Published in final edited form as:

Drug Alcohol Depend. 2008 November 1; 98(1-2): 45–53. doi:10.1016/j.drugalcdep.2008.04.007.

The role of medical conditions and primary care services in five-year substance use outcomes among chemical dependency treatment patients

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Abstract

Introduction—Health problems are prevalent in chemical dependency (CD) treatment populations, and often precede reductions in substance use among untreated populations. Few studies have examined whether medical problems predict better long-term outcomes in treated individuals, or how primary care utilization and CD/primary care service integration affects long-term outcomes among those with health problems

Method—In a sample of 598 CD patients in a private health plan, logistic regression models examined whether Substance Abuse-related Medical Conditions (SAMCs), integrated medical and CD care, and on-going primary care predicted remission of CD problems at 5 years.

Results—Those with SAMCs were no more likely than others to be remitted at 5 years except among young adults and those with medical, but not psychiatric SAMCs. Higher levels of medical problem severity at intake and receiving integrated CD and primary care in the index treatment episode predicted remission in the full sample and among those with SAMCs. Among those with SAMCs, individuals with ongoing medical care—two to ten primary care visits—in the 5 years following intake were more likely to be remitted at 5 years than those with fewer visits.

Conclusions—This study highlights the potentially important role of medical services in the long-term treatment of CD disorders. CD treatment may benefit from a disease management approach similar to that recommended for other chronic medical problems: specialty care when the condition is severe followed by services in primary care when the condition is stabilized.

Keywords

Primary Care; Medical Comorbidities; Alcohol Dependence; Substance-Related Disorders; Treatment

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1. Introduction

Patients in chemical dependency (CD) treatment have high rates of medical comorbidities (Weisner et al., 2001; Moos et al., 1994; Mertens et al., 2007; Mertens et al., 2003). There is evidence suggesting that heavy drinkers, particularly older individuals, quit drinking or reduce consumption in response to health problems (Satre et al., 2007; Hermos et al., 1988). However, findings are mixed across outcome measures and populations studied. The majority of studies have been conducted in untreated or general populations and in those with alcohol, rather than other drug, problems.

1.1 Research from untreated populations

Prospective research conducted in untreated, older, problem drinking populations has found negative health events and chronic health problems are predictive of better alcohol outcomes including abstinence and reductions in consumption (Brennan et al., 1994; Brennan and Moos, 1996; Schutte et al., 2001; Schutte et al., 1994). Similar results have been found in some general population or community studies (i.e., not restricted to problem drinkers) of older adults (Kivelä et al., 1988; Moos et al., 2005; Brennan et al., 1999).

On the other hand, there is little support in the literature for the relationship of health problems to outcome or changes in alcohol consumption among mixed-age untreated samples. This is true both for those with alcohol problems (Humphreys et al., 1996; Jin et al., 1998) and for general populations (Midanik et al., 1990). One exception is a Swedish study that found amount of decrease in alcohol consumption at 9 years was predicted by chronic medical conditions, but among men only; the study found no effect of self-rated health status, symptoms, or physical functioning (Romelsjö et al., 1991).

1.2 Research in treated populations

Findings from prospective studies in treated populations are limited to mixed-age adult samples, and show varied results on whether health problems predict alcohol or drug use outcomes. Two short-term studies—one in a VA sample and one in a privately insured sample—found no relationship of the baseline Addiction Severity Index (ASI) medical problem severity composite score to change in ASI alcohol or drug problem severity scores at follow-up (Alterman et al., 1990; Green et al., 2004). On the other hand, short-term studies suggest that the presence of health problems may lead to better outcomes. In a privately-insured sample, more baseline self-reported health problems predicted decreases in ASI drug severity scores at 7 months (but for men only) (Green et al., 2004). Similarly, a VA study found that short-term health events predicted a lower likelihood of substance use after treatment; however presence of long term health stressors (i.e., those lasting more than 2 weeks) was not related to substance use or relapse at 1 year (Tate et al., 2005).

Two studies—one short-term and one-long-term—found relationships in unexpected directions. Green and colleagues found that those with better self-reported health status at baseline were more likely to be abstinent at 7 months (Green et al., 2004). In a 33-year follow-up of heroin treatment patients, presence of a physical disability was related to a lower abstinence rate for 5 continuous years; no relationship was found between abstinence and HIV, Hepatitis, or sexually transmitted diseases (Hser et al., 2001).

These prior studies have not specifically examined medical conditions that may have been a result of, or exacerbated by alcohol and drug abuse. Therefore, they have not been able to examine the potentially abstinence-motivating effects of Substance Abuse-Related Medical Conditions (SAMCs)—those medical problems that can reasonably be assumed to be exacerbated by alcohol and drug use or which may improve if individuals abstain or reduce

consumption (Weisner et al., 2001). In the current study, we specifically analyze the impact of these disorders as well as that of other health conditions (e.g., cerebrovascular diseases, congestive heart failure, and benign prostatic hyperplasia). In addition, we also examine the role of medical problem severity (as measured by the ASI). Distinguishing between these types of health stressors may help explain the mixed results of prior studies in the relationship of health stressors to alcohol and drug use. Specifically, SAMC health stressors—those that are exacerbated by alcohol and drug use—may be predictive of outcome because they have a “contingent relationship” (Moos et al., 1990) to alcohol and drug use behavior.

1.3 Primary care services, integrated medical and chemical dependency services and outcome

There is evidence that primary care services are predictive of better substance use treatment outcomes a) for those with medical problems (Saitz et al., 2005) and particularly those related to and exacerbated by substance use (Weisner et al., 2001), and b) when integrated with the CD program (Weisner et al., 2001; Friedmann et al., 2003). For example, in the original randomized study from which this sample comes, we found that integrated primary medical and CD services, compared to primary care services received as usual (i.e., outside the CD program), was related to a higher odds of abstinence at 6-months following treatment intake for those with SAMCs. In the present study, we examine whether integrated care at the index treatment episode, and on-going primary care services received between intake and 5 years are predictive of long-term alcohol and drug use outcomes, particularly in CD patients with SAMCs.

1.4 Stress and coping framework

Stress and coping theory suggests that adaptational outcomes including alcohol and drug use and problems, are influenced by stressors, social support, and coping strategies (Moos et al., 1990; Finney and Moos, 1984), as well as interventions (Moos, 2002). The model suggests that substance use and problems are influenced by chronic, ongoing “life” stressors (e.g., health stress), social resources (e.g., supportive friendships), and the “personal system”, which includes demographic characteristics (e.g., age, gender, and education) and CD interventions (Moos, 2002); and generally posits that stressors are related to worse outcomes. However, stressors could also have the opposite effect, deterring use if they are a consequence of or “contingent to” drinking behavior (Moos et al., 1990).

In this study, we use a stress and coping model to examine the role of health stressors, (including medical problem severity, SAMCs, and other medical conditions) in 5-year treatment outcome in a mixed-age sample of adult patients in private CD treatment. Because prior research has found effects only for men, we examine gender differences. We also expand the concept of “interventions” from the stress and coping model to examine the role of primary care services and integrated medical and CD care.

We examine the role of these factors in abstinence or elimination of problematic substance use (i.e., “remission”). We hypothesized that SAMCs would be predictive of a higher likelihood of remission, controlling for other variables in the model. We also expected that both integrated care in the index episode and on-going primary care services would predict better outcome, particularly among those with SAMCs. We examine these questions within the context of other factors drawn from a stress and coping framework that have been found to be predictive of alcohol and drug outcomes, including demographic characteristics, alcohol and drug use problem severity, social support (Weisner et al., 2003b; Ray et al., 2005), “wet” (non-abstinent) support networks (Brennan and Moos, 1996; Weisner et al., 2003b; Weisner et al., 2003a; Ray et al., 2005), and avoidance coping (Brennan et al., 1994).

2. Method

2.1 Sample

The sample was originally recruited for a randomized controlled trial of integrated primary care and CD treatment versus primary care medical treatment independent of CD services (usual care) (Weisner et al., 2001). Research participants were men and women aged 18 and over meeting criteria for alcohol or other drug abuse or dependence admitted to treatment at the Kaiser Permanente (KP) Sacramento, California Chemical Dependency Recovery Program (CDRP) between April 1997 and December 1998. Northern California KP is a large (3.5 million membership), group-model, integrated managed care organization, serving 70% of the insured population in the Sacramento, California area. The health plan provides CD treatment services internally, rather than referring to contracted programs. Patients were recruited at intake by research associates from the KP Division of Research (DOR). For patients ready to begin treatment (after detoxification when needed), research staff explained the study, obtained written informed consent, and administered the baseline instrument. Patients were offered random assignment either to integrated or independent delivery of CD and primary care for one year. Patients in the integrated services group received primary care within the CD program; patients in independent care received usual primary care from a regular KP primary care medical department in a location separate from the CD program. The participants in the present study included all those recruited at intake, whether or not they agreed to be randomized or actually began treatment (N=747); all were consented and followed as part of the original study. For this observational study, we wanted to include the population base of all those entering treatment. Of these 747, a total of 21 died by the 5-year follow-up. Of the 726 survivors, a total of 598 (82%) responded to the interview at 5 years. Research staff conducted follow-up interviews by telephone 5 years after study recruitment (referred to hereafter as the 5-year follow-up), regardless of randomization or treatment participation. Annual Institutional Review Board approval was obtained from the Kaiser Research Foundation Institute and the University of California, San Francisco. Written informed consent was obtained at baseline and permission to contact participants for future interviews was obtained at each prior interview. Specific consent to conduct 5-year interviews was obtained at the beginning of the 5-year interview. A total of 49% of the original sample (N=598) were members at the five-year follow-up. But even among those who were not members at five-year follow-up, 97% were members at some point in the first year after intake, 70% at some point in the second year after, 54% were members at some point in the third year after and 46% were members at some point in the fourth year after. The median duration of membership from intake through five years was 56 months.

2.2 Treatment programs

The CDRP provides an outpatient and a day treatment program. The content of services is the same in both programs, although the day treatment includes four times the amount of each service (Weisner et al., 2001). Both programs last 8 weeks, with 10 months of aftercare available. Group-based treatment includes supportive therapy, education, relapse prevention and family-oriented therapy. Individual counseling is available as needed. Patients are expected to attend 12-step meetings off site. Patients receive random breathalyzer and urine screens weekly during the first 4 weeks and monthly thereafter for one year.

2.3 Measures

Outcome—We used past-year *remission* at 5 years as the outcome variable, consistent with recent long-term studies of mixed-age samples (Moos and Moos, 2003; Ouimette et al., 2000). Remitted individuals were those who either reported abstaining in the past year, or those who were non-problem users as follows: They a) used alcohol, but had no days of drinking five or more drinks in a day, and drank only four times per month or less in the past year; or

used marijuana, but not more than once per month in the past year; *and b*) had no other drug use in the past year; *and c*) had no problems with friends or family, violent behavior, or suicidal ideations in the month prior to interview, *and d*) had not been arrested, in jail/prison, under electronic home surveillance, or been to a probation or parole officer in the year prior to interview. This definition is consistent with other “non-problem use” and “remission” definitions in the literature (Moos and Moos, 2003; Ouimette et al., 2000) .

Substance Abuse-Related Medical Conditions (SAMC)—We identified a list of medical conditions from the literature described as “conditions related to drug and alcohol abuse.” (Stein, 1999; Chou et al., 1996; Sikkink and Fleming, 1992; Hellschober and Miller, 1991; Weisner, 1997; National Institute on Alcohol Abuse and Alcoholism, 1990; Alaja et al., 1998; Mendelson et al., 1986; Moos et al., 1994; Kessler et al., 1996). A consensus of physicians with expertise in addiction medicine services helped refine the list. The final list of SAMCs was comprised of *those acute or chronic physiological or behavioral conditions that can reasonably be assumed to be exacerbated by alcohol or drug use or which may improve if individuals abstain or reduce consumption*. This measure was used for the analysis of the randomized controlled trial for which these patients were originally recruited (Weisner et al., 2001). The SAMC conditions are depression, injury and poisonings, anxiety and nervous disorders, hypertension, asthma, psychoses, acid-related disorders, ischemic heart disease, pneumonia, chronic obstructive pulmonary disease, liver cirrhosis, Hepatitis C, diseases of the pancreas, alcoholic gastritis, toxic effects of alcohol (ethyl and unspecified), alcoholic neuropathy, drug neuropathy, alcoholic cardiomyopathy, excess blood alcohol level, poisoning by alcohol, and drug dependence in the mother-childbirth (ICD-9 codes available upon request). We used the health plan's OSCR (Outpatient Summary Clinical Record) and ADT (Admissions/Discharges/Transfers) automated diagnostic databases (Selby, 1997) to identify participants diagnosed with SAMC disorders in KP hospitals or outpatient clinics during the year prior and year after treatment intake. Participants diagnosed with any of these conditions during the relevant time period were categorized as having SAMCs. A total of 458 (77% of the sample) had either medical or psychiatric SAMCs; 55% (N=327) had psychiatric SAMCs and 57% (N=340) had medical SAMCs. HIV was not included, as less than 0.01% of our sample had a diagnosis, and because of extraordinary health plan confidentiality of HIV data.

Other health conditions—We also created a measure of other common medical conditions, that is, health conditions that do not fall into our measure of SAMCs, but that are common, and have been found to contribute to health services use (Ray et al., 2000). These were benign conditions of the uterus, cancers of the breast, lung, colon, and prostate, cerebrovascular diseases, congestive heart failure, diabetes, benign prostatic hyperplasia, and renal failure. We used the same method as for the SAMC variables, extracting data from the health plan OSCR and ADT databases and measuring conditions in the year prior and after treatment entry.

Primary care—Primary care visits in the 5 years after intake were measured both within plan (using data from KP databases, and including visits to adult medicine or ob-gyn) or out-of-plan (using self-report data from the 5-year interview). We include visits from both sources.

Other health care variables—Psychiatric care visits and Emergency Room visits in the 5 years after intake were measured both within plan (using data from KP databases) or out-of-plan (using self-report data from the 5-year interview).

Substance dependence—We used questions from the Diagnostic Interview Schedule for Psychoactive Substance Dependence to provide a DSM-IV diagnosis (American Psychiatric Association, 2000) for alcohol and drug (11 substance types) dependence. For each substance,

we established whether three of seven dependence symptoms were present or absent during the previous 6 months.

Addiction Severity Index (ASI)—To assess addiction severity and problem severity in related areas at baseline, patients were administered items that comprise the alcohol, drug, medical, and legal problems severity composite scores of the ASI. (McLellan et al., 1992). The score obtained in each area indicates problem severity in the 30 days prior to the interview (Weisner et al., 2000) and yields continuous scores from 0 (no problem) to 1.0 (extreme problem) for each domain (McLellan et al., 1992). Validity and reliability of the ASI have been found across patient age ranges (McLellan et al., 1985).

Coping—We used the Coping Responses Inventory (CRI) (Moos, 1992) to measure participant coping styles. The CRI has been used extensively with community and chemical-using populations (Moos, 1992) and has been shown to have adequate reliability and validity (Moos, 1992). The CRI includes items that measure both approach and avoidance coping. Consistent with prior research (Moos et al., 2004; Brennan et al., 1994; Brennan and Moos, 1996) we created a measure of “percentage of approach coping” which divides the total score for the avoidance coping scale by the sum of the avoidance and approach coping scales. Higher scores indicate greater use of the approach strategy, which is considered more active and effective than avoidance coping (Moos, 1992).

Social support—To enumerate extent of social support, we asked “How many people do you have in your life to talk to when you worry about personal problems, such as family or work?” To assess “wet” sources of support, we asked “Of all the people who you regularly talk to or get help from, how many do you believe are heavy users or problem users of alcohol or drugs?”

Demographic variables from the baseline questionnaire included age (coded 18–34, 35–50, 51 years and older), gender, race/ethnicity (white, African American, Latino/Hispanic, other), education (no college, some college or more), employment status (employed full time, employed part-time or casually, not employed), and income (less than \$40,000 per year or at least \$40,000 per year).

2.4 Analyses

In the total 5-year sample (N=598), we compared the remitted to the non-remitted participants on demographic characteristics, life context (i.e., health stressors, social support, coping), integrated care assignment at index treatment, and primary care visits, and conducted chi-square tests (for categorical variables) and t-tests (for continuous variables). We ran preliminary logistic regression models predicting remission at 5 years which included all of the demographic and life context variables. Variables from the stress and coping model that did not approach significance (i.e., $\alpha < .20$) in preliminary models and that were not the focus of interest for this study (i.e., those other than medical conditions and medical services which were included in our hypotheses) were dropped from the final models. Thus, ethnicity, education, income, the social support variables and the approach coping measure were not included in the final models. In post-hoc analyses, we ran cross-tabs (with chi-square statistics) and logistic regression models within gender and age categories to examine whether SAMC predicted remission among women and men, and among age sub-groups. Because there is no “standard” number of recommended primary care visits for CD patients in the literature, we conducted bivariate analyses to examine the relationship of primary care visits to remission. We used these findings to inform the categorization of “number of visits” in a subsequent logistic regression model, which modeled the relationship of primary care visits for the full sample and among SAMC participants. Informed by bivariate analyses, we created a primary

care visit categorical variable with three categories: zero or one visits, 2–10 visits, and 11 or more visits for the final models. To examine whether legal problem severity confounded the results (because justice system involvement and associated drug testing can often motivate abstinence) we examined the prevalence of legal problems in the sample and re-ran the models controlling for baseline ASI legal problem severity. We also conducted post-hoc analyses of the models controlling for number of ER visits and psychiatric visits, as well as a measure indicating whether the participant had CD readmissions. To test the effect of psychiatric versus medical SAMCs, we assessed the relationship of each to remission. We also examined the relationship of the presence of medical SAMCs to remission among those without psychiatric SAMCs.

In order to examine whether non-response bias changed our results, we conducted multiple imputation (using PROC MI in SAS V. 9.1, with 10 imputations, and using Monte Carlo methods) to impute data with missing values. Although continuous variables can be imputed with unbiased results, the same cannot be said of binary variables (such as the remission measure which we imputed) (Horton et al., 2003). Because of this issue of bias, and because we found the same pattern of results in the models using imputed data as those using list-wise deletion, we present only the latter models. Finally, we conducted validation analyses for the self-report utilization measures using data from a later wave of data on this cohort. No adjustments were made for multiple comparisons (Rothman, 1990).

3. Results

Validation of self-report utilization measures

We conducted validity analyses of the self-report utilization measures using a 7-year follow-up of this cohort. Using question wording similar to that used to ask about non-KP utilization, we asked about patients' past-year use of KP ER visits, hospitalizations, and outpatient doctor/nurse practitioner visits and compared them to KP utilization databases. For ER visits and outpatient medical visits there was 90%, and 89% agreement, respectively, between the self-report and KP database measure of having any visit in the prior year, and the Kappa coefficients were .62 and .79, respectively. For having had a hospital visit there was 95% agreement and the Kappa was .62. All Kappa coefficients were considered indicative of substantial agreement (Landis and Koch, 1977). For the questions about the number of ER visits, hospital days, and doctor/NP visits, the Pearson correlations between the self-report and database measures were .77, .71, and .60, respectively (all were $p < 0.0001$).

Study sample

Table 1 describes characteristics of the study sample, including demographic factors, percentage of participants with SAMC and non-SAMC medical conditions, and substance use measures. Forty percent of the sample were alcohol dependent only, 31% were drug dependent but not alcohol dependent, and 18% were both alcohol and drug dependent. The large majority of the sample (58%) had multiple substances which they either used regularly for 5 or more years or for which they met dependence criteria (not shown). In addition, most of those who were dependent on alcohol used other drugs as well, and the same pattern of mixed use was observed for those who were dependent on other substances. Prevalent substances of dependence were alcohol (58%), stimulants (24%), marijuana (17%), narcotic analgesics (9%), and cocaine (9%) (not shown).

The mean and median numbers of SAMCs per participant were 1.7 and 2.0, respectively; the minimum was zero and the maximum was eight (not shown).

Based on ASI legal problem severity composite items, 12% of participants were on probation or parole at baseline, 10% were awaiting charges, trial, or sentencing, 7% had been in jail in the month prior to baseline, and 7% participated in illegal activities for profit in the month prior to baseline (not shown). To address the possibility that our results were confounded by participants' legal problems, we re-ran the models controlling for baseline ASI legal problem severity, but found no differences in the pattern of results.

A total of 338 of the 598 (57.5%) in the sample met criteria for remission in the year prior to 5-year follow-up. Table 1 presents bivariate analyses of the demographic, life context, and intervention variables for the total sample and by remission status at 5 years. Those who remitted were more likely to be aged 50 and older and less likely to be aged 18–34 ($p=.002$) than aged 35–49, and had higher levels of medical problem severity ($p=.023$). They were marginally more likely to have been randomized to integrated care in the index CD treatment episode ($p=.067$), and had slightly lower levels of baseline ASI drug problem severity ($p=.080$), and slightly fewer friends who were heavy substance users ($p=.088$), although these relationships only approached statistical significance.

Table 2 presents results of the final logistic regression models. In preliminary models, ethnicity, education, employment, income, the two social support variables, and coping did not approach significance (i.e., $\alpha < .20$); thus, they were dropped from the final models. SAMC conditions did not predict remission, nor did other conditions. However, medical problem severity was associated with higher odds of remission ($OR=2.0$; 95% $CI=1.14, 3.54$). Assignment to integrated care in the original randomized trial was predictive of a higher odds of remission at 5 years ($OR=1.48$; 95% $CI=1.04, 2.13$).

In post-hoc analyses, we also stratified the sample by age group and examined the model within each age category (not shown). SAMC predicted higher odds of remission among the 18–34 age group ($N=228$) ($OR=2.19$ $p=.01$), but there was no significant relationship in the 35–50 age group ($N=313$) or the 51 and older age group ($N=57$). We also examined cross-tabulations of remission by SAMC status within each age group. In younger individuals, 52% of those with SAMCs remitted compared to 35% of those without SAMCs ($p=0.02$). In those aged 34–50, 56% of those with SAMCs and 62% of those without SAMCs remitted. Due to the small cell size of those aged 51 and older, we had insufficient power (.203) to test the significance of this relationship, and cross-tabs showed that 70% of those with a SAMC were remitted compared to 80% of those without.

In post-hoc analyses we examined the effect of SAMC conditions by gender, because prior studies found that medical conditions predicted better substance use outcomes for men but not women (Green et al., 2004; Romelsjo et al., 1991). There was no relationship of SAMCs to remission for either women or men.

Table 2 also presents model results in those with SAMCs (to test our second hypothesis). Among those with SAMCs, those having 2–10 visits in the 5 years after intake had almost three times the odds of remission at 5 years. As hypothesized, integrated care predicted higher odds of remission among those with SAMCs.

A post-hoc analysis used the same model and also controlled for number of ER visits and psychiatric visits, as well as whether or not the participant had CD readmissions. This model showed the same pattern of findings – those with 2–10 primary care visits had 3.1 times the odds of remission compared to those with 1 or 0 visits (95% $CI = 1.28, 7.64$) (not shown).

Finally, we conducted post-hoc analysis to assess whether psychiatric versus medical SAMCs influenced outcome (not shown). We examined the relationship of each to remission; neither measure was significantly related to remission in the full sample. However, among those who

did not have psychiatric SAMCs, having medical SAMCs was significantly related to remission; in this subgroup (n=271) 64% of those with medical SAMCs were remitted at 5 years versus 51% of those without medical SAMCs ($p=.047$) (not shown).

4. Discussion

4.1 Health stressors and long-term outcome

This study of the role of health stressors in a mixed-age, privately insured treatment sample was the first to examine both SAMCs and medical problem severity in long-term substance use outcomes. We found that diagnoses of either psychiatric or medical SAMCs in the year prior or the year after treatment intake was not related to remission at 5 years. However, among those with no psychiatric SAMCs, having medical SAMCs was related to a higher likelihood of remission. A higher level of medical problem severity at baseline was related to higher odds of remission.

These findings are counter to the traditional stress and coping model which proposes that stressors are generally related to worse outcome (Cronkite and Moos, 1980; Moos et al., 1990), and in agreement with the position that stressors can deter use if they are a consequence of or “contingent to” substance use behavior (Moos et al., 1990). Among participants who had no psychiatric problems, health stressors exacerbated by alcohol and drug use may have provided motivation for reduction of substance use. The findings were also contrary to 6-month results in this sample which found poorer CD outcomes for those with SAMCs in the year prior to CD intake (Weisner et al., 2001). Although SAMCs may be a marker for more severe alcohol and drug disorders, which tend to have a worse short-term prognosis, medical SAMCs also may provide an impetus for individuals to abstain or reduce their use of alcohol and drugs over the long term.

Our hypothesis regarding the relationship of SAMCs to better substance use outcome was supported in younger participants (aged 18–34 years), but not among those aged 35–50 years. We did not have sufficient power to examine this question in those aged 50 years or older. In prior studies of this sample we have found that late-middle aged and older individuals (aged 55 and older) in treatment have better outcomes than those younger (ages 18–39) (Satre et al., 2003) in general. Future research should examine whether this is also true of those with SAMCs.

4.2 Integrated care, primary care services and long-term outcome

Primary care visits were not related to outcome in the full sample. However, primary care visits were predictive of remission at 5 years in the SAMC subgroup such that those with 2–10 visits were more likely to be remitted than those with fewer than 2 visits. Moreover, receiving integrated medical and CD services in the index episode predicted higher odds of remission in both the full sample and the SAMC subgroup. These findings extend our prior 6-month results, which show that medical services integrated with CD services predict better outcome among those with SAMCs. In the original trial, receiving integrated medical and substance services predicted better 6-month outcome for those with SAMCs versus receiving independent primary care (Weisner et al., 2001). Although our current long-term findings are observational, they are consistent with research on the importance of primary care and substance use disorders (Friedmann et al., 2003; Saitz et al., 2005; Weisner et al., 2003a; Weisner et al., 2001), particularly for those with health problems (Saitz et al., 2005; Weisner et al., 2001). For these patients, regular primary care visits may be helpful in maintaining motivation to sustain remission over the long term.

The study had several limitations. As with other longitudinal research, there was some attrition due to non-response. However, our 5-year response rate was high, and models using multiple imputation methods for missing data found results similar to those among respondents with complete data. Because this 5-year study is observational, we cannot assume that any relationship between receipt of primary care and remission is causal. For example, it may be that healthier people with less substance use obtain preventive primary care visits. Although we were only able to assess changes in medical problem severity at five years, rather than continually over time, worsening of medical conditions could increase likelihood of remission. In contrast, health improvements could make drug use or heavy drinking more tolerable physically. We plan to examine the effect of such health changes in future research on this sample, as we measure medical problem severity at regular 2-year intervals beginning with the 5-year follow-up. Finally, the stress and coping variables we analyzed were measured at intake, 5 years before the outcome. This may explain why these variables did not have stronger relationships to outcome.

4.3 Conclusions and implications

Although an observational study, this long-term study of outpatient CD treatment may be indicative of the important role that medical services can play in the treatment of alcohol and drug use disorders. These disorders have much in common with other chronic medical conditions that have contributing behavioral factors (such as diabetes, asthma, and hypertension) (McLellan et al., 2000). Therefore, CD treatment may benefit from a disease management approach similar to that recommended for these other chronic conditions—specialty care when the condition is severe, followed by treatment in primary care when the condition is stabilized (Wagner et al., 1996). A disease management model for Chemical Dependency would involve the primary care provider monitoring substance use at each visit, regardless of the purpose of the visit, and, when needed, referring patients to specialty treatment. Thus, patients in CD treatment may benefit from primary care linkages and from education about how to use primary care to maintain health. This approach could potentially include assessment, diagnosis, and treatment of medical problems as part of specialty CD treatment. Future randomized studies should examine the long-term impact of such linkages to primary care among those with medical conditions, to inform best practices for these complex patients.

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Table 1
Demographics, Intervention Factors, and Life Context among Participants responding to 5-year Follow-up

	(N=598) Past Year Remission at 5-Year FU		p-value	Total Sample
	No, not remitted	Remitted		
(N)	(268)	(330)		598
<u>Demographics</u>				
% women	40%	45%	0.233	43%
Ethnicity			0.261	
White	72%	76%		74%
African-American	10%	10%		10%
Hispanic	12%	7%		9%
Other	7%	7%		7%
Age Group (in %)			0.002	
18–34	44%	33%		38%
35–50	50%	55%		52%
51+	6%	12%		10%
% with Some college or more education	58%	61%	0.424	59%
% Employed	62%	68%	0.168	65%
% with Income: \$40,000 or more	30%	35%	0.256	33%
<u>Life Context</u>				
% with SAMC diagnoses	75%	78%	0.307	77%
Number of SAMC Diagnoses (mean, sd)	1.8 (1.6)	1.8 (1.4)	0.611	1.8 (1.5)
% with Other Medical diagnoses.	54%	59%	0.369	55%
ASI ¹ Medical Problem Severity (mean,sd)	.18 (.30)	.24 (.34)	0.023	.21 (.32)
ASI ¹ Alcohol Problem Severity (mean,sd)	.38 (.30)	.35 (.29)	0.273	.36 (.30)
ASI ¹ Drug Problem Severity (mean,sd)	.14 (.13)	.12 (.13)	0.080	.13 (.13)
ASI ¹ Legal Problem Severity (mean,sd)	0.09 (.18)	.08 (.18)	0.732	.09 (.18)
Dependence Type (%)			0.126	
Alcohol Dependence Only	38%	42%		40%
Drug Dependence Only	29%	32%		31%
Alcohol and Drug Dependence	22%	15%		18%

(N=598) Past Year Remission at 5-Year FU				
	No, not remitted	Remitted	p-value	Total Sample
Abuse Only	10%	12%		11%
Number of friends/family subject could talk to (mean, sd)	4.7 (5.4)	5.0 (7.9)	0.621	4.9 (6.9)
Number of friends who are heavy users of substances (mean, sd)	1.8 (5.1)	1.4 (2.1)	0.088	1.6 (4.1)
Percentage of approach coping, of all coping used (mean,sd)	.57 (.15)	.57 (.15)	0.731	.57 (.15)
<u>Intervention Variables</u>				
Randomization			0.066	
Integrated Care	35%	45%		41%
Independent Care	51%	44%		47%
Not Randomized	13%	12%		12%
Number of primary care visits (mean,sd)	16 (21)	17 (33)	0.472	17 (28)

/ ASI refers to Addiction Severity Index: (see measures)

Table 2
Logistic Regression Model Predicting Remission in Study Subjects responding to 5-year Follow-up

	Full Sample (N=598)				Individuals with SAMCs (N=458)			
	O.R.	Lower	Upper	p-value	O.R.	Lower	Upper	p-value
<u>Demographics</u>								
women (vs men)	1.33	0.93	1.90	0.116	1.26	0.84	1.88	0.263
<u>Age Group</u>								
18-34 vs. 51+	0.33	0.17	0.66	0.002	0.47	0.22	0.99	0.046
35-50 vs. 51+	0.50	0.27	0.95	0.035	0.55	0.27	1.10	0.090
<u>Health Stressors</u>								
Substance Abuse-Related Medical Condition	1.11	0.73	1.69	0.639	n/a	n/a	n/a	n/a
<u>Other Medical Conditions</u>								
ASI ¹ Medical Problem Severity	0.89	0.61	1.31	0.568	n/a	n/a	n/a	n/a
Other Life Context Variables	2.00	1.14	3.54	0.017	2.08	1.16	3.73	0.013
<u>ASI¹ Alcohol Problem Severity</u>								
ASI ¹ Drug Problem Severity	0.58	0.33	1.04	0.068	0.59	0.31	1.15	0.12
<u>Intervention Variable</u>								
Randomization	0.40	0.10	1.58	0.190	0.46	0.10	2.09	0.313
<u>Integrated Care (vs. Independent Care)</u>								
Not Randomized (vs. Independent Care)	1.48	1.04	2.13	0.032	1.63	1.08	2.48	0.022
<u>Primary Care Visits</u>								
2-10 Visits (versus 0-1)	0.99	0.58	1.71	0.977	1.22	0.66	2.26	0.524
11+ Visits (versus 0-1)	1.48	0.76	2.88	0.248	2.99	1.23	7.27	0.016
Model Chi-Square (df)	1.06	0.53	2.11	0.864	1.91	0.78	4.69	0.156
	33.97 (12)		0.001		28.91 (10)		0.001	

¹ ASI refers to Addiction Severity Index: (see measures)