


# Differences between dedicated and not dedicated hospice physicians in symptoms and signs improvement among advanced cancer patients

Jae Ho Chung, MD, PhD<sup>a</sup>, Sun Hyun Kim, MD, PhD<sup>b,\*</sup> , Sang-Yeon Suh, MD, MPH, PhD<sup>c,d</sup>, Shao-Yi Cheng, MD, MSc, DrPH<sup>e</sup>, Masanori Mori, MD<sup>f</sup>, Takashi Yamaguchi, MD, PhD<sup>g</sup>, Ping-Jen Chen, MD<sup>h,i</sup>, Tatsuya Morita, MD<sup>f</sup>, Satoru Tsuneto, MD, PhD<sup>j</sup>, on Behalf of the EASED Investigators

## Abstract

The hospice and palliative care can improve the symptoms and signs of terminal cancer patients. The purposes of this study are how to improve terminally ill cancer patients' symptoms and signs and how the dedicated palliative care service effects on these improvements.

From January 2017 to March 2019, among 919 terminally ill cancer patients admitted to the palliative care units in 11 hospitals of South Korea, we analyzed 334 patients with prospective cohort method and categorized them into non-dedicated hospice care group of 234 and dedicated hospice care group of 100.

Symptoms improvement of dyspnea, fatigue, drowsiness, and dry mouth during the first week of admission were respectively 298 (89.2%), 25 (7.5%), 204 (61.1%), 76 (22.8%). Signs improvement of myoclonus, respiratory secretion, leg edema, and ascites between admission and a week after were 5 (1.5%), 41 (12.3%), 47 (14.1%), 12 (3.6%). Significant differences between dedicated hospice care physician group and non-dedicated hospice care physician group were shown in drowsiness (67.5% vs 46%,  $P < .001$ ) and respiratory secretion (15% vs 6%,  $P < .028$ ). Compared to non-dedicated care group, the odds ratio for more than 2 symptoms or signs was 1.78 (95% confidence interval, 1.05–3.02) in the dedicated care group after adjusting confounding variables.

In conclusion, terminally ill cancer patients who received palliative or hospice service showed significant improvement in symptoms and signs. And, family doctors (dedicated hospice physician group) performed better than oncologists (non-dedicated physician group).

**Abbreviations:** CCI = Charlson comorbidity index, DRS-R-98 = Delirium Rating Scale-revised-98, ECOG = Eastern Cooperative Oncology Group, HPC = hospice and palliative care, MDAS Memorial Delirium Assessment Scale, PCU = palliative care units, The EASED study = the East-Asian collaborative cross-cultural Study to Elucidate the Dying process.

**Keywords:** cancer, Korea, palliative care

Editor: Mihai Dorin Vartolomei.

The IRB committee of Catholic Kwandong university, St. Mary's Hospital approved the study (the committee's reference number: 17 Yeon IRB011).

This study was supported by a Grant-in-Aid from the Japan Hospice Palliative Care Foundation (2015 grant); MEXT KAKENHI (Grant-in-Aid for Scientific Research) Grant Numbers 16H05212 and 16KT0007; Ministry of Science and Technology, Taiwan, 105-2314-B-002-172.

The authors declare that they have no competing interests.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

<sup>a</sup> Department of Internal Medicine, Catholic Kwandong University, International St. Mary's Hospital, Incheon, South Korea, <sup>b</sup> Department of Family Medicine, Catholic Kwandong University, International St. Mary's Hospital, Incheon, South Korea, <sup>c</sup> Department of Family Medicine, Palliative Care Center, Dongguk University Ilsan Hospital, Goyang, South Korea, <sup>d</sup> Department of Medicine, School of Medicine, Dongguk University, Seoul, Korea, <sup>e</sup> Department of Family Medicine, College of Medicine and Hospital, National Taiwan University, Taipei, Taiwan, <sup>f</sup> Department of Palliative and Supportive Care, Seirei Mikatahara General Hospital, Hamamatsu, Japan, <sup>g</sup> Division of Palliative Care, Konan Medical Center, Kobe, Japan, <sup>h</sup> Department of Family Medicine, Kaohsiung Medical University Hospital, and School of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan, <sup>i</sup> Marie Curie Palliative Care Research Department, Division of Psychiatry, University College London, London, UK, <sup>j</sup> Department of Human Health Sciences, Graduate School of Medicine, Kyoto University, Kyoto, Japan.

\* Correspondence: Sun Hyun Kim, Department of Family Medicine, Catholic Kwandong University, International St. Mary's Hospital, 25 Simgokro #100 Gil, Seo-Gu, Incheon 22711, Republic of Korea (e-mail: drsunhyun@gmail.com).

Copyright © 2021 the Author(s). Published by Wolters Kluwer Health, Inc.

This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial License 4.0 (CCBY-NC), where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.

How to cite this article: Chung JH, Kim SH, Suh SY, Cheng SY, Mori M, Yamaguchi T, Chen PJ, Morita T, Tsuneto S. Differences between dedicated and not dedicated hospice physicians in symptoms and signs improvement among advanced cancer patients. *Medicine* 2021;100:32(e26915).

Received: 22 April 2021 / Received in final form: 22 July 2021 / Accepted: 22 July 2021

<http://dx.doi.org/10.1097/MD.00000000000026915>

## 1. Introduction

Well-dying (dying with dignity) has become important as our society is rapidly becoming an aging society.<sup>[1]</sup> In other words, a growing number of terminally ill patients prefer palliative care to keep their quality of life instead of taking tough treatment to prolong their life by a few weeks or months.<sup>[2]</sup> Therefore, palliative and hospice referral for terminally ill cancer patients is becoming important.<sup>[3]</sup> According to a World Health Organization's report, 37.4% patients who died worldwide could have benefitted from palliative care specialist. Additionally, over 34% cancer patients died without receiving the palliative care, despite they needed the service.<sup>[4]</sup> In Korea, 7 out of 10 peoples answered that they would use hospice service if they were in terminal state, and most doctors agreed with it. Additionally, according to a survey, 97% of patients satisfied with the hospice care service they received.<sup>[5]</sup>

Patients with a life expectancy of 6 months or less can get the hospice service if they agree and sign that they no longer want to continue chemotherapeutic treatments.<sup>[5,6]</sup> Recently, there has been an increasing interest in specialist in palliative care to improve terminally ill cancer patients.<sup>[5]</sup>

There is not government-approved hospice palliative medicine board certification system yet in Korea, so any doctors can perform hospice care after completing a certain education. Most of them are family doctors or oncologists.

Family physicians in general hospitals focus on taking care only for hospice-palliative inpatients, while oncologists care a number of inpatients who actively treat cancer as well. Therefore, the task of oncologist is relatively burdensome. Because Palliative physicians need to cope with every aspects of their patients, taking care of too many patients will not only burn them out physically and mentally, but will also make it difficult for them to take care of the patients. As palliative care specialists usually focus more on terminally ill cancer patients' symptom distress, it is possible that they might be more sensitive in identifying details of symptoms and sign changes.<sup>[7]</sup>

Therefore, we hypothesized that the family physicians who could be more dedicated to palliative patients, and examined the difference in symptom improvement between the oncologist and the family physicians, but few studies have compared symptoms according to the level of dedication and clinical intensity within a group of palliative physician. Therefore this study shows whether symptoms and signs improves in terminally ill cancer patients and also examines the available evidence on whether dedicated palliative care interventions or not might have evidence an association with symptoms and signs improvements terminally ill cancer patients.

## 2. Methods

### 2.1. Study populations

This study was conducted as one of the secondary analysis of the East-Asian collaborative cross-cultural Study to Elucidate the Dying process (The EASED study), an international multicenter prospective cohort study for the cultural differences of advanced cancer patients at palliative care units (PCUs) in Japan, Korea, and Taiwan. The participating institutions for The EASED study included 22, 11, and 4 PCUs in Japan, Korea, and Taiwan, respectively. Only the Korean data were included for the present analysis, as our main aim was to identify differences in symptom improvements within the group of palliative physicians in Korea.

Informed consent was obtained from patients or families (in case of patients' lack of decisional capacity). We enrolled cancer patients who admitted to 11 PCUs in Korea. Inclusion criteria were (1) age 18 or older, (2) locally advanced or metastatic cancer (histological, cytological, or clinical diagnosis), and (3) admitted to the participating PCUs. Exclusion criteria were (1) patients with scheduled discharge within a week, (2) patients or their families who declined participation. From January 2017 to March 2019, 919 terminally ill cancer patients admitted to the PCUs in 11 hospitals of South Korea, 417 were eligible to the study and a total 334 were analyzed except those who could not follow up, lacked available data or refused to participate in the study (Fig. 1). We categorized 334 terminally ill cancer patients into non-dedicated and dedicated hospice care group. In this paper, the definition of dedicated hospice physician was designated as a family doctor who does not have many inpatients other than hospice patients. Oncological and others, which have relatively large patient loadings other than hospice patients, were classified as non-dedicated hospice physician.

### 2.2. Data collection

Measurement outcomes included variables related to dying process, end of life care, and demographic data. These measurement outcomes were developed from a systematic literature review on this topic and extensive discussions among the research group.<sup>[8]</sup> We collected data regarding the patients' age, sex, primary cancer sites, comorbidity (items per Charlson comorbidity index: CCI), highest level of education, living situation, having children under age 20 years-old, marital status, and psychological factors (emotional stability over the past 3 days). We also collected the data about whether the preference for place for death is hospice unit or not. Symptoms (dyspnea, fatigue, drowsiness, dry mouth) and signs (myoclonus, respiratory secretion, leg edema, ascites) are investigated (at/on) initial admission and 1 week after the initial investigation, we followed-up symptoms and signs improvements.<sup>[9]</sup> Physicians requested participants to report the intensity of symptoms (fatigue, drowsiness, and dry mouth) based on a scale of on scale of 0 to 5 (0: not at all, 1; slightly, 2; moderately, 3; severe, 4; overwhelmingly, 5; cannot assess).<sup>[10]</sup> Dyspnea was checked on a scale with 0; no, 1; yes on exertion only, 2: yes at rest. Myoclonus was counted with frequency of jerks/10 seconds at rest (0: No, 1:  $\leq 1$  jerk, 2: 2–3 jerks, 3: 4–9 jerks, 4:  $\geq 10$  jerks). The severity of respiratory secretion was evaluated using Back's Scale (0: not audible, 1: only audible at the head of bed, 2: clearly audible at the foot of bed, 3: clearly audible at 6 m away from the foot of bed).<sup>[11]</sup> Peripheral edema on a scale based on severity on the leg with less edema (0: no, 1: mild [ $< 5$  mm], 2: moderate [5–10 mm], 3: severe [ $> 10$  mm]). Physicians rated the severity of ascites on a scale of 0 to 2 (0: physically undetectable, 1: physically detectable but asymptomatic, 2: symptomatic). We also checked mental status with Memorial Delirium Assessment Scale (MDAS), item 9 (MDAS #9, decreased or increased psychomotor activity,<sup>[12]</sup> and Delirium Rating Scale-revised-98 (DRS-R-98), item 2 (perceptual disturbances and hallucinations). Eastern Cooperative Oncology Group (ECOG) and Karnofsky performance scales are widely used functional scales that describe the functional ability of cancer patients.<sup>[13]</sup> ECOG ranges from 0 to 5, where 0 means fully active, and 5 means patient death. The Karnofsky scale ranges from 0 to 100, where 0 indicates the dead and 100 indicates the normal. Primary tumors were categorized as lung,

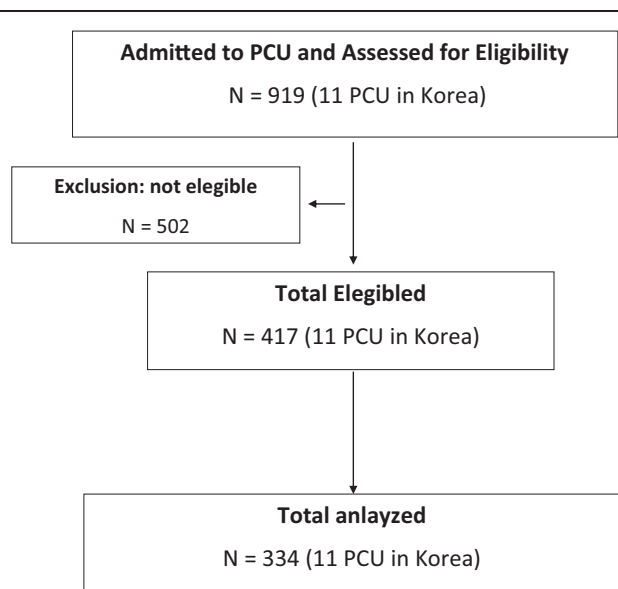


Figure 1. Flow chart. PCU = palliative care unit.

breast, gynecologic, gastrointestinal, prostate, pancreas, urologic, head and neck, hematologic, and others. Comorbidities were also collected to allow reporting of patients' CCI. The CCI is calculated based on 15 comorbidities (1: myocardial infarction, 2: congestive heart failure, 3: peripheral vascular diseases, 4: cerebral vascular disease, 5: dementia, 6: chronic pulmonary disease, 7: connective tissue disease, 8: gastric ulcer disease, 9: liver disease, 10: diabetes with no end-organ damage, 11: hemiplegia, 12: moderate/severe renal disease (Cr  $\geq$  3 mg/dL), 13: diabetes with end-organ damage, 14: moderate/severe liver disease (cirrhosis with portal hypertension), 15: AIDS).<sup>[14]</sup> The definition of improvement is that it improves when it falls below the initial score.

### 2.3. Data analysis

Basic characteristics of each group were compared using the chi-square test.

The association between dedicated care group and symptoms & signs improvements was analyzed using the multiple logistic regression analysis adjusted for age, sex, Karnofsky score, ECOG scale, CCI, PCU admission duration, education level, living with family, having children <20 years-old, religion, peaceful feeling and preference for place of death. *P* values <.05 were considered statistically significant. All data were analyzed using SPSS for Windows (version 21.0; SPSS Inc., Chicago, IL).

### 3. Results

Table 1 summarizes the demographic characteristics of 334 patients. Mean age of 68-year-old and ECOG more than 2 was 245 (77.3%). Mean hospice stay days were 25.9 days, living with family was 292 (87.7%), having children <20 years-old was 15 (4.5%), married status was 226 (67.7%), have religion was 214 (64.1%), emotionally stable was 177 (53.0%), and hospice preference for place of death was 169 (50.6%). Mean clinical experience of palliative care was 8.9 years and mean numbers of terminally ill cancer patients seen in a year was 232.9. Male sex, less education status were significantly higher in dedicated

hospice care physician group, as were living with family, having children <20 years-old, marriage status, have religion, emotional stability at admission and hospice preference for place of death were not different from dedicated hospice care physician group and non-dedicated hospice care physician group. Clinical experience of palliative care and the numbers of terminally ill cancer patients seen in a year were significantly higher in non-dedicated hospice care physician group.

Table 2 summarizes symptoms and signs improvement of palliative care patients. Symptoms improvement of dyspnea, fatigue, drowsiness and dry mouth between at admission and after 1 week were 298 (89.2%), 25 (7.5%), 204 (61.1%), 76 (22.8%), respectively. Signs improvement of myoclonus, respiratory secretion, leg edema and ascites at admission and after 1 week were 5 (1.5%), 41 (12.3%), 47 (14.1%), 12 (3.6%), respectively. Significant difference between dedicated hospice care physician group and non-dedicated hospice care physician group were drowsiness (67.5% vs 46%, *P* <.001), respiratory secretion (15% vs 6%, *P* <.028) improvements. Table 3 showed odd ratios for the association between dedicated hospice care and symptoms & signs improvements ( $\geq$ 2 symptoms or signs improvements). Compared to non-dedicated care group, the odds ratio (OR) for more than 2 symptoms or signs was 1.78 (95% confidence interval, 1.05–3.02) in the dedicated care group after adjusting age, sex, Karnofsky score, ECOG scale, CCI, PCU admission duration, education level, living with family, having children <20 years-old, religion, peaceful feeling and preference for place of death.

### 4. Discussion

Our study showed that symptoms and signs were improved among terminally ill cancer patients who received hospice care service. Family doctors (dedicated physician group) outperformed compared to oncologist (non-dedicated physician group) in taking care of the terminally ill cancer patients.

The demand for hospice and palliative care (HPC) specialists is growing rapidly, because timely palliative care interventions have been shown to improve the quality of care, reduce medical costs, and occasionally increase longevity.<sup>[15]</sup> These days, the field has expanded from the concept of traditional hospice to supportive and early palliative care, and its role has been extended to provide palliative care for improving quality of life and decision making with aggressive disease treatment in any stage of diseases.<sup>[16,17]</sup> Therefore, the importance of palliative specialists is also emerging. In Korea, there is not government-approved hospice palliative medicine certification system yet, and general specialists can perform hospice care after completing a certain education. Most of them are family doctors and oncologists. However, the clinical burden in the 2 groups is thought to be higher for oncologists. Oncologists often treat patients with active chemotherapy as well as palliative patients, which can often leads to severe clinical loading, exhaustion of the doctor's own, and difficulty in the delicate care required by palliative patients. Therefore, in this paper, the family doctor was classified as a dedicated group and the oncologist as a non-dedicated group.

Our study showed that dedicated hospice care physician group were significantly improve symptoms and sign improvement than non-dedicated group (drowsiness (67.5% vs 46%, *P* <.001), respiratory secretion (15% vs 6%, *P* <.028). In addition, we observed the number(s) of terminally ill cancer patients seen in a year were(was) significantly lower in dedicated hospice care

**Table 1**  
**Patient demographic and clinical characteristics.**

Variable	Total (N = 334)	Dedicated hospice care group (N = 234)	Non-dedicated hospice group (N = 100)	P value*
Age (yr)	68.3 ± 12.2	70.0 ± 12.3	66.5 ± 11.5	.092
Gender				.023
Male	183 (54.8)	138 (59.0)	45 (45.0)	
Female	151 (45.2)	96 (41.0)	55 (55.0)	
Karnofsky (mean, SD)	42.8 ± 17.2	40.8 ± 16.6	47.9 ± 17.5	.001
ECOG scale				.025
0	2 (0.6)	2 (0.9)	0 (0)	
1	23 (6.9)	11 (4.7)	12 (12.0)	
2	63 (19.2)	39 (16.7)	25 (25.0)	
3	157 (47.0)	115 (49.1)	42 (42.0)	
4	88 (26.3)	67 (29.5)	21 (21.0)	
Primary tumor				.046
Lung	49 (14.7)	40 (17.2)	9 (9.0)	
Breast	19 (5.7)	12 (5.1)	7 (7.0)	
Gynecologic	15 (4.5)	9 (3.8)	6 (6.0)	
Gastrointestinal	103 (30.8)	79 (33.8)	24 (24.0)	
Prostate	4 (1.2)	2 (0.9)	2 (2.0)	
Pancreas	44 (13.2)	28 (12.0)	16 (16.0)	
Urologic	12 (3.6)	9 (3.8)	3 (3.0)	
Head and neck	10 (3.0)	9 (3.8)	1 (1.0)	
Hematologic	41 (12.3)	21 (9.0)	20 (20.0)	
Others	37 (11.1)	25 (10.7)	12 (12.0)	
Charlson comorbidity index				.416
0	148 (63.2)	68 (68.0)		
1	66 (28.2)	25 (25.0)		
2	17 (7.3)	4 (4.0)		
3	3 (1.3)	3 (3.0)		
Duration of PCU admission (d)	25.9 ± 25.9	27.8 ± 24.8	21.5 ± 28.1	.041
Psychosocial aspect				.007
Education				
Less than high school	268 (80.2)	197 (84.2)	71 (71.0)	
More than university	66 (19.8)	37 (15.8)	29 (29.0)	
Live family				.584
Yes	292 (87.7)	207 (88.5)	85 (85.0)	
No	41 (12.3)	27 (11.5)	15 (15.0)	
Children <20 yrs-old				.395
Yes	15 (4.5)	9 (3.8)	6 (6.0)	
No	319 (95.5)	225 (96.2)	94 (94.0)	
Marriage				.799
Unmarried/widowed/separated	108 (32.3)	77 (32.9)	31 (31.0)	
Married	226 (67.7)	157 (67.1)	69 (69.0)	
Religion				.137
None	120 (35.9)	78 (33.3)	42 (42.0)	
Yes	214 (64.1)	156 (66.7)	58 (58.0)	
Peaceful feeling				.635
No	157 (47.0)	108 (46.2)	49 (49.0)	
Yes	177 (53.0)	126 (53.8)	51 (51.0)	
Preference for place of death				.721
Hospice	169 (50.6)	120 (51.3)	49 (49.0)	
Others	165 (49.4)	114 (48.7)	51 (51.0)	
Symptoms				
Dyspnea				
At admission	128 (38.3)	90 (38.5)	38 (38.0)	.519
After 1 wk	141 (42.2)	91 (38.9)	50 (50.0)	.070
Fatigue				
At admission	281 (84.1)	198 (84.6)	83 (83.0)	.745
After 1 wk	259 (77.5)	174 (74.4)	85 (85.0)	.033
Drowsiness				
At admission	236 (70.7)	180 (76.9)	56 (56.0)	<.001
After 1 wk	221 (66.2)	159 (67.9)	62 (62.0)	.314
Dry mouth				

(continued)

**Table 1**  
(continued).

Variable	Total (N=334)	Dedicated hospice care group (N=234)	Non-dedicated hospice group (N=100)	P value*
At admission	228 (68.3)	160 (68.4)	68 (68.0)	1.000
After 1 wk	213 (63.8)	142 (60.7)	71 (71.0)	.082
Signs				
Myoclonus				
At admission	3 (0.9)	2 (0.9)	1 (1.0)	1.000
After 1 wk	6 (1.8)	4 (1.7)	2 (2.0)	1.000
Respiratory secretions				
At admission	44 (13.2)	31 (13.2)	13 (13.0)	1.000
After 1 wk	66 (19.8)	53 (22.6)	13 (13.0)	.051
Leg edema				
At admission	135 (40.4)	97 (41.5)	38 (38.0)	.627
After 1 wk	146 (43.7)	102 (43.6)	44 (44.0)	1.000
Ascites				
At admission	78 (23.4)	57 (24.4)	21 (21.0)	.573
After 1 wk	70 (21.0)	51 (21.8)	19 (19.0)	.660
Attributes of the physician estimating prognosis				
Clinical experience (yr)	17.1±5.3	16.4±5.5	18.8±4.3	<.001
Clinical experience of palliative care (yr)	8.9±4.2	8.7±3.9	9.8±4.8	<.001
Number of terminally-ill cancer patients seen in a year	232.9±226.3	154.4±79.1	416.8±329.9	<.001

The sample statistics presented in this table were mean±standard deviation (SD) for continuous variables and frequency (percentage, %) for categorical variables.  
\*The listed P values of statistical tests were calculated using the Kruskal–Wallis rank sum test for continuous variables and the chi-square test for categorical variables.

physician group. This result may be partly explained by the fact that proper hospice care management rather than seeing many hospice patients seems to be associated with more attention to help improve symptoms and signs of hospice patients. In addition, since family doctors are accustomed to various symptoms and diseases, it is considered to be easier to access the symptoms of terminally ill patients more comprehensively. Also, they have been trained not only on physical symptoms, but also on psychosocial symptoms and communication with patients.

In Korean medical situations, oncologists have a relatively large number of outpatient and inpatient burdens compared to dedicated hospice care physician, and eventually it can be very heavy work to focus on hospice care. One doctor in a dedicated

PCU cannot take care of more than 20 in-patients of the PCU according to the designated hospice ward regulations, but oncologist also have patients in other oncology ward and there are many difficulties in the reality of each hospital environment. Since hospice care requires meticulous care in addition to the medical part of each patient, it is not easy for 1 doctor to provide delicate care when there are many patients to be cared for. In addition, due to the characteristics of terminal cancer, the physical and mental fatigue of medical staff can be very great. The number of hospice patients that can be treated in Korea is limited to 20 patients per doctor, but this number is not small. Thus, if fewer patients were to be cared for, or freed from non-HPC tasks, doctors would be able to provide much more efficient and sophisticated care to their patients.

**Table 2**  
Comparison symptoms and signs improvement whether family medicine palliative care physician.

Variable	Total (N=334)	Dedicated hospice care group (N=234)	Non-dedicated hospice group (N=100)	P value*
Symptoms improvement				
Dyspnea	298 (89.2)	210 (89.7)	88 (88.0)	.701
Fatigue	25 (7.5)	16 (6.8)	9 (9.0)	.501
Drowsiness	204 (61.1)	158 (67.5)	46 (46.0)	<.001
Dry mouth	76 (22.8)	54 (23.1)	22 (22.0)	.887
Signs improvements				
Myoclonus	5 (1.5)	3 (1.3)	2 (2.0)	.638
Secretion	41 (12.3)	35 (15.0)	6 (6.0)	.028
Leg edema	47 (14.1)	34 (14.5)	13 (13.0)	.987
Ascites	12 (3.6)	10 (4.3)	2 (2.0)	.521
Sx & Sn improvements	126 (37.7)	98 (41.9)	28 (28)	.019
MDAS improvements	7 (2.1)	6 (2.6)	1 (1.0)	.679
DRS-R-98 improvements	15 (4.5)	13 (5.6)	2 (2.0)	.247

CCSA = Communication Capacity Scale, DRS-R-98 = Delirium Rating Scale-revised-98, MDAS = Memorial Delirium Assessment Scale.

The sample statistics presented in this table were frequency (percentage, %) for categorical variables.

\*The listed P values of statistical tests were calculated using the chi-square test for categorical variables.



**Table 3**  
**Odd ratios of the association between dedicated hospice care and symptoms & signs improvements ( $\geq 2$  symptoms or signs improvements).**

	OR (95% confidence interval)
Non-dedicated hospice care group	Reference
Dedicated hospice care group	1.78 (1.05–3.02)

Adjusted for age, sex, Karnofsky score, ECOG scale, Carlson comorbidity index, PCU admission duration, education level, living with family, having children <20 yr-old, religion, peaceful feeling and preference for place of death.

In this study, due to the nature of treatment environment in Korea, the difference in the intensity of work between the 2 occupations was considered, and the family doctor was expressed as a dedicated doctor. However, regardless of the specialty board, it is considered that the environment in which dedicated palliative physicians who have been trained and can concentrate on palliative patients will be very important.

A randomized controlled trial of early palliative care among patients with advanced non-small-cell lung cancer,<sup>[18]</sup> palliative care specialists usually use their time focusing on 3 things: managing symptoms, engaging patients in emotional work; and serving as a moderator between the oncologist and the patient. In fact, clinicians treating cancer patients offer general palliative care, regardless of their specialty. Most palliative care provided to patients with cancer outside the designated hospice ward or designated hospice hospital can be called “primary palliative care” or “general palliative care” for this type.<sup>[19]</sup> However, palliative care specialists can perform a higher level of care. They can provide additional expertise to promote optimal symptom management and effective communication, and they are more effective in dealing with patients and many prognostic uncertainties. It is also shown that patients can act as intermediaries or mediators in communication with the attending physician and other professionals in relation to the psychosocial aspects that the patient cannot talk to. These are thought to be areas that can be handled by dedicated palliative specialists trained to be interested in both psychosocial and physical problems.

Our study showed that only 50% of hospice care patient prefer hospice units as a place of death. Place of death also has an important meaning in the distribution of medical resources. In other words, hospital deaths need more medical resource than home or hospice death. Many studies have shown that most people prefer to die at home, but most do not agree with the preference for the place of death and the actual place of death.<sup>[20]</sup> 13% (Canada) to 53% (Mexico) of people died at home and 25% (the Netherlands) to 85% (South Korea) died in hospital.<sup>[21]</sup> These country-specific differences cannot be merely explained by socio-demographic characteristics, causes of death or available medical resources, but also appear to be related to the country’s terminal care and mitigation policies. The first hospice clinic in Korea opened in 1965, hospice care policy and facilities developed quite slowly up until 2000. The government policies for HPC developed in 2005<sup>[22]</sup> have resulted in rapid increase in the number of designated PCU in Korea, which as of 2020 totaled 87. However, the utilization of HPC among Korean cancer decedents has been reported as low as 22.0% in 2017 and almost half of patients who were admitted to a hospice care units died within 15 days. This means that even for hospice users, a significant number of people with terminally ill cancer patients

referred to HPC very late. There are many factors involved in hospice care, but the most important is the perception of health care providers and the general public. The biggest barrier is that the public is still not favorable to hospice due to the influence of the traditional negative perception of hospice in Korea.<sup>[23]</sup> We need to continually promote the HPC to the public, develop nationally certified palliative physician specialists on this, and need a system that will ease the other medical burdens of palliative physician already in charge of hospice care. In Taiwan, family medicine residents can obtain a palliative medicine specialty board with family medicine board at the same time after a certain period of training. In Korea this year, the first hospice accreditation system was implemented to produce palliative specialists by KOREAN SOCIETY FOR HOSPICE AND PALLIATIVE CARE, but this is not an officially recognized specialty certification or board system in the country, so it should be converted into a specialist board certification system in the near future. Also, one of the main reasons people come to hospice is the lack of family caregivers. Some hospice institutions offer formal vocational caregivers, giving these institutions a higher admission rate. As families become smaller in society, the number of institutions providing such care must also increase.<sup>[23]</sup>

There are some limitations to our study. First, there is no verified definition for the classification of the dedicated and non-dedicated groups. In the future, it is expected that further studies, comparing with specific data like a patients numbers or physician’s clinical loading, will be needed. Second, due to the secondary analysis, the sample size was not calculated in this study, and finally, the number of symptoms and signs was limited and was a surrogate measure, not a patient-reported result. Finally, we were not adjusted nursing, social work, spiritual and other supports for symptoms and signs improvements for hospice patients. Further prospective study elucidate this limitations.

## 5. Conclusion

In conclusion, terminally ill cancer patients who received palliative or hospice service showed significant improvement in symptoms and illness signs. Moreover, family doctors (dedicated hospice physician group) performed better than oncologist (non-dedicated physician group). Finally we need to conduct clinical trial as well as the basic research associated with dedicated hospice care, and these data can be the foundation of future advanced HPC development.

## Author contributions

**Conceptualization:** Sun Hyun Kim, Sang-Yeon Suh, Shao-Yi Cheng, Masanori Mori, Takashi Yamaguchi, Ping-Jen Chen.

**Data curation:** Jae Ho Chung, Sang-Yeon Suh, Shao-Yi Cheng, Masanori Mori, Takashi Yamaguchi, Ping-Jen Chen.

**Formal analysis:** Jae Ho Chung.

**Methodology:** Sun Hyun Kim.

**Resources:** Sun Hyun Kim.

**Supervision:** Sun Hyun Kim, Tatsuya Morita, Satoru Tsuneto.

**Writing – original draft:** Jae Ho Chung.

**Writing – review & editing:** Sun Hyun Kim.

## References

- [1] Hemati Z, Ashouri E, AllahBakhshian M, et al. Dying with dignity: a concept analysis. *J Clin Nurs* 2016;25:1218–28.

- [2] Jordhoy MS, Fayers P, Loge JH, Ahlner-Elmqvist M, Kaasa S. Quality of life in palliative cancer care: results from a cluster randomized trial. *J Clin Oncol* 2001;19:3884–94.
- [3] De Palma R, Fortuna D, Hegarty SE, Louis DZ, Melotti RM, Moro ML. Effectiveness of palliative care services: a population-based study of end-of-life care for cancer patients. *Palliat Med* 2018;32:1344–52.
- [4] Worldwide Palliative Care Alliance. *Global Atlas of Palliative Care at the End of Life*; 2014.
- [5] Welfare MoHa. *Fact Sheets of Hospice and Palliative Care in Korea, 2017*. Ministry of Health and Welfare Press Release; 2019.
- [6] Act on Decisions on Life-Sustaining Treatment for Patients in Hospice and Palliative Care or at the End of Life. Korean Law Information Center, Korea Ministry of Government Legislation; 2018.
- [7] Higginson IJ, Evans CJ. What is the evidence that palliative care teams improve outcomes for cancer patients and their families? *Cancer J* 2010;16:423–35.
- [8] Cheng SY, Suh SY, Morita T, et al. A cross-cultural study on behaviors when death is approaching in east Asian countries: What are the physician-perceived common beliefs and practices? *Medicine* 2015;94:e1573.
- [9] Schildmann EK, Groeneveld EI, Denzel J, et al. Discovering the hidden benefits of cognitive interviewing in two languages: the first phase of a validation study of the Integrated Palliative care Outcome Scale. *Palliat Med* 2016;30:599–610.
- [10] Murtagh FE, Ramsenthaler C, Firth A, et al. A brief, patient- and proxy-reported outcome measure in advanced illness: validity, reliability and responsiveness of the Integrated Palliative care Outcome Scale (IPOS). *Palliat Med* 2019;33:1045–57.
- [11] Back IN, Jenkins K, Blower A, Beckhelling J. A study comparing hyoscine hydrobromide and glycopyrrolate in the treatment of death rattle. *Palliat Med* 2001;15:329–36.
- [12] Breitbart W, Rosenfeld B, Roth A, Smith MJ, Cohen K, Passik S. The Memorial Delirium Assessment Scale. *J Pain Symptom Manage* 1997;13:128–37.
- [13] Oken MM, Creech RH, Tormey DC, et al. Toxicity and response criteria of the Eastern Cooperative Oncology Group. *Am J Clin Oncol* 1982;5:649–55.
- [14] D’Hoore W, Sicotte C, Tilquin C. Risk adjustment in outcome assessment: the Charlson comorbidity index. *Methods Inf Med* 1993;32:382–7.
- [15] Morrison RS, Dietrich J, Ladwig S, et al. Palliative care consultation teams cut hospital costs for Medicaid beneficiaries. *Health Aff (Project Hope)* 2011;30:454–63.
- [16] Hui D, Bruera E. Integrating palliative care into the trajectory of cancer care. *Nat Rev Clin Oncol* 2016;13:159–71.
- [17] Kavalieratos D, Corbelli J, Zhang D, et al. Association between palliative care and patient and caregiver outcomes: a systematic review and meta-analysis. *JAMA* 2016;316:2104–14.
- [18] Temel JS, Greer JA, Muzikansky A, et al. Early palliative care for patients with metastatic non-small-cell lung cancer. *N Engl J Med* 2010;363:733–42.
- [19] Quill TE, Abernethy AP. Generalist plus specialist palliative care – creating a more sustainable model. *N Engl J Med* 2013;368:1173–5.
- [20] Hunt KJ, Shlomo N, Addington-Hall J. End-of-life care and achieving preferences for place of death in England: results of a population-based survey using the VOICES-SF questionnaire. *Palliat Med* 2014;28:412–21.
- [21] Pivodic L, Pardon K, Morin L, et al. Place of death in the population dying from diseases indicative of palliative care need: a cross-national population-level study in 14 countries. *J Epidemiol Commun Health* 2016;70:17–24.
- [22] Kang J, Koh SJ, Yoo YS, et al. Development of the standard hospice and palliative care education program in Korea: results from the demonstration project. *J Palliat Med* 2010;13:703–10.
- [23] Park SJ, Nam EJ, Chang YJ, Lee YJ, Jho HJ. Factors related with utilizing hospice palliative care unit among terminal cancer patients in Korea between 2010 and 2014: a single institution study. *J Korean Med Sci* 2018;33:e263.