DETERMINING WHETHER A COMPLEX INTERVENTION OCCURRED: THE CASE OF THE NATIONAL LONG TERM CARE DEMONSTRATION

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A. BACKGROUND

The rapid growth of public and private expenditures for long term care for the frail elderly and the expectation that these expenditures will rise even more as a result of both demographic trends and increases in health care costs have focused the attention of the government on ways to control long term care expenditures while still providing adequate care to those in need. In 1980, the United States Department of Health and Human Services funded the National Long Term Care Demonstration to conduct a rigorous test of one approach to controlling the costs of long term care--the provision of case managed community-based services (channeling) for the impaired elderly. In the channeling demonstration, case management included the following components:

- Comprehensive, structured needs assessment to determine individual problems, resources, and service needs
- Care planning to specify the types and amounts of care to be provided to meet the identified needs of each client
- Service arrangement to implement the care plan
- Monitoring to ensure that services were provided as called for in the care plan or modified as necessary
- Reassessment to adjust care plans to changing needs.

In addition to these components, channeling case managers could purchase community-based services for clients. Under one model, the basic case management model, funding for this was rather limited. In the other, the financial control model, case managers could purchase as many as 19 different community-based services up to an average cost (across all clients) of 60 percent of the cost of nursing home care. Clearly, the "treatment" in the National Long Term Care Demonstration, which consisted of several case management services and purchase of services, was quite complex.

The effect of channeling case management on the costs of long term care and other outcomes for clients was evaluated by comparing the experiences of a treatment group to those of a control group, where treatment or control group status was randomly assigned. However, this comparison was not straightforward. First, partly because of its complexity, the treatment was not implemented to the same degree for all members of the treatment group. Some participated in the program longer than others and not all participants received the same amount of attention from channeling staff. Second, many control group members were receiving one or more aspects of the treatment. Control group members received services otherwise available in their communities and these services included a substantial amount of case management. The nature and extent of the case management services received by the treatment and control group was a critical issue in the evaluation of the channeling demonstration. If there was no intervention, that is, if the treatment group did not receive more case management than the control group, the likelihood of channeling having *detectable* impacts would be low. This would be the case *even if* case management were very effective in controlling the costs of long term care.

This paper describes the approach taken in the National Long Term Care Demonstration to the measurement of the receipt of a complex treatment, case management, by both the treatment and control groups. Receipt of services which could be purchased under the demonstration was analyzed separately and is not considered here.

B. DATA SOURCES

Measuring the amount of case management received by the sample (including both treatment and control group members) proved a difficult problem. There was little experience on which to base an approach. Although there have been a number of other evaluations of the impact of case management programs for the elderly, none had analyzed receipt of the treatment.[1]

A multifaceted approach was adopted. This approach involved:

- Site visits for collection of qualitative data on the nature of the case management services (other than channeling) in each of the ten communities in which the demonstration was operating and on the implementation of the treatment under channeling
- Collection of interview data from the elderly sample members (or their proxies) on their receipt of key aspects of case management and of services from particular agencies known to provide case management services approaching the comprehensiveness of those under channeling
- Collection of executive interview data from the staff of service provider agencies about the characteristics of the services they provided

- o Coding of data from the records of these agencies on the services received by sample members
- o Use of program records on the receipt of case management services by treatment group members.

Because the executive interview and provider records data were available only for a twenty percent subsample and the channeling records were only available for treatment group members, the analysis of treatment/control differences in the receipt of case management focused on the qualitative data collected in site visits and the sample member interview data, both of which were applicable to the entire sample. The key advantage of the qualitative data was that they could distinguish relatively subtle differences between case management programs. However, they did not describe what individual sample members received. In contrast, the interview data could measure only relatively gross differences in case management services but applied to the services received by individual sample members. Thus, the two major data sources were complementary. The data from the other sources were used to inform the overall results.

C. RESULTS

In this section we describe and compare the amount of case management received by treatment and control group members.

1. Qualitative Analysis

A major issue for the qualitative analysis was whether the components of case management under channeling were implemented according to design, that is, did the treatment group receive the intended intervention. Analysis of site visit interviews and data from program records, indicated that channeling case management had been implemented in general accordance with the design, although some channeling clients at most sites did not receive monitoring as frequently as intended and initial reassessments were often delayed. There was no difference between models in the implementation of case management (Carcagno et al forthcoming).

The five case management components of channeling described above provide a starting place for characterizing the nature of case management services offered by providers other than channeling and available to control group members. One can think of case management services as falling along a continuum of comprehensiveness, with agencies which provide all five components at one extreme and agencies providing only one of these at the other extreme.

Data collected in the site visits was used to characterize the case management services typically available from agencies common in each of the ten communities in which the demonstration was operating and to array the case management provided by these agencies on the continuum relative to channeling. The common agencies were hospital discharge and social service units, home health agencies, and publicly-provided homemaker programs.[2] These agencies typically provide assessment and care planning and service arrangement but little monitoring or reassessment. In addition to arraying the services provided by common agencies along the continuum, the program offering the most comprehensive case management in each community (i.e., the one most closely approaching channeling) was identified, studied in the site visits, and arrayed on the continuum.

Figure 1 presents the completed continuum. It is clear from the figure that some case management functions were commonly available to control group members and that five sites had case management programs approaching or surpassing the comprehensiveness of channeling. Four of these five sites were financial control model sites. We concluded that there was much less contrast between channeling and other case management programs in the financial control sites than there was in the basic model sites. An important caveat here is that the continuum does not consider the extent to which the programs studied and others[3] provide case management services to members of the control group. For that issue, we turn to the quantitative analysis.

2. Quantitative Analysis

Our strategy in the elderly sample member interview was two-pronged. We asked respondents about receipt of services from the agencies in each community, offering comprehensive services, listing the relevant agencies by name and we asked about receipt of key components of case management. Because of space constraints we were only able to include two questions on key components. These two questions were designed to focus on each end of the comprehensiveness continuum, one on visits to assess needs and arrange for services (components of case management which were commonly available) and one on monitoring and reassessment (components which were less commonly available). Separate questions (not analyzed here) considered receipt of services other than case management.

Table 1 shows the results on receipt of case management services at six and twelve months using each of the three measures for each of the two channeling models. The mean for the treatment group, the mean for the control group, and the difference between them (i.e., the treatment/control difference) are shown.[4] As expected, given the widespread availability of some case management services, a sizeable proportion of control group members reported its receipt. This ranged from 17 to 35 percent of control group members, with the percentage varying with the measure of case management, model, and time period involved. Also as expected, the proportion of the control group reporting receipt of visits to arrange services was substantially greater than the proportion reporting visits to monitor or reassess services. As noted above,

FIGURE 1

COMPARISON OF CHANNELING AND OTHER CASE MANAGEMENT SERVICES

Continuum of Case Management	Typical Community-Based Service Providers	Specific Comprehensive Case Management Programs
Least Comprehensive		
	Hospital Discharge Planning Social Service Departments Publicly-Provided Homemaker Programs (except for four state home care programs)	
	Certified Home Health Agencies	
		Family and Children Services (Baltimore)[a] Sheltering Arms (Houston) COPSA (Middlesex County)
		UCC (Miami) HC (Eastern Kentucky)
		GLSS (Greater Lynn) PCA (Philadelphia) SMSC (Southern Maine)
		Channeling Projects BRI (Cleveland) Eddy Memorial Foundation Program (Rensselaer County)
Most Comprehensive		

NOTE: Excludes purchase of service, eligibility restrictions and total caseload size constraints. The continuum is intended to be an ordinal scale. Within groups, sites are listed in alphabetic order.

[a]In Baltimore, the state home care program, Gateway II, was limited to channeling clients, and so is not arrayed on the continuum.

the latter component was less commonly available. The control group means for a visit from staff of a named comprehensive case management agency are roughly comparable to those for a visit to monitor or reassess services, again consistent with expectations.

At six months, for two of the measures there are statistically significant differences across models in the receipt of case management by the control group.[5] These differences are generally consistent with the results of qualitative analysis: more control group members received case management in the financial control than in the basic model sites. However, there are no such statistically significant differences at twelve months, suggesting that the additional case management services available to the control group at financial control sites may be provided only for a limited time after the crises that precipitated their referral to channeling (and subsequent randomization into the control group).

The records of agencies providing services to elderly sample members and executive interviews with staff of those agencies confirmed that a substantial proportion of the control group received case management or had it available as part of a service they received. These results are presented in Table 2. Although the samples are quite small and apply only to a single time period,[6] the pattern of results is consistent with those presented in Table 1 (which are based on the much larger interview sample). Like the interview data, the records data indicate that more control group members in the financial control than in the basic model sites received case management or had it available.

Turning to the treatment group, it is absolutely clear from Table 1 that treatment group members were much more likely to receive case management services than control group members; the differences are quite large and highly statistically significant. Depending on the measure, the treatment/control differences range from about 25 to 56 percentage points. These differences represent increases in receipt of case management for treatment group members two to three times the level received by control group members.

As Table 1 indicates, however, the percentage of treatment group members reporting receipt of case management was considerably less than 100 percent. Across models and measures, from 46 to 82 percent of treatment group members reported receipt of case management. The highest percentages were reported for the measure of a visit from a named comprehensive case management agency (which included channeling).[7] While some treatment group members were terminated from the channeling project in the initial days of their participation and did not receive a channeling visit, this was true of less than nine percent of the treatment group overall and an even smaller proportion of this sample.[8] Rather, many treatment group members who received a visit from channeling did not report it in the interview. In the next section, we consider misreporting further. Before turning to that, let us consider the evidence from another data source on the receipt of case management by treatment group members.

As presented in Table 3, channeling program records indicate that by six months, over 20 percent of the sample members were no longer participating and, by twelve months, 28 percent. (Apart from death, which is not an issue here as the deceased were excluded from the samples, the major reasons for termination were institutionalization and refusal.) As indicated in Table 3, by twelve months, the proportion terminated in the basic model was higher than in the financial control model and this difference is statistically significant.[9] Given that the qualitative evidence indicated no difference between models in the implementation of the treatment, these differences in participation may account for the fact that the treatment/control difference in monitoring or reassessment at twelve months in the interview data (see Table 1) is larger in the financial control than in the basic model. Monitoring and reassessment were the case management services received by those who were participating in channeling at twelve months. Assessment, care planning and service initiation were provided during the early weeks and months of participation.

<u>Misreporting</u>. A comparison of interview reports and channeling program records indicated a moderate amount of underreporting of receipt of case management services for the treatment group. There was about a 15 to 20 percentage point difference between the proportion reporting a visit from a comprehensive case management agency and the proportion actually receiving at least one channeling visit.[10] Because some treatment group members who were terminated from the channeling program surely received some case management services from other sources, the proportion who received a visit from channeling (according to records) represents a lower bound on the proportion of treatment group members receiving a visit from a comprehensive case management agency.

We also compared control group interview data to service provider agency records in an effort to evaluate the existence and extent of misreporting for this group. These data are much less definitive than the program records data for the treatment group. Much of the case management available to control group members was offered as an integral part of other services (e.g., skilled nursing) and the data available in such circumstances indicate only whether another service was received and whether the agency reported case management services to be an integral part of that service; they do not indicate whether a given control group member actually received case management services. Nevertheless, if we treat case management services as having been received when they were available, the agency records data represents the upper bound of the receipt of case management services by control

TABLE 1

RECEIPT OF CASE MANAGEMENT (INCLUDING CHANNELING)
BY SIX MONTH TIME PERIODS
Percent

Whether Received Visit:	Six Months			Twelve Months		
	Treatment Group Mean	Control Group Mean	Treatment/ Control Difference	Treatment Group Mean	Control Group Mean	Treatment/ Control Difference
Basic Case Management Model						
To arrange services[a]	66.0	30.6#	35.4** (16.55)	51.6	25.4	26.2** (11.26)
To monitor/reassess services[a]	50.1	19.2	30.9** (14.54)	47.2	17.2	30.0**# (13.27)
From a named comprehensive case management agency[a]	72.2	20.4#	51.8** (26.74) (27.04)	60.1	14.4	45.7** (20.88)
Sample Size	1128	796	1924	1014	674	1688
Financial Control Model						
To arrange services[b]	67.9	35.0	32.9** (15.22)	45.6	20.8	24.8** (10.61)
To monitor/reassess services[b]	52.3	20.2	32.1** (14.97)	57.1	19.1	38.0**# (16.73)
From a named comprehensive case management agency[b]	82.0	25.7	56.3** (29.16)	65.9	18.2	47.6** (21.66)
Sample Size	1340	723	2063	1165	633	1798

SOURCE: Six and Twelve Month Followup Interviews.

**Statistically significant at the 99 percent level using a two-tailed test.

#Treatment/control differences or control group means are significantly different across channeling models at the 95 percent level.

a,b Impact estimates for outcome variables with the same alphabetic superscript were tested to determine whether they were jointly equal to zero. For all outcome variables and both followups, there were significant differences.

TABLE 2

RECEIPT AND AVAILABILITY OF CASE MANAGEMENT SERVICES
TO CONTROL GROUP MEMBERS AT SIX MONTHS

Percent

	6 Months	
Records Indicate:	Basic Case Management	Financial Control
Case Management as a Separate Service Received	17.6	25.0
Case Management Available with Skilled In-Home Services Received	30.7[#]	48.6[#]
Case Management Available with Semi-Skilled In-Home Services Related	14.4	18.1
Case Management Available with Other Services Received	5.2	2.8
Some Case Management Received or Available	49.7[#]	61.8[#]
Sample Size	153	144

NOTE: The base is control group members with provider records data. Elderly sample members receiving case management services and other services with which case management was integrated are included in more than one category. Elderly sample members receiving separate case management services from more than one agency are counted only once in that category and similarly for skilled, in-home services, semi-skilled in-home services and other services with integrated case management.

[#] The difference across models in the proportion of the control group receiving case management is statistically significant at the 95 percent level. Because these categories are not mutually exclusive they were tested individually using a chi-square contingency table test.

TABLE 3

CLIENTS TERMINATED BY MODEL IN FOLLOWUP SAMPLES

Percent

	6 Month Followup Sample			12 Month Followup Sample	
	Terminated Between Random Assignment and Completion of Care Plan	Terminated at 6 Months	Sample Size	Terminated at 12 Months	Sample Size
Base Case Management Model	11.3	22.0	1,181	30.2[#]	1,052
Financial Control Model	11.0	20.4	1,405	25.7[#]	1,212
Total	11.2	21.2	2,586	27.8	2,264

SOURCE: National Long Term Care Demonstration Client Tracking Form.

[#]Significantly different across models at the 95 percent level.

group members. Under that assumption, the proportion reporting receipt of a visit to arrange services, the most common component of case management considered in the interview, is about 20 to 25 percentage points lower than the proportion that records indicate received it or had it available.

The measures and procedures used to examine misreporting for the treatment and control group members differ and these results must, therefore, be interpreted with caution. However, using a conservative procedure based on a lower bound estimate of actual receipt for the treatment group and an upper bound estimate for the control group, we find underreporting of roughly the same order of magnitude for treatment and control group members. Given that this is the case and the very substantial differences in the proportions of treatment and control group members who reported receipt of case management (see Table 1), it is highly unlikely that differences in the extent of underreporting of receipt could invalidate our conclusion that the treatment group received substantially more case management services than the control group.

D. SUMMARY AND CONCLUSION

In social science demonstrations the treatment is often complex. In this circumstance some treatment group members will receive less of the treatment than others and some components of the treatment may be available to control (or comparison) group members. Therefore, comparison of the means for outcome variables for treatment and control group members can lead to erroneous conclusions about the impact of the treatment.

This paper described the multifaceted approach taken to measuring the receipt of case management services in the National Long Term Care Demonstration. In this approach, qualitative analysis of the services available in the ten demonstration communities was integrated with quantitative analysis of interview and records data. The evidence consistently indicates that a substantial proportion of the control group received some components of the treatment, but that a much larger proportion of the treatment group did so. The evidence indicates, therefore, that there was an intervention in the National Long Term Care Demonstration.

An analysis of program records data indicates underreporting of receipt of case management by the treatment group in the interview data. Analysis of much less definitive data from service provider records for the control group suggests that the interview reports for this group were subject to underreporting of roughly of the same order of magnitude. We conclude that measurement artifacts due to differences in the reporting of receipt are unlikely to invalidate the large and highly statistically significant differences in the receipt of case management reported for treatment and control group members.

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FOOTNOTES

[1]One (Price and Ripps, 1980) provides some description of other case management activities but does not compare the receipt of case management for treatment and control group members. Also, Weissert, Wan and Livieratos (1980) examine the receipt of day care and homemaker services by the control group in a study of the impact of those services on the chronically ill. Assessment and care planning were provided in conjunction with these services.

[2]While other agencies, particularly social service agencies, also provided case management services, the nature of these programs varied so substantially that it was not possible to place them as a group along the continuum.

[3]Resource constraints prevented study of multiple case management programs at each of the ten sites.

[4]The control group means shown are the simple unadjusted means. The treatment group means were calculated by summing the treatment/control difference and the control group means. The treatment/control differences presented in the table were estimated using ordinary least squares (OLS) regression, controlling for a number of baseline characteristics of the sample members, including health and functioning; living arrangement and availability of informal supports; demographic

characteristics; income, assists and insurance coverage; psychological well-being and attitude toward nursing home placement; prior service use; use of proxy respondents; and site. Using regression adjusted means is preferably to simple comparison of means because it controls for differences in the characteristics of the treatment and control groups which may affect the outcomes of interest. Such differences may be due to chance differences at intake and to attrition during the course of the demonstration. The latter is an important consideration here. A simple comparison of means cannot take into account differences in the characteristics of the treatment and control group. (For a detailed discussion of the procedures used, see Kemper et al, 1984.) Comparable results were obtained when the effects of attrition have been taken into account using the procedure developed by Heckman (1976, 1979) and when a probit analysis was conducted to ensure that the treatment/control results presented in Table 1 were robust despite the binary dependent variable.

[5]Based on our qualitative analysis we also expected more of the control group in the financial control sites than in the basic sites to receive a visit to monitor or reassess services. However, the means for the control group on this variable are only slightly larger in the financial control model than in the basic model. An examination of the results by site for this variable suggest that part of the explanation may be in program size and eligibility restrictions not taken into account in the continuum. For example, one site, the control group mean for a visit to monitor or reassess services is one third that for the other financial control sites. Although the program listed on the continuum for that site is the one most closely approaching channeling on the continuum, it is smaller than channeling and serves almost exclusively Medicaid recipients. Channeling serves people without regard for income.

[6]Some records data were collected at twelve months but the sample is even smaller than that presented here. The pattern of results is similar to that presented for six months.

[7]While not shown here, the proportion reporting either arranging or monitoring was higher than the proportion reporting a visit from a named agency.

[8]Only a portion of those who were terminated without an initial visit from channeling are included in this analysis. This is because baseline data are required and fewer than half of the sample members who left the program before receiving an initial visit agreed to complete a research baseline interview.

[9]The financial control model offered more purchased services than the basic model and thus may have been more attractive.

[10]One cannot determine from the available records data whether channeling staff made a visit to monitor or reassess services. Many agencies other than channeling may have made a visit to arrange services. Thus the measure involving a visit from named agency provides the best measure of misreporting for the treatment group.