



Emergency tracheostomy management in critical care and the operating room

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Comment on: Villasenor M, Bengson J, Cloyd BH, *et al.* Cardiac arrest due to an unexpected inability to ventilate in a tracheostomy patient suggesting the need for a routine anesthesia checklist and an anesthesia relevant emergency pathway for tracheostomy management: a case report. *Ann Transl Med* 2023;11:420.

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We read with great interest the case report by Villasenor and colleagues describing cardiac arrest due to an unexpected inability to ventilate in a tracheostomy patient (1). We would like to congratulate the authors on their publication as it highlights a number of important issues regarding tracheostomy management in anaesthesia practice. We would like to make some comments regarding the case report.

We agree with the authors recommendation that an anaesthesia specific guideline should be used for every patient with a tracheostomy undergoing surgery. Crises can challenge even the most experienced clinicians and cognitive aids can provide valuable real time decision support (2,3). In the case report Villasenor and colleagues identified a number of actions that could have been undertaken if a well-designed cognitive aid had been available and they presented a new checklist and guideline (1). Key points they emphasized were: having awareness of the age of the tracheostomy and the relative difficulty of previous upper airway management, confirmation of a patent airway with capnography before commencing anaesthesia, the importance of passing a suction catheter to confirm tube patency and manage obstruction, the value of deflating the cuff and the importance of prompt tube removal (1).

The Austin Hospital, Melbourne, Australia has developed a double sided, A3 sized Emergency Tracheostomy Management cognitive aid which travels with the patient wherever they go in the hospital including the operating

room (4). The major content source for our cognitive aid was the National Tracheostomy Safety guidelines and algorithm (5). We suggest that the use of our cognitive aid (or equivalent) would have prevented and/or enabled more rapid management of this challenging situation.

The cognitive aid is navigated by a cognitive aid reader who is separate to the team leader (3). The front side of the cognitive aid is for primary responders who are the bedside/ward staff. This page also contains tracheostomy and upper airway information. The second side of the cognitive aid is the advanced responders' side, which is to be used by the code blue team and in critical care environments including intensive care, emergency department and the operating room.

The advanced responders' side of the cognitive aid could have been used in this case as follows:

- (I) Check through the 'in all cases section' confirming that: this is a tracheostomy not laryngectomy patient, the patency of the upper airway and the age of the tracheostomy. The knowledge that the tracheostomy was surgically placed months prior would have reassured the clinicians regarding the patency of the tract and enhanced confidence that it was safe to remove it. Knowledge of the documented airway grade and ease of bag mask ventilation would have further reinforced this plan.
- (II) Determine which of the three pathways to follow: the first pathway 'difficulty breathing or ventilating

via tracheostomy tube' is most commonly chosen. The second pathway should only be chosen if the tracheostomy tube is completely out of the neck. The third pathway is for bleeding. In this case the first pathway would be chosen.

- (III) Proceed down the 'difficulty breathing or ventilating via tracheostomy tube pathway'. Step 1 would have identified that the inner cannula was absent. In step 2 failure to pass the suction catheter through the entire length of the tracheostomy tube would have led directly to step 3 and deflation of the cuff. This would have enabled the patient to breathe via their upper airway, or if their breathing was inadequate, would lead to standard upper airway management (i.e., bag mask ventilation, supraglottic airway insertion or intubation). If the patient regained stability, emergency actions could cease and the team could await the arrival of additional experts to troubleshoot the tracheostomy.
- (IV) If the situation remained unstable and in the absence of other patient causes (step 4) or an indication for immediate use of a bronchoscopy (step 5) the tracheostomy tube could be removed (step 6) and the patient managed as a patient with a 'completely removed tracheostomy tube' which is the second pathway.

We have observed in simulation on multiple occasions the phenomenon of an experienced clinician passing a suction catheter into a completely blocked tracheostomy and incorrectly reaching the conclusion that the tube is patent. We suggest to learners to gauge depth of the suction catheter on the spare tracheostomy tube at the bedside before inserting it into the patient. In this case the clinician may not have appreciated that the suction catheter had not passed the entire length of the tracheostomy tube. If the team had been using the Austin cognitive aid, failure of passage of a suction catheter to stabilise the patient would still have led them on to the next step (step 3) cuff deflation and if the patient remained unstable to continue until the emergency was resolved.

Cognitive aids should be developed in a comprehensive manner by diverse teams (6,7). The emergency tracheostomy management cognitive aid in our hospital is part of hospital-wide, system level approach to tracheostomy care led by the Tracheostomy Review and Management Service (TRAMS). Such a comprehensive approach has been demonstrated to improve outcomes (8,9).

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Footnote

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