# A Randomized Trial of the Cost Effectiveness of VA Hospital-Based Home Care for the Terminally Ill

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*All admissions to a 1,100-bed Department of Veterans Affairs (VA) hospital were screened to identify 171 terminally ill patients with informal caregivers who were then randomly assigned to VA hospital-based team home care (HBHC,* N = *85) or customary care (*N = *86). Patient functioning, and patient and caregiver morale and satisfaction with care were measured at baseline, one month, and six months. Health services utilization was monitored over the six-month study period and converted to cost. Findings included no differences in patient survival, activities of daily living (ADL), cognitive functioning, or morale, but a significant increase in patient* ($p = .02$) *and caregiver* ($p = .005$) *satisfaction with care at one month. A substitution effect of HBHC was seen. Those in the experimental group used 5.9 fewer VA hospital days* ($p = .03$)*, resulting in a $1,639 or 47 percent per capita saving in VA hospital costs* ($p = .02$)*. As a result, total per capita health care costs, including HBHC, were $769 or 18 percent (n.s.) lower in the HBHC sample, indicating that expansion of VA HBHC to serve terminally ill veterans would increase satisfaction with care at no additional cost.*

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The high cost of care for the dying has received considerable attention in the United States during the past decade (Scitovsky 1984; Zook and Moore 1980; Lubitz and Prihoda 1983; Fleming, Kobrinski, and Long 1985; Anderson and Steinberg 1984). Because of concerns about both the cost and the appropriateness of care for the terminally ill, several studies of home care as an alternative to acute hospital care have been conducted. Most of this literature describes the philosophy of hospice care and advocates its expansion. As a result, little evidence exists specifically regarding the cost effectiveness of home health care in substituting for other, more costly forms of care for the terminally ill (Koff 1980; Millet 1979; Foster 1979).

The majority of studies conducted to date have utilized quasi-experimental designs (Bloom and Kissick 1980; McCusker and Stoddard 1987). The best known of these is the National Hospice Evaluation, which compared home and hospital-based hospice care to conventional hospital care provided on oncology services to Medicare beneficiaries (Greer and Mor 1986). Study findings included a slight gain in satisfaction with care among patients receiving hospital-based hospice, but no cost savings. Significant cost savings were found in the home care hospice model during the last month of life. However, the study did not use a randomized design, and its findings are subject to rival interpretations.

To date, only one randomized study of the effects of hospice care has been conducted, by Kane, Wales, Bernstein, et al. (1984). Findings from this study include higher satisfaction with care in the treatment group but no cost savings. However, this study tested the impact of an inpatient hospice unit rather than a home care intervention. Another randomized study of the impact of physician-led team home health care, by Zimmer, Groth-Junker,and McCusker (1985), failed to find cost savings for the total home care sample but revealed substantial cost savings in hospital days for the subset of subjects in the experimental group who were terminally ill. This finding was based on a small sample ($N = 48$), but supports the findings of the National Hospice Evaluation in suggesting the potential cost effectiveness of home health care for the terminally ill.

Although a Medicare hospice benefit that preferentially reimburses for home-based care was implemented prior to the conclusion of the National Hospice demonstration, no similar benefit exists at present for non-Medicare beneficiaries. In fact, the two-year period of permanent and total disability that is required for Medicare eligibility for younger individuals exceeds the life expectancy of many terminally ill patients, thereby precluding their participation.

The Edward Hines, Jr. VA Hospital has had a Hospital-Based Home Care (HBHC) program since 1971. The program encompasses an interdisciplinary team that is led by a physician and includes nurses, a social worker, a physical therapist, a dietitian, and health technicians. The Hines HBHC program develops goal-oriented, interdisciplinary patient care plans at team meetings, and schedules visits according to individual patient needs. The HBHC physician also manages the hospital's inpatient intermediate care unit, and is able to manage HBHC patients both in and out of the hospital. The HBHC model of care at Hines emphasizes the provision of care to high-risk patients, the provision of comprehensive services based on need, the importance of timely communication about patients across team members, and the instruction and involvement of informal caregivers in patient care to the maximum extent possible.

Over time, the Hines program had observed an increase in the referral of terminally ill and severely disabled patients. In 1984, a randomized study was undertaken to determine the cost effectiveness of home care services for these two patient groups. The primary hypothesis of the study was that HBHC would cost less than customary care—that is, that HBHC would substitute for institutional care while simultaneously it would prove to be as effective as customary care with respect to patient functional status and patient and caregiver morale and satisfaction with care outcomes. In other words, we believed that HBHC could produce a net cost savings without harming patients, in terms of their functional status or in terms of patient and/or caregiver morale or satisfaction with care. Finally, we also sought to compare the attributes of the Hines model of care with traditional community home care services to which control group patients could be referred. A comparison of the two models was believed to be important in enabling us to determine the extent to which the Hines "model" was implemented as intended and whether it, in fact, differed from customary care provided in the community. The effects of the HBHC program on the combined patient samples and on the severely disabled group are reported elsewhere (Hughes, Cummings, Weaver, et al. 1990; Cummings, Hughes, Weaver, et al. 1990). This article reports the effect of HBHC on terminally ill patients.

## METHODS

This study used a randomized pretest-multiple posttest experimental design. Subjects were inpatients admitted to the 1,100-bed Edward

Hines, Jr. VA Hospital and their primary informal caregivers. From April 1984 to May 1987, all admissions to medicine, surgery, and neurology were screened to identify terminally ill patients. All individuals with a prognosis from a primary physician of a life expectancy less than six months were considered to be terminally ill.

Three other inclusion criteria were required for study entry: presence of an available caregiver, residence within the HBHC 30-mile catchment area, and willingness to participate in a randomized trial. A primary caregiver was defined as the individual who was willing to take major responsibility for assisting the patient upon discharge from acute care. The caregiver did not have to be related to or live with the patient.

A total of 944 patients who lived within the HBHC catchment area were screened for participation. Of these, 331 met the criteria for inclusion in the terminally ill group. Over half of these patients (175; 58 percent) were included in the study, with the most common reason for noninclusion being patient or caregiver refusal to participate based on a perception that home care was not needed at that time. Subsequently, four subjects (two experimental and two control) were admitted to nursing homes directly from the hospital. Since these individuals were never exposed to treatment or control conditions, they were excluded from the analysis. Analyses were conducted on 85 control and 86 HBHC patients and caregivers. Control group patients were able to access customary care within or outside the VA with the exception of access to Hines HBHC. Thus, control group patients could be referred by VA discharge planners to community home care or to Hospice care.

## MEASURES

Demographic data on age, race, education, religion, marital status, health insurance, and prior health care use were obtained for all patient groups. Baseline, one-month, and six-month follow-up interviews were conducted to assess patients' cognitive and functional status and patient and caregiver morale and satisfaction with care. The Barthels Self-Care Index was used to assess patient functional status (Sherwood et al. 1977). The Fortinsky, Granger, and Seltzer (1981) modified scoring system was used because it provides a wider scoring range than the original scale. Cognitive functioning was assessed using the Short Portable Mental Status Questionnaire (SPMSQ), a ten-item scale taken from the larger OARS Multidimensional Functional Assessment Questionnaire (OMFAQ) instrument (Duke University 1978). Patient and caregiver morale were assessed using the short version of the Philadelphia Geriatric Center Morale Scale from the Multilevel Assessment Instrument (Lawton et al. 1972; Lawton 1975). The Satisfaction with Care scale was originally developed by Greer for the National Hospice Study (Greer et al. 1972). The adapted version that was used in this study contained 17 items covering satisfaction with physician, nurse, social work, and general medical care. It had an acceptable internal consistency (Cronbach's alpha) of .73 in the patient sample and .69 in the caregiver group.

Utilization of health care services both within the VA system and in the private sector was monitored for all subjects. The scope of services tracked included both VA and private sector hospital, nursing home, and emergency room use, home health care services, and ambulatory care. VA services were tracked through existing records, files, and computer data bases. Use of health care services outside the VA was monitored by participants. To improve subject recall, patients were provided with a health care diary and were asked to record in the diary all home health care visits, clinic visits, and admissions to health care facilities for the six-month period of their participation in the study. Patients were contacted monthly by research staff to retrieve the diary information, and diaries were also examined by research staff in patients' homes during the one-month and six-month interviews.

During the study recruitment phase, all admissions to the acute inpatient wards were screened to determine whether patients met the criteria of residence within the Hines HBHC catchment area and presence of a terminal illness. Patients who met these criteria were interviewed by a research assistant to determine whether or not they met the remaining study criterion: presence of a willing caregiver. Screening took place within five to eight days after admission to allow for interward transfers, rapid discharges of obviously inappropriate patients (e.g., those admitted for minor surgery or substance abuse), and general stabilization of new admissions. Prior to the patient's discharge, written consent was obtained from the patient and caregiver, the patient was randomized to treatment or control group status, and baseline interviews were conducted.

The patient and caregiver were presented with the health diary and instructions on how to maintain it during the six-month study period. One-month and six-month follow-up interviews of patients and caregivers were conducted in the patient's home, the hospital, or a nursing home, depending on a given patient's location at the time. If a patient died between baseline and the one-month follow-up, only the one-month interview was conducted with the caregiver. If the patient died between the one-month and six-month follow-up points, a second follow-up interview was conducted with the caregiver within one month of the patient's death.

## UTILIZATION AND COST DATA

Self-reported use of VA health care services was confirmed using existing VA records, files, and computer data bases. Self-reported use of private sector health services was confirmed through letters or telephone calls to hospitals, doctors, clinics, nursing homes, and home care agencies. Confirmation by a provider was obtained in 99 percent of cases and only confirmed utilization data were included in the analyses.

Over the three years of study enrollment, the majority of patients (40 percent) were enrolled during 1985. Therefore, costs are reported in 1985 dollars. These costs and their sources are provided in a previous article (Cummings, Hughes, Weaver, et al. 1990). With the exceptions of VA emergency room and outpatient clinics, all VA hospital cost figures were derived from the Edward Hines, Jr. VA Hospital. Emergency room and outpatient clinic costs were derived from national VA figures (Veterans Administration 1986).

The hospital costs reported are based on average accounting costs per day in the hospital. Prior literature suggests that average costs are a reasonable estimate of long-run marginal hospital costs (Friedman and Pauly 1983), and therefore are an appropriate opportunity cost measure. For the average hospital admission, average per diem costs probably overstate costs at the end of a hospital stay and understate costs at the beginning of a stay, due to higher intensity of services at the beginning of the stay. However, this may be less true for the clearly terminal case admissions considered here. We believe the available average cost data form the best available approximation of marginal costs.

The American Hospital Association provides yearly average per diem costs for nongovernment not-for-profit hospitals by state. Figures for 1985 indicate that the average inpatient per diem for Illinois was $500.37 (American Hospital Association 1986). Unlike the VA hospital figures, this figure does not include physician costs. Therefore, based on Medicare national data, the per diem figure was adjusted to include the physician (an additional 33 percent of the per diem), resulting in an adjusted private hospital per diem rate in 1985 of $665.49.

The Illinois Cost Containment Council (1986) provided a list of emergency room visit base costs for all private hospitals in Illinois during 1985. The average base cost for the hospitals located in the area where our patient sample resided was calculated from this list. The figures for home health agency (HHA) costs were obtained from the Federal Register's Medicare schedule of maximum limits on home health agency costs for metropolitan Chicago (Federal Register 1985).

The Illinois Health Care Association (1985) conducted a survey in 1985 that examined Medicare nursing home reimbursement rates. The average nursing home per diem reported in Illinois was $52.41 (Illinois Cost Containment Council 1986). Since the majority of the users of private nursing home care in our sample were private pay or private insurance, we considered the Medicare reimbursement rate to provide a better per diem estimate than Medicaid rates. Actual charges that were confirmed by providers were used to impute the cost of private ambulatory care and home care services.

### ANALYSES

Multivariate analyses of covariance were conducted on patient outcomes at one month and on caregiver outcomes at one and six months. Since a majority of the patients in both groups expired before the six-month posttest, *t*-tests of mean differences were conducted on the six-month patient outcomes and on the service utilization and cost data.

## RESULTS

### PROCESS

As intended, close to 100 percent of the HBHC sample received at least one home care visit from an HBHC staff member (98 percent, $N$ = 86). In contrast, one-half (52 percent, $N$ = 44) of the control group sample received some type of customary community-based home health care services.

The volume of visits for home care users differed significantly by group. Terminally ill HBHC recipients received an average of 19.25 visits during the study period, whereas controls received 13.64 visits ($t$ = 2.24, df = 126; $p < .05$). HBHC users also had significantly longer lengths of stay on home care than customary community home care users at 67.9 days versus 46.1 days, respectively ($t$ = −2.13, df = 121, $p < .05$).

Analysis by study group of the types of visits received revealed that the control group rarely received home health care visits from disciplines other than nursing. Although approximately one-quarter of control group home care users received visits from a health aide, the prevailing pattern of service received by the control group was the Medicare skilled home health care model. In contrast, more than half of the HBHC sample received at least one nurse, physical therapist, social worker, health technician, and dietitian visit. Almost half (49 percent) of the HBHC sample also received at least one physician visit at home. Taken as a group, these process data indicate that the majority of subjects in the HBHC group received home health care that was more comprehensive and continuous than that provided to controls.

## PATIENT OUTCOMES

Baseline characteristics of HBHC and control group patients displayed in Table 1 indicate that patients in both groups were predominantly white (90 percent), non-service-connected (74 percent), male veterans who were cared for by spouses (65 percent). The mean ages of HBHC and control patients were 65.7 years and 63.3 years, respectively ($t = -.75$, df = 169, $p < .10$), indicating that the HBHC group was slightly older. The mean age for retirement was also slightly higher at 56.1 years in the HBHC group versus 51.1 years for the control sample ($p < .10$). A majority of subjects in both groups had retired for health reasons. The most common principle diagnosis in both groups was cancer, followed by other diseases of the genitourinary system and other respiratory diseases.

Baseline functional and cognitive status, morale, and satisfaction with care scores for control and HBHC groups (also shown in Table 1) indicate that the study groups were very similar to each other at the time of randomization.

The major reason for attrition from posttest measurement was mortality, at 79 percent in the HBHC group and 78 percent in the control group. An examination of survival days indicated no group differences: 76.2 days, s.d. = 67.1 in the HBHC group versus 83.1 days, s.d. = 68.1, (n.s.) in the control group for all study subjects and 48.0 days, s.d. = 43.3 versus 54.5 days, s.d. = 47.7 days for decedents.

Analyses of covariance were conducted on outcomes at one month for each of four patient outcomes: (1) ADL functioning, (2) morale, (3) cognitive status, and (4) satisfaction with care. Covariates in the analyses included age, education, race, marital status, retirement due to health, prior private sector hospital use, living arrangement, and the pretest score on the outcome measure of interest. Patient six-month outcome data were analyzed using simple *t*-tests because the sample

Table 1: Baseline Characteristics of Study Samples

| | *Control* (N = *85)* | *HBHC* (N = *86)* | p-*Value** |
|---|---|---|---|
| *Patient Demographic Variables* | | | |
| Age (mean ± s.d.) | 63.26 (8.0) | 65.73 (10.9) | |
| Race (% white) | 85 | 93 | |
| Marital status (% married) | 74 | 63 | |
| Education (% high school graduate) | 44 | 45 | |
| Retired due to health (%) | 61 | 51 | |
| Age retired (mean ± s.d.) | 51.0 (19.8) | 56.1 (17.3) | |
| Use of VA hospital care in past six months | 70 | 60 | |
| *Primary Diagnoses* (32 recodes for ICDA-9-CM) | | | |
| Malignant neoplasms | 80 | 73 | |
| Genitourinary system | 5 | 4 | |
| Other respiratory | 3 | 4 | |
| Other | 12 | 19 | |
| *Patient Pretest Scores* | | | |
| Barthels (range -5–100) | 71.8 | 71.7 | |
| MSQ (range 0–10) | 8.2 | 8.3 | |
| Satisfaction (range 1–3) | 2.61 | 2.65 | |
| *Caregiver Demographic Variables* | | | |
| Mean age (mean ± s.d.) | 56.4 ± 13.1 | 55.5 ± 15.0 | |
| Race (% white) | 85 | 93 | |
| Relationship to patient (% spouses) | 72 | 58 | |
| Lives with patient | 97 | 88 | |
| Education (% high school graduate) | 60 | 60 | |
| *Caregiver Morale and Satisfaction* | | | |
| Morale (range 1–2; mean ± s.d.) | 1.58 ± 0.3 | 1.64 ± 0.3 | |
| Satisfaction with care (range 1–3; mean ± s.d.) | 2.61 ± 0.3 | 2.65 ± 0.3 | |

**p*-Values not significant.

size at six months was insufficient to approximately test a regression model.

Examination of the one-month findings (see Table 2) indicates that the covariates used in the analyses were not significant predictors of the outcome. No effects of group assignment (treatment) are seen on ADL, cognitive status, or morale at one month in the patient samples. However, satisfaction with care is significantly higher at the one-month follow-up ($p$ = .02), indicating that HBHC patients were more satis-

Table 2: Patient One-Month Outcomes

| | | One Month | | | |
|---|---|---|---|---|---|
| | *df* | *Beta* | t | p | *Adj.* $R^2$ |
| Baseline | | | | | |
| Barthels | 9/96 | .82 | 6.94 | .0001 | .38 |
| Treatment | | -.58 | -0.11 | .92 | |
| Baseline | | | | | |
| Cognitive status | 9/76 | .72 | 5.20 | .0001 | .21 |
| Treatment | | .12 | 0.32 | .75 | |
| Baseline | | | | | |
| Morale | 9/79 | .45 | 4.66 | .0001 | .15 |
| Treatment | | .02 | 0.35 | .73 | |
| Baseline | | | | | |
| Satisfaction with care | 9/78 | .39 | 3.52 | .007 | .15 |
| Treatment | | .13 | 2.15 | .04 | |

Table 3: Patient Six-Month Outcomes

| | *Control* | | *HBHC* | | | |
|---|---|---|---|---|---|---|
| | X | (N) | X | (N) | t | p-*Value* |
| Barthels | 69.31 | (16) | 72.00 | (18) | <1 | ns |
| Cognitive status* | 8.86 | (14) | 8.33 | (18) | <1 | ns |
| Morale | 1.57 | (14) | 1.54 | (17) | <1 | ns |
| Satisfaction with care | 2.45 | (14) | 2.72 | (17) | -1.98 | .06 |

*Scale has been recorded so that higher scores represent more correct answers and thus better cognitive status.

fied than control group patients at the one-month posttest. Similarly, at the six-month follow-up (see Table 3), satisfaction with care approached but did not reach significance in the treatment group ($p$ = .06), possibly as a function of reduced sample size.

## CAREGIVER OUTCOMES

Terminally ill control and HBHC caregivers did not differ on any demographic measures at baseline (see Table 1). The majority of caregivers in both groups were female (92 percent), white (89 percent), and married (82 percent), with a mean age of 56 years. Caregivers in both groups were also quite similar with respect to their baseline scores on morale and satisfaction.

One-month and six-month outcome analyses of covariance (see Table 4) were conducted; these included as covariates caregiver age, race, education, and relationship to patient as well as the pretest score

Table 4: Caregiver One- and Six-Month Outcomes

| | *df* | *Beta* | t | p | *Adj.* $R^2$ |
|---|---|---|---|---|---|
| *One Month* | | | | | |
| Baseline | | | | | |
| Morale | 6/140 | .78 | 12.25 | .0001 | .55 |
| Treatment | | -.02 | 0.57 | .57 | |
| Baseline | | | | | |
| Satisfaction with care | 6/149 | .48 | 5.25 | .0001 | .19 |
| Treatment | | .18 | 3.46 | .0007 | |
| *Six Months* | | | | | |
| Baseline | | | | | |
| Morale | 6/52 | .78 | 8.53 | .0001 | .65 |
| Treatment | | -.12 | -2.30 | .03 | |
| Baseline | | | | | |
| Satisfaction with care | 6/72 | .07 | 0.53 | .60 | .04 |
| Treatment | | .12 | 1.59 | .12 | |

Table 5: Change in Caregiver Morale

| | *Control* (N = *27)* | | *HBHC* (N = *32)* | |
|---|---|---|---|---|
| | *Mean* | *s.d.* | *Mean* | *s.d.* |
| Baseline | 1.61 | .32 | 1.75 | .22 |
| $t_1$-Posttest (1 month) | 1.58 | .32 | 1.75 | .21 |
| $t_2$-Posttest (1 month or 6 months after death) | 1.62 | .34 | 1.67 | .25 |

on the outcome measures. These covariates were selected because they had been found in other studies to influence satisfaction with care (Ware, Davies-Avery, and Stewart 1978). The results indicate that pretest scores, as expected, were significant predictors of one-month and six-month morale. Education was significantly related to morale at one and six months, with higher education related to lower morale. No morale differences related to treatment were seen at one month. At six months, however, morale in the treatment group was lower ($p = .03$). Specifically, the morale of HBHC caregivers whose relative survived for more than 30 days postdischarge (i.e., caregivers who participated in baseline, Time 1, and Time 2 posttests) declined between the first and second posttest (see Table 5). Controlling for survival days did not alter this finding.

Importantly, identical analyses of caregiver satisfaction using the

Table 6: Utilization of Health Care Services

| | *Control* (N = *85*) | | *HBHC* (N = *86*) | | | |
|---|---|---|---|---|---|---|
| *SERVICE* | X | *(s.d.)* | X | *(s.d.)* | t | p-*Value* |
| A. *VA Services* | | | | | | |
| Hospital days | | | | | | |
| Intensive care | 0.45 | (3.8) | .13 | (.80) | <1 | ns |
| Rehabilitation | 0.14 | (1.3) | 0.00 | (0.0) | <1 | ns |
| Intermediate bed | 2.52 | (7.9) | 4.00 | (8.0) | -1.22 | ns |
| General bed | 12.06 | (15.2) | 5.63 | (10.0) | 3.26 | .002 |
| Total days | 15.86 | (20.1) | 9.94 | (13.3) | 2.27 | .03 |
| Emergency room visits | 0.72 | (0.9) | 0.57 | (0.8) | 1.14 | ns |
| Extended care days | 0.00 | (0.0) | 0.38 | (3.6) | -1.0 | ns |
| Nursing home days | 0.52 | (2.4) | 0.84 | (5.6) | <1 | ns |
| HBHC visits | – | – | 17.93 | (18.2) | – | – |
| Outpatient clinic visits | 2.59 | (6.1) | 0.73 | (1.9) | 2.57 | .01 |
| B. *Non-VA Services* | | | | | | |
| Private hospital | 0.43 | (2.2) | 0.69 | (3.4) | <1 | ns |
| Emergency room visits | 0.08 | (0.3) | 0.10 | (0.3) | <1 | ns |
| Ambulatory care visits | 0.16 | (1.2) | 0.00 | (0.0) | 1.30 | ns |
| Community nursing visits | 7.06 | (13.7) | 0.06 | (0.5) | 4.69 | .0001 |
| Private home care visits | 0.07 | (0.6) | 2.00 | (12.8) | -1.42 | ns |
| Nursing home days | 0.00 | (0.0) | 0.07 | (0.07) | -1.00 | ns |

same covariates found that HBHC caregivers reported significantly higher satisfaction with their relative's care at one month ($p = .005$) and continued to report higher satisfaction at the Time 2 posttest, although the significance level attenuated from .005 to .12, possibly as a result of decline in sample size.

## HEALTH SERVICES UTILIZATION

The utilization of a comprehensive set of VA and private sector health care services was examined by group (see Table 6). Percent of subjects readmitted to the hospital by group did not differ, at 66 percent for the HBHC group and 74 percent for controls. However, a significant group difference was found in total VA hospital days ($t = 2.27$, df = 169, $p = .03$). Control group subjects averaged 15.9 inpatient days, versus 10 days for HBHC patients. Disaggregation of total hospital days by hospital location (i.e., intensive care, rehabilitation, intermediate care, general bed) indicates that most of the additional six hospital days for control patients were spent on the general bed ward (12 days versus 5.6 days for HBHC patients, $p < .002$).

To gain a better understanding of the group difference in hospital use, length of stay for admissions terminating in death was examined. Although the proportion of decedents who expired in the hospital did not differ by group (roughly 50 percent in each group), on average, HBHC patients spent 3.5 fewer days in the hospital prior to death than control group patients (mean = 9.9 days versus 13.5 days, respectively). This finding indicates that the HBHC program maintained patients at home for a slightly longer time period prior to death than did customary care.

The number of outpatient clinic visits and the number of home health care visits also differed by study group. The mean number of clinic visits was significantly higher for control patients than for HBHC subjects (2.59 versus 0.73 visits, respectively, $p = .01$). In contrast, HBHC patients received more than twice as many home nursing visits as controls (17.9 versus 7.1, $p = .001$ visits). No significant differences in health care use were found for any other non-VA services.

## COST

As expected, total home care costs were significantly higher for the HBHC sample than for control group patients ($t = 5.10$, df = 169, $p < .0001$) (see Table 7). Only half of the control group subjects received home health care visits; their length of stay on home care was shorter and their profile of services used was less comprehensive than services received by the HBHC group. Consequently, HBHC home care costs were more than double that of the control group or $1,001 versus $343, respectively.

However, this increase in costs of home health care was more than offset by reduced VA hospital costs for HBHC patients. VA hospital costs were reduced by almost half in the HBHC terminally ill sample (48 percent; or $1,795 versus $3,434, respectively, $p = .02$). Control patients spent more time in the hospital, primarily on general bed wards. The average general bed cost for HBHC was $1,310 as compared to $2,807 for controls ($t = 3.26$, df = 169, $p < .02$). As a result of savings in hospital costs, the total cost of institutional care was also significantly lower for the HBHC group than the control group ($p = .05$). When net per capita health care costs for the two groups are compared, a savings of $769.00 per person is seen in the HBHC group

Table 7: Mean Cost of Health Care Services

| *Service* | *Control* (N = *85)* | *HBHC* (N = *86)* | t | p-*Value* |
|---|---|---|---|---|
| A. *Institutional* | | | | |
| 1. VA hospital | 3434.38 | 1795.07 | 2.47 | .02 |
| 2. Private hospital | 289.68 | 457.56 | <1 | ns |
| 3. Total hospital costs (VA and private) | 3724.06 | 2251.25 | 2.09 | .04 |
| 4. Total institution costs (All hospital and nursing home) | 3757.37 | 2341.79 | 1.99 | .05 |
| B. *Noninstitutional* | | | | |
| 1. Outpatient clinic | 100.42 | 26.46 | 2.76 | .01 |
| 2. HBHC | – | 999.28 | – | |
| 3. Community nursing | 343.29 | 1.97 | 4.86 | .00 |
| 4. Total home care costs (HBHC plus community nurse) | 343.29 | 1001.24 | -5.10 | .00 |
| C. *Totals* | | | | |
| 1. Total VA costs | 3602.37 | 2934.52 | <1 | ns |
| 2. Total non-VA care costs | 646.31 | 544.84 | <1 | ns |
| 3. Total cost of care (VA and private) | 4248.68 | 3479.36 | 1.05 | ns |

($4,248 for the control group versus $3,479 for HBHC). While not statistically significant, this 18 percent savings in net cost in the experimental group suggests that HBHC could be a cost-effective means of caring for the terminally ill patient.

## DISCUSSION

This randomized trial demonstrated that VA HBHC differs in important ways from traditional home care services. The HBHC model that was tested is more comprehensive, encompassing an interdisciplinary team approach to care that differs from the skilled nursing service utilized by control group patients. The HBHC program also offered more continuous care with a mean length of stay of 68 days versus 46 days in the control group. Finally, data from this study indicate that, in the absence of VA HBHC, terminally ill veterans encounter substantial difficulty gaining access to home health care services. Although 98 percent of patients in the experimental group used HBHC, only 52 percent of control group patients received any home care services, despite their grave medical conditions and prognoses. This difficulty in gaining access to care probably stems from the fact that the mean age of the control group sample was 63.3 and only 42 percent had Medicare coverage. Thus, 58 percent of patients were not eligible for Medicare home health or Medicare hospice benefits.

The comprehensive and continuous home health care provided by the HBHC program was regarded highly by both patients and caregivers in the experimental group. They expressed significantly higher levels of satisfaction with care than controls did at one month, and they continued to express higher satisfaction at six months (although the significance level became marginal possibly as a result of small sample size). We noted no differences in survival days by group, nor did we find any differential deterioration in functional status for patients in the HBHC group vis-a-vis controls. Although no difference in morale was evident at one month, the morale of HBHC caregivers whose relatives survived longer than 30 days postdischarge declined significantly. This finding is difficult to interpret. It may reflect the fact that the subset of caregivers who participated in both posttests contained higher numbers of caregivers who were experiencing a recent bereavement. It is possible that bereavement was more pronounced among the HBHC group as a result of more intense and prolonged involvement in their relative's care. Whether this outcome should or should not be termed a negative one is difficult to judge, since it also may reflect healthy grieving that is facilitated by direct involvement in a relative's care. This finding may also suggest that caregiver support groups and especially bereavement support groups may be needed and would be helpful for caregivers of terminally ill patients.

This study documented an important substitution effect of HBHC for VA hospital days. Although the average cost of home care services was $668 higher in the HBHC group, this cost was more than offset by the $1,639 savings in hospital costs. Largely due to this difference in VA hospital costs, the net cost of care for the HBHC group over the six-month period of observation was 18 percent lower than for controls. Although the 18 percent difference was not statistically significant, this is the first home care trial that has documented a trend indicating a potential for cost savings. However, given the imprecision of the cost estimate (e.g., the large standard error), the results can only be viewed as suggestive at this time.

Taken as a group, these findings indicate that the comprehensive and continuous home care services provided in the HBHC model increase access to home care services for terminally ill veterans and increase patient and caregiver satisfaction with care. Simultaneously, these services have the potential to decrease net health care expenditures by reducing length of hospital readmissions. On the basis of this evidence, the expansion of HBHC services to all terminally ill veterans would appear to have the potential to increase the quality of VA health care without increasing VA health care expenditures. A multi-site trial is needed, however, to test the generalizability of the model and findings across other Depatment of Veterans Affairs facilities. The need for further studies of the cost effectiveness of hospital-based home care for other terminally ill populations, such as AIDS patients, is also suggested by these findings.

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