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The cost of treating addiction from the client's perspective:

Results from a multi-modality application of the Client DATCAP

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Abstract

There is a considerable disparity between the number of individuals who need substance abuse treatment and the number who actually receive it. This is partly due to the fact that many individuals with substance use disorders do not perceive a need for formal treatment. Another contributing factor, however, is a discrepancy between the real and perceived cost of services. Although many cost evaluations of substance abuse treatment have been conducted from the treatment provider perspective, less is known about the client-specific costs of attending treatment (e.g., lost work and leisure time, transportation, out-of-pocket and in-kind payments). Concerns about financial and other barriers to participating in treatment have encouraged addiction researchers to more carefully consider these previously unmeasured costs. To address this information gap, we administered the Client Drug Abuse Treatment Cost Analysis Program (Client DATCAP) to 302 clients (representing a total of 302 outpatient and 142 inpatient treatment episodes) as part of a larger study examining the cost-effectiveness of interventions designed to improve treatment linkage and engagement in Dayton, Ohio. The value of a client's time accounted for the largest component of total cost (more than 59%). The cost per visit for outpatient clients ranged from \$19 for outpatient methadone to \$38 for intensive outpatient/aftercare treatment. The average cost per day of treatment for inpatient clients was \$235. Policy makers and treatment providers now have a broader view of the opportunity cost of addiction treatment and can use this information to support initiatives for improved treatment access and delivery.

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Keywords

Cost analysis; Addiction treatment; Client DATCAP; Economic evaluation

1. Introduction

There is a considerable disparity between the number of individuals who need substance abuse treatment and the number who actually receive it. According to the 2007 National Survey on Drug Use and Health (NSDUH), 20.8 million people reporting illicit drug or alcohol use problems had never been treated for these conditions (Substance Use and Mental Health Services Administration, 2008). This is partly due to the fact that many individuals with substance use disorders do not perceive a need for formal treatment. Among those who do perceive such a need, one of the top reasons cited for not pursuing treatment is the high cost. Specifically, more than 31% of individuals aged 12 or older reported that cost was an important factor in determining whether or not to pursue treatment (Substance Use and Mental Health Services Administration, 2008).

The Client Drug Abuse Treatment Cost Analysis Program (Client DATCAP) was developed in 2002 to examine more carefully the financial burden placed on treatment clients. Cost analyses traditionally provide detailed information on program resources and associated costs, but less is known about the full opportunity cost of treatment, particularly the client's investment in terms of time, payments, and other resources in his/her recovery process. Measuring costs specifically incurred by clients in substance abuse treatment is a relatively unexplored area of research. Concerns about financial and other barriers to participating in treatment have encouraged researchers to consider these previously unmeasured costs.

This paper describes the current version of the Client DATCAP and presents recent findings from the first formal application of the instrument across multiple treatment modalities. The Client DATCAP was administered to 302 individuals as part of a larger economic evaluation of interventions designed to improve treatment linkage and engagement in Dayton, Ohio. Some of the sampled clients had multiple treatment episodes, resulting in a total of 444 completed Client DATCAPs (302 outpatient episodes and 142 inpatient episodes). Four primary treatment modalities were represented: standard outpatient (non-methadone), outpatient methadone, intensive outpatient/aftercare, and inpatient. The following section provides an overview of cost evaluation of addiction treatment programs and briefly describes the development of the DATCAP family of instruments.

2. Addiction treatment cost estimation and DATCAP instruments

Existing cost studies of addiction treatment programs have used cost data from program budgets, facility charges, financial statements, audit reports, and expert opinion to estimate the costs of service delivery (e.g., Anderson et al., 1998; Batten et al., 1992; Butynski, 1991; Caliber and Associates, 1989; Cartwright and Kaple, 1991; Flynn et al., 2009; Frank and McGuire, 1995; Goodman et al., 1992; Goodman et al., 1996; Harwood et al., 1984; Holder, 1987; Holder and Blose, 1991; Horgan, 1991; Hubbard et al., 1989; Rice et al., 1990; Rosenbach and Huber, 1994; Zarkin et al., 2004; Zarkin et al., 2008). The cost estimates presented in these studies are difficult to compare and evaluate because data collection procedures differed across the studies in several respects (e.g., analysis perspective, available information, funding source, methodology). Nevertheless, collectively they represent significant progress toward creating standardized, program- or service-level data collection instruments to estimate the economic cost of alcohol and other drug treatment programs.

Among the approaches to cost estimation represented in the literature cited above, one of the most widely used program-level instruments is the Drug Abuse Treatment Cost Analysis Program (DATCAP) (French, 2002a; 2002b). The DATCAP has been successfully applied to a variety of interventions such as methadone maintenance programs, outpatient drug-free programs, drug court programs, prison-based treatment, short and long-term residential programs, and employee assistance programs (Bradley et al., 1994; Bray et al., 1996; French et al., 1998; French et al., 1997; French et al., 2008; French & McGeary, 1997; Roebuck et al., 2003).

The Client DATCAP was developed to broaden the evaluation perspective of the Program DATCAP by measuring costs incurred by treatment clients, an important opportunity cost of addiction treatment. The Client DATCAP has evolved from a growing collection of DATCAP instruments, which now includes the Program DATCAP, Brief DATCAP (a streamlined version of the Program DATCAP), and Caretaker DATCAP (estimates the costs incurred by parents/caregivers of adolescents attending treatment). The Client DATCAP serves as a companion instrument to the Program/Brief DATCAP, applying similar terminology and time frames to estimate client costs.

The Client DATCAP was originally pilot-tested in Miami, Florida, in 2003 (Salomé et al., 2003). A total of 77 clients (50 inpatient and 27 outpatient) were recruited to complete the instrument. Results of the Pilot Study indicated that the total incurred cost was \$3,251 (\$49.77 per visit) for the average outpatient client (based on an average of 51 days in outpatient treatment) and \$16,372 (\$195 per day) for the average inpatient client (based on an average of 87 days in treatment). Time cost, valued through lost work and leisure time, represented the largest opportunity cost incurred by treatment clients (77-99% of total cost). The total incurred costs do not reflect the total cost for full treatment episodes, however, as the Pilot Study did not have access to clinical data on the length of stay for individual clients. Instead, the estimates reflect the total incurred costs of attending treatment up to the day of the administration of the instrument. Beyond reporting the quantitative findings and testing the feasibility and client acceptability of the Client DATCAP, the economists conducting the pilot study reviewed the data to assess the validity of client responses to each cost category. As part of the validation process, client costs were compared with results from the broader literature describing patient costs in other health care settings such as treatment for mental illness (e.g., Kleinman et al., 2003; Rice et al., 1992). This review process revealed that a client's investment in addiction treatment mirrored other types of treatment in that the opportunity cost of time represents a significant component to total patient/client costs. An important goal of the Pilot Study was to incorporate suggested changes from clients, treatment providers, and researchers, allowing the pilot instrument to be refined and re-released as Client DATCAP: Edition 2.

3. Methods

Client cost data were collected in collaboration with two NIDA-funded projects examining the effectiveness (the parent study) and cost effectiveness (the ancillary study) of reducing barriers to substance abuse treatment in Dayton, Ohio. The parent study was a clinical trial that assessed the effectiveness of two interventions in facilitating clients' linkage with treatment in their community and fostering treatment engagement, a measure of the extent of treatment participation. Clients entering a Central Intake Unit (CIU) in Dayton were randomly assigned to a motivational interviewing (MI) intervention, a strengths-based case management (SBCM) intervention, or the CIU's standard assessment and referral condition. The CIU is the point of entry for all clients seeking publicly funded substance abuse or mental health treatment in the county. Eligibility criteria for the parent study required individuals to be (1) at least 18 years of age, (2) diagnosed as having a substance abuse and/or dependence disorder, (3) without diagnoses of schizophrenia or other psychotic disorders, and (4) referred to a state-certified

specialty substance abuse treatment program (Rapp et al., 2008). A total of 678 subjects were recruited and subsequently enrolled in the study. Forty-six percent, or 312 subjects, actually linked with treatment. Baseline, 3-, and 6-month follow-up assessments were conducted between April 2004 and July 2006.

A second ancillary study was funded to examine the cost effectiveness of MI and SBCM relative to usual care (Pyne et al., 2008). Effectiveness was measured using disease-specific (e.g., treatment linkage, abstinence) and general effectiveness (i.e., quality-adjusted life years or QALYs [Gold et al., 1996]) measures. The primary objectives were (1) to conduct an incremental cost-effectiveness analysis of the MI and SBCM interventions as compared to usual care from the societal and program perspectives, (2) to determine the sensitivity of two commonly used QALY measures to traditional substance abuse outcomes, and (3) to determine predictors of these general effectiveness measures in a sample seeking treatment for substance abuse (Pyne et al., 2008).

The Client DATCAP study was developed as a sub-analysis to the cost-effectiveness project to examine client-specific costs of inpatient and outpatient treatment. As mentioned above, these studies provided a unique opportunity to incorporate the Client DATCAP instrument into the existing battery of instruments being used in a large clinical trial. Moreover, the parent and ancillary studies provided an ideal setting in which to test the Client DATCAP in its first formal application in a large multi-modality treatment evaluation.

3.1. The Client DATCAP

The Client DATCAP comprises two modules: Outpatient and Inpatient. Both modules can be either self-administered or interviewer-administered. The instrument covers four primary cost categories: cash or in-kind payments, transportation, time, and miscellaneous expenditures. The instrument also collects basic information from the interviewer or facilitator (name of treatment program, treatment type or modality, mode of administration, and date) and the respondent (name, last four digits of social security number, previous treatment episodes, and zip code of primary residence). In the Pilot Study (Salomé et al., 2003), it was determined that by asking clients to record their full names and the last four digits of their social security numbers, analysts would be able to merge Client DATCAP data with program records to obtain demographic and treatment participation information. This not only helped to streamline the Client DATCAP instrument but also eliminated the need for self-reported length of stay in treatment. Moreover, it was discovered that the integrity of the data was not compromised by the inclusion of personal information because respondents themselves indicated that the questions were neither sensitive nor implicating.

The Client DATCAP was designed to be brief and flexible. The Inpatient module contains just 17 questions, and the Outpatient module contains only 20. The average time required to complete either module is approximately 10 minutes. Clients are asked to report the amount of time invested and all expenses incurred in an average week in treatment. For each cost category and for total cost, the Client DATCAP estimates the average cost per visit (outpatient) or per day (inpatient) and the total cost per treatment episode. As described above, program admission and discharge dates are used to measure treatment participation (length of stay in days or weeks) for each client. We are thus able to estimate average unit costs (per visit or day) and total episode costs, by modality.

3.1.1. Cash or in-kind payments—The first set of questions in the Client DATCAP asks patients to report whether they make cash or in-kind payments for treatment at the respective program. Specific examples of in-kind contributions are noted on the instrument to guide clients in answering the question (e.g., volunteering his/her time at the program or donating supplies). Clients are then asked to record the type of payments, how often payments are made (one lump

sum, weekly, monthly), and the exact or approximate value. Outpatient clients are also asked to report the average number of times they visit the program per week.

3.1.2. Transportation costs—The next set of questions addresses travel time and transportation costs. Clients are asked to report the number of miles traveled (one-way) to the program, how long it takes to travel to the program, and the mode of transportation used (e.g., car, public bus, taxi). Clients also report how much they spend out-of-pocket to travel to the program (roundtrip for outpatient clients and one-way for inpatient clients). Transportation costs represent the direct expenditures (e.g., gasoline, bus fare, taxi fare) of traveling to the program. For outpatient clients, this is calculated as a per visit travel cost, which can simply be multiplied by the number of visits per week and the number of weeks in treatment to obtain an estimate of total transportation cost (per treatment episode). Inpatient clients report one-way transportation costs, which can then be doubled to estimate total transportation cost per episode (assuming they do not return home during that inpatient treatment episode). For clients who do not report any direct travel costs (usually because they express difficulty estimating these values), the number of miles traveled to the treatment program is multiplied by the average transportation cost per mile (U.S. Department of Transportation, Bureau of Transportation Statistics, 2007) to obtain an alternative estimate of transportation costs. The number of miles traveled is either reported by the client or estimated by the analyst using zip codes and Google Maps.

3.1.3. Time costs—The opportunity cost of a client's time includes both the time spent to travel to the program as well as the time spent in treatment activities. For these calculations, we assume that participating in treatment encroaches on both work and personal (i.e., leisure) time. The cost of missed work time is traditionally valued using an individual's rate of pay (Pauly et al., 2002). Valuing leisure time is more challenging and controversial, and has been the subject of numerous theoretical and empirical studies over the past four decades (e.g., Becker, 1965; Feather and Shaw, 1999; Heckman, 1974; Moffitt, 1982; Propper et al., 2002; Tranmer et al., 2005). Lacking any clear consensus regarding the preferred method for valuing leisure time, we valued both forgone work and leisure time using the clients' last reported hourly wage or the federal minimum hourly wage for those reporting no previous employment history. Variations to this approach for valuing time are considered in the sensitivity analysis described below.

For outpatient clients, time costs were calculated by combining the number of hours spent in treatment per week and the number of hours spent traveling to treatment per week and multiplying that sum by the reported hourly wage (or minimum wage). Total time cost was equal to the time cost per week multiplied by the number of weeks in outpatient treatment. For inpatient clients, time costs were calculated somewhat differently. Inpatient clients reported how much free time, including time spent eating and sleeping, they had during a typical day in treatment. They also reported the average number of hours worked per week if they had any current or previous work experience. Inpatient time costs per day were calculated as 24 hours minus the client's reported hours of free time per day (again, including time spent eating and sleeping). The remaining number of hours (presumably involved in treatment activities) was then multiplied by the last reported hourly wage or by the federal minimum wage for those without any previous work experience to estimate the time cost per day. Total time cost for inpatient clients was equal to the cost per day multiplied by the total number of days in treatment.

3.1.4. Other costs—A final set of questions asks clients to report any miscellaneous obligations, payments, or expenses associated with treatment. Typical items reported by clients include dependent care (baby sitting or day care), physical exams, books and other treatment-

related materials, and parking fees. As with cash or in-kind payments, clients report the type of obligation or cost, how often they incur this burden, and the approximate financial value.

3.1.5. Total client cost—Total unit and episode costs are equal to the sum across all of the cost categories described above. For inpatient clients, the cost per day for each cost category was summed, and the result was multiplied by the number of days in treatment to estimate total episode cost. A similar procedure was used for outpatient clients, whereby the cost per visit for each cost category was summed, the result was multiplied by the average number of visits per week, and then the total number of weeks in treatment to arrive at total episode cost.

3.2. Process of administering the Client DATCAP

The Client DATCAP was administered as part of a larger battery of research instruments at the 3- and 6-month follow-up assessments. Study participants who reported attending a treatment program(s) since their last research interview were asked to complete a Client DATCAP for each program they attended. Researchers conducting the follow-up assessments under the parent study obtained informed consent from participants for completing all instruments (Rapp et al., 2008). Of the 312 clients in the parent study that linked with treatment, a total of 302 clients completed one or more Client DATCAP surveys (more than half of inpatient and outpatient clients reported multiple treatment episodes). For the purposes of the current study, each completed Client DATCAP corresponded to an individual outpatient or inpatient treatment episode. Stated differently, we examined distinct treatment episodes rather than a continuum of treatment that could have spanned multiple modalities or new episodes within the same modality.

Research interviewers from the parent grant administered the Client DATCAP to study participants. Interviewers reported that the questions were easy to understand and that no participants refused to complete the instrument. Compliance may have been boosted because the Client DATCAP was administered within the context of multiple research instruments, and it is unlikely that participants viewed the Client DATCAP as a stand-alone interview. Interviewers also reported that clients generally did not encounter any major difficulties in answering the questions. These qualitative findings are consistent to those reported from the Pilot Study of the Client DATCAP (Salomé, et al., 2003).

3.3. Sensitivity analysis

Sensitivity analyses are useful for establishing lower and upper bounds for estimation results by varying values of key independent variables, examining the influence of outliers, testing the effects of different model specifications, and comparing results with imputed and non-imputed data. In the context of the current study, we conducted sensitivity analyses of client cost estimates by varying the rate at which we valued employment and leisure time, by performing a data transformation to minimize the influence of outliers (i.e., *winsorizing*), and by calculating and comparing cost estimates with and without imputed length of stay data.

Although the incidence of missing data was minimized through the presence and assistance of an interviewer, the number of days in treatment (obtained from clinical records) was either unusable or unavailable for 9% of the outpatient sample and 32% of the inpatient sample. In most of these cases, missing data resulted from the absence of reliable admission and discharge dates. Length of stay information is a necessary piece of information for calculating the total episode cost estimates. Advanced imputation methods are available based on maximum likelihood estimation (MLE) and multiple imputation (MI), which apply an iterative method that predicts missing values from all other available data (see Schafer and Graham [2002] for a formal methodological discussion of imputation techniques). MI methods were used in the present study to impute missing length of stay data using the *uv*is program in Stata (Royston,

2004). This procedure includes a bootstrap option, which relaxes the assumption that the distribution of regression coefficients is multivariate normal (essentially increasing robustness).

In addition to calculating and comparing client costs with imputed and non-imputed data, a second sensitivity analysis examined the influence of outliers on total episode cost. We applied a commonly used transformation to each category of client costs that reassigns the top and bottom 5% of the distribution to the next lowest/highest values, counting inwards from the extremes (*winsorizing*; Barnett and Lewis, 1994; Cox, 1998). In addition to category-specific winsorizing before summing for total costs, we also winsorized total cost after summing the raw data across categories and achieved similar results.

As a third sensitivity test, we considered different approaches to valuing the opportunity cost of time. For the primary analysis, a client's travel time and time in treatment were valued at the most recently reported hourly wage, assuming that anyone reporting previous employment had full-time employment potential at this rate. For those with no previous employment history, the federal minimum wage was used (\$5.15). Approximately 24% of outpatient clients and 84% of inpatient clients reported not being employed in the previous 12 months. The last reported wage may therefore not accurately reflect current opportunity costs for those clients. To test this assumption and establish a lower bound on the value of client time, we recalculated the opportunity cost of client time by replacing the last reported hourly rate of pay with the minimum wage rate for all clients who did not work in the past 12 months. To establish an upper bound on the value of client time, we cross-referenced clients' reported occupations (current or previous) with the average rate of pay for those occupations in the Dayton area using data provided by the Bureau of Labor Statistics National Compensation Survey (U.S. Bureau of Labor Statistics, 2007). Results of the sensitivity analyses are discussed below and presented in Tables 3 and 4.

4. Results

4.1. Client characteristics

The majority of clients in this study were male (54%) and the average age was 31 years. Forty-three percent of clients were African American, with very few Hispanics. Approximately 27% of the sample reported being married or living as married. The average number of years of education was less than 12, suggesting that most clients lacked a high school diploma. More than 99 percent of all clients reported employment in their lifetime whereas only 40% reported currently working. For those clients who reported any employment history, the average number of hours worked per week was 34. The average rate of pay was \$9.23 per hour (well above the federal minimum wage of \$5.15). This is consistent with the type of work, given that most clients reported working in service, production, and construction occupations, which pay an average of \$15-\$18 per hour (U.S. Bureau of Labor Statistics, 2007).

Modality-specific treatment characteristics are presented in Table 1. Most clients had more than two previous episodes of drug or alcohol treatment (range of 2.04-3.05). The average number of visits per week to outpatient non-methadone and intensive outpatient/aftercare programs was 2-2.5 whereas outpatient methadone clients reported more than 6 visits per week. The average length of stay in treatment was 77 days in outpatient non-methadone, 105 days in outpatient methadone, 52 days in intensive outpatient/aftercare, and 49 days in inpatient treatment.

Travel distance (one way) ranged from 6-10 miles for outpatient clients and required an average of 30-50 minutes of travel time. Outpatient clients incurred transportation costs of \$2-\$4 per visit and spent between 1 and 2.4 hours at the program. Inpatient clients reported traveling

more than 38 miles one way to treatment and spending more than an hour of travel time. Mean travel distance is skewed upwards due to 5 inpatient clients who reported receiving treatment in another state and traveling more than 700 miles one way. Less than half of inpatient clients (43%) reported any transportation costs, which amounted to approximately \$2 per episode.

Among the currently employed outpatient clients, 20% of outpatient non-methadone, 42% of outpatient methadone, and 30% of intensive outpatient/aftercare clients reported that attending treatment interfered with work, resulting in an average lost work time of 3.9-6.7 hours per week.

The mean values for client cost estimates are reported in Table 2 (in 2005 dollars). Summary cost estimates include the cost per treatment episode, the cost per visit for outpatient clients, and cost per day for inpatient clients. Outpatient non-methadone clients had a total cost per visit of \$28.50, comprised of \$23.50 in time cost, \$0.45 in cash/in-kind payments, \$3.69 in transportation costs, and \$0.84 in miscellaneous costs. The total cost per outpatient non-methadone treatment episode was \$571. Outpatient methadone clients had a total cost per visit of \$19.20 (\$13.30 in time costs, \$0.46 in cash/in-kind payments, \$4.99 in transportation costs, and \$0.43 in miscellaneous costs) and a total cost per treatment episode of \$1,853. Intensive outpatient/aftercare clients had a total cost per visit of \$37.80 (\$7.58 in cash/in-kind payments, \$4.19 in transportation costs, \$25.5 in time costs, and \$0.55 miscellaneous costs) and a cost per treatment episode of \$771. Finally, inpatient clients had an average cost per day of \$235 (\$0.29 in cash/in-kind payments, \$2.04 in transportation cost, \$232 in time cost, and \$0.17 in miscellaneous costs) and a total cost per treatment episode of \$10,749.

In addition to the standard deviations on mean client cost values, which are relatively large and reflect right-skewed cost distributions, Table 2 also includes quartile estimates of unit and total costs to provide additional information regarding the distribution of these cost estimates. The quartile estimates demonstrate that the range for the top quartiles are much wider than the range for the bottom quartiles, and the mean cost estimates are considerably greater than the median (50th percentile) cost estimates for all groups.

4.2. Sensitivity analyses

Table 3 presents the sensitivity analyses of total episode cost using non-imputed length of stay data (Column 3) and winsorized cost estimates (Column 4). Because 9% of the outpatient episodes and 32% of the inpatient episodes were missing reliable data on length of stay in treatment, total episode costs for outpatient clients had to be calculated using the imputed length of stay data (as reported in Table 2). Total episode cost estimates based on the imputed data, however, were the same or higher than total episode costs derived with the unimputed data. The percent reduction in treatment episode cost for outpatient clients when using unimputed versus imputed data was 23.6% for intensive outpatient/aftercare treatment, 4.2% for outpatient non-methadone treatment, and 1.2% for outpatient methadone treatment. The percent reduction in total episode cost for inpatient clients was only 3.6% when the unimputed length-of-stay data were used.

As expected, the winsorized estimates of total episode cost are also lower than the estimates presented in the primary analysis. This redistribution of client costs reduced outpatient non-methadone total episode cost by 5.1%, outpatient methadone total episode cost by 13.9%, intensive outpatient total episode cost by 29.8%, and inpatient total episode cost by 15.4%. This exercise demonstrates that a few extreme outliers can significantly influence the average episode cost estimates for some modalities.

Table 4 presents the results from the sensitivity analyses of the opportunity cost of client time using different valuation approaches for employment and leisure time. As a point of reference,

the second column in Table 4 lists the values for time costs used in the primary analysis (also reported in Table 2). The first sensitivity analysis (SA1) presented in Column 3 replaced the last reported hourly wage with the minimum wage for those clients with no employment history during the previous 12 months. This reduced the time cost estimates to \$447 per episode for outpatient non-methadone clients, \$1,093 per episode for outpatient methadone clients, and \$416 per episode for intensive outpatient/aftercare clients. For inpatient clients, this reduced the time cost estimate per episode to \$7,699. Relative to the primary analysis, the largest percentage declines occurred for the intensive outpatient/aftercare (46%) and outpatient methadone (41%) modalities.

Column 4 in Table 4 presents the second sensitivity analysis (SA2), in which the average salaries in Dayton for the occupations reported by clients were used in the calculations instead of clients' reported hourly wages. This adjustment increased total client time costs to \$875 for outpatient non-methadone clients, \$2,635 for outpatient methadone clients, and \$16,805 for inpatient clients. Total client time costs actually declined slightly (from \$771 to \$747) for intensive outpatient/aftercare clients.

5. Discussion

The goal of this study was to conduct the first formal application of the second edition of the Client DATCAP instrument in a large treatment evaluation study to evaluate the costs incurred by clients participating in residential and outpatient substance abuse treatment programs in Ohio. These results reflect the first multi-modality application of the Client DATCAP in ten different treatment programs representing four unique treatment modalities.

To summarize the results presented in Table 2, the average client cost per outpatient treatment episode ranged from \$571 (\$28.50 per visit) for outpatient non-methadone treatment to \$1,853 (\$19 per visit) for outpatient methadone treatment. Inpatient clients incurred an average cost per treatment episode of \$10,749 or \$235 per day. The opportunity cost of a client's time represented the largest share of total client cost (59% for intensive outpatient/aftercare treatment, 84% for outpatient non-methadone treatment, 71% for outpatient methadone treatment, and 99% for inpatient treatment). Cash/in-kind payments and miscellaneous costs were relatively small for most clients. Transportation costs were also relatively modest across all modalities and clients.

These results are similar to those of the Pilot Study (Salomé et al., 2003) using the first edition of the Client DATCAP instrument, but the current study offers additional contributions to the literature. First, the current study used the second edition of the Client DATCAP instrument, which has not been administered in any prior treatment evaluations. Second, client costs reflect full treatment episodes (for each modality) based on actual (versus self reported) admission and discharge data provided by the treatment programs. Third, the Client DATCAP instrument and the client cost assessment were incorporated into a large treatment evaluation study that provided a sample of more than 300 clients. Finally, client costs were examined across four distinct treatment modalities.

5.1. Comparing program and client costs

Ultimately, the goal of a comprehensive treatment cost assessment is to combine client costs with program costs to generate a more comprehensive estimate of the total cost of treatment participation. To gauge how client costs might impact total program cost, we considered recent estimates from a survey of published program DATCAP studies (French et al., 2008). The authors compiled DATCAP-generated cost data across ten treatment modalities from 110 substance abuse treatment programs. Average weekly costs ranged from \$87-\$112 for

methadone maintenance, from \$74-\$221 for non-methadone outpatient treatment, from \$243-\$598 for intensive outpatient treatment, and from \$607-\$918 for inpatient treatment.

Simply combining the average weekly program cost estimates with the average weekly client cost estimates would generate a total weekly cost for outpatient non-methadone treatment of \$205 (\$57 in client costs plus \$148 in program costs). Average weekly costs would increase to \$230 for outpatient methadone treatment, to \$514 for intensive outpatient treatment, and to \$1,408 for inpatient treatment. These preliminary calculations suggest that the addition of client costs to existing program cost estimates would increase total treatment cost by 32%-82%.

Combining Client DATCAP estimates with program cost estimates may seem like a straightforward mathematical exercise, but it introduces the possibility of double counting. For example, the Brief DATCAP asks programs to include an estimated value for donated resources such as volunteer labor. In many treatment programs, the clients serve as program volunteers, which would be recorded on both the Client DATCAP (as an in-kind contribution) and the Program DATCAP (as an opportunity cost of volunteer services). If we simply add client and program cost estimates together, the cost of volunteer time would be counted twice. A comprehensive set of rules and guidelines for estimating the full cost of treatment (i.e., client and program) is beyond the scope of this paper, but additional studies are currently underway that will address how to combine program and client cost estimates for future cost evaluations.

5.2. Potential modifications and extensions to the Client DATCAP

Given that the Client DATCAP is a relatively new instrument with only two applications, it is prudent to recommend some modifications and extensions to broaden our understanding of the financial burden placed on treatment clients. First, some studies may find it useful to ask clients about their insurance coverage. Although few basic insurance plans offer substance abuse and mental health carve outs, it is nevertheless clear that individuals with more comprehensive insurance coverage would have better access to treatment and potentially higher rates of utilization and would therefore incur fewer direct costs by participating in treatment.

Second, if the treatment sample is functioning at a relatively high level, it may be useful to ask clients directly whether they receive paid or unpaid personal leave from their jobs to participate in treatment. The opportunity cost of time spent in treatment would need to be reduced for clients with paid leave, as they would not be forgoing income to participate in treatment. In the current sample, we suspect that paid leave is uncommon, as most working clients (40%) were employed in service, construction, and production occupations where such employment benefits are uncommon.

Finally, it would be interesting to conduct a complementary analysis of clients' willingness-to-pay (WTP) for substance abuse treatment. One possibility would be to include a supplementary survey with WTP questions that could be directly linked to the main Client DATCAP instrument for anyone interested in evaluating these additional measures. WTP estimates could be compared with the direct costs currently reported through the Client DATCAP, which would provide an alternative measure of the client's opportunity cost of treatment. Such an approach would make a unique contribution to the economics of addiction literature, as only one study has examined society's WTP for substance abuse treatment (e.g., Zarkin et al., 2005) and no studies have addressed WTP from the client's perspective.

5.3. Study limitations

A number of study limitations must be noted. First, although the Client DATCAP is designed to be self- or interviewer-administered, results from this study are based solely on the interviewer-administered approach. This may explain why response rates for certain questions

were much higher in this study than in the Pilot Study. Typically, the most challenging questions for clients to answer include how to value in-kind contributions and how to estimate travel distance and time costs. In the current study, interviewers were able to assist clients directly by offering examples and helping clients calculate mileage to and from treatment using various geographic community markers. It is unclear how prevalent item non-response would have been without interviewer assistance.

Although the presence of missing data for length of stay in treatment was already discussed in the Methods and Results sections, it is worth noting again that this is an important limitation in our study. Length of stay (in days or weeks) is needed to calculate both unit (per day/visit) and total episode costs. Some data were missing because a few programs were unable to provide reliable admission and discharge dates for some clients. This issue was most pronounced among the inpatient sample, with data missing for 32% of inpatient clients. Rather than lose such a large portion of our inpatient sample, we chose to impute these values with a multiple imputation (MI) approach that was based on socio-demographic and treatment history data for the set of inpatient clients with complete length of stay information.

Third, although the interviewers provided clients with assistance in estimating treatment-related costs (whenever necessary), they did not cross-check client responses with program records or other sources of data as part of a formal validation process. For example, if a client reported incurring childcare expenses to attend treatment, interviewers did not conduct background checks to confirm whether the client had a child. Although it is unlikely that clients would intentionally misrepresent such expenses, developing a feasible and cost effective approach to validating client responses is an important challenge for future applications of the Client DATCAP.

Fourth, our calculations assume that client costs are constant over time, but they may in fact vary over the course of treatment. For example, some programs may require clients to purchase books and other program materials in the first few weeks of treatment. If a client completes the instrument in a particularly high or low cost period, then the reported costs may not accurately reflect an average week of treatment. Of course, one way to address this issue is to administer the Client DATCAP more frequently, but the added client burden may not be feasible.

Fifth, the current study focused on estimating client costs within a specific treatment modality in order to describe the costs incurred by the average outpatient/intensive outpatient/inpatient client. An alternative perspective for the analysis could examine the total client cost for a continuum of treatment or by individual treatment trajectories, taking into account the fact that many individuals have multiple treatment episodes that bridge multiple modalities of care. Although highly interesting and policy relevant when combined with more advanced economic evaluations (e.g., cost-effectiveness analysis and benefit-cost analysis), such an analysis is beyond the scope of the present study.

Sixth, these results are based on a sample of clients seeking publicly funded substance abuse treatment in Dayton, Ohio. These individuals were largely low-income clients with two or more previous drug and alcohol treatment episodes. Given this setting, the client cost estimates presented here are not necessarily generalizable to private paying clients, other types of treatment clients, or other geographical areas.

Finally, for the primary analysis, we valued client time at a constant rate based on reported rate of pay or the national minimum wage. As mentioned previously, there is no consensus regarding the best approach to valuing employment and leisure time. Most studies estimate time costs using reported wages under the assumption that individuals have flexible work hours and are able to trade work time for leisure time (Feather and Shaw, 1999). Other studies

consider different rates of time preference, and substance users may in fact discount their futures at a higher rate than the general population (i.e., present time valued much more highly than future periods) such that the hourly wage may not take into account this time trade-off (Bickel and Marsh, 2001). We also do not know whether the opportunity cost of time as valued in the current study is appropriate for individuals who remain unemployed or out of the labor force for long periods of time. A formal examination of how to value lost work and leisure time is beyond the scope of this paper, but we addressed some basic modifications to these assumptions in the sensitivity analyses (see Table 4).

6. Conclusion

This study completed the first formal application of the second edition of the Client DATCAP instrument in the context of a large treatment evaluation study. Policy makers rely on economic evaluations to guide their decisions regarding the allocation of scarce health care resources. Results from the Client DATCAP analysis provide a broader understanding of the total societal cost of addiction by estimating the opportunity cost of a client's investment in recovery.

This study has demonstrated that the application of the Client DATCAP is feasible in various treatment modalities and that the instrument could beneficially be appended to a larger battery of instruments for program evaluation. As described in Section 3.2 above, research interviewers reported that the instrument was easy to work with and clients did not express any unusual difficulty in answering the questions. Ideally, programs wishing to use the Client DATCAP would have one or two dedicated computers/laptops available on which clients could complete an electronic version of the instrument (in Microsoft Excel) with guidance from a treatment counselor or other program staff. This would facilitate data collection by eliminating reliance on "paper and pencil" questionnaires, which increases the chances of reporting and/or coding mistakes.

In summary, treatment providers and policy makers can use client cost information to facilitate access to treatment for potential clients and enhance treatment engagement for existing clients. For example, case managers and counselors can use these data to reveal and discuss potential barriers to treatment retention before problems emerge. Considering that the opportunity cost of time dominated total client cost, policy makers could offset these costs for clients who have successfully undergone treatment by offering rebates/vouchers for grocery items, rent, or utilities. Similarly, to offset the transportation costs associated with treatment, cities could offer discounted bus passes or other transportation vouchers to treatment clients. Such recommendations obviously raise questions regarding the ethics (and cost-effectiveness) of offering financial incentives to treatment clients. This relates to a growing consensus among treatment experts that contingency management (CM) protocols (i.e., offering treatment participants rewards such as vouchers and prizes for maintaining abstinence and meeting program goals) should become a standard component of treatment (e.g., Kellogg and Kreek, 2006; Roll, 2007). At the very least, a better understanding of the financial burden placed on treatment clients could motivate treatment providers to make adjustments in treatment hours or fees to help minimize these costs. Given the well-documented link between length of stay in treatment and positive outcomes, understanding and effectively addressing the client costs of treatment participation could prove extremely beneficial to society.

References

- Anderson DW, Bowland BJ, Cartwright WS, Bassin G. Service-level costing of drug abuse treatment. *J. Subst. Abuse Treat* 1998;15:201–211. [PubMed: 9633032]
- Barnett, V.; Lewis, T. *Outliers in Statistical Data*. John Wiley; New York: 1994. Previous editions 1978, 1984

- Batten, HL.; Horgan, CM.; Prottas, JM.; Simon, LJ.; Larson, MJ.; Elliott, EA.; Bowden, ML.; Lee, MT. Drug Services Research Survey: Phase I, final report. Brandeis University, Institute for Health Policy; Waltham, MA: 1992.
- Becker GS. A theory of the allocation of time. *Econ. J* 1965;75:493–517.
- Bickel WK, Marsch LA. Toward a behavioral economic understanding of drug dependence: delay discounting processes. *Addiction* 2001;96:73–86. [PubMed: 11177521]
- Bradley CJ, French MT, Rachal JV. Financing and cost of standard and enhanced methadone treatment. *J. Subst. Abuse Treat* 1994;11:433–442. [PubMed: 7869464]
- Bray JW, French MT, Bowland BJ, Dunlap LJ. The cost of employee assistance programs (EAPs): findings from seven case studies. *Employee Assistance Quarterly* 1996;11:1–19.
- Butynski, W. Drug treatment services: funding and admissions. In: Pickens, RW.; Leukefeld, CG.; Schuster, CR., editors. *Improving Drug Abuse Treatment*. NIDA Monograph No. 106. National Institute on Drug Abuse; Rockville, MD: 1991. p. 20-52.
- Caliber and Associates. Final Report. 1989. Cost-benefit Study of the Navy's Level III Alcohol Rehabilitation Program.
- Cartwright, WS.; Kaple, JM., editors. NIDA monograph No. 113. National Institute on Drug Abuse; Rockville, MD: 1991. Economic Costs, Cost-effectiveness, Financing, and Community-based Drug Treatment.
- Cox, NJ. WINSOR: Stata Module to Winsorize a Variable. Statistical Software Components S361402. Department of Economics, Boston College; Boston, MA: 1998. Revised 09 Aug. 2006
- Feather P, Shaw WD. Estimating the cost of leisure time for recreation demand models. *J. Environ. Econ. Manage* 1999;38:49–65.
- Flynn PM, Broome KM, Beaton-Blaakman A, Knight DK, Horgan CM, Shepard DS. Treatment Cost Analysis Tool (TCAT) for estimating costs of outpatient treatment services. *Drug Alcohol Depend* 2009;1(10012):47–53. [PubMed: 19004576]
- Frank RG, McGuire TG. Estimating costs of mental health and substance abuse coverage. *Health Aff* 1995;14:102–115.
- French, MT. Drug Abuse Treatment Cost Analysis Program (DATCAP): Program version User's Manual. Vol. Eighth Edition. University of Miami; Coral Gables, FL: 2002a.
- French, MT. Drug Abuse Treatment Cost Analysis Program (DATCAP): Program version. Vol. Eighth Edition. University of Miami; Coral Gables, FL: 2002b.
- French MT, Dunlap LJ, Zarkin GA, Karuntzos GT. The costs of an enhanced employee assistance program (EAP) intervention. *Eval. Program Plann* 1998;21:227–236.
- French MT, Dunlap LJ, Zarkin GA, McGeary KA, McLellan AT. A structured instrument for estimating the economic cost of drug abuse treatment: The Drug Abuse Treatment Cost Analysis Program (DATCAP). *J. Subst. Abuse Treat* 1997;14:1–11.
- French MT, McGeary KA. Estimating the economic cost of substance abuse treatment. *Health Econ* 1997;6:539–544. [PubMed: 9353658]
- French MT, Popovici I, Tapsell L. The economic costs of substance abuse treatment: updated estimates and cost bands for program assessment and reimbursement. *J. Subst. Abuse Treat* 2008;35:462–469. [PubMed: 18294803]
- Gold, MR.; Siegel, JE.; Russell, LB.; Weinstein, MC., editors. *Cost-effectiveness in Health and Medicine*. Oxford University Press; New York: 1996.
- Goodman AC, Holder HD, Nishiura E, Hankin J. An analysis of short-term alcoholism treatment cost functions. *Med. Care* 1992;30:795–809. [PubMed: 1518312]
- Goodman AC, Nishiura E, Hankin JR, Holder HD, Tilford JM. Long-term alcoholism treatment costs. *Med. Care Res. Rev* 1996;53:441–464. [PubMed: 10162960]
- Harwood, HJ.; Napolitano, DM.; Christensen, PL.; Collins, JJ. Report to the Alcohol, Drug Abuse, and Mental Health Administration. Research Triangle Institute; Research Triangle Park, NC: 1984. Economic Costs to Society of Alcohol and Drug Abuse and Mental Illness: 1980.
- Heckman JJ. Shadow prices, market wages, and labor supply. *Econometrica* 1974;42:679–694.
- Holder HD. Alcoholism treatment and potential health care cost saving. *Med. Care* 1987;25:52–71. [PubMed: 3100880]

- Holder HD, Blose JO. Typical patterns and cost of alcoholism treatment across a variety of populations and providers. *Alcohol Clin. Exp. Res* 1991;15:190–195. [PubMed: 2058794]
- Horgan, C. Cost of Drug Treatment Programs: Preliminary findings from the 1990 Drug Services Research Survey; Presented at the NIDA National Conference on Drug Abuse Research and Practice; Washington, DC. 1991; Jan.
- Hubbard, RL.; Marsden, ME.; Rachal, JV.; Harwood, HJ.; Cavanaugh, ER.; Ginzburg, HM. *Drug Abuse Treatment: A National Study of Effectiveness*. University of North Carolina Press; Chapel Hill, NC: 1989.
- Kellogg S, Kreek MJ. On blending practice and research: the search for commonalities in substance abuse treatment. *Subst. Abuse* 2006;27(12):9–24.
- Kleinman L, Lowin A, Flood E, Gandhi G, Edgell E, Revicki D. Costs of bipolar disorder. *Pharmacoeconomics* 2003;21:601–622. [PubMed: 12807364]
- Moffitt R. The Tobit model, hours of work and institution constraints. *Rev. Econ. Statist* 1982;64:510–515.
- Pauly MV, Nicholson S, Xu J, Polsky D, Danzon PM, Murray JF, Berger ML. A general model of the impact of absenteeism on employers and employees. *Health Econ* 2002;11:221–231. [PubMed: 11921319]
- Propper C, Croxson B, Shearer A. Waiting times for hospital admissions: the impact of GP fundholding. *J. Health Econ* 2002;21:227–252. [PubMed: 11939240]
- Pyne JM, French MT, McCollister KE, Tripathi S, Rapp R, Booth B. Quality-adjusted life years (QALYS) and substance use disorders. *Addiction* 2008;103:1331–1332.
- Rapp RC, Carr CA, Lane D, Redko C, Carlson RG. Development of the pretreatment readiness scale for substance abusers: modification of an existing motivation assessment. *Subst. Abuse* 2008;29:39–50.
- Rice DP, Kelman S, Miller LS. The economic burden of mental illness. *Hosp. Community Psychiatry* 1992;43:1227–1232. [PubMed: 1459546]
- Rice DP, Kelman S, Miller LS, Dunmeyer S. *The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985*. 1990DHHS Publication No. (ADM) 90-1694
- Roebuck MC, French MT, McLellan AT. DATStats: results from 85 studies using the Drug Abuse Treatment Cost Analysis Program. *J. Subst. Abuse Treat* 2003;25:51–57. [PubMed: 14512108]
- Roll JM. Contingency management: an evidence-based component of methamphetamine use disorder treatments. *Addiction* 2007;102(Suppl 1):114–120. [PubMed: 17493060]
- Rosenbach, ML.; Huber, JH. National Institute on Drug Abuse Services Research Monograph No. 1. 1994. Utilization and cost of drug abuse treatment under Medicaid: an in-depth study of Washington State; p. 51-94.
- Royston P. Multiple imputation of missing values. *The Stata J* 2004;4:227–241.
- Salomé HJ, French MT, Miller M, McLellan AT. Estimating the client costs of addiction treatment: first findings from the Client DATCAP. *Drug Alcohol Depend* 2003;71:195–206. [PubMed: 12927658]
- Schafer JL, Graham JW. Missing data: our view of the state of the art. *Psychol. Methods* 2002;7:147–177. [PubMed: 12090408]
- Substance Abuse and Mental Health Services Administration. *Results from the 2007 National Survey on Drug Use and Health: National Findings*. Office of Applied Studies; Rockville, MD: 2008. Rep. No. NSDUH Series H-34. DHHS Publication No. SMA 08-4343
- Tranmer JE, Guerriere DN, Ungar WJ, Coyte PC. Valuing patient and caregiver time: a review of the literature. *Pharmacoeconomics* 2005;23:449–459. [PubMed: 15896097]
- U.S. Department of Labor. Bureau of Labor Statistics. *National Compensation Survey-July 2007*. 2008 [accessed March 20, 2009]. Available at <http://www.bls.gov/ncs/ocs/sp/ncb11035.pdf>
- U.S. Department of Transportation. Research and Innovative Technology Administration. *Transportation Statistics Annual Report 2007*. Bureau of Transportation Statistics; Washington, DC: 2007.
- Zarkin GA, Cates SC, Bala MV. Estimating the willingness-to-pay for drug abuse treatment: a pilot study. *J. Subst. Abuse Treat* 2005;18:149–159. [PubMed: 10716098]
- Zarkin GA, Dunlap LJ, Homs G. The Substance Abuse Services Cost Analysis Program (SASCAP): a new method for estimating drug treatment services costs. *Eval. Program Plann* 2004;27:35–43.

Zarkin GA, Dunlap LJ, Wedehase B, Cowell AJ. The effect of alternative staff time data collection methods on drug treatment service cost estimates. *Eval. Program Plann* 2008;31:427–35. [PubMed: 18640722]

Table 1
Mean Values of Treatment Characteristics

Variable	Outpatient Non-Methadone (N=138)	Outpatient Methadone (N=106)	Intensive Outpatient and Aftercare (N=58)	Inpatient (N=142)
Number of times in alcohol or drug treatment (lifetime)	2.04 (3.59)	2.08 (2.07)	2.52 (5.00)	3.05 (4.11)
Visits to program, per week	2.00 (0.87)	6.79 (0.87)	2.48 (0.88)	N/A
Length of stay in treatment (days)	77.49 (51.50)	104.82 (48.59)	51.83 (41.51)	49.20 (32.98)
Average travel distance to program one way (miles)	5.94 (5.54)	9.95 (6.93)	6.17 (5.50)	38.38 (138.00)
Average travel time to program (hours)	0.50 (0.50)	0.34 (0.26)	0.36 (0.27)	1.20 (3.95)
Average travel cost to program, per visit (\$)	2.73 (2.43)	4.37 (3.20)	2.35 (2.53)	1.97 (4.11)
Average time spent at program, per visit (hours)	2.09 (0.77)	1.11 (0.83)	2.44 (0.73)	N/A
Treatment interferes with work (%) ^a	20.3	41.9	30.4	N/A
Hours missed from work to attend treatment, per week ^a	6.71 (5.44)	3.85 (3.48)	4.14 (3.89)	N/A

Notes: Standard deviations (SD) in parentheses for continuous variables. Sample sizes reflect the total number of treatment episodes in each modality. The number of episodes is greater than the number of individuals in the study because 169 individuals had multiple episodes of treatment.

N/A: not applicable.

^aConditional on being currently employed.

Table 2
Mean Values of Client Cost Estimates (2005 dollars)

Variable	Outpatient Non-Methadone (N=138)		Outpatient Methadone (N=106)		Intensive Outpatient and Aftercare (N=58)		Inpatient (N=142)	
	Cost per visit	Cost per treatment episode ^a	Cost per visit	Cost per treatment episode ^d	Cost per visit	Cost per treatment episode ^d	Cost per day	cost per treatment episode ^d
Cash or in-kind payments	0.45 (2.62)	2.73 (15.4)	0.46 (1.66)	39.6 (138)	7.58 (42.3)	189 (1,046)	0.29 (3.12)	4.46 (37.4)
Transportation ^b	3.69 (3.51)	78.1 (100)	4.99 (3.42)	485 (385)	4.19 (4.35)	108 (281)	2.04 (8.70)	44.5 (160)
Opportunity cost of time ^c	23.5 (28.5)	482 (620)	13.3 (9.82)	1,309 (1,297)	25.5 (16.5)	452 (502)	232 (219)	10,695 (9,757)
Other ^d	0.84 (7.77)	8.62 (71.1)	0.43 (2.31)	19.5 (113)	0.55 (4.12)	22.6 (171)	0.17 (1.52)	4.98 (34.0)
Total	28.5 (30.3)	571 (654)	19.2 (10.9)	1,853 (1,432)	37.8 (46.4)	771 (1,306)	235 (219)	10,749 (9,757)
25 th percentile	15.7	158	11.1	913	20.5	95.8	152	4,234
50 th percentile	21.9	399	17.6	1,476	28.5	378	181	8,415
75 th percentile	30.5	826	23.9	2,490	36.9	867	227	13,675
100 th percentile	316	4,496	69.2	10,038	321	7,845	1,783	58,843

Notes: Standard deviations in parentheses.

^aCost per treatment episode refers to the total cost incurred by the patient from the day of treatment entry to the last day of service.

^bFor outpatient treatment, this represents direct out-of-pocket expenditures (e.g., bus fare, taxi fare) to travel to the program. For inpatient treatment, this is the number of miles traveled to the program (round trip) times the average cost per mile (U.S. Department of Transportation, Bureau of Transportation Statistics, 2005).

^cIncludes opportunity cost of travel time plus time spent in treatment, valued using most recent reported wage rate.

^dOther costs include miscellaneous expenditures such as program books (AA/NA books), laboratory fees, and state identification/drivers license fees.

Table 3
Sensitivity Analysis of Total Episode Cost Using Non-Imputed Length of Stay Data and Winsorized Cost Values

Treatment Modality	Client Cost per Treatment Episode (\$)		
	Primary analysis	Non-imputed values ^a	Winsorized values ^b
Outpatient Non-Methadone	571 (654)	547 (612) [-4.2%]	542 (547) [-5.1%]
Outpatient Methadone	1,853 (1,432)	1,831 (1,437) [-1.2%]	1,596 (890) [-13.9%]
Intensive Outpatient/Aftercare	771 (1,306)	589 (824) [-23.6%]	541 (584) [-29.8%]
Inpatient	10,749 (9,757)	10,355 (10,473) [-3.6%]	9,093 (6,532) [-15.4%]

Notes: Standard deviations in parentheses. Bracketed values represent the percentage change from primary analysis. All cost estimates are in 2005 dollars.

^a Samples sizes for the raw non-imputed length of stay data were: N=123 for outpatient non-methadone; N=104 for outpatient methadone; N=48 for intensive outpatient/aftercare; and N=101 for inpatient.

^b Client cost categories were winsorized at the 5% level.

Table 4
Sensitivity Analysis of the Opportunity Cost of Client Time in Treatment Using Different Valuations of Employment and Leisure time

Treatment Modality	Primary analysis ^a	SA1 ^b	SA2 ^c
Outpatient Non-Methadone	571 (654)	447 (605)	875 (894)
Outpatient Methadone	1,853 (1,432)	1,093 (1,165)	2,635 (3,258)
Intensive Outpatient	771 (1,306)	416 (497)	747 (881)
Inpatient Treatment	10,695 (9,757)	7,699 (7,104)	16,805 (15,490)

Notes: Standard deviations in parentheses. All cost estimates are in 2005 dollars.

^aRepresents the total opportunity cost of the average client's time in treatment (travel time, time missed from work, and time spent at the program) valued at the last reported hourly wage or the federal minimum wage for those with no previous work experience. Also reported in Table 2.

^bSensitivity analysis 1 (SA1) changed the reported hourly rate of pay to the minimum wage (\$5.15) for all clients that had not been employed in the previous year.

^cSensitivity analysis 2 (SA2) changed the reported hourly rate of pay to the average hourly earnings for specific occupations reported by clients, obtained from the Bureau of Labor Statistics National Compensation Survey (2005).