Anaesth Crit Care Pain Med 38 (2019) 327–328

Editorial

High-fidelity simulation in airway management: Aim or tool towards skills and safety?

ARTICLE INFO

Keywords:
Airway management
High-fidelity simulation
Non-technical skills
Video game
quality

For the last years, teaching with simulation has significantly increased in the medical field, especially in intensive care medicine and anaesthesiology. Therefore, tools must be adapted to reach various pedagogical objectives: technical skills, including psychomotor coordination, and non-technical skills [1]. In parallel, securing the airway during general anaesthesia remains a cornerstone of the speciality. Any delay in upper airway control in case of unplanned difficulty is associated with severe complications, and this potential event must be prepared and repeated in safe conditions to improve technical and non-technical skills (i.e. intubation through a Fastrach vs. decision and communication) [2]. Interestingly, airway management represents a continuum from normal to the "Cannot Intubate, Cannot Oxygenate (CICO)" situation and, its simulation may promote an opportunity for residents and care providers to maintain skills. Nasotracheal intubation using fibreoptic is a procedure requiring the learning of complex psychomotor tasks (manual movements and hand-eye coordination). A lot of studies have focused on the most effective teaching methods to acquire this skill. A wide range of simulators was evaluated, from the homemade trachea-bronchial tree, to the high-fidelity manikin, and virtual reality with haptic force-feedback. These different simulation methods allow the acquisition of skills whose ultimate goal is to improve the quality of care. In order to evaluate this benefit, it is possible to use a training evaluation model proposed by Donald Kirkpatrick [3]. It has now been proven that simulation makes it possible to reach levels 1 to 3 (respectively: satisfaction, acquired skills and impact on the work process). On the other hand, evidence is still needed to show that simulation undoubtedly improves the patient outcomes. In this fibreoptic intubation learning curriculum, it is likely that the practice of video games will allow learners to gain greater capacity for performing the procedure before using low-fidelity task trainer.

Strategy around simulation in airway management includes a framework, and some teams have described their teaching corpus for residents [4]. More generally, technical skills would be improved with low-fidelity or task manikins. The aim is a good knowledge of the anatomy and devices, with optimal condition of use and gesture. These skill-techniques are also the first step to primary non-technical skills, such as ergonomics, clean procedures, pain and anxiety approaches. In addition, high-fidelity simulation promotes better collaboration with a realistic environment, especially if learners play with other participants to re-create usual work conditions. The great advantage of this approach is a good knowledge transfer, whether for active learners or spectators [5]. The future in simulation was transiently represented by 3D or virtual games, but reality tends to show the difficulty to reproduce the accurate gesture. These techniques are probably a way to improve individual performances in an isolated environment, with or without a personal debriefing for general analysis. Hybrid-simulation is probably a way to compensate some gap in the current high-fidelity simulation. For example, neurological assessment uses the comprehensive explanation of a therapeutic strategy with a human actor and paraverbal hints to interpret. An intermediate technique about fibreoptic skills was proposed in this journal by Yilbas et al. to intubate patients with planned or unplanned difficult airway [6]. They combined a pure technical approach on task-trainer with a randomised arm and an additional training through video games. The video game was seriously chosen to set a behavioural model for the stick, which was like fibreoptic control, and improve hand-eye coordination and visuospatial skills. The authors demonstrated on 36 anaesthesia residents that on real patients with ENT surgery under experienced anaesthesiologist supervision, the intubation time was shorter (90.0 ± 45.5 s vs. 127.6 ± 39.5 s, $P = 0.017$) and the success rate on first attempt was higher (100% versus 86.1%, $P = 0.045$) after video game training. This approach seems interesting as a first step towards enhancing psychometric coordination, without the risk of damaging fibreoptic device. It could be set up just before the use of low-fidelity simulation sessions in a structured stepwise programme. Moreover, the pedagogical contribution of training on expensive simulation equipment does not seem to be significant compared to low-cost models [7].

The future of combined strategy is now open with a great access to pedagogical content and games through smartphones.

https://doi.org/10.1016/j.accpm.2019.06.007

Table Description of the framework in airway management and current or next devices in simulation [7].

Objectives	Material	Future
Learning different techniques of airway management (videolaryngoscopy, Fastrach fibroscopy...)	Videos and tutorials Heads to intubate with different ranges of difficulty	Virtual reality
Handling unplanned difficulty in airway management	High-Fidelity simulator with multi-professional	Serious games and network
Improving the inter-professional communication	High-Fidelity simulator	Hybrid simulation with actors New generation of robots
Improving safety in airway approach	High-Fidelity simulator	Video game with changes in the facial morphology
Handling medico-legal issues	Actors	

Successful airway management, from laryngeal mask to cricothyroidotomy, is an undeniable skill of the anaesthesiologist. It is essential to develop a real curriculum to improve skills [8] and consequently a safe anaesthesia. Once again, the formal aim of simulation is the improvement in health management and in the patient outcome through a real culture of safety, as proposed by aeronautic.

Disclosure of disclosure

The authors declare that they have no competing interest.

References

[1] Flin R, Maran N. Basic concepts for crew resource management and non-technical skills. Best Pract Res Clin Anaesthesiol 2015;29(1):27–39.
[2] 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;120(2):323–52.
[3] Curran V, Reid A, Reis P, Doucet S, Price S, Alcock L, et al. The use of information and communications technologies in the delivery of interprofessional education: a review of evaluation outcome levels. J Interprof Care 2015;29(6):541–50.
[4] Grande B, Kolbe M, Biro P. Difficult airway management and training: simulation, communication and feedback. Curr Opin Anaesthesiol 2017;30(6):743–7.
[5] Blanié A, Gorse S, Roulleau P, et al. Impact of learners'role (active participant-observer or observer only) on learning outcomes during high-fidelity simulation sessions in anaesthesia: A single center, prospective and randomised study. Anaesth Crit Care Pain Med 2018;37(5):417–22.
[6] Yilbas AA, Canbay O, Akca B, et al. The effect of playing videogames in fibreoptic intubation skills. Anaesth Crit Care Pain Med 2019.
[7] Myatra SN, Kalkundre RS, Divatia JV. Optimizing education in difficult airway management: meeting the challenge. Curr Opin Anaesthesiol 2017;30(6):748–54.
[8] Mosier JM, Malo J, Sakles JC, et al. The impact of a comprehensive airway management training program for pulmonary and critical care medicine fellows. A three-year experience. Ann Am Thorac Soc 2015;12(4):539–48.

Morgan Le Guen[a,*], Frederic Martin[b]
[a] *Department of Anaesthesiology, Hospital Foch, University of Versailles, Saint-Quentin-en-Yvelines, 55, avenue de Paris, Versailles 78000, France*
[b] *Department of Anaesthesiology, Versailles Private Hospital, 9, rue du Parc de Clagny, Versailles 78000, France*

*Corresponding author
E-mail address: m.leguen@hopital-foch.org (M. Le Guen).