



Editorial

Prehospital intubation in cardiac arrest: The debate continues

Advanced pre-hospital airway management is a rapidly evolving and controversial area. The paper by Wang et al. published in this issue of the journal further adds to that debate.¹

Wang and colleagues are to be congratulated on reporting such a large dataset, and adding significantly to the body of knowledge. They have documented the prehospital use of tracheal intubation and alternative airway devices in 16 American states in 2008. A full range of clinical conditions were included but the majority were in cardiac arrest, providing important information about this group of patients.

Tracheal intubation has been used in pre-hospital cardiac arrest since the 1970s, and has become known as the “gold standard” of care. However, it must be remembered that when this practice began there were no readily available supraglottic airway devices, and the only real alternative to tracheal intubation was bag-mask ventilation.

Recently, several publications have suggested that tracheal intubation may not be the best technique for pre-hospital airway management in cardiac arrest.² The reasons to suggest this are multi-factorial, and well highlighted by this paper.

Tracheal intubation is a highly technical skill, with a learning curve of up to 60 procedures.³ In addition, skill fade will occur when there is a lack of regular exposure to the procedure: EMS providers in the UK perform tracheal intubation between 1 and 4 times annually.⁴ This rate of exposure is supported by the findings of Wang and colleagues, with intubation attempted once in every 225 patient care episodes. An EMS provider attending 1000 patients annually will therefore attempt intubation only four times.

Some EMS systems make provision to increase exposure by limiting the skill to smaller teams who are selectively tasked to such events; the German Notarzt system and recently introduced “critical care paramedics” in the UK are examples of this. However the inevitable consequence is that general EMS providers will lose the skill, and it is hard to identify a way of increasing exposure of all providers except through simulation or placement in other settings (e.g. hospital operating theatres) which is expensive and often logistically challenging.

Tracheal intubation can provide very effective ventilation if performed correctly, but is associated with a number of major complications. The most important is unrecognised oesophageal intubation, rendering the patient effectively apnoeic until the situation is identified and rectified. An oesophageal intubation rate of 0.5% was reported in this study, with immediate recognition in the majority of cases. However the self-reporting methodology makes this a likely underestimate, and other papers suggest higher rates of unrecognised non-tracheal intubation.⁵ This remains an impor-

tant risk, particularly whilst capnography is not universally used to confirm placement.

Other complications of tracheal intubation such as hypoxia, aspiration and bronchial intubation are also known to occur, but in this study their frequency is hard to estimate since they are not listed by airway device. Nevertheless, by far the most common complication is failure to insert the device.

Failure to insert a tracheal tube during cardiac arrest has a number of implications. It implies that there have been multiple attempts to instrument the airway with resultant trauma, and also implies a period of limited ventilation whilst each attempt takes place. During out of hospital cardiac arrest a very real concern is that intubation causes a marked pause in chest compressions.⁶ Recent resuscitation guidelines have emphasised further the importance of effective chest compressions and minimising any interruption in these.⁷ As any intubation can lead to lengthy pauses in chest compressions it is likely that a failed intubation attempt will have a major impact on the effectiveness of resuscitation.

The success rate of tracheal intubation in Wang's study is 78%. Whilst this is lower than other reports, most pre-hospital studies have intubation success rates below 90%.⁸ A failure rate of 10–25% in a rarely performed skill raises considerable concern, particularly when the success rate of tracheal intubation is so much better within the controlled environment of the Emergency Department.^{9,10}

What is encouraging from Wang's paper is the use of supraglottic airway devices. Tracheal intubation was attempted more than four times as often as all alternative devices combined, but their use is likely to have increased further since 2008. Wang and colleagues report on the use of the combitube and oesophageal obturator devices, which are not truly supraglottic but showed success rates of 83.6% and 84.6%. They also report the use of the laryngeal mask airway in over 500 patients, which is a significant series. The success rate of 95.3% is excellent, and consistent with other pre-hospital series.¹¹ There is increasing evidence that the classic laryngeal mask airway is not the easiest device to use in the pre-hospital environment, and alternate devices such as the iGEL (Intersurgical, Wokingham, UK) or LMAsupreme (Intavent Orthofix, Maidenhead, UK) may be more appropriate, although comparative trials are currently unavailable.^{12,13}

Whilst the work of Wang and colleagues benefits from reporting a very large number of procedures it is inevitably subject to significant quantities of missing data and the biases of self-reporting; problems that the authors thoughtfully consider in their paper. High quality prospective trials are still urgently required in this area.

So what is the way forward? One option would be to remove tracheal intubation from the skill set of all pre-hospital practitioners. However this would take no account of situations where tracheal intubation may be advantageous, especially for long distance transfers and the use of drug assisted intubation in highly managed systems, for which a recent study reports a survival advantage in severely brain injured patients.¹⁴

In cardiac arrest, however, the case for abandoning tracheal intubation is more compelling, and has been recommended in the UK.¹⁵ There would appear to be little doubt that in the majority of urban pre-hospital cardiac arrests, with rapid transfer times, the airway may be swiftly and successfully managed with a supraglottic airway device, reducing both complications and interruptions in chest compressions. It would also seem reasonable to suggest that a procedure performed less than five times annually will be subject to significant skill fade. In response, the College of Paramedics in the UK has provided a cogent argument for an alternative approach, suggesting that enhanced training, exposure and equipment will all act to improve success rates.¹⁶

Compromise could be achieved if the majority of EMS providers manage the airway with a supraglottic airway device, and are provided with adequate initial and refresher training. Tracheal intubation could then be limited to a smaller group of clinicians who are specifically tasked to patients who are likely to benefit from this intervention, and who perform the procedure with sufficient frequency to maintain competence within a highly managed system that actively monitors success rates, complications and patient outcomes. Concentrating the management of cardiac arrest within smaller groups of EMS providers is likely to have additional benefits by improving the overall quality of patient management, and ultimately the survival of these individuals.

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