Economic Evaluation of Continuing Care Interventions in the Treatment of Substance Abuse

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Economic Evaluation of Continuing Care Interventions in the Treatment of Substance Abuse: Recommendations for Future Research

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Abstract

The chronic and relapsing nature of substance abuse points to the need for continuing care after a primary phase of treatment. This article reviews the economic studies of continuing care, discusses research gaps, highlights some of the challenges of conducting rigorous economic evaluations of continuing care, and offers research guidelines and recommendations for future economic studies in this emerging field. Rigorous economic evaluations are needed by healthcare providers and policymakers to justify the allocation of scarce resources to continuing care interventions. The adoption of cost-effective continuing care services can reduce long-term consequences of addiction, thereby potentially increasing overall social welfare.

**Keywords:** substance abuse treatment; continuing care; economic evaluation; economic costs and benefits
1. Introduction

There is considerable agreement in the clinical addiction treatment literature that although some substance abusers attain long-term abstinence after a single treatment episode, the majority of individuals with substance use disorders go through cycles of alternating episodes of treatment and use over an extended period (Dennis and Scott [in press]; Hser et al. 1997; McKay 2001a, 2001b). Substance abuse is now more likely to be considered as a chronic problem, similar to other medical disorders such as diabetes, asthma, or hypertension. The relapsing nature of addiction explains why a single treatment episode may not be sufficient to engender long-term recovery for many individuals, and multiple and cumulative treatment episodes are required to sustain the effects of treatment over the long-run (Dennis and Scott [in press]).

One approach used to address the chronic nature of substance abuse is to provide some form of lower intensity continuing care after the initial high intensity treatment phase. Continuing care has often been delivered as outpatient services when the initial treatment phase consisted of residential treatment. With the reduced availability of residential treatment, the most common modality of addiction treatment in the United States is now outpatient care (i.e., either intensive or standard outpatient). When the initial treatment episode is outpatient care, individuals often receive a lower intensity outpatient care after the initial phase of intensive outpatient treatment. Sometimes patients start with residential treatment, step down to intensive outpatient care, and then move to standard outpatient care. The most common form of continuing care is generally delivered through group counseling sessions. The purpose of continuing care is to sustain the gains attained in the initial treatment phase and to prevent relapses by offering support for participation in self/mutual help and other programs. Nevertheless, continuing care interventions are usually brief, rarely extending for more than 12 to 24 weeks. As clinical studies find that longer lengths of stay in
treatment are associated with better outcomes, one approach to enhance treatment effectiveness would be to provide longer interventions to substance abusers (McKay 2005).

According to McKay's (2001a) review of the clinical literature on continuing care interventions, correlational studies show that participation in continuing care (or attendance to self/mutual help programs) is associated with better drug and alcohol use outcomes. However, part of this association can be accounted for by factors such as patients' motivation to stop substance use or success of the initial treatment intervention. A recent review found that half of the 20 controlled continuing care studies published since the late 1980s found evidence of significant treatment effects. Studies that were completed more recently, had longer treatment interventions, and featured more active efforts to bring treatment to patients were more likely to yield significant treatment effects (McKay 2007).

Prior to routinely adopting continuing care interventions, policymakers and payers demand not only evidence of better outcomes from these treatments, but also economic justification to help in the allocation of scarce public and private resources. Researchers need to examine the full economic impact of continuing care interventions and disseminate the findings to key stakeholders to foster improvements. The potential adoption of an economically beneficial continuing care program will raise overall social welfare as it maximizes the net benefits to society.

Unfortunately, the economic literature on continuing care models is scant. Although advances have been made in clinical studies, very few economic studies have evaluated continuing care models. Within the broader area of addiction treatment research, the majority of economic evaluations pertain to acute care models, where one modality of treatment is delivered for a relatively brief period and no additional aftercare is provided (for a review, see French and Drummond 2005). Little is known about the economic costs and benefits of continuing care models, as the findings of the economic evaluations of acute care may not be directly transferable to continuing care.
One of the reasons why the economic literature on addiction treatment lacks empirical studies of continuing care approaches is that little conceptual and practical guidance on how to conduct such studies is available. The goal of this article is to promote and guide much needed progress in this area. In Section 2, we provide a brief overview of the economic evaluation methods used in the addiction treatment literature. We summarize the few relevant continuing care studies and emphasize the need for future research in Section 3. Section 4 identifies some of the key gaps and limitations in the literature. Section 5 discusses the challenges related to the economic evaluation of continuing care. Section 6 offers practical guidelines and recommendations for future analyses of continuing care interventions, and Section 7 offers concluding remarks.

2. Brief Overview of Economic Evaluation Methods

Most economic evaluations of substance abuse treatments start with a cost analysis. Cost studies determine the value of resources used to deliver the services associated with a specific treatment program. Some evaluations of addiction treatment calculate accounting costs (Barnett and Swindle 1997; Weisner et al. 2000). A conceptually superior measure is economic or opportunity cost, which does not always equate to the accounting cost of the treatment, but represents the value of the next best alternative forgone for the resources used to deliver a program. Economic costs include the value of unpaid resources, such as the estimated market value of volunteer labor or donated equipment. Generally, economic cost studies are conducted from the societal perspective because society shares in the benefits of addiction treatment. To enable accurate economic cost calculations, researchers have developed comprehensive instruments to collect the necessary resource use and financial data. The first standardized approach to data collection and economic cost estimation was the Drug Abuse Treatment Cost Analysis Program (DATCAP) (Bradley, French, and Rachal 1994; French et al., 1994; www.DATCAP.com). It was created and launched in the early 1990s and it has been successfully used in more than 100 settings to generate cost estimates.
of numerous addiction treatment programs in the United States (French, Popovici, and Tapsell [in press]; Roebuck, French, and McLellan 2003). The DATCAP assembles the information necessary to estimate all economic costs involved in service delivery in most treatment modalities and settings. It collects and organizes detailed data on the resources used and their associated opportunity cost. Resource categories include personnel, supplies and materials, contracted services, buildings and facilities, equipment, and miscellaneous items. In order to estimate economic costs, respondents are asked to report the value of all paid resources as well as the estimated market value of all subsidized and free-of-charge resources. The data reported for the six resource categories are used to estimate total annual economic cost of the program. Information on average daily census and average length of stay is used to estimate average weekly and episode costs per client.

Several other methods to estimate substance abuse treatment costs have been proposed and implemented (see Cartwright [in press-a] for a review of these methods): the Substance Abuse Services Cost Analysis Program (SASCAP) (Zarkin, Dunlap, and Homsi 2004), the Alcohol and Drug Services Study (ADSS) (SAMHSA 2003), Capital Consulting Corporation’s (1998) accounting approach, and the unit service costs and accounting method (Anderson et al. 1998). Cost studies are usually only the first and prerequisite step for two types of full economic evaluations: cost-effectiveness analysis (CEA) and benefit-cost analysis (BCA). Both CEA and BCA are more informative than cost estimates, as costs alone do not provide sufficient information to determine whether a program should be adopted or continued.

CEAs compare two or more alternative programs or a standard and an enhanced version of the same program (Barnett, 1999; Barnett, Zari, and Brandeau 2001; Kunz, French, and Bazargan-Hejazi 2004; McCollister et al. 2003a, 2003b, 2004; Zari, Barnett, and Brandeau 2000; Zarkin et al. 2003). The incremental opportunity cost of implementing a treatment program is compared with the incremental change in a non-monetary outcome (such as quality-adjusted life-years saved,
incarceration days avoided, number of illness episodes avoided, or abstinence days). A major limitation of CEA applied to addiction treatment is the possibility of overlooking some important outcomes, as it is not intended for multi-outcome programs with numerous stakeholders (Sindelar et al. 2004).

BCAs compare the total economic cost of a treatment program with the total monetized value of all treatment outcomes (Ettner et al. 2006; Fleming et al. 2000, 2002; French, Salomé, and Carney 2002; French et al. 2003; Logan et al. 2004; Mundt et al. 2005). The first step in a BCA is to select treatment outcomes (e.g., health services utilization, education, employment, criminal activity) that can be meaningfully converted into economic benefits. Second, all selected outcomes are converted into monetary equivalents using reliable monetary conversion factors. Results are usually expressed as benefit-cost ratios or net benefits. A benefit-cost ratio in excess of 1 or net benefit greater than zero is considered evidence that the intervention is cost-beneficial, as the total economic benefit of the program exceeds its total opportunity cost. Because it takes into account all outcomes and converts them into monetary equivalents, BCA can be used to compare programs that deliver different services and generate different outcomes. Although BCA is typically viewed as the most comprehensive and informative form of economic evaluation, it has been applied less frequently than CEA, as estimating the total economic benefit of addiction treatment is difficult due to the variety of treatment outcomes and because monetary conversion factors are not always readily available. For interested readers, a full description of the techniques used for economic evaluation of addiction treatment is available for consultation in several recent articles and books (e.g., Cartwright 2000; Cartwright [in press-a, in press-b]; Drummond et al. 2005; French and Drummond 2005; Zavala et al. 2005).

3. Review of Empirical Economic Studies of Continuing Care Models
The methods described above have been successfully implemented in several economic evaluation studies of acute care treatment interventions. Although estimating the economic costs and benefits of acute care interventions is timely and important, due to the chronic nature of addiction, economic evaluations of multiple sequential interventions provide a fuller understanding of the costs and outcomes of treatment over time. This section summarizes the findings of the few economic evaluations of continuing care studies in the literature.

French et al. (2000) extended an effectiveness analysis conducted by McKay et al. (2002) by performing a BCA of two separate treatment continua. They compared the net benefit for Medicaid-funded patients with substance use disorders who received either a full or partial continuum of care. Clients in the full continuum (FC) of treatment started in a residential setting followed by lower intensity continuing care (i.e. intensive or standard outpatient). Partial continuum (PC) patients began with an episode of intensive outpatient care, typically followed by standard lower-intensity outpatient care. Average treatment reimbursement rates were used as an approximation for treatment costs. An augmented version of the Addiction Severity Index (ASI) was used to collect data at admission to treatment and at 9-months post baseline. The outcome variables selected from the ASI were converted into monetary benefits. The estimated net benefits were positive and significant for both treatment continua. Although the benefit-cost ratio for PC was more than twice as large as that for FC, the difference did not quite reach statistical significance because of limited power. These results strongly suggest that the total benefits generated by the two treatment continua exceeded their total costs.

Clinical research has established that, in addition to in-prison treatment of substance abusers, the provision of transitional community-based aftercare programs is critical for the effective rehabilitation of criminal offenders (Inciardi et al. 1997; Martin et al. 1999). As the positive
outcomes of prison-based and post-release treatment emerged, economic evaluations followed to further understand the economic implications of these treatment programs.

McCollister and French (2002) estimated the economic costs of four in-prison treatment programs in California, Delaware, Colorado, and Kentucky and one post-release residential program in California. They found large variations in the incremental cost of treatment as the programs evaluated varied in location, size, and range of services provided. Nevertheless, their cost estimates suggest that the incremental cost of in-prison addiction treatment for criminal offenders, as well as the average weekly cost of an aftercare program, is relatively modest. This finding, along with the suggested efficacy of continuing care in clinical studies, points to the need for comprehensive economic evaluations of continuing care interventions.

Griffith et al. (1999) conducted a CEA of an in-prison therapeutic community (TC) and aftercare program in Texas. Outcomes for high- and low-risk offenders that participated in treatment and aftercare were compared to outcomes for untreated parolees. The rate of recidivism was the primary outcome. Treatment and continuing care was found to be more cost-effective for high-risk completers than for non-completers, low-risk completers, and untreated criminal offenders.

Aos et al. (2001) estimated the economic costs and benefits of 16 in-prison therapeutic communities (TCs), 11 of which were augmented with aftercare treatment. For each of the 11 programs that included continuing care, total benefits exceeded total treatment costs by sizable margins.

McCollister et al. (2003a) extended the outcome analysis conducted by Inciardi et al. (1997). The authors performed a CEA of Delaware’s CREST Outreach Center, a three-stage TC treatment continuum that began with in-prison treatment, and continued with work release tailored as a transitional TC program, followed by aftercare delivered in an outpatient setting. The outcome
chosen for this analysis was the number of days re-incarcerated over an 18-month follow-up period. The results suggest that the full continuum of treatment that includes aftercare was more cost-effective than the work release program only. Work release and aftercare completers had a lower cost-effectiveness ratio than participants of work release only.

McCollister et al. (2003b) conducted a CEA of the Amity in-prison TC and Vista aftercare programs in California. Again, the number of days re-incarcerated over a 1-year follow-up period was the selected outcome. Consistent with McCollister et al. (2003a), in-prison TC and continuing care completers had a lower cost-effectiveness ratio than criminal offenders that participated only in the in-prison treatment program.

McCollister et al. (2004) extended the study of the Amity in-prison TC and Vista aftercare programs in California by following participants over a 5-year period. The results were consistent with previous findings, indicating that continuing care is a critical component of treatment for criminal offenders, as the prison TC only was not a cost-effective alternative. Overall, the findings of these studies strongly and consistently indicate that treating criminal offenders with a continuum of care, rather than just a single prison-based episode, is a cost-effective treatment alternative. However, it should be noted that only those participants who completed aftercare were included in the aftercare group in some of these studies, which could have somewhat biased the results in favor of the continuing care model.

A few other studies have performed economic evaluations of different treatment continua. Weisner et al. (2000) conducted a CEA of two treatment alternatives (day hospital rehabilitation and traditional outpatient treatment) in a managed care organization in California. After three weeks, both programs stepped down to lower intensity care for five weeks and included aftercare for up to six months after intake. The authors used abstinence from alcohol and other drugs as the outcome of interest and patients were followed for eight months. Patients with mid-level psychiatric severity
were found to have higher abstinence rates in the day hospital program, which delivered the same services but at four times the intensity of the outpatient program. The day hospital alternative was more cost-effective for these patients as well.

Alexandre et al. (2003) estimated the economic costs of a three-phase long-term residential program for drug-dependent women and their children within a public housing setting. In Phase I, patients received bio-psychosocial assessments and intensive therapeutic interventions, including group, family, and individual counseling for a period of twelve weeks. Phase II continued the counseling sessions for about twenty weeks, but employment skills were also developed. Patients continued to attend counseling in Phase III for eighteen weeks longer and were encouraged to seek employment. The DATCAP was used to collect data on each of the three phases separately. The estimated weekly cost per client was only slightly higher than the weekly cost estimates of other residential programs found in the literature. However, the average episode costs were much larger than estimates for other residential programs due to the public housing program's extended length of stay.

Koenig et al. (2005) estimated total costs and benefits of different treatment programs in Ohio, using data from the Persistent Effects of Treatment Studies. Benefits were measured as reduced crime-related costs, health care costs, and increased client earnings. The study analyzed the benefits of receiving a continuum of care that started with residential treatment or intensive outpatient and stepped down to outpatient care. The results suggest that adding outpatient care to an initial treatment episode offers substantial benefits above program costs, particularly for patients who begin treatment with residential care.

Daley et al. (2000) compared the costs of five types of treatment (detoxification only, methadone maintenance only, residential care only, outpatient care only, and a treatment continuum of residential care followed by outpatient) with the benefits associated with reduced criminal
involvement for pregnant women. All treatment modalities had benefits far in excess of costs, with the residential settings being the most cost-beneficial alternatives.

This relatively small number of studies, each with certain data and/or methodological limitations, demonstrates the great need for future research in the area of continuing care interventions. Although scarce, the current economic evaluation research suggests that continuing care models that encompass different modalities of treatment can be more effective than acute care models, where patients are treated with a single intervention approach. Adding elements of aftercare to different addiction treatment programs seems to enhance their effectiveness, yielding positive net economic benefits.


Before discussing some of the challenges of conducting economic evaluations of continuing care in general, we identify several gaps and limitations associated with the existing empirical studies reviewed in the previous section. This information is discussed below and summarized in Table 1.

- The majority of economic studies evaluated substance abuse interventions for special populations such as criminal offenders or pregnant/parenting women. A substantial number of the clients treated for addiction in the U.S. come from these special populations and more economic evaluations of continuing care interventions for them are warranted. Nevertheless, research findings for special populations are not necessarily transferable to the general population of substance abusers. Therefore, we encourage health economists and other addiction researchers to fill this research gap and conduct economic evaluations of continuing care that have direct applications to the general population of substance abuse treatment clients.

- The existing literature focuses mainly on publicly-funded programs serving low-income patients, whereas research findings for continuing care services delivered in privately-funded treatment programs are lacking.
• The existing research mostly uses CEA to evaluate continuing care. CEA is limited to a single outcome of the intervention and/or continuum. Addiction treatment often results in multiple social, economic, medical, and legal benefits and analyses of continuing care should not overlook these important outcomes. BCAs often provide a more complete and policy-relevant picture of the economic impact of continuing care interventions.

• In most of the economic studies reviewed, the patients entered the aftercare treatment programs voluntarily. This might introduce some degree of selection bias into the analysis. Treatment outcomes and economic benefits can be confounded with unobserved patient characteristics. For example, better outcomes of continuing care interventions might be the result of the correlation between individual motivation to become abstinent and their participation in the continuing care phase of the program. Aftercare volunteers may have characteristics (e.g. stronger motivation to recover) that drive improvement of outcome variables regardless of participation in the aftercare treatment.

• The size of the samples recruited and analyzed by many continuing care studies is relatively small. Small sample sizes result in lower power and other statistical limitations associated with non-normal distributions. These limitations are not solely contained in economic evaluations, but such evaluations often require larger samples to accurately estimate economic benefits.

• A critical assumption made when evaluating aftercare is that a single initial intervention or the initial care plus continuing care are appropriate for all patients. However, differences between the two treatment groups at baseline usually indicate that this assumption might be false. Some patients could benefit from aftercare services while others may not. Statistically controlling for observable differences between groups at baseline is not a perfect substitute for random assignment.
• Another limitation pertains to the selection of the comparison group. An assumption made by Koenig et al. (2005) due to the unavailability of a “no-treatment” control group is that baseline outcome values are typical of the outcomes that would have occurred in the absence of treatment. There are reasons to question this assumption, however, as some patients might have entered treatment at atypical times (e.g. periods of particularly heavy or light use), some might have been mandated to treatment, and others might have chosen treatment voluntarily. In addition, the comparison group chosen in some studies (e.g., McCollister et al. 2003a) does not perfectly reflect a “no-treatment” control group as many of the patients received some treatment services, although not necessarily from the modality under study.

• The lack of long-term follow-up data is another limitation of most studies in the literature. With the exception of two studies (Koenig et al. 2005; McCollister et al. 2003b) with longer follow-up periods, most of the studies reviewed have a follow-up of 18 months or less.

• Although there is evidence that treatment outcome data derived from the Addiction Severity Index (ASI) and other evaluation instruments can be quite accurate (Rouse, Kozel, and Richards 1985; Turner, Lessler, and Devore 1992), self-reported data might be less reliable than data from other sources. In addition, the ASI was designed to measure clinical outcomes and many of its measures are not well suited for economic evaluations while other key economic outcomes (e.g. criminal activity) are not collected.

• Some of the studies in the literature collected and calculated accounting costs for the treatment programs, yet economic or opportunity cost is a conceptually superior measure.

• The economic evaluation methods implemented in the existing studies are not always consistent and standardized. This hampers the ability to make valid comparisons across treatment approaches.

5. Challenges Associated with the Economic Evaluation of Continuing Care Models
Despite the advances made in the economic evaluation of acute care treatment programs, there are some potential challenges that future economic analyses of continuing care models will encounter. Before offering practical guidelines for conducting continuing care studies, we identify some of these challenges, but one has to keep in mind that additional issues will probably emerge with future research in the area.

One important issue was highlighted by McKay (2001a) and it applies to clinical as well as economic evaluations. Namely, the exact definition or description of continuing care is ambiguous. For example, a standard outpatient treatment intervention can be classified as continuing care if it follows residential or intensive outpatient care, but it is categorized as primary treatment when patients are directly admitted into this level of care. As a result, patients receiving outpatient treatment might be progressing through either initial or continuing treatment.

As mentioned earlier, the first requirement of any economic evaluation is an accurate estimation of the economic or opportunity costs of treatment. A continuum of care denotes a phased treatment process in which patients are stepped down to a lower intensity phase after the initial episode of care. Some continuing care models actually phase up patients who may relapse or do poorly in lower intensity treatments, which further complicates the estimation of costs and economic benefits. The DATCAP or a similar cost instrument must be administered separately for each treatment phase, making accurate cost estimation for continuums of care more challenging than for acute treatment episodes. Nevertheless, cost instruments have been successfully implemented in a few of the existing studies, which is encouraging for future cost assessments.

One of the challenges encountered in the economic evaluation of addiction treatment in general, but particularly important for the evaluation of continuing care interventions, is the rarity of long-term data. Given the chronic and relapsing nature of substance abuse, it is critical to understand whether the short-term benefits accruing after a continuing care episode of treatment
extend into the long term. It is quite possible for example that the net economic benefits of an episode of acute care do not differ significantly from the net economic benefits of the same treatment episode combined with aftercare in the short term, but that the trend in net benefits is very different in the long term. In other words, short term data might indicate that adding aftercare to an initial phase of treatment does not provide additional benefits to outweigh the extra costs of continuing care. However, the benefits of the continuing care intervention might take longer to emerge or persist for a longer period than those of the acute treatment episode, suggesting aftercare is cost beneficial in the long run, but not necessarily over the short term. Moreover, one of the challenges faced when analyzing long-term follow-up data is distinguishing between true treatment effects and other confounding factors that tend to become more pronounced over time, including subsequent episodes of acute care.

The rarity of randomized controlled trials (RCTs) in substance abuse research in general is another challenge to the evaluation of continuing care. The preferred option in analyzing the costs and benefits of a continuing care intervention would be a RCT where patients that received the same primary treatment are randomly assigned to different levels of aftercare and/or no formal treatment. However, in most of the studies of continuing care to date, patients entered the aftercare phase voluntarily, making it difficult to separate the effects of treatment from other unobserved factors.

When conducting economic evaluations of continua of care, especially in the absence of random assignment, it is tricky to evaluate the individual contribution of each phase of treatment, thereby complicating the determination of which phase or combination of phases is the most effective. For example, when patients are initially admitted to residential care, stepped down to intensive outpatient, followed by aftercare, investigators may desire to compare the full treatment continuum to residential plus intensive outpatient care or to the primary phase of residential care.
only. However, when treatments are phased or bundled, the individual contributions as well as the interactive effects of each level of care become indistinct.

Forming no-treatment control groups is also a challenging task. For example, patients who receive the initial acute care, but not the designated aftercare treatment, are usually chosen as the comparison group. However, these clients might receive the designated aftercare service through self selection or some other treatment mechanism during the follow-up period. Therefore, the comparison group often does not perfectly reflect a no-aftercare control group.

Finally, after conducting an economic evaluation of a continuing care intervention, one should be cautious when making inferences about other related programs or drawing broad economic conclusions about continuing care interventions in general. Currently, there are no generally accepted standards for continuing care services delivery. Thus, it is not clear whether the findings of one economic evaluation directly apply to other continuing care interventions. For example, many studies found evidence that economies of scale exist in the delivery of substance abuse treatment, as larger treatment facilities are less costly on a per admission basis than smaller ones in both outpatient and residential modalities (Beaston-Blaakman et al. 2007; Duffy et al. 2004; Harwood, Kallinis, and Liu 2001). Economies of scale may also be present with continuing care services, but more investigation is needed in this area before offering any firm conclusions.

The challenges presented here do not represent insurmountable obstacles for future research. Instead, they signify issues to consider, highlight the opportunities for significant contributions, and establish a foundation for specific guidelines and recommendations for conducting economic evaluations of continuing care interventions.

6. Research Guidelines and Recommendations

The scarcity of rigorous empirical economic studies of continuing care interventions may partially be due to the lack of conceptual and practical guidance on how to conduct such studies.
One of the goals of this article is to begin filling this void by providing recommendations for future research in this area. This section offers both methodological and empirical guidelines for the economic evaluation of continuing care models of addiction treatment. Table 2 summarizes these research recommendations.

- Before embarking on an extensive examination of the economic merits of a continuing care intervention, it is critical that effectiveness is already established. Although economic benefits of treatment are not always congruent with clinical effectiveness (Dismuke et al. 2004; Sindelar et al. 2004), it is best to have at least some preliminary evidence of the effectiveness. Sometimes, the outcome evaluation is conducted simultaneously with the economic evaluation and the results emerge together. If an outcome evaluation is ongoing, then a review of existing and related clinical studies might provide some evidence of effectiveness. In this case, the analyst should justify why the selected studies provide a representative subset of studies from the available clinical literature (Drummond et al. 2005).

- A first step in conducting economic evaluations of continuing care is to identify and describe the treatment alternatives to be compared. Policymakers and treatment providers make decisions about how to allocate scarce healthcare resources to substance abuse treatment, and economic evaluations of addiction treatment seek to provide useful information in deciding among different uses of these scarce resources. Essentially, economic evaluations formalize and quantify the choices between competing alternatives. There are many forms of continuing care models. When the initial phase of treatment is delivered in a residential setting, continuing care is generally offered to patients as outpatient treatment. In an outpatient service delivery model, patients who complete an initial phase of intensive outpatient care step down to standard outpatient treatment. In these cases, there are several alternative ways to evaluate the economic aspects of the continuing care phase of treatment. Patients receiving the treatment continuum
can be compared to patients receiving only the initial phase of care or to a no treatment control group. Sometimes addiction treatment is delivered as stepped-down care followed by aftercare. Patients might start in a residential setting, step down to intensive outpatient, and then move to standard outpatient care. Those clients receiving the full continuum of care might be compared to those receiving no treatment, to patients receiving the residential part of treatment only, or to patients receiving residential plus intensive outpatient care without additional aftercare. In all of these scenarios, researchers must identify the best and most appropriate combination of interventions. Most economic evaluations of a continuing care intervention would probably compare the costs and benefits of a treatment episode that includes the continuing care intervention to those for the same initial treatment and no additional aftercare. Another alternative for the comparison group could be patients receiving the primary treatment plus another form of continuing care. This type of analysis would try to determine the type of continuing care services that are more cost effective or cost beneficial. The key point here is that investigators should clearly specify and describe the intervention(s) and comparison group(s) before initiating a formal economic evaluation.

- As noted earlier, ambiguity in structure and duration make it challenging to identify exactly what constitutes continuing care. McKay (2005) provides definitions of terms used in the addiction treatment field in relation to continuing care. Aftercare, step-down, or continuing care are all used to refer to less intensive care delivered after an initial phase of treatment is completed. A more general definition of continuing care refers to longer duration treatment. Stepped care and continuum of care denote entire treatment protocols that consist of phases of different types and intensity of treatment. Again, researchers should be very clear and consistent in their definitions of continuing care and phases of treatment.
• RCTs are viewed as the gold standard in economic evaluations of substance abuse treatment, or any health care intervention for that matter. However, in long-term studies, clients sometimes enter one or more other treatment programs after the study conditions and supervision have ended. Careful record keeping and rigorous statistical modeling should be used to address potential biases. Even with these safeguards in place, randomized designs and natural experiments are rare. RCTs are sometimes considered unethical if treatment is withheld for patients in the control group, and they are sometimes infeasible, as not every alternative of care being compared is available in a given location (Homer, Drummond, and French 2007). Whenever RCTs are not possible, proper econometric techniques should be used to minimize the potential bias introduced by self selection, important omitted variables, and other statistical problems.

• Currently, most addiction treatment in the U.S. is delivered as outpatient care (McKay 2001a). Therefore, most future research should probably focus on continuing care that follows outpatient interventions in order to provide a better understanding of the contemporary substance abuse treatment system and to be able to use the findings in the decision-making process.

• The majority of the economic studies reviewed in this article evaluated in-prison TC or other publicly-funded treatment programs. Although most of the substance abuse treatment in the U.S. is delivered by publicly-funded programs and more economic evaluations of these programs are needed, future research should also examine privately-financed programs to provide valuable economic information on all types of addiction treatment.

• Given the chronic nature of substance abuse, reliable long-term follow-up data should be collected and analyzed, as most existing studies report short-term findings. Some of the economic benefits might extend over a longer period or they could dissipate quickly. A short-
term follow-up period does not provide a complete picture of treatment outcomes. Long-term economic evaluations will provide valuable information about the economic benefits of treatments over time, as many programs and clients will have different trajectories of costs and benefits over the long-run vis-à-vis short-run measures.

- As mentioned earlier, the first step of any economic evaluation of treatment is estimating the costs of services. Although other data collection and cost estimation instruments have been developed, the DATCAP has been updated and refined since the early 1990s, applied successfully to over 100 substance abuse programs, gathers detailed and rigorous information on treatment resources and costs, and calculates various economic cost factors (e.g., marginal, average, and total cost). When a continuum of care is evaluated, the phases of treatment can vary substantially in duration, type, and intensity of services provided. The DATCAP or a similar validated cost instrument should be administered separately for each phase of care to calculate the full cost of treatment.

- Economic cost data should be collected for all services provided as part of a treatment continuum, including services received by patients in the period between different phases of care or even external to the conditions under study.

- When selecting the most appropriate and feasible economic evaluation method, researchers should strongly consider BCA, as this approach is the most comprehensive and policy-relevant form of economic evaluation and it has been applied successfully to numerous single-episode interventions. Moreover, BCA has numerous advantages over CEA when evaluating addiction treatment given the host of positive and negative externalities than can’t be included in a single outcome measure.

- Economists often find it necessary to use measures from clinical instruments as sources of outcome data. As these instruments were not designed for economic evaluations of substance
abuse interventions, they do not always include outcomes that can be converted to economic benefits, such as employment and earnings, health care utilization, educational changes, or criminal activity. Economists are therefore encouraged to develop economic evaluation modules to collect the necessary data on such measures.

- After selecting important outcome measures from assessment instruments, it is recommended that current and reliable unit cost estimates (i.e. monetary conversion factors) be obtained or developed from reputable data sources. Moreover, current monetary conversion factors that pertain to the specific location and setting of the intervention would be ideal. Whenever possible, more than one monetary conversion factor should be obtained for each outcome chosen, as sensitivity analyses are an important part of economic evaluations.

- Due to the long-term nature of continuing care interventions, costs and benefits might accrue over multiple years, and most costs occur earlier than benefits. Thus, it is critical to discount future costs and benefits to present values. For example, an economic evaluation of a continuing care intervention might be conducted as a comparison between the primary phase of treatment only and the initial treatment plus continuing care. If we assume a positive rate of time preference (i.e., most individuals prefer benefits today rather than in the future and would like to delay costs) and earlier-accruing benefits from the first alternative, initial treatment plus continuing care would appear more attractive without discounting. Considerable debate surrounds the choice of a discount rate, but we would recommend the generally accepted social rate of time preference (5%) for comparability with other available studies. Other discount rates that appear in the literature are 3% and 10%. Whereas discounting costs and benefits to present values is strongly recommended in BCAs, opinions differ on whether to discount longer-term outcomes in CEAAs (Drummond et al 2005). Some argue that discounting health care outcomes such as years of life gained places less value on health for future generations. Others argue that
discounting costs and not outcomes could lead to artificial preferences for programs that have delayed costs and outcomes relative to those that accrue costs and outcomes earlier. For this reason, we recommend discounting future costs and outcomes using the same social discount rate, whenever possible.

- To be able to conduct improved and more comprehensive economic evaluations of continuing care, economists should actively participate during the early stages of design development. When economists join a research team after data collection instruments are finalized and study groups are formed, analysis strategies are constrained and it becomes very difficult to modify the final parameters of an economic evaluation.

7. Conclusion

Decision makers rely on economic evaluations when allocating scarce health care resources to addiction treatment interventions. Clinical studies suggest that substance abuse is a chronic disorder and there is a growing body of evidence that providing patients with a continuum of care is more effective than acute interventions. Clinical studies of continuing care should be linked to economic studies to provide a comprehensive perspective on the effectiveness and cost-effectiveness of continuing care. This review points to the need for systematic economic analyses of continua of care to assess the economic merits of adding lower intensity continuing care to a primary treatment. Although only a few economic studies are currently available in the published literature, there is evidence that continuing care models are more cost-effective than acute treatment episodes. Stated differently, an initial treatment episode alone is usually not enough to maximize economic value given the chronic and relapsing nature of addiction. The comprehensive review of existing economic studies of continuing care and their limitations indicate numerous opportunities for future research in this field. Although challenges exist when estimating the economic costs and benefits of continuing care addiction treatment, they do not represent insurmountable obstacles.
The practical guidelines and recommendations proposed in this article are meant to aid health economists, health services researchers, policymakers, and providers by offering a foundation for future research in this emerging field.
References


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<th>Gaps and Limitations</th>
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<tr>
<td>1. The majority of the existing economic studies evaluate addiction treatment for special populations.</td>
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<td>2. Mostly publicly-funded programs serving low-income populations are evaluated.</td>
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<td>3. BCA methodology is rarely used in economic evaluation of continuing care interventions.</td>
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<td>4. Random assignment is rare. Patients enter the aftercare phase of the treatment program voluntarily.</td>
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<td>5. Continuing care studies usually include relatively small samples.</td>
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<td>6. The comparison group selected in some continuing care studies does not reflect a “no-treatment” control group.</td>
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<td>7. Long-term follow-up studies are very rare.</td>
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<td>8. The ASI, used by most continuing care studies as the core instrument, is not well suited for economic evaluations of addiction treatment, as key economic outcomes are not collected.</td>
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<td>10. Economic evaluation methods used in existing studies are not always consistent and standardized.</td>
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<td>Research recommendations</td>
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<td>1  Provide (preliminary) evidence of the effectiveness of the intervention under study.</td>
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<td>2  Identify and clearly describe the treatment alternatives to be compared.</td>
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<td>3  Be consistent in the definitions used for continuing care and phases of treatment.</td>
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<td>4  Evaluate more RCTs. Whenever this is not possible, employ proper econometric techniques to minimize the potential bias from observational studies.</td>
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<td>5  Conduct more economic evaluations of continuing care interventions following outpatient treatment.</td>
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<td>6  Perform more economic evaluations of continuing care treatments in privately-financed programs.</td>
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<td>7  Collect reliable long-term follow-up data.</td>
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<td>8  Use the DATCAP or a similar validated resource use and cost instrument to estimate opportunity costs of continuing care interventions.</td>
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<td>9  Collect economic costs for all services provided as part of a treatment continuum.</td>
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<td>10 Perform more BCAs of continuing care treatment programs.</td>
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<td>11 Encourage the design of economic evaluation modules to collect important economic outcome data.</td>
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<td>12 Obtain current and reliable unit cost estimates from reputable data sources.</td>
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<td>13 Discount future costs, outcomes, and economic benefits to present values.</td>
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<tr>
<td>14 Perform improved and more comprehensive economic evaluations of continuing care by integrating economists during the early stages of design development.</td>
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