

A Model for Reducing the Cost of Care in VA Medical Centers That Offer Adult Day Health Care

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One approach to providing cost-effective adult day health care (ADHC) services is to guide both the inputs to ADHC services and the provision of other services so that substitution for institutional services can realistically take place. This approach has been used in a randomized clinical trial to evaluate the medical efficacy and cost of ADHC in the Department of Veterans Affairs (DVA). This article describes the strategies that were used to improve the cost effectiveness of ADHC during the evaluation. Cost and use estimates were developed based on the best data available from the DVA and previous research on the cost for patients' use of ADHC, nursing home, hospital, and ambulatory care. A cost workshop was attended by the ADHC managers to develop plans for controlling costs. Plans were identified that increase the likelihood that ADHC can be shown to be less costly than customary care.

Home- and community-based long-term care has long and consistently been promoted as a cost-effective alternative to unnecessary nursing home and hospital care. Frail elderly patients are offered home health

care, day care, meals on wheels, homemaker services, friendly visitors, home repair services, and other interventions aimed at prevention of institutionalization or shortening length of stay. Studies of these services show net cost increases, because even when institutionalization has been delayed or shortened, new spending on the preventive services has almost invariably exceeded potential institutional costs avoided (Hedrick & Inui, 1986; Kemper, Applebaum, & Harrigan, 1987; Weissert, Cready & Pawelak, 1989). One exceptionally well-targeted and controlled program, the South Carolina Community Long-Term Care, was able to break even, illustrating at least the potential for implementing a cost-effective program (Kemper et al. 1987).

One major cause of the negative cost findings may have been inadequate program design. Despite nearly three-dozen cost-effectiveness studies of home- and community-based long-term care undertaken during the past three decades (reviewed by Hedrick & Inui, 1986; Hughes, 1985; Kane & Kane, 1987; Weissert et al., 1989; Weissert, 1985), only a few have attempted to control costs through spending caps or client cost sharing (Kemper et al., 1987, 1988), and none has actually begun with a realistic target budget showing what was likely to be saved on institutional care and using that figure as a constraint on new spending. The few studies that have attempted such an approach have invariably greatly overestimated potential institutional cost reductions, thus ensuring large net cost increases. Good management control (Anthony & Herzlinger, 1975) dictates that realistic cost goals be set and that a system be implemented to monitor progress toward those goals. Green (1987) argued forcefully that program management directed at increasing productivity is a key element in making community-based long-term care cost effective.

In response to these problems, the Department of Veterans Affairs (DVA) has designed an experimental test of one mode of home and community care—adult day health care (ADHC)—that is structured

AUTHORS' NOTE: This research was supported by the Department of Veterans Affairs Health Services Research and Development Service, Project # SDR 85-07. The opinions expressed are those of the authors and do not necessarily reflect the views of the Department of Veterans Affairs. Address correspondence to Michael K. Chapko, PhD, Department of Health Services, SC-37, University of Washington, Seattle, WA 98195.

so that this traditional problem is, to the extent possible, avoided. By conducting a series of cost analyses, the study's designers have used data available in the literature, from administrative sources and the management information system at the DVA to simulate results of the study under differing assumptions about success of the project in several dimensions of performance. Results of the simulation are being used to alert the medical centers of the impact that their program management and clinical decision making are likely to have on the total cost of care for ADHC patients. In this way, the intervention being tested has been modified to include data-driven management and clinical decision making as well as the actual service delivery package. The expectation is that as managers and clinicians become aware of the effects of their decisions on net costs, they will reevaluate those decisions to assure themselves that they have appropriately balanced clinical judgment with prudent use and cost-control considerations.

The conceptual basis of the model rests on the observation that home- and community-based care must meet certain performance prerequisites if it is to become cost effective. These were detailed by Weissert (1985) in an analysis of the causes of failure of past projects to achieve cost effectiveness. To become cost effective, home and community care projects must serve patients at high risk of institutionalization or hospital admissions and long stays; they must reduce these stays; they must avoid spending more on the treatment than was saved on foregone institutionalization; or they must produce patient benefits valued at more than net costs of the treatment over the avoided institutionalization. This article presents the strategies implemented during the study to address these concerns.

The ADHC cost model presented below is designed for the DVA's ADHC programs that are targeted at patients who are at high risk of nursing home placement. The current eligibility and admission criteria result in admissions of patients who are, in most cases, being discharged from a hospital with dependencies in one or more activities of daily living or have poor cognitive status. The ADHC programs have a target census of 35 patients and are staffed to serve a very disabled population, with 8.5 full-time equivalent (FTE) staff, including the full- or part-time services of a coordinator, physician, registered nurse (usually including a geriatric nurse practitioner), correc-

tive and occupational therapists, nurses' aides, and a dietitian, and have the objective of improving patient functioning and/or reducing the necessity for institutionalization. The DVA limits ADHC attendance to 6 months following a hospital discharge for patients who do not have a service-connected disability. The health care cost and use values for each parameter within the model are tailored to these DVA programs, but the general form of the model can be used in other settings by making appropriate adjustments to the values entered into the model.

The Department of Veterans Affairs' Evaluation of Adult Day Health Care

In 1987, the Department of Veterans Affairs began an evaluation of ADHC at four DVA medical centers: Little Rock, Miami, Minneapolis, and Portland (Oregon). DVA patients at risk of nursing home placement were randomized to receive either ADHC care or customary care. To increase the likelihood that patients at risk of nursing home placement were selected, research casefinders screened hospital and other patients for inclusion in the study. The criteria for selection included dependence in selected activities of daily living (i.e., toileting, dressing, ambulation, bowel incontinence) and poor cognitive status. From July 1987 through January 1989, 826 patients were enrolled in the study. Each patient was followed for 1 year. During this time, data were collected on health care use and cost, physical and psychosocial health status, patient satisfaction and caregiver satisfaction. Hedrick and colleagues (in press) present a more complete description of the ADHC evaluation study.

The Adult Day Health Care Cost Analysis

To help ADHC managers understand how their services affected care overall, costs were analyzed using the variables summarized in Table 1. The cost of caring for patients in the ADHC associated with a DVA medical center was compared to the cost of customary care in that medical center. The analysis included the costs of four sources of care: nursing homes, hospitals, outpatient clinics, and ADHC. Table 1

Table 1
Model Comparing the Cost of Adult Day Health Care to Customary Care Within the Veterans Administration for 100 Patients

	Customary	ADHC	Difference
Nursing home			
Use rate (%)	10.00	7.50	2.50
Length of stay (days)	195	195	0
Cost per day (\$)	95.30	95.30	0.00
Total cost	\$185,835	\$139,376	\$46,459
Hospital			
Use rate (%)	100	100	0
Length of stay (days)	13.10	10.48	2.62
Cost per day (\$)	363.75	363.75	0
Total cost	\$476,513	\$381,210	\$95,303
Outpatient			
Use rate (%)	100	100	0
Visits/rate	7.0	3.5	3.5
Cost per visit (\$)	82.09	82.09	0
Total cost	\$57,463	\$28,732	\$28,732
Adult day health care			
Use rate (%)	0	85	-85
Length of stay (months)	0.0	6.0	-6.0
Visits per week	0.0	2.5	-2.5
Cost per day (\$)	66.00	66.00	0
Total cost	\$0	\$364,650	-\$364,650
Grand total	\$719,811	\$913,968	-\$194,157
Cost per patient			
Nursing home	\$1,858	\$1,394	\$465
Hospital	4,765	3,812	953
Outpatient	575	287	287
ADHC	0	3,646	-\$3,647
Total cost per patient	\$7,198	\$9,140	-\$1,942
Cost of ADHC in excess of customary care			26.97%

presents the estimated ADHC and customary care costs as two separate columns with the third column showing the differences between the ADHC and customary care. Table 1 also shows the total cost of care for 100 patients in each form of care, the average cost per patient, and the difference in cost between ADHC and customary care as a percentage of the cost of customary care. The parameter estimates (e.g., length of stay in a nursing home) were based on analyses of other studies of long-term care programs in the private sector (Weissert

et al., 1989), management information system data from the DVA medical centers at the four sites of the ADHC evaluation project, and preliminary questionnaires concerning the ADHC specific costs at the four sites. It should be noted that these figures will be made increasingly more accurate as information on actual patients enrolled in the ADHC evaluation study becomes available.

The selection of the value for three parameters in Table 1 requires explanation. First, the length of stay for nursing home care has been set at 195 days for both the customary care and ADHC groups. We have estimated that ADHC will reduce total nursing home use by 25% through effects on both admission rate and length of stay. However, for simplicity, the reduction in use is totally reflected by the reduction in the nursing home admissions rate in the analysis. Splitting the 25% reduction in total use between admission rate and length of stay would not change the basic conclusions drawn from the analysis.

Second, the hospital admission rate has been set at 100% for both groups because the majority of patients are selected for the study during hospitalization. One affect the ADHC may have on costs is to shorten the hospital length of stay by providing an acceptable transition away from acute care through ADHC's flexibility in accommodating patients. Including the initial hospitalization allows the analysis to reflect early discharge to ADHC. In addition, ADHC may reduce the number and duration of rehospitalizations. Third, the length of stay for ADHC has been set at 6 months (180 days) because that is the maximum length of stay allowed nonservice connected veterans (the majority of study patients) by the law authorizing the DVA to provide this type of care.

The following formulas specify the interrelationships between the analytical parameters:

$$\text{TOTAL COST} = \text{NURSING HOME COST} + \text{HOSPITAL COST} + \text{OUTPATIENT COST} + \text{ADHC COST}$$

$$\text{NURSING HOME COST} = (\text{ADMISSION RATE}) \times (\text{LENGTH OF STAY}) \times (\text{COST PER DAY})$$

$$\text{HOSPITAL COST} = (\text{INITIAL ADMISSION RATE}) \times (\text{LENGTH OF STAY}) \times (\text{COST PER DAY}) + (\text{SUBSEQUENT ADMISSION RATE}) \times (\text{LENGTH OF STAY}) \times (\text{COST PER DAY})$$

$$\text{OUTPATIENT COST} = (\text{NUMBER OF VISITS}^*) \times (\text{COST PER VISIT})$$

*Includes home based nursing services

$$\text{ADHC COST} = (\text{ADMISSION RATE}) \times (\text{LENGTH OF STAY IN MONTHS}) \times (\text{VISITS PER WEEK}) \times (\text{WEEKS PER MONTH}) \times (\text{COST PER DAY})$$

As Table 1 indicates, the total cost of caring for one patient in ADHC is estimated to be \$9,140, whereas the cost of caring for a comparable patient in customary care is \$7,198. ADHC costs \$3,647 per patient, making total costs of patients receiving ADHC care 27% more than those of customary care. Although it is anticipated that ADHC will reduce the cost of nursing home care by \$464.59, hospital care by \$953.03, and outpatient care by \$287.32, the \$3,646.50 cost of ADHC itself is considerably larger than these savings.

It is possible that ADHC could be less expensive than customary care or no more expensive than customary care if one or more of the parameters in Table 1 could be changed. Looking at only ADHC cost, it would be difficult to equate the total cost of ADHC patients and customary care patients by making a change in only one ADHC input. However, the costs could be equated if smaller changes in several of the inputs were combined. Table 2 lists the magnitude of changes in five ADHC inputs necessary to reduce the gap between the cost of care for customary and ADHC groups by 25%. For example, the following four changes could be made: (a) increase the ADHC daily census from 30 to 35 patients, (b) reduce the average number of ADHC visits per week from 2.5 to 2.17, (c) reduce the ADHC length of stay from 6 to 5.2 months, and (d) reduce staff salaries by \$54,787 (22% of total salaries). These may not be the set of changes actually implemented, but they do demonstrate that realistic changes in several ADHC inputs can equate the cost of ADHC to the cost of customary care.

Table 2
Changes in ADHC Inputs for a 25% Reduction in the Difference Between Customary and ADHC Cost

	Value assumed in the model	Value necessary to reduce difference by 25%
Daily census	30.0 patients	34.6 patients
Staff	\$251,657 per year	Reduce by \$54,787 per year
Transportation	\$7.45 per trip	Not possible
ADHC visits per week	2.50 visits	2.17 visits
ADHC length of stay	6.0 months	5.2 months

Table 3 estimates the change in total cost per patient that may be attributed to a 10% reduction in one of seven parameters most under the control of managers at the medical center. This analysis is based on estimated elasticities for each parameter. The elasticity was calculated from projected costs as the percentage change in total costs associated with a 1% change in the parameter. As indicated in Table 3, hospital length of stay has the highest elasticity (.42); followed by ADHC length of stay, visits per week, and cost per day (.40); the nursing home length of stay and admission rate in the ADHC group (.15); and outpatient visits (.03). These data suggest that changes in hospital and ADHC parameters will have the largest impact on the relative cost for the ADHC group.

ADHC Cost Containment Workshop

Prior to the ADHC evaluation, ADHC clinical directors (coordinators) met in Washington, DC. At this meeting, the purpose and content of the cost control strategies were presented. Following this meeting the economist from the evaluation project visited each site and presented cost containment strategies as they applied to that site to ADHC clinical director and staff. The various methods of reducing costs depicted in Tables 1 through 5 were discussed. After the start of the program evaluation and the collection of actual ADHC costs within the VA, sites were provided with cost data as depicted in Table 1. These feedback reports contain cost figures obtained from each site.

In accordance with Huber's (1980) approach to managerial problem solving, a meeting of the ADHC coordinators was held in Febru-

Table 3
The Effect on Total Costs of a 10% Parameter Reduction

	Total patient cost of ADHC with a 10% parameter reduction	Elasticity
No change in the parameters	\$9,140	—
Hospital length of stay (days)	\$8,758	.42
Nursing home use rate	\$9,000	.15
Nursing home length of stay	\$9,000	.15
ADHC length of stay	\$8,775	.40
ADHC visits per week	\$8,775	.40
ADHC cost per day	\$8,775	.40
Outpatient visits per year	\$9,111	.03

ary, 1988, to discuss the importance of controlling cost and the methods by which costs could be controlled. The nature of the problem was explored, alternative solutions were generated, choices were made by each ADHC coordinator among the alternative solutions, and commitments were given to implement the chosen solutions. Prior to the meeting, each coordinator received a copy of the cost analysis presented in Table 1 accompanied by a written explanation. At the meeting, the cost data from all four sites were summarized and the results distributed to the four ADHC coordinators. This feedback allowed each coordinator to compare her costs to the costs of the other sites.

Tables 4 and 5 were presented to show the magnitude of change required in parameters needed to reduce total costs for their patients. Table 4 presents the estimated change that would have to occur in one parameter to bring total costs of care for patients receiving ADHC services equal to the total cost of customary care. Some of these changes may not be possible or may not equate costs for the groups. This analysis does provide direction for managers to gain an understanding of the level of change that would be needed on an individual parameter basis. Table 5 presents simultaneous changes of equal proportion (11.82%) in all parameters that bring ADHC costs comparable to customary care costs. These parameters were particularly important to the ADHC managers because they were expected to coordinate care received by patients in the DVA and (through the kind of close clinical management and support to caregivers possible in a

Table 4

Holding Other Parameters Constant, Changes in Each ADHC Parameter Necessary to Equate the Cost of ADHC and Customary Care

	Table 1 parameter estimate	Parameter estimate for ADHC cost to equal customary care cost
Hospital length of stay	10.48 days	5.14 days
Nursing home use rate	7.5%	not possible
Nursing home length of stay	195 days	not possible
ADHC length of stay	6.00 months	2.81 months
ADHC visits per week	2.50	1.17
ADHC cost per day	\$66.00	\$30.86
Outpatient visits per year	3.50 days	not possible

program in which patients are seen several times per week) intervene to avoid unnecessary hospital days, nursing home stays, and outpatient visits. The intent of providing this information was twofold: first, to demonstrate the relationship between program characteristics and cost, and second to indicate to the program coordinators the approximate magnitude of changes that are necessary. Using a modified nominal group process, the coordinators developed an extensive list of potential methods for controlling cost.

At the meeting, the ADHC coordinators also developed a list of specific actions to reduce cost. The following categories were selected by at least three coordinators: (a) increase daily census, (b) decrease nursing home admissions or length of stay, and (c) decrease hospital admissions. Regarding ADHC census, proposed actions included more aggressive marketing within the medical center to increase the number of appropriate referrals. An additional problem has been patients who originally agree to attend but drop out after one visit or even before any visits. Special efforts were to be made to conduct outreach activities with these patients to enhance their commitment to the program and facilitate their attendance. Nursing home admission and length of stay will be reduced by increasing efforts with patients at immediate risk including following up on patients after they are discharged from the ADHC during the year follow-up period of the study. Where appropriate, patients would receive respite care within ADHC or be readmitted to ADHC if they are about to enter a nursing home. Outpatient use will be reduced by periodically reviewing all

Table 5
*Simultaneous Changes in Parameters Necessary
 to Equate the Cost of ADHC and Customary Care^a*

	Table 1 parameter estimate	Parameter estimate for ADHC cost to equal customary care cost
Hospital length of stay	10.48 days	9.24 days
Nursing home use rate	7.5%	6.61%
Nursing home length of stay	195.0 days	172.0 days
ADHC length of stay	6.00 months	5.29 months
ADHC visits per week	2.50	2.20
ADHC cost per day	\$66.00	\$58.20
Outpatient visits per year	3.50 days	3.09 days

a. Each change is 11.82% of the best estimate of the parameter.

upcoming patient clinic appointments and substituting services in ADHC as appropriate. Monitoring patients and increasing ADHC services as appropriate will be used by two ADHC programs to avoid hospitalization. For patients who are hospitalized, early discharge to ADHC will be coordinated with hospital staff.

Discussion

The cost analysis in Table 1 uses current best estimates of parameters for ADHC and customary care in DVA Medical Centers. Simulation of total costs using various values for the parameters indicate that ADHC will be no more expensive than customary care if any one of the following happen: (a) The cost per day of ADHC is reduced from \$66.00 to \$30.86; (b) the average length of stay in the ADHC is reduced from 6.00 months to 2.81 months; (c) the number of ADHC visits per week is reduced from 2.50 to 1.17; (d) the average yearly length of stay in the hospital for ADHC patients is reduced from 10.48 to 5.14 days. These changes may be difficult to achieve individually. However, some combination of smaller changes are quite feasible and can be implemented to reduce the cost of ADHC. Combinations of cost savings will make ADHC equal in cost to or less costly than customary care. The specific combination of changes will vary from program to program and will depend on the particular mix of patients and services offered at that medical center.

The purpose of developing the cost control strategies presented here is to ensure that day care is given the fairest possible test under the most appropriate circumstances. Those are circumstances in which program managers and clinicians understand that their admission decisions, care plans, and other clinical and management judgments influence net cost-effectiveness results. It may be possible for ADHC to substitute for more hospital and nursing home days than was true in the earlier studies. The strategic approach to cost issues should enhance prospects for cost effectiveness by promoting better decision making.

The approach would also seem to hold considerable potential for day-to-day program planning and management. Although it remains an open question whether or not day care or any other home and community care service can or should break even in the exchange of institutional for community care costs, prudent management would seem best served if clinical decision making were given some reasonable performance goals toward which to strive. Use patterns in community care have proven unpredictable and widely varying, typically determined more by characteristics of the provider than by characteristics of the patient. Other indications are that if there are measurable effects on health status of patients, these tend to occur in the earliest stages of the intervention, suggesting that continued participation should be examined and modified periodically as one way of trying to keep cost closer to potential savings from avoided institutionalization. Alternatively, clinical staff may choose to concentrate efforts on being more judicious in targeting care to patients who have the highest potential for benefiting from the intervention in the form of reduced institutionalization. These may be high users of home and community care, but their benefits in reduced institutionalization combined with contentment effects, if any, valued at some level, may more than offset costs.

How successful these strategies will be in helping the study's day-care programs control their costs is not yet known. The approach does offer considerable promise for other applications, however, including project management and performance evaluation by com-

parison of a current project's performance with earlier projects on all of the parameters—treatment costs, targeting effectiveness, success in reducing use, and increases in health status as reflected in reduced use. Program managers and those responsible for financing and reviewing the performance of home and community care projects may wish to consider similar strategies in projects for which they have responsibility.

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