Inpatient Addiction Consultation for Hospitalized Patients Increases Post-Discharge Abstinence and Reduces Addiction Severity

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BACKGROUND: Alcohol and drug use results in substantial morbidity, mortality, and cost. Individuals with alcohol and drug use disorders are overrepresented in general medical settings. Hospital-based interventions offer an opportunity to engage with a vulnerable population that may not otherwise seek treatment.

OBJECTIVE: To determine whether inpatient addiction consultation improves substance use outcomes 1 month after discharge.

DESIGN: Prospective quasi-experimental evaluation comparing 30-day post-discharge outcomes between participants who were and were not seen by an addiction consult team during hospitalization at an urban academic hospital.

PARTICIPANTS: Three hundred ninety-nine hospitalized adults who screened as high risk for having an alcohol or drug use disorder or who were clinically identified by the primary nurse as having a substance use disorder.

INTERVENTION: Addiction consultation from a multidisciplinary specialty team offering pharmacotherapy initiation, motivational counseling, treatment planning, and direct linkage to ongoing addiction treatment.

MAIN MEASURES: Addiction Severity Index (ASI) composite score for alcohol and drug use and self-reported abstinence at 30 days post-discharge. Secondary outcomes included 90-day substance use measures and self-reported hospital and ED utilization.

KEY RESULTS: Among 265 participants with 30-day follow-up, a greater reduction in the ASI composite score for drug or alcohol use was seen in the intervention group than in the control group (mean ASI-alcohol decreased by 0.24 vs. 0.08, $p < 0.001$; mean ASI-drug decreased by 0.05 vs. 0.02, $p = 0.003$.) There was also a greater increase in the number of days of abstinence in the intervention group versus the control group (+12.7 days vs. +5.6, $p < 0.001$). The differences in ASI-alcohol, ASI-drug, and days abstinent all remained statistically significant after controlling for age, gender, employment status, smoking status, and baseline addiction severity ($p = 0.018$, 0.018, and 0.02, respectively). In a sensitivity analysis, assuming that patients who were lost to follow-up had no change from baseline severity, the differences remained statistically significant.

CONCLUSIONS: In a non-randomized cohort of medical inpatients, addiction consultation reduced addiction severity for alcohol and drug use and increased the number of days of abstinence in the first month after hospital discharge.

INTRODUCTION

Addiction has emerged as a public health crisis in America. There are 22 million people in the United States with a substance use disorder (SUD).[1] Unintentional overdose is the leading cause of accidental death, killing more Americans than car accidents.[2] From 2000 to 2014, nearly half a million people in this country died from drug overdose, with 47,055 deaths in 2014 alone.[3] Each year only 10% of people with an SUD receive treatment.[1] Among hospitalized patients the prevalence of SUD is higher than the general population.[4] Hospital discharge is a vulnerable time for individuals with SUD when the risk of overdose is increased, highlighting the need for intervention.[5] Patients with SUD are also at increased risk of hospital readmission.[6] Several interventions for patients with alcohol, tobacco, or drug use disorder in general medical settings have been shown to improve retention in treatment and clinical outcomes.[7–14] Implementation of these interventions in real-world clinical practice, however, remains rare, and rigorous evaluations of hospital-based interventions are lacking.

The goal of this study was to evaluate the impact of addiction consultation during hospitalization on addiction severity and self-reported abstinence at 30 days post-discharge.

METHODS

Study Design. We conducted a prospective, quasi-experimental evaluation of an inpatient addiction consultation service, with 30-day post-discharge outcomes as the primary

outcome measures. Because the program was implemented on a subset of medical floors, and not all eligible patients on implementation floors received inpatient consults, we were able to conduct a controlled evaluation of the program.

Study Site. The study was conducted in an urban academic medical center with approximately 48,000 inpatient admissions annually. In November 2014, all inpatients began being screened for substance use by the admitting nurse using the Alcohol Use Disorders Identification Test–Consumption (AUDIT-C) and the National Institute on Drug Abuse (NIDA) single-question screening for drug use.[15, 16] The AUDIT-C, which comprises three questions from the Alcohol Use Disorders Identification Test (AUDIT), has demonstrated validity in identifying heavy drinking and alcohol use disorder. An AUDIT-C score of 8 or higher is 92% specific for alcohol use disorder and 99% specific for heavy drinking and/or alcohol use disorder.[15] The single-question drug screen asks "How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?" A response of at least one time is considered positive. This screening question is 100% sensitive and 73.5% specific for the detection of drug use disorder, with test characteristics similar to the longer 10-item Drug Abuse Screening Test (DAST-10).[16]

Participants. Participants included adults 18 years or older admitted during the study period who had or were at high risk for drug or alcohol use disorder as determined by an AUDIT-C score of 8 or higher, had a positive single-item drug screen, or who were identified by the primary nurse as having a substance use disorder. Exclusion criteria were 1) pregnancy; 2) inability to be interviewed due to acute illness, somnolence, or cognitive impairment; 3) and screening solely for marijuana use.

Recruitment. On 14 study floors, eligible participants were asked by a unit nurse for permission to be approached by a research assistant. The research assistant, available only on weekdays during business hours, completed further screening to confirm eligibility. Participants provided oral informed consent and received a $25 gift card at each follow-up assessment.

Intervention. Twelve of the 14 study floors had access to an addiction consult team (ACT). The remaining two floors did not. The limited access to ACT was due to a phased rollout of this new service. The two floors without access to ACT were floors with a mixed population of medical and surgical or respiratory acute care patients; non-medical patients on these floors were not included in the study. Floor assignment for patients was independent of this study and was based on bed availability at the time of admission. The decision to consult ACT was made by the primary clinical team independently of this study.

ACT is a multidisciplinary team consisting of a psychiatrist, a rotating group of internists with addiction expertise (all of whom had been granted waivers to prescribe buprenorphine, some board-certified in addiction medicine), advanced practice nurses (one full- and one part-time), three clinical social workers, a clinical pharmacist, recovery coach, and resource specialist. ACT provides each patient with a diagnosis and a longitudinal treatment plan, which is initiated in the hospital. The treatment plan includes an assessment of the ideal level of care, appropriateness of pharmacotherapy initiation, psychosocial needs, harm reduction needs, and patient readiness and preferences. Social workers provide bedside motivational enhancement therapy. Pharmacotherapy, when indicated, is initiated during hospitalization. Recovery coaches, who can provide peer support during hospitalization, are available in select outpatient practices and can longitudinally follow patients who receive primary care there. These coaches offer a range of services; examples include attending appointments, providing motivational support, helping with legal or social service needs, and connecting patients to other community supports. The social workers and resource specialist identify community-based treatment resources and make every effort to link patients directly to care following discharge. Patients without a concrete discharge plan are offered care through a low-threshold post-discharge clinic which provides transitional addiction treatment including pharmacotherapy.

Participants in the control group received standard of care for SUD prior to the establishment of ACT. Standard of care included access to a general psychiatry consult liaison team and floor social work. Hospital management of SUD generally included withdrawal treatment and referral to outpatient addiction care. Pharmacotherapy for SUD was rarely initiated in the hospital.

Assessments. Participants were assessed upon enrollment and at 30 and 90 days following discharge. Baseline assessments were conducted in person. Follow-up assessments were completed by phone, in person, or through the mail, depending on participant preference. The research assistant made a maximum of 15 attempts at contact per participant. Participants were asked about substance use and a number of secondary measures, including healthcare utilization.

Substance use severity was assessed using the questions from the Addiction Severity Index (ASI) which make up the alcohol and drug composite scores. The ASI is a standardized instrument for evaluating the severity of problems for patients with SUD.[17] The composite score for each problem area of the ASI was derived from sets of items within the ASI, and may be a better indicator of overall problem severity and change in problem status.[18] The time period for composite scores is the prior 30 days. The items are combined using a formula to ensure equal weighting of each variable in the composite score. In addition, participants were asked to report the number of days within in the past 30 days that they had used alcohol or drugs.

Self-efficacy was assessed by a question demonstrated to be predictive of relapse.[19] Participants were also asked about motivation for abstinence, lifetime and past-30-day history of

overdose, treatment engagement, quality of life, and tobacco use and quit attempts. (See online Appendix for full survey).

Main Measures. The primary outcomes of this study were change in ASI composite score for alcohol and drug use and self-reported abstinence at 30 days post-discharge compared to baseline. This combination of self-reported abstinence and ASI composite score has been used effectively in measuring the impact of care interventions.[20]

Secondary outcomes included change in self-efficacy, motivation for abstinence, self-reported overdose, treatment engagement, mutual help attendance, self-reported health care utilization, and quality of life.

Although the primary endpoint of the study was 30 days, participants were followed and outcomes were collected for up to 90 days.

Analysis. Continuous variables were summarized using the mean with standard deviation, and categorical variables were summarized using frequency with percentage. Separate analyses were conducted for those with 30-day follow-up and those with 90-day follow-up and changes from baseline were compared between the two study groups. For primary outcomes, regression models were used to compare outcomes, adjusting for differences in baseline characteristics. Using an intention-to-treat analysis, all enrolled patients were included and analyzed according to their original treatment groups. In order to include these participants in the analysis, we needed to impute outcomes for participants who were lost to follow-up. We conservatively assumed that participants who were lost to follow-up had no change from baseline severity. For binary secondary outcomes, the differences in change from baseline were compared by testing the interaction between group and time in the logistic regression models. All analyses were conducted using SAS version 9.4 software (SAS Institute Inc., Cary, NC). A two-sided *p* value of 0.05 or less was considered statistically significant.

The study was designed to enroll 200 intervention patients and 200 control patients in order to detect a mean difference of 0.28 in ASI drug use composite score, assuming a standard deviation of 0.1 with 80% power.[20]

The Partners Healthcare institutional review board approved the study.

RESULTS

Enrollment and Follow-Up. Participants were enrolled from April 1, 2015, until April 1, 2016. During the study period, 2192 participants were available for screening. Of those, 728 were eligible for enrollment; 328 declined and 399 consented to participate (Fig. 1). Of those enrolled, 256 (64%) received the intervention and 143 (36%) did not. Thirty-day follow-up was completed for 165 of 256 (65%) in the intervention group

and 100 of 143 (70%) in the control group. Ninety-day follow-up was completed for 144 (56%) in the intervention group and 83 (58%) in the control group. Follow-up rates did not differ significantly between groups (*p* = 0.27, 0.73 for 30 and 90-day follow-up, respectively). Participants without 30-day follow-up were more likely to be male (78% vs. 69%, *p* = 0.065), less educated (60% vs. 51% with high school education or less, *p* = 0.091), unemployed (51% vs. 42%, *p* = 0.15), and with significantly higher baseline ASI-drug scores (0.16 vs. 0.12, *p* = 0.012). Participants without 90-day follow-up were more likely to report drugs as the major problem substance (52% vs. 40%, *p* = 0.049), more likely to be a minority (23% vs. 15%, *p* = 0.061) and unemployed (50% vs. 41%, *p* = 0.053), and had higher baseline ASI-drug scores (0.16 vs. 0.11, *p* < 0.001).

Characteristics of Study Participants. Table 1 shows the characteristics for enrolled participants. Among all patients, 218 (55%) identified alcohol as their major problem substance, 143 identified drugs (36%), and 38 identified both (10%). Among those who identified drugs as their major problem, heroin was the primary drug for 52%, cocaine for 15%, multiple drugs for 15%, and other opioids for 9%. The distribution of major problem or primary drug did not differ between intervention and control groups. The groups differed at baseline on several key demographics: those in the intervention group were younger (mean age 46 vs. 51, *p* = 0.006) and were more likely to be unemployed (53% vs. 31%, *p* < 0.001) and active smokers (69% vs. 55%, *p* < 0.001). Mean baseline ASI composite scores were higher in the intervention than in the control group (ASI-alcohol 0.46 vs. 0.31, *p* < 0.001, ASI-drug 0.15 vs. 0.10, *p* < 0.001).

Primary Outcomes. Among the 265 patients with 30-day follow-up, a significantly greater reduction in ASI composite scores was found in the intervention group (ASI-alcohol −0.24 vs. −0.08, *p* < 0.001; ASI-drug −0.05 vs. −0.02, *p* = 0.003; Tables 2 and 3). Only 10% of participants reported both alcohol and drug use as their major substance problem. The small sample size limited subgroup analyses for this group; however, a greater decrease in ASI composite scores was found in the intervention group (ASI-alcohol −0.25 vs. −0.15, *p* = 0.49; ASI-drug −0.08 vs. −0.01, *p* = 0.19.). The intervention group also showed a greater increase in the number of days of abstinence within the past 30 days (12.7 vs. 5.6, *p* < 0.001). In the adjusted analyses, differences in ASI-alcohol, ASI-drug, and days abstinent all remained statistically significant after controlling for age, gender, employment status, smoking status, and baseline ASI or days abstinent (*p* = 0.018, 0.018, and 0.02, respectively). In the intention-to-treat analysis, assuming that participants lost to follow-up had no change from baseline, differences between groups remained significant in both bivariate and multivariable analyses. There was a decrease in self-reported past-30-day overdose in both groups.
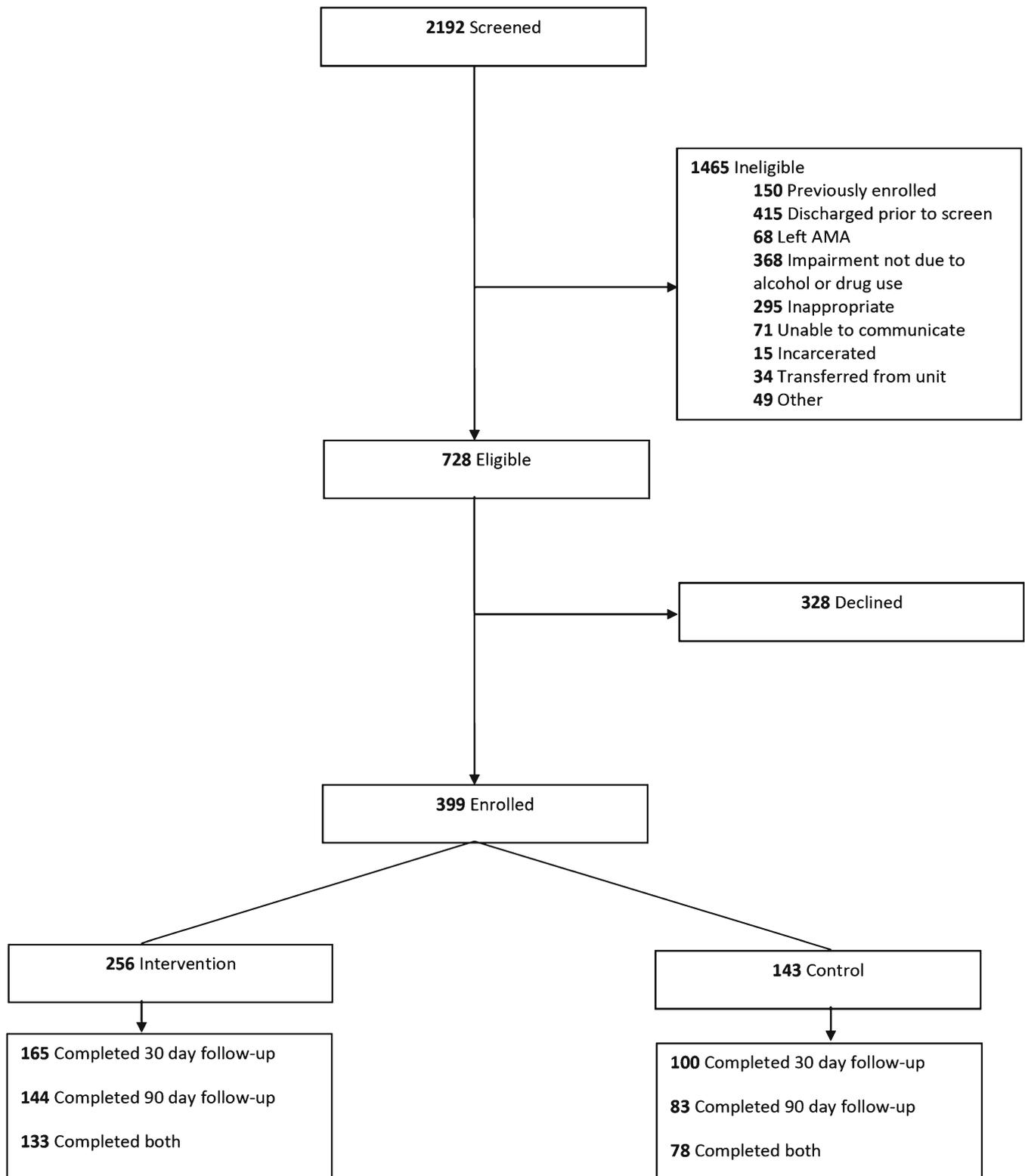
Figure 1 Participant flow.

Secondary Outcomes. Among the 227 patients with 90-day follow-up, a greater reduction in the mean ASI composite score for alcohol was noted in the intervention group (-0.22 vs. -0.10, $p = 0.003$; Table 2). The mean change in ASI-drug was also greater in the intervention group, but the difference did not reach significance (-0.05 vs. -0.02, $p = 0.058$). The change in days of abstinence remained higher in the intervention group (11 vs. 5.5, $p < 0.001$). There were 16 patients (11 intervention and 5 control) who could not

Table 1 Baseline Characteristics of All Enrolled Patients

	All (N = 399)	Intervention (N = 256)	Control (N = 143)	P value
Major substance problem, n (%)				0.88
Alcohol	218 (55)	141 (55)	77 (54)	
Drug	143 (36)	92 (36)	51 (36)	
Both	38 (10)	23 (9)	15 (10)	
Age, mean (SD)	48 (14)	46 (13)	51 (15)	0.006
Female, n (%)	110 (28)	77 (30)	33 (23)	0.14
White, n (%)	324 (81)	209 (82)	115 (80)	0.76
Education, n (%)				0.88
High school or less	216 (54)	142 (55)	74 (52)	
More than high school	91 (23)	59 (23)	32 (22)	
Unknown	92 (23)	55 (21)	37 (26)	
Employment status, n (%)				<0.001
Employed/student	81 (20)	42 (16)	39 (27)	
Retired	32 (8)	11 (4)	21 (15)	
Disabled	78 (20)	49 (19)	29 (20)	
Not employed	179 (45)	135 (53)	44 (31)	
Unknown	29 (7)	19 (7)	10 (7)	
Smoking status, n (%)				0.002
Never	53 (13)	31 (12)	22 (15)	
Past	37 (9)	14 (5)	23 (16)	
Active	255 (64)	177 (69)	78 (55)	
Unknown	54 (14)	34 (13)	20 (14)	
Baseline ASI alcohol, mean (SD)	0.41 (0.33)	0.46 (0.34)	0.31 (0.31)	<0.001
Baseline ASI drug, mean (SD)	0.13 (0.15)	0.15 (0.16)	0.10 (0.11)	<0.001

be reached at 30 days but were reached at 90 days. Table 3 shows days of abstinence among all participants and those reached at 30 days, 90 days, or both.

The magnitude of the decrease in self-reported overdose at 90-day follow-up was greater in the intervention group; however, this was not significant (-0.23 vs. -0.13 $p = 0.28$).

Participants in the intervention group had attended more mutual help meetings at the 30-day (8.1 vs. 4.4, $p = 0.004$)

and 90-day follow-up (9.0 vs. 5.1, $p = 0.005$). They were also more likely to be engaged in treatment at 30-day (57.9% vs. 41.4%, $p = 0.009$) and 90-day follow-up (54.6% vs. 40.7%, $p = 0.047$).

At 30-day follow-up, a significantly greater decrease in self-reported inpatient substance-related hospitalizations was seen in the intervention group (61% vs. 51%, $p = 0.001$), as well as a significantly greater reduction in substance-related ED visits (66% vs. 53%, $p = 0.002$; Table 4).

Table 2 Substance Use Outcomes

		30-Day follow-up			90-Day follow-up		
		Intervention (N = 165)	Control (N = 100)	P value	Intervention (N = 144)	Control (N = 83)	P value
ASI alcohol	Baseline	0.46 (0.33)	0.28 (0.29)	<0.001	0.47 ().32)	0.30 (0.31)	<0.001
	Follow-up	0.22 (0.22)	0.20 (0.20)	0.45	0.25 (0.22)	0.20 (0.22)	0.12
	Change	−0.24 (0.28)	−0.08 (0.24)	<0.001	−0.22 (0.29)	−0.10 (0.27)	0.003
	Adjusted difference*	−0.06 (0.02)		0.018	−0.01 (0.03)		0.79
ASI drug	Baseline	0.13 (0.16)	0.10 (0.11)	0.057	0.12 (0.15)	0.09 (0.11)	0.17
	Follow-up	0.08 (0.11)	0.08 (0.09)	0.74	0.07 (0.08)	0.07 (0.08)	0.89
	Change	−0.05 (0.11)	−0.02 (0.08)	0.003	−0.05 (0.11)	−0.02 (0.09)	0.058
	Adjusted difference*	−0.02 (0.01)		0.018	−0.01 (0.01)		0.12
Days abstinent	Baseline	12.6 (10.6)	19.1 (11.1)	<0.001	13.2 (11.0)	18.6 (11.2)	<0.001
	Follow-up	25.3 (8.3)	24.7 (7.9)	0.57	24.3 (9.3)	24.1 (9.9)	0.88
	Change	12.7 (11.7)	5.6 (10.2)	<0.001	11.0 (12.7)	5.5 (10.5)	<0.001
	Adjusted difference*	2.59 (1.11)		0.02	1.70 (1.35)		0.21
Overdose	Baseline	0.23 (0.85)	0.23 (0.96)	0.99	0.24 (0.89)	0.17 (0.60)	0.5
	Follow-up	0.04 (0.30)	0.06 (0.24)	0.60	0.01 (0.08)	0.04 (0.33)	0.43
	Change	−0.19 (0.73)	−0.17 (0.85)	0.86	−0.23 (0.90)	−0.13 (0.44)	0.28
	Adjusted difference*	−0.03 (0.03)		0.42	0.01 (0.01)		0.48

The difference in changes from baseline to follow-up between intervention and control groups from regression models adjusting for age, gender, employment status, smoking status, and baseline value

Table 3 Days of Abstinence Among Participants at 30 Days, 90 Days, or Both

Days abstinent		30-Day follow-up						90-Day follow-up					
		Intervention			Control			Intervention			Control		
		No.	Mean	SD	No.	Mean	SD	No.	Mean	SD	No.	Mean	SD
All	Baseline	165	12.6	10.6	100	19.1	11.1	144	13.2	11	83	18.6	11.2
	Follow-up	165	25.3	8.3	100	24.7	7.91	144	24.3	9.29	83	24.1	9.85
	Change	165	12.7	11.7	100	5.61	10.2	144	11	12.7	83	5.45	10.5
Both	Baseline	133	13	10.8	78	18.6	11.1	133	13	10.8	78	18.6	11.1
	Follow-up	133	25.7	7.87	78	24.5	8.35	133	24.3	9.32	78	24.2	9.71
	Change	133	12.7	11.4	78	5.92	10.4	133	11.2	12.6	78	5.62	10.6
30-Day only	Baseline	32	10.7	10.1	22	20.9	11.2						
	Follow-up	32	23.5	9.83	22	25.4	6.25						
	Change	32	12.8	13.3	22	4.5	9.69						
90-Day only	Baseline							11	15.6	13.5	5	18.4	13.2
	Follow-up							11	24.3	9.32	5	21.2	12.8
	Change							11	8.73	14.4	5	2.8	9.2

DISCUSSION

This prospective, controlled evaluation of an inpatient addiction consultation service for hospitalized medical patients with an SUD found that consultation significantly reduced addiction severity for alcohol and drug use and increased the number of days of abstinence in the first month after hospital discharge. The increase in abstinence days and reduction in alcohol use severity remained significantly greater at 3 months following discharge. The magnitude of improvement with respect to the severity of drug use was also greater at 3 months, although the difference was no longer significant. Addiction consultation also reduced the number of self-reported hospital and ED returns for substance use-related issues.

Our findings build on previous research demonstrating efficacy for hospital-based SUD interventions. An uncontrolled study offering a range of services, including methadone initiation, to non-treatment-seeking hospitalized patients with opioid use disorder showed that 82% of patients engaged in a post-discharge addiction follow-up visit.[7] A meta-analysis found that a brief intervention for unhealthy drinkers in a hospital setting reduced alcohol consumption 6 months after discharge.[8] A study of hospitalized patients with alcohol use disorder found that bedside assessment with motivational interviewing and facilitated referral to treatment increased treatment participation following discharge.[9] Starting pharmacotherapy for alcohol, tobacco, or opioid use disorder prior to discharge is reported to improve treatment retention, reduces substance use, and

Table 4 Secondary Outcomes

		30-Day follow-up			90-Day follow-up		
		Intervention (N = 165)	Control (N = 100)	P value	Intervention (N = 144)	Control (N = 83)	P value
Mutual help attendance	Baseline	4.5 (9.5)	2.9 (7.3)	0.12	5.1 (10.2)	2.9 (7.6)	0.065
	Follow-up	8.1 (12.3)	4.4 (8.2)	0.004	9.0 (11.9)	5.1 (8.7)	0.005
	Change	3.6 (12.4)	1.6 (7.6)	0.10	3.9 (13.4)	2.2 (8.0)	0.23
Treatment engagement (%)	Baseline	30.5	30.3	0.97	30.5	29.6	0.89
	Follow-up	57.9	41.4	0.009	54.6	40.7	0.047
	Change	27.4	11.1	0.018	24.1	11.1	0.092
Hospital admission	Baseline	1.2 (1.4)	0.5 (0.9)	<0.001	1.1 (1.4)	0.5 (1.0)	<0.001
	Follow-up	0.4 (1.1)	0.2 (0.8)	0.14	0.2 (0.8)	0.1 (0.6)	0.25
	Change	−0.8 (1.6)	−0.3 (0.9)	0.001	−0.9 (1.4)	−0.4 (0.7)	<0.001
ER use	Baseline	1.5 (2.1)	0.7 (1.4)	<0.001	1.3 (1.6)	0.8 (1.5)	0.017
	Follow-up	0.6 (1.6)	0.3 (0.9)	0.10	0.3 (1.0)	0.2 (0.8)	0.21
	Change	−0.9 (1.6)	−0.3 (1.3)	0.002	−0.9 (1.8)	−0.6 (1.4)	0.084
Current quality of life	Baseline	5.0 (3.0)	5.5 (3.0)	0.23	5.0 (2.9)	6.0 (2.9)	0.021
	Follow-up	5.9 (2.9)	6.2 (2.7)	0.45	6.3 (2.8)	6.7 (2.9)	0.29
	Change	0.9 (3.1)	0.7 (2.8)	0.61	1.3 (3.0)	0.7 (2.8)	0.20
30-Day quality of life	Baseline	3.4 (1.3)	3.1 (1.5)	0.13	3.3 (1.3)	3.0 (1.5)	0.16
	Follow-up	2.5 (1.5)	2.6 (1.6)	0.51	2.2 (1.3)	2.8 (1.7)	0.014
	Change	−0.9 (1.9)	−0.5 (2.0)	0.11	−1.1 (1.9)	−0.3 (2.3)	0.006
Self-efficacy	Baseline	6.9 (3.0)	6.8 (3.7)	0.65	7.0 (2.9)	7.2 (3.5)	0.62
	Follow-up	7.2 (2.8)	7.3 (3.2)	0.93	8.1 (2.6)	7.4 (3.2)	0.098
	Change	0.3 (3.5)	0.5 (3.6)	0.61	1.1 (3.6)	0.2 (3.3)	0.054
Abstinence motivation	Baseline	9.2 (2.2)	8.1 (3.3)	0.003	9.3 (1.7)	8.5 (3.1)	0.031
	Follow-up	9.0 (2.4)	8.3 (3.1)	0.062	9.4 (1.7)	8.2 (3.1)	0.001
	Change	−0.2 (2.1)	0.2 (3.4)	0.22	0.2 (2.0)	−0.2 (2.5)	0.21
Medication adherence	Baseline	1.8 (6.1)	0.5 (3.1)	0.023	1.9 (6.5)	0.6 (3.4)	0.043
	Follow-up	1.0 (4.4)	0.3 (1.2)	0.045	0.7 (3.1)	0.2 (0.8)	0.11
	Change	−0.8 (6.6)	−0.2 (3.3)	0.34	−1.3 (7.2)	−0.4 (3.6)	0.21

decreases hospital readmission.[10–12] Initiation of pharmacotherapy with buprenorphine during an emergency room visit for individuals with opioid use disorder was found to increase treatment engagement and reduce illicit drug use.[13] These previous studies have generally examined either pharmacotherapy initiation or behavioral interventions in the hospital. The intervention in this study incorporated elements from all of these prior studies. To our knowledge, no controlled studies have evaluated the impact of comprehensive addiction consultation in the general hospital on substance use outcomes.

Our study suggests that a hospital-based intervention which includes pharmacotherapy initiation, brief behavioral intervention, and direct linkage to outpatient treatment is effective. Hospitalization can offer an opportunity to engage with and initiate treatment for individuals with SUD who are actively experiencing the negative consequences of their disease. The durability of our findings at 3 months for days of abstinence and alcohol use severity is promising, and suggests that such an intervention can have longer-term benefits. This study has important implications for hospital systems, particularly in light of the current opioid epidemic.[21]

There are limitations to this study. First, assignment to the intervention was not randomized. Consequently, patients in the intervention and control arms differed on a number of variables. We controlled for these differences in the analysis, but in the absence of randomization, unmeasured confounding is possible. We did not examine the impact of psychiatric comorbidity. All patients were general medical patients with SUD; however, it is possible that psychiatric complexity differed between groups. Studies examining the impact of psychiatric comorbidity on substance use outcomes have reported mixed results.[22] Co-occurring psychiatric illness has been shown to be more strongly associated with employment problems and suicide risk than with response to treatment or SUD severity. We controlled for baseline addiction severity as measured by ASI composite scores for drug and alcohol, which are the indices within the ASI shown to have the most validity for patients with severe mental illness.[23] Second, due to variations in practice across the hospital, the care received by patients in the control arm was heterogeneous. It is possible that some control patients received addiction services, including pharmacotherapy. However, this would only have biased study results toward the null. Third, based on a number of baseline characteristics, including drug use severity, patients who were not reached for follow-up appeared to have been sicker and more marginalized. This is unlikely to have biased our results, because rates of follow-up completion did not differ between study arms. Despite multiple attempts to reach participants, our follow-up rates were relatively low. However, these follow-up rates were similar to those for participants in the control arms of previous studies of hospital-based interventions.[12, 13] In addition, the main outcomes did not change in an intention-to-treat analysis which considered missing participants as not having changed from baseline severity. Fourth, our outcome measures relied on self-reporting and did not use biological confirmation. However, substance use self-reporting has been widely used as a treatment outcome in the literature, even among those with co-occurring psychiatric illness, and a meta-analysis demonstrated good agreement with biological measures for substance use.[24, 25] Lastly, this was a single-site study in an academic medical center that followed patients for up to 3 months. The results may not be generalizable to other care settings and may not be durable.

CONCLUSION

In a non-randomized cohort of medical inpatients, addiction consultation reduced addiction severity for alcohol and drug use and increased the number of days of abstinence during the first month after hospital discharge. Hospitalization appears to be an effective setting in which to initiate addiction treatment. Hospitals have an opportunity to address the current crisis of SUD across the U.S. by offering addiction diagnosis, treatment, and linkage to care.

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