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The Effect of Non-Payment, Optional Treatment, and Hospitalization Decision on the Payment of Medical Expenses

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ABSTRACT

The purpose of this study is to provide the basic data for related policies by analyzing the relationship between the non-payment, optional treatment, hospitalization decision, and the payment of medical expenses. A total of 7,317 inpatients were selected as the final subjects using the 2011-2015 data of the Korea Medical Panel. It was analyzed using the chi-square test and the generalized estimating equation (GEE), and the demographic variables affecting payment of medical expenses and use of medical treatment variables were included as the correction variables. As a result of the analysis performed, compared to the inpatients with non-payment expenditures less than 250,000 won, 250,000 won to 500,000 won (OR: 1.19 95% CI: 1.01-1.39, P-value: 0.0319), 500,000 won to less than 1 million won (OR: 1.75 95% CI: 1.46-2.09, P-value: <.0001), over 1 million won (OR: 1.58 95% CI: 1.27-1.96, P-value: <.0001), there was a burden on the expenditure of medical expenses. Furthermore, while there was no recommendation for optional treatment, the inpatients who received optional treatment had a higher payment of medical expenses compared to the inpatients who did not (OR: 1.20 95% CI: 1.00-1.45, P-value: 0.0490). The patients who decided to be hospitalized had a higher payment of medical expenses than those who decided to be hospitalized by themselves (OR: 1.14 95% CI: 1.03-1.27, P-value: 0.0149). As a result of this study, the non-payment, optional treatment, and the hospitalization decision had an effect on the payment of medical expenses. Optional treatment was closed after 2018, but the payment of medical expenses due to the non-payment and the hospitalization decisions still exists, and hence, there is a need for the policy improvement to reduce them.

1. Introduction

As health information is shared through many media, the public's level of health is improving while the interest in the use of medical treatment has also increased (Shin, Lim, & Han, 2014), and hence, the importance of the medical insurance system to prevent excessive economic loss while the people use medical services is also emphasized. The comparison among the OECD countries demonstrates that Korea's out-of-pocket ratio including non-payment was 32.9%, which was 12.5% higher than the OECD average, which is the fourth highest among the OECD countries (Kong, 2020). Furthermore, according to a survey on the out-of-pocket medical expenses of health insurance patients, the average statutory out-of-pocket ratio between 2013 and 2015 was about 19.93% and the average non-payment out-of-pocket ratio was about 17.2%, indicating that non-payment medical expenses were as much as the statutory out-of-pocket expenses (Choi et al., 2019). Such a high proportion of non-payment may be seen in the health insurance coverage rate, as when the health insurance coverage rate is low, a single household's medical expenses, the main cause of which is non-payment, is catastrophic medical expenses exceeding a certain level. Hence, a low health insurance coverage rate causes non-payments, which increases the out-of-pocket ratio including non-payments, which also increases optional treatment, which accounts for a high proportion of the three largest non-payments (An & Park, 2011; Na & Eun, 2018).

The representative examples of the policies implemented to reducethe non-payment medical expenses in Korea include the three largest non-payment improvements (superior ward room charges, optional treatment expenses, and nursing expenses), and the selective and reserve benefits, etc (Yeo, 2020). In particular, the screening benefit is a guarantee system that recognizes benefits for the four major diseases, which was introduced to manage the non-payment medical expenses and strengthen their coverage, but it showed a negligible effect, and hence, a preliminary benefit was introduced as the next method. Unlike the screening benefits, the reserve benefit is an active concept system that manages the non-payments for all diseases, and based on which, it was made possible to understand the actual situation of non-payments and also lay the foundation for the infrastructure construction (Yeo, 2020). However, Korea's medical insurance system has a low coverage despite the implementation of non-payment benefits such as the selective benefits and reserve benefits for non-payment management.

Hence, the non-payment medical expenses account for a high proportion of total out-of-pocket expenses due to a low coverage, and the burden of medical expenses is expected to increase since the patients have to pay the entire amount of non-payment medical expenses (Kong, 2017). Even in Japan, which has in place a medical insurance system similar to that of Korea, the more the patients use the non-payment services, the higher the burden of medical expenses is, because they have to pay their statutory out-of-pocket expenses (Hayashi & Yamada, 2003; Oh, 2021).

As such, the non-payment of out-of-pocket medical expenses increases the burden of medical expenses and may threaten or seriously affect the household economy (Do, 2007). Furthermore, it could affect the overburdened medical expenses and cause problems with access to health services, such as the patients hesitate or give up on medical services (Kim & Lee, 2012). This is a factor which impedes the improvement of public health, which is the fundamental purpose of the medical

insurance system, by not being able to use medical services in a timely manner due to the burden of medical expenses (Shin & Shon, 2009), while they are necessary medical services for the patients. The diseases that are not treated early and advanced may be the cause of the higher medical expenses for the individuals and the state. As such, the burden of individuals is very important in that it leads to the burden of the government (Shin & Kim, 2018).

Hence, the non-payment medical expenses affect the burden of medical expenses (Lee & Lee, 2015) and it is necessary to study this as a major factor affecting operation. For this reason, this study seeks to examine the effect of non-payment on the burden of medical expenses of patients. Furthermore, since the payment of medical expenses becomes an important variable for the patients to select and use medical services (Oh, 2021), the relationship between the optional treatment and hospitalization will also be further analyzed in this study. The optional treatment was closed from January 2018, but before then, it is sought to confirm the rationale for policy implementation by observing whether the patients had to make the payment of medical expenses due to the optional treatment. Furthermore, the inpatients have a longer period of receiving medical services and more resources than the outpatients, and hence, there may be more payment of medical expenses made in terms of health economics. This study seeks to examine the relationship between the payment of medical expenses and the factors that influenced the hospitalization decisions of inpatients beyond whether they were hospitalized, and also add the rationale for establishing a system for reducing the payment of medical expenses. Hence, the purpose of this study is to examine the relationship between the non-payment, optional treatment, hospitalization decision and the payment of medical expenses of the inpatients.

2. Research Method

2.1 Research data and subjects

In order to understand the 'effects of non-payment, optional treatment, and hospitalization decisions on payment of medical expenses', this study is based on annual data from the Korea Medical Panel from 2008 to 2018, which was jointly hosted by the Korea Institute for Health and Social Affairs and the National Health Insurance Service (Version 1.7). The original sample of the Korean Medical Panel Survey was 18,257 people during the 6th survey in 2011, but new samples were drawn from the 7th survey in 2012 to compensate for the continued dropout of the existing panel households. Since the measurement year of the variable related to payment of medical expenses ran from 2011 to 2015, the relevant period was set as the research period. The patients with a history of hospitalization during the study period were selected as the study subjects, and only the first hospitalization of the study subjects was set for the analytical target. In each year, 1,091 people in 2011, 1,350 people in 2012, 1,327 people in 2013, 1,731 people in 2014, and 1,818 people in 2015, excluding responses with missing or erroneous information necessary for the study, were the study subjects. A total of 7,317 subjects were the final study subjects, of which 3,283 were male and 4,034 were female.

2.2 Research Tools

2.2.1 Independent variable

In the Korean Medical Panel, the non-payment amount for medical expenses consists of 1 question, optional treatment consists of 2 questions, and the hospitalization decision consists of 1 question.

2.2.1.1 Non-payment

The total medical expenses confirmed through the question of "How much was the medical expense paid at hospital (or clinic) on a specific day?" were classified into 5 groups as follows: 0 won, more than 0 won - less than 250,000 won, more than 250,000 won - less than 500,000 won, more than 500,000 won - less than 1 million won, and more than 1 million won.

2.2.1.2 Optional treatment

For the optional treatment, whether optional treatment is recommended and whether optional treatment is made are considered together. The response to "Did you receive optional treatment during hospitalization?" was used to determine whether optional treatment was recommended, and whether optional treatment was recommended was answered to "Did you receive optional treatment during hospitalization?" were used. The optional treatment recommendation and optional treatment were classified into 4 groups as follows: received - proceeded (optional treatment was recommended and proceeded), received - not proceeded (optional treatment was recommended but not proceeded), not received - proceeded (optional treatment was not recommended, but proceeded), not received - not proceeded (optional treatment was not recommended and not proceeded)

2.2.1.3 Hospitalization decision

The answers to the question of "Who played the most important role in the hospitalization decision and the decision on the content of treatment after hospitalization?" were classified into 3 groups: medical staff, the person (patient, self), and others (family, acquaintances, assailants, others, unrelated).

2.2.2 Dependent variable

The dependent variable was payment of medical expenses, and the answers to the following questions were used. "Do you think that the hospitalization fees paid to hospital (or clinic) on a specific day put a burden on the household?" There are five possible answers: "It puts a lot of pressure on it," "It puts a little pressure on it," "I can handle it," "It puts little pressure on it," and "It doesn't burden it at all." Among which, the responses of "It puts a very heavy burden" and "It puts a slight burden" were classified as the payment of medical expenses, and other responses were classified as the non-payment of medical expenses.

2.2.3 Correction variable

The correction variable was the total medical expenses (less than 500,000 won, more than 500,000 won - less than 1 million won, more than 1 million won - less than 2 million won, more than 2 million won - less than 3 million won, more than 3 million won), gender (male, female), age (under 19 years old, 20 - 29, 30 - 39, 40 - 49, 50 - 59, over 60), region (Seoul, metropolitan city, others), type of medical institution (tertiary general hospital, hospital, legislator). The questions used for the non-payment among independent variables were used for the total medical expenses.

2.2.4 Statistical analysis method

The chi-square test was used to check on the difference in terms of the payment of medical expenses according to the characteristics of the study subjects. The generalized estimating equation (GEE) model was applied to analyze the relationship between non-payment, optional treatment, hospitalization decision, and payment of medical expenses using the panel data, and the analysis was performed by including the correction variable in the model. For the statistical analysis, the SAS ver.9.4 (SAS Institute Inc, Cary, NC, USA) was used, and the statistical significance was tested at a significance level of 5%.

3. Results

3.1 General characteristics of the study subjects

Table 1 demonstrates the general characteristics of the study subjects. The total number of study subjects was 7,317 people, of whom 4,736 people (64.7%) had the payment of medical expenses and 2,581 people (35.3%) had no payment of medical expenses, with half of those who answered that they had made the payment of medical expenses. The group with the non-payment expenses greater than 0 won and less than 250,000 won was the largest with 2,941 people (40.2%), followed by more than 1 million won (16.7%), more than 250,000 won and less than 500,000 won (16.1%), more than 500,000 won and less than 1 million won (15.9%), and 0 won (11.2%). As for the payment of medical expenses according to non-payment expenses, the group with non-payment expenses greater than 0 won and less than 250,000 won had the lowest ratio (57.3%) who answered that medical expenses were borne, followed by the group with 0 won. From 250,000 won or more, the higher the non-payment cost, the higher the proportion of respondents who answered that they would be burdened with medical expenses. From 250,000 won or more, the higher the non-payment cost, the higher the proportion of respondents who answered that they would be burdened with medical expenses. The difference in terms of the payment of medical expenses according to these non-payment amounts was statistically significant ($p<.0001$). The most important person in hospitalization decision was the medical staff (89.1%), followed by the patient themselves (8.4%) and others (2.5%). The group that received the hospitalization for other reasons felt the most payment of medical expenses

at 66.1%, and the group that received hospitalization by medical staff was next with 65.1%, and when the patient himself decided to be hospitalized, 59.9% paid for the payment of medical expenses.

Table 1. General characteristics of the study subjects

Variable	Whether payment of medical expenses						
	Total		Causes burden		Does not cause burden		P-value
	N	%	N	%	N	%	
Non-payment (Unit: KRW 10,000)							<.0001
0	816	11.2	490	60.0	326	40.0	
Over 0 and less than 25	2,941	40.2	1,686	57.3	1,255	42.7	
Over 25 and less than 50	1,178	16.1	740	62.8	438	37.2	
Over 50 and less than 100	1,163	15.9	855	73.5	308	26.5	
Over 100	1,219	16.7	965	79.2	254	20.8	
Total medical expenses (Unit: KRW 10,000)							<.0001
Less than 50	713	9.8	319	44.7	394	55.3	
Over 50 and less than 100	1,920	26.3	1,091	56.8	829	43.2	
Over 100 and less than 200	2,152	29.4	1,354	62.9	798	37.1	
Over 200 and less than 300	967	13.2	696	72.0	271	28.0	
Over 300	1,565	21.4	1,276	81.5	289	18.5	
Optional treatment recommended - optional treatment							<.0001
Received - proceeded	864	11.8	650	75.2	214	24.8	
Received - not proceeded	53	0.7	36	67.9	17	32.1	
Not received - proceeded	863	11.8	638	73.9	225	26.1	
Not received - not proceeded	5,537	75.6	3,412	61.6	2,125	38.4	
Hospitalization decision							0.7265
Medical staff	6,518	89.1	4,246	65.1	2,272	34.9	
Self (patient)	613	8.4	367	59.9	246	40.1	
Others	186	2.5	123	66.1	63	33.9	
Gender							0.1800
Men	3,283	44.8	2,080	63.4	1,203	36.6	
Women	4,034	55.2	2,656	65.8	1,378	34.2	
Age (Unit: years old)							<.0001
-19	900	12.3	417	46.3	483	53.7	
20-29	359	4.9	176	49.0	183	51.0	
30-39	735	10.0	348	47.3	387	52.7	
40-49	801	10.9	467	58.3	334	41.7	
50-59	1,108	15.1	659	59.5	449	40.5	
60 -	3,414	46.7	2,669	78.2	745	21.8	
Region							0.9997
Seoul	712	9.6	449	63.1	263	36.9	
Metropolitan city	2,080	28.4	1,343	64.6	737	35.4	
Others	4,525	62.0	2,944	65.1	1,581	34.9	
Type							<.0001
Tertiary general hospitals	1,239	16.9	916	73.9	323	26.1	
Hospitals	4,873	66.6	3,120	64.0	1,753	36.0	
Clinics	1,205	16.5	700	58.1	505	41.9	
TOTAL	7,317	100.0	4,736	64.7	2,581	35.3	

3.2 Relationship between the non-payment, optional treatment, hospitalization decision and the payment of medical expenses

Table 2 is the result of analyzing the correlation between non-payment, optional treatment, hospitalization decision and the level of medical expenses burden. Compared to the non-payment group with more than 0 won and less than 250,000 won, the group with more than 250,000 won - less than 500,000 won had 1.19 times more payment of medical expenses (OR: 1.19 95% CI: 1.01-1.39, P-value: 0.0319). Furthermore, the group with the non-payment of 500,000 won or more - 1,000,000 won was 1.75 times (OR: 1.75 95% CI: 1.46-2.09, P-value: <.0001), and the group with more than 1 million won had 1.58 times (OR: 1.58 95). % CI: 1.27-1.96, P-value: <.0001) more payment of medical expenses. In the case of optional treatment, the group that did not receive optional treatment but proceeded with it had 1.20 times (OR: 1.20 95% CI: 1.00-1.45, P-value: 0.0490) more payment of than the group that did not recommend or proceed with optional treatment. The hospitalization decision was 1.14 times (OR: 1.14 95% CI: 1.03-1.27, P-value: 0.0149) higher in the group that decided to be hospitalized for other reasons, such as the patient's guardian, compared to the group in which the patient himself made the hospitalization decision.

Table 2. Relationship between non-payment, optional treatment, hospitalization decision and payment of medical expenses

Variable	Level of payment of medical expenses		
	OR	95% CI	P-value
Non-payment (Unit: KRW 10,000)			
0	1.04	0.88 - 1.23	0.6812
Over 0 and less than 25	1.00	-	
Over 25 and less than 50	1.19	1.01 - 1.39	0.0319
Over 50 and less than 100	1.75	1.46 - 2.09	<.0001
Over 100	1.58	1.27 - 1.96	<.0001
Total medical expenses (Unit: KRW 10,000)		-	
Less than 50	1.00		
Over 50 and less than 100	1.54	1.28 - 1.84	<.0001
Over 100 and less than 200	1.90	1.57 - 2.29	<.0001
Over 200 and less than 300	2.34	1.85 - 2.96	<.0001
Over 300	3.16	2.46 - 4.05	<.0001
Optional treatment recommended - optional treatment		-	
Received - proceeded	1.20	0.99 1.46	0.0581
Received - not proceeded	1.14	0.61 - 2.13	0.6918
Not received - proceeded	1.20	1.00 - 1.45	0.0490
Not received - not proceeded	1.00	-	
Hospitalization decision		-	
Medical staff	1.20	1.00 1.44	0.0556
Self (patient)	1.00	-	
Others	1.14	1.03 - 1.27	0.0149
Gender		-	
Men	1.00		
Women	1.14	1.03 - 1.27	0.0149

Variable	Level of payment of medical expenses		
	OR	95% CI	P-value
Age (Unit: years old)		-	
-19	0.90	0.69 - 1.16	0.3968
20-29	0.77	0.62 - 0.95	0.0156
30-39	1.25	1.02 - 1.53	0.0331
40-49	1.36	1.13 - 1.65	0.0012
50-59	3.47	2.95 4.09	<.0001
60 -	1.00	-	
Region		-	
Seoul	0.78	0.65 - 0.93	0.0061
Metropolitan city	1.03	0.92 1.16	0.5906
Others	1.00	-	
Type		-	
Tertiary general hospitals	1.02	0.83 - 1.26	0.8375
Hospitals	1.03	0.89 1.19	0.6849
Clinics	1.00	-	
Year		-	
2011	1.31	1.10 - 1.55	0.0024
2012	1.21	1.03 - 1.42	0.0194
2013	1.05	0.90 - 1.23	0.5511
2014	0.94	0.81 - 1.08	0.3753
2015	1.00	-	

3.3 Relationship between the non-payment, optional treatment, hospitalization decision and the payment of medical expenses according to gender

Table 3 is the result of analyzing the correlation between the level of non-payment, optional treatment, hospitalization decision and the payment of medical expenses according to the gender of the study subjects. In the case of non-payment, the payment of medical expenses was higher in women than in men when non-payment expenditures were more than 500,000 won compared to the group with more than 0 won and less than 250,000 won. In particular, in the group with non-payment expenditures between KRW 500,000 and less than KRW 1 million, both the men and women had the highest payment of medical expenses (Male = OR: 1.53, 95% CI: 1.18-1.99, P-value: 0.0014; Female = OR: 1.95, 95% CI: 1.52-2.49, P-value: <.0001). In the case of optional treatment, when compared with the group where there was no recommendation for optional treatment and no optional treatment, there was no recommendation among men, but there was more payment of medical expenses in the group that received the optional treatment. However, it was not a significant result (OR: 1.30, 95% CI: 1.00-1.70, P-value: 0.0499), and there was no statistically significant result among women. In the case of the hospitalization decision, among women, the group where the medical staff made the hospitalization decision had 1.45 times (OR: 1.45 95% CI: 1.14 1.85, P-value: 0.0024) more than the group in which the patient himself made the hospitalization decision, yet there were no statistically significant results among men.

Table 3. Subgroup analysis results by gender

Variable	Level of payment of medical expenses							
	Men				Women			
	OR	95% CI		P-value	*OR*	95% CI		P-value
Non-payment (Unit: KRW 10,000)								
0	1.10	0.86	1.40	0.4637	0.98	0.77	1.24	0.8710
Over 0 and less than 25	1.00	-			1.00	-		
Over 25 and less than 50	1.26	1.00	1.60	0.0527	1.15	0.93	1.42	0.2072
Over 50 and less than 100	1.53	1.18	1.99	0.0014	1.95	1.52	2.49	<.0001
Over 100	1.52	1.11	2.10	0.0095	1.60	1.19	2.15	0.0020
Total medical expenses (Unit: KRW 10,000)								
Less than 50	1.00	-			1.00	-		
Over 50 and less than 100	1.48	1.14	1.94	0.0035	1.57	1.22	2.02	0.0005
Over 100 and less than 200	1.81	1.37	2.38	<.0001	1.99	1.53	2.59	<.0001
Over 200 and less than 300	2.09	1.48	2.94	<.0001	2.56	1.85	3.55	<.0001
Over 300	3.37	2.34	4.84	<.0001	2.99	2.11	4.22	<.0001
Optional treatment recommended - optional treatment								
Received - proceeded	1.13	0.86	1.48	0.3779	1.29	0.98	1.69	0.0708
Received - not proceeded	0.98	0.37	2.55	0.9617	1.31	0.56	3.06	0.5289
Not received - proceeded	1.30	1.00	1.70	0.0499	1.14	0.88	1.48	0.3289
Not received - not proceeded	1.00	-			1.00	-		
Hospitalization decision								
Medical staff	0.91	0.68	1.21	0.5251	1.45	1.14	1.85	0.0024
Self (patient)	1.00	-			1.00	-		
Others	1.18	0.66	2.11	0.5724	1.38	0.84	2.27	0.2061
Age (Unit: years old)								
-19	1.09	0.75	1.57	0.6572	0.79	0.55	1.14	0.2142
20-29	0.84	0.60	1.18	0.3228	0.79	0.59	1.06	0.1102
30-39	1.11	0.83	1.47	0.4822	1.45	1.07	1.95	0.0149
40-49	1.24	0.95	1.61	0.1080	1.56	1.18	2.06	0.0017
50-59	2.81	2.26	3.49	<.0001	4.43	3.44	5.69	<.0001
60 -	1.00	-			1.00	-		
Region								
Seoul	0.94	0.72	1.22	0.6375	0.65	0.51	0.84	0.0007
Metropolitan city	1.11	0.94	1.32	0.2255	0.97	0.82	1.14	0.6860
Others	1.00	-			1.00	-		
Type								
Tertiary general hospitals	1.16	0.85	1.58	0.3573	0.94	0.70	1.26	0.6782
Hospitals	1.09	0.87	1.37	0.4312	0.99	0.83	1.19	0.9438
Clinics	1.00	-			1.00	-		
Year								
2011	1.25	0.97	1.61	0.0893	1.37	1.08	1.74	0.0089
2012	1.40	1.10	1.76	0.0053	1.06	0.85	1.32	0.5959
2013	1.08	0.86	1.36	0.5226	1.03	0.83	1.29	0.7932
2014	1.04	0.84	1.29	0.7294	0.85	0.70	1.04	0.1200
2015	1.00	-			1.00	-		

4. Discussion

In this study, it was sought to examine and understand the effect of non-payment, optional treatment, and hospitalization decision on the payment of medical expenses of patients who have been hospitalized by using the 2011-2015 medical panel data. The study results are summarized as follows. The larger the non-payment expenditure, the greater the patient's perceived payment of medical expenses. In the case of optional treatment, the level of payment of medical expenses tended to be large when the optional treatment was performed, and the payment of medical expenses was statistically significant when the optional treatment was recommended. As for the hospitalization decision, when the hospitalization was made due to other factors such as medical staff, family, or acquaintances, the burden of medical expenses was higher than for the patients who chose to be hospitalized, but only the hospitalization due to other factors was statistically significant. Non-payment is an item which is excluded from the health insurance benefits and is not covered, and an increase in non-payment translates into the patient's economic burden. The results of this study also demonstrate the fact that as the non-payment increases, the level of medical expenses increases, suggesting that non-payment is an important factor for the level of medical expenses for the patients.

In Korea, the policies to reduce the non-payment medical expenses have been introduced and implemented. Among which is the abolition of optional treatment, which has been in effect since January 2018. Optional treatment was a representative form of treatment included for the non-payment, and it was fully paid by the patients, thereby increasing the payment of medical expenses. From 2018, optional treatment was closed to reduce the payment of medical expenses. The results of our study examining the payment of medical expenses according to optional treatment before the abolition of optional treatment also confirmed the result that the burden of medical expenses for patients who proceeded with optional treatment was greater. In the study on the “Factors Affecting Out-of-Payment Amounts for Inpatients,” it was found that non-payment items such as advanced ward and the optional treatment significantly affected the out-of-pocket costs, and hence, the patients using the non-payment medical services had the greater out-of-pocket expenses than those who did not (An, 2012). Our research results are meaningful in that they reinforce the grounds for the abolition of optional treatment, examine the factors that increase the amount of non-payment, such as optional treatment, and suggest the need to seek the directions to suppress unnecessary non-payment items.

Furthermore, in the case of the payment of medical expenses according to hospitalization decision in this study, the burden was greater if it was decided by someone else than by the patients themselves. This is explained through the results of previous studies that if the patients were hospitalized due to the external factors other than their health status, it was determined as unnecessary hospitalization, and the patients felt the economic burdens (Ahn, 2017). Hence, there is a need for the evaluation and management of inappropriate hospitalization as a non-payment management method.

As such, in spite of the continuous efforts such as abolition of the three largest non-payments and the expansion of non-payment management from the four major diseases to all diseases to strengthen the health insurance coverage in Korea, the non-payment-related medical practices and new medical technology’s continuous quantitative increase (Kim, 2016) still affects the non-payment

burden of the patients, the payment of medical expenses for non-payment has also increased. The use of non-payment medical expenses has also increased as new medical technologies are continuously introduced, and the more patients use non-payment items, the more they are added to the statutory out-of-pocket expenses, making them very burdensome for the household economy as a whole (Do, 2007).

Furthermore, if the medical expenses, including non-payment, are continued to be used for the treatment of the patients' diseases in a situation where medical expenses are a burden on the entire household, it will cause excessive losses to the household economy and cause catastrophic medical expenses that put a family into poverty (Kim, 2018). This can lead to unsatisfactory medical experiences such as hesitating or giving up treatment due to the burden of medical expenses despite the situation in which medical services are needed in the future for patients to treat diseases. worsening and can lead to serious consequences of lowering the patient's overall quality of life (Kim, 2009; Lee & Choi, 2017). Furthermore, in the previous study, “Factors Affecting Functional Satisfaction and Psychological and Aesthetic Satisfaction of Dental Prosthetic Treatment,” the dental prosthetic treatment is a non-payment service, and the quality of medical service varies depending on the patient's income level, resulting in the patient’s satisfaction. The cost of treatment was also found to have a significant effect on the treatment cost (Choi & Lee, 2015), which not only limits the access to the health care services but also limits the access to the health care services if the patient chooses the low-quality medical services as the patient feels burdened with non-payment. This suggests that the quality of medical care may deteriorate, which may also reduce the patient’s satisfaction.

Such excessive non-payment medical expenses limit the very choice of medical services for the patients due to the economic cost burden, may cause problems in access to health services (Cho, 2013), and may also affect the patient’s satisfaction and the quality of medical care (Choi & Lee, 2015; Seo, 2016). Hence, the burden of the non-payment medical expenses can undermine the purpose of the medical insurance system because it can cause problems in the quality and accessibility of health services as well as the overall quality of life of the patients. Given such reasons, Korea is preparing various non-payment medical expenses management policies to lower the proportion of non-payment for the out-of-pocket ratio to reduce the patients' payment of medical expenses in the essential medical field (Ahn, 2019).

However, such a system affects the financial decline of hospitals that provide the non-payment medical services, and the non-payment is reimbursed for the purpose of strengthening coverage. It is considered that this will indirectly affect the patients by increasing the tax on the health insurance paid by the patients. Hence, it is necessary to prepare a continuous plan for the non-payment management in the future. As a measure in that respect, Korea is currently implementing a mandatory non-payment explanation from January 2021 for the non-payment management. This is a system in which the medical provider directly obtains written consent from the patient on non-payment items and expenses, and it increases the access to the non-payment usage information and guarantees the patients’ right to know (Shin, 2021). Based on which, the patients may be notified of the cost of non-payment medical services in advance and recognize the period until the payment is made, thereby reducing the burden of medical expenses felt by the patients, and it is expected to be able to help with the payment management based on the accurate identification of non-payment. However, there is

a problem in that it is difficult to deal with all non-payment items other than the high cost and frequent items, and since the medical provider must directly obtain consent in writing, it may be difficult to realize realistically considering the number of doctors and the doctor's office hours (Kim, 2020).

Hence, as a realistic and practical way to realize it, it is considered that rules such as delegation authority are needed to ensure that the medical personnel such as nurses designated by doctors and medical institution workers can give advance explanations on behalf of doctors in the subject of non-payment advance explanation. In order to fully understand the patients' use of non-payment medical services, it is considered necessary to explain the reasons for using non-payment and a standard form for non-payment advance explanations (Kim, 2020; Shin, 2021). If these systems are well improved for the non-payment management in the future, and if they are established and operated, it will be possible to understand the exact situation of non-payments. It is expected that a refund system for a certain amount of payment will also become possible. Hence, it is said that effective non-payment management and standards are needed for the advance notification system to lower the patients' payment of medical expenses in the high cost and frequent non-payment items along with the reserve benefit system currently in place in Korea.

The limitations of this study are as follows. First, this study is one using the data from the Korean Medical Panel, which studies the relationship between the non-payment, optional treatment, hospitalization decision, and the payment of medical expenses, and hence, there may be a correlation between the variables that were not considered and the variables used in this study. Second, the dependent variable of this study may have limitations in that it measures the patients' subjective payment of medical expenses for non-payment. Hence, as a practical measure, the subjective payment of medical expenses measure may be more appropriate (Choi, Lee, & Yim, 2011; Do, 2007). Furthermore, the independent variables, total medical expenses and non-payment expenses, were examined through the medical expense receipts, and based on which, an effort was made to minimize the recall bias of the examiner. Despite these limitations, this study made the attempt to study the effect of non-payment, optional treatment, and hospitalization decisions on the payment of medical expenses as a result of using the representative data, the Korean Medical Panel, on the relationship between the two variables, and it is considered to be meaningful in providing the basic data thereto. Furthermore, unlike the previous studies that measured the size of out-of-pocket expenses according to the types of non-payment items, this study studied the patients' subjective medical expense burden according to the total non-payment expenses, and it offers a significant advantage in that it secures the representativeness of the study by using the collected study sample.

5. Conclusion

This study made the attempt to examine and understand the relationship between the non-payment, optional treatment, hospitalization decision and the payment of medical expenses. As a result of the study conducted, as the non-payment increased, the payment of medical expenses tended to increase. Furthermore, if the optional treatment was not recommended but proceeded, the payment

of medical expenses was particularly large. Optional treatment was closed after 2018, but the payment of medical expenses due to the non-payment and the hospitalization decisions still exists. Hence, it would be necessary to improve the system and prepare the standards to reduce the patients' payment of medical expenses, and the efficient non-payment management is expected.

Conflicts of interest

No author has any financial or other conflict of interest to declare.

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Appendix table 1. General characteristics of study subjects by year

Variable	Whether payment of medical expenses																			
	2011						P-value	2012						P-value	2013						P-value
	Total		Causes burden		Does not cause burden			Total		Causes burden		Does not cause burden			Total		Causes burden		Does not cause burden		
	N	%	N	%	N	%		N	%	N	%	N	%		N	%	N	%	N	%	
Non-payment (Unit: KRW 10,000)							<.0001							<.0001							<.0001
0	174	15.9	115	66.1	59	33.9		173	12.8	109	63.0	64	37.0		127	9.6	77	60.6	50	39.4	
Over 0 and less than 25	403	36.9	246	61.0	157	39.0		543	40.2	319	58.8	224	41.3		569	42.9	323	56.8	246	43.2	
Over 25 and less than 50	161	14.8	110	68.3	51	31.7		234	17.3	142	60.7	92	39.3		201	15.2	129	64.2	72	35.8	
Over 50 and less than 100	166	15.2	122	73.5	44	26.5		211	15.6	164	77.7	47	22.3		193	14.5	144	74.6	49	25.4	
Over 100	187	17.1	152	81.3	35	18.7		189	14.0	155	82.0	34	18.0		237	17.9	184	77.6	53	22.4	
Total medical expenses (Unit: KRW 10,000)							<.0001							<.0001							<.0001
Less than 50	112	10.3	56	50.0	56	50.0		141	10.4	62	44.0	79	56.0		129	9.7	63	48.8	66	51.2	
Over 50 and less than 100	267	24.5	158	59.2	109	40.8		374	27.7	224	59.9	150	40.1		370	27.9	201	54.3	169	45.7	
Over 100 and less than 200	330	30.2	218	66.1	112	33.9		410	30.4	256	62.4	154	37.6		399	30.1	254	63.7	145	36.3	
Over 200 and less than 300	135	12.4	107	79.3	28	20.7		174	12.9	134	77.0	40	23.0		153	11.5	112	73.2	41	26.8	
Over 300	247	22.6	206	83.4	41	16.6		251	18.6	213	84.9	38	15.1		276	20.8	227	82.3	49	17.8	
Optional treatment recommended - optional treatment							0.0002							0.0002							0.0001
Received - proceeded	169	15.5	132	78.1	37	21.9		180	13.3	132	73.3	48	26.7		172	13.0	127	73.8	45	26.2	
Received - not proceeded	9	0.8	8	88.9	1	11.1		9	0.7	3	33.3	6	66.7		18	1.4	14	77.8	4	22.2	
Not received - proceeded	119	10.9	93	78.2	26	21.8		162	12.0	123	75.9	39	24.1		147	11.1	111	75.5	36	24.5	
Not received - not proceeded	794	72.8	512	64.5	282	35.5		999	74.0	631	63.2	368	36.8		990	74.6	605	61.1	385	38.9	
Hospitalization decision							0.4491							0.1655							0.0768
Medical staff	944	86.5	649	68.8	295	31.3		1,185	87.8	791	66.8	394	33.3		1,201	90.5	783	65.2	418	34.8	
Self (patient)	116	10.6	78	67.2	38	32.8		136	10.1	80	58.8	56	41.2		89	6.7	48	53.9	41	46.1	
Others	31	2.8	18	58.1	13	41.9		29	2.2	18	62.1	11	37.9		37	2.8	26	70.3	11	29.7	
Gender							0.0471							0.5340							0.1894
Men	468	42.9	304	65.0	164	35.0		622	46.1	415	66.7	207	33.3		620	46.7	389	62.7	231	37.3	
Women	623	57.1	441	70.8	182	29.2		728	53.9	474	65.1	254	34.9		707	53.3	468	66.2	239	33.8	
Age (Unit: years old)							<.0001							<.0001							<.0001
-19	136	12.5	74	54.4	62	45.6		175	13.0	81	46.3	94	53.7		142	10.7	70	49.3	72	50.7	
20-29	47	4.3	23	48.9	24	51.1		73	5.4	38	52.1	35	48.0		61	4.6	26	42.6	35	57.4	
30-39	118	10.8	57	48.3	61	51.7		148	11.0	74	5.5	74	5.5		132	10.0	62	47.0	70	53.0	
40-49	113	10.4	65	57.5	48	42.5		157	11.6	96	61.2	61	38.9		145	10.9	79	54.5	66	45.5	
50-59	177	16.2	115	65.0	62	35.0		198	14.7	131	66.2	67	33.8		205	15.5	115	56.1	90	43.9	
60 -	500	45.8	411	82.2	89	17.8		599	44.4	469	78.3	130	21.7		642	48.5	505	78.7	137	21.3	
Region							0.2939							0.7046							0.3365
Seoul	145	13.3	93	64.1	52	35.9		136	10.1	90	66.2	46	33.8		124	9.3	79	63.7	45	36.3	
Metropolitan city	301	27.6	216	71.8	85	28.2		359	26.6	230	64.1	129	35.9		362	27.3	223	61.6	139	38.4	
Others	645	59.1	436	67.6	209	32.4		855	63.3	569	66.6	286	33.5		841	63.4	555	66.0	286	34.0	
Type							0.0008							<.0001							0.0025
Tertiary general hospitals	167	15.3	130	77.8	37	22.2		247	18.3	186	75.3	61	24.7		217	16.4	161	74.2	56	25.8	
Hospitals	730	66.9	500	68.5	230	31.5		845	62.6	561	66.4	284	33.6		895	67.5	569	63.6	326	36.4	
Clinics	194	17.8	115	59.3	79	40.7		258	19.1	142	55.0	116	45.0		215	16.2	127	59.1	88	40.9	
TOTAL	1,091	100.0	745	68.3	346	31.7		1,350	100.0	889	65.9	461	34.2		1,327	100.0	857	64.6	470	35.4	

continued on next page

Appendix table 1. (Continued)

Variable	Whether payment of medical expenses												
	2014						P-value	2015					P-value
	Total		Causes burden		Does not cause burden			Total		Causes burden		Does not cause burden	
	N	%	N	%	N	%		N	%	N	%	N	%	
non-payment (Unit: KRW 10,000)							<.0001						<.0001
0	193	11.2	109	56.5	84	43.5		149	8.2	80	53.7	69	46.3	
Over 0 and less than 25	665	38.4	370	55.6	295	44.4		761	41.9	428	56.2	333	43.8	
Over 25 and less than 50	288	16.6	174	60.4	114	39.6		294	16.2	185	62.9	109	37.1	
Over 50 and less than 100	286	16.5	201	70.3	85	29.7		307	16.9	224	73.0	83	27.0	
Over 100	299	17.3	222	74.3	77	25.8		307	16.9	252	82.1	55	17.9	
Total medical expenses (Unit: KRW 10,000)							<.0001						<.0001
Less than 50	160	9.2	73	45.6	87	54.4		171	9.4	65	38.0	106	62.0	
Over 50 and less than 100	456	26.3	249	54.6	207	45.4		453	24.9	259	57.2	194	42.8	
Over 100 and less than 200	491	28.4	301	61.3	190	38.7		522	28.7	325	62.3	197	37.7	
Over 200 and less than 300	252	14.6	172	68.3	80	31.8		253	13.9	171	67.6	82	32.4	
Over 300	372	21.5	281	75.5	91	24.5		419	23.1	349	83.3	70	16.7	
Optional treatment recommended - optional treatment							0.0021						<.0001
Received - proceeded	167	9.7	120	71.9	47	28.1		176	9.7	139	79.0	37	21.0	
Received - not proceeded	6	0.4	4	66.7	2	33.3		11	0.6	7	63.6	4	36.4	
Not received - proceeded	204	11.8	142	69.6	62	30.4		231	12.7	169	73.2	62	26.8	
Not received - not proceeded	1,354	78.2	810	59.8	544	40.2		1,400	77.0	854	61.0	546	39.0	
hospitalization decision							0.0167						0.6036
Medical staff	1,513	87.4	945	62.5	568	37.5		1,675	92.1	1,078	64.4	597	35.6	
Self (patient)	161	9.3	88	54.7	73	45.3		111	6.1	73	65.8	38	34.2	
Others	57	3.3	43	75.4	14	24.6		32	1.8	18	56.3	14	43.8	
Gender							0.8918						0.0164
Men	770	44.5	480	62.3	290	37.7		803	44.2	492	61.3	311	38.7	
Women	961	55.5	596	62.0	365	38.0		1,015	55.8	677	66.7	338	33.3	
Age (Unit: years old)							<.0001						<.0001
-19	225	13.0	104	46.2	121	54.8		222	12.2	88	39.6	134	60.4	
20-29	85	4.9	39	45.9	46	54.1		93	5.1	50	53.8	43	46.2	
30-39	172	9.9	68	39.5	104	60.5		165	9.1	87	52.7	78	47.3	
40-49	187	10.8	110	58.8	77	41.2		199	11.0	117	58.8	82	41.2	
50-59	268	15.5	148	55.2	120	44.8		260	14.3	150	57.7	110	42.3	
60 -	794	45.9	607	76.5	187	23.6		879	48.4	677	77.0	202	23.0	
Region							0.8531						0.6967
Seoul	155	9.0	94	60.7	61	39.4		152	8.4	93	61.2	59	38.8	
Metropolitan city	528	30.5	333	63.1	195	36.9		530	29.2	341	64.3	189	35.7	
Others	1,048	60.5	649	61.9	399	38.1		1,136	62.5	735	64.7	401	35.3	
Type							0.0043						0.0002
Tertiary general hospitals	305	17.6	214	70.2	91	29.8		303	16.7	225	74.3	78	25.7	
Hospitals	1,169	67.5	713	61.0	456	39.0		1,234	67.9	777	63.0	457	37.0	
Clinics	257	14.9	149	58.0	108	42.0		281	15.5	167	59.4	114	40.6	
TOTAL	1,731	100.0	1,076	62.2	655	37.8		1,818	100.0	1,169	64.3	649	35.7	