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Emergency endotracheal intubation: best practice versus reality

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Orotracheal intubation was first described by Hippocrates (460–370 BC), who advised inserting a small tube into the patient's throat to inject air in the case of "suffocation". This procedure was then repeated throughout history by various doctors, including the Persian philosopher and physician Avicenna (980-1037). Nevertheless, it was only after World War II that orotracheal intubation was used regularly in hospitals [1]. Formerly only practised by anaesthesiologists, it is now performed by intensivists and emergency physicians in the case of acute respiratory distress [2]. However, delays during tracheal intubation and multiple attempts at laryngoscopy are associated with increased complications, including persistent neurological injury, cardiac arrest and death. The issue of how to maintain and promote the same level of patient safety when the procedure is performed in pre-hospital settings by medical professionals in new specialties, particularly paramedics, has been a subject of debate and controversy for several years [2].

The myth of the tube: be a hero!

While anaesthesiologists perform routine airway monitoring in the operating theatre, endotracheal intubation performed by emergency physicians is less common. Due to this lower exposure, as well as the high severity of patients intubated in the emergency room, such intubations place pressure on the doctor, sometimes disproportionately compared to the technical simplicity of the procedure and its success rate [3]. In the pre-hospital setting, this trend is exacerbated: the operator is often alone, and patient survival may depend on his/her actions. The main reasons for intubation failure identified are poor identification of at-risk patients, poor or incomplete planning, inadequate provision of skilled staff and equipment, delayed recognition of events, and failed rescue due to no or incorrect interpretation of capnography [4]. Mastering the art of intubation, in particular its indications, alternatives and the management algorithm, is essential [5]. The main indications for airway control in an emergency are coma, acute respiratory or circulatory failure and cardiac arrest. Except in cases of cardiac arrest, the patient is intubated after general anaesthesia. Importantly, the management of anaesthetic agents requires prior training in anaesthesia and can lead to major complications.

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Acquisition and maintenance of competencies

Training for direct laryngoscopy is well-established [6]. To be effective, an operator should perform at least 50-70 direct laryngoscopies; of these, 20 should be performed in simulation training [7, 8]. However, the minimum exposure required to be a skilled operator varies between education programmes. Only access to the operating theatre allows an operator to reach this high minimum exposure to endotracheal intubation. In Switzerland, graduation in pre-hospital emergency medicine requires an emergency physician to have completed at least one full year in anaesthesia.

The emergence of video-laryngoscopy has increased physician confidence by facilitating the intubation gesture. However, airway control management is not limited to the intubation task itself and requires knowledge of the entire procedure, including direct laryngoscopy and rescue techniques [9]. Nevertheless, it has been recognised that video-laryngoscopy makes it easier for the teacher to monitor the procedure in real time. Simulation training has also allowed a significant improvement in the satisfaction of physicians-in-training, as well as in their dexterity and reflexes in difficult situations [3]. Nevertheless, although simulators are becoming increasingly advanced, such training does not completely replace *in vivo* mentoring in the operating theatre or elsewhere. Both training methods should be used to ensure complete mastery of the procedure. Importantly, after completion of this well-established initial training, an emergency physician must be able to maintain this competence, even though there are fewer intubations in the pre-hospital and emergency department settings than in the operating theatre. In order to complete the laryngoscopy quota, access to the simulation centre and operating theatre must be formalized [10, 11]. Unfortunately, in some hospitals, the operating theatre remains difficult to access for emergency physicians.

Benefit/risk balance

Apart from the purely technical aspect, the main difficulties involve identifying the indication for intubation and knowing how to react in the case of failure. These cases are most commonly patients in a critical condition, either hypoxemic or in a precarious haemodynamic state. Irrespec-

tive of the context, the expected benefit must be weighed against the risks for the patient. The risk is sometimes difficult for a novice to assess as it depends on the patient, their history, advance directives, the physician's experience, the context and the environment. The combination of operator, patient and environmental factors means that intubation is difficult in most circumstances [12]. Despite the high-risk nature of intubation in the emergency department, most incidents occur after the airway has been secured and are due to airway displacement or blockage [13].

Outside the hospital the risk is greater, as the environment is less safe and the risk of patient decompensation remains considerable. Indeed, the hardest part is deciding when to withhold the intervention. In this context, without regular out-of-hospital emergency medicine practice, even the best of technicians can be unsettled and feel isolated. Embarking on such an intervention under pressure and without the necessary skills and experience is very likely to lead to a poor outcome for the patient [12]. Postponing the procedure or persisting with several attempts at direct laryngoscopy can constitute a real loss of opportunity for the patient, with the delay in ventilation leading to irreversible consequences [2, 14] and having a significant impact on morbidity and mortality.

The 2021 European Resuscitation Council Guidelines for the management of in- and out-of-hospital cardiac arrest are clear. Tracheal intubation is not considered a priority in the initial phase [15] and it is recommended to proceed step by step and primarily use basic ventilation as the first line of airway control management, if effective. Thus, only trained operators with a high intubation success rate (>95% success rate in two attempts) are supposed to perform tracheal intubation, while weighing the benefit/risk ratio of the procedure.

Conclusion

Airway control management has become an important part of the treatment of critically ill patients in emergency and pre-hospital settings. Every hospital with pre-hospital medical teams should formalize their training for this procedure. More importantly, the maintenance of operator skills should be ensured. This requires regular exposure to the practice or regular access to the operating theatre. Training sessions in a simulation centre should complement this teaching. Similarly, if the procedure needs to be delegated to other, non-medical health workers, this should be done in the same manner to guarantee complete safety, as well as in consultation with other players in the field and within the framework of a public health policy [16]. Particular care should be taken not to put professionals in competition for access to training. The old adage "practice makes perfect" still holds true and patient safety must always be placed at the centre of the debate.

Potential competing interests
All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest was disclosed.

References

1. Szmuk P, Ezri T, Evron S, Roth Y, Katz J. A brief history of tracheostomy and tracheal intubation, from the Bronze Age to the Space Age. Intensive Care Med. 2008 Feb;34(2):222–8. http://dx.doi.org/10.1007/s00134-007-0931-5. PubMed. 0342-4642
2. Adnet F, Lapostolle F. Intubation endotrachéale aux urgences par les urgentistes : pour. Reanimation. 2002;11(7):473–6. http://dx.doi.org/10.1016/S1624-0693(02)00281-5. 1624-0693
3. Park L, Zeng I, Brainard A. Systematic review and meta-analysis of first-pass success rates in emergency department intubation: creating a benchmark for emergency airway care. Emerg Med Australas. 2017 Feb;29(1):40–7. http://dx.doi.org/10.1111/1742-6723.12704. PubMed. 1742-6723
4. Cook TM, Woodall N, Harper J, Benger J; Fourth National Audit Project. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: intensive care and emergency departments. Br J Anaesth. 2011 May;106(5):632–42. http://dx.doi.org/10.1093/bja/aer059. PubMed. 1471-6771
5. Couret M, Gendre G, Magnusson L, Schoettker P, Ribordy V. [Out-of-hospital tracheal intubation and alternatives in the prehospital setting]. Rev Med Suisse. 2020 Feb;16(681):325–30. PubMed. 1660-9379
6. Paal P, Herff H, Mitterlechner T, von Goedecke A, Brugger H, Lindner KH, et al. Anaesthesia in prehospital emergencies and in the emergency room. Resuscitation. 2010 Feb;81(2):148–54. http://dx.doi.org/10.1016/j.resuscitation.2009.10.023. PubMed. 1873-1570
7. Quintard H, l'Her E, Pottecher J, Adnet F, Constantin JM, De Jong A, et al. Intubation and extubation of the ICU patient. Anaesth Crit Care Pain Med. 2017 Oct;36(5):327–41. http://dx.doi.org/10.1016/j.accpm.2017.09.001. PubMed. 2352-5568
8. Higgs A, McGrath BA, Goddard C, Rangasami J, Suntharalingam G, Gale R, et al.; Difficult Airway Society; Intensive Care Society; Faculty of Intensive Care Medicine; Royal College of Anaesthetists. Guidelines for the management of tracheal intubation in critically ill adults. Br J Anaesth. 2018 Feb;120(2):323–52. http://dx.doi.org/10.1016/j.bja.2017.10.021. PubMed. 1471-6771
9. Baciarello M, Zasa M, Manferdini ME, Tosi M, Berti M, Fanelli G. The learning curve for laryngoscopy: airtraq versus Macintosh laryngoscopes. J Anesth. 2012 Aug;26(4):516–24. http://dx.doi.org/10.1007/s00540-012-1351-4. PubMed. 1438-8359
10. Graham CA. Advanced airway management in the emergency department: what are the training and skills maintenance needs for UK emergency physicians? Emerg Med J. 2004 Jan;21(1):14–9. http://dx.doi.org/10.1136/emj.2003.003368. PubMed. 1472-0213
11. Gillett B, Saloum D, Aghera A, Marshall JP. Skill Proficiency is Predicted by Intubation Frequency of Emergency Medicine Attending Physicians. West J Emerg Med. 2019 Jul;20(4):601–9. http://dx.doi.org/10.5811/westjem.2019.6.42946. PubMed. 1936-9018
12. Crewdson K, Lockey DJ, Røislien J, Lossius HM, Rehn M. The success of pre-hospital tracheal intubation by different pre-hospital providers: a systematic literature review and meta-analysis. Crit Care. 2017 Feb;21(1):31. http://dx.doi.org/10.1186/s13054-017-1603-7. PubMed. 1466-609X
13. Thomas AN, McGrath BA. Patient safety incidents associated with airway devices in critical care: a review of reports to the UK National Patient Safety Agency. Anaesthesia. 2009 Apr;64(4):358–65. http://dx.doi.org/10.1111/j.1365-2044.2008.05784.x. PubMed. 1365-2044
14. Hasegawa K, Shigemitsu K, Hagiwara Y, Chiba T, Watase H, Brown CA 3rd, et al.; Japanese Emergency Medicine Research Alliance Investigators. Association between repeated intubation attempts and adverse events in emergency departments: an analysis of a multicenter prospective observational study. Ann Emerg Med. 2012 Dec;60(6):749–754.e2. http://dx.doi.org/10.1016/j.annemergmed.2012.04.005. PubMed. 1097-6760
15. Soar J, Böttiger BW, Carli P, Couper K, Deakin CD, Djärv T, et al. European Resuscitation Council Guidelines 2021: adult advanced life support. Resuscitation. 2021 Apr;161:115–51. http://dx.doi.org/10.1016/j.resuscitation.2021.02.010. PubMed. 1873-1570
16. Schmutz T, Guechi Y, Gendre G, Ariosa J, Ribordy V. [SMUR or not SMUR?]. Rev Med Suisse. 2021 Aug;17(746):1367–9. http://dx.doi.org/10.53738/REVMED.2021.17.746.1367. PubMed. 1660-9379