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Factors associated with completion of alcohol detoxification in residential settings

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ABSTRACT

Purpose: Over 15 million Americans have alcohol use disorder (AUD). Detoxification often occurs before treatment and is, therefore, an important component of the alcohol treatment system. Detoxification in a residential setting is indicated for certain patient populations, who often have more severe cases. This analysis examines factors associated with completion of detoxification for patients with AUD in residential facilities.

Data and methods: We analyzed the 2006–2014 Treatment Episode Data Set – Discharges (TEDS-D) using logistic regression to estimate the association of a number of patient demographic, treatment, and disorder characteristics with completion of residential alcohol detoxification.

Results: Social determinants of health were associated with detoxification completion. Patients who had a high school education or more and who were not homeless were more likely to complete detoxification. Referral from alcohol/drug care and other health care sources, school/work and community sources, and the criminal justice system had higher odds of completing detoxification. The odds of completing detoxification were lower for patients who began drinking at age 11 or younger, those with concurrent opioids, methamphetamine, or benzodiazepine abuse, and those with a co-occurring psychiatric condition.

Conclusions: The factors this study identified as being associated with lower odds of detoxification completion could be used to identify patients who would benefit from greater support during detoxification, treatment, and continuing care.

1. Introduction

There were 15.1 million people aged 12 and above who had an alcohol use disorder (AUD) in the United States in 2016 according to the National Survey on Drug Use and Health (NSDUH). Sacks, Gonzales, Bouchery, Tomedi, and Brewer (2015) estimated that nationally the costs of excessive drinking are \$250 billion. At the individual level, AUD can result in physical, psychological, legal, workplace, and social issues (Friedmann, 2013). Yet < 8% of those who had an AUD reported receiving any treatment for alcohol use in the past 12 months.

Treated individuals with alcohol dependence have better outcomes than untreated individuals. Weisner, Matzger, and Kaskutas (2003) found that 40% of treated individuals had subsequent non-problematic use of alcohol compared to 23% of untreated individuals. Dawson, Grant, Stinson, and Chou (2006) found that those who sought help with alcohol dependence were more than twice as likely to experience any recovery.

Detoxification often precedes treatment and is, therefore, regarded

as an important part of the alcohol treatment system (Jonkman, McCarty, Harwood, Normand, & Caspi, 2005; Mark, Vandivort-Warren, & Montejano, 2006). Detoxification can help diminish drinking cues, such as relief drinking to prevent withdrawal, as well as manage withdrawal symptoms and prevent medical complications (Raistrick, 2004). Complications of withdrawal include seizures and delirium tremens, and they can be fatal (Timko, Below, Schultz, Brief, & Cucciare, 2015). Approximately 30% of admissions where alcohol was the primary substance of abuse in the 2015 Treatment Episode Data Set - Admissions (TEDS-A) were for detoxification. Detoxification can occur in outpatient settings or in residential settings at hospitals or in free-standing facilities. Receiving detoxification at a residential setting is indicated for patients who have medical or psychiatric comorbidities, who are 60 years old or older, who are from unstable environments that put them at an increased risk for relapse, who consume 20 or more drinks per day, and/or who have had adverse reactions to withdrawal in the past (Friedmann, 2013; Room, Babor, & Rehm, 2005).

Alcohol withdrawal can result in the experience of unpleasant

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symptoms, including tremors, sweating, muscle pain, insomnia, depression, seizures, hallucinations, and delirium (Raistrick, 2004). In addition to possibly experiencing (or being worried about experiencing) these symptoms during detoxification, patients in residential detoxification may also experience fears. Patients may be concerned that they will encounter stigma because they were in detoxification. They may worry about becoming addicted to medications used during detoxification. They may have concerns about living without alcohol in the future (e.g., if their social life involved frequent drinking). They may also be concerned that they will relapse following detoxification. Patient fears can increase their distress during detoxification (Allen, Copello, & Orford, 2005).

Failure to complete detoxification can be a barrier to a patient continuing on to treatment (Mark et al., 2006) and can adversely affect an individual's belief that he or she is capable of recovery (Raistrick, 2004). It has been proposed that increased efforts should be made to encourage treatment retention for individuals undergoing detoxification (Stein, Kogan, & Sorbero, 2009). However, very little research has been done on factors associated with treatment completion for individuals undergoing detoxification for AUD in a residential setting (Callaghan & Cunningham, 2002). The current study examines patient demographic, treatment, and disorder characteristics associated with completion of detoxification for AUD at residential settings receiving public funds in the U.S.

2. Data and methods

2.1. Data

This analysis was conducted using the 2006 to 2014 Treatment Episode Dataset-Discharges (TEDS-D), which is made available by the Substance Abuse and Mental Health Services Administration (SAMHSA). Treatment programs receiving any public funds (from State and/or Federal sources) are requested to provide discharge-level data on publicly and privately funded clients for the dataset. There are differences in state licensing, certification, and accreditation, as well as in the dispersing of public funds, that can affect the scope of facilities contained in the TEDS-D (CBHSQ, n.d.). Nevertheless, the TEDS-D captures a significant share of all discharges from treatment facilities across the United States, especially those that reflect public spending.

Detoxification discharges from hospital inpatient and free-standing residential facilities providing 24-hour services where alcohol was the primary substance of abuse were included in the analysis. During the study period, over 96% of detoxification discharges in the TEDS-D where the primary substance of abuse was alcohol occurred in residential settings; the remainder occurred in an ambulatory setting.

Detoxification completion and transfer from detoxification to treatment are regarded as positive outcomes (Timko et al., 2015). Therefore, we follow Mutter, Ali, Smith, and Strashny (2015) and categorized patients whose discharge status was completed treatment or transferred to another treatment program or facility as having completed detoxification. We categorized discharge statuses of left against professional advice or terminated by facility as not having completed detoxification. Approximately, 3% of detoxification discharges had another disposition status (e.g., incarceration, death), and they were excluded from the analysis.

2.2. Methods

We calculated descriptive statistics for the patient population overall and by detoxification completion status. We report p-values from chi square tests comparing detoxification completion by patient demographic, treatment, and disorder characteristics.

We also used multivariate logistic regression to examine the association of a number of demographic, treatment, and disorder characteristics with completion of residential alcohol detoxification. We

Table 1
Descriptive statistics of detoxification discharges where alcohol is the primary substance of abuse, TEDS-D, 2006–2014.

Variable	All discharges	Discharges where detoxification was completed	p-Value ^a
Completed detoxification	85.1%	100.0%	
Demographic characteristics			
Treatment age			
Adolescent	0.2%	85.7%	
Transition aged	5.7%	83.7%	
25 to 34	17.4%	83.5%	
35 to 44	28.7%	83.8%	
45 to 54	35.3%	86.0%	
55+	12.7%	88.2%	< 0.0001
Sex			
Male	77.8%	84.9%	
Female	22.2%	85.7%	< 0.0001
Education			
Less than high school	23.5%	84.3%	
High school	47.4%	85.0%	
Some college	20.7%	84.9%	
College plus	8.4%	88.5%	< 0.0001
Employment			
Full time	13.4%	87.1%	
Part time	6.0%	88.4%	
Unemployed/not in labor force	80.6%	84.5%	< 0.0001
Housing			
Independent living	56.0%	85.2%	
Dependent living	9.0%	87.8%	
Homeless	35.0%	84.3%	< 0.0001
Race and ethnicity			
Black	14.0%	83.6%	
Hispanic	13.3%	93.0%	
Asian	0.7%	88.2%	
Native American	5.4%	84.0%	
Other	1.9%	80.8%	
Non-Hispanic White	64.7%	84.0%	< 0.0001
Marital status			
Married	12.9%	85.5%	
Not married	87.1%	85.0%	0.004
Treatment characteristics			
Time in treatment			
One day	36.0%	82.7%	
Two days	13.8%	76.7%	
Three days	12.1%	82.2%	
Four days	11.8%	90.9%	
Five days	7.8%	93.0%	
Six days	5.0%	93.5%	
Seven days	2.6%	92.8%	
Eight days+	10.9%	89.1%	< 0.0001
Referral source			
Alcohol/drug care	8.4%	89.1%	
Other health care	13.3%	87.7%	
School/work	0.2%	89.0%	
Community	15.1%	96.5%	
Criminal justice	15.9%	83.1%	
Individual	47.1%	80.6%	< 0.0001
Service setting			
Hospital inpatient	4.5%	87.3%	
Free-standing residential	95.5%	85.0%	< 0.0001
Disorder characteristics			
Age of alcohol initiation			
11 or younger	12.0%	81.9%	
Adolescent	62.6%	84.9%	
Transition aged	20.8%	87.7%	
25+	4.6%	84.6%	< 0.0001
Other substances			
Cocaine			
No cocaine	87.7%	85.7%	< 0.0001
Marijuana	14.9%	84.2%	
No marijuana	85.1%	85.2%	< 0.0001
Opioids			
No opioids	93.1%	85.6%	< 0.0001
Methamphetamines	2.0%	81.2%	

(continued on next page)

Table 1 (continued)

Variable	All discharges	Discharges where detoxification was completed	p-Value ^a
No methamphetamines	98.0%	85.2%	< 0.0001
Benzodiazepines	2.7%	81.0%	
No benzodiazepines	97.3%	85.2%	< 0.0001
Prior treatment	73.1%	86.4%	
No prior treatment	26.9%	81.5%	< 0.0001
Co-occurring psychiatric condition	25.2%	84.3%	
No co-occurring psychiatric condition	74.8%	85.4%	< 0.0001
Year			
2006	9.4%	84.7%	
2007	10.8%	82.5%	
2008	12.1%	83.1%	
2009	11.5%	83.3%	
2010	11.1%	82.6%	
2011	11.9%	84.5%	
2012	11.4%	87.4%	
2013	10.9%	89.1%	
2014	10.9%	89.0%	< 0.0001

^a p-Values are from chi-square tests of association between the row variables and detoxification completion.

included the following patient demographic characteristics in the model: age at the time of detoxification, sex, education, employment, housing, race/ethnicity, and marital status. We controlled for the following treatment characteristics: number of days in detoxification, source of referral to detoxification, and service setting (i.e., hospital inpatient or free-standing residential). We also included the following variables that capture aspects of the patient's disorder: age of alcohol initiation, other substances abused, whether the patient had undergone prior treatment, and whether the patient had a co-occurring psychiatric condition. We also included dummy variables for the year in which the detoxification occurred. The model included state fixed effects to account for unobservable state level characteristics that might impact detoxification completion, and we calculated robust standard errors.

3. Results

Table 1 shows descriptive statistics for patients receiving residential detoxification services for AUD. Overall, 85.1% of patients completed detoxification.

The largest age group was 45 to 54 year olds. The older age groups (i.e., 45 to 54 and 55 and above) have the highest percentages of patients completing detoxification. The share of discharges by those aged 55 and above has nearly doubled over the period. (See Fig. S1 in the Supplementary appendix.)

Over three quarters of patients were male. Nearly half of patients had a high school education. Completion of detoxification was highest for individuals with a college education or higher. Over 80% of patients were unemployed or not in the labor force. Detoxification completion was higher among those who were employed than those who were not. More than half of patients lived independently. Detoxification completion was lowest among the homeless.

Over two thirds of patients were non-Hispanic whites. Hispanics had the highest detoxification completion percentage. The share of detoxification patients who were Hispanic has increased over time. (See Fig. S2 in the Supplementary appendix.)

Approximately one third of patients were in detoxification for one day. Detoxification completion was highest for patients who were in treatment four or more days.

Nearly half of detoxification discharges were self-referrals. However, self-referral had the lowest completion percentage. < 5% of

discharges were from hospital inpatient facilities.

The majority of patients began drinking when they were adolescents. Patients who initiated alcohol consumption at age 11 or younger had the lowest detoxification completion percentage.

Patients who abuse other substances had lower detoxification completion percentages. The largest gap in treatment completion percentage was for patients who also abused opioids (85.6% completion percentage for those who do not abuse opioids versus 78.5% for those who do). The most common other substance of abuse was marijuana (14.9%) followed by cocaine (12.3%). During the study period, cocaine became a less common secondary substance of abuse and marijuana became more common. (See Fig. S3 in the Supplementary appendix.)

Approximately three fourths of patients had experienced prior treatment, and a higher percentage of those with prior treatment completed detoxification than those without prior treatment. Slightly more than one fourth of patients had a co-occurring psychiatric condition. The detoxification completion percentage was slightly higher for those without a psychiatric co-occurring condition. The percentage of detoxifications resulting in completion was lower from 2007 to 2011 than it was in 2006. However, the percentage was higher from 2012 to 2014 than it was in 2006.

Table 2 presents results for an analysis of demographic, treatment, and disorder characteristics associated with completion of residential alcohol detoxification using logistic regression with state fixed effects and robust standard errors. The odds of detoxification completion are highest among those aged 55 and above. Being male is associated with lower odds of detoxification completion. The odds of detoxification completion are lowest for those with less than a high school education and highest for those with a college education or more. Those who live independently or in dependent living facilities have higher odds of detoxification completion than those who are homeless. Blacks, Hispanics, and Native Americans all had higher odds of completing detoxification than non-Hispanic whites. Asian Americans had lower odds of completing detoxification than non-Hispanic whites. Patients who were married had lower odds of completing detoxification.

The odds of detoxification completion were higher for multiple days of detoxification than for one day. The odds ratio was highest at six days. The odds of detoxification completion were higher for sources of referral other than self-referral. The odds of detoxification completion were also higher at hospital inpatient than at free-standing residential facilities.

Compared to those who initiated alcohol use at age 11 or younger, patients who started using alcohol as adolescents or as transition aged youth had higher odds of completing detoxification. Individuals with opioids, methamphetamines, and benzodiazepines also identified as substances of abuse had lower odds of completing detoxification. Having a co-occurring psychiatric condition was also associated with lower odds of completing detoxification. Patients discharged in years after 2006 had higher odds of completing detoxification. The odds ratios were highest in 2012 to 2014.

4. Discussion

Detoxification was completed by approximately 85% of the patients with AUD who were discharged from the residential facilities included in this study. Many of these patients faced challenges that had the potential to make recovery more difficult. Over 80% of the patients were unemployed or not in the labor force. Over one third of the patients were homeless. Many of the patients abused multiple substances, and approximately one-fourth of patients had a co-occurring psychiatric condition. This study examined factors associated with detoxification completion for patients whose primary substance of abuse was alcohol.

Brower, Mudd, Blow, Young, and Hill (1994) found that older patients experienced more severe withdrawal symptoms and had them over a longer period of time. Residential detoxification programs are regarded as appropriate for older patients (Friedmann, 2013), and we

Table 2
Factors associated with completion of detoxification for encounters where alcohol is the primary substance of abuse, TEDS-D, 2006–2014.

Variable ^a	OR	p-Value	95% CI
<i>Demographic characteristics</i>			
<i>Treatment age</i>			
Adolescent	0.91	0.28	0.77 to 1.08
Transition aged	0.83	0.00	0.80 to 0.87
25 to 34	0.89	0.00	0.86 to 0.92
35 to 44	0.89	0.00	0.87 to 0.92
45 to 54	0.95	0.00	0.92 to 0.98
55+ Reference			
Male	0.91	0.00	0.89 to 0.93
<i>Education</i>			
High school	1.07	0.00	1.05 to 1.10
Some college	1.05	0.00	1.02 to 1.07
College plus	1.14	0.00	1.10 to 1.18
Less than high school Reference			
<i>Employment</i>			
Full time	0.99	0.32	0.96 to 1.01
Part time	1.04	0.07	1.00 to 1.08
Unemployed/not in labor force Reference			
<i>Housing</i>			
Independent living	1.05	0.00	1.03 to 1.08
Dependent living	1.10	0.00	1.05 to 1.14
Homeless Reference			
<i>Race and ethnicity</i>			
Black	1.03	0.03	1.00 to 1.06
Hispanic	1.21	0.00	1.17 to 1.25
Asian	0.81	0.00	0.73 to 0.91
Native American	1.14	0.00	1.09 to 1.20
Other	0.92	0.00	0.87 to 0.97
Non-Hispanic White Reference			
Married	0.97	0.04	0.95 to 1.00
<i>Treatment characteristics</i>			
<i>Time in treatment</i>			
Two days	2.44	0.00	2.37 to 2.51
Three days	5.61	0.00	5.44 to 5.78
Four days	17.62	0.00	16.96 to 18.30
Five days	21.40	0.00	20.44 to 22.39
Six days	27.30	0.00	25.81 to 28.86
Seven days	26.79	0.00	24.97 to 28.74
Eight days+	19.06	0.00	18.30 to 19.86
One day Reference			
<i>Referral source</i>			
Alcohol/drug care	1.30	0.00	1.26 to 1.35
Other health care	1.06	0.00	1.03 to 1.09
School/work	1.45	0.00	1.16 to 1.81
Community	2.03	0.00	1.94 to 2.13
Criminal justice	1.38	0.00	1.33 to 1.43
Individual referral Reference			
<i>Service setting</i>			
Hospital inpatient	2.67	0.00	2.52 to 2.83
Free-standing residential Reference			
<i>Disorder characteristics</i>			
<i>Age of alcohol initiation</i>			
Adolescent	1.03	0.01	1.01 to 1.06
Transition aged	1.05	0.01	1.01 to 1.08
25+	0.99	0.66	0.94 to 1.04
11 or younger Reference			
<i>Other substances</i>			
Cocaine	1.02	0.12	0.99 to 1.05
Marijuana	1.03	0.02	1.00 to 1.06
Opioids	0.67	0.00	0.65 to 0.69
Methamphetamine	0.91	0.00	0.85 to 0.96
Benzodiazepines	0.87	0.00	0.83 to 0.91
Prior treatment	1.00	0.66	0.98 to 1.03
Co-occurring psychiatric condition	0.83	0.00	0.81 to 0.85
<i>Year</i>			
2007	1.05	0.01	1.01 to 1.09
2008	1.10	0.00	1.06 to 1.15
2009	1.06	0.00	1.02 to 1.10
2010	1.10	0.00	1.06 to 1.14
2011	1.14	0.00	1.10 to 1.18
2012	1.33	0.00	1.28 to 1.38
2013	1.51	0.00	1.44 to 1.57

Table 2 (continued)

Variable ^a	OR	p-Value	95% CI
2014	1.32	0.00	1.27 to 1.38
2006 Reference			

^a Model controls for state fixed effects.

found that in our study population, the reference group of patients aged 55 and above had higher odds of completing detoxification relative to patients in younger age groups. Our results could be evidence of the potential benefit of correctly matching patients to the appropriate setting of care. They could also reflect the better outcomes associated with increasing age among individuals with alcohol dependence (Dawson et al., 2005).

Sharrett-Field, Butler, Reynolds, Berry, and Prendergast (2013) report evidence that the brains of men and women respond differently to alcohol dependence and withdrawal. These differences can have behavioral manifestations and require further study to inform potential tailoring of service delivery to men and women. We found differences by sex with men having lower odds of detoxification completion, which could be due, in part, to the greater severity of withdrawal symptoms that some studies have reported in men compared to women (Soyka et al., 2006; Wojnar, Wasilewski, Matsumoto, & Cedro, 1997) or to the more frequent experience of anxiety in withdrawal that Deshmukh et al. (2003) reported in males compared to females.

Social determinants of health have been shown to be positively associated with AUD outcomes, including remission and relapse after remission (Moos & Moos, 2006). We found that the odds of detoxification completion were higher for patients with a high school education or more and for those who were not homeless. Patients from unstable environments face potentially greater challenges during detoxification and the treatment that follows (Room et al., 2005), and they may benefit from additional services and support.

Vaeth, Wang-Schweig, and Caetano (2017) report that there is both between and within group variation in drinking, perceived need for treatment, and treatment seeking among racial and ethnic groups. There are differences among racial and ethnic groups in factors associated with treatment seeking and treatment retention, including input from family, friends, and employers; requirements from the legal system; proximity to treatment services; secondary substances of abuse; and facilitators and barriers to treatment, such as insurance coverage, access to child care and transportation, and time off from work. In their review of the literature on racial and ethnic differences in drinking and treatment for AUD, Vaeth et al. (2017) call for research on racial and ethnic variations in treatment use by setting. In this study, we found that African Americans have higher odds of completing detoxification than whites. Weisner, Matzger, Tam, and Schmidt (2002) found that among problem and dependent drinkers, African Americans were more likely to enter treatment than whites. Since detoxification frequently precedes treatment, African Americans' greater odds of treatment completion may reflect a greater demand for treatment. We also found that Asian Americans have lower odds of completing treatment. Masson et al. (2013) found that shame and fear of losing face can be important barriers to receiving treatment among Asian Americans; therefore, their lower odds of completing detoxification may reflect a lower demand for treatment.

Marriage has been found to be associated with both abstinent and non-abstinent recovery (Dawson et al., 2005). In this study, we found that it was associated with lower odds of completing detoxification. It is possible that the finding could be due to multi-collinearity since marital status is strongly associated with other variables in the model, such as education and employment. When we only include marital status in the model as a robustness check, we found that married patients had higher odds of completing detoxification than unmarried patients (OR: 1.03, 95% confidence interval, CI: 1.01–1.06).

Episodes of longer duration are associated with better outcomes at each stage of the treatment process, including detoxification, intensive treatment, and continuing care (Timko et al., 2015). We found that odds of completing detoxification were higher for patients who spent multiple days in detoxification.

Patients with referrals from alcohol/drug care and other health care sources may have more access to and engagement with the health care system. Those patients have higher odds of completing detoxification, a finding that should encourage providers to refer patients with AUD to detoxification and subsequent treatment. Patients with school/work and community referrals to detoxification may have greater social support, which could be the reason for the higher odds of detoxification completion those individuals have. Individuals with AUD who have more social resources have better outcomes (Moos & Moos, 2006); therefore, providers offering detoxification may need to provide extra support to patients with fewer social resources. Pressure from the legal system can be a reason why people enter the treatment system for AUD (Vaeth et al., 2017), and we found that criminal justice referral is associated with higher odds of completing detoxification.

There is considerable variation in the services provided in residential AUD detoxification facilities (Jonkman et al., 2005). We were able to distinguish between detoxifications in hospital and non-hospital, free-standing residential settings. Patients who entered detoxification in a hospital setting had higher odds of completing detoxification.

Early onset of alcohol consumption is associated with more severe withdrawal symptoms and worse outcomes for patients with AUD (Dawson et al., 2005; Raistrick, 2004). In this study, we found that patients who initiated alcohol use as adolescents or transition-aged adults had higher odds of completing detoxification than those who began drinking at age 11 or younger. These findings illustrate the importance of prevention efforts targeted at children.

Comorbid use of other substances and having a co-occurring psychiatric condition predict worse outcomes for individuals with AUD (Dawson et al., 2005). Patient benzodiazepine abuse can complicate the use of benzodiazepines in detoxification to treat withdrawal (Raistrick, 2004). We found that patients with opioids, methamphetamines, and benzodiazepines listed as secondary or tertiary substances of abuse had lower odds of completing detoxification. We also found that patients with a co-occurring psychiatric condition had lower odds of completing detoxification. Other studies have found that patients with co-occurring mental health conditions receive follow-up care at lower rates following detoxification (Stein et al., 2009). Patients with more complicated cases due to the use of other substances or the presence of a mental health condition may benefit from additional services and support during detoxification and beyond.

The increased odds of alcohol detoxification completion in more recent years, especially from 2012 to 2014, is encouraging and worthy of further investigation. This improvement could be due to advances in the use of medication, technology, and behavioral therapy for patients with AUD (Huebner & Kantor, 2011). It could also be due, in part, to the increased proportions of patients in detoxification in recent years who have characteristics associated with higher odds of completing detoxification (e.g., age 55 and above and Hispanic ethnicity). As the profile of substance abuse continues to evolve, clinicians will need to be mindful of the increased abuse of certain substances (e.g., opioids) that are associated with lower odds of detoxification completion.

This study is subject to a number of limitations. First, this is a descriptive analysis. Further research is warranted to verify the robustness and clinical significance of the findings. Second, facilities in the TEDS-D receive public funds. The reported results may not generalize to facilities that do not receive public funds. Third, the TEDS-D does not include certain variables that have been shown to be associated with outcomes for AUD detoxification, including information on program size and program attributes, such as the use of pharmacotherapy or recovery peers, or patient motivation (Jonkman et al., 2005; Stein et al.,

2009). Fourth, the TEDS-D does not capture the appropriateness of services that patients received or whether a single provider was involved throughout the patient's detoxification (Timko et al., 2015). Fifth, the TEDS-D does not have a unique patient identifier. Therefore, it is not possible to distinguish between multiple detoxifications by the same patient and detoxifications by multiple patients. However, the TEDS-D is a large, nationwide dataset that captures a significant share of all discharges from treatment facilities across the United States. It also captures detoxification completion, a variable that is an important predictor of the outcomes of patients with AUD.

5. Conclusions

Individuals with AUD have better outcomes when they participate in detoxification and subsequent treatment (Timko et al., 2015). This study found factors (e.g., older age, more education, housing) that are associated with higher odds of completing detoxification for AUD and others (e.g., younger age of initiation, co-occurring use of certain substances, co-occurring psychiatric condition) that are associated with lower odds of completing detoxification for AUD. Moos and Moos (2006) recommended the creation of a risk factor score based on characteristics known to be associated with poorer outcomes for patients with AUD. The factors this study identified as being associated with lower odds of detoxification completion (e.g., lower educational attainment, homelessness, pre-adolescent initiation of alcohol use, opioid abuse, and co-occurring psychiatric condition) could be considered in combination to identify patients who would benefit from greater support during detoxification, treatment, and continuing care. Many patients do not receive treatment after completing detoxification (Timko et al., 2015), and follow-up treatment has been recommended as a public sector substance use treatment system performance measure (Stein et al., 2009). Future research could examine factors associated with patient receipt and engagement in treatment following detoxification for AUD, as well as how patient and program characteristics during detoxification impact the transition of patients from detoxification to treatment and continuing care. Analysis is needed of approaches that might encourage the transition from detoxification to treatment, including transportation and financial incentives. Given the high relative cost of residential detoxification compared to outpatient detoxification for AUD, future research should also examine the settings most appropriate for patients with different characteristics (Timko et al., 2015).

Declarations of interest

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Disclaimer

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jsat.2018.12.009>.

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