

Is In-Prison Treatment Enough? A Cost-Effectiveness Analysis of Prison-Based Treatment and Aftercare Services for Substance-Abusing Offenders*

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This study performed a cost-effectiveness analysis (CEA) of the Amity in-prison Therapeutic Community (TC) and Vista aftercare programs for criminal offenders in California. For the average treatment participant, the cost of treatment was \$4,112, which led to approximately fifty-one fewer days incarcerated (36% less) than the average individual in the control group. This implies that, for the average offender, treatment reduced recidivism at a cost of \$80 per incarceration day. For participants who received both in-prison treatment and aftercare services, an additional day of incarceration was avoided at a cost of \$51 per day relative to those that received in-prison treatment only.

I. INTRODUCTION

What constitutes appropriate rehabilitation in our nation's prisons is an extremely contentious issue. Incarceration is the accepted sanction for engaging in criminal activity, but inherent to the rehabilitation process is the delicate balance between delivering punishment while effectively addressing

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the issues contributing to criminal behavior. A growing number of publications in the criminal justice and addiction treatment literature suggest that public sentiment towards rehabilitating drug-abusing criminal offenders is evolving. This evolution suggests a shift from demanding traditional incarceration to being more accepting of the possibilities for rehabilitation through substance abuse treatment and socialization programs.

This shift in public opinion has contributed to the development of treatment interventions that are applicable within criminal justice settings. One approach to treating offenders is based on the Therapeutic Community (TC) model. Modified TC programs have been implemented in several prisons across the country (Wexler, De Leon et al. 1999). One such program is the Amity TC at the R. J. Donovan Correctional Facility near San Diego, California. This program includes access to aftercare at the Amity-run community-based TC in Vista, California.

The primary objective of the present study was to provide an economic perspective on the decision to fund prison-based substance abuse treatment and aftercare programs. Specifically, the relative cost and effectiveness (assessed using the number of days reincarcerated during follow-up) were estimated for the Amity in-prison TC, Vista aftercare treatment, the combined intent-to-treat sample, and no-treatment conditions. Incremental cost-effectiveness ratios were then calculated and compared. This is the first economic evaluation of the Amity prison TC and Vista programs and, to our knowledge, one of the first economic studies of prison TCs in general. This article offers empirical contributions to the cost-effectiveness literature and provides guidance for managing treatment resources in correctional systems.

II. HISTORY OF PRISON-BASED TREATMENT AND PREVIOUS RESEARCH

The evolution of prison-based treatment for drug-abusing criminal offenders is described in Lipton, Martinson, and Wilks (1975); Lipton (1995); Leukefeld and Tims (1992); and Peters and Steinberg (2000). Leukefeld and Tims cite the opening of two U.S. Public Health Service Hospitals in the 1930s as the formal beginning of prison-based drug abuse treatment. These original programs ("narcotic farms") developed as clinical research centers that were eventually transferred from the U.S. Public Health Service (PHS) to the Federal Bureau of Prisons (BOP).

Lipton, Martinson, and Wilks (1975) surveyed a number of early prison-based treatment programs and found little evidence to support the effectiveness of these programs. Although the authors were careful not to discount the potential for prison-based rehabilitation, this report – and a policy article based on its findings (Martinson 1974) – was interpreted more pessimistically by corrections' officials who adopted the attitude that "nothing works" for drug addicted prisoners. Lipton (1995) offered a follow-up to the 1975 study and explained how the advances in treatment programs from the 1970s to

1990s led to reductions in drug use and criminal behavior by treatment participants. These findings established a renewed interest in providing treatment for addicted inmates.

A. THE PRISON-BASED THERAPEUTIC COMMUNITY (TC) MODEL

In the last decade, the TC model has been modified and successfully adapted to correctional environments (Wexler 1995; Wexler, Blackmore & Lipton 1991; Wexler & Lipton 1993). The core beliefs and practices of the TC have been thoroughly discussed (see Bell 1994; De Leon & Rosenthal 1989; De Leon & Ziegenfuss, 1986; Kooyman 1993; Sugarman 1986). The goal of the TC is a global change in lifestyle involving abstinence from drugs, elimination of anti-social activities, development of employable skills, prosocial attitudes, and values. To facilitate these global changes, the therapeutic process involves the use of the community as the healing agent and includes all of the activities and interactions between the individual and the peer community (De Leon 1995, 1996, 2000). TCs in prisons are distinguished from the general prison environment by several characteristics: (1) TC activities embody prosocial values and promote lifestyle change; (2) TC staff, some of whom are recovering addicts and former inmates, provide positive role models; and (3) TC concepts offer an optimistic view of the inmate and his or her potential for change.

B. RECENT OUTCOME FINDINGS

To date there have been two primary outcomes of interest in the research on prison-based treatment programs: drug relapse and criminal recidivism. Wexler et al. (1992) examined recidivism for both males and females in the Stay'n Out program, a TC program developed at two sites in New York State, one in Manhattan and one in Staten Island. The three major findings of this study suggested one, that the in-prison program was effective in reducing recidivism; two, that other less intensive treatment approaches were not as effective as the TC approach; and three, that time in prison-based treatment was positively and significantly related to better outcomes.

Similar findings were shown by Inciardi et al. (1997) and by Martin et al. (1999), who examined the KEY-CREST program in Delaware. This program emphasized a three-phase approach to treating criminal offenders. Each treatment phase corresponded with the correctional status of the offender, including incarceration (KEY), work release (CREST), and parole. Those assigned to CREST (work release and aftercare), at both eighteen-months post-release and three-years post-release, had either directly or proceeding KEY, lower drug relapse rates and fewer arrests compared to those who received in-prison treatment only or no treatment at all.

Hiller, Knight, and Simpson (1999) analyzed the number of days until reincarceration for a sample of parolees in Texas. Participants in the prison TC had both a lower probability of rearrest and a longer elapsed time before

rearrest relative to the no-treatment comparison group. This sample was re-evaluated at three years post-parole (Knight, Simpson & Hiller 1999). The previous findings were reconfirmed and the importance of aftercare was highlighted: clients receiving both in-prison treatment and aftercare had the lowest average arrest rate three years after leaving prison.

This article is an extension of treatment effectiveness studies by Wexler, De Leon et al. (1999); Wexler, Melnick et al. (1999); and Lowe, Wexler, and Peters (1998), who examined reincarceration for participants in the Amity TC at Donovan prison in California. These earlier studies found that, over a period of one to three years post-parole, offenders who received both in-prison treatment and aftercare had significantly fewer returns to custody than offenders who received no in-prison treatment.

C. ECONOMIC STUDIES OF TREATING CRIMINAL OFFENDERS

The results of the outcome evaluations discussed above motivated the research questions addressed in this article namely, at what cost was the decrease in reincarceration obtained and how can an economic perspective assist policy-makers in deciding whether or not to fund addiction treatment for criminal offenders. Initial cost, cost-effectiveness, and benefit-cost studies of treatment in criminal justice settings have been completed, providing a research foundation for the current study and for future economic evaluations.

McCollister and French (2002) performed economic cost analyses of four in-prison treatment programs located in various regions of the United States (California, Delaware, Colorado, and Kentucky). The incremental cost of treatment varied considerably across these programs due to geographical location, program size, and the variety of services offered. Average weekly costs of these in-prison programs ranged from \$68 to \$37, while the average weekly cost of a post-prison, community-based program in California was estimated to be \$181. To put these estimates in perspective, consider the average weekly cost of a community-based modified TC for mentally ill drug abusers, which was estimated to be \$554 (\$79 per day) (French et al. 2002). These results highlight the relatively modest incremental cost of providing substance abuse treatment in criminal justice settings.

Griffith et al. (1999) performed a cost-effectiveness analysis of an in-prison TC with aftercare in Texas. Treatment effectiveness (lower recidivism) was examined for high-risk and low-risk parolees who participated in treatment and aftercare relative to untreated parolees. The risk classification was based on an assessment instrument created by the U.S. Parole Commission to determine which offenders had the best (or worst) parole prognosis (Hoffman 1983; Hoffman & Beck 1974). High-risk inmates were assumed to need more intensive treatment and aftercare than low-risk offenders. In addition, a criterion for treatment completion was factored into the effectiveness assessment. Treatment proved most cost-effective for the high-risk parolees who completed treatment and aftercare relative to low-risk parolees who completed

treatment and aftercare, high-risk and low-risk non-completers, and the untreated comparison group.

Mauser, Van Stelle, and Moberg (1994) examined the benefits and costs of the Treatment Alternative Programs (TAP) for criminal offenders in Wisconsin. Three pilot projects were funded to examine the effectiveness of diverting offenders into substance abuse treatment instead of jail using a case management model. To measure benefits, the study considered criminal justice cost reductions, avoided cost of medical care, and productivity improvements. Given the absence of a control group for this study, the authors assumed that accrued benefits were the result of treatment. The results of their benefit-cost analysis showed that for every dollar invested in TAP, the societal benefit amounted to between \$1.40 and \$3.30.

Aos et al. (2001) compared the costs and benefits of juvenile and adult offender programs, focusing on reduced criminality. Among the various types of programs surveyed, the authors examined sixteen adult in-prison TCs, eleven of which had aftercare programs. On average, the economic return from these programs ranged from \$1.91 to \$2.69 per dollar invested.

The economic research described above represents initial efforts to assess the economic impact of treatment in criminal justice settings. Additional contributions to this literature that combine standard economic theory with rigorous empirical techniques to assess the economic merits of these programs are needed. The following sections describe the data from the original outcome evaluation of the Donovan and Vista programs and the methods employed for the cost-effectiveness analysis.

III. PROGRAM DESCRIPTION AND DATA

The Amity prison TC is run in one of the five housing units on the Donovan prison grounds. Program activities take place in two trailers that are located adjacent to the housing facility. Primary recruitment occurs from a pool of new inmate arrivals, who are given a presentation on the Amity TC program and can then volunteer for treatment. Volunteers must apply for acceptance into the program, which is based on eligibility and availability. Inmates are considered eligible for the program if they are within nine to fourteen months of parole, have a history of substance abuse (determined by self-reported age of initiation and frequency of alcohol and drug use), do not have psychiatric disorders (psychosis, mood disorders), and have not been convicted of sexual crimes (Wexler, De Leon et al. 1999).

The original outcome evaluation of the Amity prison TC and Vista aftercare programs was performed by Wexler and colleagues and provided the outcome data for the current paper (Graham & Wexler 1997; Wexler 1995; Wexler, De Leon et al. 1999; Wexler, Melnick et al. 1999). A sample of 715 men was selected from a pool of inmates who had volunteered for treatment in the Amity program. Subjects were randomly assigned to an intent-to-treat prison

Table 1. Variable Means, by Study Condition

Variables	Donovan (N = 225)	Donovan + Vista (N = 110)	Combined Intent- to-Treat (N = 335)	Control (N = 196)
<i>Demographics</i>				
Age in years***	30.16 (7.22)	33.17 (8.47)	31.15 (7.77)	30.33 (6.90)
Education in years	11.12 (2.24)	11.16 (2.16)	11.13 (2.21)	11.19 (2.35)
African American (%)*	36.00	21.00	31.00	37.00
White (%)*	34.00	51.00	40.00	35.00
Hispanic (%)	29.00	27.00	29.00	24.00
Other race/ethnicity (%)	0.00	2.00	1.00	4.00
Married (%)	5.00	5.00	5.00	9.00
<i>Primary Drug of Use (30 days pre-incarceration)</i>				
Alcohol (%)	13.00	6.00	11.00	9.00
Marijuana (%)†	8.00	6.00	7.00	16.00
Crack (%)	20.00	15.00	18.00	14.00
Cocaine (%)	5.00	5.00	5.00	4.00
Heroin (%)	14.00	20.00	16.00	12.00
Methamphetamines (%)	24.00	29.00	26.00	25.00
Other drugs/no preference (%)	4.00	5.00	4.00	8.00
<i>Criminal Justice Measures</i>				
Months incarcerated – lifetime***	96.55 (82.10)	98.56 (79.35)	97.21 (81.10)	74.83 (57.18)
Times arrested – lifetime†††	23.04 (25.01)	26.87 (46.48)	24.30 (33.58)	22.04 (33.97)
Any arrest – 1 year post-parole****††	62.00	28.00	51.00	65.00
Days incarcerated – 1 year post-parole****†††	118.40 (114.00)	34.41 (72.54)	90.82 (109.52)	142.30 (118.33)
<i>Cost of Prison Treatment and Aftercare (\$)</i>				
Cost to the criminal justice system****†††	2,708 (1,084)	6,985 (2,524)	4,112 (2,629)	0.00

Notes: All values reflect variable averages by study group. Percentage (%) values are presented in decimal notation. Donovan and Donovan + Vista participants are subsamples of the Combined group. Standard deviations in parentheses for continuous variables.

Statistically significant differences in variable means between Donovan, Donovan + Vista, and Control groups, * = $p < 0.10$; ** = $p < 0.05$; *** = $p < 0.01$, Kruskal-Wallis equality of populations rank test.

Statistically significant differences in variable means between the Combined group and the Control group, † $p < 0.10$, †† $p < 0.05$, ††† $p < 0.01$, Kruskal-Wallis equality of populations rank test.

TC group or a no-treatment control group based on program bed availability. Once an inmate from the volunteer pool dropped below a nine-month sentence, they were assigned to the Control group. When aftercare became available, parolees who had completed the in-prison program were given the option to continue treatment in the community-based aftercare TC in Vista, California. Four post-hoc primary study conditions emerged: (1) All treatment participants (Combined, N = 335), (2) In-prison treatment only (Donovan, N = 225), (3) In-prison treatment plus aftercare (Donovan + Vista, N = 110), and (4) No in-prison treatment (Control, N = 196).

Data were collected over three phases: (1) prior to admission to in-prison treatment (baseline), (2) during treatment, and (3) at twelve-months post-parole (i.e., one-year follow-up). A combination of instruments was used during data collection. A background interview questioned participants about their family background, education, drug use, criminal activity, psychological and medical status, attitudes toward substance abuse treatment, and drug treatment history (Wexler, De Leon et al. 1999). A standard battery of psychological tests was used to supplement the background interview (Beta IQ, Tennessee Self-Concept Scale, Beck Depression Inventory, the Symptom Checklist-90, and the Taylor Manifest Anxiety Scale) as well as the Diagnostic Interview Survey and the Circumstances, Motivation, Readiness and Suitability Scale (*ibid.*). Information on reincarceration was collected from a database of correctional records maintained by the California Department of Corrections (CDC).¹

A. ANALYSIS VARIABLES

Table 1 presents mean values for all variables used in the economic analysis by study group.² The table organizes these variables into four domains: demographic characteristics, primary drug of use, criminal activity, and cost of prison treatment and aftercare. Statistically significant differences in variable means for all study conditions are noted.

The average age of the treatment group samples ranged from thirty to thirty-three. The average level of education was approximately eleventh grade, indicating that many inmates had not obtained a high school degree. The Control and Donovan conditions had the greatest percentage of African American men (36–37%), whereas Donovan + Vista subjects were 50% white. The distribution of Hispanic men was approximately equal across the study groups (ranging from 24% to 29%).

The set of data following these demographics reports the primary drug of use in the month preceding incarceration for the current (commitment) offense. On average, methamphetamine was the most commonly used drug by all study groups. Crack and heroin were the second most commonly used drugs for all study groups except Control (marijuana, crack, and heroin were the second most commonly used drugs). Very few participants reported consistently mixing drugs or having no preference across drugs.

Criminal justice measures and the cost of delivering treatment are reported at the bottom of Table 1. After careful review of the available outcome data, the number of days reincarcerated after parole was selected as the measure of treatment effectiveness. Control subjects reported the least number of lifetime months incarcerated (74.83), but the highest number of days incarcerated during the follow-up period (142.30). Donovan subjects incurred the second highest days incarcerated over follow-up (118.40), and the Donovan + Vista group had the fewest incarceration days (34.41). The Combined sample (comprised of Donovan-only and Donovan + Vista subjects) had an average of 90.82 follow-up days incarcerated. The average rearrest rate at follow-up differed significantly across groups, with the Donovan + Vista condition displaying the lowest rearrest rate (0.28) and the Control group displaying the highest (0.65).

The final row of Table 1 lists the cost of providing in-prison treatment and aftercare from the California Department of Correction's perspective. The Control group had no cost associated with in-prison treatment, while the Donovan + Vista group had an average cost per inmate of \$6,985, and the Donovan-only group had an average cost of \$2,708. The entire intent-to-treat sample (Combined) had an average cost of \$4,112. The approach and results of the cost analysis are described in more detail in the Methods and Results sections that follow.

IV. METHODS

Cost-effectiveness analysis (CEA) was selected as the method for examining the short-run returns (i.e., one-year post-parole) to the Amity prison TC and aftercare programs. In estimating cost-effectiveness, one important outcome, such as reduced recidivism, is selected to assess program effectiveness. Differences in program effectiveness are compared to differences in program cost across study groups. The results of the CEA are expressed as a cost-effectiveness ratio, typically with cost placed in the numerator and the effectiveness measure in the denominator (a lower cost-effectiveness ratio is viewed as better).³ Effectiveness can also be described as a combination of outcomes using a common scale (e.g., change in quality-adjusted life-years) (French 2000). Alternatively, the ratio of cost and effectiveness can be derived for a single program and then compared to an established benchmark ratio in the literature (Gold et al. 1996; Kenkel 1997; Zarkin et al. 2001). Each component of a CEA is described below, followed by a discussion of the empirical models used to perform the CEA.

A. ECONOMIC COST ANALYSIS

The foundation for economic evaluations of healthcare or addiction treatment programs is a comprehensive economic cost analysis (Gold et al. 1996). One of the first steps in organizing a cost analysis is to determine the perspective

of the analysis. The different points of view in an economic evaluation of public or private investment in healthcare can include that of society, the government or one of its agencies (e.g., a department of corrections), the patient, the treatment provider, or the employer (Drummond et al. 1997).

Economists generally prefer to examine program costs from a societal perspective. However, because our focus for the CEA in this article is on the short-run returns to prison-based treatment and aftercare, and because we are evaluating criminal justice outcomes (incarceration and recidivism), we chose to frame the analysis from the perspective of the California Department of Corrections (CDC). Thus, the cost estimates per day for in-prison treatment and a day in aftercare treatment reflect the accounting cost, or direct cost of treatment to the CDC, excluding the value of donated or subsidized resources from other agencies or individuals.

A full cost analysis of these programs was performed, which showed that for the in-prison program there was no difference between economic and accounting cost. A differential was present, however, with the aftercare component due to subsidized rent and volunteer workers, which did not enter into accounting cost, but were valued at full market rates for economic cost (see McCollister & French 2002).

Estimating the costs of prison-based treatment requires an incremental analysis of resource use because common resources in the prison (e.g., housing, food, security) are not directly associated with the treatment program. The costs of treatment are the additional costs above standard incarceration costs (i.e., the total costs associated with incarceration and treatment minus the standard cost of resources provided to the general prison population). The cost data for the Amity TC and Vista programs were collected using the Drug Abuse Treatment Cost Analysis Program (DATCAP) (French 2002). The DATCAP is a structured data collection instrument developed by French (ibid.) and colleagues, which outlines both program revenues and costs. The instrument is used to collect resource use and other data to estimate total annual cost, distinguishing between economic and accounting cost. This allows the analyst to consider cost and financing issues from different perspectives, as mentioned above. Client case-flow data are incorporated to determine the average annual cost per client. Other useful computations include average cost per treatment episode and marginal cost per enhancement (French et al. 1997; Salomé & French 2001). The DATCAP has been applied to a variety of treatment interventions such as methadone maintenance, outpatient drug-free, long-term residential, short-term residential, prison-based programs, and employee assistance programs (e.g., French 2002; French et al. 1997; French & McGeary 1997; McCollister & French 2002; Salomé & French 2001).

B. TREATMENT EFFECTIVENESS

Treatment effectiveness was measured as the number of days incarcerated over the one-year follow-up period. Thus, fewer incarceration days implies

greater effectiveness. Reincarceration is a useful measuring tool of criminal recidivism. It informs the rate of repeat criminal offenses and the seriousness of those repeat offenses, as evidenced by the number of days reincarcerated. This effectiveness measure is appropriate for the economic analysis because incarceration is perhaps the primary concern of the CDC. As in many states, the California corrections system is overburdened with new and repeat offenders, which implies an increasing strain on public resources. Return to custody has been the focus of several recent evaluations (e.g., Griffith et al. 1999; Lowe et al. 1998; Martin et al. 1999; Wexler, Melnick et al. 1999), which provides a point of reference for interpreting the results of our CEA.

C. COST-EFFECTIVENESS CALCULATIONS

A CEA calculates and compares ratios of incremental cost and incremental effectiveness between two or more study conditions. For the present analysis, mean values for treatment cost and days incarcerated during the follow-up period for each treatment condition (Donovan, Donovan + Vista, and Combined) were subtracted from corresponding cost and effectiveness values for the control condition (Control) to determine if the treatment conditions were cost-effective relative to no prison treatment. In addition, incremental cost and effectiveness were calculated for Donovan + Vista relative to Donovan-only to determine whether the combination of in-prison and aftercare treatment was more cost-effective than in-prison treatment only. The general form of the incremental cost-effectiveness ratios is displayed below where C_x and C_y is mean treatment cost for study conditions x and y , E_x and E_y is mean effectiveness for study conditions x and y , IC_{xy} is the incremental cost of condition x relative to condition y , IE_{xy} is the incremental effectiveness of condition x relative to condition y , and $ICER_{xy}$ is the incremental cost-effectiveness ratio. For policy purposes, $ICER_{xy}$ indicates the marginal cost of achieving one less incarceration day in study condition x relative to study condition y .

$$\frac{C_x - C_y}{E_x - E_y} = \frac{IC_{xy}}{IE_{xy}} = ICER_{xy}$$

Equation 1

V. RESULTS

Table 2 presents the results of the treatment cost analysis. The average length of stay in the prison-based and aftercare treatment programs and associated treatment cost are reported from Donovan, Donovan + Vista, and Combined participants. According to estimates obtained from the DATCAP, the average cost per day was \$8.57 in the prison-based program (Donovan) and \$16.26 in the aftercare program (Vista).

Table 2. Average Utilization and Cost of In-Prison Treatment and Aftercare, By Study Condition (1993 dollars)

Study Condition	Days in Prison Treatment ¹	Days in Aftercare ²	Average Total Cost (\$)
Donovan Participants (N = 225)	310.22 (130.20)	0.00	2,708 [2,568; 2,847]
Donovan + Vista Participants (N = 110)	381.88 (116.38)	227.37 (145.63)	6,985 [6,509; 7,489]
Combined Intent-to-Treat Participants ³ (N = 335)	333.75 (130.10)	74.64 (135.46)	4,112 [3,857; 4,417]

Notes: Standard deviations in parentheses. Bracketed values are 95 percent confidence intervals derived from bootstrap estimates (1,000 repetitions) using the bias-corrected approximation method (StataCorp 1999).

1. Estimated unit cost (per day) for prison treatment = \$8.57 from the DATCAP.
2. Estimated unit cost (per day) for aftercare = \$16.26 from the DATCAP.
3. Combined Intent-to-Treatment Participants is the sum of Donovan Participants and Donovan + Vista Participants.

Parolees who completed Donovan and participated in Vista had the highest average cost per inmate (\$6,985). Donovan-only participants had an average cost of \$2,708, and the average cost for all treatment participants (the Combined group) was \$4,112. Notable in this table is that the average length of stay in-prison treatment for Donovan + Vista was slightly greater than one year (381.88 days). Ideally, in comparing costs and outcomes, it is preferable to analyze consistent time lines (i.e., one-year returns for one year of treatment). The fact that some treatment participants were staying in treatment longer than one year may imply that the returns to treatment will in turn take longer than one year to materialize. These and other qualifications are discussed in the conclusions section.

Table 3 reports the results of the cost-effectiveness analysis for days incarcerated. The first column lists the four study conditions: Control, Combined, Donovan, and Donovan + Vista. Columns A and B report the mean estimates for treatment cost and days incarcerated during follow-up for each study condition. Columns C and D report the estimates of incremental treatment cost and incremental treatment effectiveness (days incarcerated) that were used to calculate the cost-effectiveness ratios for each group. Recall that because the Control group had no prison treatment, the incremental treatment cost for Donovan and the Combined groups is the actual treatment cost. The incremental treatment cost for the Donovan + Vista condition relative to the Donovan condition is simply the treatment cost of Donovan + Vista minus the treatment cost of Donovan-only.

Incremental treatment effectiveness was calculated by subtracting the number of days reincarcerated in each treatment condition from the number of days reincarcerated in the comparison condition. For the Combined and

Table 3. Cost-Effectiveness Analysis: Days Incarcerated

Study Condition	Average Treatment Cost [A]	Average Days Incarcerated During Follow-up [B]	Incremental Treatment Cost [C]	Incremental Days Incarcerated During Follow-up [D]	Incremental Cost-Effectiveness Ratio [E]
Control Participants	0.00	142.30 [126; 160]	–	–	–
Combined Intent-to-Treat Participants ^a	4,112 [3,857; 4,417]	90.82 [80; 103]	4,112***	51.48***	80 [58; 125]
Donovan Participants ^a	2,708 [2,568; 2,847]	118.40 [104; 133]	2,708***	23.90**	113 [57; 542]
Donovan + Vista Participants ^b	6,985 [6,509; 7,489]	34.41 [22; 48]	4,277***	83.99***	51 [41; 68]

Notes: Bracketed values are 95 percent confidence intervals derived from bootstrap estimates (1,000 repetitions) using the bias-corrected approximation method (StataCorp 1999).

- a The Combined group and the Donovan-only group are compared to the Control group. Thus, the incremental treatment cost is the same as the average treatment cost since the Control group had no treatment cost. Incremental effectiveness is the number of reincarceration days in the Control group minus the number of reincarceration days in the treatment groups (Combined and Donovan-only).
- b The Donovan + Vista group is compared to the Donovan-only group. Thus, the incremental treatment cost is Donovan + Vista cost minus Donovan cost, and incremental effectiveness is the number of reincarceration days in the Donovan group minus the number of reincarceration days in the Donovan + Vista group.

*Statistically significant, $p < 0.10$

**Statistically significant, $p < 0.05$

***Statistically significant, $p < 0.01$

Donovan-only groups, incremental effectiveness was the number of follow-up days incarcerated in the Control group minus the number of incarceration days for the Combined and Donovan groups. For Donovan + Vista, incremental effectiveness was the number of days incarcerated in the Donovan-only group minus the number of days incarcerated in the Donovan + Vista group. The final column of Table 3 lists the cost-effectiveness ratios and corresponding 95% confidence intervals.

The following comparisons were made:

Control vs. Combined. This comparison considers any treatment exposure (comprised of Donovan and Donovan + Vista participants) versus no treatment exposure (Control). By generalizing the treatment experience to “any involvement in treatment,” we are considering whether even brief treatment interventions (combined with treatment completers) are more effective at reducing recidivism than nothing. The incremental cost-effectiveness ratio for the Control group vs. the Combined group shows that the Combined group generated a cost per avoided incarceration day of \$80. In other words, the cost of an average offender that received any treatment was \$4,112 and had 36% less incarceration time (51.48 fewer incarceration days) than the average Control participant.

Control vs. Donovan. This comparison considers the incremental cost and effectiveness of the in-prison treatment program as compared to no prison treatment. The incremental treatment cost was \$2,708, and the incremental effectiveness was 23.90 days incarcerated (the average Donovan subject had 23.90 fewer days incarcerated during follow-up relative to the average Control subject). Dividing incremental cost by incremental effectiveness generated a cost-effectiveness ratio of \$113. This value indicates that it cost the CDC \$113 per avoided follow-up incarceration day for the average Donovan-only participant. To put it another way, the average Donovan participant cost \$2,708 and generated 17% less incarceration time (23.90 fewer incarceration days) than the average Control participant.

Donovan vs. Donovan + Vista. This comparison considers the additional cost to avoid an incarceration day when going beyond the in-prison treatment component (Donovan-only) to include an aftercare component (Donovan + Vista). Adding the Vista component and comparing to Donovan-only produced an incremental cost-effectiveness ratio of \$51. This suggests that, with the in-prison component already in place, the cost to avoid an additional incarceration day through the aftercare component was \$51.

Some participants who completed the in-prison program volunteered to enter aftercare and were admitted on a bed-available basis. For this reason, a comparison between Donovan + Vista participants and the Control group is problematic, as Donovan + Vista participants were not randomly assigned to the Vista program. Thus, Table 3 does not include the cost-effectiveness ratio for Control vs. Donovan + Vista. However, if the CDC had the option to select

Donovan + Vista as a treatment alternative (as opposed to only being able to initiate treatment in Donovan), a comparison between the Control group and the Donovan + Vista group reveals that the cost per avoided incarceration day would be \$65, the lowest among the comparisons to the Control group.⁴

VI. DISCUSSION

This research showed that offering a continuum of treatment has the greatest potential to reduce reincarceration among substance-abusing offenders. A review of the cost-effectiveness ratios presented above demonstrates that the group that received only in-prison treatment (Donovan-only) had the highest cost per avoided incarceration day (\$113). It is important to clarify, however, that while baseline assignment to in-prison treatment (Donovan) or the Control group was random, participation in the Vista aftercare program was voluntary. Donovan + Vista volunteers may possess characteristics that facilitate improvement independent of Vista services. This suggests the possibility of post hoc selection bias associated with the Donovan + Vista condition. A review of sample characteristics presented in Table 1 reinforces this concern. Donovan + Vista participants were older, more white (51%), had more lifetime arrests, and had spent more time incarcerated than the other study groups. These characteristics may be driving the treatment effect in Donovan + Vista participants found in the cost-effectiveness analysis. If selection bias is present, then the incremental cost-effectiveness ratios for Donovan + Vista are overstated.

Given this concern, the comparison between the Combined group (all Donovan participants, some of which volunteered for aftercare) and the Control group should be highlighted. The results of the CEA for this analysis found that the average Combined participant cost the CDC \$4,112 in treatment resources and had fifty-one fewer incarceration days (36% less) than the average Control participant. Therefore, for about \$80 per day (per offender) the CDC can reduce reincarceration for substance abusing offenders. This translates to an additional investment of about \$20 per day over the daily cost of housing an inmate (\$59; CDC, 1997–1998). The broader question, then, is what is the additional \$20 “buying” the CDC?

To answer this question, multiple treatment outcomes could be examined, such as reduced criminal activity and criminal justice system costs, increased employment, reduced health care costs, and reduced dependence on welfare and other social programs. Benefit-cost analysis (BCA) is the economic evaluation methodology that compares treatment cost to a collection of treatment outcomes that have been translated into dollar values. Results are expressed as net economic benefit (total benefit minus total cost) or a benefit-cost ratio (total benefit divided by total cost), where a net benefit greater than zero or a benefit-cost ratio greater than unity indicates that the benefits of treatment offset the cost of providing treatment.

In order to perform a BCA, outcome data must be quantifiable in dollar terms. Because Amity program data were not collected with this goal in mind, we were not able to perform a BCA. Nevertheless, it is useful to present some hypotheses (to be explored in planned future evaluations) about what other returns the CDC and society are gaining from the Amity programs. First of all, criminal activity, regardless of whether or not it leads to an arrest, is an important treatment outcome to be considered in estimating the economic benefits of prison-based treatment. The social cost of crime is substantial, and reductions in criminal activity translate into significant economic benefits. Employment and reduced dependence on social welfare programs would also be important economic outcomes, particularly for a criminal justice population. In addition, given the numerous health consequences of drug abuse, reduced health services utilization can be an important contributor to economic benefits.

Another area of potentially substantial cost-savings associated with offering in-prison treatment involves the management of correctional institutions and the productivity of prison personnel. A recent article by Prendergast, Farabee, and Cartier (2001) considered how the presence of in-prison TCs affected overall prison management at the California Substance Abuse Treatment Facility (CSATF) in terms of fewer inmate infractions, reduced inmate drug use, and reduced absenteeism among correctional staff. The authors examined data from random drug testing, department records of disciplinary actions, absenteeism among personnel, the Correctional Institutions Environment Scale (Moos 1974), and information obtained from focus groups of randomly selected correctional officers and inmates. The results suggest that the presence of an in-prison TC program creates a more positive rehabilitative environment for both inmates and correctional officers. The authors found almost no drug use and fewer disciplinary infractions on the facility's treatment yards relative to the general inmate population. In addition, correctional officers assigned to the treatment yards had fewer sick days and rated the quality of the work environment higher than officers on non-treatment yards. These differences represent important economic benefits of including a treatment component within correctional institutions and will be an important area to explore in future economic evaluations of prison-based treatment programs.

Other research qualifications should be noted and explained. First, the average cost of housing an inmate reported by the CDC does not account for the other costs to the criminal justice system associated with incarceration, including policing, processing, and adjudication. These resources could, however, be factored into a more comprehensive cost analysis to understand the daily cost of incarceration to the criminal justice system.

Second, one should guard against drawing general economic conclusions about prison treatment based on this short-term CEA of the Amity TC and Vista programs. Currently, there is no widely accepted standard for providing prison treatment, so programs should be evaluated individually. This analysis is primarily useful for assessing the short-term potential of in-prison and aftercare programs in California and for providing the CDC with quantitative

results on which further funding decisions for prison-based treatment can be considered.

Third, while the average length of stay for the Donovan + Vista study condition was greater than one year (which influenced treatment cost), we consider incarceration days for up to one-year post-parole. These unequal time lines for the cost and effectiveness comparisons may skew the cost-effectiveness ratios upwards. Over time, it is expected that these ratios would decline.

Finally, additional analysis of the one-year follow-up data suggests that a greater percentage of Control subjects were incarcerated at twelve-months post-parole relative to Donovan subjects and Donovan + Vista subjects. Assuming this pattern continues throughout future follow-up periods, the incremental cost-effectiveness ratios for the Donovan and Donovan + Vista conditions relative to the Control condition will decline.

VII. CONCLUSIONS

This study is the first economic evaluation of the Amity prison TC and aftercare programs and one of the first economic studies of prison TCs in general. The main result of the cost-effectiveness analysis presented here is that sending an offender to the Amity prison TC (who may or may not go on to receive aftercare) cost the CDC \$4,112 in treatment resources and led to fifty-one fewer days incarcerated (36% less) than the no-prison-treatment Control group. This translates to a cost per avoided incarceration day of \$80. If the CDC were able to enforce in-prison program completion and participation in aftercare (Donovan + Vista), then the cost per avoided incarceration day would be \$65. Aftercare appears to play a pivotal role, as is illustrated by the comparison of treatment participants who received only in-prison treatment with those participants who also received aftercare. Investment in aftercare treatment reduced follow-up incarceration by an additional 71% (eighty-four fewer days) relative to the prison-only treatment group. Therefore, if the CDC could choose between sending another offender through the in-prison program (Donovan) or to in-prison plus aftercare treatment (Donovan + Vista), it would be more cost-effective to select Donovan + Vista.

To answer the question posed in the title of this paper, it does not appear that in-prison treatment alone is enough. Aftercare programs are undeniably important for the offender's transition from prison to the community. This result resonates with the outcomes of recent studies that compared offenders receiving in-prison treatment and aftercare to offenders receiving in-prison treatment only or no treatment (e.g., Griffith et al. 1999; Inciardi et al. 1997; Martin et al. 1999; Wexler, De Leon et al. 1999; Wexler, Melnick et al. 1999). The main challenge for the California Department of Corrections (CDC), and for Departments of Correction in general, is to promote program completion and encourage participation in aftercare. Given the numerous types of aftercare programs, a secondary challenge will be to assess what types of

aftercare are most cost-effective (i.e., residential TCs, work release, outpatient counseling).

The next step in this research program is to examine more long-term outcomes of the Amity prison TC and Vista programs to assess the economic impact of corrections-based treatment over time. Prendergast and colleagues at UCLA's Drug Abuse Research Center (DARC) have collected data for a five-year follow-up outcome evaluation of participants in the Amity prison TC and the Vista aftercare programs (Prendergast, Hall & Wexler 2001). Subjects from the original evaluation sample were contacted to complete a five-year follow-up interview. All interview instruments cover the same areas (i.e., drug use, criminal behavior, prosocial behavior, medical and psychological status, family life) as the one-year follow-up evaluation to ensure comparability of short-term and long-term outcomes. These data will be used to perform a five-year cost-effectiveness analysis of the Amity TC and Vista programs to assess the long-term economic returns to prison-based treatment and aftercare.

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NOTES

1. All the data are self-reported except for days incarcerated during the follow-up period, which came from California Department of Corrections records.
2. The primary cost-effectiveness analysis applied treatment cost and criminal justice data to calculate the cost-effectiveness ratios described below. Two multivariate modes of *days incarcerated* and *treatment cost* were also specified, which included all of the variables listed in Table 1. Because the results of the regression analyses were not significantly different from the descriptive analyses (see Tables 1 and 2), we do not present the multivariate analyses here. These results are, however, available for the corresponding authors upon request.
3. As explained later in this section, CEA is fundamentally an incremental analysis with an incremental cost-effectiveness ratio equal to incremental cost divided by incremental effectiveness.
4. The incremental cost of Donovan + Vista relative to the Control group was \$6,985, and the incremental effectiveness was 108 fewer days incarcerated. This implies a cost-effectiveness ratio of \$65.

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