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Title: Symptom-triggered therapy for assessment and management of alcohol withdrawal syndrome in the emergency department short-stay Clinical Decision Unit

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Abstract

Introduction: We previously reported that benzodiazepine detoxification for alcohol withdrawal using symptom-triggered therapy with oral diazepam reduced length of stay (LOS) and cumulative benzodiazepine dose by comparison with standard fixed-dose regimen. In this study, we aim to describe the feasibility of symptom-triggered therapy in an emergency department (ED) short-stay Clinical Decision Unit (CDU) setting.

Methods: In this retrospective cohort study, we describe our experience with symptom-triggered therapy (STT) over a full calendar year (2014) in the CDU. A retrospective chart review was conducted and data collection included demographics, clinical details, total cumulative dose of diazepam, receipt of parenteral thiamine, length of stay and disposition.

Results: 5% (n=174) of 3222 admissions to CDU required STT. Collapse or seizure (41%, n=71) and alcohol withdrawal (21%, n=37) were the most common reasons recorded for admission to CDU in those who required STT. Median AUDIT score was 25 and 112 patients (64%) had at least one CIWA-Ar measurement ≥10, triggering a dose of diazepam (20mg). The median cumulative oral diazepam dose was 20mg while 24 (15%) of patients received a cumulative dose of 100mg or more. Median time for STT was 12 hours (IQR=12, R=1-48). 3% (n=5) of patients required further general hospital admission and median LOS in CDU, was 22 hours (IQR=20, R=1-168).

Conclusion: STT is potentially feasible as a rapid and effective approach to managing AWS in the ED/CDU short-stay inpatient setting where patient length of stay is generally less than 24 hours.

Section 1: What is already known on this subject

Symptom-triggered therapy (STT) for alcohol-withdrawal reduces both the length of stay and the cumulative dose of benzodiazepine, when compared to a fixed-dose reducing schedule. The symptom-triggered approach has been adopted in the multiple settings including short-stay medical unit (less than 48 hours) and specialist addiction unit, but has not been reported in an ED clinical decision unit (CDU).

Section 2: What this study adds

In this retrospective study of 174 CDU patients who underwent symptom-triggered therapy with oral diazepam for alcohol withdrawal, 87% had completed STT in less than 24 hours and 97% were discharged home from CDU. STT is potentially feasible as a rapid and effective approach to managing alcohol withdrawal syndromes in selected patients.

INTRODUCTION

Alcohol withdrawal syndrome (AWS) is frequently observed in the emergency department. Early identification and treatment of patients with AWS is important in preventing further complications such as seizures and delirium tremens. [1-2]

Severity of alcohol withdrawal varies from each individual and the dosage of benzodiazepines needed to control withdrawal symptoms can also differ significantly. Long-acting benzodiazepines are generally administered on a reducing dosing schedule for at least 5 days for patients with AWS in hospital inpatient as well as outpatient settings. Symptom-triggered therapy by contrast allows individualised monitoring of AWS and optimum dosage administration.

Symptom-triggered therapy (STT) for alcohol withdrawal is attractive in an ED setting as it is brief, reduces both the length of stay and the cumulative dose of benzodiazepine, when compared to a fixed-dose reducing schedule. [3-7]

Symptom-triggered therapy (STT) for the assessment and management of alcohol withdrawal syndrome has been utilised in the Clinical Decision Unit (CDU) at Cork University Hospital Emergency Department since 2006. CDUs are inpatient services in Emergency Departments, previously named ED Observation Wards in some hospitals that are led by Consultants in Emergency Medicine. The purpose of a CDU is to make timely clinical decisions on patients who present to the ED with specific conditions whose length of stay is likely to be no longer than 24 hours. However, some patients do remain in CDU for longer than 24 hours for example in complex cases that require longer observation or patient requires further admission to the hospital. Cork University Hospital ED is the main ED for the Southern region and is the busiest ED in Ireland (65,730 presentations in 2014). The CDU at Cork University Hospital is a rapid turnaround ward in the ED with 12 beds.

AIM

The aim of this study was: to describe the feasibility of symptom-triggered therapy in an emergency department (ED) short-stay Clinical Decision Unit (CDU) setting over a full calendar year.

METHODS

A retrospective chart review was conducted for all patients (age ≥18 years) who were recorded as having received the symptom-triggered alcohol detoxification protocol in the CDU during the full calendar year 2014. Admission to CDU is suitable for ED patients who an Emergency Medicine Physician considers to require a short period of observation or treatment, typically for a maximum of 24 hours (Figure 1). Patients about whom there is a clinical suspicion of alcohol withdrawal or risk of alcohol withdrawal are among those considered suitable for CDU although such patients will typically also have other medical assessment and treatment needs. Patients are considered unsuitable for CDU if they have complex medical issues, unstable physiological parameters, violent or psychotic behaviour.

According to the STT protocol, patients are assessed for severity of alcohol withdrawal symptoms using a standardised 10-item patient rating scale, the Clinical Institute Withdrawal Assessment for Alcohol revised

(CIWA-Ar). (See Figure 2 and Appendix A) Patients who develop significant withdrawal symptoms (ie CIWA-Ar score ≥ 10) are administered a single dose of oral diazepam (20 mg). The CIWA-Ar is then repeated at 90-minute intervals until there are no significant withdrawal symptoms for three consecutive assessments. All patients commenced on STT in CDU are commenced on daily parenteral vitamins 'Pabrinex' (administered as iv solution of Ampoules 1 and 2 containing 250mg of thiamine, 4mg vitamin B2, 50mg vitamin B6, 500mg Vitamin C, 160mg Nicotinamide, 1g glucose).

Data collection included demographics, length of stay (LOS), reason for admission, self-reported weekly alcohol intake, Alcohol Use Disorders Identification Test (AUDIT) score, total cumulative dose of diazepam, duration of STT protocol, admission to the ward and whether STT had been switched to oral chlordiazepoxide after 24 hours. The duration of STT protocol was calculated using the length of time (in hours) between the first and the last CIWA-Ar score documented. The cumulative dose of diazepam and the total number of parenteral vitamins given was obtained from the medication administration records. Assessment notes by the alcohol liaison nurse were reviewed to ascertain main intervention recommended. Reason for admission to CDU from the main ED is extracted from the offline database in the CDU.

The descriptive results were presented as means [SD] for age or medians with interquartile intervals [IQR] and range [R] for variables with skewed distributions (cumulative dose of benzodiazepine, length of stay, total dose of parenteral vitamins). Baseline categorical variables were compared within groups by using Student t-test, chi-square test and Mood's median test. No sample size estimates were done; the sample size was determined by the number of patients admitted to the CDU.

This study was approved by the Clinical Governance Department, Cork University Hospital in July 2015. The data collection stage was completed in August 2015 and data were anonymised and stored offline on an SPSS database in a Liaison Psychiatry office computer. No items of information that would enable the identification of any subject were recorded.

RESULTS

Demography and Length of stay

There were 3222 admissions to CDU in 2014. 174 of these patients (5.4%) were included in the STT protocol for potential to develop alcohol withdrawal syndrome. 75% (n=131) were male. The mean age was 46 years (SD=+/-13, R=18–76). The median LOS was 22 hours (IQR=20, R=1–168) which was longer than that for all CDU admissions (median=17 hours, IQR=20, R=1-303).

Reason for CDU Admission

The most common reason for patients to be referred to the CDU for STT was collapse or suspected seizure (41%, n=71), followed by alcohol withdrawal syndrome (21%, n=37), trauma (14%, n=25), other medical problems (10%, n=18), deliberate self-harm (9%, n=16), and other psychiatric problems (4%, n=7) (Table 1).

Table 1. Summary of demographic patient data and results

	n (%)
Mean age, years (SD, range))	46 (+13.1, 18-76)
Gender	
Male	131 (75%)
Female	43 (25%)
Reason for CDU admission	
Collapse or suspected seizure	71 (41%)
Alcohol withdrawal syndrome	37 (22%)
Trauma	25 (14%)
Other medical problems	18 (10%)
Deliberate self-harm	16 (9%)
Other psychiatric problems	7 (4%)
Clinical profile	
Median alcohol intake (units per week *)	100 (6-274)
Median AUDIT score	25 (8-40)
Median LOS (hours)	22 (1-168)
Patients with CIWA-ar score ≥ 10	112 (64%)
Treatment	
Patients who received diazepam	112 (64%)
Median cumulative diazepam dose (mg)	20 (0-260mg)
Cumulative diazepam dose > 100mg	26 (15%)
Patients switched to a fixed benzodiazepine dose	11 (6%)
Patients who received parenteral vitamins	158 (91%)
Median number of doses of parenteral vitamins	3 (0-27)
Disposal location	
Admission to a hospital ward	5 (3%)
Discharge home	169 (97%)

*In Ireland, a unit of alcohol has ten grams of pure alcohol. For example: A half pint of beer, pub measure of spirits (35.5ml) and a small glass of wine (100ml, 12.5% volume).

Admission to the ward

3% (n=5) patients required admission to the ward (medical and psychiatric ward) with principal presentation of deliberate self-harm (n=2), chest pain (n=2) and collapse (n=1). 97% (n=165) were discharged home following CDU admission.

Benzodiazepine dose / symptom-triggered therapy

Of patients admitted to the CDU, 64% (n=112) had at least one score of CIWA-Ar ≥10 and received one dose of diazepam. Within this group, the median occurrence when a patient score CIWA-Ar ≥10 during STT was 2 (IQR=3, R=1-13). 36% of patients (n=62) did not require any symptom-triggered benzodiazepine therapy. The median cumulative dose of diazepam administered during STT was 20mg (IQR=80mg, R=0–260mg). 15%

(n=26) had a cumulative dose of diazepam higher than 100 mg. The median length of STT was 12 hours (IQR=12, R=1-48). 13% (n=22) underwent STT for more than 24 hours and 6% (n=11) were switched from diazepam to a standard fixed dose schedule of chlordiazepoxide. There was no significant difference in gender (chi-square 0.235, degree of freedom 1, *p*=0.628), or age (t-test, t=0.868, *p*=0.312), between those who required or did not require diazepam. Those who received at least a single dose of diazepam had a significantly longer median LOS in CDU (25 hours vs. 17 hours (Mood's median test $\chi^2 = 12.77$, $p<0.001$)) compared with those who did not require diazepam.

Thiamine/B-Vitamins
91% (158/174) received at least one dose of parenteral vitamins. The median number of doses of parenteral vitamins administered was 3 (IQR=2, R=0-27).

Referral for addiction liaison nurse assessment
51% (88/174) were assessed by an alcohol liaison nurse. 34% (30/88) of patients were given psychoeducation in alcohol use, 42% (37/88) were referred to residential rehabilitation centre and 15% (13/88) were referred to outpatient addiction counselling.

DISCUSSION

Alcohol intoxication and alcohol-related morbidity place a significant burden on the limited resources in emergency departments. [8] Early identification and management of alcohol withdrawal syndrome is crucial in preventing serious complications such as seizures and delirium tremens. Benzodiazepines remain the mainstay of treatment of withdrawal and prevention of complications. Two common strategies used in the management of alcohol withdrawal syndromes are fixed-schedule treatment and symptom-triggered therapy (STT). In the ED setting STT is attractive because of its short duration which coincides with expected length of stay of typical admissions with alcohol-related emergency department presentation. A previous study has shown that symptom-triggered front-loading detoxification using diazepam was as effective as fixed dose schedule. [9]

The symptom-triggered approach has been adopted in the multiple settings including short-stay medical units (less than 48 hours) and specialist addiction units. [9,10] Our study has shown that it was feasible to adopt symptom-triggered therapy (STT) in short-stay ED department (ie less than 24 hours). We selected diazepam as a detoxification agent due to its pharmacokinetic properties and adapted our protocol based on several previous studies. [9-11]

STT was introduced 18 months prior to our previous study in 2008 which examined a much smaller, selected cohort of patients. [3] Since then STT has expanded to become an essential part of management of AWS in our service. The current study describes activity and outcomes in relation to STT for AWS in our CDU over a one-year period. The increasing numbers of patients being treated on this protocol has led to greater familiarity with the protocol among the nursing staff.

It has been recommended that patients with alcoholism presenting to services who are at risk of Wernicke encephalopathy or Korsakoff syndrome should receive prophylactic high-dose thiamine as part of an alcohol detoxification program. [12,13] There is a lack of consensus with regard to its optimal dose, mode of administration, frequency of administration or duration of treatment. [13,14] As a minimum, at least one

prophylactic dose of thiamine intravenously should be given to patients with chronic alcohol abuse with evidence of malnutrition or decompensated liver disease. [15] In our sample, we have shown that it is feasible for more than 90% of patients requiring symptom-triggered therapy for alcohol withdrawal to receive at least one dose of parenteral thiamine during their Emergency Department stay.

The strengths of our study include a large sample size and a standardized approach to the management of alcohol withdrawal. The potential limitations of our study includes that this is a single-centre descriptive study, patients were referred to the CDU on the basis of physician impression and thus may have varied in their acuity. The nursing staff also had no formal training in the use of CIWA-Ar which may affect the accuracy in using this tool. We were also unable to determine the frequency of the use of STT in the overall ED cohort (i.e. those not sent to the CDU) although we expect it to be low or absent as our STT protocol is specifically for the CDU setting.

Our findings are potentially generalizable in that: CDU care is a key part of Emergency Medicine in the UK, Australia, Canada and the US and in Ireland, it is National policy that CDUs should be developed in all 24/7 EDs. [16]

CONCLUSION

Service activity in relation to alcohol is considerable in the Emergency Department. Our findings suggest that symptom-triggered therapy (STT) is potentially feasible as a rapid and effective approach to managing AWS in the ED/CDU short-stay setting where patient length of stay is less than 24 hours.

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Contributorship Statement

MFI, KD, EMC, PB and IOS was involved in the planning of the study. MFI and KD conducted the data collection and MFI has completed the data analysis. MFI and EMC were responsible in preparing the manuscript. MFI, KD, EMC, PB and IOS were involved in the revision of the manuscript. All authors certify that they have participated sufficiently in the work to take public responsibility for the content.

Figures

Figure 1. Criteria for admission to Clinical Decision Unit

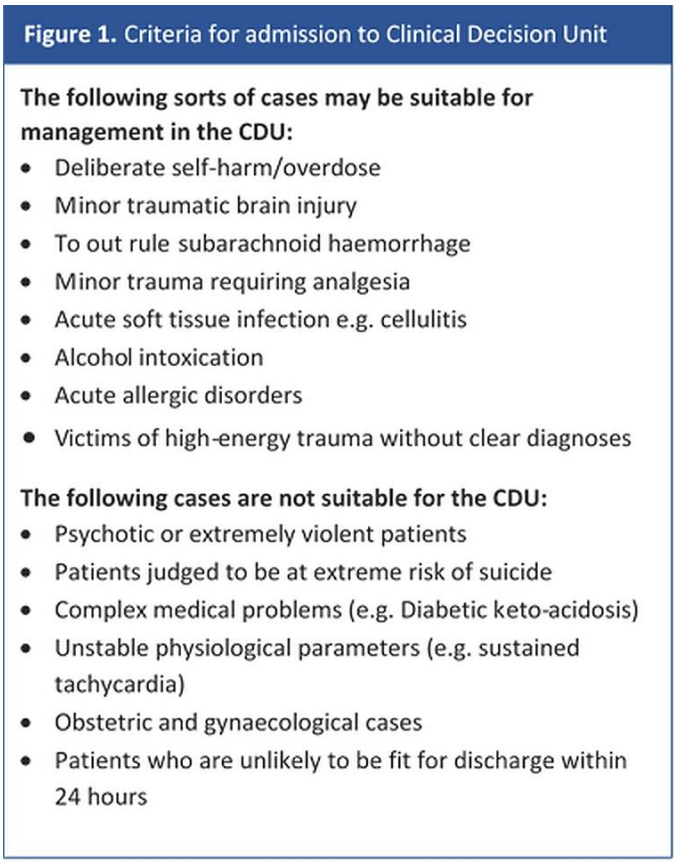

Figure 2. Suitability criteria for symptom-triggered therapy

Figure 2. Suitability criteria for symptom-triggered therapy

What patients are suitable for STT?

- Patients must be in Clinical Decision Unit (CDU)
- Patients in obvious withdrawal (CIWA-Ar score≥10)
- History of excessive alcohol intake or previous alcohol withdrawal symptoms
- Patients with a history of previous alcohol-withdrawal seizures or delirium tremens

What patients are not suitable for STT?

- Patients in the main ED awaiting medical/surgical admission
- Patients with dependency on other drugs in addition to alcohol
- Patients with severe liver impairment, respiratory failure or other major physical illness
- Patients who were unable to communicate