

Does hospice service associated with efficient healthcare costs among terminal lung cancer patients ?

Hospital charges per day of lung cancer patients at their end of life; A retrospective cohort design of 2010-2018

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Introduction

- Hospice palliative care is medical care aimed at improving the quality of life for terminal cancer patients and their families through comprehensive assessment and treatment of the physical, psychosocial and spiritual areas, including relief of pain and symptoms.
- The healthcare costs of cancer patients were markedly increased to show a "U" shape at the first stage of diagnosis and at the end of life. Especially during the last months of life, hospital charges are known to increase rapidly
- Over the past decades, Cancer is the one leading cause of death in Korea, the latest statistics indicate that in 2016, there were 25,780 incident lung cancer cases (out of a total of 229,180 cancer cases; 69% male), 18,658 deaths (out of a total of 79,729 deaths; 74% male) in Korea
- The share of hospice use among all cancer deaths was 17.5% in 2016 and 20.0% in 2017, up from 7.3% in 2008. However, in 2011, the figure far behind the United States (52.0%), the United Kingdom (46.6%), Canada (40.8%) and Taiwan (39.0%), etc.
- From July 2015, South Korea started applying national health insurance reimbursement to inpatient hospice services, and it is now appropriate time to evaluate how hospice care associated with healthcare costs using national health insurance claims data among terminal lung cancer patients.
- The purpose of this study was to investigate how the hospice program for lung patients were associated with end of life healthcare expenditure of lung cancer patients using Korean Nationwide Health Insurance(NHI) Claims.

Methods

- We used nationwide newly diagnosed lung cancer patients' health insurance claims during 2010-2018 which accounted for 236,165 patients. We transposed the dataset into a retrospective cohort design study that the unit of analysis is information of each lung cancer patient.
- Then hospital charges and utilization were estimated for each patient according to six months, three months, and one month before death.
- We selected study population as death after July 2016 and we have observed hospice service users' healthcare expenditure before death by different time frame comparing with non-hospice service users. A control group(non-service users) was selected based on the propensity score matching using survival time, age group, gender, and diagnosed year.
- Finally, the difference in healthcare expenditures was investigated by the initial use of hospice services before death among hospice service users.

National Health Insurance Service–National data

- During 2010-2018
- Claim patients (Diagnosed C34 ; ICD-10)
- 236,165 Patients (6,407,518 claims)

Transpose claims data in to retrospective cohort design

- Unit of analysis : Each case → Each patient : Retrospective cohort design
- Estimation of Healthcare expenditure before death by various time frame ; six months, three months, and one month before death

Selecting Criteria

- Deaths after July 2016 ; To select the diagnostic case of the deceased
- Excluding: One month before death total spending less than KRW 600,000(About \$500 USD)
- Total : 26,901 Patients

Target classification

- Case group: Hospice service users ; Hospice Usage Code Since July 2015 ; 4,136 Patients
- Control group: Non-hospice service users ; 4,136 Patients
- Propensity score matching used; survival time, age group, sex, diagnosed year

Total population for Analysis

- Total 8,272 Patients in analysis
- Generalized Linear Model (GLM) analysis to determine the effect of hospice use on healthcare expenditure in end-of-life patients with lung cancer
- Additionally, the difference in healthcare expenditures was investigated by the different initial use of hospice services before death (by 15 day unit).

Flow Chart of Subject Selection

Results

- The total study subjects were 8,272 patients(male:6,076(73.5%), female:2,196(26.5%)). The average survival time of hospice service users was 434 days, and the average survival time of non-hospice service users was 434 days.
- Hospice service users were associated with lower hospital charges per day as they close to death than non-hospice service users.

Variables	Total(n=4,896)	Hospice service users(N=2,448)		Non-hospice service users(N=2,448)	
	means	means	STD	means	STD
Survival time (day)	434.0	434.0	439.5	434.0	439.5
Total spending (KRW)	27,441,090	29,502,693	23,172,093	25,379,487	23,969,946
Length of stay (day)	108.5	113.4	107.9	103.6	113.6
Daily healthcare expenditure(KRW)					
One month before death	267,310	253,912	108,366	280,708	290,988
Three month before death	244,736	236,759	143,762	252,713	224,367
Six month before death	245,706	240,503	156,676	250,909	217,202

- With other variables were adjusted, hospice users spent less on hospital charges per day by lung cancer patients at their end of life compared to non-users 27,190 KRW (about \$23) for 1 months before death, 16,185 KRW(about \$14) for 3 months before death, and 10,931 KRW(about \$9) for 6 month before death.

The result of GLM analysis to confirm the impact of hospice on healthcare costs in end-of-life lung cancer patients

Variables	One month before death spending		p-value	Three month before death spending		p-value	Six month before death spending		p-value
	Non-User	Ref		Ref	Ref				
Hospice Service									
	Non-User	Ref		Ref			Ref		
	User	-27,190	<.01	-16,185	<.01		-10,931	<.01	
Age Group									
	80-	Ref		Ref			Ref		
	70-79	37,213	<.01	35,282	<.01		39,842	<.01	
	60-69	48,426	<.01	53,282	<.01		62,212	<.01	
	50-59	88,161	<.01	99,077	<.01		97,634	<.01	
	-49	87,944	<.01	94,490	<.01		114,781	<.01	
Sex									
	Female	Ref		Ref			Ref		
	Male	13,156	0.02	14,508	<.01		12,270	0.01	
Health Insurance									
	Medic Aid beneficiaries	Ref		Ref			Ref		
	Self-employed insured	45,904	0.03	20,575	0.27		23,699	0.20	
	Employee insured	48,818	0.0	22,639	0.21		25,038	0.16	
Income Level									
	Lowest income group	Ref		Ref			Ref		
	Under 25%ile	-31,693	0.11	-20,777	0.22		-21,277	0.21	
	25%ile – 50%ile	-25,703	0.20	-10,378	0.54		-10,684	0.53	
	50%ile – 75%ile	-33,550	0.09	-21,521	0.20		-24,472	0.15	
	75%ile over	-27,367	0.16	-18,004	0.28		-15,408	0.36	
Diagnosed year									
	2010	Ref		Ref			Ref		
	2011	-64,014	0.28	7,586	0.88		-22,549	0.65	
	2012	-51,469	0.36	-26,992	0.58		-54,276	0.26	
	2013	-48,817	0.37	-21,587	0.64		-29,809	0.52	
	2014	-25,127	0.65	-6,524	0.89		-20,415	0.66	
	2015	-19,182	0.73	-10,970	0.82		-10,931	0.82	
	2016	14,630	0.80	14,854	0.76		7,880	0.87	
	2017	31,496	0.59	44,087	0.37		42,862	0.39	
	2018	64,801	0.27	74,086	0.14		67,570	0.18	
Survival Time [day]*		33	0.01	10	0.35		14	0.17	

- Among hospice service users for lung cancer patients at their end of life, the lower the hospital charges per day as they close to death. (One month before death spending: 15 day before: less spend 34,084 KRW(about \$28).

The result of GLM analysis to investigate differences in healthcare costs by initial use of hospice services before death among hospice service users

Variables	One month before death spending		p-value	Three month before death spending		p-value	Six month before death spending		p-value
	Ref	Ref		Ref	Ref				
Initial use of Hospice service before death									
	45- day before death	Ref		Ref			Ref		
	30-44 day before death	13,935	0.06	-3,305	0.73		19,024	0.07	
	15-29 day before death	-9,636	0.07	-5,375	0.44		12,929	0.09	
	-14 day before death	-34,084	<.01	-11,001	0.09		10,610	0.13	

*All adjusted by age group, sex, health insurance, income level, diagnosed year and survival time.

Conclusions

- In this study, we found lower end-of-life healthcare associated hospital charges were found for the lung cancer inpatients who were admitted to hospitals with hospice care beds when nears death. Furthermore, use of hospice services right before death were also associated with lower healthcare costs.
- Through the reduction of healthcare expenditure of end-of-life patients with lung cancer, it is possible to improve the efficiency of national healthcare expenditure in Korea, which has entered the aged society.
- This study suggests that health policy-makers and the National Health Insurance program need to consider expanding the use of hospice care beds within hospitals and hospice care facilities for end-of-life patients with lung cancer not only in South Korea but also other countries, where very limited resources are available for healthcare.