RESEARCH ARTICLE

Time Trend of Out-of-pocket Expenditure among Cancer Inpatients: Evidence from Korean Tertiary Hospitals

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Abstract

Background: This study aimed to examine out-of-pocket expenditure for cancer treatments of hospitalized patients and to analyze changing patterns over time. Materials and Methods: This study examined data of all cancer patients receiving inpatient care from two tertiary hospitals from January 2003 to December 2010. Medical expenditures per admission were calculated and classified into those covered and uncovered by the Korean National Health Insurance (NHI) and co-payment. Results: The medical expenditure per admission increased slowly from 3,455 thousand Korean won (KRW) to 4,068 thousand KRW. While expenditures covered by the NHI have increased annually, co-payments have generally decreased. The out-of-pocket expenditure ratio, which means the proportion of uncovered expenditure and co-payment among total medical expenditure dropped sharply from 2005 to 2007 and was maintained at a similar level after 2007. Medical expenditures, NHI coverage, and the out-of-pocket expenditure ratio differed across cancer types. Conclusions: It is necessary to continually monitor the expenditure of uncovered services by the NHI, and to provide policies to reduce this economic burden. In addition, an individual approach considering cancer type-specific characteristics and medical utilization should be provided.

Keywords: Hospitalization - medical expenditure - neoplasm type - out-of-pocket expenditure - trends

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Introduction

Cancer has remained the primary cause of death over the last 30 years in Korea, and the incidence of cancer is continually increasing. However, early detection of cancer has increased and mortality has decreased. Since 2002 the mortality rate has decreased slightly, and the proportion of deaths caused by cancer among all deaths declined for the first time from 28.6% in 2010 to 27.8% in 2011 (Jung et al., 2012).

As the survival time of cancer patients and the average cost of cancer treatments are increasing, the economic burden of cancer treatment has continued to grow (Jönsson et al., 2007; Warren et al., 2008; Kimman et al., 2012). In the United States, the number of cancer survivors is expected to increase from 13.8 million in 2010 to 18.1 million in 2020, and the national cost of cancer care is also estimated to increase from 125 billion US dollars in 2010 to 158 billion US dollars by 2020 (Mariotto et al., 2011). According the Korean National Health Insurance (NHI) statistics, the amount of benefit caused by the diagnosis of neoplasm (ICD C00-D48) was 2,626 billion Korean won (KRW) (2,826 million US dollars) in 2007. This accounted for 10.7% of the total annual benefits of NHI in 2007. In 2011, the amount of benefits due cancer increased to 4,601 billion KRW (4,152 million US dollars) and the percentage of the total annual benefits also increased to 12.8% (National Health Insurance Service, 2013).

The Korean NHI successfully established an insurance system for the entire population in the short-term, but it is problematic in that the coverage for severe diseases is low and the out-of-pocket expenditure for patients is high. In order to reduce the heavy out-of-pocket expenditure for cancer patients, the Ministry of Health and Welfare conducted the cancer patient registration system in September 2005 and co-payment was reduced from 20% to 10% among the medical expenditure covered by the NHI for cancer patients. The co-payment for cancer patient was reduced again to 5% in December 2009.

After the NHI instituted a policy to enhance the coverage of cancer treatments, some studies focusing on medical expenditure and utilization by cancer patients have been conducted (Kim et al., 2008; Lee, 2009; Bae, 2010), but they have several limitations. Most studies analyzed the NHI claims data, which do not include the expenditure of NHI-uncovered services, and it is therefore difficult to evaluate the scale of total medical expenditure including out-of-pocket expenditure. In addition, previous studies have limitations in detecting changes in patterns of the medical expenditure for cancer treatments over

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long periods. This study focused on the scale of medical expenditure including out-of-pocket expenditure for hospitalized cancer patients and changing patterns of expenditure to better understand economic burden for cancer patients in Korea.

Materials and Methods

Subjects

In order to validate the trends in hospital medical expenditure incurred by cancer treatments, this study examined all cancer patients who received inpatient care at two academic medical centers (tertiary hospitals) located in Seoul, Korea from January 1, 2003 to December 31, 2010. The hospitals had 1,332 and 570 beds, respectively. Both hospitals were top-ranked with a nationwide reputation in cancer treatment. The present study used hospital administrative data and selected patients with a primary diagnosis of cancer using the International Classification of Diseases, 10th revision. The cancer diagnosis codes were malignant neoplasm (C00-C97) and carcinoma in situ of the cervix uteri (D06) as specified in the guidelines of the Korea Central Cancer Registry.

Data

This study used hospital administrative data that was originally constructed for cost accounting. The data included not only the patients' demographic characteristics, diagnosis, and treatments (treatment types, frequency, and etc.), but also all revenues, expenditures, and net revenue. Thus, the administrative data included medical services both covered and uncovered by the NHI. Data used in this study were collected from only two hospitals, so the results are limited in national representativeness. However, the data had a strong advantage in accuracy and reliability.

In order to analyze the composition of the medical expenditure, thousands of different types of fee codes were reclassified into eight categories: doctors' fees, room and board, laboratory tests, imaging studies, medication, injections, operations and procedures, and others. The doctor's fee is the consultation charge of examining patients. We regarded the charge of radiotherapy, such as rotational radiation and teletherapy, as an operation and procedure charge, because radiotherapy is a medical procedure in the treatment of cancer.

In general, medical expenditures in the NHI are divided into three categories by payer – those paid by the insurer (NHI), co-payment, and uncovered by the NHI. Medical expenditures paid by the NHI are the reimbursement to hospitals when claims are submitted to the NHI after treatment is provided. Co-payment means that patients pay some portion of services covered by the NHI. Uncovered medical expenditures include high level inpatient room fees, selected doctors' fees, new therapeutic technologies (e.g. robotic surgery) and so on, and patients are expected to pay 100% of the uncovered services. Therefore, the actual out-of-pocket expenditure paid by patients is the combined amount of co-payment of covered services and uncovered services. It is difficult to accurately calculate co-payment expenditure because the applicable standards such as coinsurance rate, deductibles amounts, annual maximum amounts, and different rates for specific diseases are complicated. In this study, co-payment amounts were estimated by applying constant rates to covered medical expenditure. Reflecting the introduction of co-payment reduction in 2005 and 2009, the applied constant rates were as follows: 20% by August 2005, 10% from September 2005 to November 2009, and 5% after December 2009.

Analysis

Inpatient medical expenditure per admission for each patient was calculated by summing all medical service charges from admission to discharge. Although the medical fee had been raised several times based on the inflation rate during the eight years (2003-2010), the medical expenditure for each year between 2004 and 2010 were not adjusted to the present value for 2003 in order to specifically examine the changing patterns of medical expenditures. Descriptive statistics including average, frequency, and percentage were calculated and the results are presented. Graphs are also presented which show the changes over time (by year). Although different types of cancers could be considered to be one disease, they differ depending on the organ or site of occurrence. These differences can also affect medical expenditure, so that this study analyzed seven major cancers. The seven major cancers in the analysis were selected based on incidence: stomach (C16), colorectal (C18-C21), liver (C22), lung (C33-C34), breast (C50), uterine cervix (C53, D06), and thyroid (C73) cancer. For all statistical analyses in this study, SAS ver. 9.2 (SAS Institute, Cary, NC, USA) was used.

Results

Medical expenditure of all cancer patients

The annual medical utilization of all cancer patients is presented in Table 1 for the years 2003 to 2010. The number of hospitalized cancer patients increased sharply from 2003 to 2010. The number of admissions in 2010 was approximately doubled compared to 2003. However, the average length of stay (LOS) decreased rapidly from 9.6 days in 2003 to 6.3 days in 2010. The expenditure per admission increased slowly from 3,455 thousand KRW per admission in 2003 to 4,068 thousand KRW per admission in 2010. It increased from 2003 to 2005, decreased between 2006 and 2007, and increased again after 2008. To estimate the expenditure per day, we divided the expenditure per admission by LOS. The expenditure per day increased greatly from 359 thousand KRW in 2003 to 644 thousand KRW in 2010 (Table 1).

Figure 1 shows the changing patterns per year in the payment scale by payers and the out-of-pocket expenditure ratio. While the expenditure paid by the NHI increased annually, co-payment expenditure decreased from 2003 to 2010. The expenditure of uncovered services by the NHI increased or decreased repeatedly each year, but was reduced slightly during the period as a whole. As a result, the out-of-pocket ratio was greatly decreased from 46.9% in 2003 to 26.9% in 2010. It was sharply decreased from 2005 to 2007 and was maintained at a similar level after

2007 (Figure 1).

Figure 2 shows the variation of fractions (%) by year classified into eight categories of medical expenditures for all cancer patients. Although the injection fee accounted for the largest portion of the eight categories, it was continually reduced over time. In addition, the proportions of procedure/operation and laboratory test charges increased, whereas the proportions of imaging studies and pharmaceutical charges remained constant (Figure 2).

Medical expenditure by major cancers

Figure 3 presents the changes per year for medical expenditure per admission by cancer type. The expenditures increased every year as a whole, but they temporarily decreased in 2007 and 2008. The medical expenditure for stomach, lung, and liver cancers increased rapidly. However, the expenditures for breast cancer were unique; they remained almost constant from 2003 to 2008 and then decreased after 2008. The medical expenditures by cancer type showed significant differences; the highest expenditures, which were incurred by liver cancer, were about three times greater than the lowest those which were incurred by breast cancer (as of 2010). The differences in the expenditures by each cancer type also increased over the study period (Figure 3).

Figure 4 indicates that the changing yearly patterns for the out-of-pocket expenditure ratio, indicating the portion of the sum of uncovered services which are 100% paid by patients and co-payments among total medical expenditure. In 2003, the out-of-pocket ratios were about 40~50% but they declined to about 30% in 2010. This means that the ratio of out-of-pocket expenditure had decreased, except for thyroid cancer. Overall, the ratios sharply decreased in 2005 and 2006 and then slightly increased or remained constant after 2008. The differences in out-of-pocket ratios by cancer types were not significant over the study period, but the ratio for thyroid cancer was greatly increased in 2010 (Figure 4).

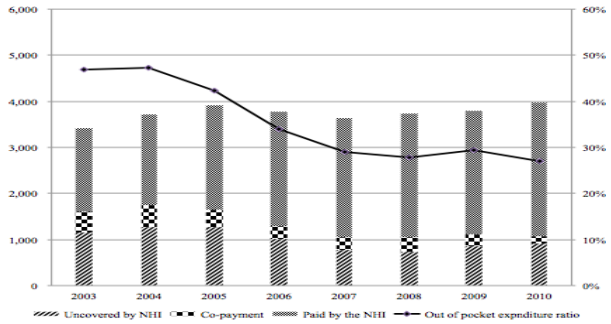

Figure 1. Expenditure Per Admission and Out-of-pocket Expenditure of All Cancer Patients from 2003 to 2010 (unit: 1,000 Korean won); NHI, National Health Insurance

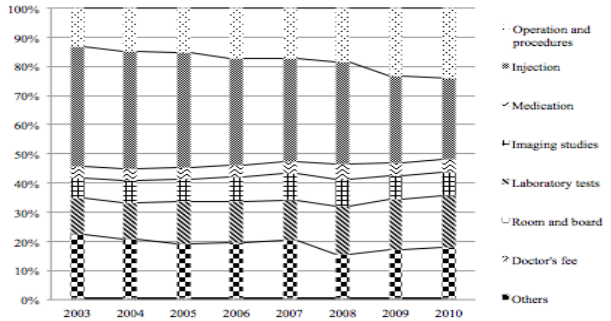

Figure 2. Composition of Medical Services in Total Medical Expenditures from 2003 to 2010

Discussion

This study showed that the number of cancer patients receiving inpatient care in the two hospitals sharply increased from 17,160 in 2003 to 35,127 in 2010. During the same period, the number of new cancer cases in Korea also increased significantly from 125,444 in 2003 (237.9 for every 100,000 individuals) to 202,053 in 2010 (304.8 in every 100,000 individuals) (National Cancer Information Center, 2013). At the same time, the medical utilization of cancer patients was also greatly increased. According to statistics of the NHI claims, the inpatient care performance for patients diagnosed with neoplasm (C00-D48) increased as follows: the number of patients increased from 331,055 in 2004 to 506,311 in 2010, the LOS increased from 11,393,760 in 2004 to 19,628,508

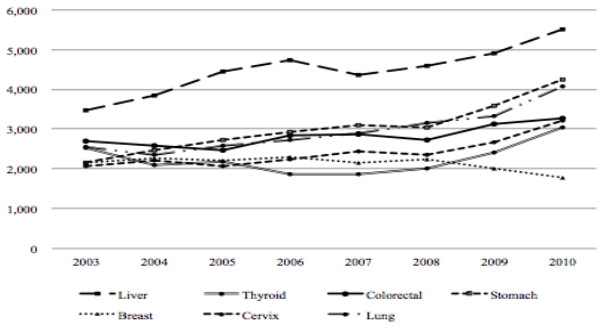

Figure 3. Medical Expenditure Per Admission by Cancer Type from 2003 to 2010 (unit: 1,000 Korean won)

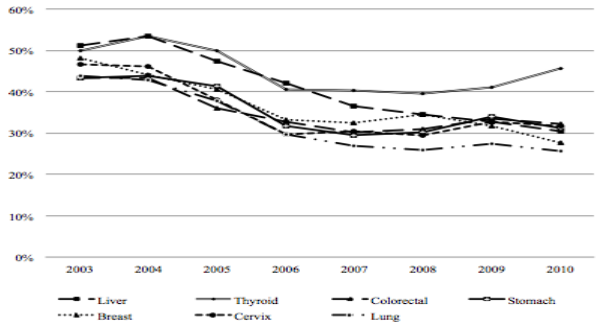

Figure 4. Out-of-pocket Ratio of Medical Expenditures by Cancer Type from 2003 to 2010

Table 1. Medical Utilization and Expenditure of All Cancer Inpatients from 2003 to 2010

	2003	2004	2005	2006	2007	2008	2009	2010
Number of admissions	17,160	19,384	21,451	25,489	26,663	26,248	31,238	35,127
Length of stay per admission**	9.6	9.2	8.8	8.8	8.1	7.5	6.5	6.3
Expenditure per admission*	3,455,943/2,900	3,742,432/3,269	3,947,331/3,854	3,810,849/3,988	3,736,173/4,021	3,848,233/3,490	3,882,147/3,041	4,068,954/3,519
Expenditure per day*	359,926/302	404,983/354	447,141/437	435,207/455	460,883/496	514,879/467	596,319/467	644,473/557

*KRW, Korean won; USD, US dollar; **days

in 2010, and covered medical expenditures increased from 1,031 billion KRW in 2004 to 2,589 billion KRW in 2010 (National Health Insurance Service, 2013). The growth rate of the NHI-covered medical expenditures for cancer inpatient care was much higher than that of the cancer incidence rate, and can be attributed to increasing survival rates for cancer patients and rising costs for cancer treatments.

The out-of-pocket expenditure ratios, which represent the level of the patients' economic burden for cancer treatments, were above 40% between 2003 and 2005, but the ratios decreased rapidly after 2005 and were maintained below 30% after 2007. The reason for this rapid decrease in out-of-pocket expenditure ratios between 2005 and 2007 were the significant effects of the policy of reduced co-payments for cancer patients introduced in 2005 and the expansion of NHI coverage. However, it should be noted that the reduction of out-of-pocket expenditures ratios has been stagnant since 2008. It appears that additional policies for reducing co-payments introduced in 2009 did not have as significant effects as the primary reduction in 2005. When analyzing the trend of out-of-pocket ratios, the trend of medical expenditures for services uncovered by the NHI should be considered along with the reduction of co-payments. The absolute value of medical expenditures for uncovered services per admission increased from 2003 to 2005, but decreased in 2006 and 2007. The reduction contributed to lowering the out-of-pocket ratios along with the co-payment reduction in 2005. However, the medical expenditures for uncovered services increased again from 2008. This could be the cause of the stagnation of out-of-pocket ratios.

Considering that the subjective economic burden for medical expenditures is larger for elderly individuals, the unemployed, and those with a higher proportion of medical expenditures among household expenditures (Choi et al., 2011), patients' subjective economic burden is especially great for cancer patients. The medical expenses incurred by cancer that are the responsibility of patients are relatively high compared to the expenses caused by other diseases (Langa et al., 2004; Wagner and Lacey, 2004). A co-payment without consideration of individual income along with medical expenditures caused by uncovered services is a significant burden, especially for the elderly and low income patients with cancer, and this could influence the application of appropriate treatment methods and outcomes (Kim, 2007; Mathews et al., 2009; Neumann et al., 2010). In order to dramatically decrease the economic burden on cancer patients, solutions are required to not only reduce co-payments, but also to reduce medical expenditures incurred by uncovered services (Kim et al., 1995; Norton et al., 2002; Lee, 2009).

Even though most of the policies and systems related to cancer do not classify the occurrence of cancer into specific types, but consider it as one disease entity, each type is very different not only in epidemiological characteristics and clinical aspects, but also with regard to medical utilization (Penberthy et al., 1999; Yabroff et al., 2007; Kim et al., 2008; 2012; Warren et al., 2008; Shin et al., 2012). This study confirms that the amount of medical expenditures, configuration of expenditures, and out-of-pocket ratios were significantly different by cancer type. Compared with total medical expenditures per admission by major type of cancer, the highest amount in absolute value was three times higher than the lowest and the total amount of expenditures and differences among the cancer types have increased in recent years. In addition, the ratio of out-of-pocket expenditure differed greatly by cancer type and the trends of expenditure increases or decreases varied by cancer type as well.

Thyroid cancer had the fastest growth in the incidence (annual growth rate for men was 25.5% and 24.5% for women). These facts of thyroid cancer showed different aspects compared to other cancer types - breast, colorectal, lung, stomach, liver, and cervical cancer - which have the highest incidence rates, but have a low increase in incidence (National Cancer Information Center, 2013). The out-of-pocket ratio for thyroid cancer was the highest and the growth rate was the most distinct after 2008. These significant differences by cancer type demonstrate that policy makers should consider cancer not just as one entity, but as individual types of cancer when making co-payment reduction policies or considering expansion of NHI coverage. They should consider an individual approach based on cancer type-specific characteristics and medical utilization.

This study is limited in its ability to generalize results because the analysis was conducted with medical expenditures data from two tertiary hospitals. However, this has a strong advantage in that the results show the actual economic burden of cancer patients including uncovered services. Therefore, the study results are significantly meaningful. In addition, through the annual analysis, this study examined changing patterns in the amount of medical expenditures and out-of-pocket expenditure and indirectly evaluated the effectiveness of related policies and the response (behavior) of health care providers. On the other hand, patient severity, treatment methods, and the objectives of hospitalization were not distinguished, and differences in medical expenditures by patients' characteristics were not examined. The present study was not able to review the total medical expenditures for a certain period of time, because the expenditures were calculated per admission. Therefore, further follow-up studies are necessary to overcome these limitations.

In the last eight years, the out-of-pocket expenditure ratios decreased. The absolute value of uncovered services decreased and then increased again, so that the absolute amount of out-of-pocket expenditure has been at a constant level since 2007. In the future, efforts should be made to continually monitor the out-of-pocket expenditure among cancer patients, including the uncovered services, and to provide effective policies to reduce this burden based on the monitoring of these results. In addition, individual approaches for policies should be provided by considering cancer type-specific characteristics and medical utilization.

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