

Toward a Strategy for Reducing Potentially Avoidable Hospital Admissions Among Home Care Clients

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Cognizant of the disappointing health status effects of home care in past studies, the authors argue that home care (homemaker, chore, day care, and other personal care services) is ill equipped to alter health status but could alter the way in which patients, family, and physicians respond to health status changes. If it does this, it should be effective in preventing some of certain types of hospitalizations: those for death, nursing home placement, and evaluation. This study, which reanalyzes the National Channeling Demonstration Project data set to focus on these three most promising outcome effects of home care, found that it did not prevent these types of potentially avoidable hospitalizations. Indeed, there is little evidence that such targeted preventive efforts took place. This may suggest that the objective function of home care should be redefined to focus on altering responses to health status change rather than on altering health status.

In study after study, measurable benefits of home and community care other than small to moderate increases in perceived life satisfaction have eluded investigators (Weissert, Cready, and Pawelak 1988). Thus, the promise

Medical Care Research and Review, Vol. 54 No. 4, (December 1997) 439-455
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of home care to reduce hospital use has not been achieved. Studies show no effect on hospital use when home care is used. This was true even in the pre-Medicare prospective payment system days when hospital stays were much longer and perhaps more amenable to reduction. As a possible explanation for these disappointing results, we hypothesized that the problem might lie in a poor conceptual framework for both the intervention and the analyses of home care effectiveness.

NEW CONTRIBUTION

The goal of this study is to illustrate how the objective function of home care might be reconfigured to emphasize altering *not health status changes* but *response* of patients, families, and home care workers to those changes. Data are analyzed to show that a substantial number of home care patients are admitted to hospitals for reasons that home care might be able to prevent if it were better focused on identifying patients at risk of those types of hospitalizations and designing protocols specifically intended to prevent them.

CONCEPTUAL FRAMEWORK

In this study we sought to improve on past analyses (including our own) by better defining the population of interest for studying a specific outcome—in this case, reduced hospitalization. Conceptually, we started with a provocative assumption that is well supported by the evidence from previous studies: that there is no evidence to support the notion that home care produces inpatient use reductions *through altering health status*. Physical and mental functioning have not shown improvement or even slowed their rate of decline in the face of these new services in the many studies that sought to find such benefits (Weissert, Cready, and Pawelak 1988).

For this reason, notions that home care would alter health status sufficiently to avoid hospitalizations by altering patients' physical conditions were eschewed in favor of a more realistic view: that home care affects patient, family, and caregiver *predisposition to forego hospitalization* rather than directly affecting health status.

With that framework in mind, we took an "agency theory" perspective (Moe 1984) to speculate that the reason for the poor performance of home care may lie in its lack of the essential elements that make for a good agent:

This project was supported by a grant from the Blue Cross and Blue Shield Foundation of Michigan. This article, submitted to *Medical Care Research and Review* on February 3, 1996, was revised and accepted for publication on May 8, 1997.

- clear specification of goals and objectives, proper training in how to achieve them, and appropriate tools and technology for achieving them;
- effective supervision and monitoring of interim indicators of performance; and
- appropriate incentives to meet the specified goals and objectives.

We believe that home care typically lacks such features and tools and as a consequence fails to achieve substantial benefits for most patients. For effectiveness, the case manager should have been equipped with

- appropriate tools for identifying clients at risk of potentially avoidable hospitalization;
- training in how to recognize signs that an inpatient event might be imminent;
- training and protocols for effectively communicating information to the patient's physician;
- policies and procedures necessary to make it possible to avoid hospitalization, including advance counseling of the patient and family regarding their options for avoiding certain types of hospitalizations and the advantages of doing so;
- milestones and supervision to assure that appropriate steps were being taken;
- monitoring of performance to assess compliance and success and feedback information on how to better perform; and
- incentives intended to produce reduced hospitalizations (e.g., positive performance evaluations, praise for successes, and making the home care program partially or fully responsible for costs of inpatient use).

Risk identification tools could include risk profiles such as those identified here and improved with additional data and experience, instructions for counseling patients to sign do not resuscitate (DNR) orders, advanced decisions on how best to respond in the event of health status change, and a relationship with the family physician that would assure respect for the aide's evaluative and reportorial skills. Together these steps could make the case manager a more effective agent of the payer, program administrators, and the patient in avoiding some potentially avoidable hospitalizations.

PILOT STUDY

To test these notions, we mounted a pilot study using the best available—although inadequate—data from the National Channeling Demonstration project. The challenge for the reader is to look beyond the inadequacy of the data set employed and see the potential of the conceptual framework offered to improve both the performance of home care and the kinds of data collected for its evaluation in future studies. While the findings from the pilot study are interesting in themselves, the data are old and were not collected in sufficient

detail—no doubt a reflection of the lack of a conceptual framework such as the one offered here that would have shown the necessity of more detailed data. The primary usefulness of this analysis is in pointing the way for using the conceptual model proffered as a way to think about managing home care and as a guide to the kinds of data to collect to evaluate it.

DEFINING POTENTIALLY AVOIDABLE HOSPITALIZATIONS

Three prototypical types of hospitalization were identified as potentially avoidable: (1) individuals who are dying; (2) those about to enter a nursing home; and (3) those on whom the physician wants to gather additional information for purposes of evaluating health status, either because health status has changed or because the patient, family, or home care worker has reported concerns. These three types of hospitalization seemed to be the ones that an optimally functioning home care program could help its clients avoid. That is not to say that they are avoidable. Many would be desirable and might improve outcomes including reduced suffering or prolonged life. But they represent a class of hospitalizations that deserve close scrutiny. Our contention is that home care should provide that scrutiny, and if it did, some types of hospitalizations, not all, would be avoided.

Hospitalization for Death. Most people agree that death at home is preferable to death in a hospital. Home care, which is capable of providing both limited therapeutic services and palliative and supportive care and counseling in the patient's own home, should therefore be able to help its clients prepare for and meet death without the indignity and disruption of a hospital admission. This could occur if through home care availability a terminally ill patient is made more willing to state a preference for death at home, encouraged to sign an advanced directive, and the patient and his or her family are counseled by his or her physician on what to expect and how to achieve the goal of death at home. Family members, the patient, and the physician might engage in discussion of this preference for death at home and take steps appropriate to achieving it. Home care programs should be able to encourage that kind of planning for death. Family members might be trained in oxygen therapies or administration of pain-relieving drugs. The physician might be willing to sign for the emergency, as needed (PRN) orders for pain-relieving drugs or make him- or herself available for telephone authorizations.

Nursing Home Admission via the Hospital. About a quarter of home care users require nursing home placement in a given year. Presumably home care has done all it can to delay or avoid these stays, but controlled experiments

show that about one fourth of patients enter nursing homes nonetheless (Weissert, Cready, and Pawelak 1988). Sometimes this decision is made deliberately and carefully, with advance planning and an orderly transition. But all too frequently, it is made during a crisis: the elderly person suffers a setback, he or she is admitted to the hospital, the decision is made to initiate a nursing home admission, and the patient is eventually discharged to a nursing home after a suitable one is found or Medicaid eligibility determination is made. Sometimes the problem is a fracture, infection, or other problem with relatively rapid onset and no time to plan. But in other cases, the decision to institutionalize follows a long-term process of wearing down reserves and caregiver capabilities. This process is not really sudden, although the precipitating event may be. If there has not been advanced planning, the transition is made immediately following a hospital admission. One might even suspect that the hospital admission is sometimes precipitated by an underlying desire to bring the situation to a head and force a decision. In such cases, ideally, the home care program should be able to help the patient and the family approach transition to a nursing home in an orderly fashion. Patients in home care should not have to go to a hospital simply to make a decision that has been delayed because of feelings of guilt, reluctance to examine options, or unfamiliarity with options. Home care should pave the way by helping family visit nursing homes, making financial arrangements, and helping to prepare everyone involved psychologically. This advance work might allow placement to take place directly from the community rather than through a crisis-oriented hospital stay used primarily as a staging point for making the placement decision. This is not to say that home care does or should encourage or even acquiesce in nursing home entry if the patient can be kept at home. However, when nursing home admission is highly likely, home care might help it happen as a planned event rather than an unplanned crisis involving a hospitalization. Avoiding hospitalizations for which direct nursing home admission could have been substituted should be a goal of case managers; they should be equipped to identify such potential situations, be trained to initiate dialogue between the patient and family physician, and volunteer help in facilitating the placement process.

Hospitalization for Evaluation. Finally, patients in home care can be closely monitored for vital signs, intake and output of fluids, diet, sleep habits, blood chemistry, mood and behaviors, and overall well-being, among other things. Ideally, home care patients should not be admitted to hospitals simply for evaluation that could have taken place in the home. Home care workers should be trained to expect variations in health status change and to be good evaluators and reporters of the patient's condition rather than encouraging

hospitalization simply because the patient has undergone a slump. Belatedly, but different in important respects, are patients admitted because their physician did not effectively manage a difficult chronic condition such as congestive heart failure or chronic obstructive pulmonary disorder. Home care itself could not provide medical care, but home care staff with well-established communication with the patient's physician may in some cases be able to alert medical personnel to developing problems before they lead to hospitalization.

Hypotheses and Research Questions. Two hypotheses were tested: (1) that the incidence of admission from home care to hospital was moderately high during the period of the Channeling Demonstration project for the three reasons described, and (2) that frail elderly clients at risk of hospital admission for one of these three reasons experienced fewer of them because they were receiving case management and home care services. It must be acknowledged, of course, that none of these types of admissions are easy to pick out or predict in advance. Nor are all of them avoidable. But the view taken here is that if home care is doing its job, patients who receive it should be able at the margin to experience fewer potentially unnecessary hospital admissions of these general types than a control group not receiving home care.

DATA SOURCES

A serious problem for hypothesis testing is that no suitable data set exists because home care programs have not been designed with this conceptual framework in mind. In an ideal data set, case managers would be equipped with risk profiles, training on how to train patients and family, training on how to improve communication and advanced planning, and milestones by which to monitor progress toward changed attitudes and behavior.

Instead of ideal data, those from the National Channeling Demonstration project, the largest and among the best designed of all the home care demonstration projects of the past three decades, were reanalyzed. Channeling was a randomized controlled experiment that provided case management and a fully subsidized expanded array of home and community care services. It provided services between June 1982 and June 1984 to elderly individuals who suffered dependencies in at least two instrumental activities of daily living (IADLs). The project has been described in detail elsewhere (Carcagno and Kemper 1988). Costing more than \$50 million dollars, it was specifically commissioned by Congress and was designed to benefit from, and improve on, all previous studies of home care costs and effectiveness. Clients were offered a wide and costly array of more than two dozen services ranging from postacute skilled home care services and a variety of therapies, assessment,

monitoring, and care planning to homemaker services, transportation to medical services, telephone reassurance, and many others.

From among the Channeling study sample of more than 6,300 individuals, 2,869 treatment and control group patients were selected for the present study. These included all treatment and control group members enrolled at each of the project's full subsidy sites (Cleveland, Greater Lynn County, Miami, Philadelphia, and Rensselaer County), where treatment group participants received assessment, care planning, advocacy and monitoring, and full financial subsidy for the wide range of expanded home care services made available to them. These were the clients who stood most to benefit from home care, facing as they did no financial and few other access barriers to care. Clients had been randomly assigned to treatment or control groups within study cities. Reflecting the original Channeling study design, two thirds of the cases were treatment group members, while the remainder came from the control group, which did not receive expanded home care services.

Patient and caregiver characteristics were drawn from the study's eligibility screening assessment, its baseline health status assessment, and caregiver interview files, while utilization was followed for 1 year from randomization using patient health status tracking files and claims files. For one aspect of the analysis, each individual participant's data record was supplemented with data elements reflective of the community in which the site was located. These data were drawn from the Area Resource File System (Bureau of Health Professionals 1991).

Published results from the Channeling study show that the treatment had no significant effect on hospital use for the full study group, comparing treatment and control patients (Woolridge and Schore 1988). Subgroup analysis for hospital care was not reported by the Channeling researchers. Forming subgroups as we did among patients we believed most likely to be favorably benefited by home care therefore had the potential to produce more advantageous results than the overall study.

HIGH PREVALENCE OF POTENTIALLY AVOIDABLE HOSPITALIZATIONS

Identifying clients who experienced potentially avoidable hospital stays during the study period was a necessary first step and provided the dependent variable for measuring success of home care treatment in avoiding such stays.

Among the 62 percent of Channeling participants who were hospitalized within 1 year of randomization, analysis showed that a substantial number did so within 1 week of discharge. In fact, 31 percent of those who died did so within 1 week of hospital discharge, and 51.8 percent of those who entered a

nursing home did so within 1 week of hospital discharge. The rates of death and nursing home admission then dropped substantially.

Given those distributions, we elected to define a hospitalization for death as one that resulted in death in the hospital (i.e., discharged dead or 0 days between hospital discharge and death). Similarly, a hospitalization for nursing home placement was defined as a stay that was followed by a nursing home admission within 1 day of discharge.

The final category, hospitalization for evaluation was so difficult to measure in the Channeling data that we have elected to present this portion of the study as an appendix, acknowledging the fact that data limitations make results for it suspect.

Predictor Variables. To judge effects of expanded home care treatment on the incidence of potentially avoidable hospital admissions, it was necessary to control for effects of determinants of potentially avoidable hospital use other than home care. Predictors of potentially avoidable hospital stays selected from the data set are presented in Table 1 along with their distributions. They were chosen following the theoretical framework originally developed by Andersen (1968) and later refined with various colleagues (Aday and Andersen 1978; Andersen and Newman 1973). This framework classifies predictors of health care use into three categories: predisposing, enabling, and need variables.

Using their framework, predisposing characteristics are those thought to affect an individual's perceived recognition or desire to seek care. They include demographic characteristics (e.g., age, sex, marital status), social-structural (e.g., race, living arrangement, education) and health beliefs (e.g., attitudes toward health services, medical knowledge). Predisposing factors found by other researchers to be correlated with hospitalization include advanced age (Kovar 1977; U.S. National Center for Health Statistics 1979; Roos and Shapiro 1981; Wilson 1981; Garnick and Short 1985) and marital status (Verbrugge 1979; Morgan 1980; Gove, Hughes, and Style 1983; Evashwick et al. 1984). Findings have been mixed on gender (Aday and Eichhorn 1972; Deacon et al. 1979; Branch et al. 1981; Rice 1983; Wolinsky et al. 1983; Evashwick et al. 1984; Soldo and Manton 1985; Cafferata 1987) and race (Branch et al. 1981; Davis, Gold, and Makuc 1981; Vladeck 1981; Wolinsky et al. 1983; Evashwick et al. 1984; Cafferata 1987).

Anderson and colleagues' enabling characteristics allow individuals to use appropriate services once a need has been recognized: individual and family resources (e.g., income or wealth, insurance and Medicaid, having a regular source of care) and resources of the community (e.g., physician-to-population ratio, hospital bed-to-population ratio). Such factors found to be correlated

TABLE 1 Variable Definitions Using Data from Baseline Assessments

<i>Variable</i>	<i>Description</i>	<i>%</i>	<i>N</i>
Predisposing			
70-74	Aged 70-74	0.162	2,869
75-79	Aged 75-79	0.203	2,869
80-84	Aged 80-84	0.244	2,869
85-89	Aged 85-89	0.181	2,869
90+	Aged over 89	0.111	2,869
Married	Currently married	0.318	2,865
White	Race White	0.721	2,866
Male	Gender male	0.286	2,869
Lives alone	Lived alone, no informal support	0.081	2,869
Alone with help	Lived alone, informal support	0.298	2,869
Informal care hours	Hours informal support per week	9.152	2,869
Enabling			
High income	Monthly income greater than \$999	0.091	2,869
Moderate income	Monthly income \$500 and \$999	0.359	2,869
Regular medical care	Regular source of medical care	0.923	2,856
Physician visit	Physician visit in last 2 months	1.829	2,869
No Medicaid	No Medicaid; unlikely next 3 months	0.3721	2,869
Medigap	Supplemental Medicare insurance	0.343	2,843
Need			
Bed bound	Participant was bedbound	0.264	2,863
Severe ADL ^a	Eating or transferring dependent	0.604	2,869
Incontinent	Incontinent of bowel or bladder	0.571	2,820
Fair health	Self-perceived health status fair	0.327	2,831
Good/excellent health	Self-perceived health status good or excellent	0.176	2,831
Worse health	Health condition worsened	0.721	2,799
Bone condition	Participant had a bone condition	0.152	2,855
Cancer	Participant had cancer or a tumor	0.109	2,846
Heart condition	Participant had heart condition	0.479	2,852
Respiratory condition	Had respiratory condition	0.232	2,861
Low life satisfaction	Reported life satisfaction low	0.313	2,869
Unmet medications need	Unmet need for help taking medications	0.337	2,793
Unmet treatment need	Unmet need for medical treatment	0.458	2,701
Unmet care need	Unmet need for personal care	0.913	2,804

(continued)

TABLE 1 continued

<i>Variable</i>	<i>Description</i>	<i>%</i>	<i>N</i>
Treatment			
Treatment group member	Randomized to treatment group	0.633	2,869
Cleveland	Participant at Cleveland site	0.183	2,869
Greater Lynn	Participant at Greater Lynn site	0.188	2,869
Miami	Participant at Miami site	0.229	2,869
Rensselaar	Participant at Rensselaar site	0.126	2,869

a. ADL = activity of daily living.

with hospitalization include socioeconomic status (Vladeck 1981), insurance (Hulka and Wheat 1985), having a regular source of care (Wolinsky et al. 1983), and the physician-to-population ratio (Anderson 1976; Harris 1975).

The treatment itself—assignment to the group eligible to receive full subsidization of case managed services—would also be regarded as an enabling variable and is of special interest here. Indicator variables were also included for each of five sites. To avoid violating the experimental design, we have not excluded from the analysis the small number of clients who were assigned to the treatment group who eventually chose to not actually receive expanded care. This choice is consistent with the theory of experimental research, which regards the experimental treatment as “intention to treat,” not actual services used, because allowing client choice to dominate the analysis introduces selection bias into the results.

The third component of the Andersen model, need, includes health status measures: diagnoses, physical and mental functioning, previous hospital and nursing home use, and subjective health status and life satisfaction measures. Need factors found in other researchers’ studies to be correlated with hospitalizations include diagnostic categories (Bacon, Wotjynick, and Krzyzanowski 1983), medical conditions (Branch et al. 1981; Roos and Shapiro 1981; Evashwick et al. 1984; Soldo and Manton 1985; Cafferata 1987), functional dependencies (Branch et al. 1981; Evashwick et al. 1984; Wolinsky et al. 1983; Soldo and Manton 1985), and self-perceived health status (National Center for Health Statistics 1983).

DATA ANALYSIS

To profile patients at risk of each of the three types of hospitalization, and to evaluate the treatment’s effects on their occurrence, we estimated three

logistic regression equations—one for each of the types of hospitalizations of interest: hospitalization for death, hospitalization for nursing home placement, and hospitalization for evaluation. A fourth equation combining all three types of potentially avoidable hospitalizations into a single dependent variable was also estimated, but to conserve space, its results, which were consistent with the three separate equations, are not reported. Each of these equations was estimated using the PC-SAS procedure PROC LOGISTIC (SAS Institute 1986).

Multicategory variables for age, income, and site were entered as groups of indicator variables with age 65-69, low income, and Philadelphia serving as reference groups. Once a main effects model was estimated, pairwise interactions between the treatment variable (assignment to the Channeling treatment group) and each of the included predictor variables were evaluated. In addition to interactions between the treatment and patient characteristics, effects of proxy variables representing variation in case manager training and supervision were tested by replacing site indicators with site-level measurements of the hospital and nursing home bed supply and proxies for variation in case management administration and monitoring. Suffice it to say that the variables available were of such poor quality that they proved not to be useful. Future researchers should attempt to better measure the contribution of variation in training, supervision, monitoring, and incentives in ways consistent with Moe's (1984) and others' views on agency theory. In the end, we abandoned efforts to test hypotheses related to agency theory in favor of models designed to maximize predictive accuracy. In keeping with this limited goal of prediction, we sought a model that minimizes concerns regarding potential omitted variables. All variables likely to produce a more accurate prediction were included so long as they fell below moderate levels of zero-order correlation, with little concern for multicollinearity. As a consequence, there may be some degree of correlation among coefficients in the model, making individual coefficients less meaningful than the overall model prediction.

Results. The odds of hospitalization for death (Table 2) were significantly greater if the individual was severely ADL dependent (i.e., eating or transferring dependent), had cancer, or was male. The odds of hospitalization for death were significantly less if the individual was in the Miami site sample. Overall, the treatment (eligibility for Channeling's home care services) had no effect on hospitalization resulting in death. Pairwise interactions of treatment group enrollment and each of the site dummies, as well as the pairwise interactions of treatment and each of the significant main effect variables, showed no effect and were excluded from the reported models. Treatment

TABLE 2 Predictors of Hospitalization for Death and Nursing Home Admission

Variable	Death		Nursing Home	
	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio
Predisposing				
Age 70-74	0.239	0.79	0.131	1.14
Age 75-79	-0.005	0.99	0.377	1.46
Age 80-84	-0.064	0.94	0.148	1.16
Age 85-89	0.297	1.35	0.736**	2.09
Age 90+	0.284	1.33	0.378	1.46
Married	-0.062	0.94	0.422*	1.53
White	-0.234	0.79	0.814***	2.26
Male	0.362*	1.44	-0.279	0.76
Lives alone	-0.166	0.85	0.311	1.36
Alone with help	-0.115	0.89	0.415**	1.51
Informal care hours	0.002	1.00	-0.005	1.00
Enabling				
High income	-0.222	0.80	-0.339	0.71
Moderate income	-0.119	0.89	-0.105	0.90
Regular medical care	0.132	1.14	-0.298	0.74
Physician visit	0.018	1.02	-0.015	0.99
No Medicaid	-0.130	0.88	0.292	1.34
Medigap	0.168	1.18	-0.164	0.85
Need				
Bed bound	0.294	1.34	-0.167	0.85
Severe ADL ^a	0.497**	1.64	0.036	1.04
Incontinent	0.048	1.05	0.393**	1.48
Fair health	0.037	1.04	-0.277	0.76
Good/excellent health	0.128	1.14	-0.141	0.87
Worse health	0.267	1.31	0.059	1.06
Bone condition	-0.106	0.90	0.078	1.08
Cancer	0.914****	2.49	-0.156	0.86
Heart condition	0.207	1.23	-0.132	0.88
Respiratory condition	0.195	1.21	-0.177	0.84
Low life satisfaction	0.283	1.33	-0.207	0.81
Unmet medications need	0.288	1.33	0.085	1.09
Unmet treatment need	0.133	1.14	0.075	1.08
Unmet care need	0.341	1.41	-0.130	0.88

TABLE 2 continued

Variable	Death		Nursing Home	
	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio
Treatment				
Treatment group member	0.118	1.12	-0.146	0.86
Cleveland	0.382	1.47	0.379	1.46
Greater Lynn	0.100	1.11	-0.133	0.88
Miami	-0.748**	0.47	-0.040	0.96
Rensselaar	0.343	1.41	-0.781	0.46
Intercept				
Model χ^2	-435****		-3.042**	
	76.493****		70.54****	

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$. **** $p < 0.001$.

a. ADL = activity of daily living.

group members did not avoid hospitalizations for death any better than did control group members. This result remained stable regardless of changes in model specification.

Hospitalization for nursing home placement (Table 2) was significantly greater if the individual was between the ages of 85 and 89, was White, was married, lived alone with informal support, or was incontinent. Risk of hospitalization for nursing home placement was less if the individual was a participant at the Rensselaar site. Again, the treatment and its pairwise interactions showed no significant effects in the initial analysis or in sensitivity analysis.

In short, results showed that very old, very sick individuals were at risk of what may be potentially avoidable hospitalizations. The Channeling treatment—substantially expanded eligibility for home care, an expanded scope of services covered, and a major increase in the amount of home care services consumed—did not alter the likelihood of experiencing a hospital stay that might have been avoidable.

CONCLUSIONS

These results confirm that a substantial number of hospitalizations are for reasons that potentially include some that might be effectively managed at home if adequate preparations were made. That data are not available to make

a better assessment of the actual potential for avoiding admissions—for example, to separate successful from unsuccessful live discharges to the community with no follow-up hospitalization—shows that they were not collected and so could have played no rule in clinical decision making in the Channeling study. The analysis gives clues to the kind of data that should be collected, although in more detail. The results also suggest that a major expansion of home care benefits did not reduce hospitalization of these potentially avoidable types—although, of course, crudeness of the definitions means that many of the hospitalizations included in them were probably appropriate and should not have been avoided.

Despite these shortcomings, these results are consistent with many other studies showing no effects on hospitalization or death that they make it reasonable to conclude that something is wrong with the intervention. If supported in better designed analyses of more detailed data, the more general implications would be that home care might be made more effective if it focused its efforts on treating risks for which it is well equipped—that is, altering patient, family, and physician attitudes and behaviors in response to health status changes. That its ability to do this job has not been effectively tested is suggested by the absence in the Channeling project of protocols designed to guide home care staff in producing such behavior changes, and by failure of programs to collect data such as DNR orders signed and specific risk factors for hospitalization that would permit them to estimate each client's risk of hospitalization.

Home care has not tended to be equipped in past studies with tools for assessing various risks or with protocols for ameliorating those risks. Patients have not been separated into groups carefully designed to reduce population heterogeneity when tailoring the intervention to their needs, which differ substantially among subgroups. These kinds of refinements of the home care intervention could improve its performance and guide the way to more sensitive evaluations. Research should be undertaken that assigns patients to resource groups on the basis of their risks of adverse outcomes. Their treatments should be tailored to ameliorating those outcomes. Success of home care should be measured as reducing incidence of these outcomes in patients assigned to these groups.

APPENDIX

Hospitalization for Evaluation

Constrained by lack of more direct measures of our concept, the evaluation variable was coded as having occurred if all of the following were true:

- The individual was hospitalized exactly once during the first 6 months following randomization.
- The individual was not hospitalized in the second 6 months following randomization.
- The individual did not die in the first year following randomization.
- The individual was not institutionalized during the first year following randomization.

This is an admittedly crude definition because it no doubt includes successes as well as failures. Successes would be patients appropriately admitted for acute care problems who were then discharged after recovery. Failures would be those that could have been avoided with no effect on health status. Unfortunately, clinical data on the Channeling data set were not sufficiently detailed to offer a meaningful way of distinguishing among successes and failures. But the important point for this analysis is that cases such as these are the ones with the highest potential for diversion by home care. Data should have been collected, protocols should be in place for targeting special efforts to sorting successes from failures, and the total of such cases admitted should have been lower with Channeling services than without them if these expanded services were to be effective in sorting out potential failures and preventing their admission. That such data were not collected points to the need for a definition of such admissions and thoughtful effort to collect data to separate avoidable from unavoidable admissions. The provisional definition used here is intended to illustrate the kind of targeting, data collection, and analysis that should be done in future studies. By using this crude definition, we hope to point the way for future researchers to collect data better so that this important type of potentially avoidable hospitalization can be identified, avoided when appropriate, and used as a measure of home care success. It showed that 6.9 percent of those hospitalized were hospitalized for evaluation.

Risk of hospitalization for evaluation from regression results not presented here was greater if the individual was between the ages of 85 and 89, had a monthly income of \$1,000 or more, suffered from a bone-related condition, or reported having an unmet personal care need. Risk of hospitalization for evaluation was lower if the individual reported an unmet medical treatment need, lived alone, or was White. Again, no treatment main or interactive effect was significant.

REFERENCES

- Aday, L., and A. Andersen. 1978. Insurance Coverage and Access: Implications for Health Policy. *Health Services Research* 13:369-377.

- Aday, L., and A. Eichhorn. 1972. *The Utilization of Health Services: Indices and Correlates*. DHEW no. (HSM) 73-3003. Washington, DC: Government Printing Office.
- Andersen, R. 1968. *A Behavioral Model of Families' Use of Health Services: HSA Studies, University of Chicago Research Series no. 25*. Chicago: University of Chicago, Center for Health Administration Studies.
- Andersen, R., and J. F. Newman. 1973. Societal and Individual Determinants of Medical Care Utilization in the United States. *Milbank Memorial Fund Quarterly* 51 (1): 95-124.
- Anderson, J. G. 1976. A Social Systems Model of Hospital Utilization. *Health Services Research* 11:271-287.
- Bacon, W. E., B. Wotjynick, and M. Krzyzanowski. 1983. Hospital Use by the Elderly in Poland and the United States. *American Journal of Public Health* 74:1220-1226.
- Branch, L., J. A. Jette, C. Evashwick, M. Polansky, G. Rowe, and P. Diehr. 1981. Toward Understanding Elders' Health Service Utilization. *Journal of Community Health* 7 (2): 80-92.
- Bureau of Health Professionals. 1991. *Technical Documentation with Field Numbers for the Area Resource File*. Office of Data Analysis and Management.
- Cafferata, G. L. 1987. Marital Status, Living Arrangements and the Use of Health Services by Elderly Persons. *Journal of Gerontology* 24 (6): 613-618.
- Carcagno, G. L., and P. Kemper. 1988. The Evaluation of the National Long Term Care Demonstration: An Overview of the Channeling Demonstration and Its Evaluation. *Health Services Research* 23 (1): 1-22.
- Davis, K., M. Gold, and D. Makuc. 1981. Access to Health Care for Poor: Does the Gap Remain? *Annual Review of Public Health* 2:159-182.
- Deacon, R., J. Lubitz, M. Gornick, and M. Newton. 1979. Analysis of Variations in Hospital Use by Medicare Patients in PSRO Areas, 1973-1977. *Health Care Financing Review* 1 (1): 79-107.
- Evashwick, C., G. Rowe, P. Diehr, and L. Branch. 1984. Factors Explaining the Use of Health Care Services by the Elderly. *Health Services Research* 19 (3): 357-382.
- Garnick, D. W., and T. Short. 1985. The Utilization of Hospital Inpatient Services by Elderly Americans. *DHHS Publication no. (PHS) 85-3351, Hospital Studies Program, 3*.
- Gove, W. A., M. Hughes, and C. B. Style. 1983. Does Marriage Have Positive Effects on the Psychological Well-Being of the Individual? *Journal of Health and Social Behavior* 24:122-313.
- Harris, D. M. 1975. Effect of Population and Health Care Environment on Hospital Utilization. *Health Services Research* 10:229-243.
- Hulka, B. S., and J. A. Wheat. 1985. Patterns of Utilization: The Patient Perspective. *Medical Care* 23 (5): 438-460.
- Kovar, M. G. 1977. Elderly People: The Population 65 Years and Over. In *Health: United States: 1976-1977*; 3-25. DHHS Publication no. (HRA) 77-1232. Washington, DC: Government Printing Office.
- Morgan, M. 1980. Marital Status, Health, Illness and Service Use. *Social Science and Medicine* 14A:633-643.
- Moe, T. M. 1984. The New Economics of Organization. *American Journal of Political Science* 28 (November): 739-777.

- National Center for Health Statistics. 1983. *Vital and Health Statistics: Americans Assess Their Health: United States, 1978. Series 10: Data from the National Health Survey, no. 142.* DHHS Publication no. (PHS) 83-1570. Washington, DC: Government Printing Office.
- Rice, D. P. 1983. Sex Differences in Mortality and Morbidity: Some Aspects of the Economic Burden. In *Sex Differentials in Mortality: Trends, Determinants and Consequences*, ed. A. D. Lopez and L. T. Ruzicka; 335-369. Miscellaneous Series no. 4. Canberra: Australian National University, Department of Demography.
- Roos, N. P., and E. Shapiro. 1981. The Manitoba Longitudinal Study on Aging: Preliminary Findings on Health Care Utilization by the Elderly. *Medical Care* 9:644-657.
- SAS Institute. 1986. *SUGI Supplemental Library User's Guide*. Cary, NC: SAS Institute.
- Soldo, B. J., and K. G. Manton. 1985. Health Status and Service Needs of the Oldest Old: Current Patterns and Future Trends. *Milbank Memorial Fund Quarterly* 63 (2): 286-319.
- U.S. National Center for Health Statistics. 1979. *Vital and Health Statistics: Current Estimates from the Health Interview Survey: United States—1978. Series 10: Data from the National Health Survey, No. 130.* DHEW Publication no. (PHS) 80-1551. Hyattsville, MD: U.S. Department of Health Education and Welfare.
- Verbrugge, L. 1979. Marital Status and Health. *Journal of Marriage and the Family* 41: 267-285.
- Vladeck, B. C. 1981. Equity, Access, and the Costs of Health Services. *Medical Care* 19 (12): 69-80.
- Weissert, W. G., C. M. Cready, and J. E. Pawelak. 1988. The Past and Future of Home- and Community-Based Long-Term Care. *Milbank Quarterly* 66 (2): 309-388.
- Wilson, P. A. 1981. Hospital Use by the Aging Population. *Inquiry* 18 (4): 332-344.
- Wolinsky, F. D., R. M. Coe, D. K. Miller, J. M. Prenderga, M. J. Creel, and M. N. Chavez. 1983. Health Services Utilization among the Noninstitutionalized Elderly. *Journal of Health and Social Behavior* 24:325-337.
- Woolridge, J., and J. Schore. 1988. The Evaluation of the National Long Term Care Demonstration: 7. The Effect of Channeling on the Use of Nursing Homes, Hospitals and Other Medical Services. *Health Services Research* 23 (1): 119-128.