Published in final edited form as:

Drug Alcohol Depend. 2012 July 1; 124(1-2): 57–62. doi:10.1016/j.drugalcdep.2011.12.006.

Remission from Alcohol and Other Drug Problem Use in Public and Private Treatment Samples Over Seven Years

Kevin L. Delucchi^{1,*}, Andrea H. Kline Simon², and Constance Weisner^{1,2}

¹Department of Psychiatry, University of California, San Francisco, 401 Parnassus Ave., San Francisco, CA, 94143

²Kaiser Permanente Division of Research, 2000 Broadway, Oakland, CA 94612

Abstract

Background—The treatment of alcohol and other drugs is now more commonly framed in terms of a chronic condition which requires ongoing monitoring. A model which includes continuing access to health care may optimize outcomes. Most studies of chronic care models have not included health care and have only examined short term effects.

Methods—The sample (n = 783) included consecutive admissions in ten public and private alcohol and other drug (AOD) treatment programs followed over seven years. The outcome was remission which was defined as alcohol and drug abstinence or non-problem use.

Results—In the private sample, receiving health care services predicted remission across the seven years; however this did not occur in the public sample. More patients in the public treatment sample received AOD treatment readmissions each year, while more of those in the private sector received psychiatric and general health visits. Except for drug problem severity, there were no other clinical differences between the samples. There were no differences in the proportions of patients in the two sectors who received the full spectrum of chronic care services. In the final models, 12-step participation was markedly significant for both samples.

Conclusions—Models of chronic care for substance use need to consider differences between private and public treatment and should take into account that individuals may not always have access, or avail themselves of services that may optimize long-term outcomes.

Keywords

alcohol; chronic care; longitudinal; treatment services

© 2011 Elsevier Ireland Ltd. All rights reserved.

*Corresponding author: Kevin L. Delucchi, Tel: +1-415-476-4180; fax +1-415-476-7677, kevin.delucchi@ucsf.edu.

Contributors: Dr. Delucchi led the analytic design and wrote sections of, and organized, the first draft of the manuscript. Ms. Kline Simon conducted the analysis and drafted the methods and results sections. Dr. Weisner developed the original idea and drafted the Discussion section. All authors edited the final draft.

Conflict of Interest

All three authors declare they have no conflict of interest.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1. Introduction

One of the more challenging aspects of the study and treatment of alcohol and other drug (AOD) disorders is understanding its true nature and course over time—a course shaped by numerous factors including societal, economic, and genetic forces as well as personal decisions such as what form of treatment is acceptable or feasible for a person at a given time (Institute of Medicine, 2006). Such problems are increasingly framed as a chronic illness (Institute of Medicine, 2006; National Institute on Alcohol Abuse and Alcoholism, 2006). That is, following a treatment episode, relapse, recovery and remission are likely. This conceptualization implies that long-term effective treatment needs to be continuing and services models which are consistent with that concept must be developed (Saitz et al., 2008). Such an approach is seen in disease management programs for other chronic illnesses such as diabetes. A model which includes health care may be more sustainable over the longer run and prove effective in preventing problems in the future and lengthening periods of remission.

Several approaches and models are currently under investigation. In one approach researchers have studied extended “step-down” or aftercare programs designed to follow a treatment episode which have been associated with better outcomes (Godley et al., 2007; Grella and Greenwell, 2007; McKay et al., 2009; Ritsher et al., 2002). Another important example associated with better outcomes is Recovery Management Check-ups which involve quarterly management checkups after treatment (Dennis et al., 2003; Scott and Dennis, 2009). Lash and colleagues have also argued for, and found positive effects of, such models (Lash, 1998; Lash and Blosser, 1999; Lash et al., 2004; Lash and Dillard, 1996; Lash et al., 2001; Lash et al., 2007). These are typically included as an extension of the AOD program.

While these services are a more recent innovation in AOD treatment, informal services, particularly Alcoholics Anonymous (AA), have traditionally been the primary “chronic care” following treatment. AA and other 12-step participation is encouraged by most public and private treatment programs (Institute of Medicine, 2006), and has been shown to benefit long-term outcomes (Institute of Medicine, 2006; Kaskutas, 2009; Kaskutas et al., 2005; Tonigan et al., 1996; Witbrodt et al., in press).

Both formal interventions and 12-step programs, however, take place outside the general health care setting. While 12-step involvement can continue through life, the treatment-based extended care services do end and the patient becomes disconnected from the clinic and its resources. The course of the illness is no longer routinely monitored by the clinic. So a model for on-going care is one more consistent with that for other chronic problems—one requiring the linkage of primary medical care after specialty care. Such a chronic care model which includes medical care is consistent with the observation that AOD patients typically have other medical and psychiatric conditions which are ongoing after treatment (Institute of Medicine, 2006; Mertens et al., 2008; Mertens et al., 2003; Weisner et al., 2001).

Clearly, access to health care is necessary for such a chronic care model to be applicable to the AOD field. While public AOD treatment is available through federal block grants, public health clinics operate primarily with Medicaid funds and having an AOD disorder alone does not qualify one for such benefits. Few uninsured AOD patients have Medicaid (Institute of Medicine, 2006). Individuals in public programs do not have the same access to general health care as do patients in private programs with health insurance or the ability to self-pay. Thus, examining the role of formal and informal services in producing long-term outcomes within the context of both systems of care is important.

A primary limitation of the studies published to date is a limited time frame. The real test of a chronic care model is to look for effects over several years. Toward that end, we examined the relationship of service use to remission from a seven-year longitudinal study of dependent and problem drinkers. We asked the question of whether, controlling for relevant patient characteristics, the simple receipt of general health visits, mental health services, alcohol and drug severity, and 12-step participation over time was related to remission from problem drinking and drug use. We examined this in the context of a population based sample of private and public, AOD treatment agencies in a California county.

2. Methods

2.1. Sample

The original sample (n = 926) included consecutive admissions in ten public and private AOD programs in Contra Costa County that met the following criteria (Kaskutas et al., 1997): 1) at least one new intake per week, 2) drugs other than alcohol were not the primary focus (e.g., the two methadone maintenance programs were not included) and 3) this was a first line treatment entry (e.g., aftercare programs were excluded). The *public programs* included two detoxification programs, two residential programs, and two outpatient programs. The four *private programs* were managed care and fee-for-service programs and included detoxification, inpatient, and outpatient services. Structured in-person interviews, by trained interviewers, were conducted before the end of their third day of residential treatment or third outpatient visit. Informed consent was obtained and participation was independent of receiving agency services. The baseline recruitment rate across treatment programs was 80% (Kaskutas et al., 1997).

Weights, applied to all analyses, were used to adjust the baseline treatment samples for unequal probabilities of selection, non-response and fieldwork durations in programs within each treatment sector (public, private) (Kaskutas et al., 1997; Tam, 1997).

Follow-up interviews, also conducted by trained interviewers, were conducted at 1, 3, 5 and 7 years post-baseline with response rates of 78%, 75%, 72% and 67%, respectively. The models were estimated using data from 1- through 7-years post-baseline, and included only those participants who had at least one follow-up during that time period (n=783).

Compared to those included in the analysis, those lost to follow-up (n=143) were mostly male, African American, less educated, had higher rates of unemployment, and more were unmarried and uninsured (all $p < 0.05$). However, we found no differences between those included in the number of drinks or drugs used in the year prior to baseline. As we were interested in understanding how health care visits affects remission from AOD use over time for individuals in the two initial treatment sectors, we did a stratified analysis on the initial treatment type; public (n=231) and private (n=552).

2.2. Measures

2.2.1. Individual Characteristics—Age, education level (categorized for analysis as; some college, no college), income (categorized for analysis as; at least \$25,000 a year, less than \$25,000 a year), gender, ethnicity (categorized for analysis as; white, other), employment status (employed, unemployed) and marital status (married, single) were measured at baseline. Severity of AOD use and related problems at baseline and each follow-up were measured by the alcohol, drug, medical and psychiatric composite scores of the Addiction Severity Index (ASI) instrument (McLellan et al., 1992). For each follow-up, we created a set of dichotomous markers to flag whether the patient had alcohol, drug, medical or psychiatric problems at prior time points (1 if the lagged ASI score at the prior time point was greater than 0, 0 otherwise). Our main interests were in the associations

between the presence of problems at prior time point, use of corresponding services and remission at the following time point.

2.2.2. Services—Three different health care service types were examined in relation to remission: alcohol and other drug (AOD) treatment readmissions, general health visits and psychiatric visits. As zero and one were the most common number of services received, binary indicators for services received versus not were used with little loss of information. Specifically, the AOD treatment indicator was constructed as: 1 for any visits to an outpatient or inpatient AOD program, excluding DUI programs, in the prior 12 months; 0 otherwise. The general health care visits measure was based on the question “any other medical visits in the prior 12 months” which excludes hospital, emergency room, dental, AOD and psychiatric visits. The general health care variable was equal to 1 for any other medical visits in the prior 12 months; 0 otherwise. The psychiatric visits indicator was equal to 1 if there were any visits to a psychologist, psychiatrist, therapist or social worker in a public clinic or private practice in the prior 12 months; 0 otherwise. Finally, we included Alcoholics Anonymous (AA) attendance as it is considered an important form of chronic care by both public and private systems (Institute of Medicine, 2006). Similarly, due to its observed distribution, the AA attendance indicator was equal to 1 if there were any AA meetings attended in the prior 12 months; 0 otherwise.

A measure approximating chronic or continuing care was created by combining the above formal (but not AA) services with the need for them based on our severity measures. At each time point, we defined those getting such health care as having: 1) at least one general health visit in the past year; 2) both alcohol and drug ASI at the assessment prior to the current one (i.e., lagged) equal to zero OR above zero and at least one visit to AOD treatment in the past year; and 3) lagged psychiatric ASI equal to zero OR above zero and at least one psychiatric visit in the past year.

2.2.3. Outcome Measure—Our time-varying outcome measure was *remission* for the prior 30 days at each follow-up. Individuals were classified as “in remission” if they were *abstaining* from alcohol and drugs or were *non-problem users*. We defined “non-problem users” as those who were not completely abstinent, but who: (1) used alcohol, but had no days of drinking five or more drinks in a day, and drank only four times or less in the prior month; (2) did not use marijuana more than once in the prior 30 days; (3) had no other drug use in the prior 30 days; and (4) reported that they had none of the following alcohol related problems in the prior month: suicidal ideations, violent behavior, or serious conflicts with family or friends. This definition was developed from the literature examining long-term outcomes in individuals with alcohol and drug problems (Mertens et al., 2008; Moos and Moos, 2003; Ouimette et al., 2000).

2.3. Data analysis

Weighted standard summary statistics were used to describe the samples. Pearson chi-square analyses were used to compare the difference between remitted and non-remitted individuals for the categorical variables; t-tests were used for the continuous variables. In each sample, public (n=231) and private (n=552), differences between remitted and non-remitted individuals by individual characteristics, service use and severity were examined. We estimated and tested non-linear mixed-effects multivariate stepwise logistic regression models with a random intercept using PROC NLMIXED in SAS. In this model the covariates have an influence on the subject effect.

We fit initial models for the two samples which included only baseline demographic variables. If a baseline variable was significant at $p < .10$, in either the public or private

sample, it was included in all future models. As a result, three baseline measures were included in all models in addition to time of follow-up (coded as 0, 2, 4, 6 at 1-, 3-, 5- and 7-year follow-up); income, education and age at baseline. In the second step, the binary markers created for lagged alcohol, drug, medical, and psychiatric ASI were added to the demographic models. In the third step, the health care variable made up of the severity measures and the service use variables was added to the model containing the baseline demographics only. For the fourth and final step, we added AA meeting attendance. Interactions between the services (including AA) and their corresponding ASI variable as well as interactions between the services (including AA attendance) and time were also investigated.

3. Results

Women made up 37% of the full sample ($n = 783$), and the mean age was 38.4 years. The sample was 57% white, 30% African American, and 5% Hispanic. Twenty-seven percent had at least some college education, and 41% had an annual income of \$25,000 or higher.

Individual characteristics and service use over time were compared between those who entered public treatment programs and those entering private treatment programs at baseline. Relative to the private programs, public patients were younger, fewer were employed, fewer were married, a larger proportion were African American and fewer were white; they had incomes less than \$25,000 a year and had fewer years of education (no college) (all $< .05$, Table 1). There were no significant gender differences. ASI drug severity measures at baseline were higher in the public sample (median 0.106 vs. 0.073 for the public and private samples, respectively, $p < 0.001$); however, alcohol, psychiatric, and medical severity were similar.

A higher proportion of individuals in the *private* treatment sample had general medical visits over time (56% of the private sample vs. 45% of the public sample, $p = 0.011$; 50% vs. 41%, $p = 0.020$; 55% vs. 43%, $p = 0.003$; 68% vs. 58%, $p = 0.023$ at 1, 3, 5, and 7 years, respectively). Those in private treatment programs reported higher proportions of any psychiatric services in the prior 12 months throughout 7 years; however they were not significant. Rates of AOD treatment significantly differed between systems at 5 years, with 20% of the *public* sample reporting an AOD treatment readmission the year prior to 5 year follow-up; 11% of the private sample (p -value = 0.001). Those in *public* treatment programs also reported higher proportions of AA attendance in the prior 12 months than those in private programs (77% vs. 53%, $p < 0.001$; 55% vs. 39%, $p < 0.001$; 47% vs. 32%, $p < 0.001$; and 51% vs. 32%, $p < 0.001$ at 1 year, 3 years, 5 years, and 7 years, respectively). (Table 2)

In the first step, in the private treatment sample, age and income (\$25,000+, <\$25,000) were significantly associated with remission over time; education level (some college, no college) was significant in the public treatment sample. Gender, ethnicity (white, other), employment status (employed, unemployed), and marriage status (married, single) were not significantly related to remission in either sample. Therefore, the final baseline models for both public and private initial treatment samples were limited to age, income and education level (Tables 3 and 4).

In the second step, all four severity measures (alcohol, drug, medical and psychiatric ASI) were added to the model. In the private sample having alcohol ASI scores of 0 at prior time points and having psychiatric ASI scores of 0 at prior time points significantly predicted remission over time. In the public sample both alcohol and psychiatric ASI scores of 0 at prior time points also significantly predicted remission over time. (Tables 3 and 4).

Our third model included three components: regular general health visits, psychiatric services as needed determined by the psychiatric ASI score, and AOD treatment as needed determined by the drug and alcohol ASI scores. Based on this definition of chronic or continuing care, 13%, 15%, 13% and 15% in the private sample, and 14%, 15%, 14% and 14% in the public sample, received such care at 1, 3, 5, and 7 years, respectively; there were no significant differences in proportions receiving care between public and private samples over time (Table 2).

Multivariate mixed-effects logistic regression models examining the relationships between health care and remission over time (step 3) for the private sample indicated that the odds of remitting for those who received care were 1.50 times the odds for those who did not (adjusted OR = 1.50, 95% C.I. = 1.01, 2.21, $p = 0.046$) (Table 3). However, receiving health care was not associated with remission over time for those in the public sample (Table 4).

In the final step we added AA meeting attendance to the model. Individuals who attended at least one AA meeting in the year prior were more likely to be remitted in both public and private samples than those who did not (Private OR = 1.89, CI = 1.34, 2.67, $p < 0.001$; Public OR = 1.76, CI = (1.15, 2.69), $p = 0.01$). The health care variable was not significant in either sample after adding AA attendance (Tables 3 and 4).

4. Discussion

This paper examined the role that receipt of health care and informal services (AA) played in remission of AOD problems following specialty AOD treatment. We contrasted public and private treatment sectors, given their different structures and patient characteristics, as well as patients' potentially different access to health services. We further examined this in the context of AA participation — the AOD field's long-standing informal approach to chronic care.

We found that in the private sample, independent of demographic characteristics, receiving health care services predicted remission across the seven years. However, in the public sample, it did not predict remission. In attempting to understand the differences, we found that patients in the two sectors received different types of services. More of those in the public initial treatment sample received AOD treatment readmissions each year (both inpatient and outpatient), while more of those in the private sector received psychiatric and general health visits each year. It is not clear whether the health care and psychiatry visits were more important than the AOD readmissions, or whether the quality of services was different between sectors. Due to the federal Block Grant, access to AOD treatment is higher than to the other two service types (Weisner, 1993). Further, because a substantially larger proportion of those in private agencies had health insurance across the seven years, they may have had more continuity in their relationships with providers, with potentially more help with their AOD problems. It is also clear that the populations entering the two systems at our index episode were very different, with more in the older age group in the private system (with perhaps more health problems), more African Americans and fewer whites, lower education, lower income, lower employment and fewer married in the public than the private sample. These characteristics may have impacted how individuals benefited from their care. Interestingly, except for drug problem severity, there were no other clinical differences between the samples. In both samples, the continuing presence of some degree of alcohol-related severity was related to a decreased likelihood of remission. In contrast, the presence of psychiatric severity was a strong predictor of remission in both samples before the health care measure was added to the models.

Of particular interest is that there were no differences in the proportions of patients in the two sectors who received the full spectrum of health care services. Both were low, with the

rate varying between 13% and 15% across all waves. Thus, even though most of those in the private agencies likely had good access to services, their utilization was also low. As the utilization literature has shown, individuals with severe AOD problems typically do not make use of healthcare as others do, using more emergency services rather than sustained primary care with consistent primary care contact (Parthasarathy and Weisner, 2005; Parthasarathy et al., 2001). These findings suggest the importance of developing interventions for use in AOD treatment which would develop linkages to health care. In the few studies of linkages to primary care, some evidence exists that linkage to primary care appears to be workable and may be effective (Samet et al., 2001) and, at least for alcohol related problems, management through primary care is feasible (Friedmann et al., 2006; Friedmann et al., 2003). A few studies provide examples of randomized trials of the effects of integrating primary medical care and addiction treatment “during” treatment (Weisner et al., 2001; Willenbring and Olson, 1999), finding a positive benefit and cost-effectiveness.

An important finding is that when AA was added to the models, it was markedly significant for both public and private samples. In the private sample, health care and the demographic characteristics were no longer significant. This finding is consistent with other literature on the importance of AA in different samples and over time (Kaskutas et al., 2005; McKellar et al., 2003; Moos and Moos, 2004, 2006; Tonigan et al., 2003; Witbrodt et al., in press; Zemore and Kaskutas, 2004). However, its impact in the context of formal health services has not been examined. The significance of AA is not surprising, because although attendance is often a result of pressure to attend by AOD treatment (and legal, employment and family pressure), even among those patients it may suggest a stronger commitment to recovery, and thus more likelihood of remission.

Limitations include that these are observational, self-reported data which is common in studying such research questions. However, we have used up-to-date methods for addressing self-selection effects, and they provide one of the initial steps necessary to determine whether such a model has potential outcome benefits in order to develop more empirical studies. The service data was not very specific and some attrition due to participant drop out over time was observed. Although our analytic methods allowed the use of all collected data for estimation, it is possible the analyzed sample did not fully represent the baseline sample. Also, the database lacks information on length of stay in the index treatment. There could be differences due to degree of service utilization of each type; these data are not available across waves. We only have data on AA participation, rather than other types of 12-step participation, and AA participation seemed to be related to AOD treatment readmissions, raising a question about the direction of any causal pathway. However, AA use is correlated with AOD treatment visits in both samples ($r = 0.279$, $p < .001$; $r = 0.225$, $p < .001$ for public and private respectively). The 30-day window may mean remission rates are underestimated. Finally, due to unequal sub-sample size, differences in statistical power may account for some of the private-public differences.

While not directly testing a “chronic care” model, the implications of these findings include that substantial differences may exist in developing medical-home related chronic care or disease management programs for AOD problems similar to those for other health conditions. Applying this to the AOD field is challenging because public and private treatment have traditionally taken place in institutions separate from mainstream health care, and until recently treatment (especially in public agencies) has not been based on a medical model (Institute of Medicine, 2006).

In this regard, a key contribution of the study is its contrast of public and private sectors, which is important in the context of the many current changes in health care policy, which are intended to result in more similarity in systems. The role of health care is particularly

relevant and much more feasible than in the past. U.S. health reform legislation, the Affordable Care Act, should provide health insurance to many of the currently uninsured individuals, and potentially provide them with more continuity of care (National Association of Community Health Centers, 2009). At the same time, it brings large resources to public health clinics to provide more AOD and psychiatric care, which may facilitate better communication across AOD and health care systems. A focus of the Affordable Care Act is on integrating care for behavioral health and general health care. Our findings, consistent with other research, show that individuals with AOD problems do not avail themselves of needed services, even when they have access. There have been very few studies of linkages between AOD treatment and health care following treatment (Chi et al., 2011; Saitz et al., 2004; Samet et al., 2001), but those which exist show positive benefits. They build on research showing the importance of including medical care “during” treatment (Weisner et al., 2001). The data suggest that patients may benefit from treatment policy and treatment providers developing stronger referral processes to health care and help patients realize the importance of such care. At the same time, we emphasize the importance of continuing research on interventions that link patients to treatment, as well as research on the interactions between health care providers and patients in regard to AOD problems.

Acknowledgments

Ms Agatha Hinman generously formatted the manuscript including the reference section.

Role of the Funding Sources

This study was supported by the National Institute on Alcohol Abuse and Alcoholism grant # RO1AA-09750 and a National Institute on Drug Abuse grant P50DA09253..

References

- Chi FW, Parthasarathy S, Mertens JR, Weisner CM. Continuing care and long-term substance use outcomes in managed care: initial evidence for a primary care based model. *Psychiatr Serv.* 2011; 62:1194–2000. [PubMed: 21969646]
- Dennis M, Scott CK, Funk R. An experimental evaluation of recovery management checkups (RMC) for people with chronic substance use disorders. *Eval Program Plann.* 2003; 26:339–352.
- Friedmann PD, Hendrickson JC, Gerstein DR, Zhang Z, Stein MD. Do mechanisms that link addiction treatment patients to primary care influence subsequent utilization of emergency and hospital care? *Med Care.* 2006; 44:8–15. [PubMed: 16365607]
- Friedmann PD, Zhang Z, Hendrickson J, Stein MD, Gerstein DR. Effect of primary medical care on addiction and medical severity in substance abuse treatment programs. *J Gen Intern Med.* 2003; 18:1–8. [PubMed: 12534757]
- Godley MD, Godley SH, Dennis ML, Funk RR, Passetti LL. The effect of assertive continuing care on continuing care linkage, adherence and abstinence following residential treatment for adolescents with substance use disorders. *Addiction.* 2007; 102:81–93. [PubMed: 17207126]
- Grella CE, Greenwell L. Treatment needs and completion of community-based aftercare among substance-abusing women offenders. *Womens Health Issues.* 2007; 17:244–255. [PubMed: 17544296]
- Institute of Medicine. Improving the Quality of Health Care for Mental and Substance-Use Conditions: Quality Chasm Series. National Academies Press; Washington, DC: 2006.
- Kaskutas, L.; Russell, G.; Dinis, M. Technical Report on the Alcohol Treatment Utilization Study in Public and Private Sectors. Alcohol Research Group; Berkeley, CA: 1997.
- Kaskutas LA. Alcoholics Anonymous effectiveness: faith meets science. *J Addict Dis.* 2009; 28:145–157. [PubMed: 19340677]
- Kaskutas LA, Ammon L, Delucchi K, Room R, Bond J, Weisner C. Alcoholics Anonymous careers: patterns of AA involvement five years after treatment entry. *Alcohol Clin Exp Res.* 2005; 29:1983–1990. [PubMed: 16340455]

- Lash SJ. Increasing participation in substance abuse aftercare treatment. *Am J Drug Alcohol Abuse*. 1998; 24:31–36. [PubMed: 9513628]
- Lash SJ, Blosser SL. Increasing adherence to substance abuse aftercare group therapy. *J Subst Abuse Treat*. 1999; 16:55–60. [PubMed: 9888122]
- Lash SJ, Burden JL, Monteleone BR, Lehmann LP. Social reinforcement of substance abuse treatment aftercare participation: impact on outcome. *Addict Behav*. 2004; 29:337–342. [PubMed: 14732421]
- Lash SJ, Dillard W. Encouraging participation in aftercare group therapy among substance-dependent men. *Psychol Rep*. 1996; 79:585–586. [PubMed: 8909084]
- Lash SJ, Petersen GE, O'Connor EA, Lehmann LP. Social reinforcement of substance abuse aftercare group therapy attendance. *J Subst Abuse Treat*. 2001; 20:3–8. [PubMed: 11239722]
- Lash SJ, Stephens RS, Burden JL, Grambow SC, DeMarce JM, Jones ME, Lozano BE, Jeffreys AS, Fearer SA, Horner RD. Contracting, prompting, and reinforcing substance use disorder continuing care: a randomized clinical trial. *Psychol Addict Behav*. 2007; 21:387–397. [PubMed: 17874889]
- McKay JR, Carise D, Dennis ML, Dupont R, Humphreys K, Kemp J, Reynolds D, White W, Armstrong R, Chalk M, Haberle B, McLellan T, O'Connor G, Pakull B, Schwartzlose J. Extending the benefits of addiction treatment: practical strategies for continuing care and recovery. *J Subst Abuse Treat*. 2009; 36:127–130. [PubMed: 19161893]
- McKellar J, Stewart E, Humphreys K. Alcoholics Anonymous involvement and positive alcohol-related outcomes: cause, consequence, or just a correlate? A prospective 2-year study of 2,319 alcohol-dependent men. *J Consult Clin Psychol*. 2003; 71:302–308. [PubMed: 12699024]
- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The fifth edition of the Addiction Severity Index. *J Subst Abuse Treat*. 1992; 9:199–213. [PubMed: 1334156]
- Mertens JR, Flisher AJ, Satre DD, Weisner CM. The role of medical conditions and primary care services in 5-year substance use outcomes among chemical dependency treatment patients. *Drug Alcohol Depend*. 2008; 98:45–53. [PubMed: 18571875]
- Mertens JR, Lu YW, Parthasarathy S, Moore C, Weisner CM. Medical and psychiatric conditions of alcohol and drug treatment patients in an HMO: comparison with matched controls. *Arch Intern Med*. 2003; 163:2511–2517. [PubMed: 14609789]
- Moos RH, Moos BS. Risk factors for nonremission among initially untreated individuals with alcohol use disorders. *J Stud Alcohol*. 2003; 64:555–563. [PubMed: 12921198]
- Moos RH, Moos BS. Long-term influence of duration and frequency of participation in Alcoholics Anonymous on individuals with alcohol use disorders. *J Consult Clin Psychol*. 2004; 72:81–90. [PubMed: 14756617]
- Moos RH, Moos BS. Participation in treatment and Alcoholics Anonymous: a 16-year follow-up of initially untreated individuals. *J Clin Psychol*. 2006; 62:735–750. [PubMed: 16538654]
- National Association of Community Health Centers. [Accessed on Oct 21, 2010] America's health centers. 2009. http://www.nachc.org/client/documents/America%27s_%20Health_Centers_updated_11_09.pdf
- National Institute on Alcohol Abuse and Alcoholism. [Accessed on October, 11 2011] Five-year strategic plan (FY07-11): alcohol across the lifespan. 2006. <http://pubs.niaaa.nih.gov/publications/StrategicPlan/NIAAASTRATEGICPLAN.htm>
- Ouimette PC, Moos RH, Finney JW. Two-year mental health service use and course of remission in patients with substance use and posttraumatic stress disorders. *J Stud Alcohol*. 2000; 61:247–253. [PubMed: 10757135]
- Parthasarathy S, Weisner C. Five-year trajectories of health care utilization and cost in a drug and alcohol treatment sample. *Drug Alcohol Depend*. 2005; 80:231–240. [PubMed: 15916868]
- Parthasarathy S, Weisner C, Hu TW, Moore C. Association of outpatient alcohol and drug treatment with health care utilization and cost: revisiting the offset hypothesis. *J Stud Alcohol Drugs*. 2001; 62:89–97.
- Ritsher JB, McKellar JD, Finney JW, Otilingam PG, Moos RH. Psychiatric comorbidity, continuing care and mutual help as predictors of five-year remission from substance use disorders. *J Stud Alcohol Drugs*. 2002; 63:709–715.

- Saitz R, Larson MJ, Horton NJ, Winter M, Samet JH. Linkage with primary medical care in a prospective cohort of adults with addictions in inpatient detoxification: room for improvement. *Health Serv Res.* 2004; 39:587–606. [PubMed: 15149480]
- Saitz R, Larson MJ, LaBelle C, Richardson J, Samet JH. The case for chronic disease management for addiction. *J Addict Med.* 2008; 2:55–65. [PubMed: 19809579]
- Samet JH, Friedmann P, Saitz R. Benefits of linking primary medical care and substance abuse services: patient, provider, and societal perspectives. *Arch Intern Med.* 2001; 161:85–91. [PubMed: 11146702]
- Scott CK, Dennis ML. Results from two randomized clinical trials evaluating the impact of quarterly recovery management checkups with adult chronic substance users. *Addiction.* 2009; 104:959–971. [PubMed: 19344441]
- Tam, T. Technical Report on the Alcohol Treatment Utilization Study in Public and Private Sectors: Within and Across Sector Weights. Alcohol Research Group; Berkeley, CA: 1997.
- Tonigan, JS.; Connors, GJ.; Miller, WR. Participation and involvement in Alcoholics Anonymous. In: Babor, T.; DelBoca, FK., editors. *Matching Alcoholism Treatments to Client Heterogeneity: The Results of Project MATCH.* Cambridge University Press; New York: 2003. p. 184-204.
- Tonigan JS, Toscova R, WRM. Meta-analysis of the literature on Alcoholics Anonymous: sample and study characteristics moderate findings. *J Stud Alcohol.* 1996; 57:65–72. [PubMed: 8747503]
- Weisner C. Toward an alcohol treatment entry model: a comparison of problem drinkers in the general population and in treatment. *Alcohol Clin Exp Res.* 1993; 17:746–752. [PubMed: 8214407]
- Weisner C, Mertens J, Parthasarathy S, Moore C, Lu Y. Integrating primary medical care with addiction treatment: a randomized controlled trial. *JAMA.* 2001; 286:1715–1723. [PubMed: 11594896]
- Willenbring ML, Olson DH. A randomized trial of integrated outpatient treatment for medically ill alcoholic men. *Arch Intern Med.* 1999; 159:1946–1952. [PubMed: 10493326]
- Witbrodt J, Mertens JR, Kaskutas LA, Bond J, Chi FW, Weisner C. Do 12-step meeting attendance trajectories over 9 years predict abstinence? *J Subst Abuse Treat.* 2011 In press.
- Zemore SE, Kaskutas LA. Helping, spirituality and Alcoholics Anonymous in recovery. *J Stud Alcohol Drugs.* 2004; 65:383–391.

Table 1

Demographic Characteristics by Initial Treatment Type

	Private Treatment (N = 552)		Public Treatment (N = 231)		p-value
	N	%	N	%	
Age					
18-29	104	18.9	43	19.1	
30-39	193	34.8	103	46.0	
40-49	155	28.0	61	27.4	
>= 50	101	18.3	17	7.5	< .0001
Education Level					
< High School	54	13.1	95	28.2	
High School Graduate	215	52.4	184	54.3	
>= College	142	34.6	59	17.5	< .0001
Employed					
Baseline	272	49.2	37	16.8	< .0001
Ethnicity					
White	380	68.8	95	43.7	
African American	106	19.2	96	42.7	
Hispanic	38	6.3	10	4.4	
Other	32	5.8	21	9.3	< .0001
Gender					
Female	224	40.5	76	34.0	ns
Income					
< \$10,000	79	19.7	214	63.5	
\$10,000-\$19,999	52	12.8	53	15.7	
\$20,000-\$34,999	69	17.0	32	9.5	
\$35,000-\$49,999	78	19.5	18	5.4	
>= \$50,000	125	31.0	20	5.8	< .0001
Married					
Baseline	242	43.8	42	19.1	< .0001

Table 2

Service Use by Initial Treatment Type

	Private Treatment (N = 552)		Public Treatment (N = 231)	
	N	%	N	%
General Medical Visits				
Baseline	452	83.6	146	65.5
1 Year	289	56.0	91	45.4
3 Year	244	50.4	79	40.6
5 Year	262	55.3	79	42.5
7 Year	298	67.9	101	58.2
Psychiatric Visits				
Baseline	243	44.0	66	29.6
1 Year	252	48.9	89	44.2
3 Year	185	37.6	67	33.8
5 Year	172	36.4	54	28.9
7 Year	146	33.2	55	31.4
AOD Treatment Readmissions				
Baseline	254	45.9	165	74.6
1 Year	120	23.4	55	27.4
3 Year	85	17.1	39	19.4
5 Year	53	11.1	39	20.9
7 Year	42	9.5	37	21.1
AA Meeting Attendance				
Baseline	270	48.9	178	80.6
1 Year	268	53.1	147	76.8
3 Year	193	39.2	106	54.6
5 Year	153	32.2	87	46.5
7 Year	141	32.1	88	50.9
Health Care Visits *				
1 Year	73	13.1	31	14.0
3 Year	82	14.8	34	15.1
5 Year	72	12.9	32	14.2
7 Year	85	15.4	31	13.8

* Baseline could not be calculated because the variable is based on prior year severity measures

Table 3

Odds Ratios from Four Nested Models of 30-day Remission in Private Sample (N=552)

	Odds Ratio of 30-day Remission Step 1	Odds Ratio of 30-day Remission Step 2	Odds Ratio of 30-day Remission Step 3	Odds Ratio of 30-day Remission Step 4	95% Confidence Interval - Step 4
Time to Follow-up	0.96	0.92**	0.96	0.99	(0.93, 1.05)
Age at Baseline	1.02*	1.01	1.02*	1.02	(1.00, 1.04)
Education (some college [†])	1.14	1.19	1.12	1.05	(0.62, 1.76)
Income (\$25K [†])	1.71*	1.14	1.70*	1.80	(1.11, 2.91)
Lagged Alcohol ASI (> 0)		0.39***	X	X	X
Lagged Drug ASI (> 0)		0.79	X	X	X
Lagged Medical ASI (> 0)		1.11	X	X	X
Lagged Psychiatric ASI (> 0)		0.07***	X	X	X
Health Care Visits					
AA Meeting Attendance (at least one in the year prior)			1.50*	1.35	(0.91, 2.01)
				1.89***	(1.34, 2.68)

* p < .05,

** p < .01,

*** p < .001,

[†] p < 0.1

Note: (X) The lagged ASI variables are components of the health care variable, so they cannot be included in the model.

Table 4
Odds Ratios from Four Nested Models of 30-day Remission in Public Sample (N=231)

	Odds Ratio of 30-day Remission Step 1	Odds Ratio of 30-day Remission Step 2	Odds Ratio of 30-day Remission Step 3	Odds Ratio of 30-day Remission Step 4	95% Confidence Interval - Step 4
Time to Follow-up	0.97	0.93	0.97	0.99	(0.92, 1.08)
Age at Baseline	0.99	0.99	0.99	0.99	(0.96, 1.02)
Education (some college ⁺)	2.09 ⁺	1.77	2.07 ⁺	2.05 ⁺	(0.93, 4.50)
Income (\$25K ⁺)	1.17	1.46	1.17	1.13	(0.56, 2.31)
Lagged Alcohol ASI (> 0)		0.50 ^{**}	X	X	X
Lagged Drug ASI (> 0)		0.71	X	X	X
Lagged Medical ASI (> 0)		1.21	X	X	X
Lagged Psychiatric ASI (> 0)		0.05 ^{***}	X	X	X
Health Care Visits			1.14	1.04	(0.61, 1.77)
AA Meeting Attendance (at least one in the year prior)				1.76 ^{**}	(1.15, 2.69)

* p < .05,
 ** p < .01,
 *** p < .001,
⁺ p < 0.1

Note: (X) The lagged ASI variables are components of the health care variable, so they cannot be included in the model.