Who Needs Inpatient Detox? Development and Implementation of a Hospitalist Protocol for the Evaluation of Patients for Alcohol Detoxification

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BACKGROUND: Clinicians caring for patients seeking alcohol detoxification face many challenges, including lack of evidence-based guidelines for treatment and high recidivism rates.

OBJECTIVES: To develop a standardized protocol for determining which alcohol dependent patients seeking detoxification need inpatient versus outpatient treatment, and to study the protocol's implementation.

DESIGN: Review of best evidence by ad hoc task force and subsequent creation of standardized protocol. Prospective observational evaluation of initial protocol implementation.

PARTICIPANTS: Patients presenting for alcohol detoxification.

INTERVENTION: Development and implementation of a protocol for evaluation and treatment of patients requesting alcohol detoxification.

MAIN MEASURES: Number of admissions per month with primary alcohol related diagnosis (DRG), 30-day readmission rate, and length of stay, all measured before and after protocol implementation.

RESULTS: We identified one randomized clinical trial and three cohort studies to inform the choice of inpatient versus outpatient detoxification, along with one prior protocol in this population, and combined that data with clinical experience to create an institutional protocol. After implementation, the average number of alcohol related admissions was 15.9 per month, compared with 18.9 per month before implementation ($p=0.037$). There was no difference in readmission rate or length of stay.

CONCLUSIONS: Creation and utilization of a protocol led to standardization of care for patients requesting detoxification from alcohol. Initial evaluation of protocol implementation showed a decrease in number of admissions.

KEY WORDS: alcohol detoxification; alcohol withdrawal; quality improvement; hospital medicine.

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BACKGROUND

Alcohol dependence is a prevalent and morbid condition. A recent study estimated a 12-month prevalence of 3.8 % in the United States.¹ Alcohol consumption is the third leading cause of preventable death in the U.S.² In 2006, the direct health care costs in the U.S. were \$24 billion, with \$5.1 billion due to alcohol-related hospitalizations.

Clinicians caring for patients presenting to emergency departments in need of detoxification from alcohol must make difficult decisions, including whether to provide inpatient versus outpatient treatment. Few randomized controlled trials compare treatments for alcohol detoxification. One study comparing cost and safety of inpatient versus outpatient detoxification found no difference in sobriety rates at 6 months, with a significantly lower cost in the outpatient arm.³

In the absence of clear clinical trial data, strategies for deciding inpatient versus outpatient detoxification have utilized severity of withdrawal and clinical predictors of delirium tremens (DTs).^{4,5} Predictors of DTs, however, are generally derived from retrospective studies of hospitalized medical patients, and may not apply to patients presenting to the emergency department for detoxification.^{6,7}

The University of North Carolina (UNC) Health Care System includes a 805-bed academic hospital, with 38,000 admissions and 73,000 emergency department (ED) visits annually (http://www.unchealthcare.org/site/aboutus/fiscal_facts.htm). The UNC internal medicine hospitalist practice admits an average of 19 patients per month for detoxification from alcohol. We have observed a pattern of short admissions with high frequency of discharge against medical advice and/or readmissions. Although we had an inpatient protocol for treatment of alcohol withdrawal, we lacked a standardized system for determining which patients

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required inpatient detoxification versus those who might be treated as outpatients.

In this report, we describe our process of creating a protocol to standardize care for patients presenting to our ED requesting detoxification. We aimed to determine which patients could be treated as outpatients and to improve the coordination with community resources for substance abuse treatment. We evaluated the effect of the protocol on admission rates, readmissions, and length of stay.

METHODS

Protocol Development

Task Force and Clinical Questions. We assembled a task force that included three physicians, one nurse practitioner, and one case manager. The clinical questions included the following: 1) Is inpatient or outpatient treatment superior for alcohol detoxification? 2) What factors should guide decisions on inpatient versus outpatient treatment?

Literature Search. We searched PubMed (years 1980 to 2011) utilizing combinations of the search terms “alcohol detoxification,” “inpatient,” “outpatient,” and “ambulatory,” along with review of reference sources. To identify factors used to guide decisions on inpatient versus outpatient treatment, we searched PubMed using the search terms “delirium tremens” and “alcohol withdrawal”.

Study Selection. We reviewed titles and abstracts, and pulled the articles that appeared to answer our stated questions and focused specifically on alcohol detoxification. Among the pulled articles, we eliminated those that did not inform our protocol development, and scanned the reference lists for additional articles. This review was conducted as a QI project and not as a formal systematic review. Individual reviewers brought summary results to task force meetings for group review and discussion.

Data Synthesis. The task force used the resulting studies to create the prototype protocol. When there was not direct clinical trial evidence, the task force used group consensus for standards of care.^{4,5,8} In addition, the task force members included their own clinical experiences with difficult treatment decisions, such as how to address acutely inebriated or suicidal patients referred for admission, in development of the protocol. We resolved any differences of opinion by consensus.

Protocol Implementation

The prototype protocol was presented for discussion to the hospitalist and emergency physicians. In our institution, all

referrals for admission for detoxification generate from the ED. The admitting hospitalist has the discretion to perform consultation and directly discharge patients from the ED if appropriate. We sought to create a protocol to standardize care for both the ED and hospitalist groups, while giving the hospitalist group a standardized framework for evaluating those patients referred for admission.

Once all comments were incorporated, the protocol was implemented on July 1, 2011. We received institutional review board (IRB) approval for a prospective observational study of protocol implementation.

Protocol Evaluation

The primary outcome measures were number of admissions for alcohol detoxification, 30-day readmission rate, and length of stay. Data were obtained by query of UNC data submitted to University Healthcare Consortium. Metrics are available by diagnosis related group (DRG) codes and physician grouping. We searched the DRGs 896 and 897, “alcohol/drug abuse or dependence without rehabilitation therapy,” with and without major comorbidity or complication (MCC) respectively, coupled with discharge physicians from our group. In order to identify hospital stays for observation for alcohol related diagnoses, we searched a UNC hospital database using specific ICD-9 codes, 291.81, 303.00, 303.81, 303.90, 303.91 and 305.00. These were narrowed to outpatient visits with attendings from our hospitalist group. We combined patients on observation status with those formally admitted to the hospital for our primary outcome variable labeled hospital admission. We reviewed the period 21 months after implementation of the protocol and compared with the period 12 months before implementation.

We also performed a search of UNC psychiatry admissions using the same DRGs (896 and 897). Lastly, we measured number of discharges against medical advice (AMA) for patients with primary or secondary ICD-9 codes alcohol detoxification (946.2) or alcohol withdrawal (291.81).

In order to assess adherence to the protocol, we reviewed the last 20 consecutive admissions after implementation. We also performed a search of ED visits for the last 3 months of the study period using the same ICD-9 codes used to identify observation patients. Charts were reviewed manually to assess whether the protocol was utilized appropriately.

We plotted the internal medicine admissions per month on a Shewhart Process Control Chart (C-Chart). After the first 12 months of data, we calculated control limits and extended those limits forward to help evaluate for special cause variation.⁹

Although control chart analysis was our primary means of assessing the process, we also performed t-tests to compare admission rates per month and length of stay

before and after implementation of the protocol. Analyses for the t-tests were performed in SPSS (IBM, Armonk, NY) and the rest of the analyses were conducted in Microsoft Excel®.

RESULTS

Protocol Development

Literature Review. We identified only one clinical trial comparing inpatient versus outpatient alcohol detoxification.³ The trial differs from our clinical setting, most notably in that after initial detoxification, both groups were assigned to a structured substance abuse treatment, which is not a part of standard procedure on most medical units. The 30-day same cause readmission rate for the inpatient group was 12.1 %, compared with 8 % outpatient, despite the average of 9.2 days spent in the inpatient arm.³ The main outcome, cost, was significantly lower in the outpatient group, and report of sobriety was no different at 6 months.³ While more patients completed detoxification in the inpatient group, 95 % versus 72 %, there were no adverse events, including seizures or DTs, in either group.

We identified three studies of predictors of DTs (Table 1).^{6,7,10} Two studies are retrospective, utilize hospitalized medical patients, and have conflicting results. The rate of DTs reported in these studies is also substantially higher than average for patients with alcohol withdrawal. The first study included 200 consecutive internal medicine inpatients treated for alcohol withdrawal.⁶ 24 % developed DTs, with the most powerful predictor being concurrent medical illness. There was no association with prior DTs. In the second study, 33 % of patients developed DTs; HR > 100 and a history of prior DTs were the strongest predictor variables.⁷ The one identified prospective study examined risk factors for DTs among patients

requesting alcohol detoxification.¹⁰ Of these patients, 43.5 % had prior DTs and 41.6 % had prior seizures.¹⁰ During the study only 6.9 % of patients developed DTs. In regression analysis, the strongest predictors were concurrent infectious disease, HR > 120, and autonomic signs of withdrawal while legally intoxicated. Prior seizures and prior DTs were weaker predictors.

We identified only one paper describing a protocol for the assessment of patients requesting alcohol detoxification.⁵ The authors reported a substantial decrease in number of admissions for alcohol detoxification after the protocol was employed. The protocol recommends inpatient treatment for patients with Clinical Institute Withdrawal Assessment (CIWA) scores > 15 or for a history of delirium tremens or alcohol “withdrawal symptoms.”⁵ CIWA is clinically validated, widely used in both inpatient and outpatient health care settings, and offers the ability to perform continuous assessment of withdrawal symptoms.¹¹

Evidence Synthesis. Based on our review of the evidence and the one prior published protocol, we concluded that patients at highest risk for complicated withdrawal were those with decompensated acute or chronic medical disease. These patients would be admitted regardless of CIWA score (Fig. 1). Although there was not strong evidence to guide what degree of alcohol withdrawal required inpatient care, we felt community standard practice supported admitting patients with CIWA scores > 15 for inpatient detoxification.^{5,8} Patients with scores 8–15 would be admitted if they had a history of prior seizures or DTs, but could otherwise be considered for outpatient detoxification. We felt that patients with CIWA < 8 could be safely treated as outpatients, with the caveat that prior history of DTs or alcohol withdrawal seizures should lead to consideration of outpatient detoxification with fixed dose medications.

Table 1. Summary of Predictors of Delirium Tremens

Author	Country	Design	Setting	Patients	% Patients with DTs	Predictors of DTs
Ferguson et al., 1996	United States	Retrospective	Inpatient general medical ward	200 hospitalized general medical	24 %	Concurrent medical illness (OR 5.1, CI 2.07-12.55) > 2 days since last drink (OR 1.3, CI 1.09-1.61)
Lee et al., 2005	Korea	Retrospective	Inpatient general medical ward	178 hospitalized general medical	33 %	Prior DTs (OR 3.9, CI 1.63-9.76) HR > 100 at admission (OR 4.16, CI 2.03-8.51)
Palmstierna et al., 2001	Sweden	Prospective	Inpatient psychiatric and dependency emergency unit	334 hospitalized patients with alcohol withdrawal	6.9 %	Current infectious disease ($\beta^*=0.334$) HR > 120 ($\beta=0.126$) Autonomic activity while intoxicated ($\beta=0.129$) Prior seizure ($\beta=0.068$) Prior DTs ($\beta=0.060$) * β =regression coefficient

Figure 1. UNC Hospital Medicine protocol for evaluation of patients for alcohol detoxification.

Our recommended regimens for outpatient detoxification include two options: benzodiazepines and anticonvulsants. The standard therapy for alcohol withdrawal is benzodiazepines, with meta-analyses of randomized placebo-controlled trials showing decreased incidence of seizures and delirium with treatment.^{8,12} We chose chlordiazepoxide due to its long half-life and self-tapering effect. Carbamazepine also has good support by medical evidence and was included as an option.^{13,14}

We incorporated the requirement for sobriety before referral for admission. This was based on our experience with inebriated patients referred for inpatient detoxification, with a substantial number leaving AMA several hours later when sober. Similarly, we positioned the assessment for suicidality only after sobriety had been achieved, having had a number of admissions driven by concern for suicide risk based on statements patients made while intoxicated, only to have the statements recanted when sober. Lastly, in order to improve coordination with outpatient substance abuse treatment, we included a process for contacting our largest local treatment facility directly.

The synthesized protocol includes assessment of risk factors for complicated withdrawal coupled with CIWA scores (Fig. 1). This protocol is a summary of the best evidence as we interpret it, along with our collective clinical experience.

Protocol Implementation

Modifications. The only modification made to the prototype protocol related to the assessment of sobriety in the ED. Our initial draft necessitated a serum alcohol level of < 0.02 before referral for admission. ED staff were concerned that re-measuring alcohol levels on inebriated patients would be unnecessarily time intensive as they would continue to be cared for in the ED, and suggested that the requirement be altered to include

clinical assessment of sobriety after the initial alcohol level was drawn.

Experience with Protocol. After implementation, use of the protocol was evident by responses received, both internal and external to our group. As we sought to reduce the admission of acutely inebriated patients, hospitalist leadership was asked by ED staff to mediate disagreements over the interpretation of sobriety. Additionally, as patients were allowed to become sober in the ED, it became clear that some patients' primary need was for psychiatric services. The psychiatry consult service was asked to take a larger role. As more patients were deemed appropriate for discharge from the ED, the ED case manager reported an increased workload. Finally, our largest local substance abuse treatment center reported increased referrals.

Protocol Evaluation

Outcome Measures. Over the baseline 12-month period from July 2010 through June 2011, we admitted an average of 18.9 patients per month for alcohol detoxification. During this time period the average length of stay was 2.7 days. Readmission rate was 26.5 %.

After intervention, we noted a decrease in the number of admissions to an average of 15.9 admissions per month. The C-Chart shown in Fig. 2 demonstrates evidence for a fundamental change in the process, with 12 out of 14 points after the new protocol below the center line, meeting a control chart rule espoused by Grant and Leavenworth.¹⁵ We also conducted a *t*-test comparing number of admissions per month before and after protocol implementation, and the difference was statistically significant (15.9 v. 18.9, $p=0.037$).

The average length of stay was slightly higher after introduction of the protocol, but was not statistically significant (2.7 versus 3.4 days, $p=0.09$). Readmission rate was not different (26.5 % to 28.4 %; $p=0.33$).

Figure 2. Control chart of admissions per month for alcohol related DRGs to UNC Hospital Medicine service. Data shown are for 12 months before protocol implementation and 21 months after.

Evaluation of Unintended Consequences. To assess for patients being prematurely discharged from the ED, we evaluated all admitted patients to see if they had a proximate prior ED visit during which they were sent home. Before the intervention, 8.8 % had an ED visit within 7 days prior to the one that precipitated admission, compared with 10.8 % after.

The number of admissions to the UNC psychiatry service with DRGs 896 and 897 did not change. In the 12 months before protocol implementation, there were 236 admissions compared with 230 in the following 12 months.

In the 6 months before protocol implementation, there were 16 AMA discharges with ICD-9 codes of alcohol withdrawal or alcohol dependence, for an average of 2.7/month. In the 18 months after protocol implementation, there were 18, for an average 1.0/month.

Evaluation of Fidelity with the Protocol. Manual chart review of the last 20 admissions during our observation period revealed that two admissions were initially for reasons other than withdrawal or detoxification; specifically, one case was for altered mental status and one for seizures. The protocol was followed correctly for admission in 15 out of 18 cases (83.3 %). Based on this analysis, we could have potentially avoided three additional admissions out of 20.

Manual chart review of patients seen in ED for alcohol-related ICD-9 codes during the last 3 months of the protocol identified 23 visits that were primarily for alcohol detoxification but did not lead to an admission. CIWA score was documented in only eight of these visits, making it hard to assess for inappropriate discharges, but no discharged patients had high CIWA scores or clinical description consistent with severe withdrawal.

Three cases returned to ED for re-evaluation within 48 h of discharge. One patient returned 1 day after being seen and was admitted with acute pancreatitis, having reported no symptoms at the prior visit. One patient returned intoxicated, was monitored until sober and again discharged. One patient returned intoxicated with epistaxis after a physical altercation and was also treated and released.

DISCUSSION

The development of our protocol has standardized care for what had been a very challenging issue for our hospitalist group. Protocol implementation has also correlated with a decrease in admissions for alcohol-related DRGs that was statistically significant and clinically meaningful for the 21 months after initiation. Average length of stay and 30-day readmission rate did show an upward trend, possibly due to selection of

more severely ill patients. Regardless, the overall decrease in average number of admissions by three per month represents a substantial decrease in utilization of inpatient resources. In a separate analysis performed by our group, patients with primary alcohol-related diagnoses generated costs of \$8742 per case. Thus, a decrease of three admissions per month would generate an annualized cost decrease of \$315,000 per year. While we did not perform a cost-benefit analysis, this is still likely to represent important institutional cost savings.

Our manual chart review of the last 20 admissions revealed reasonable implementation, with 83.3 % following the protocol. We believe we would have been able to see an even greater decrease in number of admissions with 100 % adherence to the protocol. Manual review of ED visits not admitted for the last 3 months of the study period showed inconsistent use of CIWA scoring and thus the protocol. The ED appears to use the CIWA only when a case reaches its initial threshold for considering admission.

This study adds to the literature on assessment and treatment of patients presenting for alcohol detoxification. We have attempted to operationalize current evidence regarding the risks and benefits of inpatient and outpatient treatment, in the context of a local care delivery system. We are unable to provide our patients with the intensive outpatient treatment program, which included substance abuse treatment, described by Hayashida and colleagues.³ This is true for many inpatient facilities, creating the need to stratify risk for complicated withdrawal and to admit some patients to the hospital.

Our study is similar to that of Asplund and colleagues, although we provide more detail on implementation of a protocol and specific rates of hospital admission, length of stay, and readmissions over time.⁵ Interestingly, Asplund and colleagues report almost no admissions to the hospital after implementation of their protocol,⁵ while we continue to have admissions that we deem appropriate. This difference may reflect differences in medical comorbidity between their health system and ours.

Our study has several limitations. We do not have a control group and it is possible that admissions decreased due to factors unrelated to our intervention. The qualitative reports of use of the protocol and multiple discussions with affected groups increase our belief that the protocol led to decreased hospitalizations. We were also unable to examine outcomes for patients discharged from the ED based on the protocol, including any potential adverse events. We are thus unable to draw definitive conclusions about the protocol's safety for patients not admitted to the hospital. Future evaluations could consider resource use at other hospitals or EDs, longitudinal use of outpatient facilities, and long-term sobriety.

Our study demonstrates a standardized approach to patients requiring alcohol detoxification. Given the widespread and

common problem of alcohol dependence, there is great potential for application of similar protocols at other institutions and further study to optimize care for this population.

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Conflicts of Interest: The authors declare that they do not have a conflict of interest.

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