

Hospitalization Cost and Health Care Utilization of Women's Cancer Surgery: A Real-World Evidence Study in Korea

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OBJECTIVES

- Cancer is one of leading causes of death among women and surgery is a gold standard to treat cancer. Due to an aging global population and increasing cancer incidence rates, the cost related to cancer surgery has been increasing worldwide.
- In this study, we assessed the socio-economic impact of surgeries frequently performed in women to treat cancer using a national claims dataset in Korea. In particular, we estimated health care utilization and hospitalization cost of cancers that most often affect women as well as the correlation between length of stay and total medical costs by procedure specialty and hospital types.

METHODS

- We analyzed medical claims of women who received surgery for thyroid, breast, endometrial, or cervical cancer using 2016 National Patient Sample (NIS) dataset of Health Insurance Review and Assessment Service (HIRA). The NIS-HIRA dataset is a stratified proportional sample of patients who used inpatient services representing 13% of hospitalized patients of that year.
- Patients who were hospitalized with claims of both cancer diagnoses and surgery procedure codes were included for analysis. Patients with multiple surgeries were excluded from the analysis.
- We used R software for the entire study; Spearman test was used to test correlation between the variables. Cost was converted to USD using 2016 exchange rate (USD1 = KRW 1,207.7).

RESULTS

- A total of 5,087 women patients were identified. Baseline patient characteristics are presented in Table 1. The mean age of patients receiving surgery was 50.6. Two-point eight percent of patients were insured by medical aid.
- The number of breast surgery patients (N=2,685) was the largest followed by thyroidectomy (N=2,140), hysterectomy for cervical (N=161) and for endometrial (N=101) cancer, respectively. The largest proportion of surgeries was performed in upper general (71.5%) and general (24.6%) hospitals. The proportion of patients receiving surgeries at high volume center with ≥1000 beds was 43.1%.

Table 1. Baseline Characteristics

	N	Proportions (%)
Age (years)	5087	50.6±11.9
Insurance		
General	4945	97.20%
Medical aid	142	2.80%
Region		
Capital	3161	62.10%
Others	1926	37.90%
Hospital type		
Upper General	3636	71.50%
General	1251	24.60%
Hospital	159	3.10%
Clinical	41	0.80%
Bed size		
<1000	2895	56.90%
≥1000	2192	43.10%
Procedure		
Cervical Hysterectomy	161	3.20%
Endometrial Hysterectomy	101	2.00%
Mastectomy	2685	52.80%
Thyroidectomy	2140	42.10%

- Thyroidectomy patients were the youngest (Mean age: 48.2). The proportion of patients covered by medical aid was 5% for each hysterectomy, 3.2% for mastectomy, and 2.1% for thyroidectomy.
- The trend of patients and surgery concentrated in high volume hospitals appeared more evident in mastectomy; Patients’ centralization to hospitals located in capital areas was 68.4% for mastectomy, 62.4% for endometrial hysterectomy, 55.3% for cervical hysterectomy and 54.8% for thyroidectomy. The admission rate to upper general hospitals was 76.2% for endometrial hysterectomy, 74% for mastectomy, 68.3% for thyroidectomy and cervical hysterectomy.

Table 2. Baseline Characteristics, Length of Stay and Cost by Procedure

	Hysterectomy (Cervical) (N=161)	Hysterectomy (Endometrial) (N=101)	Mastectomy (N=2685)	Thyroidectomy (N=2140)
Age	51.9 ± 11.0	55.5 ± 12.5	52.2 ± 11.1	48.2 ± 12.5
Insurance				
General	153 (95.0%)	96 (95.0%)	2600 (96.8%)	2096 (97.9%)
Medical aid	8 (5.0%)	5 (5.0%)	85 (3.2%)	44 (2.1%)
Region				
Capital	89 (55.3%)	63 (62.4%)	1837 (68.4%)	1172 (54.8%)
Others	72 (44.7%)	38 (37.6%)	848 (31.6%)	968 (45.2%)
Hospital type				
Upper-general	110 (68.3%)	77 (76.2%)	1988 (74.0%)	1461 (68.3%)
General	0 (0.0%)	0 (0.0%)	46 (1.7%)	113 (5.3%)
Hospital	51 (31.7%)	24 (23.8%)	637 (23.7%)	539 (25.2%)
Clinical	0 (0.0%)	0 (0.0%)	14 (0.5%)	27 (1.3%)
Bed size				
<1000	99 (61.5%)	59 (58.4%)	1370 (51.0%)	1367 (63.9%)
≥1000	62 (38.5%)	42 (41.6%)	1315 (49.0%)	773 (36.1%)

LOS <i>mean ± SD</i>	12.2 ± 11.0	10.2 ± 6.4	9.0 ± 6.2	5.9 ± 2.7
LOS <i>median [IQR]</i>	10.0 [6.0;15.0]	9.0 [6.0;13.0]	8.0 [6.0;10.0]	5.0 [4.0; 7.0]
<i>Cost (USD), mean ± SD</i>				
Total	4,853 ± 2,989	4,615 ± 2,833	4,066 ± 2,627	2,585 ± 801
Government	4,194 ± 2,755	3,951 ± 2,620	3,091 ± 1,336	2,006 ± 710
Patient	660 ± 356	665 ± 332	975 ± 1810	579 ± 233
<i>Cost (USD), median [IQR]</i>				
Total	4,718 [2,728;5,793]	3,995 [3,066;5,302]	3,170 [2,520;4,402]	2,519 [2,139;2,892]
Government	3,989 [2,200;4,904]	3,291 [2,431;4,660]	2,794 [2,292;3,573]	1,914 [1,604;2,268]
Patient	717 [355; 855]	706 [431; 834]	245 [180; 696]	627 [575; 694]

- Length of stay was much shorter in thyroidectomy (5.9 days) than mastectomy (9 days), endometrial (10.2 days), and cervical hysterectomy (12.2 days). Total cost of the entire hospitalization period also followed in the same order. The mean total cost from admission to discharge was USD 2,585 for thyroidectomy, USD 4,066 for mastectomy, USD 4,615 for hysterectomy-endometrial and USD 4,853 for hysterectomy-cervical cancer. Patients’ payment was the highest in mastectomy at USD 975, which was 1.47-1.68 times higher than that of surgeries for the other cancers.
- The Box plot (Figure 1-(B)) also shows that upper-general hospitals likely discharge patients earlier than that of general hospitals and hospitals (median LOS [IQR]: Upper general 6[5-8.5], General 7[5-10], Hospital: 9[6-14], Clinic: 5[4-8]). Total cost was also lower in upper general hospitals compared to general hospitals and hospitals (median: Upper general USD 2, 796, General USD 2,854, Hospital USD 2,820, Clinic USD 2,456).

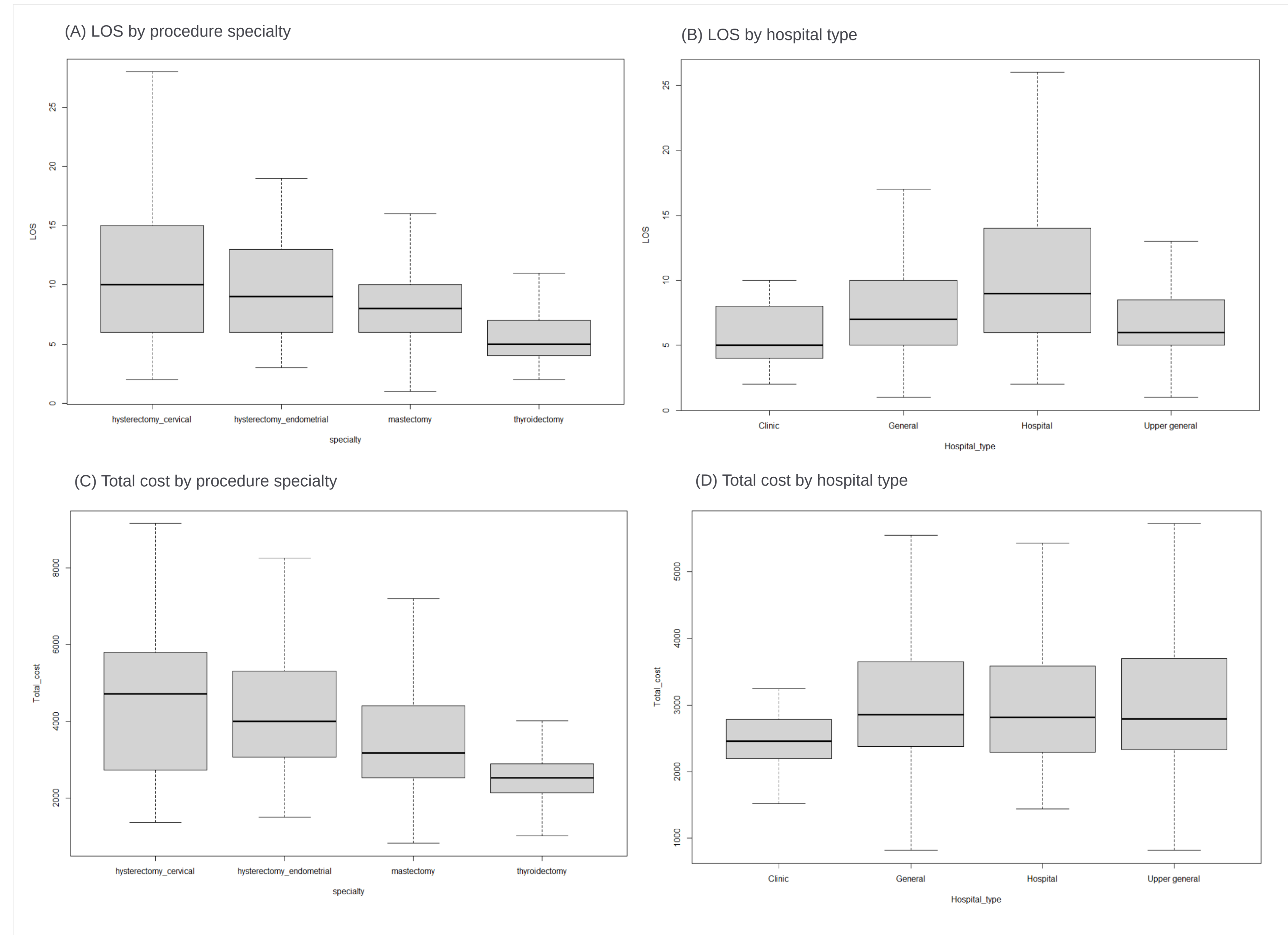


Figure 1. Box plot

- Spearman test results (Figure2) indicate that total medical cost was positively correlated with LOS. This correlation was much stronger with government payment (rho= 0.7082) and total cost (rho = 0.6961), but less with patient payment (rho=0.2981) with all having statistical significance (p= 0.001).
- Mastectomy presented greater variation in terms of patient payment, while thyroidectomy showed more consistency with small variation.

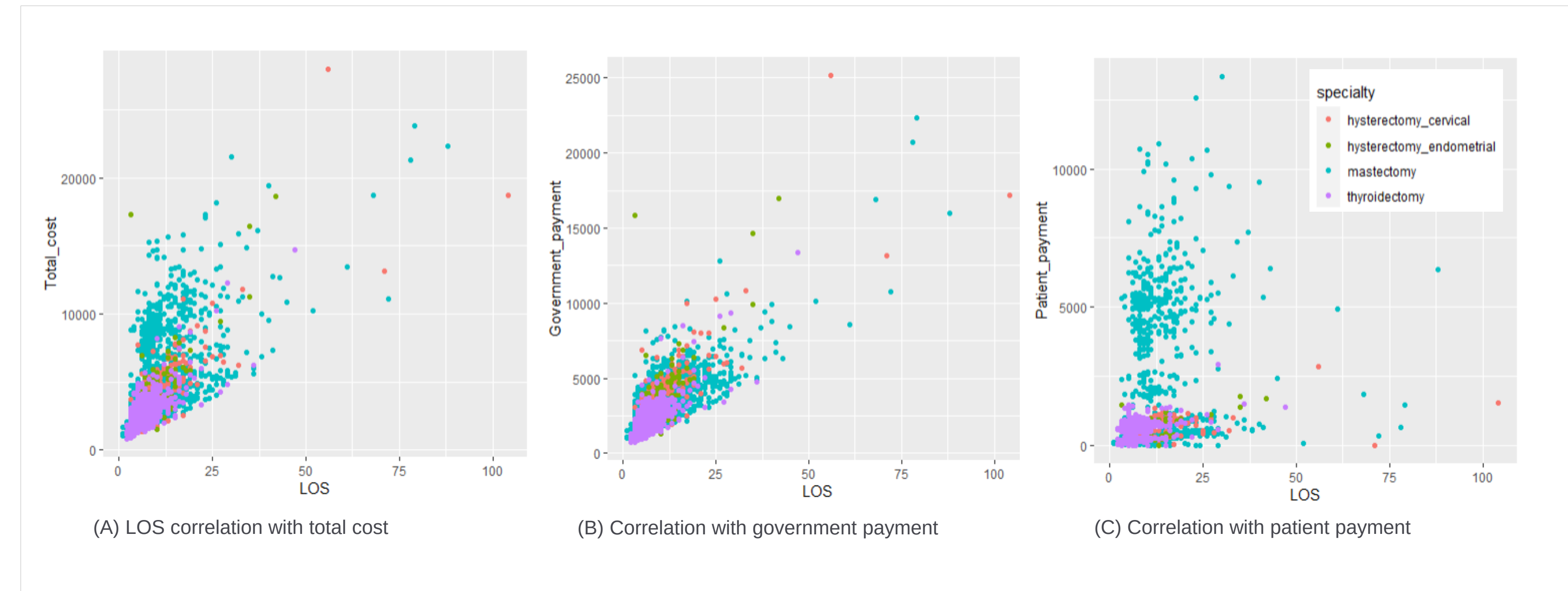


Figure 2. Correlation between LOS and medical costs

CONCLUSION

- The cost of women’s cancer surgery in Korea is substantial and total cost increases with an extended length of stay.
- Total medical cost of hospitalization was highest in hysterectomy-cervical cancer, showing greater variation between the patients, while thyroidectomy exhibited less variation in LOS and cost between patients or hospital types. Centralization of care to hospitals in greater Seoul area was more evident in mastectomy with highest patients’ payment. Compared to other procedures, hysterectomy-endometrial cancer patients preferred to visit large sized upper-general hospitals to receive surgery.