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Costs of day hospital and community residential chemical dependency treatment

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Abstract

Background—Evidence suggests that expensive hospital-based inpatient chemical dependency programs do not deliver outcomes that are superior to less costly day hospital programs, but patient placement criteria developed by the Addiction Society of Medicine (ASAM) nonetheless have identified a need for low-intensity residential treatment for patients with higher levels of severity. Community-based residential programs may represent a low-cost inpatient alternative that satisfies the ASAM criteria, but research is lacking in this area. A recent clinical trial has found similar outcomes at social model residential treatment and clinically-oriented day hospital programs, but did not report on the costs associated with treatment in that study.

Aims—This paper addresses whether the similar outcomes in the recent trial were delivered with comparable costs. It also studies costs separately for men and women, and for Whites and non-Whites, subgroups not included or identified in prior cost effectiveness work.

Method—This paper reports on clients who participated in a randomized trial conducted in three metropolitan areas served by a large pre-paid health plan. Clients were eligible if they met the first five dimensions of the ASAM criteria for low-intensity residential treatment and had not been mandated to residential treatment due to dangerous home environment (the sixth ASAM dimension). The five day hospital programs included here are typical of mainstream private chemical dependency programs that were developed as an alternative to inpatient treatment. The seven residential programs are typical of those historically developed by members of alcohol mutual-help programs. Cost data for the study sites were collected using the Drug Abuse Treatment Cost Analysis Program (DATCAP) which produces estimates of average costs per week per client treated at a particular treatment program. Lengths of stay were derived from program records. Costs per episode for each study subject were calculated by multiplying the DATCAP-based program-specific costs (per week) by the number of weeks the subject stayed in the program to which they had been randomly assigned. Differences in length of stay, and in per-episode costs, were compared between residential and day hospital subjects using the Brown-Forsythe robust test of the equality of means.

Results—Lengths of stay at residential treatment were significantly longer than at day hospital, in the sample overall and in the disaggregated analyses for both genders and for both Whites and non-Whites. This difference was especially marked among non-Whites, who had quite short stays in day

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hospital. The average cost per week was $575 per week at day hospital, versus $370 per week at the residential programs. However, because of the longer stays in residential programs, this lower cost per week did not always translate to lower per-episode costs. Instead, the per-episode costs were significantly higher for those treated in residential programs than in day hospital in the sample overall, and among non-Whites. Costs were comparable for Whites and for women treated in either setting, but were marginally higher for men randomized to residential programs.

Discussion—These cost results must be considered in light of the null findings comparing outcomes between subjects randomized to residential versus day hospital programs in this study, in the overall sample and by gender and race/ethnicity: That is, the longer stays in the sample overall and for non-White clients at residential programs came at higher costs but did not lead to better rates of abstinence. An important component of the cost differential arose from especially short stays in day hospital among non-Whites, calling into question the attractiveness of day hospital for minority clients.

Conclusion—Outcomes and costs at residential versus day hospital programs were similar for women and for Whites in a randomized trial of pre-paid health plan members who met ASAM criteria for low-intensity residential treatment but were not at environmental risk. For non-Whites, and marginally for men, a preference for residential care would appear to come at a higher cost.

Implications for health care provision and use—Lengths of stay in residential treatment are significantly longer than in day hospital, but costs per week are lower. Women and Whites appear to be equally well-served in residential and day hospital programs, with no significant cost differential. Provision of residential treatment for non-Whites may be more costly than day hospital, because their residential stays are likely to be 3 times longer than they would be if treated in day hospital. For men, residential care will be marginally more costly.

Implications for health policy formulation—Residential treatment appears to represent a cost-effective alternative to day hospital for female and White clients with severe alcohol and drug problems who are not at environmental risk, although it will be important that the current study be replicated with different samples and study programs.

Implications for further research—The much shorter stays in day hospital than at residential among non-Whites highlight the need for research to better understand how to best meet the needs and preferences of non-White clients when considering both costs and outcomes.

INTRODUCTION

Month-long stays in hospital-based inpatient chemical dependency programs are expensive, and they have not been found to deliver better outcomes overall than less costly hospital-based day treatment of similar duration.[1-4] In the current era of cost containment,[5] this lack of demonstrated cost-effectiveness for inpatient programs has led to an increasing emphasis on day hospital programs. Another, less studied alternative to hospital-based inpatient programs is the community-based residential treatment program, which may be less expensive than inpatient hospital programs because of its non-medical setting and non-medical staff. We conducted a randomized trial comparing outcomes and costs for day hospital versus community residential treatment programs, and found similar rates of abstinence (e.g., 62% versus 63% respectively at 12 months).[6] This paper reports on the costs component of that study. We study weekly program costs for operating each type of program, and we compare average treatment costs (per episode costs) for day hospital versus the community residential programs.

Analyses from our randomized trial (of day hospital versus residential treatment) also included post-hoc comparisons of outcomes by gender and ethnicity, and did not find differences in abstinence rates.[6] In this paper, we consider costs (for day hospital versus residential treatment) disaggregated by gender and ethnicity, which have not been reported in the existing literature

comparing inpatient to day hospital chemical dependency treatment (for example, McKay's landmark 1995 study only included male veterans).

METHOD

Sample

This study reports on clients who participated in the randomized arm of a large health services trial conducted in three metropolitan areas (area 1, area 2, and area 3) served by a large pre-paid health plan. Study subjects were recruited when seeking chemical dependency treatment at the programs administered by the plan between the period of May 2000-December 2003. Details of the recruitment and study sites are reported in [6] and we borrow here from that work. Briefly, clients were eligible for the study and for randomization if they met the first five dimensions of the ASAM criteria for low-intensity residential treatment and had not been mandated to residential treatment by the physician due to dangerous home environment (which is the sixth dimension of the ASAM criteria for low-intensity residential treatment). About half of the eligible clients agreed to randomization and were assigned to a day hospital program (n=154) or a community residential program (n=139). Reasons for refusing randomization pertained primarily to logistical problems due to work, school, childcare, or other family concerns; as a whole, these clients had less severe drug, psychiatric, social, legal and employment problems than those agreeing to randomization (see [6]) for more details. Treatment costs were covered for the study subjects under the health plan.

Study sites

The five day hospital programs included here are typical of mainstream private chemical dependency programs that were developed as an alternative to Minnesota Model inpatient treatment[7] and conform to ASAM patient placement criteria for intensive outpatient/ partial hospitalization.[8] Clients spend 3 to 4 hours a day in group sessions at the four 2-week programs and 5.5 hours a day in the only 3-week program. Patients are expected to attend 12-step meetings in the community on their own. The day hospital programs are staffed by psychiatrists, primary care physicians, masters-level social workers and therapists, registered nurses, and certified/licensed addiction counselors. Fewer than half are in recovery. The day hospital programs are owned and administered by the health plan. There was one day hospital program in metropolitan areas 1 and 2 respectively, and three in area 3.

The seven community residential programs are typical of those historically developed by members of alcohol mutual-help programs, referred to in California (where our study was conducted) as "California social model residential programs" because the model was formalized there and was explicitly non-medical.[9] Although the term "social model" residential program is not commonly used outside California, residential programs elsewhere are generally non-medical, are community-based rather than set in hospital complexes, and represent a similar alternative to inpatient hospital-based programs throughout the US. The social model approach has evolved since its inception in the 1970's, becoming more clinical and professionalized[10] and representing an attractive solution to health plans that do not choose to run their own residential treatment programs. The community residential programs in this study are freestanding community-based chemical dependency programs that have contracted with the health plan to provide services to plan members; the programs also serve other clients, through a variety of funding streams. There were two community residential programs in area 1, two in area 2, and three in area 3.

Two of the seven residential study programs in our study provided mixed gender services; three were male-only programs and two were female-only programs. Clients could stay up to 60 days, attending groups for 3 to 4 hours a day, with other available time used for helping with

program maintenance, attending 12-step meetings in-house and/or in the community, and participation in medical or physical activities. The community residential programs are staffed primarily by non-degreed counselors in recovery, many themselves program graduates. Most programs had several state-certified alcoholism and drug abuse counselors on staff (and at some, all counselors were certified). Programs rely on volunteers with longer-term sobriety to lead recovery-oriented groups.

Measures

Length of stay (in days) was extracted from health plan records. Resource use and cost information at participating treatment programs were obtained by administering a cost data collection instrument, the Drug Abuse Treatment Cost Analysis Program (DATCAP) www.DATCAP.com.[11] The DATCAP measures both the accounting and opportunity costs of a chemical dependency treatment program based upon standard economic principles. The DATCAP has been utilized in numerous treatment evaluation studies.[12-16] The instrument is intended to collect and organize detailed information on resources used in service delivery and their associated costs. Resource categories include personnel, supplies and materials, contracted services, buildings and facilities, equipment, and miscellaneous items.

Because the impact of drug abuse is felt broadly, the economic evaluation of drug abuse interventions, including cost studies, is generally conducted from a comprehensive societal perspective rather than from a private perspective (e.g. treatment provider, insurance company).[13] A societal perspective implies that opportunity costs are included for all participants or stakeholders in a program (without double counting), such as organizations, individuals, taxpayers, and insurance companies.[17] Economic or opportunity costs include the full value of all resources used by a program, regardless of who paid for them. Although accounting costs may be of interest to providers for fiscal planning, economic costs are preferred for economic evaluation because society shares in the benefits of substance abuse treatment.

In addition to reporting annual accounting and opportunity (economic) costs for a particular program, the information can be used to generate the average weekly economic cost per client (cost at the individual level) and the average cost for a treatment episode (per capita average for a program).

The DATCAP was completed for all seven community residential programs and for the day hospital program in one metropolitan area (area 1). It was not possible to obtain the above detailed resource costs necessary to estimate the DATCAP for the day hospital programs in metropolitan areas 2 and 3 because the cost break-downs were not available from their accounting systems. To obtain the costs for the day hospital programs in these two areas, conversion factors were developed, based on the available and most reliable Cost-of-Living Indices (COLIs) for the three metropolitan areas under study here. As a first step, we obtained a multiplier for converting area 1 costs to area 2 costs, using a COLI for cities in metropolitan areas 1 and 2 in the state where the study was conducted (http://houseandhome.msn.com/pickaplace/comparecities.aspx). Since the city in metropolitan area 3 was not included in this index, in a second step we turned to the health care component of the COLI produced by the American Chamber of Commerce Researchers Association[18] to determine an appropriate conversion factor for translating costs from area 2 to area 3. By extension, the conversion factor from area 1 to area 3 is the product of the two conversion factors (i.e., the conversion factor from area 1 to area 2, times the conversion factor from area 2 to area 3).

The conversion factor from area 1 to area 2 was 1.11, and the factor for converting from area 2 to area 3 was 0.83. The resulting conversion factor from area 1 to area 3 is 1.11 times 0.83,

which equals 0.92. Thus, for example, if the unit cost per week of residential treatment in area 1 were $1000, the unit cost per week for residential treatment in area 2 would be $1000 times 1.11 = $1110; and, the unit cost for residential treatment in area 3 would be $1000 times 0.92 = $920.

Data analytic procedures

Differences in the mean length of stay between subjects randomized to day hospital versus community residential programs were based on the Brown-Forsythe robust test of equality of means.[19] This statistic is preferable to the F statistic because it is robust to groups that are unequal in size and when the assumptions of normality and equal variance are violated. First, differences in length of stay at the two study conditions were studied for the sample overall. Next, differences in length of stay at day hospital versus residential treatment were compared within four stratum: male subjects, female subjects, White subjects, and non-White subjects.

The average weekly cost for providing treatment to one individual was calculated for each program using DATCAP data. This program-specific cost figure was then multiplied by the number of weeks a client stayed in the program to obtain a per-episode cost for each client. Brown-Forsythe tests were again used to determine whether mean differences in per-episode costs were statistically significant for clients in a day hospital program versus those in residential treatment, in the sample overall and within the gender and ethnicity stratum. SPSS version 12[20] was used to test these differences. Statistical significance was judged at $p<.05$ using two-sided tests.

RESULTS

The randomized subjects were equally distributed to day hospital and community residential programs by gender (about 38% female), ethnicity (about 17% Hispanic and 23% African American), age (40 years on average), employment status (83% employed full or part-time), education (only 20% with less than a high school education), and marital status (34% married); see Table 1. Similar proportions were dependent on alcohol only, on drugs only, and on alcohol and drugs. There were no significant differences in terms of baseline ASI problem severity or prior treatment episodes between subjects randomized to day hospital vs. community residential programs.

Table 2 presents the results comparing day hospital and residential treatment for lengths of stay (first column under each modality in Table 2) and costs per episode (second column under each modality). The parallel results of our tests of significance for lengths of stay and for costs are shown in the two respective columns at the far right of Table 2; significant results ($p<.05$) are bolded. The average lengths of stay in this study were significantly higher ($F=36.47$, $p<.001$) for subjects randomized to community residential programs than to day hospital in the sample overall (22.5 days versus 10.9 days, respectively) and within the gender and ethnicity stratum ($p=.01$ among women; and $p<.001$ among men, among Whites, and among non-Whites). The difference was especially marked for the non-Whites stratum, with their average length of stay in residential about 3 times longer than their average stay in day hospital. In contrast, for Whites and women, stays in residential were only about 60% higher than in day hospital.

As for costs, the per-episode cost, on average, was $575 per week at day hospital (ranging from $523 to $633, depending on the area) and was $370 at community residential treatment (ranging from $289 to $475, depending on the program). The longer stays in residential treatment (reported above) generated significantly higher per-episode costs for those randomized to residential treatment than day hospital in the sample overall ($p=.025$), among non-Whites ($p=.001$), and marginally among males ($p=.06$). The magnitude of the differences in per episode

costs was over $250 in the sample overall and for males, and over $600 higher for non-Whites. For the female and the non-Hispanic Whites in our study, per episode costs were very similar in residential and day hospital treatment.

DISCUSSION

This study adds new comparative information about community residential treatment costs to the existing literature on inpatient versus day hospital chemical dependency treatment. In addition, it provides cost data for groups not represented or identified in earlier studies: women and ethnic minorities. Our analyses of length of stay highlighted significantly longer stays in community residential treatment than for day hospital overall, and for all of our disaggregated groupings. Meanwhile, the cost per week at day hospital was higher in all three metropolitan areas than the cost per week at any of our seven community residential programs, with the lower bound of the range for day hospital higher than the upper bound of the range for residential ($523 versus $475, respectively).

This has implications for the resultant comparisons of costs per episode between day hospital and community residential programs. That is, the longer stays at residential are countered by the higher costs per week at day hospital, so that costs might have been expected to come out about equal in either setting. Instead, we found higher costs for the residential condition in the sample overall and for men and non-White study participants. The largest difference was for non-Whites ($600 more per episode in residential than in day hospital), and was driven not only by the group's longer stays in residential treatment but by their shorter stays in day hospital. Stays at day hospital among non-Whites averaged a little over a week, the lowest day hospital stays in our sample. We conducted a post-hoc analysis to explore one possible explanation for these shorter stays, focusing on whether the respondents had a car, thinking that perhaps non-Whites randomized to day hospital were less likely to have a car than Whites randomized to day hospital. However, 68% of the non-Whites in the day hospital group and 65% of the non-Whites in the residential condition reported having a car available for their use.

These cost results must be considered in light of the null findings comparing outcomes between subjects randomized to day hospital versus community residential programs, in the overall sample and by gender and ethnic groupings.[6] For example, the longer stays overall and for non-White and male subjects randomized to community residential programs came at higher costs (albeit marginally higher for males), but did not lead to better rates of abstinence. While it is encouraging that outcomes and costs were similar for recovery home and day hospital stays among Whites and women, the different results for non-Whites and men are puzzling. More research is needed to understand why non-Whites and men would require longer stays in residential treatment to achieve abstinence rates similar to those obtained from much shorter stays at day hospital.

The goal of the ASAM patient placement criteria is to assign patients to the optimal level of care: over-treatment causes no harm, but is wasteful of resources; and under-treatment is harmful.[21] Patient preference is not part and parcel of the placement criteria, although patients tend to prefer a level of treatment lower than the level indicated by the criteria (see [22] for a review of this literature). Since the data reported here are on subjects willing to be randomized to residential or day hospital treatment, patient preference ought not to have been an issue here. However, the especially short lengths of stay in day hospital among non-Whites would appear to belie this conclusion, suggesting that even in a randomized trial, patient preference appears to be at work. And in this trial, a preference for residential care would appear to come at a higher cost, especially for non-Whites. How can providers best meet the needs and preferences of non-White clients (while considering costs as well as outcomes), when options include day

hospital and community residential programs? Answering this question should be a research priority, especially since we know that length of stay is generally a strong predictor of successful treatment outcome.

An additional consideration is the costs associated with withdrawal from the labor force while participating in the longer stays at residential treatment in our study. Had these costs been considered in our analysis, the costs associated with residential treatment would be even higher. This in turn would make day hospital a more attractive option from the perspective of the policymaker. The current study was designed to capture the costs associated with resources used in service delivery, from a societal perspective. Although the value of this information to treatment programs and policymakers is high, future studies may want to include patient-specific costs (i.e., the cost of not participating in the labor market) in order to broaden the evaluation perspective).

Patients also face a myriad of other costs, both tangible and intangible, which were not considered in this study. These may include (in addition to costs associated with missing work) costs incurred for childcare and transportation, costs associated with insurance co-payments, etc., as well as intangibles such as loss of free time for pursuing hobbies or spending time with family.

Limitations of this study primarily pertain to generalizability. First, we studied members of a large health plan; and secondly, our study was limited to day hospital and community residential programs in a single state. The latter limitation is countered somewhat by our having included three metropolitan areas with different costs of living. Nonetheless, more research is needed that studies community residential program costs and outcomes in randomized trials addressing alternatives to outpatient services, among both publicly and privately insured populations. A third importation caveat to the generalizability of the study results is that we only included patients who were *not* at high environmental risk for relapse but whose severity level otherwise qualified them for low intensity residential treatment. Results therefore do not generalize to patients at high environmental risk for relapse, nor to those who did not meet the remaining ASAM criteria for low intensity residential treatment.

Last, since the health plan was not running the residential programs but was running the day hospital programs, it is possible that the quality control procedures at the residential programs differed from those in place at the programs run by the health plan itself. However, we observed treatment throughout the trial as part of our study protocol, and did not detect a pervasive quality differential between the residential and day hospital programs in this trial. In addition, the health plan routinely monitors the residential programs with which it contracts, as part of its own quality control effort.

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Table 1

Sample characteristics, by study condition in randomized arm.

	Day Hospital	**Residential**	**Overall**
(N)	*(154)*	*(139)*	*(293)*
Gender (%)			
Women	39.0	36.0	37.5
Men	61.0	64.0	62.5
Ethnicity (%)			
White	51.9	55.4	53.6
Hispanic	15.6	19.4	17.4
African American	24.7	22.3	23.4
Other	7.8	2.9	5.5
Mean Age *(SD)*	39.9 *(11.0)*	39.0 *(10.7)*	39.5 (10.7)
Age (%)			
18-34	32.9	37.0	34.8
35-44	32.2	31.2	31.7
45+	34.9	31.9	33.4
Employment (%)			
Full	57.1	54.7	56.0
Part-time	27.3	27.3	27.3
Other	15.6	18.0	16.7
Income (%)			
<$10,000 to 29,999	53.1	55.5	54.2
$30,000 to 49,999	21.8	21.9	21.8
$50,000+	25.2	22.6	55.6
Education (%)			
Less than high sch.	11.0	18.7	14.7
High school grad.	29.9	29.5	29.7
Any college/tech sch.	59.1	51.8	55.6
% Married/living with	38.3	28.8	33.8
DSM-IV diagnosis (%)			
Alc. Dependent only	29.9	28.1	29.0
Drug dependent only	32.5	36.7	34.5
Alc.& drug dependent	35.1	31.7	33.4
Undiagnosed	2.6	3.6	3.1

	Day Hospital	Residential	Overall
Mean ASI Scores			
Alcohol *(SD)*	.4128 *(.3295)*	.4031 *(.3436)*	.4082 *(.3357)*
Drugs, any use *(SD)*	.1585 *(.1200)*	.1516 *(.1234)*	.1552 *(.1215)*
Medical *(SD)*	.2221 *(.2972)*	.2738 *(.3661)*	.2566 *(.3321)*
Psychiatric *(SD)*	.4627 *(.2345)*	.4634 *(.2326)*	.4631 *(.2332)*
Family/friend *(SD)*	.4179 *(.2857)*	.3915 *(.2832)*	.4054 *(.2843)*
Legal *(SD)*	.1380 *(.2017)*	.1807 *(.2475)*	.1582 *(.2252)*
Employment *(SD)*	.4348 *(.2669)*	.4563 *(.2783)*	.4450 *(.2783)*
Mean treatment episodes lifetime *(SD)*	3.0 *(3.0)*	2.8 *(2.6)*	2.9 *(2.9)*
Mean treatment episodes past year *(SD)*	1.4 *(0.9)*	1.4 *(0.9)*	1.4 *(0.9)*

Table 2

Mean length of stay and associated costs of treatment, by study condition, in randomized arm. Significant[a] differences (p<.05) are bolded.

	Day Hospital		Residential		significant differences for study condition		significant differences for study condition	
	$575 per week (range $523 - $633)		$370 per week (range $289 - $475)		Length of stay		Costs	
	Length of stay Days (SE)	Per episode cost $	Length of stay days (SE)	Per episode cost $	F-statistic[a]	p-value	F-statistic[a]	p-value
Overall results *(n=292)*	**10.9** (.70)	$905	**22.5** (1.79)	$1166	36.47	**<.001**	5.12	.025
Results by Gender								
Females *(n = 110)*	**11.0** (1.18)	$909	**19.1** (2.84)	$1154	6.94	**.011**	1.54	.219
Males *(n = 182)*	**10.8** (.86)	$903	**24.4** (2.28)	$1173	30.94	**<.001**	3.59	.060
Results by Ethnicity								
Whites *(n = 157)*	**13.1** (.95)	$1088	**21.0** (2.20)	$1050	10.83	**.001**	.070	.792
Non-Whites *(n = 135)*	**8.5** (.96)	**$705**	**24.5** (2.95)	**$1311**	25.39	**.001**	10.78	**.001**

Note: All data and calculations were performed with the Drug Abuse Treatment Cost Analysis Program (DATCAP; www.DATCAP.com). Average episode cost = (average weekly program cost) X (client's length of stay) / number of clients in the treatment condition (day hospital or residential treatment).

[a]Significance based on the F-statistic for the Brown-Forsythe Robust Test of Equality of Means.