



Inpatient Expenditure of the Decedent Elderly in Japan

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

End-of-life healthcare expenditure has much to do with the Japanese Government's policies of promoting integrated care in communities and promoting end-of-life care at home or at nursing homes rather than at hospitals. We analyzed healthcare expenditure for decedent elderly during the one year prior to death, focusing on inpatient expenditure and place of death as well as differences between males and females.

The share of inpatient expenditure was 78 percent for the decedent elderly as a whole, compared to 45 percent for the whole elderly population. Monthly inpatient expenditure of those decedent elderly who received inpatient care consecutively in the final 4 months, increased gradually as death month approached for each age group. However, a sharp increase was found in only a small portion of this group. Place of death was quite related to the healthcare expenditure during the one year prior to death, and frequency of inpatient care use in the final year is as important as place of death in determining the level of healthcare expenditure.

Keywords: End-of-life; healthcare expenditure; decedent elderly; place of death; frequency of inpatient care use.

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1. INTRODUCTION

Japanese life expectancy at birth is about 84 years (80.5 for males and 86.8 for females in 2014), and it is expected to increase another 4 years in 2060 (84.2 for males and 90.0 for females). In accordance with further population ageing, the Japanese Government has been pursuing the policy of promoting integrated care in communities to contain healthcare expenditure as well as long-term care expenditure. As more than half of the total healthcare expenditure is consumed by the elderly aged 65 years old or over in Japan, containing healthcare expenditure mainly means containing healthcare expenditure for the elderly. End-of-life healthcare expenditure is certainly expensive, but containing it is not far from enough in order to contain the total healthcare expenditure. However, an upward shift of per capita healthcare expenditure for the very old elderly in recent years in Japan has again increased the concerns regarding end-of-life healthcare expenditure for the elderly [1]. The Japanese Government has been promoting end-of-life care at home or at nursing homes, rather than at hospitals, which is expected to increase patients' choices of places to get care [2].

Using the National Database of Health Insurance Claim Information and Specified Medical Checkups (Note 1; we abbreviate as the National Database of CI hereafter), we analyzed healthcare expenditure for decedent elderly during the one year prior to death. Healthcare expenditure for the decedent elderly varied greatly depending on the use of inpatient services, which turned out to be the main factor behind the increase in the healthcare

expenditure for the decedent elderly as the month of death approached [1]. Therefore, our main focuses in this paper are inpatient expenditure and place of death as well as differences between males and females. From the National Database of CI, we obtained health insurance claim information during the one year prior to death for those who died in fiscal 2011 and 2012. The characteristics and bias of the data is described in Fukawa (2015). Our main conclusion is that healthcare expenditure for the decedent elderly is certainly characterized by high share of inpatient expenditure, but steep rise in monthly inpatient expenditure as death month approaches is rare, and frequency of inpatient care use in the final one year is as important as place of death in determining the level of healthcare expenditure of the decedent elderly.

2. SHARE OF INPATIENT EXPENDITURE AMONG THE DECEDENT ELDERLY IN JAPAN

The total number of decedent elderly aged 65 years old or over was about 921 thousand, and average healthcare expenditure for one year prior to death was about 3.3 million yen. The average decreased sharply with age increase from 4.5 million yen for age group 65-69 to 2.2 million yen for age group 95+ (Table 1). The share of inpatient expenditure, 78 percent for decedent elderly as a whole (Note 2), increased gradually with age increase. Fig. 1 shows the average expenditure and share of inpatient expenditure by sex and age group. Females tend to use inpatient care more than males at 70 years old or over.

Table 1 Average healthcare expenditure for one year prior to death and share of inpatient expenditure by age group: Both sexes

Age Group	Number of Data	Average healthcare expenditure for one year prior to death				Those who received no inpatient care for 1 year		Those who received inpatient care consecutively for 1 year	
		Total	Inpatient	Outpatient	Share of inpatient (%)	A (%)	B	A (%)	B
		thousand yen							
65-69	53,202	4,532	3,355	1,177	74.0	2.9	951	5.3	7,946
70-74	89,041	4,280	3,223	1,057	75.3	3.1	876	5.5	7,973
75-79	140,686	3,878	2,991	887	77.1	3.6	894	5.9	7,689
80-84	215,331	3,343	2,622	721	78.4	4.7	784	5.9	7,282
85-89	210,262	2,895	2,311	585	79.8	6.5	723	6.5	6,915
90-94	138,640	2,515	2,034	482	80.9	9.9	667	7.5	6,554
95+	73,746	2,237	1,818	419	81.3	15.8	624	9.0	6,182
65+	920,908	3,269	2,555	714	78.2	6.4	729	6.5	7,092

Note: A = proportion of those people in percent, and B = average healthcare expenditure for one year prior to death in thousand yen.

Among 921 thousand decedent elderly, we focus on two extreme cases: those who received no inpatient care for the entire one year prior to death, and those who received inpatient care consecutively for one year (Table 1). The average healthcare expenditure for one year prior to death of the former, representing 6.4 percent of total decedent elderly, was about 0.7 million yen for 65+, and the average expenditure of the latter, representing 6.5 percent of the total, was quite high (7.9 million yen for age group 65-69 and 6.2 million yen for age group 95+). In the next section, we deal with those decedent elderly who received inpatient care consecutively in the final 4 months. The number of those people was around 21-22 percent of total decedent elderly at each age group, and the average healthcare expenditure for one year prior to death of those people was 7.3 million yen for age group 65-69 and 5.1 million yen for age group 95+.

3. THOSE WHO RECEIVED INPATIENT CARE CONSECUTIVELY IN THE FINAL 4 MONTHS

The average healthcare expenditure for one year prior to death of those decedent elderly who

received inpatient care consecutively in the final 4 months, 197 thousand and representing 21.4 percent of the total, was about 6.1 million yen for 65+. In this section, focusing on these people we analyzed how monthly inpatient expenditure increased as death month approached. The objects were classified into 5 categories according to inpatient expenditure level of the month before death month, using average inpatient expenditure X of the month by sex and age group:

[0, 0.7]: inpatient expenditure is less than $0.7X$,

[0.7, 0.9]: inpatient expenditure is $0.7X$ or more but less than $0.9X$,

[0.9, 1.1]: inpatient expenditure is $0.9X$ or more but less than $1.1X$,

[1.1, 1.5]: inpatient expenditure is $1.1X$ or more but less than $1.5X$,

[1.5, ∞): inpatient expenditure is $1.5X$ or more.

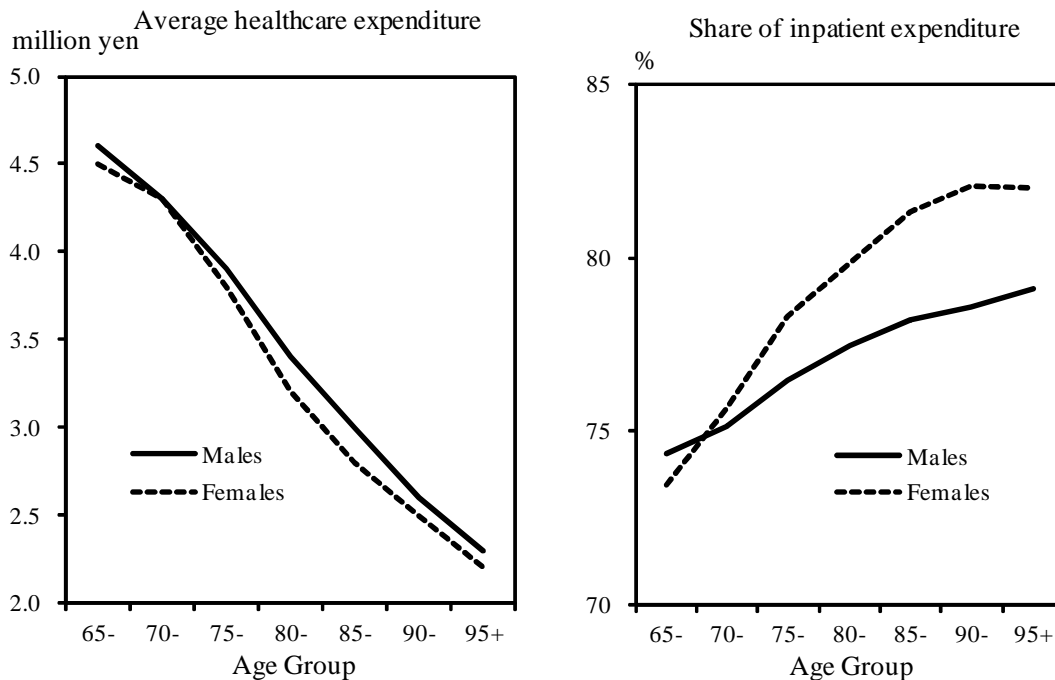


Fig. 1. Average healthcare expenditure for one year prior to death and share of inpatient expenditure by sex and age group

Fig. 2 shows average monthly inpatient expenditure by age group (a) and by category (b). The horizontal axis shows the number of months before death month, and fourth month before death month as well as death month is omitted because they do not necessarily include one full month due to the nature of the Health Insurance claim information file. Monthly inpatient expenditure decreased with age increase, but it increased gradually as death month approached for each age group. However, a sharp increase was found only at the highest category [1.5, ∞], which represented 12 percent of 197 thousand.

Fig. 3(a) shows the proportion of the highest category to the total decedent elderly by age group, and Fig. 3(b) shows average monthly inpatient expenditure of the highest category by age group. Among those decedent elderly who received inpatient care consecutively in the final 4 months, a sharp increase in monthly inpatient expenditure as death month approaches was found only at the highest category (12 percent of them). In the highest category, a sharp increase was found in each age group, but the number corresponded to only 2.6 percent of the total decedent elderly.

4. ANALYSIS OF THOSE WITH LOW AND HIGH HEALTHCARE EXPENDITURE AMONG DECEDENT ELDERLY

Using average healthcare expenditure for decedent elderly during the one year prior to death by sex and age group (Y), we defined those with Low expenditure as less than half of average and those with High expenditure as more than double of average. As for place of death, we used the following abbreviation:

In: died in medical facilities,

In-L: died in a long-term bed in a medical facility,

Out: died outside medical facilities (homes, welfare facilities, etc.),

Out-no inp: died outside medical facilities, and received no inpatient care during the one year prior to death.

For comparative purpose, we denote “Little inp” as those decedent elderly who received inpatient care less than three months (Note 3) during the one year prior to death.

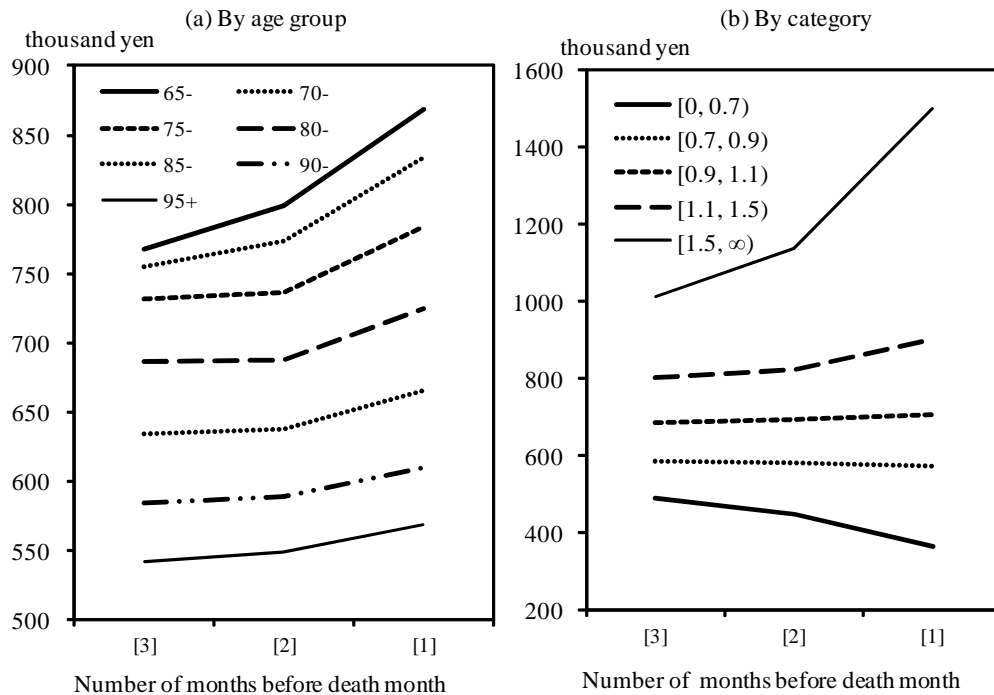


Fig. 2. Average monthly inpatient expenditure by age group and by category for those who received inpatient care consecutively in the final 4 months: Both sexes

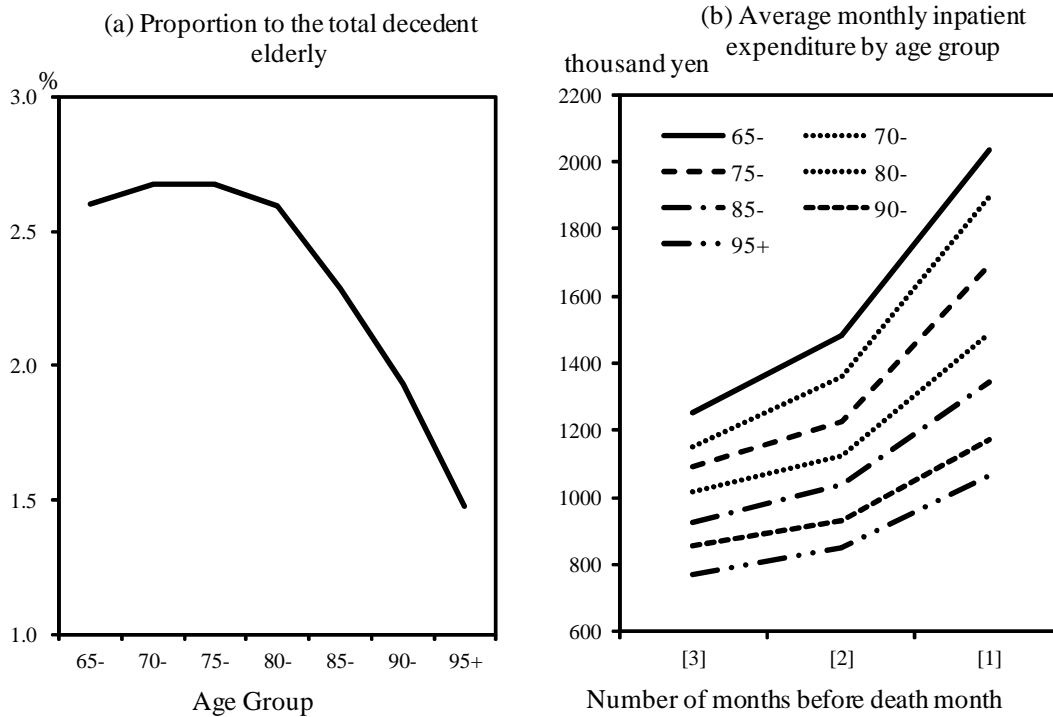


Fig. 3. Proportion of the highest category to the total decedent elderly and average monthly inpatient expenditure of the highest category by age group: Both sexes

Table 2 shows the shares of those with Low and High healthcare expenditure by sex and age group. The value of Y is also shown in the Table. As for age group total, the share of Low was 30.9 percent for males and 35.0 percent for females, and the share of High was 10.7 percent for males and 12.8 percent for females. The average expenditure of Low was less than 30 percent of

the age group average for each age group, and the average expenditure of High was more than 260 percent of the age group average. Among those decedent elderly who received inpatient care consecutively for one year, the percentage of those who belongs to Low was almost zero and 54 percent belonged to High.

Table 2 Shares of those with Low and High healthcare expenditure by age group and sex

Age Group	Males						Females					
	Number of Data	Y	Low		High		Number of Data	Y	Low		High	
			A (%)	B (%)	A (%)	B (%)			A (%)	B (%)	A (%)	B (%)
65-69	34,394	4,572	26.9	26.1	8.5	267.9	18,808	4,459	26.7	25.9	8.6	267.8
70-74	58,910	4,295	27.2	27.0	8.7	264.4	30,131	4,252	28.4	26.1	9.0	269.0
75-79	89,443	3,936	28.5	28.4	9.4	264.2	51,243	3,777	30.5	26.8	10.0	266.1
80-84	126,084	3,415	29.5	29.0	10.5	263.3	89,247	3,241	32.5	27.5	11.7	265.3
85-89	100,129	2,989	30.5	29.3	11.4	266.2	110,133	2,810	34.1	27.6	13.1	266.3
90-94	47,039	2,613	31.4	29.3	12.0	269.0	91,601	2,465	35.5	27.2	13.7	274.0
95+	17,660	2,343	33.0	28.7	12.3	275.9	56,086	2,204	37.7	25.9	14.5	283.5
65+	473,659	3,497	30.9	28.3	10.7	267.1	447,249	3,027	35.0	26.6	12.8	269.7

Note: Y=Average healthcare expenditure for one year prior to death by sex and age group, in thousand yen.

A=Proportion of those people. B = Average healthcare expenditure for those people / Y

Table 3 shows average healthcare expenditure for one year prior to death by age group and place of death. Among decedent elderly as a whole, 88 percent died in medical facilities and 12 percent outside medical facilities. For age group 65-69, 93 percent died in medical facilities, compared to 76 percent for age group 95+. Average annual expenditure of those who died in medical facilities was about two times higher than that of those who died outside medical facilities. However, average annual expenditure of those who died in a long-term bed in a medical facility was much higher for all age groups. Average annual expenditure of those who died outside medical facilities without receiving any inpatient care during the one year prior to death was quite low (Table 1). In each case, average healthcare expenditure for one year prior to death decreased with age increase (Out-no inp for age group 75-79 was the only exception).

The data for Little inp are also shown in Table 3 for reference. The number of Little inp was about half of the total decedent elderly (from 39 percent for age group 65-69 to 60 percent for age group 95+), and average annual expenditure of them was as low as that of those who died outside medical facilities.

Fig. 4 shows average healthcare expenditure for one year prior to death and share of inpatient expenditure by sex, age group and place of death. Average annual healthcare expenditure for males is usually higher than that of females, but this is not the case for those who died in a long-term bed in a medical facility. Concerning the share of inpatient expenditure, sex differences were particularly clear for those who died in medical facilities.

Fig. 5 shows the shares of those with Low and High healthcare expenditure by sex, age group and place of death. For those who died outside medical facilities, the share of Low was from 55 percent for age group 65-69 to more than 60 percent for age group 95+, and the share of High was almost zero for every age group. On the contrary, for those who died in medical facilities, the share of Low was below 30 percent for all age groups, and the share of High increased from 9 percent for age group 65-69 to 15 (males)-19 (females) percent for age group 95+. The increase in the share of High was especially remarkable for those who died in a long-term bed in a medical facility.

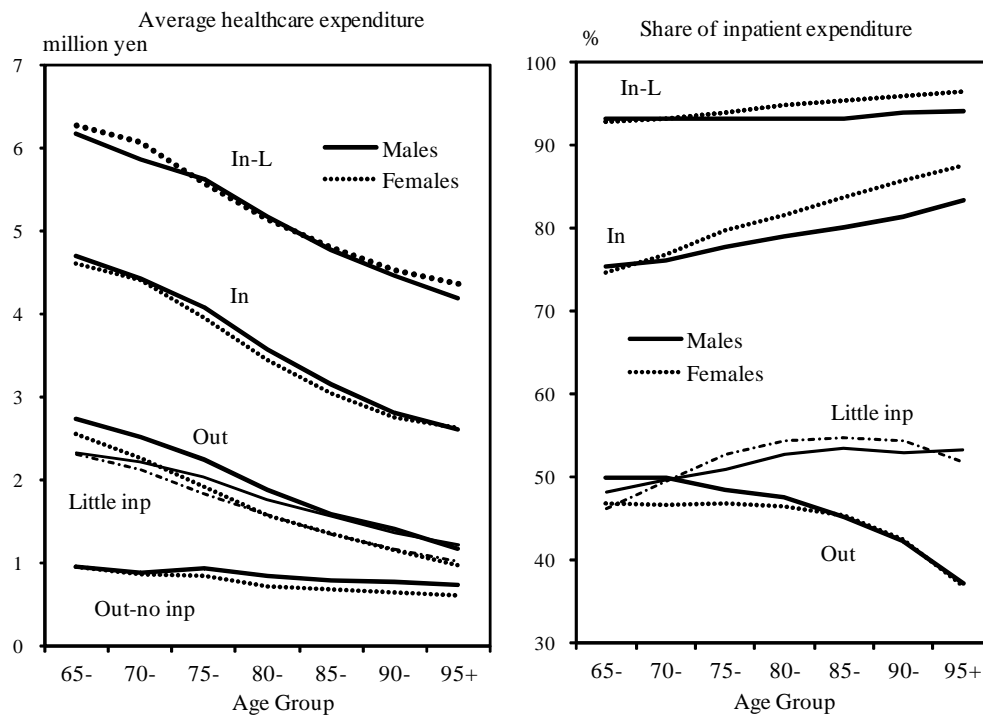


Fig. 4. Average healthcare expenditure for one year prior to death and share of inpatient expenditure according to place death

Table 3 Average healthcare expenditure for one year prior to death by age group and place of death

Age Group	Medical facility						Outside medical facility			Those who received only little inpatient care for one year		
	Total			Long-term bed			Total			A	B	C
	A (%)	B	C (%)	A	B	C	A	B	C			
65-69	93.1	4,670	75.1	3.8	6,202	93.1	6.9	2,661	48.8	39.2	2,318	47.5
70-74	92.8	4,424	76.4	5.1	5,933	93.3	7.2	2,418	48.8	40.4	2,179	49.6
75-79	92.0	4,033	78.5	7.4	5,606	93.5	8.0	2,113	47.8	43.1	1,956	51.6
80-84	90.4	3,512	80.1	9.4	5,164	93.9	9.6	1,741	47.1	47.7	1,684	53.4
85-89	88.0	3,093	82.0	11.8	4,790	94.5	12.0	1,442	45.3	52.0	1,448	54.1
90-94	83.4	2,774	84.2	14.0	4,502	95.3	16.6	1,216	42.4	55.4	1,229	53.8
95+	76.3	2,619	86.5	16.0	4,320	96.1	23.7	1,004	36.9	59.5	1,064	52.2
65+	88.3	3,496	80.1	10.1	4,929	94.5	11.7	1,550	45.2	48.9	1,594	52.4

Note: A = Proportion of those people in percent.
 B = Average healthcare expenditure for one year prior to death in thousand yen.
 C = Average inpatient expenditure / B

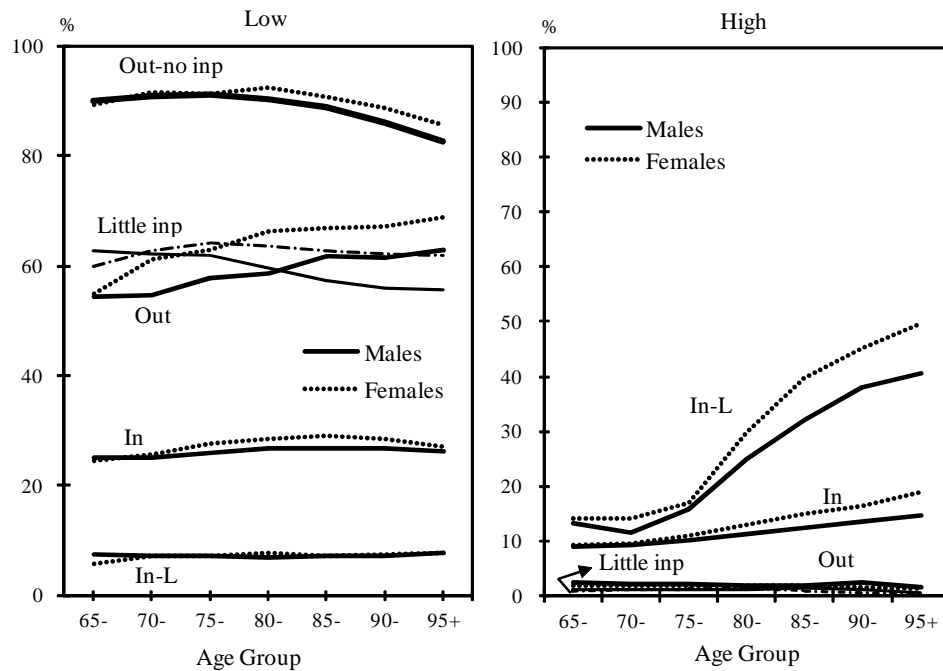


Fig. 5. Share of Low and High healthcare expenditure by sex, age group and place of death

5. DISCUSSION

A challenge facing all developed countries is to provide adequate health, nursing and long-term care services to the older population at an affordable cost, and to improve the quality of the services rendered with a view of the ageing of the general population, changes in family structures and financial constraints [3]. As adults live into their 80s and beyond, they are more likely to live with multiple chronic conditions and

functional limitations, and this combination is associated with a greater likelihood of emergency department visits and inpatient hospitalizations as well as higher Medicare spending for inpatient hospital, skilled nursing facility, and home health services [4].

5.1 Main Findings

We analyzed healthcare expenditure for the decedent elderly during the one year prior to

death, using the National Database of CI for fiscal 2011 and 2012. Our main focuses were inpatient expenditure and place of death as well as differences between males and females. The following is a summary of what we found.

- The average healthcare expenditure for the decedent elderly during the one year prior to death decreased sharply with age increase from 4.5 million yen for age group 65-69 to 2.2 million yen for age group 95+. Males were higher than that of females at each age group, on average.
- The share of inpatient expenditure was 78 percent for the decedent elderly as a whole, compared to 45 percent for the whole elderly population. The share of inpatient expenditure was higher for females than males at 70 years old or over.
- The average healthcare expenditure during the one year prior to death for those who received no inpatient care for the entire one year, representing 6.4 percent of the total, was the lowest (0.7 million yen), and the average for those who received inpatient care consecutively for one year, representing 6.5 percent of the total, was the highest (7.1 million yen).
- Average monthly inpatient expenditure of those decedent elderly who received inpatient care consecutively in the final 4 months, representing 21.4 percent of the total, increased as death month approached for each age group, but a sharp increase in monthly expenditure was found only in 12 percent of them, corresponding to only 2.6 percent of the total decedent elderly.
- If we define healthcare expenditure level of each decedent elderly by using average healthcare expenditure during the one year prior to death by sex and age group, the shares of both Low and High were higher for females than males, and 54 percent of those who received inpatient care consecutively for one year belonged to High.
- Average annual healthcare expenditure of those who died in medical facilities was about two times higher than that of those who died outside medical facilities. Average annual expenditure of those who died in a long-term bed in a medical facility was much higher, and average annual expenditure of those who died outside medical facilities without receiving any

inpatient care during the one year prior to death was quite low.

- Average annual expenditure of those who received only little inpatient care in the final year was as low as that of those who died outside medical facilities.
- For those who died outside medical facilities, the share of Low was high (around 60 percent) and the share of High was almost zero, but for those who died in medical facilities, the share of Low was below 30 percent and the share of High increased with age increase (from 9 percent for age group 65-69 to 15-19 percent for age group 95+).

Healthcare expenditure for decedent elderly during the one year prior to death was, on average, 5.0 times than the annual healthcare expenditure for surviving elderly, but the former drastically decreased with age increase, thus the rise in healthcare expenditure at the terminal stage did not greatly affect the overall healthcare expenditure for the elderly [1]. Also in the USA, the per capita costs for decedents decreased with increasing age while survivor costs increased with age [5]. Compared to an age-sex matched survivor cohort during the same period, decedents consumed 6.7 times greater mean cost in Canada, and end-of-life cost is driven largely by an increase in inpatient hospital costs during the last 120 days of life [6].

From 1978 to 2006, the share of Medicare payments allotted to individuals in their last year of life decreased from 28.3 percent to 25.1 percent in the USA [7]. End-of-life healthcare expenditure is certainly expensive, but it has not had a commanding share in the total healthcare expenditure for the elderly in Japan. Therefore, the efficiency of the healthcare system in general is required to contain the total healthcare expenditure [1].

There were substantial differences in health care utilization in the last six months of life between places of death, and place of death was significantly associated with age, sex, region and multiple chronic conditions [8]. In Massachusetts and California, expenditures in the last year of life are highest for those who died in an inpatient setting, lower for those who died in a nursing home, and lowest for those who died in a residence, though the pattern of decreasing end-of-life cost with age is consistent across these sites [9]. The likelihood of dying in hospital in the USA depends not on patient preference but on

the number of hospital beds and physicians per head, which varies geographically [10]. In the USA, end-of-life costs vary based on the site of death as hospitals tend to be almost twice as expensive as other locations, such as one's home, and hospice care is another option for end-of-life care that may provide an experience closer to patients' needs and preferences [11].

Decedent elderly as a whole, 88 percent died in medical facilities and 12 percent outside medical facilities in Japan, despite the fact that most Japanese patients prefer to die at homes rather than in hospitals. Average healthcare expenditure for one year prior to death of the former was about two times higher than that of the latter. The issue is that average annual expenditure of those who died in a long-term bed in a medical facility was much higher for all age groups, raising such questions in Japan as if it is effective and affordable.

Decedents who were hospitalized in their last few months remained around 63 percent (the percent with multiple hospitalizations increased from 20 to 27 percent from 1978 to 2006), but survivors had substantially lower and more stable hospital utilization rates in the USA [7]. In Japan, average annual expenditure of those who used only little inpatient care in the final one year, representing about half of the total decedent elderly, was as low as that of those who died outside medical facilities. Therefore, frequency of inpatient care use in the final one year is as important as place of death in determining the level of healthcare expenditure of decedent elderly.

An ageing population, increasing diversity and changing patterns of death and disability are driving demand for changes in the way care is financed as well as how it is provided. Current medical developments allow us to live prolonged lives, but we often contract diseases that are often chronic and disabling before death. Changes in financing and access are necessary so that good end-of-life care is the norm rather than the exception, and the new system should clearly define and measure essential elements for quality end-of-life care, support patient and family preferences, and provide them with knowledge of their options so they can make optimal, informed decisions about end-of-life care [11].

Time to death and age at death have significant effects on healthcare expenditure. As individuals approach death, those living in more deprived areas are less likely to be hospitalized than those

individuals living in the more affluent areas [12]. In Canada also, higher care cost for urban residents prior to death was found, and there are many potential reasons for higher urban costs, including improved access to care, and differences in inpatient preferences with respect to places of care near the end of life [6].

Introducing interventions that reduce or delay institutional care will likely reduce costs incurred at the end of life. Some hospitalizations and other health care use near the end of-life may be appropriate, but some hospitalizations at the end of life can be potentially preventable. It seems prudent, from a direct cost perspective, to identify and target the modifiable predictors of LTC entry so that people may stay at home longer with supports [6]. Per capita healthcare expenditure for the very old age group has increased again in recent years in Japan, suggesting that elderly Japanese patients tend to receive more intensive inpatient care including tube feeding [1]. Medicare per capita spending is higher, on average, for older beneficiaries compared to those in their 60s and 70s, but at the same time, the pattern of increasing per capita spending until beneficiaries are in their mid-90s raises questions as to whether beneficiaries are getting the appropriate mix of services as they age and whether more could be done to improve the management and delivery of medical care for aging Medicare beneficiaries [4]. Therefore, we need more evidences on the terminal care expenditure, in order to discuss an equitable and efficient distribution of healthcare resources among age groups, and between surviving patients and those in terminal care [3].

5.2 Limitations of this Study

Although our data has limitations as mentioned in Fukawa (2015), our results are still based on a large scale micro data, and we believe they are useful for policy discussion.

6. CONCLUSION

Healthcare expenditure for the decedent elderly in Japan was expensive due to high inpatient expenditure, but steep rise in monthly inpatient expenditure as death month approaches was not common. Most notable problem is that average annual expenditure of those who died in a long-term bed in a medical facility was quite high. Some hospitalizations at the end of life can be potentially preventable, and it is quite important to reverse the trend that elderly Japanese

patients tend to receive more intensive inpatient care including tube feeding than they wish.

(Note 1) The National Database of Health Insurance Claim Information and Specified Medical Checkups has recently made available for public use, although access is still limited. A patient's Health Insurance claim information file is issued monthly per medical facility, and we used longitudinal data for each patient.

(Note 2) The equivalent figure for the entire elderly population (namely, alive and decedent) was 45 percent according to the National Healthcare Expenditure for FY 2013.

(Note 3) Less than three months actually means less than three claim information files. As mentioned in Note 1, a patient's Health Insurance claim information file is issued monthly per medical facility, and one month does not necessarily mean 30 days.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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