Factors Affecting Place of Death of Hospice and Non-Hospice Cancer Patients

CAROL MCMILLEN MOINPOUR, PHD, AND LINCOLN POLISSAR, PHD

Abstract: We identified factors associated with death at home for 28,828 hospice and non-hospice cancer patients in 13 counties of western Washington State. Hospice participation was found to be the variable most strongly associated with death at home. Admission to hospice appears to override the tendency for certain subgroups of patients, such as the extreme elderly and those diagnosed close to death, to die in an institutional setting. These findings are discussed with respect to the problem of selection bias. (*Am J Public Health* 1989; 79:1549–1551.)

Introduction

Death at home has been associated with availability of hospice programs[1,2] and whether or not the hospice is hospital-based or home care-based.[1,3–5] In addition, variables such as case mix, availability of caregiver support, and federal policies associated with the new prospective payment system and the Medicare hospice benefit are suspected of influencing length of stay in hospitals and hospice[4–14] and may affect place of death. A number of these variables were addressed in this analysis of factors associated with death at home for hospice and non-hospice cancer patients. Hospice participation was predicted to be a major determinant of death at home.

Methods

The study population included all 28,828 residents of 13 Washington State counties who died during 1980–85 with cancer as a primary cause of death, and whose diagnosis was made prior to death. Among this population, 6,762 were admitted to one of the hospices in the area. Cancer diagnosis information was obtained from the Fred Hutchinson Cancer Research Center Cancer Surveillance System and hospice data were obtained through the cooperation of 21 hospices.

We selected two types of independent variables: 1) previously established association with place of death and/or traditional adjustment or controlling variables (age at death, sex, race, marital status, rural/urban nature of county of residence, stage and site of cancer at diagnosis, presence of a contributory cause of death on the death certificate, time from diagnosis to death, and year of death); 2) policy-related variables (type of ownership of the hospital involved in continuing care of the patient, whether or not the hospital was affiliated with or had its own hospice program, whether or not the hospital was affiliated with or had its own home care program, and type of hospice program utilized).

The effect of independent variables on the relation between hospice participation and death at home was measured by a statistic derived from the relative risk.[15] In each stratum of a variable, the "scaled" relative risk was calculated as the stratum-specific relative risk for home death divided by the overall relative risk pooled across all strata. A variable that does not modify the hospice effect on place of death will have a scaled relative risk of 1.0 for all strata.

Logistic regression analyses were based on 26,500 patients with known values for all relevant variables. The dependent variable was coded as dying at home versus dying elsewhere. Independent variables in the logistic regression were modeled as dummy variables.[16]

Results

Hospice patients were 2.8 times as likely to die at home as non-hospice patients, the strongest association with place of death of any variable studied. Patients in hospice Home Health Based 1 and 2 programs were more likely to die at home than other hospice patients (Table 1). Inpatient hospice participants had a frequency of home death that was closer to the frequency for non-hospice than for hospice patients. The association of place of death with hospice participation yielded a p value <.0005 whether hospice was categorized as

TABLE 1—Place of Death, among Cancer Patients, by Type of Hospice or Non-Hospice Care

	Place of Death (percent)				
Type of Care	At Home	Hospital	Nursing Home	Other	N
Non-Hospice	16.3	63.6	19.1	1.0	22066
Hospice*	45.3	42.3	10.8	1.6	6762
HH-Based 1	53.2	36.8	8.2	1.8	3794
HH-Based 2	41.3	45.7	11.8	1.2	1642
Inpatient	25.1	56.7	16.7	1.6	1013
Community-Based/Volunteer Intensive	35.8	44.1	18.8	1.3	313
Total N					28828

*HHB1: General home and hospice home care delivered by a Medicare Certified Home Health Agency.

HHB2: Hospice home care only, delivered by a Medicare Certified Home Health Agency.

Inpatient: Hospice care delivered in a hospital setting.

Community-Based/Volunteer Intensive: Hospice care delivered by organizations supported by donations and volunteer services.

Address reprint requests to Carol M. Moinpour, PhD, Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, 1124 Columbia Street, MP557, Seattle, WA 98104. Dr. Polissar is also affiliated with the Fred Hutchinson Cancer Research Center, and with the Department of Biostatistics, University of Washington. This paper, submitted to the Journal October 24, 1988, was revised and accepted for publication May 10, 1989.

TABLE 2—Percent of Hospice and Non-Hospice Patients Dying at Home; Relative Risk and Scaled Relative Risk for Dying at Home Associated with Hospice By Patient Demographic and Medical Variables (N = 28,828)

Variables	Hospice % (N)	Non-Hospice % (N)	RR	Scaled RR
Age at Death (years)				
0–19	69.2 (26)	25.9 (189)	2.7	1.0
20–64	44.3 (2488)	17.9 (7882)	2.5	.9
65–74	45.0 (2397)	16.4 (6580)	2.7	1.0
75–84	46.0 (1494)	15.4 (5064)	2.7	1.1
85+	49.2 (356)	12.0 (2351)	4.1	1.5
Unknown (N = 1)				
Marital Status				
Single	37.9 (264)	14.2 (1405)	2.7	1.0
Married	47.6 (4400)	18.2 (12694)	2.6	1.0
Divorced	36.4 (623)	13.7 (2159)	2.7	1.0
Widowed	43.4 (1470)	13.6 (5778)	3.2	1.2
Unknown (N = 35)				
Residence				
Rural	39.7 (398)	20.1 (2326)	2.0	.7
Semi-Urban	55.0 (762)	18.7 (3939)	2.9	1.0
Urban	44.4 (5602)	15.1 (15801)	2.9	1.0
Unknown (N=0)				
Time from Diagnosis to Death				
<30 Days	50.0 (70)	5.1 (1228)	9.8	3.6
>30 Days	45.1 (6598)	17.0 (19970)	2.7	1.0
Unknown (962)				
Year of Death				
1980–82	40.4 (2142)	15.4 (11567)	2.6	1.0
1983–85	47.5 (4620)	17.3 (10499)	2.7	1.0
Unknown (N = 0)				
Hospital Ownership				
Local Govt	44.3 (784)	16.4 (3188)	2.7	1.0
Non-Profit	44.8 (5080)	16.8 (14691)	2.7	1.0
For-Profit	45.8 (341)	11.5 (1017)	4.0	1.4
Federal Govt	42.0 (150)	11.3 (1294)	3.7	1.4
Unknown (2283)				

TABLE 3—Relative Risks, Coefficients, and Standard Errors for Death at Home, Linear Logistic Model (n = 26,500)

Variables	Relative Risk	Coefficient	Standard Error
Intercept	–	−1.62	.04
Age at Death (years)			
<65	1.1	0.12	.05
65–74*	1.0	0	–
75–84	1.0	−0.04	.05
85+	0.8	−0.25	.08
Hospice Participation			
Non-Hospice*	1.0	0	–
Home Health-Based 1	5.1	1.63	.06
Home Health-Based 2	3.6	1.28	.07
Inpatient	1.6	0.48	.09
Community-Based	1.9	0.66	.14
Marital Status			
Currently Married*	1.0	0	–
Single	0.7	−0.34	.07
Divorced/Widowed	0.8	−0.27	.04
County Location			
Urban*	1.0	0	–
Semi Urban	1.3	0.24	.04
Rural	1.4	0.32	.05
Time from Diagnosis to Death			
<30 Days	0.3	−1.36	.14
>30 Days*	1.0	0	–
Year of Death			
1980–1982*	1.0	0	–
1983–1985	1.2	0.14	.03
Hospital Ownership			
Non-Profit*	1.0	0	–
Local Government	0.9	−0.07	.04
For-Profit	0.9	−0.09	.08
Federal Government	0.6	−0.46	.08
Interactions			
Hospice × Time from Diagnosis-Death less than 30 days	6.0	1.80	.29
Hospice × Age at Death			
Hospice × <65	0.9	−0.09	.08
Hospice × 75–84	1.1	0.12	.09
Hospice × 85+	1.6	0.49	.14

*Reference Category for Dummy Variables

dichotomous (yes/no), as a five-category variable as in Table 1, or when limited to the four categories of hospice.

The variables that had both a statistically significant direct association with place of death (home versus other) and a significant interaction with hospice in affecting place of death are shown in Table 2. All interactions were significant with $p \leq .005$ except for year of death ($p = .02$).

The positive association of hospice with death at home was stronger for the very old (age 85+), for those not living in rural counties, for those diagnosed close to the time of death (the highest scaled relative risk), and for patients using for-profit and federal government hospitals instead of non-profit and local government hospitals. There was only a minor variation in the hospice association with place of death across categories of marital status and year of death.

A logistic regression model for place of death (home versus other) was fit including all variables from Table 2. The interactions of each of the variables with hospice participation (yes/no) were included in exploratory analyses. Initially 13 constructs (all levels of a variable or levels of interaction) were included. Constructs with a p-value of $.05/13 = <.004$ were retained in the model.

The final model is presented in Table 3. The main effects and interactions all had p-values below .0001. The pattern of main effect relative risks closely followed those in Table 2. Among the interactions, only that of hospice with age and with time from diagnosis to death remained significant. As in Table 2, the positive association of hospice with death at home modifies the relation between place of death and the two variables, age at death and time from diagnosis to death. Patients age 85 and older, and those diagnosed close to death were more likely to die at home than would be predicted by age at death, time from diagnosis to death, and hospice alone.

Discussion

Hospice participation is clearly the variable most strongly related to whether or not a cancer patient will die at home. It appears that once a patient is admitted to a hospice program, the strong philosophy supporting home deaths overrides the likelihood for patients with certain characteristics to die in hospitals or nursing homes.

Because this is an observational study, it is impossible to determine if the strong association of hospice with home death is causal or if it is due to the selection of hospice by people who prefer to die at home. It is likely that at least some of the association is a causal effect of hospice itself.

The relative risk of death at home for hospice patients varies across type of hospice program. These data are consistent with the results of the National Hospice Study[1,3] where patients cared for by hospices not controlling hospital beds were almost twice as likely to die at home. It is still the case that, relative to non-hospice patients, hospice patients have a much greater likelihood of dying at home. Further, the effect of hospice also seems to be to counteract factors such as age that reduce the likelihood of death at home.

ACKNOWLEDGMENTS

The authors are grateful to Billy Kreuter and Cynthia Ames for technical support. We also appreciate the assistance of our Hospice Advisory Committee, the Washington State Hospice Organization, and the cooperation of the twenty-one participating hospices. This research supported by Health Care Financing Administration Cooperative Agreement #18-C-98674/0-02.

REFERENCES

1. Mor V, Hiris J: Determinants of site of death among hospice cancer patients. J Health Soc Behav 1983; 24:375–385.
2. Gray D, Macadam D, Boldy D: A comparative cost analysis of terminal cancer care in home hospice patients and controls. J Chronic Dis 1987; 40:801–810.
3. Greer DS, Mor V, Morris JN, Sherwood S, Kidder D, Birnbaum H: An alternative in terminal care: Results of the National Hospice Study. J Chronic Dis 1986; 39:9–26.
4. Torrens PR: Hospice care: What have we learned? Annu Rev Public Health 1985; 6:65–83.
5. Mor V, Birnbaum H: Data watch. Medicare legislation for hospice care: Implications of National Hospice Study data. Health Affairs 1983; 2:80–90.
6. Soukop M, Calman KC: Cancer patients: Where do they die? An analysis. Practitioner 1977; 219:883–888.
7. Kaplan MP, O'Connor PM: The effect of Medicare on access to hospice care. Patterns of eligibility requiring the availability of a primary care person. Am J Hospice Care November/December 1987; 4:34–42.
8. Powers JS, Burger MC: Terminal care preferences: Hospice placement and severity of disease. Public Health Rep 1987; 102:444–449.
9. Colton CJ, McClish D, Doremus H, Powell S, Smookler S, Jackson DL: Implication of DRG payments for medical intensive care. Med Care 1985; 23:977–985.
10. Balinsky W, Starkman JL: The impact of DRGs on the heath care industry. Heath Care Manager Rev 1987; 12:61–74.
11. Moc V, Laliberte LS: Simulating the impact of case-mix adjusted hospice rates. Health Care Finan Rev 1986; 8:53–56.
12. Davis FA: Medicare hospice benefit: Early program experiences. Health Care Finan Rev 1988; 9:99–111.
13. Sherman LM, Finn WE: Ethical dilemmas imposed by the medicare hospice regulations. NY State J Med 1987; 87:379–380.
14. Polissar L, Severson RK, Brown NK: Factors affecting place of death in Washington State, 1968–1981. J Community Heath 1987; 12:40–55.
15. Breslow NE, Day NE: Statistical Methods in Cancer Research, Vol I. The Analysis of Case-Control Studies. Lyon: International Agency for Research on Cancer, 1980.
16. Polissar L, Diehr P: Regression analysis in health services research: The use of dummy variables. Med Care 1982; 20:959–966.

The Impact of Media Coverage of Nancy Reagan's Experience on Breast Cancer Screening

Dorothy S. Lane, MD, MPH, Anthony P. Polednak, PhD, and Mary Ann Burg, MSW, PhD

Abstract: In surveys of random samples of women 50 years of age and older residing in two communities in Long Island, New York, both within-subject (cohort) and independent-sample comparisons were made before and after the media announcements of Nancy Reagan's breast cancer. Knowledge of lifetime risk of breast cancer increased significantly only in the cohort comparison, while self-perception of risk did not increase. Small proportions of women surveyed, however, reportedly were influenced to contact a health professional (6–8 percent) and to have their first mammogram (1.5–2 percent) which they attributed directly to Mrs. Reagan's experience with breast cancer. (*Am J Public Health* 1989; 79:1551–1552.)

Introduction

While the breast cancer experiences of public personalities could have an effect on awareness and use of cancer screening tests, no population-based studies have been published on the response to such media events. Black, *et al*,[1] found no evidence for improvement in stage distribution of breast lesions treated in two hospitals in New York City after the public announcements of breast cancer in the wives of the US President and Vice President in 1974. On October 15, 1987, Nancy Reagan's breast cancer was announced and in October–November newspapers and both local and network television reported that the cancer had been detected at an early stage by mammography. We examined the short-term effect of the news about Nancy Reagan's breast cancer experience on the breast cancer awareness and screening practices of women on Long Island.

Methods

As part of a community-based study,[2] a random sample of 254 female licensed drivers 50 years of age and older residing in two non-adjacent townships on Long Island were mailed a survey in September–October 1987 (time-1), with a $2 token prepayment. This survey included questions about past screening behavior (mammography, breast physicals, and self-examination), concerns about mammography, knowledge of breast cancer risk, and demographic characteristics. After three mailings (including certified mail) the final response rate to the time-1 survey was 68 percent (N = 183), excluding those who had died or moved out of the area. The 173 who had responded prior to the announcement of Mrs. Reagan's surgery in the media were sent a follow-up survey in November–December (time-2). The 142 women responding to both surveys comprise the cohort group. Surveys were also sent in November-December to an independent sample of women randomly selected from the same two Long Island communities (time-2), with a response rate of 71 percent (N = 205). To assess the changes in responses from time-1 to time-2, chi-square was used for the independent samples and a matched-pair or McNemar chi-square test was used for the cohort.

Results

There were no significant differences between these

Address reprint requests to Dorothy S. Lane, MD, MPH, Associate Professor, Department of Community and Preventive Medicine, School of Medicine, State University of New York at Stony Brook, Stony Brook, NY 11794. Dr. Polednak is Associate Professor, and Dr. Burg is Instructor, both in the Department of Community and Preventive Medicine at SUNY. Additionally, Dr. Lane is Principal Investigator, Dr. Polednak is CoPrincipal Investigator, and Dr. Burg is Research Scientist, all with the Awareness of Breast Cancer Screening Project. This paper, submitted to the Journal February 6, 1989, was revised and accepted for publication May 17, 1989.