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Service utilization during and after outpatient treatment for comorbid substance use disorder and depression

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Abstract

Patients with comorbid substance use disorder (SUD) and depression incur greater treatment costs than those with either disorder alone. Integrated treatment targeting both issues concurrently has been shown to reduce substance use and depression in this population, but little is known about the effects of such treatment on the utilization of costly health services. This study compared 18-month patterns of service utilization for 236 veterans with comorbid SUD depression randomly assigned to 6 months of either Integrated Cognitive Behavioral Therapy (ICBT) or Twelve-Step Facilitation Therapy. Treatment group differences were found for the utilization of psychotropic medication services and inpatient hospitalization. Higher rates of therapy attendance, lower baseline depression, and receiving ICBT all predicted shorter admissions for those hospitalized during treatment. Ethnicity and gender predicted medication service use both during and following treatment. The findings provide evidence supporting the long-term cost-effectiveness of integrated treatment for this high-risk population.

Keywords

Comorbidity; Substance use disorder; Integrated treatment; Service utilization

1. Introduction

The prevalence of psychiatric comorbidity has been estimated at 30% and 45% for those with alcohol and drug dependence, respectively (Farrell et al., 2003), and those with comorbidity have poorer treatment outcomes (Dodge, Sindelar, & Sinha, 2005; McKay et al., 2002; Ritsher, Moos, & Finney, 2002) and incur significantly higher costs than those with a substance use disorder (SUD) alone (Hoff & Rosenheck, 1998a, 1999). The most common comorbid Axis I psychiatric disorder is major depressive disorder, with an estimated 12-month prevalence rate of 15.5% (Grant et al., 2006). Multiple studies have shown that individuals with comorbid SUD-depression have more frequent and costly health service use compared to persons with one disorder (Curran et al., 2003; Mark, 2003;

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O'Toole, Pollini, Gray, et al., 2007). More specifically, average annual costs for treatment of comorbid SUD-depression have been estimated at \$5,318, compared to \$1,246 for SUD alone (Druss & Rosenheck, 1999). Thus, there is a pressing need to develop and disseminate interventions that reduce the service costs for individuals with comorbid SUD-depression.

Integrated treatments for comorbid SUD and psychiatric disorders have been widely advocated (Drake et al., 2001; Zweben, 2000) and have been more effective than non-integrated treatments in some randomized trials (Brown, Evans, Miller, Burgess, & Mueller, 1997). However, the superior efficacy of integrated treatment has been far from robust. Integrated therapy for comorbid SUD and bipolar disorder resulted in superior reductions in substance use but not depressive or manic symptoms (Weiss et al., 2007). For comorbid posttraumatic stress disorder, integrated treatment resulted in better outcomes than nonintegrated treatment in one study (Najavits, Gallop, & Weiss, 2006) but similar outcomes in another (Hien et al., 2009). Patients with SUD and social anxiety disorder in integrated treatment had worse alcohol use outcomes than alcohol-only treatment, with no differences on social anxiety indices (Randall, Thomas, & Thevos, 2001). In our own study of veterans with comorbid depression, integrated treatment resulted in superior long-term outcomes for substance use but not depressive symptoms (Lydecker et al., in press). As noted in a recent review (Hesse, 2009), integrated interventions have shown some promise but are not yet empirically supported.

Health service utilization outcomes are rarely examined in SUD treatment studies, which typically focus on clinical and psychosocial outcomes. For comorbid patients who utilize costly health services with greater frequency, service utilization outcomes should be examined as additional indicators of efficacy (Jerrell & Ridgely, 1995). In prior studies, substance-using patients in an integrated medical care program were less likely to utilize emergency department services (O'Toole, Pollini, Ford, & Bigelow, 2007), and patients receiving integrated care for psychiatric comorbidity had fewer days of hospitalization at follow-up (Smelson et al., 2007). In a study with no control condition, integrated outpatient treatment reduced psychiatric hospitalizations for patients with SUD and comorbid schizophrenia, depression, or bipolar disorder (Granholt, Anthenelli, Monteiro, Sevcik, & Stoler, 2003). These findings suggest that integrated treatment for comorbid SUD-depression may result in lower service utilization over time as compared to a nonintegrated comparison treatment. The goal of this study was to compare longitudinal measures of service utilization for veterans randomized to either Integrated Cognitive Behavioral Therapy (ICBT) or a nonintegrated comparison treatment, Twelve-Step Facilitation Therapy (TSFT), for comorbid SUD-depression (Brown et al., 2006). Multiple ancillary services were evaluated over the entire 18-month period, including outpatient therapy sessions, psychotropic medication management visits, inpatient hospitalizations, and days in recovery homes (community residential facilities). We expected that those in the ICBT group would have greater reductions in service utilization over time as compared to the TSFT group.

Our second major goal was to identify characteristics of individuals at risk for increased utilization of costly services, drawing from factors that were predictive of utilization in previous work (Brennan, Nichol, & Moos, 2003; Green-Hennessey, 2002; Kaskutas, Weisner, & Caetano, 1994; Nietert, French, Kirchner, & Booth, 2007; Parthasarathy &

Weisner, 2005; Wu, Ringwalt, & Williams, 2003; Wryobeck, Chermack, Closser, & Blow, 2006). For this comorbid sample, we selected demographic variables, SUD diagnoses, recent substance use, and depression symptom severity (all at baseline) and tested their predictive association with service utilization during and after outpatient therapy.

2. Materials and methods

2.1. Participants

This study was approved by the Veteran's Affairs (VA) San Diego Healthcare System and University of California, San Diego Institutional Review Boards. The study sample consisted of veterans who had enrolled in a randomized trial of outpatient group psychotherapy for comorbid SUD-depression. Participants were recruited from referrals to the dual diagnosis clinic for veterans with SUD and co-occurring Axis I disorders.

To be eligible for the study, participants were required to meet *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* criteria for lifetime alcohol, cannabis, and/or stimulant dependence with recent use (prior 90 days) and criteria for major depressive disorder with at least one lifetime episode independent of alcohol/drug use. Exclusion criteria included *DSM-IV* diagnosis of bipolar disorder, active psychotic disorder, or opiate dependence with intravenous administration. Those residing more than 50 miles from the facility were excluded due to demands of the outpatient intervention (e.g., twice weekly intervention groups plus medication management appointments) as were veterans with memory impairments that might compromise accurate recall for research assessments. A total of 242 participants met the study eligibility criteria, provided informed consent, and were randomized to a treatment condition. Of this total, we included 236 veterans with service utilization data collected through the 18-month follow-up visit (5 had deceased prior to the visit, and 1 had not yet completed the protocol), with 127 participants in the ICBT group and 109 in the TSFT group. This final sample included 213 men and 23 women, ranging in age from 23 to 68 years ($M = 48.2$, $SD = 7.9$). Participants were primarily Caucasian (70.3%), with an average of 13.4 years of education ($SD = 1.9$). Most of the participants were unemployed (81.8%), and relatively few (14.8%) were currently married. A large majority met *DSM-IV* criteria for lifetime alcohol dependence (89.9%). More than half (54.8%) also met criteria for lifetime stimulant dependence, and 30.2% met criteria for lifetime cannabis dependence. Participants had an average of 3.7 ($SD = 5.4$) previous treatment episodes for SUD and 3.1 ($SD = 6.9$) psychiatric treatment episodes.

2.2. Procedures

The study followed a randomized, two-treatment group design, and the procedures have previously been described in detail (Brown et al., 2006; Lydecker et al., in press). Consecutive admissions to the dual diagnosis clinic were reviewed to determine eligibility, and the study was explained in detail to eligible participants by study staff. Participants consented to randomization to one of the two study interventions, random toxicology screens, and quarterly research assessments (\$30 compensation for each assessment). With the exception of pharmacotherapy, participants agreed to not participate in any other formal treatment for depression or SUD during the 24 weeks of the psychotherapy interventions.

Following the intake assessment, research assessments were conducted at midtreatment (12 weeks), end of treatment (24 weeks), and at 3-month intervals thereafter for an additional year.

2.3. Interventions

Following informed consent and completion of the intake assessment, participants were randomized to one of the study interventions using a rolling admission procedure with treatment start dates every 4 weeks. Because of the nature of the clinical setting, participants and research staff were not blinded to treatment group assignment. Both interventions consisted of twice-weekly sessions for 12 weeks followed by once-weekly sessions for 12 weeks. Participants in both groups consulted with a VA psychiatrist, who prescribed psychotropic medication using standard VA protocol for depression.

Both interventions were delivered by two cotherapists: one senior clinician (clinical psychologist or postdoctoral therapist) and one doctoral-level trainee. Therapists typically rotated across conditions every 6 to 12 months and changed every 1 to 2 years. Standardized procedures were used to train therapists, including review of manuals, videotapes, and direct observation. All therapy sessions were videotaped, and condition-specific supervisors reviewed a random sample (25%) of sessions to ensure fidelity to the manual and to prevent contamination from outside techniques. Weekly supervision of the therapists was provided by study coinvestigators with expertise in the intervention.

For the TSFT intervention, the 12-step facilitation (Nowinski, Baker, & Carroll, 1994) provided in the Project MATCH study (Project MATCH Research Group, 1997) was modified to allow for group delivery and consideration of multiple substances. Treatment entry was allowed at the onset of one of three modules. The first module covered AA/NA Steps 1–3, the second module focused on topics common to AA/NA meetings and 12-step literature, and the third module addressed AA/NA Steps 4 and 5. In Phase I of treatment, all three modules were covered during 12 weeks of twice-weekly hour-long sessions. Phase II consisted of weekly hour-long sessions for an additional 12 weeks, where content from Phase I was reviewed and reinforced. All sessions included a review of relevant readings (e.g., AA Big Book), didactic material, and discussion of recovery tasks, such as attendance at 12-step meetings and obtaining a sponsor. Problems with depression were discussed only in the context of their relation with 12-step themes.

For the ICBT intervention, material on both substance use and depression included in each session were adapted from two empirically validated treatments: the group therapy manual for cognitive-behavioral treatment of depression (Munoz, Ying, Perez-Stable, & Miranda, 1993) and the coping skills training manual (Kadden et al., 1994) from Project MATCH. As with TSFT, treatment entry was allowed at the start of one of three modules. The first module covered identifying and challenging negative cognitions and reducing the risk of relapse, the second module focused on engagement in activities to increase positive affect and avoid relapse, and the third module involved communication training to increase positive social interaction and self-efficacy for refusing alcohol/drug use. Similar to TSFT, all modules were delivered in Phase I, with review of core skills occurring during Phase II.

2.4. Measures

2.4.1. Demographics—Demographics were assessed using a baseline questionnaire designed to assess gender, age, and ethnicity, as well as other basic personal information (i.e., religion, level of education).

2.4.2. Clinical diagnosis—The computerized interview and scoring system of the Composite International Diagnostic Interview (CIDI; Robins et al., 1998) was used to assess Axis I diagnoses. *DSM-IV* diagnoses for lifetime and current major depressive disorder and abuse/dependence of alcohol and 10 categories of drugs were obtained using the CIDI. Two binary diagnostic variables were created for each participant: (1) current alcohol dependence versus no current alcohol dependence, and (2) current drug dependence versus no current drug dependence. Because all participants had a diagnosis of lifetime alcohol or drug dependence, these variables were also considered to be indicators of current severity of SUD.

2.4.3. Recent substance use—The Timeline Follow-Back (TLFB) assessed substance use during the 90 days prior to baseline. The TLFB (Sobell & Sobell, 1992) is a calendar-assisted structured interview with well-demonstrated reliability and validity in SUD treatment research (Fals-Stewart, O'Farrell, Freitas, McFarlin, & Rutigliano, 2000; Maisto, Sobell, & Sobell, 1979). The TLFB was adapted to type and frequency of drug use in addition to frequency and quantity of alcohol consumption, as demonstrated in prior studies (Ehrman & Robbins, 1994; Fals-Stewart et al., 2000). Two measures from the baseline TLFB comprised predictors of subsequent service utilization: (1) drinks consumed each week and (2) number of days since last substance use. These measures were chosen to reflect an overall level of substance use immediately prior to entering the study.

2.4.4. Symptoms of depression at baseline—The Hamilton Depression Rating Scale (HDRS; Hamilton, 1960), a 21-item structured clinical interview, provided a measure of depressive symptoms in the prior week. The HDRS has been shown to have good sensitivity and specificity among SUD populations (Willenbring, 1986) and has been used with comorbid populations (Lydecker et al., in press).

2.4.5. Recent hospitalization at baseline—Participant interviews and reviews of electronic medical records determined the number of days of inpatient hospitalization during the 3 months prior to study entry. This measure provided an indicator of the severity of current overall health problems. Participants could be hospitalized for medical, psychiatric, or substance use treatment.

2.4.6. Service utilization—Patients who enrolled in the trial consented to cease all other formal treatments for depression or substance use during 6 months of treatment but could access other services at the VA. For 12 months of posttreatment follow-up, patients accessed any type of VA health care services. Measures of ancillary services were determined using the VA electronic patient record system and participant interviews. At each quarterly assessment, participants reported their living arrangement (e.g., recovery homes, private residence) and any nights spent away from their usual environment (e.g., inpatient

hospitalization, incarceration). Treatment services were classified into four main categories: (a) outpatient therapy, (b) psychotropic medication management, (c) inpatient hospitalization, and (d) recovery homes.

Outpatient therapy services included various types of individual and group services commonly accessed by patients receiving outpatient treatment for SUD or depression at the VA. Although the available services vary greatly in the focus of treatment, each type of outpatient therapy focuses on a specific treatment target, and the type of treatment is coded in the electronic medical record. Seven types of outpatient services were measured: (a) alcohol and drug, (b) co-occurring substance abuse and mental illness, (c) depression-specific, (d) general psychotherapy, (e) PTSD, (f) smoking cessation, and (g) urgent psychiatric care. Medication services included any appointment for the purpose of psychotropic medication management for treatment of psychiatric symptoms or substance use. For outpatient therapy services and medication services, the total number of sessions/appointments attended by each patient was computed. For inpatient services, we included inpatient hospitalization for medical, alcohol/drug, or psychiatric treatment. Recovery home services included residential sober living facilities that required abstinence from substance use as a prerequisite for all residents and varied in the required level of participation by residents and number of residents. For inpatient and recovery home services, we computed the total number of days spent within each setting. The total count for each service category was computed for three phases: Months 1–6 (active treatment), Months 7–12 (initial portion of follow-up), and Months 13–18 (extended follow-up period).

2.5. Statistical analysis

The first set of analyses focused on examining the differences between ICBT and TSFT on baseline predictors, levels of service utilization within each phase, and change in service utilization over time. A series of *t* tests and chi-square tests were used to compare treatment groups on the baseline predictors. Similarly, *t* tests (separate tests for each phase) were used to test for group differences in the utilization of each type of service. To test the change in service utilization over time, a mixed-model analysis of variance (ANOVA) was used. Separate ANOVAs were run for each service and modeled the within-subjects factor of time, between-subjects factor of treatment group, and the Time $\times$ Group interaction. Within the tests of the effects of time, we included linear and quadratic contrasts to determine the nature of change over the 18-month period.

In the second set of analyses, the effects of baseline predictors on subsequent levels of service utilization were examined. The distributions of each service type were highly skewed and censored, violating a basic assumption of linear regression. Possible methods to address this issue were to dichotomize the dependent variables and use logistic regression or compute transformations, but either of these methods would have resulted in a loss of information. Multiple alternative regression approaches were explored (e.g., Poisson regression, negative binomial regression, generalized linear models) using probability plots to compare the observed distribution of outcomes to the predicted distribution under each candidate approach. Negative binomial regression provided the best fit for the distributions of both outpatient services (outpatient therapy and medication visits). For inpatient days and

recovery home services, zero-inflated negative binomial regression provided the best fit. These groupings were relevant structurally (more zero cases in inpatient and recovery home services) and theoretically (outpatient vs. inpatient/residential). Both approaches use maximum likelihood techniques to estimate the regression coefficients. Zero-inflated negative binomial regression combines two distinct models: an initial logit model that predicts zero cases in the outcome and a negative binomial model that predicts the counts in the outcome for the non-zero cases.

As noted above, service totals were computed for three separate 6-month phases. To limit the total number of regressions performed, we combined the early and extended follow-up periods and tested predictors of utilization for active treatment (Months 1–6) and during posttreatment follow-up (Months 7–18). Analyses were performed using SPSS 16.0 and Stata 10.0.

3. Results

3.1. Treatment group differences in baseline predictors and outcomes

As expected, randomization yielded two treatment groups that were similar on all demographics, including age (overall $M = 48.2$), ethnicity (70.3% Caucasian), and gender (90.3% male). The groups did not differ statistically on the other baseline predictors, including days of inpatient treatment during the pre-baseline phase (overall $M = 16.41$), the number of study treatment sessions attended ($M = 18.00$), the number of drinks consumed per week during pre-baseline ($M = 23.96$), days since last substance use at baseline ($M = 41.16$), HDRS scores ($M = 28.32$), and the proportion meeting criteria for current alcohol (66.3%) or drug (41.2%) dependence.

3.2. Treatment group differences in service utilization at each phase

As shown in Table 1, participants in both treatment groups utilized similar levels of services during active treatment. Overall, the treatment groups also had similar levels of service utilization during follow-up, with only one significant group difference: in early follow-up, participants in ICBT had significantly more medication management visits than participants in TSFT (2.94 vs. 1.98, $p < .01$).

3.3. Treatment group differences in service utilization over time

When examining the change in service utilization over time, patterns of service use varied across service categories and between the two treatment groups. The utilization of outpatient therapy remained stable over time for both treatment groups. The mixed-model ANOVA revealed no time, $F(2, 468) = 1.35$ $p = .26$, and no Time $\times$ Group interaction, $F(2, 468) = 0.14$, $p = .87$.

The utilization of medication management services decreased over time for both treatment groups, with evidence for a steeper decline for the TSFT group during early follow-up. For medication management, the group main effect was not statistically significant, $F(1, 220) = 1.46$, $p = .23$, indicating no difference between TSFT and ICBT in the overall mean level of medication service utilization. There was a significant main effect of time, $F(2, 440) =$

53.45, $p < .001$, indicating that medication appointments decreased over the 18 months of study. The test of the Time $\times$ Group interaction approached statistical significance, $F(2, 440) = 2.77$, $p = .06$. The quadratic time effect, $F(1, 99) = 22.24$, $p < .001$, was significant for the TSFT group, but not the ICBT group, $F(1, 121) = 0.18$, $p = .67$. This reflected a steep reduction for participants in TSFT in early follow-up, whereas those in ICBT showed a more consistent linear decrease in medication appointments over time.

The most expensive service measured, inpatient services, decreased over time for the ICBT group, but not for the TSFT group. Fig. 1 displays the inpatient utilization levels over time for both groups. The group main effect was not significant, $F(1, 232) = 0.09$, $p = .76$, and time was not significant, $F(2, 464) = 0.17$, $p = .84$. However, there was a significant Time $\times$ Group interaction, $F(2, 464) = 3.14$, $p < .05$. Within-group analyses revealed that the linear time effect was significant for the ICBT group, $F(1, 126) = 4.66$, $p = .033$, but not the TSFT group, $F(1, 106) = 1.33$, $p = .25$. In particular, the interaction was characterized by a linear decrease over time in inpatient utilization for the ICBT group, whereas those in TSFT had no change at early follow-up and increased inpatient rates at extended follow-up.

For both treatment groups, there were linear and nonlinear reductions in the utilization of recovery homes over time. The main effect of group was not statistically significant, $F(1, 232) = 0.09$, $p = .76$. Recovery home use decreased significantly over time, $F(2, 464) = 27.88$, $p < .001$, for both treatment groups. Follow-up tests revealed that the linear time effect, $F(1, 232) = 36.60$, $p < .001$, and quadratic time effect, $F(1, 232) = 7.54$, $p = .007$, were both statistically significant. There was no significant Time $\times$ Group interaction, $F(2, 464) = 0.88$, $p = .42$. Thus, participants in both treatment conditions exhibited decreases in utilization of recovery homes across 18 months, with steeper reductions in the early follow-up period.

3.4. Predictors of service utilization

Negative binomial regression models were used to predict utilization of outpatient therapy and medication management sessions from the predictors measured at baseline. All baseline predictors were modeled together in one step, along with treatment group, to predict service utilization during treatment (Phase 1) and during the 12 months of follow-up (Phases 2 and 3 combined). The model significantly predicted medication management services during treatment, likelihood ratio (LR) $\chi^2(11, N = 176) = 40.91$, $p < .001$, and follow-up, LR $\chi^2(11, N = 175) = 36.47$, $p < 0.001$. During treatment, being male (odds ratio [OR] = 1.57, $p < .05$) and having more inpatient days pre-baseline (OR = 1.00, $p < .001$) were associated with more medication visits, whereas non-Caucasian ethnicity (OR = 0.73, $p < .01$) was associated with fewer medication visits. During follow-up, male gender (OR = 1.77, $p < .05$) was associated with more medication visits, and non-Caucasian ethnicity (OR = 0.59, $p < .001$) was associated with fewer medication visits. The overall model did not predict outpatient therapy visits during treatment, LR $\chi^2(11, N = 178) = 6.95$, $p = .80$, or during follow-up, LR $\chi^2(11, N = 178) = 6.41$, $p = .84$.

Zero-inflated negative binomial regression models were used to examine predictors of inpatient service use and recovery home stays. The overall model significantly predicted inpatient service use during treatment, LR $\chi^2(11, N = 178) = 24.35$, $p < .05$. The regression

provided two sets of ORs for each independent predictor: one set for the odds of having zero inpatient days and a second set predicting the length of inpatient stays for those who had at least one admission. Attending more group therapy sessions was associated with greater odds ($OR = 1.07, p < .01$) of no hospitalization. A longer period of abstinence at baseline was associated with less odds ($OR = 0.98, p < .05$) of no hospitalization. Among participants who used any inpatient services, higher levels of baseline depression ($OR = 1.02, p < .05$) was associated with longer inpatient stays, whereas attending more study treatment sessions ($OR = 0.97, p < .05$), being in the ICBT group ($OR = 0.63, p < .05$), and having current drug dependence ($OR = 0.57, p < .01$) were associated with shorter inpatient stays. The model did not significantly predict inpatient services during follow-up, $LR \chi^2(11, N = 176) = 9.43, p = .58$, nor did it significantly predict recovery home utilization during treatment, $LR \chi^2(11, N = 178) = 12.66, p = .32$, or during follow-up, $LR \chi^2(11, N = 176) = 9.44, p = .58$.

4. Discussion

This study found that ICBT for comorbid SUD-depression reduced inpatient service utilization when compared to TSFT during the year following treatment. Participants receiving ICBT consistently decreased in inpatient services, whereas TSFT participants showed a higher level at extended follow-up compared to active treatment. In addition, for patients who were hospitalized during treatment, ICBT predicted briefer hospitalization. These findings are noteworthy because inpatient service costs are substantial and far greater than the costs of outpatient treatment for patients with comorbid SUD-depression (Druss & Rosenheck, 1999). In one previous study, integrated outpatient treatment reduced inpatient hospitalization for veterans with SUDs and mixed Axis I psychiatric comorbidity (Granholtz et al., 2003). Our study extends these findings by showing that from a service utilization perspective, integrated treatment can perform better than a professionally delivered 12-step facilitation approach and demonstrates some evidence for the long-term cost-effectiveness of ICBT for the treatment of comorbid SUD-depression.

Participants in ICBT utilized more medication management services in the initial months after treatment, but by 1-year posttreatment, these visits had declined, resulting in similar levels for ICBT and TSFT. This group difference may reflect the different philosophies of these treatments. ICBT focuses explicitly on self-management of depression, which may promote the continued use of antidepressant medications for longer periods. In contrast, TSFT does not address depression explicitly outside the context of 12-step content. It is possible that specific 12-step components are associated with lower psychiatric medication utilization, such as exposure to antismedication attitudes at meetings (Rychtarik, Connors, Dermen, & Stasiewicz, 2000). Alternatively, TSFT and the prescribed 12-step activities may provide unique benefits that reduce these patients' need for pharmacotherapy. The interaction of these therapeutic elements is an interesting area for future inquiry, particularly for comorbid patients who could derive important benefits from both 12-step involvement and pharmacotherapy.

As found in prior research (Lasser, Himmelstein, Woolhandler, McCormick, & Bor, 2002; Wryobeck et al., 2006), ethnic minority participants attended fewer medication management sessions both during treatment and follow-up. The reluctance of ethnic minorities to use

psychotropic medication may be related to distrust of psychiatric interventions or fear of discrimination (Wryobeck et al., 2006) but may also reflect differences in the perceived value of medications. Similarly, women were less likely than men to utilize medication services during treatment and follow-up. Previous work has shown that women with mental health diagnoses utilize fewer VA outpatient services (Hoff & Rosenheck, 1998b). These findings highlight the need to expand and tailor VA health care services for female veterans, particularly for mental health treatment (Yano, Goldzweig, Canelo, & Washington, 2006).

Participants attending more outpatient group therapy sessions had a reduced risk of inpatient hospitalization during treatment and stayed fewer days if hospitalized. This finding supports the well-established benefit of retention in outpatient therapy (Stecker, Curran, Han, & Booth, 2007), which may be especially important for individuals with comorbid SUD-depression, since they are at an increased risk for readmission to inpatient services. In addition, a longer period of abstinence at baseline was related to a greater chance of utilizing inpatient hospitalization during treatment. This seems paradoxical, but a prior study with this sample found that the likelihood of sustained abstinence diminishes over time (Tate et al., 2008). It is possible that comorbid patients with sustained abstinence experience a worsening of depressive symptoms over time, resulting in either severe depressive episodes or a greater likelihood of relapse and eventual hospitalization. Greater depressive symptoms at baseline predicted longer inpatient admissions, suggesting that patients with both a recent history of abstinence and greater depressive symptoms may be at the greatest risk for extended inpatient utilization.

This study is the first to examine rates of health service utilization over time in a high-risk sample of patients randomized to integrated treatment for comorbid SUD-depression. Despite multiple strengths in research design and analyses, as well as contributing to an often-overlooked area of treatment outcome research, there are several limitations to these findings. One limitation is the homogenous nature of the sample, which was composed entirely of veterans, most of whom were not married Caucasian males with extensive histories of mental health and SUD hospitalization. Therefore, additional research is needed to determine whether these findings are generalizable to more heterogeneous adult clinical populations. In addition, we examined service utilization in the context of a health care system where most services are provided to patients at little to no cost. The group therapies and individual predictors might have a different impact on service utilization when examined in other health care systems with different cost structures. There are additional treatment services commonly accessed by this population (e.g., primary care, emergency departments) and other relevant patient characteristics (e.g., other Axis I or II disorders, chronic medical conditions, distance to care) that were not within the scope of this study. In addition, we implemented a model of baseline characteristics to predict service utilization up to 18 months from the baseline point. Other studies have accounted for time-varying characteristics, such as abstinence status, and their association with patterns of service utilization (Parthasarathy & Weisner, 2005). Although this was not a goal of the current study, further investigations with similar clinical samples would likely benefit from the use of this strategy.

This study demonstrates the beneficial impact of ICBT on reducing costly service utilization compared to a professionally administered 12-step approach for those with both depression and a SUD. Future studies should explore specific, time-varying factors related to the utilization of treatment services, as well as examine the effects of ancillary services on long-term outcomes for individuals with SUD and comorbid psychiatric disorders. Treatment research should continue developing effective interventions that reduce long-term treatment costs for such high-risk populations.

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Fig. 1. Mean levels of inpatient service utilization during Months 1–6 (treatment), Months 7–12 (early follow-up), and Months 13–18 (extended follow-up) for participants in TSFT and ICBT for comorbid SUD depression.

Table 1

Treatment group differences in service utilization within each 6-month phase and during the entire 18 months

Type of service and phase	Treatment condition		<i>t</i>	<i>p</i>
	TSFT	ICBT		
	<i>M (SD)</i>	<i>M (SD)</i>		
Outpatient therapy sessions				
Active treatment	4.15 (6.55)	3.83 (7.24)	0.35	.72
Early follow-up	4.51 (7.36)	3.88 (5.54)	0.75	.45
Extended follow-up	3.41 (6.70)	3.33 (7.05)	0.09	.93
18-month total	12.07 (15.53)	11.04 (14.18)	0.54	.59
Medication management				
Active treatment	4.26 (3.15)	4.19 (3.53)	0.15	.88
Early follow-up	1.98 (2.03)	2.94 (2.97)	−2.76	.006
Extended follow-up	1.86 (2.50)	1.90 (2.51)	−0.12	.90
18-month total	8.04 (5.22)	9.03 (6.70)	−1.21	.23
Days of inpatient services				
Active treatment	2.71 (7.08)	4.10 (9.42)	−1.27	.21
Early follow-up	2.45 (7.26)	3.42 (8.24)	−0.95	.34
Extended follow-up	4.28 (12.21)	2.17 (5.96)	1.72	.09
18-month total	9.47 (16.60)	9.69 (15.58)	−0.12	.92
Days in recovery homes				
Active treatment	56.09 (70.78)	49.04 (62.05)	0.82	.42
Early follow-up	31.50 (55.69)	31.02 (59.25)	0.06	.95
Extended follow-up	23.37 (53.31)	26.14 (54.91)	−0.39	.70
18-month total	111.99 (147.60)	106.20 (145.03)	0.30	.76

Note. Active treatment = Months 1–6; early follow-up = Months 7–12; extended follow-up = Months 13–18.