



Factors of Hospitals Associated With an Independent Hospice Care Unit

A Quantitative Empirical Study

Young-Taek Park, PhD ○ Hyejung Chang, PhD ○ Hyunchul Shin, PhD

Few studies have examined why some hospitals operate independent hospice units (IHUs) and others do not. This study aims to investigate the organizational factors of hospitals having IHU. The units of analysis were individual hospitals. The study had a cross-sectional design and used health insurance claims data of 349 hospitals in Korea from January 1 to December 31, 2019. The dependent variable was whether a hospital operated an IHU. The independent variables were the percentage of patients with cancer, overall severity of patients, percentage of patients 60 years and older, health care cost per patient, percentage of inpatients, and nurse staffing level. Independent hospice units were present at 21.2% of the hospitals (74/349). The odds of having an IHU were significantly associated with the following factors: the percentage of patients with cancer (odds ratio [OR], 1.228; 95% confidence interval [CI], 1.071-1.408; $P = .003$), disease severity (OR, 5.129; 95% CI, 2.477-10.622; $P < .001$), percentage of patients 60 years and older (OR, 1.053; 95% CI, 1.015-1.092; $P = .006$), health care cost per patient (OR, 1.018; 95% CI, 1.009-1.027; $P < .001$), and nurse staffing level (OR, 0.439; 95% CI, 0.292-0.661; $P < .001$). The organizational factors of hospitals operating IHUs were similar to those of hospice facilities.

Hospice refers to end-of-life care for patients with terminal illness and their families in which health professionals and volunteers provide physical, psychological, social, and spiritual support.¹ Hospice care helps patients and their family members to confront death with dignity and well-being. Because of the individualized and hands-on nature of hospice care, ensuring sufficient services necessitates an appropriate number of facilities.

Unlike the United States, where hospice care is provided in a variety of settings,^{2,3} hospice care in East Asian countries such as South Korea (hereafter, Korea) and Taiwan is provided mainly through hospitals.^{4,5} In the competitive health care environment fostered by universal health care coverage in Korea's fee-for-service system, it is frequently observed that whereas some hospitals provide hospice care through an independent hospice unit (IHU), other hospitals do not have a hospice program. However, the reasons why hospitals make different choices in this regard remain unclear.

As a possible explanation for variation across hospitals in whether or not they have an IHU, we hypothesized that it is more likely for a hospital to have an IHU if the overall organizational factors of hospitals match the characteristics of hospice facilities. For example, if a hospital has a high proportion of patients with cancer, it may be more likely to provide hospice care because of managerial and referral efficiency. To test this hypothesis, this study selected the following 6 features of hospitals to reflect the characteristics of hospice wards.

The proportion of cancer patients and patients' disease severity were selected as the first and second characteristics, because most hospice facilities have many patients with cancer and, therefore, a high overall severity of diseases. According to a hospice utilization study in the United States, the likelihood of receiving hospice care was associated with having cancer.⁶ Furthermore, cancer was found to be the most prevalent primary hospice diagnosis.⁷ Therefore, it is reasonable to hypothesize that hospitals with a high proportion of patients with cancer or other severe diseases would be more likely to operate an IHU.

The third and fourth organizational characteristics of hospitals analyzed herein were patients' age and cost per patient. Regarding age, previous research found that older age was related to higher odds of receiving hospice care.⁶

KEY WORDS

health care delivery systems, hospice, palliative care

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According to a study investigating hemodialysis patients' health care utilization, including costs before death, patients enrolled in hospice were, on average, older than their nonenrolled counterparts.⁸ Generally speaking, health care costs increase with patients' age.⁹ Nursing home residents' use of hospice significantly increased from 2004 to 2009 in the United States, and this expansion of hospice was related to Medicare expenditures.^{10,11} Therefore, it was hypothesized that hospitals with older patients and higher cost per patient would be more likely to operate an IHU.

The fifth and sixth factors relate to hospitals' patient composition and staffing levels. Hospice patients are frequently transferred from the inpatient ward or other hospitals to the IHU. Many patients with terminal illness resided in hospitals at the time of hospice admission.^{7,12} If a hospital has a high proportion of inpatients, it may be more likely to operate an IHU because internal referrals are administratively straightforward and convenient for patients. Finally, IHUs generally require a variety of experienced professionals.^{13,14} For example, a study conducted in Texas investigated nurse staffing at home health and hospice agencies and found that the agencies needed experienced registered nurses for hospice care and offered various recruitment and retention incentives.¹⁵ Furthermore, according to a study analyzing perinatal hospice and palliative care organizations, advanced practice nurses such as nurse practitioners could significantly reduce registered nurse turnover.¹⁶ Hospitals with a more substantial workforce of nurses or more experienced nursing personnel could easily substitute or fill vacancies in any unit or ward.

To summarize the previously mentioned predictions, this study hypothesized that the presence of an IHU would be associated with 6 organizational features of hospitals—a high proportion of cancer patients (hypothesis [hereafter, "H"] 1), patients with high disease severity (H2), a high proportion of patients 60 years and older (H3), high health care cost per patient (H4), a high proportion of inpatients (H5), and higher nurse staffing levels (H6).

Contingency theory, among other propositions, suggests that effective organizations move in the direction fitting their organizational structure according to the internal or external environments.¹⁷ For example, organizations having the mechanistic structure work well under stable environments or when having a strong managerial hierarchy with vertical communication, and in contrast, the organic organizations are effective when having a less formal structure or strong lateral communication networks.¹⁸ Hospitals' structure is also dependent on their internal and external environments according to the theory.¹⁹ In the framework of this study, whether a hospital operates an IHU is an aspect of organizational structure, whereas the 6 independent variables described previously reflect aspects of the internal environment.

This study is important for 3 reasons. First, by identifying any direct or indirect factors associated with IHUs, it may

be possible to induce more medical institutions to operate IHUs. Thus, the government can establish appropriate levels of IHU facilities that provide sufficient hospice services. Second, this study was conducted in a large-scale experimental setting, insofar as Korea operates a national health insurance program with universal health care coverage, and has a fee-for-service system where numerous hospitals operate independently, compete with each other, and engage in relatively free decision-making. Thus, our study results can inform other nations with similar institutions and environments. Third, this study used health care big data derived from the national health insurance program. The study sample was all hospitals in Korea with at least 100 beds. The 6 proposed independent variables were calculated based on the entire national population, which has not been studied previously, either in Korea or in other countries. The study results are, therefore, expected to provide insights into hospice care, market behavior, and the construction of efficient hospice delivery systems for international scholars, researchers, and colleagues.

The primary objective of this study was to identify the characteristics of hospitals that operate IHUs, using health care administrative data from health insurance claim databases.

METHOD

Study Design

This study was conducted in Korea. The units of analysis were hospitals with 100 beds or more, identified from all hospitals in Korea ($n = 349$; tertiary hospitals, 42; general hospitals, 307). A cross-sectional design was used. This study received ethical approval from the institutional review board on April 14, 2020 (IRB number: 2020-026-002).

Data Sources

This study used the national health insurance administrative and claims data from the Health Insurance Review & Assessment Service (HIRA) in Korea. Direct retrieval of data was possible; therefore, this study used a sample-based design and targeted all hospitals with at least 100 beds as the study population.

The patient statistics of each hospital were obtained from an analysis of all health insurance claims data from January 1, 2019, to December 31, 2019. To calculate the proportion of patients with cancer and patients 60 years and older, all the health insurance claims data were directly retrieved from the data warehouse system of HIRA during the study period.

Outcomes and Independent Variables

The main outcome variable was whether a hospital had an IHU, which was determined based on the hospital's application and approval documents for the hospice facility and whether the hospital had any health insurance claims for



hospice care. As all hospitals operate independently in Korea, operating an IHU is entirely the hospital's decision.

The percentage of inpatients with cancer among all inpatients and outpatients was calculated using *International Classification of Diseases, Tenth Revision* codes (C00-C97, D00-D09, D32-D33, and D37-D48). The total number of health insurance claims was 130 721 901 (19 556 896 patients).

To evaluate the Charlson Comorbidity Index (CCI), which was used as a measure of disease severity, patient identification numbers were retrieved from all 349 study hospitals, as well as the primary and secondary diagnosis codes of health insurance claim forms in 2019. The diagnosis codes followed the Korean Standard Classification of Diseases and Causes of Death, which is an extension of the *International Classification of Diseases, Tenth Revision*.²⁰ There were 7 781 961 health insurance claims (4 582 523 inpatients) with unique IDs. After calculating the CCI for each inpatient, the average CCI for each hospital was determined. The CCI calculations performed herein followed the method described by Quan et al.²¹ The percentage of patients 60 years and older was calculated by dividing the number of patients 60 years and older by the total number of patients (inpatients and outpatients combined). The percentage of patients with cancer was calculated similarly. The health care cost per patient for each hospital was calculated using both inpatient and outpatient costs. The percentage of inpatients compared with outpatients was calculated using the number of patients. Finally, the nurse staffing level was analyzed based on the grade used by HIRA to determine nurse staffing level fees for hospitals' inpatient claims. The grade is reported 4 times per year, on a quarterly basis, by each hospital to HIRA. The average score for 2019 was used in this study. A higher nurse staffing grade indicates a poor quality of care. For general hospitals, the following 7 grades are used to measure the standard of nursing care according to the nurse-to-patient ratio: grade 1, less than 2.5; grade 2, greater than or equal to 2.5 but less than or equal to 3.0; grade 3, greater than or equal to 3.0 but less than 3.5; grade 4, greater than or equal to 3.5 but less than 4.0; grade 5, greater than or equal to 4.0 but less than 4.5; grade 6, greater than or equal to 4.5 but less than 6.0; and grade 7, greater than or equal to 6.0 or not reporting the number of nurses to HIRA.

Other independent variables included the number of beds in each hospital, the number of years the hospital has operated, the type of hospital ownership (private or nonprofit organization), whether a hospital belonged to a multihospital system, the Herfindahl-Hirschman Index as a measure of the market competition level,²² and the location of the facility (urban = more than 100 000 residents vs rural = fewer than 100 000 residents). In the Herfindahl-Hirschman Index, the market was divided into 285 local areas and the market share measure was calculated based

on the total health care insurance billing amount requested to HIRA.

Statistical Analysis

The main outcome variable was binary (having an IHU or not having an IHU). Study variables and their associations with the presence of an IHU were cross-tabulated and tested using χ^2 test of independence and *t* test for mean differences. Before the main analysis, correlations among the independent variables were evaluated to control for the issue of multicollinearity of independent variables. High correlations were found between tertiary hospital status and the number of beds, between the percentage of patients with cancer and health care cost per patient, and between CCI and health care cost per patient. Therefore, separate models were created. For the presence of an IHU, multivariate logistic regression was conducted, and 95% confidence intervals were calculated for each independent variable with a *P* value less than .05. SAS version 9.1 (SAS Institute, Cary, North Carolina) was used for the data analysis.

RESULTS

Table 1 presents the general characteristics of the study hospitals according to the presence of an IHU. An IHU was present in 21.2% (74/349) of the hospitals. Hospitals with IHUs were more likely to be tertiary hospitals, to have been operational for a long time, to be public hospitals, to be part of a multihospital system, and to have a large number of beds (*P* < .05).

Table 2 shows the logistic regression results for the relationship between the presence of an IHU and 2 proposed independent variables: the percentage of patients with cancer (H1) and CCI (H2). Presence of an IHU was significantly associated with the percentage of patients with cancer (odds ratio [OR], 1.228; 95% confidence interval [CI], 1.070-1.408; *P* = .003) and CCI (OR, 5.129; 95% CI, 2.477-10.622; *P* < .001). The odds of having an IHU increased 1.228 times for each 1-unit increase in the percentage of patients with cancer.

Furthermore, the presence of an IHU was significantly associated with the percentage of patients 60 years and older (H3; OR, 1.053; 95% CI, 1.015-1.092; *P* = .006) and cost per patient (H4; OR, 1.018; 95% CI, 1.009-1.027; *P* < .001) (Table 3). The odds of a hospital having an IHU increased by 5.3% for each 1-unit increase in the percentage of patients 60 years and older.

Table 4 shows the associations between the presence of an IHU and the percentage of inpatients (H5) and nurse staffing level measured by the grade of the nurse-to-patient ratio (H6). The percentage of inpatients over outpatients was not associated with the presence of an IHU, and thus, H5 was not supported. However, the presence of an

**TABLE 1** General Characteristics of the Study Hospitals (N = 349)

Variables	All	Types of Hospice		P
		IHU	No Hospice	
N (no. study subjects)	349	74	275	—
Hospital type: tertiary hospitals, %	42 (12.0)	24 (32.4)	18 (6.5)	<.001
Years of operation, mean ± SD	20.1 ± 13.4	28.8 ± 11.3	17.7 ± 12.9	<.001
Ownership: not-for-profit, %	61 (17.5)	33 (44.6)	28 (10.2)	<.001
Multihospital system, %	104 (29.8)	41 (55.4)	63 (22.9)	<.001
Location: urban, %	319 (91.4)	71 (95.9)	248 (90.2)	.12
No. beds, mean ± SD	430.7 ± 326.5	719.6 ± 459.6	353.0 ± 224.7	<.001
Herfindahl-Hirschman Index, mean ± SD	0.39 ± 0.4	0.40 ± 0.4	0.39 ± 0.4	.84
% of patients with cancer, ^a mean ± SD	3.07 ± 5.0	7.3 ± 8.4	1.92 ± 2.4	<.001
Charlson Comorbidity Index, ^a mean ± SD	2.56 ± 0.5	3.05 ± 0.6	2.42 ± 0.4	<.001
% of patients 60 y and older, ^a mean ± SD	36.7 ± 10.9	43.6 ± 12.2	34.79 ± 9.7	<.001
Health care costs per patient, ^{a,b} mean ± SD	98.9 ± 52.8	151.0 ± 62.4	84.9 ± 39.6	<.001
% of inpatients over outpatients, ^a mean ± SD	19.78 ± 6.1	20.26 ± 5.6	19.66 ± 6.2	.45
Nurse staffing level, ^{a,c} mean ± SD	2.78 ± 1.7	1.68 ± 0.7	3.07 ± 1.8	<.001

Abbreviations: IHU, independent hospice unit; SD, standard deviation.
^aSix study independent variables.
^bTen thousand Korean won (approximately 10 dollars).
^cGrades 1-7 measured by nurse-to-patient ratio.

IHU was significantly associated with nurse staffing level (OR, 0.439; 95% CI, 0.292-0.661; $P < .001$) (H6). The odds of having an IHU decreased by 56.1% for each 1-unit increase in nurse staffing grade, corresponding to a deterioration in the quality of nursing.

DISCUSSION

This study found that approximately 20% of hospitals with 100 beds or more had an IHU. Five of the 6 hypotheses were supported; the percentage of patients with cancer (H1), CCI (H2), the proportion of patients 60 years and older (H3), health care cost per patient (H4), and nurse staffing level (H6) were significantly associated with the presence of an IHU.

The proportion of hospitals with an IHU in Korea (roughly 20%; $n = 74$) is similar to that in Taiwan, where a recent study found that 62 hospitals operated hospice wards.²³ However, when adjusting for population (2018), the figure for Korea (74/51.6 million [M] = 143.4)²⁴ is much lower than that for Taiwan (62/23.6 M = 262.7).²⁵ In the United Kingdom, no data have yet been published on the

number of hospitals operating IHUs, but there are 2760 beds at the national level.²⁶ The number of hospitals operating IHUs in the United Kingdom can be estimated using this figure and the fact that a hospice ward has approximately 10 to 20 beds^{27,28}; this yields an estimation that roughly 138 to 276 hospitals have IHUs, which is much higher than that in Korea (United Kingdom, 138/65.6 M = 210.4-276/65.6 M = 420.7 in 2016; Korea, 141.3 in 2018).²⁴ Although hospices are slightly different from palliative care, 97% of public hospitals in the United States had palliative care programs and teams in 2019.²⁹ Thus, our study showed that the proportion of hospitals with IHUs at the national level in Korea was much lower than those in the United Kingdom and the United States.

Regarding the percentage of patients with cancer and the average CCI, our initial prediction was confirmed, as the study results showed that hospitals with IHUs had significantly higher proportions of patients with cancer and higher disease severity. These results align with those of previous studies, which found that cancer was frequently observed in hospice wards.^{6,7} For hospitals with many cancer patients, operating an IHU would allow many



TABLE 2 Factors Associated With the Presence of an IHU: The Percentage of Patients With Cancer (H1) and CCI (H2)

Variables	OR	95% CI		P	OR	95% CI		P
		LL	UL			LL	UL	
Tertiary hospital (ref: general hospital)	0.14	0.04	0.54	.004	0.25	0.08	0.84	.03
Years of operation	1.05	1.02	1.08	.002	1.03	0.99	1.06	.09
Owned by public (ref: private)	6.11	2.78	13.43	<.001	5.07	2.27	11.30	<.001
Multihospital (ref: no)	1.71	0.85	3.47	.14	1.94	0.94	3.99	.07
Urban area (ref: rural)	5.78	0.67	50.04	.11	3.22	0.58	17.78	.18
No. beds	1.003	1.002	1.005	.001	1.004	1.002	1.006	<.001
Herfindahl-Hirschman Index	0.75	0.29	1.90	.54	0.84	0.33	2.11	.71
% of patients with cancer ^a	1.23	1.07	1.41	.003				
Charlson Comorbidity Index ^a					5.13	2.48	10.62	<.001

Abbreviations: CCI, Charlson Comorbidity Index; CI, confidence interval; IHU, independent hospice unit; LL, lower limit; OR, odds ratio; ref, reference; UL, upper limit.
^aStudy independent variable.

synergistic effects for both hospitals and patients. Hospitals can keep the patients in the same facility, bringing additional revenue, and it is convenient for patients to be transferred to an IHU at the same institution. However, it is noteworthy that the severity of patients was also higher in hospitals with IHUs than in those with no IHUs. A possible explanation may be that patients at the end stage of diseases move to hospitals with IHUs and wait for

admission to the hospice ward. Alternatively, hospitals with IHUs may also have other types of hospice programs, such as home-based or palliative programs, which might lead to many health insurance claims for patients in a severe condition, resulting in a higher average CCI.

The percentage of older patients and cost per patient were also positively associated with the presence of an IHU. Patients admitted into hospice are generally old,⁸

TABLE 3 Factors Associated With the Presence of an IHU: Percentage of Patients 60 Years and Older (H3) and Health Care Cost per Patient (H4)

Variables	OR	95% CI		P	OR	95% CI		P
		LL	UL			LL	UL	
Tertiary hospital (ref: general hospital)	0.36	0.11	1.16	.09	0.20	0.06	0.68	.01
Years of operation	1.03	0.99	1.06	.07	1.04	1.01	1.07	.01
Owned by public (ref: private)	5.52	2.49	12.23	<.001	7.30	3.31	16.12	<.001
Multihospital (ref: no)	1.79	0.89	3.63	.11	1.72	0.85	3.51	.14
Urban area (ref: rural)	2.13	0.43	10.54	.35	3.22	0.50	20.95	.22
No. beds	1.004	1.003	1.006	<.001	1.003	1.001	1.004	.003
Herfindahl-Hirschman Index	0.70	0.28	1.73	.43	0.83	0.32	2.11	.69
% of patients aged 60+ y ^a	1.05	1.02	1.09	.01				
Cost per patient ^a					1.02	1.01	1.03	<.001

Abbreviations: CI, confidence interval; IHU, independent hospice unit; LL, lower limit; OR, odds ratio; ref, reference; UL, upper limit.
^aStudy independent variable.



TABLE 4 Factors Associated With the Presence of an IHU: Percentage of Inpatients Compared With Outpatients (H5) and Nurse Staffing Level (H6)

Variables	OR	95% CI		P	OR	95% CI		P
		LL	UL			LL	UL	
Tertiary hospital (ref: general hospital)	0.35	0.11	1.11	.07	0.45	0.14	1.47	.19
Years of operation	1.04	1.01	1.07	.003	1.05	1.02	1.08	.001
Owned by public (ref: private)	7.31	3.36	15.91	<.001	10.00	4.33	23.09	<.001
Multihospital (ref: no)	1.68	0.84	3.35	.14	1.45	0.72	2.93	.30
Urban area (ref: rural)	1.79	0.36	8.96	.48	1.17	0.18	7.57	.87
No. beds	1.01	1.003	1.01	<.001	1.003	1.001	1.01	<.001
Herfindahl-Hirschman Index	0.66	0.27	1.63	.37	0.77	0.31	1.93	.58
% of inpatients over outpatients ^a	0.98	0.92	1.04	.50				
Nurse staffing level ³					0.44	0.29	0.66	<.001

Abbreviations: CI, confidence interval; IHU, independent hospice unit; LL, lower limit; OR, odds ratio; ref, reference; UL, upper limit.
^aStudy independent variable.

raising the proportion of older patients in hospice facilities. A possible explanation is that older patients might choose to receive care at hospitals with IHUs, in line with our suggestion that patients with cancer and severe medical conditions may prefer hospitals with IHUs. A hospital with many old patients operating an IHU would have many advantages, such as fast referrals³⁰ for patients with terminal illnesses and their families. Regarding cost per patient, the results supported our initial hypothesis. This might be because more financially stable hospitals with high health care expenditures per patient invest the revenue in IHUs. However, this interpretation is speculative, and more research should investigate this issue in the future.

Regarding the percentage of patients over outpatients, unlike our expectation, H5 was not supported when based on the percentage of inpatients over outpatients, which is contrasted with H1 supported based on inpatients with cancer. The difference between 2 hypotheses is the existence of the direct connection with hospices or not (H1 has, but H5 may not be). This fact suggests that hypotheses are hardly supported unless there are some strong associations between a central phenomenon and independent variables speculated. Through this study, we were aware that the general volume of the inpatients by itself does not have a strong association with the operation of IHU. Finally, nurse staffing level was found to be significantly related to the presence of an IHU. Our study results could be explained in light of the previous finding that hospitals with experienced nurses could have a low turnover rate, easily relocate experienced nurses, and offer various incentives for nurse recruitment.^{15,16} Hospitals having a high

nurse staffing level might have various advantages for operating an IHU in that hospital's design was significantly associated with increased nurse retention.³¹

This study had 2 limitations. First, this study excluded small hospitals with fewer than 100 beds to increase the generalizability of the study findings. Although, in principle, a smaller sample size would reduce the statistical power, this choice was made to focus on generalizability. Second, this study used data from only one year (2019), which may limit the validity of the results. To mitigate this limitation, we tried to maximize the validity of the 6 variables by analyzing comprehensive health insurance claims data. The results of this approach are shown by the descriptive statistics of the 6 independent variables, in which the standard deviations of all 6 variables were much lower than the mean values.

In conclusion, this preliminary exploratory study found that the percentage of cancer patients at hospitals, the percentage of elderly patients, health care cost per patient, and nurse staffing levels were significantly associated with the presence of an IHU. This study demonstrated how hospitals are organizing and adopting their structures by learning from their internal and external environments to improve organizational performance, which is one of the basic mechanisms of the contingency theory. Hospitals might choose whether to implement a hospice program based on their assets, experience, and business. The findings of this study could be used to induce more hospitals to operate IHUs, thereby ensuring a sufficient amount of inpatient hospice facilities in the health care system. On the basis of an understanding of these organizational



characteristics, health care policymakers can develop hospice policies to achieve an appropriate level of hospice inpatient facilities.

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