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Factors Influencing the Length of Stay Ischemic Heart Disease Utilizing Medical Information

Ji-Kyeong Park

Department of Healthcare Management, Dong-eui University

의료정보를 활용한 허혈성 심장질환의 재원일수에 영향을 미치는 요인 분석

박지경

동의대학교 의료경영학과

Abstract Due to population aging and westernized lifestyle, ischemic heart diseases are increasing, and Korea has one of the highest lengthsof stay for ischemic heart diseases. Since the increase in the length of stay is a major cause of the increase in medical expenses, it is necessary to prepare a plan to manage the length of stay. Accordingly, this study was conducted to identify the factors influencing the length of stay of ischemic heart disease, and provide the elementary resources necessary for the management of the length of stay. The study subjects were 566 ischemic heart disease patients of a tertiary hospital. As the result of the study, first, the number of inpatients with chest pain as the chief complaint was the largest. Second, the average length of stay was 4.89 days, and the length of stay varied depending on the type of ischemic heart disease. Third, the age of over 75 years, diabetes, and dyspnea were the factors increasing the length of stay. Therefore, for management of adequate length of stay for ischemic heart disease, it is important to prevent the progression of illness through blood sugar control for ischemic heart disease patients with diabetes. Also, it is necessary to prepare a system where patients can visit hospitals as fast as possible if they have any symptoms.

요 약 인구 고령화와 서구화된 생활로 인한 허혈성 심장질환이 지속적으로 증가하고 있으며, 우리나라는 OCED 국가 중에서 허혈성 심장질환의 재원일수가 높은 국가에 속한다. 재원일수 증가는 진료비 상승의 주요 원인이므로, 허혈성 심장질환의 재원일수 관리방안 마련이 필요하다. 이에 본 연구는 허혈성 심장질환자의 재원일수에 영향을 미치는 요인을 파악하여 재원일수 관리에 필요한 기초자료를 제공하고자 시도되었다. 연구대상자는 일개 상급종합병원의 2015년1월1일부터 12월31일까지 순환기내과의 퇴원환자 중에서 주진단명이 허혈성 심장질환인 환자 566명이다. 자료분석은 IBM SPSS ver. 23.0을 이용하여 빈도분석, 교착분석, Fisher's test, One-way ANOVA, Scheffé test, 더미변수를 이용한 다중회귀분석을 실시하였다. 연구결과는 첫째, 흉통을 주호소로 입원한 환자가 가장 많았다. 둘째, 평균 재원일수는 4.89일이었으며, 허혈성 심장질환 종류별로 재원일수에 차이가 있었다. 셋째, 75세이상, 당뇨병, 호흡곤란 증상이 재원일수를 증가시키는 요인으로 나타났다. 따라서 허혈성 심장질환의 적정 재원일수 관리를 위해서는 당뇨병을 동반한 허혈성 심장질환자의 경우에는 혈당조절을 통해서 질병의 진행을 막는 것이 중요하며, 증상이 나타났을 경우 빠른 시간 내에 의료기관을 방문할 수 있는 체계마련이 필요하다.

Keywords : Acute Myocardial Infarction, Angina Pectoris, Ischemic Heart Disease, Length of Stay, Medical Information

1. Introduction

Due to the population aging and westernized dietary life, heart diseases are increasing every year as the chronic disease patients are increasing[1]. Especially, the fatality rate due to coronary artery diseases is

*Corresponding Author : Ji Kyeong Park(Dong-eui University)
Tel: +82-2-890-4214 email: jkpark@deu.ac.kr
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rapidly increasing[2]. The Western society including U.S. has seen a decrease in ischemic heart disease since 1980[3]. Korea, however, has seen an increase in ischemic heart disease by 20 times over 20 years from 12.2 per population of 100,000 in 1994 to 27.9 in 2014 (National Statistical Office, 2014). Also, from 1990 to 2011, the fatality increase rate due to ischemic heart disease was found to be the highest among OECD countries[4], and the speed of fatality rate increase is the fastest among the degenerative diseases in Korea. Also, even in case of survival, ischemic heart disease deteriorates the individual health level due to various complications and the risk of recurrence, so continued management and rehabilitation are necessary beside the acute period treatment[5-6]. And it will exacerbate the social burden of increasing social costs for disease management and complications[7]. Therefore, a national-level management for ischemic heart disease is necessary. The Korea Centers for Disease Control and Prevention has executed the Korea national hospital discharge injury survey since 2005 for establishing and assessing efficient and scientific-evidence-based preventive measures for major chronic diseases including acute myocardial infarction. And Health Insurance Review & Assessment Service has executed the adequacy assessment for acute myocardial infarction patients since 2007 and for coronary artery bypass graft of ischemic heart disease patients since 2013 for provision of fine-quality medical services.

Also, ischemic heart disease often leads to hospital admission, being a factor increasing the length of stay[1,3,8]. The length of stay is the most important factor influencing the medical expenses for admission[9-10]. Therefore, the management for the adequate length of stay is meaningful not only for hospital but also for the country. From the perspective of the hospital, the sickbed rotation rate is improved and thus the efficiency of hospital operation can be increased. From the perspective of patients and country, it has the effect of reducing the medical expenses and national medical expenses. The average length of stay for admitted patients of acute myocardial infarction, which is the representative disease of ischemic heart disease, was 9.7 days, which was found to be the 3rd among OECD countries, and thus it belongs to countries with the longest length of stay[10]. Therefore, it is deemed necessary to identify the factor increasing the length of stay for ischemic heart disease, based on which the management plan for the length of stay should be prepared.

Domestic studies regarding the length of stay for ischemic heart disease include the study on development of model for severity-adjusted length of stay of patients of ischemic heart disease and patients who experienced percutaneous coronary intervention and coronary-artery bypass graft[1,3,11]. This, however, is a study using national-level administrative data with the purpose of statistical calculation, and the studies using clinical data are inadequate.

Therefore, this study was conducted to identify the factors influencing the length of stay for ischemic heart disease patients using the clinical data of ischemic heart disease patients of a tertiary hospital, and provide the elementary resources necessary for the management of length of stay of ischemic heart disease patients.

The detailed purpose of this study is as follows. First, the difference in types of ischemic heart disease according to general characteristics is identified. Second, the difference in the length of stay per type of ischemic heart disease is identified. Third, the factors influencing the length of stay of ischemic heart disease patients are identified.

2. Methods

2.1 Subjects

This study selected as study subjects 566 patients excluding those admitted and discharged on the same day from the patients whose principal diagnosis was ischemic heart disease among the discharged inpatients of cardiology from January 1st to December 31st, 2015

in a tertiary hospital. The average age of the study subjects was 65.72, and the gender was 365 male (64.5%), which was greater than female 201(35.5%). The admission route was 291(51.4%) for emergency, which was greater than 275(48.6%) for ambulatory, and the most common patterns of discharge were discharge order at 538(95.1%). The most common chief complaint was chest pain at 390(68.9%). For comorbidity, patients with hypertension, diabetes mellitus, and hyperlipidemia were 32(5.7%), 24(4.2%), and 4(0.7%) respectively, patients with hypertension and diabetes mellitus were 40(7.1%), patients with hypertension and hyperlipidemia were 6(1.1%), and patients with all of hypertension, diabetes mellitus, and hyperlipidemia were 2(0.4%) (Table 1).

Table 1. General characteristic

		N(%)	M±SD
Gender	Male	365(64.5)	
	Female	201(35.5)	
Age	Under 55	99(17.5)	65.72 ± 11.406
	55-64	145(25.6)	
	65-74	178(31.4)	
	More than 75	144(25.4)	
Admission route	Ambulatory	275(48.6)	
	Emergency	291(51.4)	
Patterns of discharge	Discharge order	538(95.1)	
	Discharge against medical advice	5(0.9)	
	Transfer	13(2.3)	
	Death	10(1.8)	
Chief complaint	Dyspnea	51(9.0)	
	Chest pain	390(68.9)	
	For CAG, PCI	51(9.0)	
	Others	74(13.1)	
Comorbidity	HNT	32(5.7)	
	DM	24(4.2)	
	Hyperlipidemia	4(0.7)	
	HNT and DM	40(7.1)	
	HNT and hyperlipidemia	6(1.1)	
	HNT, DM and hyperlipidemia	2(0.4)	
	None	458(80.9)	
Total		566(100.0)	

HNT : Hypertension, DM : diabetes mellitus

2.2 Definition of Variable

2.2.1 Ischemic heart disease

Ischemic heart disease is a coronary artery disease mostly caused by atherosclerosis, being a form of heart disease which causes myocardial ischemia, typical disease being angina pectoris, myocardial infarction[5]. This study defined the case which has the principal diagnosis as I20-I25 code of mid-classification criteria of Korean Standard Classification of Disease-6th as ischemic heart disease.

2.2.2 Chief complaint

Chief complaint refers to the problem or symptom the patient complains as the most uncomfortable[12], and this study classified the chief complaint indicated on the medical record based on the mid-classification of Korean Standard Classification of Disease-6th.

2.2.3 Comorbidity

Comorbidity refers to the morbidity that the patient already head along with the principal diagnosis at the time of admission[13], and this study defined such as hypertension, diabetes mellitus, and hyperlipidemia through literature review related to the risk factors of ischemic heart disease[14-16].

2.3 Data Analysis

The data was analyzed as follows using IBM SPSS ver 23.0.

1) The frequency analysis was executed for the general characteristics of ischemic heart disease.
2) Cross-analysis and Fisher's exact test were executed for the types of ischemic heart disease according to general characteristics.
3) One-way ANOVA was executed for the difference in the length of stay per type of ischemic heart disease, and Scheffé test was executed for post analysis.
4) Multiple regression analysis using dummy variable was executed for factors influencing the length of stay of ischemic heart disease.

3. Results

3.1 Type of ischemic heart disease by general characteristics

As for the type ischemic heart disease, the most common was angina pectoris at 314(55.5%), followed by acute myocardial infarction at 215(38.0%) and chronic ischemic heart disease at 37(6.5%). As for the admission route, ambulatory was more common for angina pectoris(51.3%) and chronic ischemic heart disease(67.6%), and emergency was more common for acute myocardial infarction(58.6%), showing a statistical difference(χ^2=10.695, p=0.005). The chief complaint for angina pectoris was in the order of chest pain(67.2%), for CAG and PCI(11.8%), others(11.5%), and dyspnea(9.6%), and for acute myocardial infarction, it

was in the order of chest pain(76.7%), others(12.1%), dyspnea(6.5%), and for CAG PCI(4.7%), and for chronic ischemic heart disease, it was in the order of chest pain(37.8%), others(32.4%), dyspnea(18.9%), and for CAG and PCI(10.8%), showing a significant difference(χ^2=31.590, p=0.000) (Table 2).

3.2 Differences of the length of stay by type of ischemic heart disease

The average length of stay of ischemic heart disease patients was 4.89±4.916 days. The length of stay per type of ischemic heart disease was the highest for chronic ischemic heart disease at 7.95±7.261 days, followed by acute myocardial infarction at 5.40±5.766 days, and angina pectoris at 4.18±3.613 days. It was found that the length of stay varied depending on the type of ischemic heart disease(F=11.984, p=0.000) (Table 3).

Table 2. Type of ischemic heart disease by general characteristics

		Angina pectoris	Acute myocardial infarction	Chronic ischemic heart disease	Total	χ^2(p)
Gender	Male	198(63.1)	143(66.5)	24(64.9)	365(64.5)	0.667 (0.716)
	Female	116(36.9)	72(33.5)	13(35.1)	201(35.5)	
Age	Under 55	51(16.2)	46(21.4)	2(5.4)	99(17.5)	10.199 (0.117)
	55-64	81(25.8)	52(24.2)	12(32.4)	145(25.6)	
	65-74	109(34.7)	58(27.0)	11(29.7)	178(31.4)	
	More than 75	73(23.2)	59(27.4)	12(32.4)	144(25.4)	
Admission route	Ambulatory	161(51.3)	89(41.4)	25(67.6)	275(48.6)	10.695 (0.005*)
	Emergency	153(48.7)	126(58.6)	12(32.4)	291(51.4)	
Patterns of discharge	Discharge order	298(94.9)	204(94.9)	36(97.3)	538(95.1)	5.135 (0.444)
	Discharge against medical advice	3(1.0)	2(0.9)	-	5(0.9)	
	Transfer	10(3.2)	3(1.4)	-	13(2.3)	
	Death	3(1.0)	6(2.8)	1(2.7)	10(1.8)	
Chief complaint	Dyspnea	30(9.6)	14(6.5)	7(18.9)	51(9.0)	31.590 (0.000**)
	Chest pain	211(67.2)	165(76.7)	14(37.8)	390(68.9)	
	For CAG, PCI	37(11.8)	10(4.7)	4(10.8)	51(9.0)	
	Others	36(11.5)	26(12.1)	12(32.4)	74(13.1)	
Comorbidity	HNT	17(5.4)	13(6.0)	2(5.4)	32(5.7)	8.789 (0.203)
	DM	14(4.5)	7(3.3)	3(8.1)	24(4.2)	
	Hyperlipidemia	2(0.6)	2(0.9)	-	4(0.7)	
	HNT and DM	18(5.7)	19(8.8)	3(8.1)	40(7.1)	
	HNT and hyperlipidemia	4(1.3)	1(0.5)	1(2.7)	6(1.1)	
	HNT, DM and hyperlipidemia	2(0.6)	-	-	2(0.4)	
	None	257(81.8)	173(80.5)	28(75.7)	458(80.9)	
Total		314(100.0)	215(100.0)	37(100.0)	566(100.0)	

* p<0.05, ** p<0.001, HNT: Hypertension, DM: diabetes mellitus

Table 3. Differences of length of stay by type of ischemic heart disease

	M±SD	Min	Max	F	p	Scheff
Angina pectoris[a]	4.18±3.613	3.78	4.59	11.984	0.000*	a,b<c
Acute myocardial infarction[b]	5.40±5.766	4.62	6.18			
Chronic ischemic heart disease[c]	7.95±7.261	5.53	10.37			
Total	4.89±4.916					

* p<0.001

3.3 Factors influencing the length of stay of ischemic heart disease

In order to identify the factors influencing the length of stay of patients of ischemic heart disease, the length of stay was set as the independent variable and gender, age, admission path, discharge form, chief complaint, and comorbidity as independent variables and the multiple regression analysis was executed. The tolerance of all independent was found to be 0.344～0.991, and VIF was 1.014～2.911, The possibility of multicolinearity was excluded, and the result of Durbin-Watson was found to be 1.134, showing no autho-correlation.

The factors influencing the length of stay of ischemic heart disease patients were found to be age, chief complaint, and comorbidity. In terms of age, patients over 75 showed a positive influence compared to patients under 55(β=0.161, p=0.005), and in terms of comorbidity, patients with diabetes mellitus showed a positive influence compared to patients without comorbidity(β=0.172, p=0.001). On the other hand, in terms of chief complaint, patients admitted for chest pain (β=-0.280, p=0.001) and for CAG and PCI(β=-0.220, p=0.001) showed a negative influence compared to patients admitted for dyspnea. The explanatory power of the entire model was found to be 10.2% (Table 4).

Table 4. Factors influencing the length of stay of ischemic heart disease

		B	β	t	p
(constant)		5.929		6.788	0.000
Gender	Male				
	Female	0.417	0.041	0.947	0.344
Age	Under 55				
	55 - 64	0.191	0.017	0.311	0.756
	65 - 74	0.970	0.092	1.621	0.106
	More than 75	1.818	0.161	2.809	0.005*
Admission route	Ambulatory				
	Emergency	0.517	0.053	1.199	0.231
Patterns of discharge	Discharge order				
	Discharge against medical advice	-0.570	-0.011	-0.271	0.787
	Transfer	-0.385	-0.012	-0.289	0.772
	Death	0.396	0.011	0.260	0.795
Chief complaint	Dyspnea				
	Chest pain	-2.968	-0.280	-4.113	0.000**
	For CAG, PCI	-3.769	-0.220	-3.945	0.000**
	Others	-0.729	-0.050	-0.836	0.403
Comorbidity	None				
	HNT	-0.376	-0.018	-0.440	0.660
	DM	4.194	0.172	4.277	0.000**
	Hyperlipidemia	-0.440	-0.008	-0.188	0.851
	HNT and DM	1.453	0.076	1.862	0.063
	HNT and hyperlipidemia	-2.160	-0.045	-1.122	0.262
	HNT, DM and hyperlipidemia	-3.869	-0.047	-1.158	0.247

R^2=0.129, Adjusted R^2=0.102, F=4.792, p<0.001

* p<0.05, ** p<0.001, HNT: Hypertension, DM: diabetes mellitus

4. Discussion

Korea has seen a continued increase in chronic disease patients due to the population aging, changes in life and dietary habits according to improved economic level, and increase of environmental pollution[17-18], and heart disease is also increasing every year. The Western society has seen a decreasing trend for ischemic heart disease since 1980, but for Korea, it has rather increased for over 2 times over the recent 20 years. Also, it was found to have the highest fatality rate due to ischemic heart disease among OECD countries. Ischemic heart disease not only has a hight fatality rate, but also needs continued management and rehabilitation due to the risk of recurrence and various complications even in case of survival, thus requiring national-level management.

From multiple precedent studies, the length of stay

was found to be the most important factor influencing the length of stay[7-8]. For the patients of acute myocardial infarction, one of the ischemic heart diseases, the average length of stay for Korea is 9.7, being one of the highest among OECD countries. Therefore, for efficient hospital management and national medical expense reduction, the factors increasing the length of stay for ischemic heart disease needs to be identified, based on which the management plan for the length of stay should be prepared. Therefore, this study was conducted in order to identify the factors influencing the length of stay for patients of ischemic heart disease using the clinical data of ischemic heart disease patients at a tertiary hospital and provide elementary data necessary for the management of the length of stay for ischemic heart disease inpatients.

As the result of this study, the type of ischemic heart disease was found to be angina pectoris 55.5%, acute myocardial infarction 38.0%, and chronic ischemic heart disease 6.5%. In the study by Choi, Kim, Hong(2015)[1] which used the Korea national hospital discharge injury survey data, it was found to be angina pectoris 55.9%, chronic ischemic heart disease 23.9%, and acute myocardial infarction 20.0%, and the statistical data of Health Insurance Review & Assessment Service (2015) was also angina pectoris 68.4%, chronic ischemic heart disease 20.6%, and acute myocardial infarction 10.3%, showing differences from the result of this study where the distribution of chronic ischemic heart disease was the lowest. For acute myocardial infarction, the prognosis is determined by how quickly the treatment is executed. Also, once acute myocardial infarction occurs, about 35% dies before arriving at the hospital[19], so more are expected to go to large hospitals rather than small and midium hospitals due to the severity of the disease. Therefore, this study result which targeted admitted patients of a tertiary hospital is thought to have shown more acute myocardial infarction than chronic ischemic heart diseases unlike the study results by Choi, Kim, Hong(2015)[1] which targeted hospitals of 100 beds or more or the statistical data of Health Insurance Review & Assessment Service.

As for the type of ischemic heart disease according to the general characteristics of study subjects, acute myocardial infarction had more patients admitted through emergency, while angina pectoris and chronic ischemic heart disease had more patients admitted through ambulatory. This is also in line with the findings that the admission route of acute myocardial infarction patients was more emergency than ambulatory in the study by Choi, Lim, Kim, Kang(2012)[10]. Such study result is also thought to be the result of reflecting the characteristics of acute myocardial infarction for which early treatment is important.

The chief complaint of ischemic heart disease was mostly chest pain at 68.9%. This matches the study result by Oh(2011)[20] where 69.0% of early symptom in ischemic heart disease patients showed symptoms including chest pain. Also, while the chief complaint of angina pectoris and acute myocardial infarction was 67.2% and 76.7% respectively, it was relatively low for chronic ischemic heart disease at 37.8%, implying that sudden symptom expression is relatively lower for chronic ischemic heart disease than for angina pectoris and acute myocardial infarction.

The length of stay for ischemic heart disease was found to be 4.89 days on average. This is similar to the result of the study by Choi, Kim, Hong(2015)[1] which showed 4.92 days of average length of stay by using the Korea national hospital discharge injury survey data executed by selecting sample hospitals among hospitals with 100 beds or more. That is, it can be interpreted that the length of stay for ischemic heart disease patients of all medical institutions above hospital level is similar to the length of stay for the subjects of this study.

Also age, chief complaint, and comorbidity were found to influence the length of stay. Age over 75 compared to age under 55, and patients with diabetes

mellitus compared to patients without comorbidity were found to have a positive influence on the increase of the length of stay. The study results of Kim(2011)[21], which targeted patients who have undergone coronary artery bypass graft, showed that the length of stay increased for patients with diabetes mellitus compared to patients without diabetes mellitus and that there was no difference in the length of stay for patients with hypertension and lipid abnormality, matching the results of this study. The study results of Choi, Lim, Kim, Kang(2012)[8] regarding the length of stay for acute myocardial infarction patients found that the length of stay varied only according to gender, age, type of insurance, and fatality, matches the results of this study only in terms of age. The study results of Park, Lee, Cho, Kang, Kang, Yoon, Ham(2001)[22], which found that those diagnosed with coronary artery diseases had higher possession rate of smoking, diabetes mellitus, hypertension, and LDL cholesterol risk factors, matches the results of this study only in terms of diabetes mellitus. The differences from precedent studies seem to require further continued research.

Also, there was a negative influence on the increase of the length of stay for patients admitted with dyspnea as the chief complaint compared to patients admitted for chest pain and for CAG and PCI. Once myocardial infarction occurs, a severe chest pain follows, and over time, heart failure such as arrhythmia or dyspnea follows (Cheusima, 2005)[15], so the severity of diseases would be higher for patients admitted with dyspnea as the chief complaint than patients admitted for chest pain, so it is thought that the length of stay increased for patients admitted with dyspnea as the chief complaint than other patients.

Ischemic heart disease requires national-level management due to the high risk as it is the 3rd highest cause of death in Korea, following cancer and cerebrovascular diseases. Therefore, Health Insurance Review & Assessment Service is conducting adequacy assessment for acute myocardial infarction and coronary artery bypass graft in order to improve the quality of medical services for ischemic heart disease. The assessment index of this adequacy assessment includes the length of stay, and since the medical expense adjustment reimbursement is executed based on this result, the hospitals also needs the management of length of stay for ischemic heart disease patients. Therefore, it is necessary to prepare management plan for adequate length of stay through management of variation factors increasing the length of stay for ischemic heart disease.

So far, the domestic studies related to the length of stay for ischemic heart disease were conducted only regarding the development of severity adjustment length of stay using administrative data. This study, however, is valuable in that it used clinical data of the hospitals to identify the factors influencing the length of stay for ischemic heart disease. It has, however, the following limitations. First, the generalization of this study has limitations since it was limited to ischemic heart disease patients at a tertiary hospital. Therefore, it is proposed to conduct a replication study expanded to the national-level study subjects including hospitals and general hospitals. Second, the variables found to be major risk factors of ischemic heart disease in multiple precedent studies such as percutaneous coronary intervention, smoking, obesity, and family history were not included in this study. Therefore, in future, it is thought to be necessary to collect various risk factors through medical record analysis and patient interview and conduct an expansive study including such.

5. Conclusions

Due to the population aging and westernize lifestyle, ischemic heart disease is increasing, and Korea has one of the longest length of stay for ischemic heart disease inpatients among OECD countries. The increase in the length of stay is a major cause increasing the medical expenses. Therefore, for efficient hospital management,

it is necessary to identify the increase factor of the length of stay for ischemic heart disease, based on which the management plan for the length of stay should be prepared. Accordingly, this study was conducted to identify the factors influencing the length of stay for ischemic heart disease patients, and provide elementary data necessary for the management of the length of stay for ischemic heart disease inpatients. The study subjects were selected as 566 patients excluding those admitted and discharged on the same day from patients with principal diagnosis of ischemic heart disease among those discharged from cardiology from January 1st to December 31st of 2015 at a tertiary hospital. The data analysis used IBM SPSS ver 23.0.

The study results are as follows. First, as for the type of ischemic heart disease according to the general characteristics of study subject, it was in the order of angina pectoris at 314(55.5%), acute myocardial infarction at 215(38.0%), and chronic ischemic heart disease at 37(6.5%). As for the type of ischemic heart disease according to the general characteristics, the admission route of ambulatory was more common for angina pectoris and chronic ischemic heart disease each at 51.3% and 67.6%, and emergency was more common for acute myocardial infarction at 58.6%. As for chief complaint, chest paint was most common for angina pectoris and acute myocardial infarction each at 67.2% and 76.7%, and chest pain and others were similar for chronic ischemic heart disease each at 37.8% and 32.4%.

Second, the average length of stay for patients of ischemic heart disease was 4.89 days, showing difference in the length of stay per type of ischemic heart disease. Chronic ischemic heart disease was the highest at 7.95 days, followed by acute myocardial infarction at 5.40 days and angina at 4.18 days.

Third, the factors influencing the length of stay for ischemic heart disease patients were found to be age, chief complaint, and comorbidity. For age, those over 75 was found to have a positive influence compared to those under 55, and for comorbidity, those with diabetes were found to have a positive influence compared to those without comorbidity. On the other hand, as for chief complaint, patients admitted for chest pain and for CAG and PCI were found to have a negative influence compared to patients admitted for dyspnea.

As the result of this study, the age over 75, diabetes mellitus, and dyspnea symptoms for admission were found to be factors increasing the length of stay. Based on this, the following is proposed for management of adequate length of stay of ischemic heart disease. First, the increase of the elderly population and chronic diseases is inevitable in an aging society. Therefore, it is necessary to conduct a national-level management to remove risk factors such as smoking, obesity, diabetes mellitus, and hyperlipidemia before the onset of ischemic heart disease. Second, in case of patients of ischemic heart disease accompanied by diabetes mellitus, it is important to prevent the progression of disease through strict blood sugar control. Third, it is necessary to prepare a system where one can quickly visit a medical institution in case of a related symptom through education of the early symptoms and responsive measures of ischemic heart disease.

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Ji-Kyeong Park [Regular member]

- Aug. 2006 : Catholic University of Pusan, MS
- Feb. 2015 : Catholic University of Pusan, PhD
- Mar. 2014 ~ current : Dong-eui University, Dept. of Healthcare Management, Professor

<Research Interests>
Medical Records/Health Information