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OPINION

Intubation for patients with overdose: Time to move on from the Glasgow Coma Scale

Richard AF PELLATT [1,2,3,4] Katherine ISOARDI [5,6] and Gerben KEIJZERS [1,3,4]

[1]Emergency Department, Gold Coast University Hospital, Gold Coast, Queensland, Australia, [2]LifeFlight Retrieval Medicine, LifeFlight Australia, Brisbane, Queensland, Australia, [3]Faculty of Health Sciences and Medicine, Bond University, Gold Coast, Queensland, Australia, [4]School of Medicine and Dentistry, Griffith University, Gold Coast, Queensland, Australia, [5]Faculty of Medicine, The University of Queensland, Brisbane, Queensland, Australia, and [6]Emergency Department, Princess Alexandria Hospital, Brisbane, Queensland, Australia

Abstract

Patients frequently present to the ED with drug overdose and reduced conscious level leading to coma. There is considerable practice variation around which patients require intubation. Indications include: (i) respiratory failure (including airway obstruction); (ii) to facilitate specific therapies or intubation as a therapy in itself; and (iii) for airway protection in the unprotected airway. We argue that intubating a patient purely for (iii) is outdated and that most patients can be safely observed. There is a paucity of good quality research in the area of drug overdose with reduced consciousness. Teaching may be outdated and based on the use of the Glasgow Coma Scale in head trauma. Current low quality research suggests observation is safe. We recommend that patients undergo an individualised risk assessment of the need for intubation. We propose a flow diagram to aid clinicians in safely observing comatose overdose patients. This can be applied if the drug is unknown, or there are multiple drugs involved.

Key words: *intubation, overdose, toxicology.*

> 'Within the infant rind of this small flower
> Poison hath residence and medicine power.'
>
> *Romeo and Juliet*, 2.3.23-24

Vignette

It is 2330 on a Saturday night. A young adult female is left at triage by two persons who state she has 'OD'ed', then leave without providing further information. The patient is snoring softly. She is moved to a bed where initial assessment shows oxygen saturations of 99% on 15L facemask; respiratory rate of 14; heart rate of 90 bpm with a normal ECG; BP 130/80. GCS is 7 (E1, V1, M5) with midsize reactive pupils. The ICU is full. The nurse in charge asks if the team should prepare for intubation.

Drug overdose is a common reason for presentation to the ED. Overdoses can be intentional, recreational misadventure or accidental and involve any number of different toxicological agents. Patients presenting with overdose may require airway support and in some cases, intubation and mechanical ventilation. There is considerable practice variation as to which patients with overdose require intubation. This is particularly true in those with a low level of consciousness without respiratory compromise.

In this Opinion article, we argue that intubating a patient with overdose purely for 'airway protection', without considering an individualised risk assessment, is outdated, detrimental to patient care and resource allocation, and leads to unnecessary practice variation.

Indications for intubation in drug overdose can be split into three main categories:

1. Respiratory failure including airway obstruction.

In a patient with respiratory failure (broadly, failure to oxygenate or hypercapnia) due to drug overdose, there is little controversy that intubation is required when basic airway and breathing support measures (such as airway adjuncts and supplementary oxygen) are inadequate. Respiratory failure in patients with drug overdose may be due to upper airway obstruction, aspiration, hypoventilation, central nervous system (CNS) depression or respiratory muscle paralysis, depending on the effects of the drugs involved.[1]

2. To facilitate specific therapies.

Intubation may be required to facilitate investigation and management, including specific therapies in certain life-threatening scenarios, or as a therapy in itself. For example, hyperventilation in tricyclic antidepressant overdose; to facilitate administration of activated charcoal; to facilitate the initiation of extracorporeal membrane oxygenation. Again, there is little controversy that intubation in this group is required.

Correspondence: Dr Richard AF Pellatt, Emergency Department, Gold Coast University Hospital, 1 Hospital Boulevard, Southport, QLD 4215, Australia. Email: drpellatt@googlemail.com

Richard AF Pellatt, FACEM, MBChB, BA (Hons), Staff Specialist, Emergency Physician; Katherine Isoardi, FACEM, GradDipClinTox, BMed, Staff Specialist, Emergency Physician, Clinical Toxicologist; Gerben Keijzers, MSc (Biomed Health Sci), MBBS, FACEM, PhD, Senior Staff Specialist, Emergency Physician, Professor of Emergency Medicine.

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3. In the unprotected airway.

The intubation of a patient with overdose for reduced consciousness, but otherwise not requiring organ support, without evidence of respiratory compromise, is controversial.[2] The traditional indication for intubation in this group is for 'airway protection' and often this is considered on Glasgow Coma Scale (GCS) alone (or in combination with assessment of the gag reflex), with a score <8 prompting intervention.[3] Others manage select patients within this group supportively in the recovery position until toxicity has passed.[4]

GCS does not necessarily translate from trauma to toxicology

The role of GCS as a measure of the need for intubation in overdose is not established, and indeed has been challenged.[3,4] The score was developed for and validated in patients with traumatic head injury and reduced GCS, and specifically with respect to avoiding secondary brain injury in severely injured patients requiring transfer to definitive care.[5] Many clinicians translate this practice across other patient groups including overdose patients, even though some features of the score, such as decorticate and decerebrate posturing, are less relevant in patients without a structural brain lesion.

Furthermore, patients who present with overdose have often taken drugs that are short-lived and wear off. This is in contrast to patients with significant brain injuries, where the decreased level of consciousness is not anticipated to be short-lived (Fig. 1). For example, patient intoxicated with the recreational drug gamma-hydroxybutyrate (GHB) usually have coma that resolves within 3 h.[6] When reliable and appropriate risk assessment suggests the natural course of an overdose to be self-limiting, the argument to intubate for 'airway protection' is less compelling.

It is important to balance the risk of an unprotected airway with risk of intubation. Intubation and mechanical ventilation are complex, resource-intensive procedures with associated complications, both acutely (airway trauma, hypoxia, hypotension, arrest and aspiration), and in the longer term (ventilator-associated pneumonia and psychological sequelae). In patients where coma is anticipated to be short-lived, the balance swings towards supportive care. The difficulty then lies in appropriately identifying those who are likely to have short-lived toxicity. A clinical toxicologist's opinion may assist in the risk assessment when the expected course of the overdose is not readily apparent. It is acknowledged that complexities exist where the drug involved is unknown, in polypharmacy or where there is associated trauma. There are also system issues such as available clinician skill mix or departmental pressure.

Current evidence base for observation versus intubation in patients with overdose

There is no randomised controlled trial (RCT) or high-level evidence comparing intubated and non-intubated patients with overdose and decreased level of consciousness. Such an RCT would take significant resources and would be challenging to conduct due to the heterogenous nature of the patients and drugs involved.[7] However, observational studies suggest a conservative approach to the overdose patient with reduced GCS is reasonable. GHB presentations have been shown to be safe to observe.[6,8] Munir *et al*. observed 170 ED attendances for GHB intoxication, of which 91 (54%) had a GCS of 3–8 on arrival. Of these, 79/91 (87%) were not intubated. All 170 patients were safely discharged home.[8]

Factors other than GCS may aid the decision to intubate patients presenting with overdose. Prior studies have investigated CO_2 monitoring, oxygen saturations, venous and arterial blood gas sampling, ECG findings and other measures of disease severity in relation to the need for intubation in overdose, and composite combinations of these parameters.[7,9,10] In addition, individual factors such as age, pre-existing obstructive lung disease and polypharmacy are important, although results are conflicting.[11,12] The COBRA[13] decision tool was created to help predict the need for intensive care interventions in intentional drug overdose based on cardiac conduction, oxygenation, blood pressure, respiratory rate and awareness, all readily available measures in the ED. It has been proposed that the motor component of the GCS may be of particular importance in these patients; however, results are inconsistent.[9] Other scoring systems include the rapid emergency medicine score and the rapid acute physiology score.[14] The use of the bispectral index has also been examined as a more novel way of monitoring the comatose patient with overdose.[15]

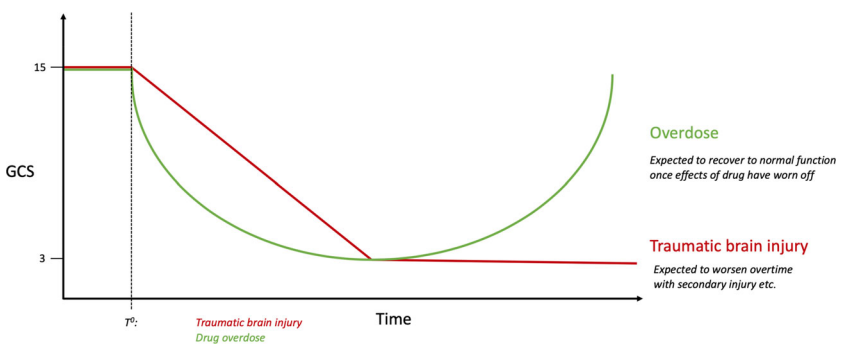

Figure 1. *Expected clinical trajectory in the comatose patient: overdose versus traumatic brain injury. To illustrate the difference between a reversible insult (overdose) and an irreversible insult (traumatic brain injury) on Glasgow Coma Scale (GCS), reflecting that GCS is therefore less useful as a stand-alone determinant of possible deterioration, as in overdose, it is expected to recover.*

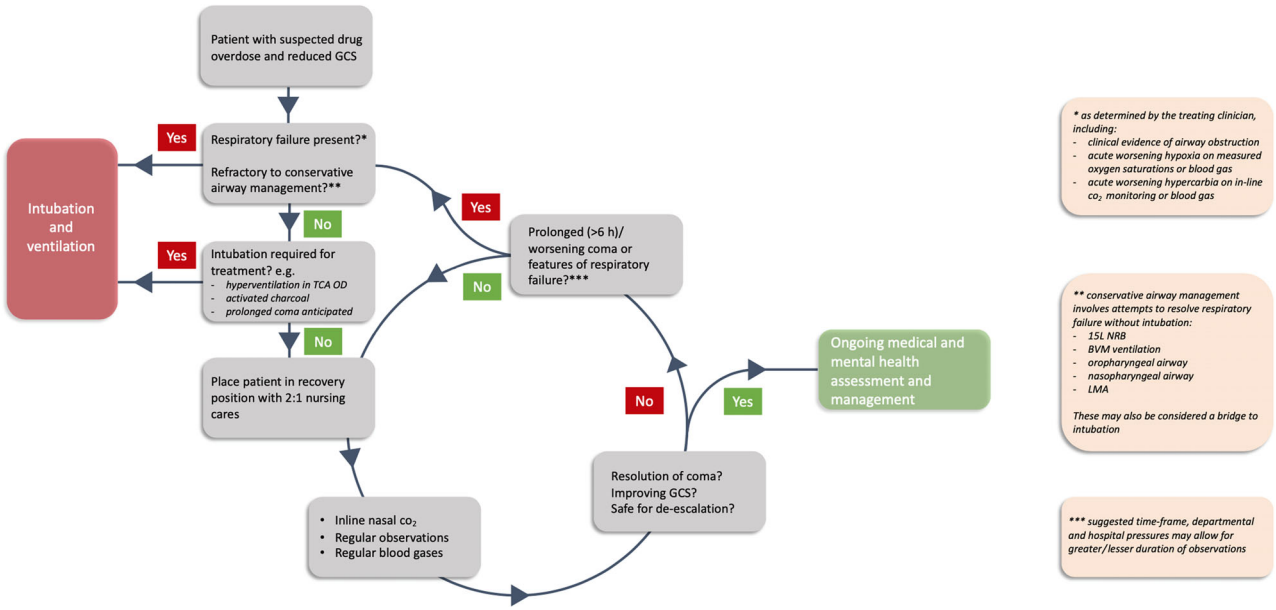

Figure 2. *Suggested draft algorithm for the management of the comatose patient with suspected drug overdose. Initial assessment involves assessment for respiratory failure, and consideration as to whether intubation is required for a specific treatment. If neither of these is required, it is suggested that the patient can be safely observed (the central 'wheel') with frequent nursing and medical observations. Trajectory is key. Consideration is made for resource availability, although counterintuitively, it may actually be preferable for a lower resourced hospital or setting to observe these patients, where equipment and staff skill mix may be lacking. BVM, bag-valve mask; GCS, Glasgow Coma Scale; LMA, laryngeal mask airway; NRB, non-rebreather; TCA OD, tricyclid antidepressant overdose.*

A possible solution

We propose that a strategy of observation with attention to the clinical trajectory of coma is reasonable in patients with overdose, where the patient does not require immediate intubation for (i) respiratory failure or (ii) a specific therapy, and toxicity is suspected to be short-lived, that is less than 6 h (but depending on setting and resources even up to 8–12 h), with an anticipated hospital stay of less than 24 h. This can still be applied to patients where the ingested drug is unknown (Fig. 2). The patient should be observed closely in a critical care setting with frequent nursing care and their clinical trajectory monitored. If there is any deterioration or coma is prolonged (>6 h) – then airway reassessment, including consideration of intubation and ventilation, is recommended.

Conclusion

Airway management of patients presenting with drug overdose should be pragmatic and based on an individualised risk assessment. It is likely that fewer patients would be intubated for airway protection only, or purely for a decreased level of consciousness, if those with anticipated short-lived toxicity are managed conservatively in the first instance. The expansion of the current evidence base would be helpful to identify which groups would benefit most from this approach. This in turn would reduce unnecessary practice variation and resource consumption.

Our recommendations are opinion based and anecdotal. There is limited evidence in this area. We propose that further research is required to strengthen the evidence base for intubation in patients with overdose. Such work is planned and will include a detailed scoping review of the topic, ongoing maintenance of an airway registry and review of practice. These, in combination with the existing literature, will inform the development of a decision aid algorithm (an early example is given in Figure 2). Such a decision aid will then be evaluated prospectively in a clinical study setting.

Author contributions

RAFP conceived the study. RAFP, KI and GK were involved in drafting and revising the manuscript for publication.

Competing interests

KI and GK are section editors for *Emergency Medicine Australasia* and were excluded from all editorial decision-making related to the acceptance of this article for publication.

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