

EMS Triage and Transport of Intoxicated Individuals to a Detoxification Facility Instead of an Emergency Department

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Study objective: We evaluate the effectiveness and safety of emergency medical services (EMS) provider use of a checklist to triage alcohol-inebriated patients directly to a detoxification facility, rather than an emergency department (ED).

Methods: A retrospective cohort study was conducted of all patients evaluated during a 2-year period, from 2003 to 2005, by EMS providers who used a detoxification evaluation checklist to aid in triage decisionmaking. Patients who did not meet detoxification evaluation checklist criteria were transported to an ED. Twelve-hour follow-up was solicited for patients taken to the detoxification center. Hospital records of inebriated patients transported to an ED were reviewed to assess ultimate need for ED care.

Results: Seven hundred eighteen patient encounters were reviewed. One hundred thirty-eight of these patients (19.2%) were transported to the detoxification facility, whereas 580 (80.8%) were transported to an ED; 339 patients transported to an ED were ultimately deemed to have required ED care. The criteria that most commonly excluded transport to the detoxification center were an inability to ambulate with minimal assistance (N=334) and an unwillingness to cooperate with the physical examination (N=195). Low-acuity adverse events were observed in 4 subjects (0.6%) initially transported to the detoxification center who then required subsequent transport to an ED. No high-acuity clinical complications were identified at any time. The use of the detoxification evaluation checklist resulted in high sensitivity (99%; 95% confidence interval 97% to 100%) and low specificity (42%; 95% confidence interval 37% to 48%) in predicting need for ED care.

Conclusion: Our analysis suggests that field triage criteria can be used effectively to safely divert inebriated patients to a detoxification facility rather than an ED, with minimal adverse events. Use of the detoxification evaluation checklist resulted in substantial ED overtriage, and further refinement of the detoxification evaluation checklist criteria is needed to reduce it. [Ann Emerg Med. 2012;xx:xxx.]

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

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INTRODUCTION

Background

There is substantial evidence to show that the resources of emergency departments (EDs) can be challenged by inebriated patients.¹⁻⁷ A 2004 article by Pletcher et al⁸ estimated that 0.6% of all ED visits in the United States were related to uncomplicated alcohol intoxication, resulting in hospital charges of \$900 million annually. Although often not acutely ill, this population tends to visit the ED more frequently than the general population and consume a disproportionate amount of resources.^{9,10}

Importance

In 2003, at the request of area hospitals, emergency medical services (EMS) agencies examined options to reduce the transport to an ED of intoxicated individuals without apparent

medical needs. As a result, a detoxification center evaluation checklist was created (Figure 1) and implemented as part of a protocol for the out-of-hospital evaluation of the alcohol-intoxicated individual. Before the institution of the detoxification evaluation checklist, the majority of these individuals were routinely transported to an ED.

Goal of This Investigation

Our goal was to test the use of the detoxification evaluation checklist to safely divert inebriated patients from the scene directly to an area facility able to provide a safe place for detoxification. We report our preliminary findings in the use of the detoxification evaluation checklist as a triage protocol tool. To our knowledge, active implementation of such an instrument by EMS personnel has not been previously presented in the medical literature.

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

A substantial number of alcohol-intoxicated patients who present to the emergency department (ED) need observation and treatment but could be managed at alternate facilities.

What question this study addressed

This study determined whether emergency medical services providers using a checklist could safely triage intoxicated individuals directly to a detoxification facility instead of transporting them to an ED.

What this study adds to our knowledge

This retrospective review of 718 patient encounters reported that nearly 20% of intoxicated individuals could be safely diverted to the detoxification facility, with no important adverse clinical events.

How this is relevant to clinical practice

Using predefined criteria in the out-of-hospital setting can reduce transports for alcohol-related visits.

institution of this new protocol, all such inebriated patients were transported to one of these 3 facilities.

Preimplementation consensus was reached between the EMS and hospital communities, as well as Lighthouse staff, that clinical characteristics could predict safe transport of inebriated patients to the area detoxification facility. As a result, the subsequent protocol change was not deemed, or designed, to be a research instrument. However, medical oversight and quality assurance of this new program were significant concerns. As part of the oversight, Lighthouse staff observed patients for the development of adverse or unexpected medical events during the standard 12-hour stay. Follow-up forms (Figure 2) were completed by Lighthouse personnel and forwarded to the authors.

To later evaluate the effectiveness of the detoxification evaluation checklist in predicting the need for ED care, retrospective hospital record review of the population transported to area EDs was necessary. Accordingly, the institutional review boards at both hospital systems approved the project.

Selection of Participants

During the 2-year study period, paramedics completed detoxification evaluation checklists on a convenience sample of inebriated patients deemed unlikely to have any significant coincident acute illness or injury. If the individual appeared to be only intoxicated and no obvious medical problem or traumatic injury was apparent, the crew used the detoxification evaluation checklist to more closely evaluate the individual for potential transport directly to the Lighthouse. Use of the detoxification evaluation checklist was required in any patient under consideration for direct transport to the Lighthouse. Patients believed by EMS to be pregnant and patients younger than 18 years were not eligible to have a detoxification evaluation checklist completed because these populations were not accepted by the Lighthouse.

Interventions

The detoxification evaluation checklist criteria were created by a consensus group consisting of area EMS officials, emergency physicians, ED nursing staff, and Lighthouse personnel. The individual criteria were predominantly based on existing requirements the Lighthouse had at that time for transfer acceptance of inebriated patients from the EDs. No reference literature was used in the development of the detoxification evaluation checklist. An orientation to the use of the detoxification evaluation checklist was presented to paramedics during quarterly meetings. One author (M.B.H.) provided all training to crews involved in the program.

Detoxification evaluation checklist criteria numbers 10 through 28 were specific mandates of the Lighthouse and were non-negotiable. The checklist consisted of 29 criteria that were to be answered either yes or no. If no was selected for all criteria, the patient was eligible for transport to the Lighthouse. If yes was selected, even 1 time, the patient was ineligible for transport

MATERIALS AND METHODS**Study Design and Setting**

During the study period, December 2003 to December 2005, El Paso County EMS agencies served approximately 370,000 people, encompassing the greater Colorado Springs metropolitan area. Total EMS call volume approximated 40,000 annually. The primary detoxification center in El Paso County during this period was known as the Lighthouse. This facility was the only receiving institution for inebriated patients believed safe for direct-to-detoxification center transport after implementation of the detoxification evaluation checklist. The Lighthouse was certified by the Alcohol and Drug Abuse Division of the Colorado Division of Human Services as a detoxification facility providing limited medical care on a 24-hour, 7-day-per-week basis. The medical capability of the Lighthouse consisted of one 24-hour nurse, supplemented by technicians. Consultation was available in the form of an on-call physician's assistant and a psychiatrist medical director. The facility had a locked unit and was capable of handling involuntary commitments. The Lighthouse ultimately closed its doors in 2009, and substance abuse detoxification was transitioned to a new center administrated by the El Paso County Sheriff's Office.

During this period, a total of 3 civilian EDs, represented by 2 hospital systems, served the population of Colorado Springs and El Paso County. The individual annual volume of these EDs approximated 30,000, 50,000, and 100,000. Before the

Detoxification Center Evaluation Checklist		
Date: _____ Crew Emp. Numbers: _____ and _____ PCR # _____		
Patient Name: _____ DOB: _____		
YES	NO	NA
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1. Is the patient unable, or unwilling, to cooperate with your examination?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Does the patient have an acute medical problem or complaint?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Does the patient have a chronic medical condition that needs to be evaluated in the ED?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. <i>Is the patient unable to walk with only minimal assistance?</i>		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Is the patient injured in any way?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Has the patient sustained a significant traumatic event within the last 24 hours?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Does the patient remain agitated or uncooperative?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Has the patient been combative at any time (during this encounter)?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Has the patient been sedated to control behavior?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Does the patient have any open sores and/or lesions?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. Is the patient incontinent?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Does the patient have an indwelling bladder catheter or colostomy?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13. Has the patient had status seizure (as defined by protocol) activity within the last 24 hours?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14. Has the patient had a loss of consciousness within the last 24 hours that is believed to be related to an acute injury or an acute illness?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15. Is the patient less than 18 years of age?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16. Is the patient pregnant (obviously gravid abdomen or claims to be PG)?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17. Is the patient on Coumadin?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18. Has the patient expressed any suicidal or homicidal ideations?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
19. Is intoxication with substances other than ethyl alcohol suspected?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
20. Is the patient on oxygen?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
21. If known, is the patient's BAL > 0.40?		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. If known, is the patient's BAL > 0.20 and the patient admits to consuming large quantities of ETOH within 1 hour of EMS arrival?		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Is the patient mentally incapacitated?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24. Does the patient have a systolic blood pressure > 180 mmHg?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
25. Does the patient have a diastolic blood pressure > 110 mmHg?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
26. Is the patient's heart rate less than 60 or greater than 120 bpm?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
27. Is the patient's blood glucose level less than 70 or greater than 140 mg%?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
28. Is the patient's SpO ₂ less than 90%?		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
29. Is the patient unwilling to go to the Detoxification Center?		
<i>Please Note: a "Yes" answer to any of the above disqualifies the patient from consideration for direct transport to the Detoxification Center.</i>		
Crew signature _____		Receiving Signature _____

Figure 1. Detoxification center evaluation checklist.

to Lighthouse and was to be transported to an ED. Alcohol levels were not obtained in the field because the ambulances were not equipped with breathalyzers. Breathalyzer analysis was, however, routinely performed by Lighthouse staff before acceptance of the patient. The facility refused all patients with a level of 0.40 mg/dL or higher. Exclusion criterion number 29 underscores the point that transport to the Lighthouse facility was a voluntary process.

Methods of Measurement

A retrospective review of hospital records from both hospital systems was performed with the standard data collection form

(Figure 3) for patients who were deemed by the detoxification evaluation checklist to require ED care. Two investigators (D.W.R. and J.R.S.) conducted all chart abstractions. As such, the abstractors were not blinded to the purpose of the study, or the review.

The requirement for ED care was defined as any one of the following: (1) admission to the hospital or inpatient psychiatric facility from the ED; (2) any radiologic or laboratory test, excluding a single breathalyzer determination or a single fingerstick blood sugar level test; (3) need for any specialty consultation; and (4) any medical treatment or intervention not available at the Lighthouse.

Patients Transported Directly to Detoxification Center
Follow-Up

Patient Initials: _____ PCR # _____

Date of Arrival at Detox: _____ Time of Arrival at Detox: _____

Did patient complete the anticipated length of stay at Detox? Yes ___ No ___

Still in Detox for longer than anticipated? Yes ___ No ___

If yes, what was the date (or anticipated date) of discharge from Detox? _____

If patient did not complete anticipated stay at Detox, why not? _____

Transported to hospital? Yes ___ No ___ Which facility? _____

What was the date and time of transport? _____

What medical condition(s) and/or symptom(s) prompted transport to hospital? _____

Were any vital signs obtained prior to transport to hospital? Yes ___ No ___

If there were vital signs what were they? HR ___ RR ___ BP ___/___ Temp ___

What was the patient's admission BA? _____

If patient remained in Detox, were there any medical complications/symptoms that occurred but were not severe enough to warrant transport to a hospital? Yes ___ No ___

If yes, describe the medical complication(s) and/or symptom(s): _____

Follow-up completed by (CES): _____

Follow-up provided by (Detox): _____

Figure 2. Lighthouse follow-up form.

Interrater reliability with respect to the hospital chart review was evaluated in the following ways. Fifty charts were randomly selected to be abstracted by both D.W.R. and J.R.S. The resultant 100 standard data collection forms were then independently analyzed for abstraction consistency, as well as need for ED care, by all 3 authors, who were blinded to one another's assessment. Additionally, all of the standard data collection forms were reviewed with respect to need for ED care by an independent emergency physician. This physician was not associated with the study or the program and was blinded to the authors' previous conclusions. The physician was instructed only on the study requirements defining the need for ED care; no other instruction or training was provided. The results of this physician's assessment were compared with that of the authors.

Primary Data Analysis

Extracted variables included age, sex, total number of visits to either the ED or Lighthouse during the 2-year period, and adverse events. The traditional measures of the diagnostic accuracy of the detoxification evaluation checklist, namely, sensitivity and specificity, were calculated with 95% confidence intervals (CIs). We used the retrospective hospital ED chart review to estimate the sensitivity and specificity of the detoxification evaluation checklist criteria to predict both the safety of ED diversion and ED necessity in this patient population, thereby allowing estimation of overtriage and undertriage. The epiR package (version 0.9-43) for R program was used for sensitivity and specificity calculations.¹¹ The irr package for R program was used for interrater reliability

Standard Data Collection Form:

Date of EMS trip: MM/DD/YYYY

Trip number:

Patient identifier: (last name, first name, or ID number)

Sex M F

Age: _____ Date of birth: MM/DD/YYYY

Hospital admission Y N

Diagnoses on admit:

Hospital discharge date:

Diagnosis on discharge:

ED Observation and discharge: Y N

Duration of ED Observation:

Emergency department tests and services:

Radiology

Laboratory studies

ED treatments/interventions

Figure 3. Standard data collection form for hospital record review.

calculations.¹² All statistical calculations were made with R software (version 2.14.2).¹³ Microsoft Excel (Microsoft, Redmond, WA) was used for creating spreadsheets for data handling and manipulation.

RESULTS

Figure 4 provides an overview of the patient population. During the study period, a total of 748 individuals qualified for detoxification evaluation checklist use. Of this cohort, 30 individuals either did not have a checklist completed or the form could not be accounted for, leaving a total of 718 encounters in which a checklist matched a corresponding EMS patient care report. Thus, within the total population of 748, the detoxification evaluation checklist form completion rate by paramedics was 96%. Overall, 138 patients (19.2%) were transferred directly to detoxification compared with 580 patients (80.8%) transported to an ED. Three hundred thirty-nine patients were deemed to have required ED care. Eleven of the 138 patients taken directly to the Lighthouse were denied admission for at least 1 of the following reasons: facility crowding, the patient's breath alcohol level exceeded 0.40 mg/dL, the patient was dismissed in the company of a sober family or friend, or refusal of treatment by the Lighthouse because of

the patient's combative or threatening behavior. These 11 patients were then taken to an ED and included in that cohort.

Of the 718 total detoxification evaluation checklist patient contacts, there were 434 unique individual presentations. The remaining number of presentations involved repeated visits to either the ED or the Lighthouse by some individuals. There were 353 individuals (81%) with 1 transport to either the ED or the Lighthouse, 35 (8%) with 2 encounters, 12 (3%) with 3 encounters, and 9 (2%) with 4 encounters. Twenty-five individuals (6%) had greater than 4 encounters and represented 30.9% of total visits to either the Lighthouse or an ED. The mean number of visits either to the Lighthouse or the ED per patient was 1.6 (SD 1.8). The range of number of visits was from a minimum of 1 to a maximum of 18.

Patient demographic information is shown in Table 1. Table 2 outlines available breathalyzer and blood alcohol data for the Lighthouse and ED cohorts. Alcohol concentrations were similar for all groups.

The average number of exclusion criteria selected per patient over the cohort was mean 2.4 (SD 2.3). As shown in Figure 5, the 4 most prevalent criteria observed either alone or in combination with another criterion were as follows: criterion 1, unable or unwilling to cooperate with the examination (N=195); criterion 4, inability to ambulate (N=334); criterion 7, agitated, uncooperative (N=171); and criterion 29, general refusal to go to the Lighthouse (N=195). The most frequently encountered single exclusion was criterion 4 (N=56). Of the 580 individual ED transports, 31 involved patients whose sole detoxification evaluation checklist exclusion was their refusal to go to the Lighthouse (criterion 29). However, subtracting this group from the total ED transports raised specificity for necessary ED care from 42% to only 52% (95% CI 0.46 to 0.57).

Twelve-hour follow-up information was available on 80% of the 138 patients transported directly to the Lighthouse (N=111). Twenty-seven follow-up forms (20%) were either not completed or not sent to the investigators from staff at the Lighthouse. Some of the encounters represented by missing follow-up forms likely represent elopement from the Lighthouse shortly after EMS transport arrival.

Adverse events were noted either from the Lighthouse follow-up forms or identified in the monthly meetings with hospital and Lighthouse staff. An adverse event was defined as any medical condition that led to unplanned transfer to an ED within 12 hours of arrival at the Lighthouse. A total of 4 (2.9%) adverse events were observed. No deaths were identified in either the Lighthouse or ED groups. Table 3 summarizes the patients with adverse events who were transported from the Lighthouse to an ED.

A total of 57 charts were missing from the hospital records, leaving 523 charts available for abstraction. Table 4 describes the interventions provided to the 339 patients requiring ED care. Twenty-six of these patients (8% of those requiring ED care) were admitted to one of the hospitals, transferred to an

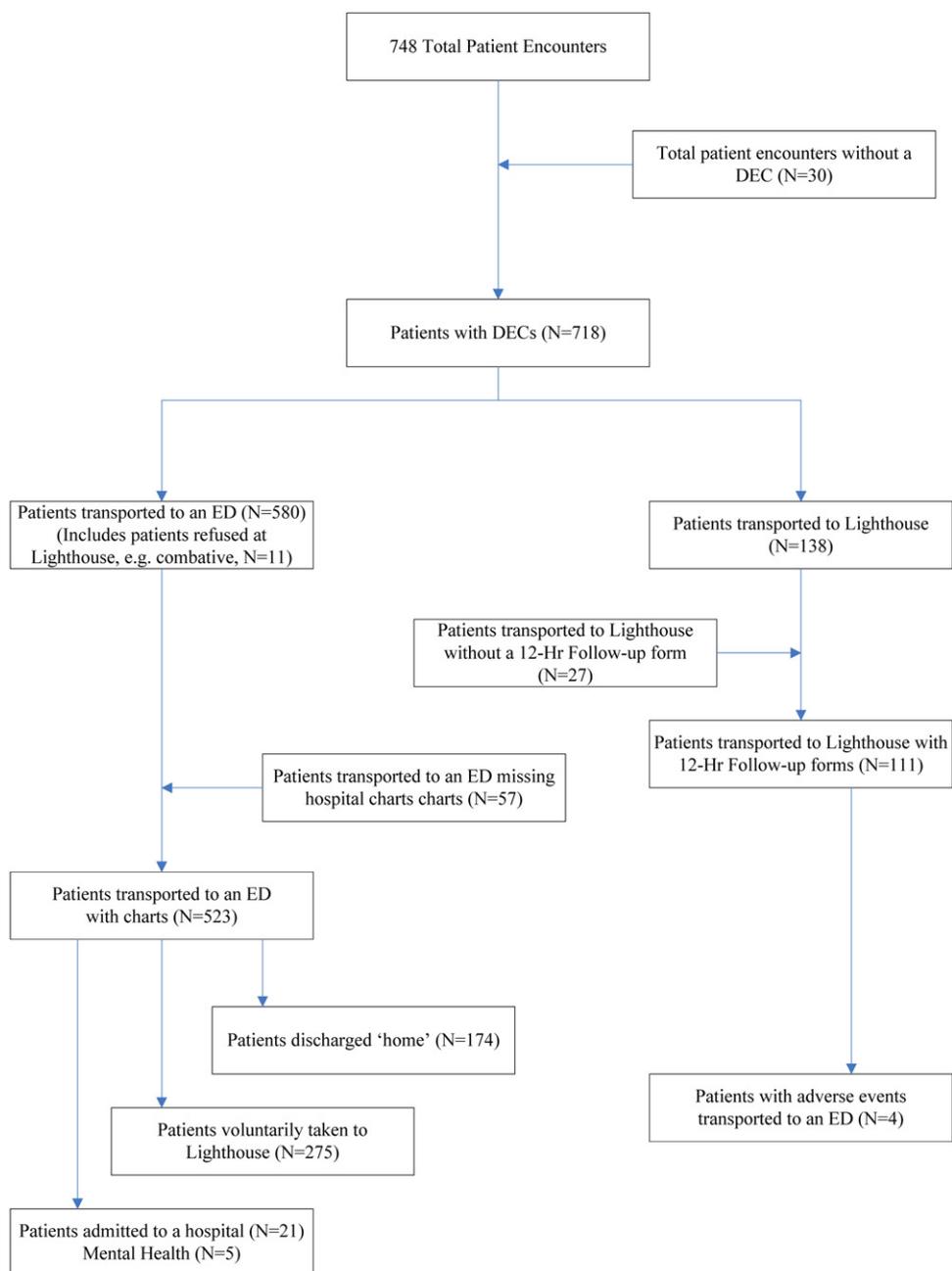


Figure 4. Flow of study subjects. *DEC*, Detoxification evaluation checklist.

inpatient psychiatric hospital, or involuntarily committed to the Lighthouse from one of the EDs. Hospital admissions among the ED cohort were most commonly related to complications associated with chronic alcohol abuse, such as withdrawal. Other frequent admission diagnoses included respiratory problems related to chronic bronchitis and electrolyte or glucose disturbances. One patient was admitted because of the presence of a small subdural hematoma and a cerebral contusion. He was observed for 7 hours in the ED and was documented to have a Glasgow Coma Scale score of 15 throughout that time. He was admitted for a 23-hour period and was discharged from the hospital with no surgical intervention.

All other patients were discharged from the EDs. Two hundred seventy-five of these discharged patients were documented to have been sent to the Lighthouse voluntarily. One hundred seventy-four discharged patients were documented to have been sent home. The remaining 48 patients did not have a specific discharge disposition listed on the chart.

Three hundred thirty-nine of the intoxicated patients transported to an ED with a completed detoxification evaluation checklist required ED care, whereas 184 patients transported to an ED through checklist criteria did not require ED care. Table 2 demonstrates that ED observation times tended to be longer for patients requiring ED care.

Table 1. Patient demographic characteristics in the ED and Lighthouse groups.

Characteristic	Lighthouse	ED
Age, y		
Median (IQR)	46 (12)	43 (13)
Range	20–75	18–75
	Total 138	Total 580
Sex, No. (%)		
Male	130 (20)	504 (80)
Female	8 (10)	76 (90)
	Total 138	Total 580
Patient encounters, No. (%)		
1	110 (89)	298 (82)
>1	13 (11)	66 (18)
	Total 123	Total 364

IQR, Interquartile range.

From the data, we calculated that the detoxification evaluation checklist criteria were able to correctly identify the appropriate clinical destination, with a sensitivity and specificity of 99% (95% CI 97% to 100%) and 42% (95% CI 37% to 48%), respectively, or a positive likelihood ratio of 1.7 (95% CI 1.6 to 1.9) and a negative likelihood ratio of 0.03 (95% CI 0.01 to 0.07). From the resultant sensitivity and specificity data, we determined an ED undertriage rate of 1% (95% CI 0% to 2%) and an overtriage rate of 58% (95% CI 51% to 66%).

Interrater reliability among the 3 authors with respect to the 50 hospital charts randomly selected resulted in a Fleiss κ of 1.0 (95% CI 1.0 to 1.0).¹⁴ Finally, the independent emergency physician review of all 523 hospital chart abstractions with respect to the need for ED care produced a Cohen's κ of 0.87 (95% CI 0.84 to 0.89).¹⁵ Combined, this suggests very good interrater reliability.

LIMITATIONS

This report was not originally designed as a research study. We gathered data from quality improvement efforts after implementation of a nonresearch protocol in which selected inebriated patients were triaged directly to a detoxification facility by EMS providers, rather than to the ED, with predefined triage criteria to determine transport destination. As such, our conclusions are somewhat limited.

We noted no serious adverse events in the 748 patient encounters. However, our sample size was relatively small, which raises the question of what the expected frequency of serious adverse events could be over a large number of patient encounters. Using the “rule of 3” as described by Hanley and Lippman-Hand,¹⁶ because none of our 748 patients showed a serious adverse event, we can with 95% confidence predict that the maximum occurrence of serious adverse event is 3 within 748 encounters (ie, 3/n). Therefore, we believe that our serious adverse rate is consistent with statistical prediction.

Although we are missing follow-up forms for 20% of the Lighthouse transports, we believe, because of both the strong operational relationship we had with the area hospitals and

regular monthly meetings we held with Lighthouse staff, that we would have been advised of the occurrence of substantial pathology requiring unplanned transfer from the detoxification center to a hospital. Even if we assume that all 27 patients missing Lighthouse follow-up forms needed ED care and add them to the group of 339 who did, the sensitivity and specificity for requiring ED care remain essentially unchanged. In fact, we calculate a resultant sensitivity of 99% (95% CI 97% to 100%) and a specificity of 42% (95% CI 37% to 48%).

Additionally, we have no follow-up for these individual presentations beyond the period of either the Lighthouse or the ED stay. However, this population has a continuous risk for negative outcome.

DISCUSSION

The purpose of this analysis was to evaluate the safety and effectiveness of a checklist of exclusion criteria used for triage of the intoxicated individual presenting to EMS without apparent indication for ED treatment.

We believe our data suggest that paramedics with specific training and protocols can safely identify patients who can appropriately be directly transported to a detoxification center. Further, paramedics were able to identify inebriated patients needing ED care with very high sensitivity (99%) but at the price of overtriage (58%), as shown by the low specificity of 42%. More important, undertriage was only 1%, which compares favorably with rates of overtriage (25% to 50%) and undertriage (less than 5%) recommended for trauma center destination transport by the American College of Surgeons Committee on Trauma.¹⁷

The overall rate of injury or illness in ED patients presenting with acute alcohol intoxication is debatable. However, Pletcher et al⁸ observed no difference in illness or injury rates in patients presenting primarily with alcohol intoxication to an ED compared with that of a general population. Hospital admission rates in both groups were equal. Our findings suggest consistency with this study.

Figure 5 demonstrates that criterion 4, inability to ambulate with minimal assistance, was the most frequently checked on the detoxification evaluation checklist, either alone or with other criteria. Thus, the criterion most responsible for the low specificity in our report was number 4. There may be ways to more precisely define and potentially combine clinical findings within this criterion population that might predict a cohort of patients who can safely be directly transported to a detoxification center.

We located detoxification evaluation checklist forms for 718 of a possible 748 eligible patients. The completion rate of 96% suggests the form could be completed with relative ease. However, we did not obtain data related to paramedic satisfaction with the checklist form, nor did we seek feedback with respect to the program from ED personnel. Anecdotally, the response from both provider groups was positive.

To our knowledge, there is relatively little information available on paramedic assessment of alcohol-intoxicated

Table 2. Median alcohol concentration (by breath and blood) and ED observation times.

Lighthouse Cohort (N=138)	Cohort Not Requiring ED Care (N=184)			Cohort Requiring ED Care (N=339)		
	Blood	Breath	Observation Time	Blood	Breath	Observation Time
N=83*	N=5*	N=162*	N=177*	N=102*	N=127*	N=239*
0.258 mg/dL	0.386 mg/dL	0.282 mg/dL	2.3 h	0.3195 mg/dL	0.286 mg/dL	4 h
IQR=0.09	IQ=0.179	IQR=0.112	IQR=2.1	IQR=0.16	IQR=0.1	IQR=3.2

*N=number of patients with available data.

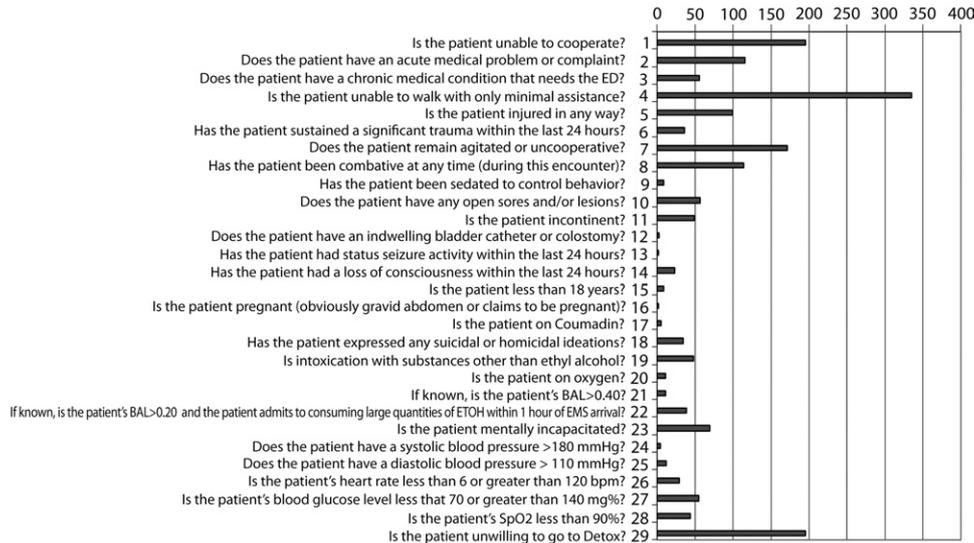


Figure 5. Distribution of exclusion criteria use in patient population (N=748).

Table 3. Summary of adverse events requiring transfer from the Lighthouse to an ED.

Male Patients, Age, Years	Event Synopsis
47	Shortly after Lighthouse arrival, the patient was difficult to arouse. Oxygen saturation at the time was 87%. After an ED observation time of 6 h, he was discharged with a room air saturation of 92%.
44	Patient who was 5 days post-knee surgery at Lighthouse admission developed knee pain nearly 12 h after arrival. He was sent to an ED and discharged with a prescription for oxycodone.
52	Cellulitis at the right elbow was observed nearly 12 h after Lighthouse admission. He was admitted to the hospital and discharged with resolution after intravenous antibiotics and treatment of alcohol withdrawal.
50	Chest/abdominal pain for 3-4 mo. The hospital chart was missing, but the Lighthouse follow-up form and subsequent EMS patient care report were available. Vital signs were stable. The patient told the paramedic transporting him from Lighthouse to the ED that he just wanted to "get his symptoms checked out."

individuals with respect to the presence of injury or illness. In an abstract published in 2000, Gratton et al¹⁸ used a retrospective survey instrument supplied to paramedics and emergency physicians on 150 inebriated patients already

transported to an urban ED. Both the paramedics and physicians assessed these patients and determined that approximately 50% of them required ED care. The paramedics' undertriage rate in this report was 16%. Further, agreement between physicians and paramedics was only 65% ($\kappa=0.30$).

Flower et al¹⁹ identified 99 inebriated patients through retrospective review who were transported to an ED during 1 month in 2003. These authors then developed a post hoc rule that might predict safe transport from the field to a detoxification center. They applied the clinical characteristics of these transports and surveyed paramedics with respect to appropriate destination, using the post hoc criteria. They concluded that their criteria would have resulted in a sensitivity of 72% in predicting need for ED care, with a concomitant specificity of 43%. Their specificity was similar to that in our report; however, their sensitivity was substantially lower. The resultant undertriage rate was 28% and must be viewed as unacceptable.

Cornwall et al²⁰ prospectively surveyed a group of emergency medical technician-intermediates about clinical specifics of 197 patients who had all been transported to an ED during a 3-month period in 2010. The task was to identify intoxicated patients who likely could safely be transported to a sobering center. The technicians were able to identify 93% of patients needing ED care with a specificity of 40%, and the authors

Table 4. Breakdown of interventions for the 339 patients requiring ED care.

Imaging Study*	Wound Care/Suturing	No. (%)				Total No. of Treatments
		Intravenous Fluids	Specialty Consultation	Laboratory Tests	Drugs Administered PO/IV [†]	
104 (9)	48 (4)	116 (10)	59 (5)	664 (57)	165 (14)	1,156

PO, Per oral; IV, intravenous.

*(%)=Percentage of total number of ED treatments (N=1,156).

[†]Drugs administered=tetanus booster and other drugs not available at the Lighthouse.

concluded that they may be able to play a role in identifying triage of intoxicated patients to an alternate sobering facility.

We are unaware of any similar reports to ours involving the active use of criteria predicting safe triage to a detoxification center by any level of EMT, including paramedics. Although our paramedics used criteria somewhat similar to that of Flower et al,¹⁹ this was an active program, relying on paramedic judgment in the use of the criteria outlined in the detoxification evaluation checklist.

There is other literature assessing paramedic ability to predict patient need for ED care in circumstances unrelated to alcohol intoxication. Results of these reports offer variable conclusions. Generally, the findings are that paramedics have difficulty in predicting the need for ED or hospital care unless defined, specific protocols are used. In such circumstances, safe triage can occur.²¹⁻²⁶

Although we acknowledge the controversy outlined in the literature cited above because it questions paramedic ability to assess the intoxicated patient, we believe our data argue to the contrary. In our observation, with very specific protocols, training, and oversight, paramedics performed well.

In summary, our study suggests that paramedics with proper training, using a specific protocol, are able to safely distinguish intoxicated patients at low risk for serious illness or injury. When appropriately identified, these patients may be transported to a facility other than an ED, such as a detoxification facility. Future efforts should focus on prospective assessment of a more simplified detoxification evaluation checklist reflecting streamlined criteria that better incorporate the most important factors predicting low risk for injury or illness in this population. Refined criteria should maintain the high sensitivity for necessary ED care observed in this study while increasing specificity.

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