



Original Article

Place of death for hospice-cared terminal patients with cancer: A nationwide retrospective study in Taiwan

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Abstract

Background: Hospice care has been part of the Taiwan health-care system for 20 years. Detailed information on the place of death for terminal cancer patients is lacking. Impending death discharge (IDD) is unique in Taiwan, and our study aims to compare IDD with in-hospice death among terminal cancer patients under hospice care.

Methods: This retrospective study used claims data of decedents of cancer from the National Health Insurance Research Database of Taiwan from 2007 to 2010.

Results: Of the 22,720 cancer decedents enrolled, 6316 had claims data marked with IDD and 16,404 with in-hospice death. Those with IDD were older; had a shorter hospice stay; and higher rates of gastrointestinal, peritoneal, and pulmonary cancers. The mean daily health-care expenditure was higher in those with IDD, however, the total expenditure of terminal hospice admission was lower than those dying in hospices. Patients who were treated at public hospitals had a higher rate of in-hospice death than those treated at private hospitals. Patients with IDD were positively correlated with increasing age and shorter hospice stay. Patients with IDD were positively correlated with private hospitals, especially religious corporation-based hospitals. Male sex, oropharyngeal cancer, bone/connective/breast cancers, and secondary/metastatic cancers were negatively correlated with IDD.

Conclusion: Patients with IDD have characteristics distinct from those dying in hospices. Advanced age and short hospice stays were common in those with IDD, and in-depth investigations were needed. As a unique pre-dying process in Taiwan, relevant health-care issues regarding IDD are warranted for further investigations.

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Keywords: hospices; length of stay; neoplasms; palliative care; patient discharge

1. Introduction

Since the first hospice was established in the United Kingdom in the late 1960s, the use of hospice and palliative care has become popular worldwide. In developed countries, hospice and palliative care are now used for services ranging from in-patient to community/home care.^{1,2} The place of death is an important issue for terminally ill patients, and evidence-

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based research has shown that dying at home is considered to improve the general quality of care.^{3–5}

Hospice care was introduced in Taiwan in the late 1980s, and has been covered by the National Health Insurance (NHI) program since 2000. In Taiwan, the model of palliative care differs from that used in Western countries. None of the hospices in Taiwan are independent institutions, but are rather affiliated with general hospitals, similar to palliative care units of hospitals in the West. At present, there are around 53 hospices with 718 in-patient beds in Taiwan.⁶ Cancer patients account for the majority of terminal patients under hospice care, even though the NHI has provided in-patient reimbursements for noncancer hospice care since 2009.⁷ The place of death is recorded for all terminal patients admitted to hospices. However, detailed information on the place of death for terminal cancer patients has not previously been reported. Choosing impending death discharge (IDD) is a unique pre-dying behavior for terminal patients in Taiwan. According to traditional culture, out-of-home death is thought to bring bad luck for the deceased in the afterlife, whereas dying at home and being cared for by younger family members is thought to bring good fortune.^{8,9} An epidemiological study in Taiwan that reviewed death certificates found that approximately 97% of out-of-hospital cancer-related deaths occurred at the patient's home.¹⁰ Thus, an IDD code in the National Health Insurance Research Database (NHIRD) can be considered to indicate dying at home. Therefore, the aim of this study was to investigate differences between terminal cancer patients with IDD and those who died in hospices.

2. Methods

This retrospective study collected data on patients who died from cancer whose NHI claims records were marked with hospice care from the NHIRD in Taiwan from 2007 to 2010. The NHIRD is maintained by the National Health Research Institute of Taiwan, and provides anonymized and encrypted data for research purposes.¹¹ In this study, we screened in-patient claims data in the NHIRD from 2007 to 2010. The terminal admission claims data marked with “4” (expired, died in a hospice) and “A” (IDD) were collected. Claims data before 2007 were not analyzed because of incomplete information (Fig. 1).

The types of cancer were classified according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes as follows: oropharyngeal cancer (ICD-9-CM 140-149), gastrointestinal/peritoneal cancers (ICD-9-CM 150-159), pulmonary cancers (ICD-9-CM 160-169), bone/connective tissue/breast cancers (ICD-9-CM 170-175), genitourinary cancers (ICD-9-CM 179-189), hematologic cancers (ICD-9-CM 200-208), other primary cancers (ICD-9-CM 190-195,199), and secondary/metastatic cancers (ICD-9-CM 196-198).

In the NHIRD, the hospital departments where patients are treated are recorded. However, palliative care is not included, and the departments responsible for terminal hospice admissions include family medicine, oncology/hematology, internal medicine, radiation oncology, and other sections.

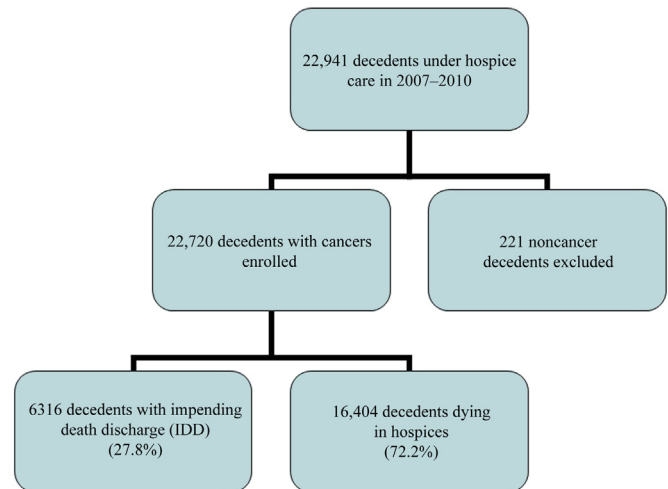


Fig. 1. Study design.

The cost of terminal hospice admissions is calculated in New Taiwan Dollars, with the exchange rate to United States Dollars being 29.35 on December 31, 2010. The types of hospice are classified in the NHIRD according to the nature of the administrative authority rather than by the health-care level. Public hospitals include the Department of Health (DOH) and municipal hospitals, national university-affiliated hospitals, military hospitals, and veterans' hospitals. Private hospitals include private/enterprise corporation hospitals, religious-based corporation hospitals, and private university-affiliated hospitals. The NHRI approved this study's protocol (No. 100257).

2.1. Statistical analysis

Data were expressed as mean \pm standard deviation or percentage (%). SPSS software (IBM SPSS version 22.0, SPSS, Inc., Chicago, IL, USA) was used for all statistical analyses. For descriptive statistics, independent *t* test, Chi-square test, Chi-square test for trend, and binary logistic regression analysis were performed. The correlated factors were presented as odds ratio (OR) and 95% confidence interval, after adjusting for each variable. Statistical significance was set at $p < 0.05$.

3. Results

From 2007 to 2010, 22,720 patients who died from cancer and received hospice care were enrolled, including 6,316 with IDD and 16,404 who died in a hospice. The numbers in both groups increased annually over the study period, with the relative percentage of patients with IDD increasing more markedly than those dying in hospices (from 23.4% to 30.1%). The trend of the percentage for patients' place of death is shown in Fig. 2.

The general information of the patients and the types of cancer are shown in Table 1. Most of the patients in both groups were aged between 60 years and 79 years. Patients with IDD had an older mean age than those who died in a hospice,

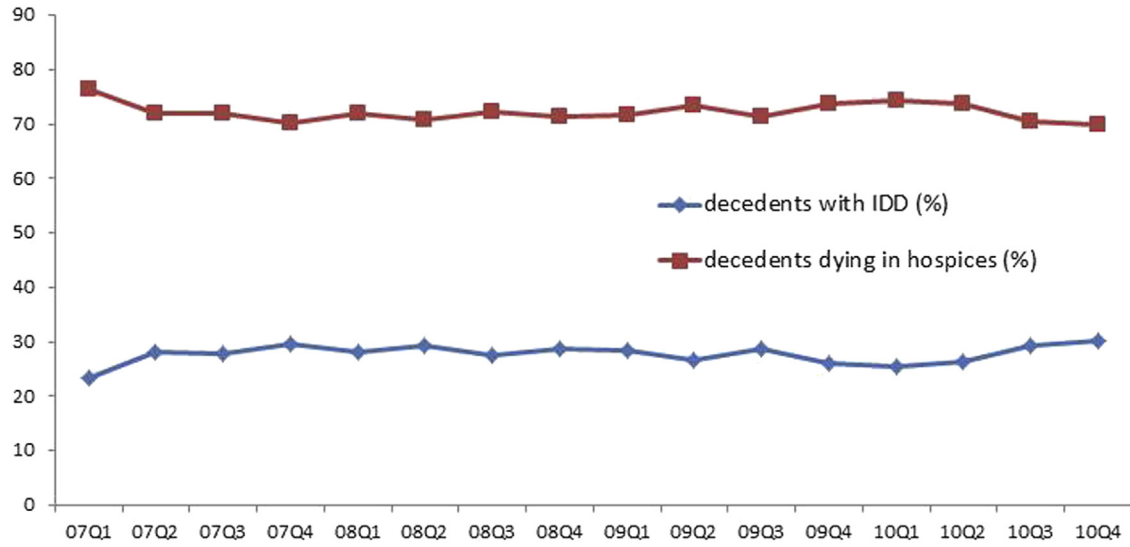


Fig. 2. Trend of percentage for place of death among the cancer patients cared for at hospices from 2007 to 2010. IDD = impending death discharge.

Table 1
Demographic data of the cancer patients with impending death discharge and those dying in a hospice.

Items	Patients with IDD ^a (n = 6316)	Patients dying in a hospice (n = 16,404)	p
Mean age (y)	68.6 ± 13.0	65.1 ± 15.2	<0.001
Age distribution (%)			<0.001
<20 y	3 (0.1)	61 (0.4)	
20–39 y	129 (2.0)	726 (4.4)	
40–59 y	1471 (23.3)	5637 (34.4)	
60–79 y	3460 (54.8)	6835 (41.7)	
≥80 y	1253 (19.8)	3145 (19.2)	
Sex (male/female)	3828/2488	9720/6684	0.064
Mean hospice stay (d)	8.7 ± 8.8	10.4 ± 10.4	<0.001
Hospice stay			<0.001
≤3 d (%)	2156 (34.1)	4963 (30.2)	
4–7 d (%)	1527 (24.2)	3680 (22.4)	
8–14 d (%)	1453 (23.0)	3627 (22.1)	
15–30 d (%)	982 (15.5)	3239 (19.7)	
>30 d (%)	198 (3.1)	895 (5.5)	
Type of cancer (ICD-9-CM codes) (%)			
Oropharyngeal cancers, 140–149	501 (7.9)	1741 (10.6)	<0.001
Gastrointestinal/peritoneal cancers, 150–159	3295 (52.2)	7858 (47.9)	<0.001
Pulmonary cancers, 160–169	1318 (20.8)	3141 (19.1)	0.004
Bone, connective tissue, and breast cancers, 170–175	320 (5.1)	1176 (7.2)	<0.001
Genitourinary cancers, 179–189	668 (10.6)	1869 (11.4)	0.082
Hematologic cancers, 200–208	170 (2.7)	436 (2.7)	0.893
Other primary cancers, 190–195, 199	227 (3.6)	728 (4.4)	0.005
Secondary/metastatic cancers, 196–198	3938 (62.3)	11,060 (67.4)	<0.001

IDD = impending death discharge.

and also a significantly shorter mean hospice stay and lower rate of hospice stay over 14 days. The patients with IDD also had higher rates of gastrointestinal or peritoneal cancer and pulmonary cancer. By contrast, those who died in a hospice had higher rates of oropharyngeal cancer, bone/connective tissue/breast cancers, other primary cancers, and secondary/metastatic cancers.

The hospital sections involved in the terminal admissions and the in-patient costs are listed in Table 2. Most of the patients in both groups (>70%) were treated at family medicine and oncology/hematology departments for their terminal hospice admission. Among the patients with IDD, more were treated at family medicine and oncology/hematology departments than were those dying in hospices, who were most frequently treated at internal medicine and radiation oncology departments. The mean daily terminal hospice admission cost

Table 2
Clinical departments and costs of terminal admissions for the studied patients.

Parameters	Patients with IDD (n = 6316)	Patients dying in hospices (n = 16404)	p
Section of admissions (%)			<0.001
Family medicine	3486 (55.2)	8501 (51.8)	
Oncology/hematology	1837 (29.1)	3941 (24.0)	
Internal medicine	456 (7.2)	2166 (13.2)	
Radiation oncology	435 (6.9)	1658 (10.1)	
Others	102 (1.6)	138 (0.8)	
Mean daily cost of hospice admissions (USD) ^a	128.2 ± 65.1	122.4 ± 61.0	<0.001
Mean total cost of hospice admissions (USD)	1027.0 ± 1138.6	1199.5 ± 1402.1	<0.001

IDD = impending death discharge.

^a 1 United States Dollar USD = 29.35 New Taiwan Dollar (NTD; exchange rate on December 31, 2010).

was higher in those with IDD, but the total cost of the terminal hospice admission was higher in those who died in a hospice.

In subgroup analysis of the types of hospice as classified by the administrative authorities (Table 3), there was a trend that the patients admitted to a public hospital had a higher rate of dying in a hospice than those admitted to a private hospital, especially in the military and veterans' hospitals. By contrast, the patients admitted to a private hospital had a trend of a higher rate of IDD, especially in religious corporation hospitals.

The factors significantly associated with IDD are shown in Table 4. After adjustments for each variable, binary logistic regression analysis showed that those with IDD were positively associated with older age (60–79 years) and shorter hospice stay. Compared with patients at the DOH/municipal hospitals, the patients with IDD were positively associated with private hospital systems, including private/enterprise corporation hospitals, religious corporation hospitals, and private university-affiliated hospitals. Compared with a department of internal medicine, being treated at other sections had the strongest association with IDD.

The factors significantly negatively correlated with IDD included male sex, oropharyngeal cancer, bone/connective/breast cancers, and secondary/metastatic cancers. Compared with the DOH/municipal hospitals, military hospitals and veterans' hospitals were also negatively correlated with IDD.

4. Discussion

The place of death is viewed as a factor affecting the quality of end-of-life care in developed countries. It has been reported to vary depending on socioeconomic status, availability of health-care resources, and cultural background.¹² In Europe, reports from Germany, Belgium, and Ireland have demonstrated an increasing trend of dying in an institution (hospice or nursing home), although dying in hospital still accounts for the majority of cases.^{13–15} In Mexico, however, as many as 52.9% of patients die at home, with deficiencies in

Table 3
Type of hospice for terminal admissions of the patients.

Item	Patients with IDD (n = 6316)	Patients dying in hospices (n = 16,404)	p *
Public/private hospital systems	1336/4980	6326/10,078	<0.001
Type of hospice (%)			<0.001
DOH and municipal hospitals	105 (1.7)	482 (2.9)	
National university-affiliated hospitals	918 (14.5)	2126 (13.0)	
Military hospitals	37 (0.6)	539 (3.3)	
Veterans hospitals	276 (4.4)	3179 (19.4)	
Private/enterprise corporation hospitals	2954 (46.8)	6549 (39.9)	
Religious corporation hospitals	1287 (20.4)	1383 (8.4)	
Private university-affiliated hospitals	610 (9.7)	1622 (9.9)	
Other private hospitals	129 (2.0)	524 (3.2)	

* χ^2 and trend χ^2 test.

DOH = Department of Health; IDD = impending death discharge.

Table 4
Comparisons of factors between patients with IDD and those dying in a hospice.

Factors	Adjusted OR ^a	95% Confidence interval	p
Oropharyngeal cancers	0.762	0.641–0.907	0.002
Bone, connective tissue, and breast cancers	0.778	0.645–0.939	0.009
Secondary/metastatic cancers	0.898	0.839–0.960	0.002
Male sex	0.935	0.876–0.999	0.047
<i>Types of hospices</i>			
National university-affiliated hospitals	1.355	1.069–1.717	0.012
Military hospitals	0.214	0.143–0.321	<0.001
Veterans hospitals	0.314	0.244–0.405	<0.001
Private/enterprise corporation hospitals	1.650	1.314–2.071	<0.001
Religious corporation hospitals	3.534	2.801–4.458	<0.001
Private university-affiliated hospitals	1.426	1.117–1.822	0.004
Other private hospitals	1.401	1.045–1.878	0.024
DOH and municipal hospitals	—	—	—
<i>Age distribution</i>			
<20 y	0.147	0.045–0.477	0.001
20–39 y	0.433	0.352–0.532	<0.001
40–59 y	0.613	0.558–0.673	<0.001
60–79 y	1.161	1.070–1.260	<0.001
≥80 y	—	—	—
<i>Section of admissions</i>			
Family medicine	2.164	1.907–2.456	<0.001
Oncology/hematology	2.259	1.969–2.592	<0.001
Radiation oncology	1.166	0.986–1.378	0.072
Other sections	3.388	2.523–4.550	<0.001
Internal medicine	—	—	—
<i>Hospice stay</i>			
≤3 d	1.517	1.278–1.801	<0.001
4–7 d	1.430	1.201–1.703	<0.001
8–14 d	1.413	1.186–1.682	<0.001
15–30 d	1.171	0.980–1.400	0.083
>30 d	—	—	—

DOH = Department of Health; IDD = impending death discharge; OR = odds ratio.

^a After adjustments for each variable.

health-care resources, advanced age, and suburban/rural residence being the predictive factors.¹⁶ Similar influencing factors have also been reported in Germany, Belgium, The Netherlands, and England.^{17,18} Support from families and improved health-care resources have been reported to be beneficial for those dying at home.¹⁹

Enabling people to choose where they die is an important issue for high-quality end-of-life care. A previous study reported that most terminal patients consider their home as the preferred place of death. Therefore, expanding and improving palliative care at home may improve the quality of care and prevent unnecessary hospitalizations.²⁰ However, few terminal patients actually die at home. Between 1990 and 1997, Tang and McCorkle²¹ found that 84–88% of terminal patients preferred to die at home, but only 17% actually did in 1995; the factors for this are unclear. The main purpose of this study was to identify the relevant characteristics of places of death in terminal patients.

In Taiwan, several population-based studies have discussed this issue. Tang et al²² performed a 6-year nationwide analysis

of cancer patients, and found that most died in hospital. Lin et al.^{23,24} investigated the role of the area of residence in the place of death, and found that, among the elderly and cancer patients, a low urbanized area was associated with dying at home. Both studies also suggested expanding the availability of palliative home care and hospice care to allow more patients to die at home.

In the present study, patients with IDD had an older mean age (≥ 60 years), which is consistent with the finding of a previous population-based study.²⁴ Interestingly, the proportion of patients aged 80 years and older was similar in both groups (19.8% vs. 19.2%). Further comparing the patients' mean age and type of hospices for terminal admission, those admitted to a DOH/municipal hospital and veterans' hospital had the highest mean age (71.1 ± 13.5 years and 67.2 ± 15.6 years, respectively). This may be because many elderly patients aged 80 years and over in Taiwan originally came to Taiwan during the Chinese Civil War in 1949, and many were servicemen. In 2014, the veterans accounted for 19.9% of all octogenarian deaths in Taiwan.²⁵ These patients are more likely to use DOH/municipal hospitals and veterans' hospitals, and thus in-hospice death is a more logical choice.

In terminal care, a short hospice stay may imply one or more issues such as poor or worsening condition and late referral from an acute ward. In this study, about one-third of the patients had a length of hospice stay of 3 days or less, and the rate was higher in the patients with IDD than in those dying in hospice (34.1% vs. 30.2%). Thus, such a short hospice stay may be a negative factor for quality of care in hospices, especially for terminal admissions. Potentially late referrals might be a problem in both groups, and more effort should be spent on promoting early referral.

The distribution of the types of cancer is also interesting. Theoretically, the type of cancer should not have impact on a patient's place of death, and the rate should be approximately the same in both groups. However, a previous population-based study in Taiwan reported that respiratory tract cancer was a predictor for dying at home.²⁴ In this study, patients with IDD had relatively higher rates of gastrointestinal/peritoneal cancer and pulmonary cancer, although the differences did not achieve statistical significance. The reason for these findings is unclear, although it may be due to more severe conditions, advanced age, and different referral times in those with specific types of cancer. Further investigations are warranted to elucidate this issue.

In this study, most cancer patients were treated at family medicine and oncology/hematology departments, and included more patients with IDD than those who died in a hospice. These two departments are more familiar with both hospice care and supporting IDD. Other departments also promoted the choice of IDD for terminal cancer patients after hospice care (Table 4). Paradoxically, radiation oncology was the first department to introduce hospice care in Taiwan,^{26,27} however, it had a higher rate of patients dying in hospice rather than with IDD. The possible reasons may be that palliative radiotherapy prolongs life and hospital stay, and reduces late referrals. The lower availability of palliative home care service

may also be a factor. A study conducted in central Taiwan reported that palliative home care allowed more terminal patients to die at home.²⁸ However, radiation oncology provides hospice ward care combined with palliative radiotherapy, which may influence the actual place of death for terminal cancer patients.

The low total cost but high daily cost of terminal admissions was also an interesting finding regarding the patients with IDD, and may reflect severe or complicated symptoms (high daily cost) followed by a rapid worsening in condition (short hospice stay and low total cost). Late referral is another possibility.

The type of hospice was also an important issue and a key point of health-care policy. Fewer patients with IDD were admitted to public hospitals than to private hospitals. The possible reasons may be that some patients, such as homeless veterans, will be admitted to veterans' or military hospitals, or that patients with low socioeconomic status may choose a public hospital due to the lower out-of-pocket expenses, which would be incurred at a private hospital. Religious corporation hospitals had the strongest correlation to patients with IDD, suggesting a close association between religion and hospice care. Public hospital-affiliated hospices should therefore promote home deaths for terminal patients, and NHI reimbursements for hospice care should be increased to maintain hospices.

Compared with the DOH/municipal hospitals, the religious corporation hospitals had the highest positive OR for patients with IDD. A possible reason for this is that religious corporation hospitals place great emphasis on hospice care, providing more hospice home care and more spiritual care workers for terminal patients, and promote public education about palliative care. The negative correlation of IDD with oropharyngeal cancer, bone/connective tissue/breast cancers, and metastatic cancers may reflect difficulties in palliative home care for these cancers, such as wound management, feeding, and pain control. A longer hospice stay may also reflect similar difficulties, especially for those with terminal oropharyngeal cancer who had the longest mean hospice stay (12.9 ± 12.5 days). The correlation between male sex and dying in a hospice may reflect gender-specific types of cancer and the male predominance in certain groups (such as veterans). Professional training for palliative home care and relevant education for patients' families may overcome these issues.

In this study, there was a trend of decreasing percentage of patients who received care in a hospice. Unlike the patients who died in a hospice, the increase of percentage in patients with IDD slowed following the third quaternary of 2009. A British systemic review suggested that good community engagement and increased caring and social networks are beneficial to improve outcomes and preferred places of death for terminal patients.²⁹ Such experience reinforces the need for palliative home care in Taiwan, and the promotion of dying at home for cancer patients receiving care at a hospice.

This study has some limitations. The geographical locations of the hospitals could not be distinguished in the database. The

lack of linkage for the mortality data also limits the accuracy of the final status of those with IDD, although the survival rate was extremely low. The variety of patients' count might affect the results of binary logistic regression. In addition, the terminal cancer patients who committed suicide were not included in this study. Furthermore, the preferred place of death, and social and economic status were difficult to investigate due to limitations of the database itself. Further cross-database linkage and relevant studies are needed to verify our findings.

In Taiwanese hospice care, most patients with terminal cancer still actually die in the hospice. Patients with IDD have some characteristic differences from those who die in hospices, including more advanced age, shorter terminal hospice stay, clinical departments admitting, predominantly being female, and being treated at predominantly private hospitals, especially religious corporation hospitals. Further investigation of behaviors and relevant supportive care for terminal cancer patients with IDD is warranted.

Acknowledgments

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