

Original Article

Hospice Exposure Is Associated With Lower Health Care Expenditures in Taiwanese Cancer Decedents' Last Year of Life: A Population-Based Retrospective Cohort Study



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Abstract

Context. Evidence for the association of hospice exposure with lower health care expenditures at end of life (EOL) remains inconclusive and neglects EOL care being concentrated in patients' last few months.

Objective. The association between hospice exposure and health care expenditures in cancer patients' last one, three, six, and 12 months was evaluated.

Methods. In this population-based, retrospective cohort study, Taiwanese cancer decedents in 2001–2010 ($N = 195,228$) were matched 1:1, with proportions of matched hospice users reaching 87.8%, by a hospice-utilization propensity score. For each matched pair, exposure to hospice (time from hospice enrollment to death) was matched to equivalent periods for hospice nonusers before death. Hospice-care associations with health care expenditures were evaluated by hospice use/exposure interactions with multilevel linear regression modeling using generalized estimating equations.

Results. The unadjusted main effect showed lower total mean health care expenditures for hospice users than for hospice nonusers only in the last one and three months (rate ratio [95% CI]: 0.86 [0.81, 0.90] and 0.93 [0.89, 0.96], respectively). However, after accounting for exposure time, hospice care was significantly associated with lower health care expenditures at exposures of ≤ 30 , ≤ 60 , and ≤ 180 days for health care expenditures measured in the last one and three months, six months, and 12 months, respectively. Savings for patients with lengthy hospice stays were neutralized or even disappeared.

Conclusion. Hospice care was associated with lower health care expenditures when it could actively intervene in EOL care. Hospice philosophy should be applied not only shortly before death but also throughout the dying trajectory to achieve maximum cost savings. *J Pain Symptom Manage* 2018;55:755–765. © 2017 American Academy of Hospice and Palliative Medicine. Published by Elsevier Inc. All rights reserved.

Key Words

Hospice, health care expenditures, end of life, cancer, oncology

Introduction

End-of-life (EOL) cancer care has become increasingly aggressive over the past decade,^{1–3} consuming a disproportionate share of health care expenditures

worldwide.^{4–9} However, such aggressive EOL care may not be in the best interests of dying patients and bereaved family caregivers.¹⁰ Aggressive EOL care also threatens the viability of health care

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systems.¹¹ To counteract poor and costly EOL care, hospice/palliative care has been embraced as the EOL-care standard. Hospice care lightens dying patients' physical/psychological symptom distress and improves their QOL,^{12–14} facilitates advance care planning,^{12,14} lessens bereaved caregivers' grief symptoms,^{13,15} and lowers health care resource utilization.^{12,16} Therefore, the worldwide number of hospice services has increased rapidly over the past decade,¹⁷ including in Taiwan, with more cancer patients using hospice care at EOL than ever before.^{3,18–20} In Taiwan, hospice is promoted as a philosophy of EOL care, and hospice services can be provided as inpatient hospice unit care, home care, and a "shared-care" model, that is, in-hospital hospice care not on a hospice unit.^{20(p.93)}

Indeed, cost savings attributable to hospice care is a widely studied and critical topic.^{21–28} However, evidence remains inconclusive for the financial impact of hospice on EOL-care expenditures. Hospice has been suggested as an "add-on" to the increasingly aggressive pattern of EOL care because hospice stays are frequently preceded by hospitalizations with intensive care unit care³ and are often short,^{3,18} which may be insufficient to reduce costs. Therefore, hospice care for cancer decedents is at best cost neutral to slightly cost saving.^{24–26} However, hospice care is more commonly viewed as cutting health care costs,^{21,22,26,27} probably by avoiding futile aggressive life-sustaining treatments²⁸ and by adequately managing symptoms to reduce emergency department visits and hospitalizations at EOL.^{12,29,30} In addition, shorter hospice stays before patient death yield higher savings.^{21,22,26,27} Neglecting the length of hospice stay possibly obscures hospice care–related cost savings.^{24,26} Therefore, exposure time to hospice care is a key factor that should be²¹ and has been^{26–28} taken into consideration when evaluating cost savings attributable to hospice use because hospice care cannot influence delivery of EOL care before hospice enrollment and, consequently, costs.

The common practice for defining exposure time for hospice care in assessing hospice-attributable cost savings is the number of days enrolled in hospice care before death and the same period before death for patients without hospice care.^{26–28} Health care expenditures are then compared within the equivalent exposure times before death, although the exact date of death may differ between hospice users and nonusers. Such an approach evaluates cost savings purely attributable to hospice care within the period when it is provided without considering total EOL-care expenditures (with/without hospice care). Given the skyrocketing EOL-care expenditures worldwide,^{4–9} evaluating the relationship between different periods of hospice enrollment and total EOL-care expenditures may provide a more

comprehensive understanding of the financial impact of hospice care as the majority of existing studies have done.^{21–24,26} Examining the cost savings attributable to hospice care is especially important for EOL-care expenditures at different periods before death. Indeed, such expenditures are highly concentrated in cancer patients' last few months, with one-third of total expenditures consumed in the last month.^{5–7,9,31} Furthermore, homogeneity between hospice users and nonusers in existing studies was commonly established by inadequate matching,^{25–28} for example, proportions of hospice users matched were 35.0%²⁸–58.2%,²⁷ limiting the representativeness of study subjects. Therefore, the purpose of this study was to examine the cost savings in EOL-care expenditures attributable to hospice care at different periods before death among a 1:1 matched cohort of cancer patients dying in 2001–2010, with the proportion of matched hospice users as high as possible. We choose 2001–2010 because it was the first decade when the Taiwanese government actively promoted hospice services.

Methods

Study Design and Sample

In this population-based retrospective cohort study, computerized national administrative data were linked at the individual patient level with scrambled personal identification numbers. Five national databases were used: the National Register of Deaths Database (NRDD), Cancer Registration System (CRS) database, National Health Insurance Research data sets, Database of Medical Care Institutions Status, and national census statistics (county/city-level household income). Taiwan's government continuously monitors these databases for completeness and accuracy. Cause-of-death information from the population-based NRDD is highly accurate for malignant neoplasms ($\kappa = 0.94$ with medical record reviews).³² The CRS, a population-based cancer registry founded in 1979, includes all newly diagnosed cancers that must be reported by all hospitals with >50 beds. The CRS included 97.34% of incident cancer cases in 2010, with 97.00% completeness and 91.11% accuracy.³³

Taiwan's National Health Insurance (NHI) is characterized by government-run, universal coverage, comprehensive health services, and a single-payer system with a uniform, regulated fee schedule for all citizens. Currently, 99.9% of Taiwan's 23 million residents are enrolled in the NHI program.³⁴ Health care systems are reimbursed primarily for services provided, and copayment is waived for cancer patients. Accuracy in coding of the NHI claims data sets is ensured for diagnosis, comorbidity, and health care

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