



Unsuspected Critical Illness Among Emergency Department Patients Presenting for Acute Alcohol Intoxication

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Study objective: Emergency department (ED) visits for acute alcohol intoxication are common, but this population is at risk for decompensation and occult critical illness. The purpose of this study is to describe the incidence and predictors of unsuspected critical illness among patients with acute alcohol intoxication.

Methods: This was a retrospective observational study of ED patients from 2011 to 2016 with acute alcohol intoxication. The study cohort included patients presenting for alcohol intoxication, whose initial assessment was uncomplicated alcohol intoxication without any other active acute medical or traumatic complaints. The primary outcome was defined as the unanticipated subsequent use of critical care resources during the encounter or admission to an ICU. We investigated potential predictors for this outcome with generalized estimating equations.

Results: We identified 31,364 eligible patient encounters (median age 38 years; 71% men; median breath alcohol concentration 234 mg/dL); 325 encounters (1%) used critical care resources. The most common diagnoses per 1,000 ED encounters were acute hypoxic respiratory failure (3.1), alcohol withdrawal (1.7), sepsis or infection (1.1), and intracranial hemorrhage (1.0). Three patients sustained a cardiac arrest. Presence of the following had an increased adjusted odds ratio (aOR) of developing critical illness: hypoglycemia (aOR 9.2), hypotension (aOR 3.8), tachycardia (aOR 1.8), fever (aOR 7.6), hypoxia (aOR 3.8), hypothermia (aOR 4.2), and parenteral sedation (aOR 2.4). The initial blood alcohol concentration aOR was 1.0.

Conclusion: Critical care resources were used for 1% of ED patients with alcohol intoxication who were initially assessed by physicians to have low risk. Abnormal vital signs, hypoglycemia, and chemical sedation were associated with increased odds of critical illness. [Ann Emerg Med. 2018;71:279-288.]

Please see page 280 for the Editor's Capsule Summary of this article.

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INTRODUCTION

Background

Emergency department (ED) visits for acute alcohol intoxication are common.¹⁻³ Most encounters for alcohol intoxication result in an uncomplicated ED course and subsequent discharge after a period of observation, with the patient returning to a normal mental status. This patient population, however, is at risk for serious underlying illness and decompensation.⁴⁻⁶

Importance

There are multiple complications that can occur among acutely intoxicated patients. Patients with alcohol intoxication can lose protective airway reflexes or experience hypoxic respiratory failure, necessitating intubation.^{7,8} Acute alcohol

intoxication may also lead to substantial psychomotor agitation, warranting chemical sedation, which is associated with its own inherent risk.^{9,10} Additionally, chronic alcohol use predisposes individuals to sepsis, acute liver failure, and gastrointestinal hemorrhage, among other serious medical comorbidities.^{4,11-13} Intracranial hemorrhage is another important consideration in this patient population, given a high prevalence of associated traumatic injuries.¹⁴⁻¹⁶ Identification of any of these concomitant processes may result in the subsequent use of ED critical care resources to stabilize and resuscitate the patient.

Goals of This Investigation

The purpose of this investigation was to determine the incidence of use of critical care resources among patients

Editor's Capsule Summary*What is already known on this topic*

Some emergency department (ED) patients assessed as having uncomplicated alcohol intoxication decompensate and receive critical care services.

What question this study addressed

What is the incidence of unsuspected critical illness among 31,364 patients with acute uncomplicated alcohol intoxication?

What this study adds to our knowledge

Approximately 1% of patients admitted to a specialized ED unit for uncomplicated alcohol intoxication subsequently received critical care services. Several clinical findings were associated with receiving critical care services: hypoglycemia, hypotension, tachycardia, fever, hypoxia, hypothermia, and use of parenteral sedation.

How this is relevant to clinical practice

EDs should pay special attention to intoxicated patients with abnormal vital signs or hypoglycemia, and those who receive chemical sedation.

who present to the ED for acute alcohol intoxication. The study population of interest was patients presenting to the ED who were assessed to have low-risk, "uncomplicated" alcohol intoxication, but for whom the encounter unexpectedly resulted in the use of critical care resources. Secondary aims of this study were to determine whether there were potential predictors associated with critical care resource use in this population.

MATERIALS AND METHODS**Study Design and Setting**

This was a retrospective, observational cohort study of patients presenting to the ED with acute alcohol intoxication from October 2011 to September 2016. The local institutional review board approved this study.

Hennepin County Medical Center is a tertiary care county hospital located in Minneapolis, MN, with greater than 100,000 annual ED visits. To accommodate for large volumes of alcohol intoxication visits (greater than 7,000 per year), the ED has a dedicated intoxication unit to cluster all alcohol intoxication encounters. This 16-bed area is staffed by 2 registered nurses, a health care technician, a resident physician, and an attending emergency physician. The unit is locked to prevent elopement, but is otherwise

functionally the same as the rest of the ED. This unit is not a detoxification center, nor is its intent to treat withdrawal.

Figure 1 demonstrates the flow of intoxication encounters in our ED. Given the staffing constraints of the intoxication unit (lower nursing-to-patient ratios), the unit's intended use is for observing individuals in the ED primarily for uncomplicated alcohol intoxication. As such, triage nurses and paramedics are instructed to room any patient with suspected or known concomitant medical issues needing active treatment elsewhere in the ED.

The second mechanism to ensure that only appropriate patients remain in the intoxication unit is the initial unit nurse and physician evaluation, which occurs generally within 10 minutes of arrival. This initial assessment includes a physical examination, assessment of vital signs (blood pressure, pulse rate, temperature, and oxygen saturation), and a breath alcohol concentration testing (Alco-Sensor III; Intoximeters, Inc., St. Louis, MO). Routine breath alcohol testing is used rather than blood testing. If the physician or unit nurse believes the patient has concomitant medical illness or significant traumatic injury, or that significant resources will be required for the patient, he or she will relocate the patient elsewhere in the ED. The group that remains in the unit after this assessment may have some medical needs (eg, a cough requiring a chest radiograph, an assault requiring a laceration repair, hypoglycemia requiring dextrose or juice), but essentially, the population who remains in this unit are those deemed by staff to be at low risk.

Once the patient is deemed appropriate for the intoxication unit, there are no standard laboratory tests or imaging studies. The one exception to this is a mandatory point-of-care glucose-level test (checked either by emergency medical services [EMS] or in the ED). Patients are observed closely while in the intoxication unit, and serial examinations and vital signs checks are performed until their mental status improves and safe disposition is possible. If unanticipated concerns arise at any point (such as unexpected clinical decompensation or the discovery of initially missed pathology), the physician or nurse can escalate care.

Although the intoxication unit is predominantly used for uncomplicated alcohol intoxication, occasionally other patients are evaluated there (eg, those with drug intoxication, those with psychiatric complaints that require a locked unit). In contrast, occasionally low-risk intoxicated individuals are treated in other parts of the ED if the unit is full (**Figure 1**).

Selection of Participants

To identify eligible encounters, we queried the electronic medical record (Epic, Verona, WI) for all ED patients aged 18 years and older and with a chief complaint of altered

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