Does National Medical Expenditure Subsidy Program for Cancer Patients Increase Survival of Gastric Cancer patients?

Dong Jun Kim[1], Ki-Bong Yoo[2], Kyu-Tae Han[3] , Woorim Kim[3], Sang Ah Lee[4], Seung Ju Kim[5], Sun Jung Kim[6,*]

[1]Department of Health Administration and Management, Soonchunhyang University Graduate School, Asan, Republic of Korea,
[2]Department of Healthcare Management, Yonsei University School of Health Science, Wonju, Republic of Korea,
[3]Division of Cancer Control and Policy, National Cancer Center, Ilsan, Republic of Korea,
[4]Department of Policy Research Affairs, National Health Insurance Service Ilsan Hospital, Ilsan, Republic of Korea,
[5]Department of Nursing, College of Nursing, Eulji University, Seongnam, Republic of Korea,
[6]Department of Health Administration and Management, Soonchunhyang University College of Medical Science, Asan, Republic of Korea ∗**Correspondence**

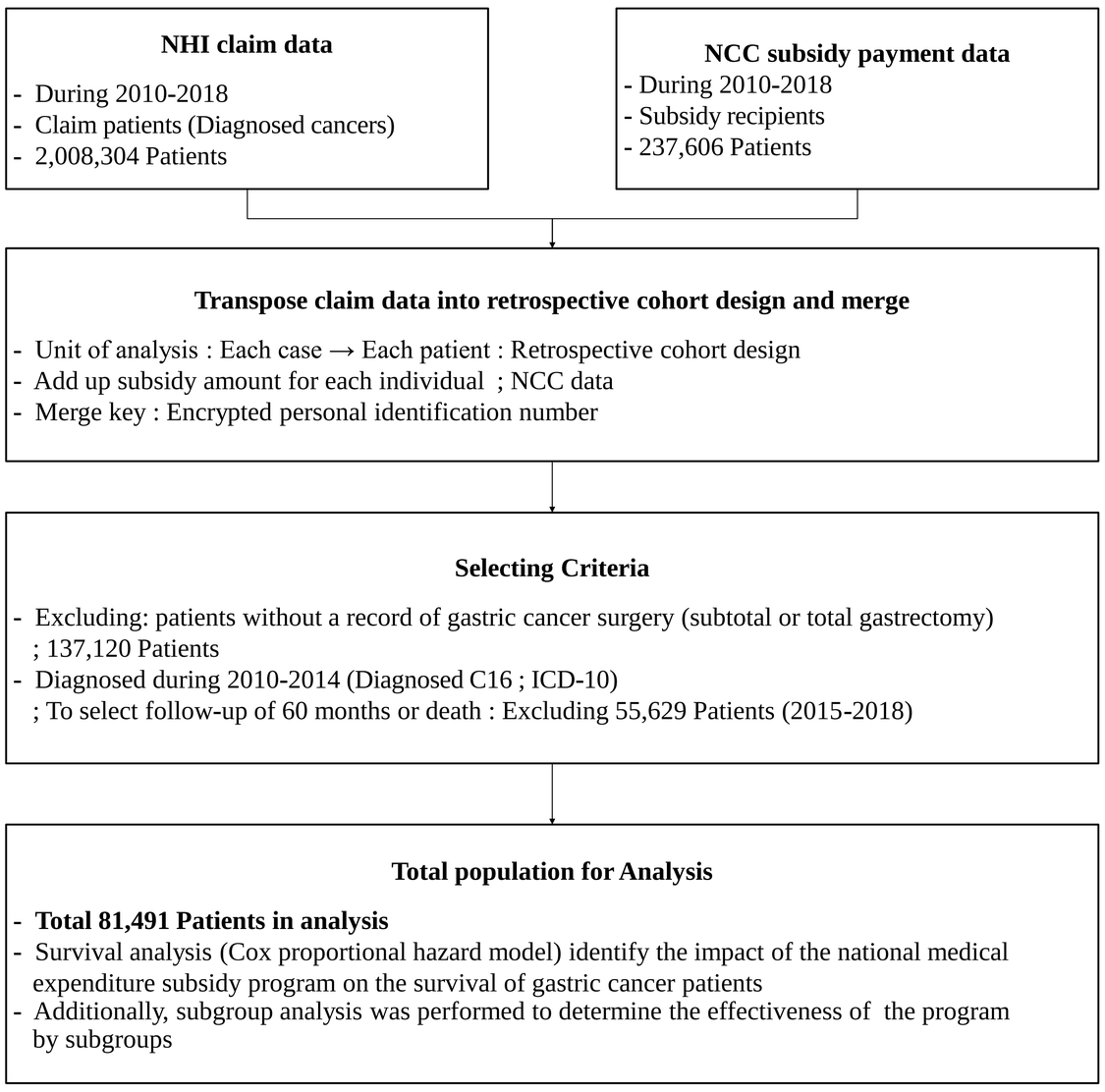
Financial Support
This work was supported by the Soonchunhyang University Research Fund.

Introduction

- The national medical expenditure subsidy program for cancer patients was introduced by the Korean Government to reduce the economic burden of cancer patients and increase access to cancer-related treatment.
- Since 2002, the government started a medical expense support project for low-income children with leukemia, and expanded the scope of support to all pediatric cancer patients in 2005, and started providing medical expenses to adult cancer patients diagnosed through national cancer screening in 2005.
- However, more than 200,000 new cancer patients is being occurred a year, and there are 1.2 million cancer patients nationwide, but the number of recipients for this subsidy program is only 50,000 as of 2015. The program steadily expanded the target and scope of support, and more than tens of billions of dollars of national budget was invested every year, but systematic analysis regarding the current status of business operation and performance is insufficient.
- Meanwhile, over the past decades, cancer is the one leading cause of death in Korea, the latest statistics indicate that in 2017, there were **29,685 incident** gastric cancer cases (out of a total of 232,255 cancer cases; **53% male**), **7,624 deaths** (out of a total of 81,203 deaths; **62% male**) in Korea. Gastric cancer is the most common cancer by incidence and the fourth leading cause of cancer mortality (excluding thyroid cancer).
- The purpose of this study was to investigate how national medical expenditure subsidy program for cancer patients were associated with survival of gastric cancer patients using Korean Nationwide Health Insurance(NHI) Claims and matched subsidy payment data from National Cancer Center(NCC) of Korea.

Methods

- We used nationwide **newly diagnosed cancer patients**' health insurance claims during 2010-2018 and subsidy payment data from NCC during 2010-2018. We transposed the dataset into a retrospective cohort design study that the unit of analysis is information of each gastric cancer patient and merged two data.
- 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 who newly diagnosed with gastric cancer after 2010 and dead or follow-up of 60 months which eventually included patients diagnosed during 2010-2014. In order to correct the severity of gastric cancer patients in the claim data, patients without a record of gastric cancer surgery (subtotal or total gastrectomy) were excluded, and the final study subjects were **81,491 patients**.
- Finally, a survival model was used to identify the impact of the national medical expenditure subsidy program on the survival of gastric cancer patients. In addition, a subgroup analysis was performed to determine the effectiveness of the program by subgroups.



Flow Chart of Subject Selection

Results

The results of general characteristics, number of death, and mean survival period

Variables		Total	Death	Rate(%)	Mean survival period (month)	*p*-value
Total		81,491	16,469	20.2	25.6	
Subsidy Program	Non-benefits	60,358	12,465	20.7	24.8	<.01
	Benefits	21,133	4,004	18.9	27.9	
Gender	Male	54,402	11,708	21.5	25.8	<.01
	Female	27,089	4,761	17.6	25.0	
Age group	- 50	14,847	2,077	14.0	25.4	
	50-59	21,776	3,175	14.6	25.8	
	60-69	22,455	4,010	17.9	26.2	<.01
	70-79	19,011	5,554	29.2	25.5	
	80 -	3,402	1,653	48.6	22.5	
Health insurance	Self-employed insured	26,773	5,548	20.7	25.5	
	Employee insured	54,387	9,690	17.8	25.7	<.01
	Medic Aid beneficiaries	3,331	1,131	34.0	24.4	
Income Level	75%ile over	27,259	5,131	18.8	25.6	
	50%ile – 75%ile	19,413	3,715	19.1	25.9	
	25%ile – 50%ile	14,558	2,943	20.2	25.4	<.01
	Under 25%ile	14,801	3,124	21.1	25.6	
	Lowest income group	5,460	1,556	28.5	24.9	
Surgery	Total gastrectomy	18,334	6,309	34.4	24.0	
	Subtotal gastrectomy	62,515	9,990	16.0	26.4	<.01
	Both	642	170	26.5	33.0	
Treatment type	With chemo and radio	4,020	1,998	49.7	30.6	
	With chemo	75,103	13,903	18.5	25.1	<.01
	With radio	55	29	52.7	24.4	
	Only surgery	2,313	539	23.3	18.8	
Diagnosed year	2010	16,990	3,673	21.6	25.8	
	2011	17,287	3,388	19.6	25.4	
	2012	16,469	3,337	20.3	25.5	<.01
	2013	15,698	3,127	19.9	26.2	
	2014	15,047	2,944	19.6	24.8	

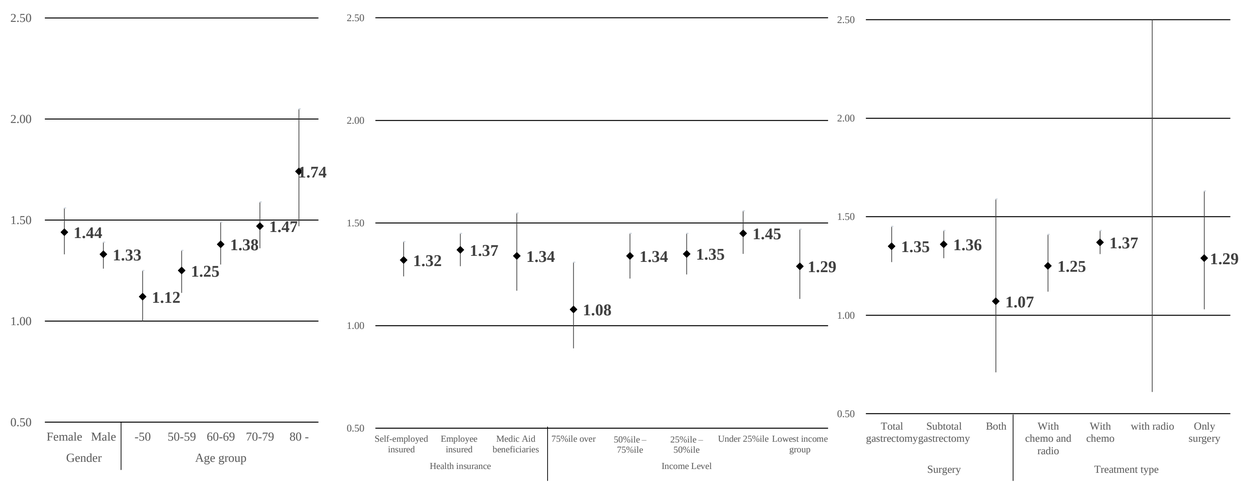
- Of the total study subjects, 16,469(20.2%) died, the mean survival period was 25.6 months, 21,133(25.9%) people received the program, and male was 54,402 (66.8%).
- The most common study subjects were in the age group of 60-69 years old, employee insured, and 75%ile over group. The number of patients by year was stable.
- Those who did not benefit the program had a 1.35 times higher Hazard Ratio (HR) for death than those who received them.
- Furthermore, Results of survival model showed that factors were significant associated; gender, age group, insurance type, income level, surgery, treatment type, diagnosed year.

The result of survival analysis to gastric cancer mortality

Variables		Hazard ratio	95% Confidence interval	
Subsidy Program	Benefit	1.00		
	Non-benefits	**1.35**	**1.30**	**1.41**
Gender	Female	1.00		
	Male	1.25	1.20	1.29
Age group	-50	1.00		
	50-59	1.05	0.99	1.11
	60-69	1.32	1.25	1.39
	70-79	2.43	2.31	2.56
	80 -	5.23	4.90	5.58
Health insurance	Employee insured	1.00		
	Self-employed insured	1.21	1.17	1.25
	Medic Aid beneficiaries	2.14	1.91	2.40
Income Level	75%ile over	1.00		
	50%ile – 75%ile	1.19	1.14	1.24
	25%ile – 50%ile	1.41	1.34	1.48
	Under 25%ile	1.47	1.40	1.54
	Lowest income group	1.14	1.03	1.26
Surgery	Subtotal gastrectomy	1.00		
	Total gastrectomy	2.39	2.31	2.47
	both	1.69	1.45	1.96
Treatment type	With chemo	1.00		
	With chemo and radio	2.98	2.84	3.12
	with radio	3.05	2.13	4.41
	Only surgery	1.15	1.06	1.25
Diagnosed year	2014	1.00		
	2010	1.13	1.08	1.19
	2011	1.03	0.98	1.08
	2012	1.05	1.00	1.11
	2013	1.04	0.99	1.09

- The subgroup is the hazard ratio of the risk of death of non-beneficiaries to the beneficiaries of the program, with female higher than male, so the program had a greater impact on female.
- Likewise, the program had a greater impact in the elderly, self-employed and low-income groups.

The result of subgroup analysis to the effectiveness of the program by all variables



*All adjusted by gender, age group, health insurance, income level, surgery, treatment type and diagnosed year.

Conclusions

- In this study, we found statistically significant medical expenditure subsidy program for gastric cancer patient were significantly associated with survival of gastric cancer patients.
- It might suggest that efficient medical policy implementation method is needed to enhance the effect of providing healthcare support services by explaining the effect of survival probability of cancer patient's medical expenditure support program according to the characteristics of patients.
- It also might be useful to health policy makers not only in South Korea but also be useful for international leaders developing national cancer management strategies aimed at reducing survival differences with medical resource supported and flexible healthcare plans for low-income group who had gastric cancer.