



## **Pre hospital airway management by paramedics – Harmful or necessary?**

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Many trauma patients are in need of early airway protection for various reasons – a decreased level of consciousness (with or without traumatic brain injury) being a common indication. Maxillofacial injury, inhalational injury, shock, chest, lung, or airway trauma are other reasons for early airway management.

The questions “What is the best timing for airway management?” and “Where and by whom the airway should be managed?” have been matters of lively debate in anesthesia-, pre-hospital-, and emergency medicine-related literature for the previous decades.

The traditional way of thinking, partly because of the immense popularity of the ATLS® guidelines among pre-hospital providers, asserts that every patient with a Glasgow Coma Scale (GCS) of 8 and under should be intubated immediately for fear of losing the airway and causing asphyxia or aspiration. However, concerns regarding the proficiency of prehospital personnel to accomplish these intubations, as well as the adverse physiological effects of rapid sequence induction medication and positive pressure ventilation, have become more prevalent.

There have been multiple contrasting studies regarding the effect of prehospital intubation and intubation attempts on outcome and mortality of patients. Cobas and others,<sup>1</sup> studied airway intervention rates and mortality at the Ryder trauma center in Miami over a 3-year period starting in 2003. Of 1320 patients who had emergency airway intervention by an anesthesiologist on arrival in the emergency department, 1117 patients were intubated after arrival and only 203 (15%) had prehospital airway management performed in the field by paramedics. Of those 203 patients, 140 (69%) were successfully intubated. Twenty-five patients (12%) had an unrecognized esophageal intubation. Mortality in the failed prehospital intubation group was 71% compared to 60% for the successful prehospital intubation group, but the result was not statistically significant. The highest mortality of 79% was found in patients who received a Combitube for prehospital airway management. Paramedics in this study performed one to three tracheal intubations per year.

One of the largest prospective studies about prehospital airway management was published in 2011 by Davis et al.<sup>2</sup> The study examined the relationship between out-of-hospital intubation attempts and mortality in patients with prehospital GCS  $\leq 8$ . The study looked at 10 major research centers in North America and included a total of 1575 patients. After controlling for multiple cofounders such as age, gender, preintubation GCS, initial hypotension, and mechanisms of injury, they were able to show an odds ratio of 2.91 for mortality in the patient group where intubation was

attempted compared to patients where no intubation was attempted. However, another finding was that EMS systems with lower intubation attempt rates had a much higher overall mortality compared to EMS systems with higher rates of intubation attempts. Lowest intubation attempt rates were recorded in Toronto, Ontario, with an 18.3% intubation attempt rate and a 45.7% overall mortality. The highest intubation attempt rate among the sites was 74.8% in Seattle/King County, Washington, with a corresponding overall mortality of 34.7%. In summary, sites with a higher intubation attempt rate had a lower overall mortality in patients who had intubation attempted.

A recent British study by Lockey and others<sup>3</sup> examined airway intervention in trauma patients in the London area. Patients were initially treated by paramedics and if required, intubation attempts were performed by the paramedic team without medications. The patients and the airway management were then assessed by a physician who arrived later with the advanced paramedic-physician team. The physicians in this study had a minimum of 5 years post-graduate experience and almost half of them were anaesthetists. Based on this physician's assessment, 57% of the 472 patients still had some sort of airway compromise upon the arrival of the advanced team and required additional airway intervention. Of a total of 45 intubation attempts by the paramedic team, only 64% were successful, and 11% of the patients had an unrecognized esophageal intubation. The physician intubations, where induction medications were used as required, were 100% successful.

The importance of a rigorous airway training system and a protocol for field intubation was shown in a study published by Prekker et al.<sup>4</sup> and examined prehospital airway interventions by paramedics in 7523 patients over a period of 5 years in King County, Washington. This study did not differentiate between trauma and non-trauma patients. Paramedics in this study underwent initial airway training with up to 50 intubations in the operating room and in the field. Each year, the paramedics in the system needed to perform at least 12 successful intubations and needed to perform additional intubations in the operating room if this number was not met with field intubations. The use of RSI drugs was encouraged as part of the intubation protocol. Seventy-seven percent of the patients in the study were successfully intubated on the first pass (including after corrective measures by the paramedics) and over 99% were successfully intubated.

In conclusion, it seems that the question of whether to intubate or not is not so much a question of who is doing the procedure, but rather the level of training and expertise in airway management as well as the regional EMS system culture and protocols. It is clear that paramedic-based systems that have a rigorous training program, high volume of intubations per specific provider, and a good working relationship with anesthesia departments will have better outcomes for early airway intervention compared to systems with less volume and more sporadic training. The latter might have better outcomes by leaving advanced airway interventions to hospitals or improving the airway training and skills of their EMS providers. Given the number of intubations performed in the operating room compared to other areas of the hospital, it is mandatory to have a working relationship with the anesthesia department to allow access to the operating room for airway training under controlled conditions and by airway experts. The airway training of emergency medicine personnel in the emergency room is more problematic due to the limited number of elective intubation opportunities. Patients who are intubated in the emergency room usually have some degree of airway compromise or other urgent reason for airway management, and teaching opportunities in these cases are limited, considering patient safety.

The alternative is a physician-staffed advanced EMS system in which physicians with appropriate training and experience supplement the existing paramedic system and perform advanced airway management and other procedures in the prehospital setting.

### **References**

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