

Analysis of the effect of medical insurance on cancer inpatients: A 10-year retrospective study on a large hospital in Northeast China*

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Abstract

Objective The aim of the study was to analyze hospital costs for cancer inpatients availing different methods of payment and the influencing factors, to provide inputs to improve the medical insurance payment policy.

Methods We analyzed the information related to length of hospital stay, hospitalization cost, and self-pay cost, collected from one large-scale, Grade A, Class Three hospital in Shenyang, China, during 2004–2013.

Results The number of cancer inpatients with different payment types (medical insurance group and non-medical insurance group) presented a rising trend. Further, the ratio of medical insurance inpatients increased rapidly (from 22.2% to 48.7%); however, this group was still a minority. The length of hospital stay became shorter (21 d vs. 17 d; $P = 0.000$) while the gap got narrower; the hospitalized expense showed an upward trend and the difference was remarkable ($¥24048.6 \pm ¥4376.28$ vs. $¥20544.36 \pm ¥4057.01$; $P = 0.000$).

Conclusion Along with normalization of cancer therapy, the influence of payment on treatment has been getting weak, the policy has impact on controlling hospitalization cost, lightening burden of cancer patient, as well as allocating medical resources in a reasonable way, becoming an important defray pattern of hospitalization cost.

Key words: medical insurance; cancer inpatients; retrospective study

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Diseases such as cancer, lifestyle-related cardiovascular diseases, and chronic respiratory diseases are called Chronic Noncommunicable Diseases (NCDs). The related high morbidity, disability, and mortality rates lead to high consumption of social resources, as well as act as a serious hazard to human health. By 2008, cancer was the leading cause of death as compared to other chronic diseases^[1]. However, cancer is a group of diseases that can be prevented and controlled. Statistics show that there are 14 million cancer patients around the world, while 1.8 to 2.0 million new cases are diagnosed each year, the death toll is 1.4 to 1.5 million. The annual standardized mortality ratio for cancer deaths in China is 158/100 000, which is far above the mortality ratio for other diseases^[2]. With constant advancement in the universal coverage health

insurance policy, there is a simultaneous increase in cancer patients availing the Urban Basic Medical Insurance. Indeed, the resultant medical expenses will place considerable stress on medical benefits funds. Thus, it is meaningful to focus on the disease burden of cancer patients. Our study analyzed the hospital costs of cancer inpatients with different methods of payment from 2004–2013, and the related influencing factors, in one large-scale, Grade A, Class Three hospital in Shenyang, Liaoning Province, China. Shenyang is a typical large city in northeastern China. Therefore, data from this city may partially reflect the situation of Chinese medical insurance during these years and possibly provide insights for improving the medical insurance payment policy.

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Materials and methods

We collected data from January 2004 to December 2013, on 36 787 cancer inpatients in one large-scale, Grade A, Class Three hospital in Shenyang, and summarized the information related to length of hospital stay, hospitalization cost, and self-pay cost. All data were obtained from the management operating system database of the hospital. Variance analysis was conducted on the data those were classified into groups divided by vintage and insurance status (the medical insurance group and the non-medical insurance group), based on statistical description.

Results

Growing number of inpatients

Overall, the number of inpatients was on the rise, regardless of methods of payment. Simultaneously, the rate of medical insurance patients increased from 22.2% to 48.7% during the last decade, which indicated a 100% increase (Table 1).

Table 1 The number of cancer inpatients during 2004–2013 (*n*)

	Medical insurance	Non-medical insurance	Total
2004	657 (22.2%)	2298 (77.8%)	2225
2005	662 (22.6%)	2261 (77.4%)	2787
2006	767 (25.7%)	2219 (74.3%)	2718
2007	897 (28.7%)	2225 (71.3%)	2955
2008	806 (30.2%)	1863 (69.8%)	2923
2009	884 (31.4%)	1933 (68.6%)	2986
2010	1585 (38.4%)	2542 (61.6%)	3122
2011	1783 (39.9%)	2678 (60.1%)	4461
2012	2189 (43.8%)	2812 (56.2%)	5001
2013	2787 (48.7%)	2939 (51.3%)	5726
Total	13017	23770	36787

Shorter average length of hospital stay

The average length of hospital stay significantly reduced among medical insurance and non-medical insurance cancer patients (21 d vs. 17 d; *P* = 0.000; Tables 2 and 3). In addition, patients with medical insurance had a significantly shorter hospital stay as compared to those without insurance (17.1 d vs. 18.2 d; *P* = 0.000; Fig. 1).

Table 2 The average hospital stay and hospitalization expenses of cancer inpatients during 2004–2013

	Average hospital stay (day)	Average hospitalization expenses (¥/time)	Average hospitalization expenses (¥/day)
2004	17.5 ± 0.30	16812.52 ± 421.47	948.19 ± 16.65
2005	17.9 ± 0.30	18748.59 ± 423.41	1046.39 ± 16.72
2006	17.5 ± 0.29	19429.19 ± 417.24	1109.86 ± 16.48
2007	17.9 ± 0.29	20228.71 ± 406.68	1127.35 ± 16.06
2008	17.0 ± 0.31	22214.36 ± 438.29	1293.06 ± 17.31
2009	16.5 ± 0.30	23008.44 ± 426.33	1411.18 ± 16.84
2010	17.5 ± 0.24	26209.36 ± 350.78	1470.23 ± 13.86
2011	17.2 ± 0.57	28914.45 ± 438.29	1678.22 ± 15.32
2012	17.6 ± 0.31	29706.32 ± 412.67	1728.38 ± 16.76
2013	17.1 ± 0.32	30122.42 ± 409.66	1701.02 ± 16.08
<i>F</i>	24.698	98.326	268.122
<i>P</i>	0.000	0.000	0.000

Table 3 The average hospitalization expenses and length of hospital stay of cancer inpatients with different payment modes

	Average hospital stay (day)		Average hospitalization expenses (¥/time)		Average hospitalization expenses (¥/day)	
	M.I.	Non-M.I.	M.I.	Non-M.I.	M.I.	Non-M.I.
2004	16	20	14077.76	18991.41	885.16	1025.07
2005	17	19	16697.93	20732.55	976.68	1107.79
2006	17	19	17221.64	21472.36	1020.55	1174.33
2007	16	18	16575.29	22869.21	1037.76	1191.97
2008	16	18	21204.13	23761.37	1256.94	1292.54
2009	18	18	22286.66	24400.19	1302.46	1365.78
2010	17	18	23242.58	26548.68	1341.08	1474.53
2011	18	18	24656.25	25400.19	1369.32	1411.46
2012	18	17	23778.73	27761.37	1320.21	1632.54
2013	18	17	27702.58	28548.68	1628.25	1682.22

Note: M.I., Inpatients with medical insurance; Non-M.I., Inpatients without medical insurance



Fig. 1 The average length of hospital stay of cancer inpatients with different payment modes (M.I., Inpatients with medical insurance; Non-M.I., Inpatients without medical insurance)

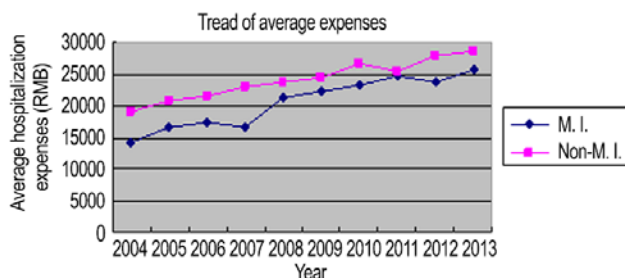


Fig. 2 The average hospitalization expenses across time (M.I., Inpatients with medical insurance; Non-M.I., Inpatients without medical insurance)

Variation in the average hospitalization expenses

The average hospitalization expenses of medical insurance patients varied over the last decade. Although a general upward trend was observed, a relative depression was observed in 2007 and 2012 (Table 3). On the other hand, the hospitalization cost exhibited a rapidly rising trend in non-medical insurance patients (Fig. 2), whose average hospitalization expenses were significantly higher than those with medical insurance ($\text{¥}24048.6 \pm \text{¥}4376.28$ vs. $\text{¥}20544.36 \pm \text{¥}4057.01$; $P = 0.000$).

Variation in the average self-pay cost

The medical insurance policy in Shenyang has gone through major changes thrice. However, despite these changes, the average self-pay cost of medical insurance patients exhibited an upward trend, especially in the same policy year (Table 4).

Discussion

According to recent data, cancer is the primary cause of death among Chinese urban residents, surpassing cardio-cerebrovascular disease and heart disease. Consequently, it brought about a direct economic loss of about $\text{¥}70\,328$ billion, an indirect economic loss of about $\text{¥}37\,268$ billion, and a total economic burden of $\text{¥}107\,596$ billion in 2006, which was 0.51% of the GDP of that year. This was

Table 4 The indicators of self-pay cost in medical insurance patients

	Average self-pay cost (¥)	Self-pay ratio	The starting payment standard (¥)
2004	2876.66	15%	900
2005	3025.71	15%	800
2006	3099.03	14%	800
2007	3180.54	14%	1000
2008	3828.58	14%	1000
2009	4152.13	14%	1000
2010	4265.96	14%	1200
2011	4315.66	13%	1200
2012	4468.89	13%	1200
2013	4694.38	13%	1200

equivalent to 4.67% of the total medical cost for that year [3-4]. Thus, cancer has already been the highest source of economic burden caused by NCD in China [5].

Currently, the Chinese basic medical insurance system adopts the medical costs of the social pool by combining with personal accounts. One of the key objectives of the medical insurance system reform is to control the unreasonable increase in medical expenses. Thus, identifying ways to decrease healthcare costs and defining the factors that influence medical cost, with special reference to quality of the medical security system are core concerns for both doctors and patients [6].

The results of the present study demonstrated that the average length of hospital stay of cancer inpatients has shortened during the last decade. Additionally, the related gap between cancer patients with and without medical insurance has also been narrowing gradually. This may be attributed to the continuous improvement in the diagnosis and treatment of cancer. Further, the normalization and standardization of cancer diagnosis and treatment technology has led an increasing number of patients to accept internationally recognized norms of best practices in the therapeutic regimen, regardless of their methods of payment.

The average hospitalization expenses have exhibited an increasing trend in both kinds of patients, which may be related to the use of new techniques, advanced equipment, and targeted molecular medicine, as well as the overall increase in prices. It is interesting to note that there was a remarkable drop in the relative costs for medical insurance patients in 2007 and 2012. A review of the relevant policy document on medical insurance in Shenyang [7] reveals that the 2007 was the first year of the implementation of the Shenyang Urban Employee Basic Medical Insurance System, while the medical insurance system for Shenyang urban residents was also set up in 2007. Thus, the two instances of drop in hospitalization expenses coincide with the implementation of fresh policies. This partly reflects that the medical insurance policy has played a role in reducing the economic burden on

cancer patients.

In addition, comparing our findings with the hospitalization cost data of designated medical institutions bulletined by the Shenyang medical insurance management center^[8], we found that, for the same disease, the expenses were different in the different kinds of medical insurance systems availed by the patients. Considering the differences in hospital grades, which might be related to many factors such as hospital conditions, (e.g., scale, medications, armarium, medical technology, etc.) as well as patients' condition and hospital stay^[9-10].

Since its implementation in 2004, the medical insurance payment policy of Shenyang has been revised thrice, in 2005, 2007, and 2009, which was reflected in the mixed self-pay cost volatility, the yearly increase in the total cost, the reduction in the ratio of self-pay by one percent as compared to that before 2005, and to an extent, the successful limiting of the increase in the average self-pay cost for cancer patients. Furthermore, along with an increasing medical insurance amount, the related government departments have simultaneously strengthened their management system; limited the use of medicines, diagnostic tools, and treatments, which, beyond the medical insurance directory, try to guide the public about reasonably consuming medicines; and ensured the hospitalization of patients in medical institutions appropriate to their medical condition by means of policy instruments like grading subsidies, regular publicity, and so on. Consequently, in Shenyang's large-scale, Grade A, Class Three medical institution that was examined in the present study, we can found that the starting payment standard has a remarkable increase after 2007, indicating that the medical institution leverages the policy for bypass patients, and rationally distributing and using medical resources.

On July 22, 2001, the 8th general meeting of the Shenyang Municipal Government passed a resolution to officially implement the Shenyang Urban Employee Basic Medical Insurance System. With this Shenyang entered the medical insurance era. Currently, despite the completion of twelve years since the implementation of this system, some people receive lower insurance because of the lack of awareness of its importance. However, an increasing number of citizens of Shenyang are joining the medical insurance scheme owing to the vigorous propaganda conducted by relevant authorities and media, as well as the actual benefits they experienced on hospitalization. By the first half of 2011, 52 329 individuals participated in the Urban Employee Basic Medical Insurance Scheme, while the Shenyang Urban Residents' Medical Insurance covered 961 039 people, including 254 900 university students. The total insured sum was 4 257 800. This year, the proportion of hospital reimbursement under the Urban Employee Basic Medical Insurance has increased to 75%,

and there has been a 10% rise, from 60%, in the reimbursement under the Urban Residents Medical Insurance. Further, the upper limit for the pay has increased from 26 thousand to 100 thousand^[11], following unremitting expansion of the diseases and drugs covered by medical insurance. Thus, more people will benefit from medical insurance, which will gradually become the major payment mode for medical costs.

Provide basic medical care for all citizens as a public product requires the realignments of the concepts and systems for medical treatment and public health China. This is also the focal point of new medical reform. Globally, most countries attach primary importance to maintaining the fairness of healthcare because it is the foundation of social equity. Strengthening government responsibility is at the core of the basic health system, to facilitate provision of basic medical care for the public, to improve the health of the population, and to promote social harmony and fairness^[12].

By 2013, the total health expenditure of China had exceeded 8208 billion and the growth rate of per capita medical expenses had reached 20%, which imposed substantial pressure on the health insurance funds. Consequently, the Ministry of Human Resources and Social Security recently released the "Opinions on Further Boosting the Reformation of Medical Insurance Payment," emphasizing on risk pooling between health insurance funds and medical institutions as the principle for healthcare reform in China. This implies that the focus is now on standardizing medical services and controlling medical fees without increasing individual monetary burden. Further, the present the reforms implemented in the medical insurance payment aim to ensure strengthening of total control, exploring total cost prepaid, capitation at outpatient facilities, and pay for diseases at hospitals and outpatient services for serious illnesses. Thus, the current medical insurance system will gradually shape into a payment system that attaches equal importance to encouraging and restraining the development of the basic medical insurance system.

The so-called prepaid total cost of medical insurance indicated the average medical costs determined by the Department of Medical Insurance by assessing medical institutions and paying standardized medical costs, in advance, to the hospital, according to this expense standard. In case actual costs exceed this advance payment, the excess portion must be borne by the hospital. This system has been widely adopted in the Western and Taiwan area of China, because it can effectively control medical expenses^[13]. As compared with paying for service items, which is currently adopted in most parts of China, the prepaid total cost enhances the medical conduct control, suppresses over-investigation and over-treatment, and consequently reduces patients' medical costs. Shanghai

has been a pilot area for this system. The Medical Insurance Bureau in Shanghai annually negotiates the total cost of medical insurance with hospitals, which has facilitated the control of the rapid rise in medical insurance expenses. Indeed, this system seems useful for perfecting the medical insurance payment policy for other areas nationwide.

Conclusion

Our study retrospectively analyzed all information related to cancer inpatients from the last decade, in one hospital. However, considering the disease in question, and the substantial differences between clinical services, treatment, and outcomes, we did not subdivide the sample according to the types of disease, stages, or other influencing factors. Therefore, further investigation would be required to look at these factors. In future, we plan to horizontally compare the data among different hospitals in Shenyang, focusing on the effect of medical insurance for cancer inpatients, to provide insights to improve the medical insurance payment policy.

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Conflicts of interest

The authors indicated no potential conflicts of interest.

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