lived with their families or were unemployed had longer LOS. Regarding the need factors, those with chronic illnesses, disabilities, and/or unmet medical needs had longer LOS, and respondents

with chronic illnesses and disabilities were responsible for higher inpatient medical costs. A model reflecting all these variables revealed that age, education level, marital status, living with family, employment status, disability, and unmet medical needs significantly influenced LOS (Table 2).

Table 1: Participants' general characteristics by health insurance scheme (N=3,869)

Variable		*Total*	*NHI (n=3,621)*	*MA (n=248)*	*χ^2 or t*	*P*
		% or Mean±SD				
Sex	Male	45.7	45.8	45.2	0.03	.855
	Female	54.3	54.2	54.8		
Education level	Below high school graduate	52.6	51.0	76.6	61.30	<.001
	Above high school graduate	47.4	49.0	23.4		
Marital status	Married	63.9	65.4	42.3	101.86	<.001
	Married (no spouse)	16.7	15.2	39.5		
	Single	19.3	19.4	18.1		
Living with family	Yes	94.3	94.8	87.1	25.44	<.001
	No	5.7	5.2	12.9		
Employment	Yes	47.5	49.7	15.9	97.63	<.001
	No	52.5	50.3	84.1		
Chronic disease	No	25.8	27.0	8.5	41.47	<.001
	Yes	74.2	73.0	91.5		
Disability	No	89.4	91.2	63.3	189.70	<.001
	Yes	10.6	8.8	36.7		
Unmet medical needs	No	70.0	70.9	55.6	25.86	<.001
	Yes	30.0	29.1	44.4		
Age (yr)		52.64 ±22.76	51.86±22.50	60.54±22.50	-5.86	<.001
Length of stay (days)		25.73±72.81	22.56±61.86	60.88±134.71	-4.45	<.001
Inpatient cost (KRW)		4,201,247 ± 8,550,880	4,047,413 ± 8,447,631	5,502,221 ± 8,763,649	-2.54	.012

NHI = National Health Insurance; MA = Medical-Aid

Table 2: Factors influencing the length of hospital stay

Type	*Variable*		*Predisposing factors*			*Enabling factors*			*Need factors*			*Total*		
			β	*t*	*P*	*β*	*t*	*P*	*β*	*t*	*P*	*β*	*t*	*P*
Predisposing factors	Sex	Female	-0.02	-1.49	.136							-0.01	-0.63	.528
	Age (years)		0.22	8.20	<.001							0.09	3.61	<.001
	Education level (ref=above high school graduate)	Below high school graduate	0.05	2.91	.004							0.04	2.01	.044
	Marital status (ref=with spouse)	Married (no spouse)	0.10	5.50	<.001							0.07	3.80	<.001
		Single	0.11	4.21	<.001							-0.01	-0.40	.686
Enabling factors	Living with family (ref=yes)	No				-0.36	-23.37	<.001				-0.35	-22.68	<.001
	Employment(ref=yes)	No				0.10	6.71	<.001				0.06	3.73	<.001
Need factors	Chronic disease(ref=no)	Yes							0.11	6.61	<.001	0.02	0.98	.329
	Disability(ref=no)	Yes							0.16	10.00	<.001	0.10	6.15	<.001
	Unmet medical needs (ref=no)	Yes							0.08	4.91	<.001	0.04	2.57	.010
Model goodness of fit	F (*P*)		46.690 (<.001)			331.639 (<.001)			62.516(<.001)			89.518 (<.001)		
	Adjusted R-square		.055			.155			.045			.197		

Factors influencing the cost of hospitalization

Among the predisposing factors, only age was found to be significant, with older respondents being responsible for higher hospitalization costs (Table 3). Regarding the enabling factors, respondents living with their families and/or being unemployed were responsible for higher hospitalization costs. Among the need factors, the presence of chronic illness or disability contributed to hospitalization costs. An assessment of the model with all the variables revealed that whether a respondent lived with family, was unemployed, or had a disability, chronic illness, or unmet medical needs statistically influenced hospitalization costs.

Table 3: Factors influencing the cost of hospitalization

Type	*Variable*		*Predisposing factors*			*Enabling factors*			*Need factors*			*Total*		
			β	*t*	*P*	*β*	*t*	*P*	*β*	*t*	*P*	*β*	*t*	*P*
Predisposing factors	Sex (ref=Male)	Female	-0.02	-1.00	.315							-0.04	-1.94	.052
	Age		0.18	6.69	<.001							0.04	1.46	.144
	Education level (ref=above high school graduate)	Below high school graduate	0.02	0.86	.391							0.01	0.69	.491
	Marital status (ref=with spouse)	Married (no spouse)	-0.01	-0.69	.490							-0.03	-1.32	.186
		Single	0.04	1.44	.149							-0.02	-0.83	.407
Enabling factors	Living with family (ref=yes)	No				-0.09	-5.35	<.001				-0.09	-5.27	<.001
	Employment(ref=yes)	No				0.12	7.23	<.001				0.11	6.36	<.001
Need factors	Chronic disease (ref=no)	Yes							0.12	7.70	<.001	0.08	4.25	<.001
	Disability(ref=no)	Yes							0.10	6.30	<.001	0.06	3.65	<.001
	Unmet medical needs (ref=no)	Yes							-0.02	-1.30	.192	-0.02	-1.06	.290
Model goodness of fit	F (*P*)		20.151 (<.001)			48.391 (<.001)			42.511 (<.001)			18.782 (<.001)		
	Adjusted R-square		.024			.026			.031			.047		

Influence of health insurance type on LOS and cost

Regression models of the factors influencing LOS significantly differed between NHI and MA beneficiaries (F=5.99, *P*=0.003) (Table 4); however, the difference in the cost was not significant (F=1.56, *P*=0.210) (Table 5). When slopes for each factor were measured by health insurance type, education level and living were significant. Those with lower education levels had longer LOS, with MA beneficiaries overstaying their admission by a larger margin than NHI beneficiaries. Those who did not live with their families had shorter LOS, with MA beneficiaries' stays being shorter by a larger margin than that of their NHI counterparts. Differences in sex and marital status by health insurance type were statistically significant; however, the effects these factors had on LOS were not.

Discussion

This study examined whether inpatient medical utilization differs in relation to one's health insurance type. LOS was found to be longer among MA beneficiaries than among NHI beneficiaries, especially among respondents with low education levels. Health illiteracy, that is, the inability to understand health-related information, can increase LOS. McCullough and Dalstrom found that during Medicaid expansion, many beneficiaries were using their healthcare coverage incorrectly—even under managed care that met their needs, which shows the need for more education and aware-

ness about health use (20). Inadequate health literacy was correlated with higher healthcare utilization and expenditure and pointed out the need for the dissemination of educational materials and care coordination intervention (21). MA beneficiaries often make their healthcare decisions based on their surroundings and word-of-mouth information (22), which makes sustainable and effective treatment difficult (23, 24). Thus, a tailored health intervention or health education focused on individuals' knowledge and environment is needed.

Table 4: Comparison test of factors influencing the length of hospital stay by health insurance scheme (N=3,869)

Type	*Variable*		*NHI (n=3,621)*			*MA (n=248)*			*Difference*	
			β	*t* or *F*	*P*	*β*	*t* or *F*	*P*	*t* or *F*	*P*
Predisposing factors	Sex	Female	0.01	0.49	.628	-0.07	-1.12	.245	2.53	.006
	Age		0.12	4.31	<.001	0.03	0.37	.712	0.91	.180
	Education level (ref=above high school graduate)	Below high school graduate	0.04	2.06	.039	0.08	1.26	.210	-2.08	.019
	Marital status (ref=with spouse)	Married (no spouse)	0.06	3.12	.002	0.01	0.10	.921	0.90	.184
		Single	0.01	0.63	.530	-0.03	-0.44	.660	1.68	.047
Enabling factors	Living with family (ref=yes)	No	-0.32	-19.29	<.001	-0.51	-8.29	<.001	8.84	<.001
	Employment(ref=yes)	No	0.06	3.69	<.001	0.01	0.10	.918	0.48	.317
Need factors	Chronic disease(ref=no)	Yes	0.02	1.00	.317	0.02	0.26	.797	-0.60	.274
	Disability(ref=no)	Yes	0.09	5.55	<.001	0.03	0.55	.583	1.14	.128
	Unmet medical needs(ref=no)	Yes	0.04	2.30	.021	-0.01	-0.24	.810	1.16	.123
Total									5.99	.003
Model goodness of fit	F (*P*)		68.583 (<.001)			8.724(<.001)				
	Adjusted R-square		.170			.255				

NHI = National Health Insurance; MA = Medical-Aid

Table 5: Comparison of factors influencing inpatient costs by health insurance scheme (N=3,869)

Type	*Variable*		*NHI (n=3,621)*			*MA (n=248)*			*Difference*	
			β	*t* or *F*	*P*	*β*	*t* or *F*	*P*	*t* or *F*	*P*
Predisposing factors	Sex	Female	-0.03	-1.38	.167	-0.15	-2.18	.030	1.85	.033
	Age		0.05	1.77	.077	0.02	0.20	.845	0.67	.252
	Education level (ref=above high school graduate)	Below high school graduate	0.01	0.48	.629	0.08	1.15	.252	-1.06	.144
	Marital status (ref=with spouse)	Married (no spouse)	-0.02	-0.83	.409	-0.13	-1.74	.083	1.47	.071
		Single	-0.01	-0.37	.712	-0.04	-0.49	.625	0.64	.262
Enabling factors	Living with family (ref=yes)	No	-0.07	-4.13	<.001	-0.11	-1.58	.115	-0.09	.466
	Employment(ref=yes)	No	0.11	6.01	<.001	0.08	1.11	.270	0.11	.456
Need factors	Chronic disease(ref=no)	Yes	0.08	4.07	<.001	0.04	0.42	.677	0.23	.411
	Disability(ref=no)	Yes	0.05	2.93	.003	0.07	1.02	.310	0.30	.382
	Unmet medical needs (ref=no)	Yes	-0.02	-1.26	.207	-0.02	-0.32	.747	-0.09	.466
Total									1.56	.210
Model goodness of fit	F (*P*)		15.062 (<.001)			2.025 (.032)				
	Adjusted R-square		.041			.043				

NHI = National Health Insurance; MA = Medical-Aid

Previously, it was widely assumed that the LOS of inpatients who live by themselves would be longer (25–27). It was thought that non-home discharges would prolong LOS, as the patients

must wait for discharge solutions or resolutions to problems related to social assistance (28). However, the present study demonstrated otherwise, showing that patients who did not live with their families exhibited shorter LOS. Caregiver stress was a significant predictor of long-term stay, regardless of a family's presence at home (29). Thus, South Korean culture, which places an undue care burden on family members, may have contributed to long-term hospital stays among patients who live with their families. More detailed research into the relationship between the care burden experienced by family members and LOS is necessary.

Further, LOS was prolonged by an even bigger margin for MA beneficiaries than for NHI beneficiaries. It appears that MA beneficiaries use inpatient services for longer, which is enabled by low out-of-pocket costs. Despite controlling for the predisposing, enabling, and need factors, the LOS of MA beneficiaries remained longer than those of NHI beneficiaries, although their out-of-pocket costs were more-or-less equal. This is notable healthcare use behavior among MA beneficiaries, with which they priorities the quantity of health service over quality.

MA beneficiaries had longer LOS than did NHI beneficiaries, but with no difference in inpatient costs, similar to the results of Lee, who compared the health service utilization patterns of NHI and MA beneficiaries with similar health conditions and found that MA beneficiaries had longer LOS but less out-of-pocket expenses than did NHI beneficiaries, despite controlling for medical needs as a variable (6). LOS was longer among MA beneficiaries than among NHI beneficiaries (5).

Such outcomes may be attributed to the so-called "social hospitalization," which refers to the long-term hospitalization of individuals whose health conditions are stable and who do not require any medical treatments. The cost of hospitalization should be proportional to LOS; however, the observed disparity suggests that patients are taking advantage of health services requiring low out-of-pocket costs for longer durations. In Taiwan, where universal healthcare coverage is similar to that of South Korea, the number of outpatient visits and hospitalizations doubled among NHI beneficiaries (30). Increasing patients' use of health services without regard for the quality of service or improvement in health results leads to medical waste and a less efficient healthcare system (31). As such, health interventions within community settings are needed to facilitate the usage of appropriate and effective health services that are commensurate with the health conditions of MA beneficiaries. These findings also warrant studies of inpatient services to examine whether health services are being provided in accordance with patients' health needs.

A qualitative study suggested that MA beneficiaries with multiple illnesses or disabilities tend to overuse healthcare services, because of the low deductible cost (32), similar to the present study findings. Day care centers or home healthcare services are not currently well-established in Korea, and thus, patients heavily rely on hospitalization. Social services are provided in community; however, the healthcare and social service systems are not linked organically (33). In the US and Britain, unnecessary medical costs reportedly reduced when home-based healthcare and day care centers were provided in an organic manner (34, 35). In Korea, more medical care services and long-term care providers are needed to expand the local community-based in-home healthcare.

This study has some limitations. First, the sample size for comparing the groups was relatively small. However, the study design did not necessarily require repeated measures spanning several years of panel study; therefore, cross-sectional data were adequate for extracting sufficient outcomes. Second, medical costs, which were used as a dependent variable, only accounted for out-of-pocket expenses. The results would have differed if the amount of benefit paid by the insurer were also included. Furthermore, it would have been desirable to examine the influence of physician-induced demand; however, such an analysis is difficult given the limited data sources. Future studies should include the amount of benefit paid by insurer in the total expenditure amount and assess the relevant factors in greater depth. Third,

the dependent variables were limited to LOS and out-of-pocket expenses, and the quality of health service was not examined, warranting further research into the adequacy of the health services.

Conclusion

There are differences in the factors influencing inpatient medical use between NHI and MA beneficiaries. MA beneficiaries stayed in hospitals for longer than did their NHI counterparts, as they do not pay proportionally higher bills. The LOS of individuals with low education level is higher, as their medical bills are often paid by their family members. To reduce medical costs and to provide appropriate healthcare, an effort is needed to switch from social hospitalization to local community care service by providing personalized healthcare education and expanding in-home healthcare and community care. Further research into the quality of inpatient medical services currently provided to MA beneficiaries is also needed.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

This research was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea Government (MSIT) (No. 2017R1C1B1002693).

Conflict of interest

None

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