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Brief Reports

DECREASED GLASGOW COMA SCALE SCORE DOES NOT MANDATE ENDOTRACHEAL INTUBATION IN THE EMERGENCY DEPARTMENT

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□ **Abstract—Background: Decreased consciousness is a common reason for presentation to the emergency department (ED) and admission to acute hospital beds. In trauma, a Glasgow Coma Scale score (GCS) of 8 or less indicates a need for endotracheal intubation. Some advocate a similar approach for other causes of decreased consciousness, however, the loss of airway reflexes and risk of aspiration cannot be reliably predicted using the GCS alone. Study Objective: A survey of all poisoned patients with a decreased GCS who were admitted to an ED short-stay ward staffed by experienced emergency physicians, to establish the incidence of clinically significant aspiration or other morbidities and endotracheal intubation. Methods: A prospective, observational study was conducted of all patients admitted to the ED short-stay ward with a decreased level of consciousness (GCS < 15). Results: The study included 73 patients with decreased consciousness as a result of drug or alcohol intoxication. The GCS ranged from 3 to 14, and 12 patients had a GCS of 8 or less. No patient with a GCS of 8 or less aspirated or required intubation. There was one patient who required intubation; this patient had a GCS of 12 on admission to the ward. Conclusions: This study suggests that it can be safe to observe poisoned patients with decreased consciousness, even if they have a GCS of 8 or less, in the ED.** © 2009 Elsevier Inc.

□ **Keywords—poisoning; alcohol; Glasgow Coma Scale; airway; aspiration**

INTRODUCTION

A decreased level of consciousness is a common reason for presentation to the emergency department (ED) and is often the result of intoxication. Originally described in head-injured patients, the Glasgow Coma Scale (GCS) was devised as a tool for recording the level of consciousness at a particular moment, whatever the cause of impairment, systematically and reproducibly (1). Repeated recordings can give an impression of deterioration or improvement. It has gained acceptance in the management of trauma and poisoned patients presenting to the ED (2–5).

Established trauma teachings describe a GCS of 8 or less as necessitating endotracheal intubation in recognition of the high risk of secondary brain injury resulting from hypoxemia and hypercapnia caused by airway obstruction or respiratory compromise (2,3).

It has also been said that a GCS of 8 or less is a useful guide for the requirement of endotracheal intubation where the cause of coma is poisoning (5,6). Poisoned patients are unlikely to suffer from secondary brain injury, but decreased consciousness and loss of protective airway reflexes predispose to respiratory failure and aspiration injury (6). However, the risk of aspiration is not confined to patients with a GCS of 8 or less, and the loss of airway reflexes cannot be reliably predicted using the GCS alone (7–11).

Respiratory failure and aspiration can be prevented by endotracheal intubation and mechanical ventilation, however, intensive care beds are a limited and expensive resource and must be used judiciously.

This observational study aimed to examine the profile of poisoned patients admitted to the ED short-stay ward

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with a decreased GCS, including their diagnoses, length of stay, and occurrence of significant events. The aim was to establish the incidence of clinically significant aspiration or other morbidities, and endotracheal intubation.

MATERIALS AND METHODS

This Scottish ED serves the region of Tayside with a population of approximately 350,000 from rural and urban environments. There are approximately 50,000 new presentations per year, and the admission rate is approximately 24%.

Within the ED there is an eight-bed short-stay ward. There are no specific admission criteria to this area, but the majority of patients are admitted after poisoning, alcohol intoxication, or head injury, with the expectation that they will be suitable for discharge within 24 h. All patients are reviewed by senior medical staff before admission and the ward is overseen by consultant emergency physicians. There is a formal ward round each morning and further review of patients is performed as required by the duty emergency medicine consultant or senior trainee. The resident ward staff consists of a junior physician and ED nurses. There is a minimum patient-to-nurse ratio of 4:1. However, the ward's proximity to the treatment area means that more medical and nursing staff are available immediately as required. There are four single rooms and one four-bed bay surrounding a central nursing station; the bed spaces all have facility for oxygen delivery, suction, and cardiorespiratory monitoring, and resuscitation equipment is immediately at hand. Although there is no maximum length of stay, the typical period of observation or treatment is < 24 h. Approximately 2650 patients are admitted per year.

A prospective, observational survey was conducted of all poisoned patients admitted to the Ninewells Hospital Emergency Department short-stay ward with a decreased level of consciousness (GCS < 15) from September 18, 2006 to December 2, 2007. Data were collected using a data collection sheet, which was completed either by the admitting physician or ward physician at the time of admission.

Patients were included if they had a GCS of < 15 as a result of poisoning at the time of admission to the short-stay ward. Patients with external evidence of head injury and poisoned patients who presented to the ED with a reduced level of consciousness but who recovered to GCS 15 before admission or were intubated in the resuscitation room and then transferred to the Intensive Therapy Unit (ITU) for further care were excluded. The local acute toxicology service is provided in the ED and, as such, poisoned patients with a decreased level of consciousness would not access another area of care. Ethical approval was not required as there was no change to the current departmental practice.

Diagnosis, GCS, and vital sign recordings were documented at the time of presentation, admission, and discharge. The GCS was calculated by the physician responsible for the patient at presentation and admission. Arterial blood gas results, if appropriate, and whether any airway intervention or computed tomography (CT) imaging was required were recorded. Events were considered significant if a patient required intubation or admission to the ITU, had clinical evidence of aspiration, or had any other episode that required transfer back to the resuscitation room, including cardiac or respiratory arrest. Other transient episodes that resolved with standard treatment were not considered clinically significant. Aspiration was diagnosed clinically and was considered present only if the patient demonstrated any respiratory symptoms or signs that were consistent with aspiration.

RESULTS

Data were collected for a total of 73 patients, 40 female and 33 male, ages 14–79 years (median 36 years, mean 35 years). The median GCS at presentation and on admission to the short-stay ward was 11. Twelve patients had a GCS of 8 or less on admission; none of these patients had clinically significant aspiration or required intubation and all had a GCS of 15 on discharge. Length of stay varied with GCS; the median was 26 h for those with a GCS of 8 or less but only 14 h for those with a GCS > 8.

The GCS remained static between presentation and admission in 53% of the patients; it improved in 25% and deteriorated in 22%. The spread of GCS and the differences between presentation and admission are shown in Figure 1.

Acute poisoning resulting from intentional overdose accounted for 65% of the short-stay ward admissions. Seven (14%) of these had a GCS of 8 or less, none of whom required transfer to the ITU. The only significant event recorded was a seizure in a patient who had taken an overdose of quetiapine, tramadol, and paracetamol. All of these patients had an arterial blood gas recorded; none of these showed evidence of ventilatory failure. The

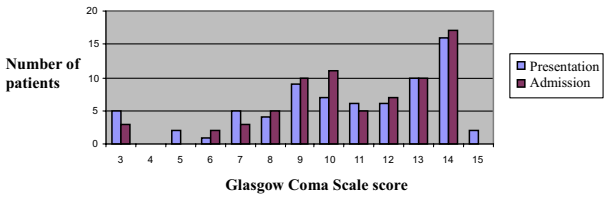

Figure 1. Glasgow Coma Scale scores on presentation and on admission to the short-stay ward.

Table 1. Comparison of patients with acute drug overdose and alcohol intoxication

	Poisoning	Alcohol Intoxication
No. of patients	51	22
Median GCS	12	10
Median length of stay (hours)	19.1	12.6
No. of admissions	1	0

GCS = Glasgow Coma Scale score.

majority of overdoses involved multiple drugs, however, tricyclic antidepressants or benzodiazepines were the most commonly implicated, and this was especially true when the GCS was 8 or less.

Thirty-nine percent of patients had consumed alcohol, and for 22 patients this was considered to be the primary reason for their decreased level of consciousness, including 5 patients who presented with a GCS of 3, and approximately half of those patients with a GCS of 8 or less at presentation. Of the 5 patients with a GCS of 3, 2 had rapidly improved to GCS 8 and 12 before admission to the ward. It is worth noting that although this group had a lower median GCS, there were no adverse events, and all of these patients except 2 were discharged within 24 h with a GCS of 15. Table 1 compares the characteristics of drug overdose and alcohol-intoxicated patients.

Fourteen patients had airway support on admission to the short-stay ward; 6 were in the recovery position, 1 required suction of the oropharynx, 3 had a nasopharyngeal airway, and 3 had an oropharyngeal airway in situ. One patient with alcohol intoxication had nasopharyngeal and oropharyngeal airways in situ. The 3 patients admitted to the short-stay ward with a GCS of 3 had oropharyngeal airway support that was tolerated even after recovery to GCS $>$ 8. A patient with chlormethiazole poisoning who presented with a GCS of 3 had an oropharyngeal airway inserted in the resuscitation room; on admission to the ward 90 min later his GCS had improved to 9, but he tolerated the airway until his GCS had reached 13, 10 h later, when it was removed.

No patient in this study received gastric lavage or had activated charcoal administered through a nasogastric tube. Neither of these treatments is safe in the unconscious patient without definitive airway protection and they are not routine practice in British Emergency Medicine.

One patient required intubation and referral to the ITU. The patient presented with an overdose of dihydrocodiene, amitryptiline, and quinine, and had a GCS of 14 on admission to the ward. One hour later the GCS had deteriorated to 6 and the patient was transferred back to the resuscitation room, where the patient was intubated before admission to the ITU. There were no episodes of clinically significant aspiration, cardiac or respiratory arrest, and no patient required a head CT scan.

DISCUSSION

This study demonstrates that it can be safe to monitor and observe individuals with a decreased level of consciousness in the ED short-stay ward. The overall incidence rates for intubation and aspiration were 1.4% (1/73) and 0% (0/73), respectively.

Alcohol is a major cause of decreased level of consciousness in the ED. A recent Scottish national survey found that 11% of ED visits were alcohol related; one-fourth of these patients were acutely intoxicated and over half had sustained an injury. One-third of all patients with alcohol-related presentations were admitted to the hospital (12). The data presented demonstrate that isolated alcohol-intoxicated patients had the lowest median GCS but made a more rapid recovery with no adverse events.

Unlike trauma, there are no criteria for the need to intubate poisoned patients. This is reflected in our study, as there were a total of 12 poisoned (overdose, alcohol, or both) patients with a GCS of 8 or less admitted to the ward for observation, none of whom went on to aspirate or require intubation.

Chan et al. found a GCS of 8 or less to be predictive of a need for intubation in poisoned patients and describe it as a useful guideline for intubation. However, this study also demonstrated that 33% of those with a GCS of 8 or less were not intubated and none of them developed any respiratory complications. They conclude that the whole clinical context of the situation should be considered before deciding on a need for intubation (5).

Cosgrove and Gascoigne advocate a "GCS 8 – intubate" approach to poisoned patients. This is based on their experiences with the management of poisoned patients admitted to a coronary care unit. They suggest that poor understanding of airway and ventilation care, that is, the "ABCD" approach, and the lack of an appropriate area for monitoring poisoned patients are problems that could be modified to improve care. A ward managed by senior emergency medicine staff addresses these problems (6).

The incidence of aspiration in poisoned patients has been reported as 0.8% with GCS 15, increasing to 4.5% when the GCS falls below 15. Subgroup analysis of those admitted to the ITU found the rate of aspiration to be 9% when the GCS was 8 and above, increasing to 17% when the GCS fell below 8 (7). Another study found evidence of aspiration in up to 15% of poisoned patients with GCS $>$ 9 and in 45% of patients with GCS $<$ 9 (8). Our experience suggests that the risk of clinically significant aspiration is less than this.

The presence of a gag reflex may be suggested as useful when assessing the risk of aspiration, however, to actively try to stimulate the gag or cough reflex in someone with potentially impaired airway reflexes could cause vomiting and lead to aspiration. Several studies have demonstrated that the presence or absence of these reflexes cannot be predicted by GCS score. Our study confirms this as we have shown that oropharyngeal airways can be tolerated at a GCS of > 8 (9–11).

Poisoned patients are different than trauma patients, and a "GCS 8 – intubate" rule probably is not applicable to the poisoned patient. Many things must be considered in the assessment, but above all, the assessment should be done by an experienced physician who has training in emergency toxicology and advanced airway management.

Limitations

The design of this study as an observational study is a significant limitation. Staff members were aware of the study and, therefore, a Hawthorne effect cannot be ruled out. There was no follow-up of the patients after their discharge from the ED and thus we could not identify any aspiration that may have presented late. Any future study aiming to identify predictors for intubation or aspiration would need to involve a significantly greater number of patients due to the low incidence of these events.

CONCLUSIONS

Decreased level of consciousness is a common reason for presentation to the ED. Frequently, this is a result of drug or alcohol intoxication. This study suggests that it can be safe to observe these patients, even if they have a GCS of 8 or less, in the ED if a thorough assessment has been made by an experienced emergency physician.

REFERENCES

1. Teasdale G, Jennett B. Assessment of coma and impaired consciousness. Lancet 1974;ii:81–4.
2. Gentleman D, Dearden M, Midgely S, Maclean D. Guidelines for resuscitation and transfer of patients with serious head injury. BMJ 1993;307:547–52.
3. American College of Surgeons Committee on Trauma. Advanced trauma life support program for doctors, 7th edn. Chicago, IL. American College of Surgeons; 2004.
4. Heard K, Bebarta VS. Reliability of the Glasgow Coma Scale for the emergency department evaluation of poisoned patients. Hum Exp Toxicol 2004;23:197–200.
5. Chan B, Gaudry P, Grattan-Smith TM, McNeil R. The use of Glasgow Coma Scale in poisoning. J Emerg Med 1993;11:579–82.
6. Cosgrove JF, Gascoigne AD. Inadequate assessment of the airway and ventilation in acute poisoning, a need for improved education? Resuscitation 1999;40:161–4.
7. Isbister GK, Downes F, Sibbritt D, Dawson AH, Whyte IM. Aspiration pneumonitis in an overdose population: frequency, predictors and outcomes. Crit Care Med 2004;32:88–93.
8. Adnet F, Baud F. Relation between Glasgow Coma Scale and aspiration pneumonia. Lancet 1996;348:123–4.
9. Kulig K, Rumack BH, Rosen P. Gag reflex in assessing level of consciousness. Lancet 1982;319:565.
10. Moulton C, Pennycook A, Makower R. Relation between Glasgow Coma Scale and the gag reflex. BMJ 1991;303:1240–1.
11. Moulton C, Pennycook A. Relation between Glasgow Coma Scale and cough reflex. Lancet 1994;343:1261–2.
12. NHS Quality Improvement Scotland. Understanding alcohol misuse in Scotland. harmful drinking. Final Report. Edinburgh: NHS Quality Improvement Scotland; 2008:17.

ARTICLE SUMMARY

1. Why is this topic important?

Decreased level of consciousness is a common presentation to emergency departments (EDs), and the management of these patients can be challenging. Intubation and ventilation provides a definitive airway but intensive care resources are limited and should be used judiciously.

2. What does this study attempt to show?

This study attempts to evaluate the safety of conservatively managing poisoned patients with decreased level of consciousness in the ED.

3. What are the key findings?

The incidence of clinically significant aspiration was found to be lower than previously reported in patients with a decreased level of consciousness as a result of drug or alcohol intoxication.

4. How is patient care impacted?

This study suggests that a GCS score of 8 does not mandate intubation in patients with a decreased level of consciousness as a result of alcohol or drug intoxication. Such patients can be managed conservatively after a thorough assessment has been made by an experienced emergency physician. This practice may help reduce the number of admissions to intensive care beds in this population.