Alcohol Use Disorder among General Hospital Medical Inpatients

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ABSTRACT

Objectives: We sought to examine alcohol use disorder (AUD) among general hospital medical inpatients with respect to identification, service utilization, and initiation of medication treatment.

Methods: We performed a retrospective chart review for all adult inpatients over one full calendar year. Subjects were separated into two categories: patients with chart documentation of an AUD diagnosis and those without such documentation. We extracted from the electronic health record and analyzed information on demographics, service utilization, and treatment initiation of medication for AUD such as naltrexone, disulfiram, or acamprosate.

Results: The study revealed three main findings: 1) Less than one percent of patients discharged from the hospital in one full calendar year had an identified AUD diagnosis. 2) Patients with an AUD diagnosis had a significantly higher number of emergency department (ED) visits and longer hospital length of stay (LOS) but did not have significantly higher 30-day hospital readmissions, compared to patients with no AUD diagnosis. 3) Among patients diagnosed with AUD, only 1.8% received FDA-approved medication for AUD.

Conclusions: The AUD identification rate we detected was markedly lower than prevalence rates reported in the literature. Patients who were identified with AUD had higher counts of ED visits and longer LOS. Initiation rates of medication for AUD were low. The study findings suggest that concerted efforts are needed to improve detection and diagnosis of AUD in order to support the delivery of effective AUD treatment including the initiation of evidence-based pharmacotherapy for AUD in the general hospital setting.

Keywords
Alcohol Use Disorder, General Hospital, Screening, ED Visits, Length of Stay, Pharmacotherapy.

Introduction
Alcohol use disorder (AUD) is the third leading cause of preventable death in the United States, a leading cause of morbidity [1], and costs an estimated $223 billion each year [2]. AUD impacts every organ system and contributes to liver disease, heart disease, gastro-intestinal disorders, head and neck cancer, neurological disorders, and psychiatric disorders such as anxiety, depression, and suicidality [3,4]. Previous research estimates that one fifth of medical inpatients have unhealthy alcohol use [5-9], and up to three quarters of those with unhealthy use are thought to have AUD [10]. Among medical inpatients, AUD is associated with increased physical health problems, poor outcomes, decreased follow-up with after-care recommendations, and high rates of comorbid mental health problems [11,12]. Importantly, AUD is
consistently among the top five conditions leading to hospital readmission among Medicaid beneficiaries and the uninsured [7].

Despite the importance of AUD in the hospital setting, current estimates of the prevalence of AUD in hospitalized inpatients vary widely. AUD prevalence data among hospital inpatients is drawn from heterogeneous literature, with some data dating back several decades, and are based on various screening tools, criteria, and diagnostic thresholds [7]. Moreover, it remains unclear if rates of AUD identification differ by provider type, whether individuals with AUD differ in their service utilization patterns compared to individuals without AUD, or how often do hospitalized individuals with AUD receive treatment for their AUD during hospital admissions. In the outpatient setting, inconsistent AUD screening practices and lack of uptake of evidence-based treatments have prompted calls to improve AUD screening in primary care [13] and trauma centers [14]. In the inpatient setting, the Joint Commission recommends screening, brief intervention, and referral to treatment (SBIRT) for all medical inpatients admitted for reasons related to AUD and has endorsed National Quality Forum (NQF) performance measures [15]. Nevertheless, these recommendations are inconsistently applied, and data on rates of screening, identification and treatment initiation continue to be unavailable. Lack of data on rates of AUD identification, service utilization and treatment initiation in acute medical settings impedes the ability to prioritize, target, and address AUD [16].

We conducted the present study among general hospital medical inpatients in a large diverse urban medical center to examine: (1) Rates of AUD identification. (2) Rates of service utilization as evidenced by emergency department (ED) visits, hospital length of stay (LOS), and 30-day hospital readmission rates, for individuals with AUD diagnosis compared with patients with no AUD. (3) Rates of treatment initiation of evidence-based pharmacotherapy using FDA-approved medication for AUD (oral naltrexone, disulfiram, or acamprosate).

**Methods**

**Study Setting**

The study was conducted using data from Cedars-Sinai Medical Center (CSMC) in Los Angeles, California, a non-profit, 886-bed general medical and surgical facility and Level I trauma center. CSMC receives 83,000 ED visits and 50,000 admissions per year.

At CSMC, all patients admitted are screened for alcohol use by nursing staff with the following question: “How many drinks do you have?” A standard drink is depicted in Figure 1 as defined by the US National Institute of Alcohol Abuse and Alcoholism (NIAAA).

Positive responses, based on NIAAA criteria for risky drinking (for women: >3 drinks per occasion OR >7 drinks per week; for men: >4 drinks per occasion OR >14 drinks per week), trigger notification to the admitting physician for further assessment, diagnosis, and management.

**Procedures and Participants**

We performed a retrospective chart review of all adult inpatients aged 18 to 65 years discharged from CSMC in one full calendar year between January 1, 2014 and December 31, 2014. The study procedures were approved by the Cedars-Sinai Institutional Review Board. The subjects were separated into two categories: those with chart documentation of AUD, and those without chart documentation of AUD. Chart documentation of AUD was ascertained based on the presence of diagnostic codes indicative of AUD, documented at any point during the inpatient encounter in an administrative field of the electronic health record such as

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**Figure 1:** NIAAA Definition of a Standard Drink.

Source: https://www.niaaa.nih.gov/alcohols-effects-health/overview-alcohol-consumption/what-standard-drink. Public domain figure and may be used or reproduced without permission from NIAAA.
admission diagnosis, discharge diagnosis, or problem list. Table 1 shows the diagnostic codes indicative of AUD.

Table 1: Diagnostic codes indicative of AUD.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>305.0-305.03</td>
<td>Alcohol abuse</td>
</tr>
<tr>
<td>303.0-303.93</td>
<td>Alcohol dependence</td>
</tr>
<tr>
<td>F10.1-F10.99</td>
<td>Alcohol use disorder</td>
</tr>
<tr>
<td>790.3</td>
<td>Excessive blood alcohol level</td>
</tr>
<tr>
<td>980-980.9</td>
<td>Alcohol toxicity</td>
</tr>
<tr>
<td>E860-E860.9</td>
<td>Alcohol poisoning</td>
</tr>
<tr>
<td>291-291.9</td>
<td>Alcohol psychoses</td>
</tr>
<tr>
<td>357.5</td>
<td>Alcoholic polyneuropathy</td>
</tr>
<tr>
<td>425.5</td>
<td>Alcoholic cardiomyopathy</td>
</tr>
<tr>
<td>535.3-535.31</td>
<td>Alcoholic gastritis</td>
</tr>
<tr>
<td>571.0-571.3</td>
<td>Alcoholic liver disease</td>
</tr>
<tr>
<td>V11.3</td>
<td>Personal history of alcoholism</td>
</tr>
<tr>
<td>94.46</td>
<td>Alcoholism counseling</td>
</tr>
<tr>
<td>94.53</td>
<td>Referral for alcohol rehabilitation</td>
</tr>
<tr>
<td>94.61-94.63</td>
<td>Alcohol rehabilitation, detoxification,</td>
</tr>
<tr>
<td></td>
<td>rehabilitation/detoxification,</td>
</tr>
<tr>
<td></td>
<td>Combined alcohol and drug rehabilitation,</td>
</tr>
<tr>
<td></td>
<td>detoxification, rehabilitation/detoxification</td>
</tr>
<tr>
<td>94.67-94.69</td>
<td>Combined alcohol and drug rehabilitation,</td>
</tr>
<tr>
<td></td>
<td>detoxification, rehabilitation/detoxification</td>
</tr>
</tbody>
</table>

Measures
We extracted the following information from the electronic health record (EHR):
1. Demographic characteristics. Age, gender, race, insurance status, and insurance plan.
2. Service utilization in calendar year 2014
   a. ED Visits: Number of visits to the ED
   b. LOS: Number of days of the most recent hospital stay
   c. 30-day readmission rate
3. Initiation of pharmacotherapy among patients with AUD.

Among those diagnosed with AUD during the study period, the proportion who received an inpatient order for the following FDA-approved medication for AUD: oral naltrexone (depot naltrexone was not available on the hospital formulary during the study period), disulfiram, or acamprosate, as recorded in the medication section of the EHR.

Statistical Analysis
Results were considered statistically significant when p < 0.05. We used SAS version 9.4 (SAS Institute Inc., Cary, North Carolina, USA) to perform all analyses.

Descriptive Analyses
We conducted univariate analyses to examine distribution, central tendencies and dispersion (range and standard deviation) of all variables. We report summary values as means and standard deviations or median and interquartile range [IQR] for continuous variables, and frequencies (%) for categorical variables.

Comparison of service utilization among those identified with and without AUD
We conducted independent samples t-tests and Wilcoxon rank sum tests to assess group differences for continuous variables and Chi-square tests to assess group differences in categorical variables.

Results
AUD Identification and Demographics Characteristics
Among a total of 30,616 discharged patients in the 2014 calendar year, AUD was identified in 227 unique patients, or 0.74% of our sample. Table 2 shows the demographic characteristics of individuals identified with and without AUD. Compared to those without an identified AUD, patients with AUD were more likely to be male (62% vs. 33%; p<0.0001) and were slightly younger (53.3 vs. 55.6; p=0.031). Race was similarly distributed across the two groups, with the majority in each group being Caucasian. The payer mix showed more Medicaid and uninsured patients in the AUD group.

Table 2: Demographic Characteristics of Patients with and without an alcohol use disorder (AUD), of all Patients Discharged in 2014.

<table>
<thead>
<tr>
<th>Measure</th>
<th>AUD N = 227</th>
<th>No AUD N = 30389</th>
<th>Overall N = 30616</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, Mean ± SD</td>
<td>53.3 ± 15.8</td>
<td>55.6 ± 20.5</td>
<td>55.6 ± 20.4</td>
<td>0.031</td>
</tr>
<tr>
<td>Female</td>
<td>75 (33.0%)</td>
<td>18861 (62.1%)</td>
<td>18936 (61.9%)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>181 (79.7%)</td>
<td>22263 (73.3%)</td>
<td>22444 (73.3%)</td>
<td>0.15</td>
</tr>
<tr>
<td>Asian</td>
<td>10 (4.4%)</td>
<td>2174 (7.2%)</td>
<td>2184 (7.1%)</td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>25 (11.0%)</td>
<td>4054 (13.3%)</td>
<td>4079 (13.3%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>11 (4.8%)</td>
<td>1898 (6.2%)</td>
<td>1909 (6.2%)</td>
<td></td>
</tr>
</tbody>
</table>

AUD = Alcohol Use Disorder.

Utilization Outcomes
ED Visits among Patients identified with and without AUD
The number of ED visits ranged from 0 to 82 among AUD patients and from 0 to 57 among patients without AUD. Compared to patients with no AUD, patients with AUD had a significantly higher number of ED visits, p<0.0001: Median [IQR] 1.0 [1 to 3] vs. 1.0 [0 to 3] and mean ± standard deviation 3.4 ± 7.6 vs. 1.0 ± 1.7.

Hospital Length of Stay (LOS)
Patients with AUD had longer LOS compared to patients without AUD, p=0.035: Median [IQR] 3.62 [2.04 – 5.91] vs. 3.17 [2.18 – 5.13] and mean 6.00 ± 11.98 vs. 4.97 ± 7.20.

30-day Readmission Rates
Thirty-day readmission rates were not significantly different between the two groups (15.4% vs. 12.6%, p=0.19).

Initiation of Pharmacotherapy among Patients identified with AUD
Among patients with AUD, only 1.8% received an FDA-approved medication for AUD during their inpatient stay. The only pharmacotherapy prescribed was naltrexone. There were no orders for disulfiram or acamprosate.

Discussion
The study revealed three main findings: 1) Only 0.74% of patients discharged from the hospital in 2014 received the diagnosis of AUD. 2) Patients with AUD had a significantly higher number of ED visits and longer LOS but did not have significantly higher 30-day readmission rates, compared to patients with no AUD.
we detected is consistent with other work, suggesting that care
treatment programs. However, the low rate of pharmacotherapy
bedside interventions or referral to appropriate community
medication for AUD. We were not able to determine whether
Among patients with AUD, very few received FDA-approved
medication for AUD.

The AUD identification rate we detected was markedly lower than
prevalence rates reported in the literature [5-7,9,10]. We suspect
that the comparatively low detection rate found in our naturalistic
study does not reflect true prevalence; rather, it reflects the barriers
to detection and documentation in the medical inpatient care
setting. Saiz et al. found that 17% of medical inpatients at an
urban teaching hospital drank risky amounts of alcohol, and upon
further evaluation, 77% of this subsample had alcohol dependence
according to DSM IV criteria [10]. Wei et al. reported that among
all patients discharged from an urban hospital setting, one quarter
had an ICD9 diagnosis related to alcohol. A systematic review of
hospital screening studies conducted by Roche et al. identified 32
studies set in hospital wards, with an average prevalence of 16.5%
positive AUD screens based on self-report measures and a range of
7 to 29%. The broad range of AUD detection rates reflects differing
assessment tools, definitions of alcohol risk, patient populations,
screening personnel, and specific location and timing for screening
[14]. The highest estimates arose from those studies that utilized
research staff rather than point of service health care providers
to conduct screening [7]. A subsequent evaluation of a national
sample of hospital admissions with a research-based diagnosis of
AUD (determined through a structured approach by trained staff
conducting face-to-face, computer-assisted, personal interviews)
found 40-42% of the sample had clinical documentation of
AUD [17], an order of magnitude higher than detection rates in
usual practice. The inconsistency between research-based and
naturalistic studies is not surprising, as clinicians in hospital settings
face several barriers regarding alcohol screening and treatment,
including lack of knowledge, lack of time, lack of resources, and
personal discomfort [18]. Altogether, the discrepancy between
detection rates in research-based versus naturalistic studies such
as ours highlights the need for quality improvement interventions
to enhance the effectiveness of clinical screening pathways.

The finding of higher ED admissions and mean LOS among
AUD patients compared with patients without AUD is consistent
with prior studies [19-21]. However, we did not detect a higher
hospital readmission rate among those with AUD. In prior studies,
inpatients with AUD have been shown to be nearly twice as likely
to be readmitted within 30 days [22] even when controlling for
insurance status [20]. Among patients with Medicaid, AUD is the
fifth leading cause of 30-day all-cause readmission, and among
uninsured patients, AUD is the second leading cause [22]. The
lack of higher hospital readmissions among patients with AUD in
our sample could reflect that our readmissions data was limited to
one site, or it may be a product of the low detection rates.

Among patients with AUD, very few received FDA-approved
medication for AUD. We were not able to determine whether
patients received other evidence-based treatments, such as brief
bedside interventions or referral to appropriate community
treatment programs. However, the low rate of pharmacotherapy
we detected is consistent with other work, suggesting that care
for hospitalized patients with AUD does not meet the needs of
patients with a moderate to severe AUD [10,23], and that uptake
of pharmacotherapy for substance use disorders remains low
[24]. Thus, AUD frequently goes undetected, and even when
recognized, is often not treated with effective interventions [17].
This points to a critical opportunity to develop treatments that
translate to evidence-based interventions into the hospital setting,
particularly motivational interviewing, medication, and addiction-
specific linkage to aftercare.

Our study had several limitations. The study was confined
to one institution, during a single calendar year, limiting its
generalizability. Utilization data was limited to one hospital
system, and we did not capture ED or hospital admissions at other
sites. Furthermore, our study utilized a retrospective chart review
design, which enabled us to identify associations but not causal
relationships. Finally, our study, by design, relied on diagnoses
generated by hospital providers during standard care. While this
finding is important and reflects the practical challenges involved
in a natural setting, it likely artificially limited the size of the
population of inpatients who had an AUD diagnosis during the
study period. However, the use of naturalistic data was also a
strength, as it allowed us to identify important disparities between
findings from research versus real world settings.

Conclusion
Using a retrospective chart review of AUD patients in the
naturalistic setting of a large urban academic general hospital,
we found that AUD identification rates among providers were
substantially lower than prevalence rates conducted using research-
based screening. When identified, patients rarely receive FDA-
approved medication for AUD such as naltrexone, disulfiram, or
acamprosate. Patients with AUD also had higher numbers of ED
visits and longer lengths of stay. Because many individuals with
AUD suffer from physical sequelae and medical comorbidities
necessitating hospitalization, and because failure to address AUD
is associated with adverse health outcomes, hospitals must focus
on identification and effective management during the inpatient
stay. Although there are validated screening tools and effective
interventions, implementing them into clinical practice has
proven to be a challenge. There is a pressing need for measures
to encourage and support the delivery of effective AUD treatment
in the hospital setting. Our study suggests that this process should
begin with concerted efforts to improve detection and diagnosis
of AUD, followed by appropriate assessment, management, and
linkage to aftercare.

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