2022 CAS Annual Meeting

Education and Simulation

(Abstracts and Case Report/Series)

Contents

Deception in Simulation and its Effects on the Learner – A Qualitative Study

Authors:

Nabecker, Sabine[1]; Bould, Dylan[2]; Fernandes, Hermann[1]; Friedman, Zeev[1]

[1] *Department of Anesthesiology and Pain Management, Sinai Health System, University of Toronto, Toronto, Canada*

[2] *Department of Anesthesiology, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada*

Introduction:

Deception is one of the most effective tools used in simulation-based medical education for emulating teamwork dynamics by utilizing deliberate misdirection of the learner without their consent. It is used to simulate communication dynamics, interpersonal conflict situations, and hierarchy. Deception provides the means of using a safe environment to train the learner in strategies for speaking up and challenging authority; both essential skills for any health care professional to prevent errors and patient harm. Educators using deception claim that if its use is disclosed to the learner after simulation, it is justified within the current guidelines of ethical conduct for simulation-based medical education. Others emphasize the potential negative emotional effects on the learner if deception is used. It is currently unclear what effect deception in simulation-based medical education has on the learner. This study's aim was therefore to investigate the impact of deception on the learner and the learning environment.

Methods:

With ethics board approval and informed consent, postgraduate year two anesthesia residents participated in a randomized controlled simulation study. Each resident had to work through the same scenario involving a staff anesthesiologist mismanaging a clinical crisis situation. Residents had several opportunities to practice challenging authority and use effective methods for speaking up. Residents were randomized to either a deception group (residents thought the staff anesthesiologist was also a participant in the simulation training) or a non-deception group (residents were made aware that the staff anesthesiologist is a confederate and part of the simulation). The deception was disclosed to the residents during the debriefing following the simulation. After the debriefing residents participated in an individual interview asking questions about the impact of the deception on them as learner and the learning environment. The interviewers facilitated the interview in a way that encouraged the residents to share their honest thoughts, feelings and opinions on the use of deception. Interviews were audio-recorded, transcribed and qualitatively Vanalyzed applying the thematic analysis method by two independent researchers. Themes were derived and refined in an iterative process. Discussions continued until consensus was reached between both researchers. All available interviews were included.

Results:

Forty-three interviews were included in the analysis, 22 in the deception group and 21 in the non-deception group. Residents confirmed that the simulation and the scenario felt realistic, and that they felt safe during the simulation. They also confirmed they felt re-assured that their performance during the simulation would not affect their training or assessments at the hospital or university. The thematic analysis identified 5 main themes: (i) Deception leads to stronger emotional response and assumed longer lasting effects on participants; (ii) Use of deception mimics reality and highlights trainees' difficulty to challenge authorities (iii); A professional relationship with the staff anesthesiologist and a steeper hierarchy gradient limit trainees' ability to speak up;

(iv) Participants believe they would challenge authorities more aggressively in a real-life emergency; (v) Simulation creates the expectation of a crisis situation but still prepares for real life emergencies.

Discussion:

Residents who experienced deception perceive it as tool that causes strong emotional responses which can improve the simulation experience by emulating the reality of a stressful crisis situation. However, trainees still believe, it would be easier to challenge an authority during a real-life emergency. As we know from previous adverse events, this may not always be the case. Some residents voiced concerns regarding challenging the staff anesthesiologist during the simulation for concern of damaging their prior established professional relationship. This highlights the importance of taking appropriate precautions to ensure psychological safety for simulation participants before the session and during debriefing.

References:

No references.

Effect of a Core Rotation on Graduating Medical Students' Perspectives on and Understanding of Anesthesia

Authors:

Nixon, Michael[1]; Brundage, Monica[1]; Carr, Adrienne[2]; Cordovani, Daniel[1]

[1] *Anesthesiology, McMaster University, Hamilton, Ontario*
[2] *Anesthesiology, Dalhousie University, Halifax, Nova Scotia*

Introduction:

In Canada, there are no requirements mandating anesthesiology rotations during medical school. (1) Three out of the seventeen Canadian medical schools do not have a core anesthesia rotation. The impacts of a core anesthesia rotation have not been studied. Early exposure and role models influence specialty selection,(2) which could result in a stronger applicant pool. Additionally, antipathy towards a specialty develops during medical school,(3) which could be harmful as anesthesiologists work with multiple specialists to provide patient care.

We investigated the effects of a mandatory anesthesia rotation on medical students' perceptions and understanding of the specialty.

Methods:

With research ethics board approval, we conducted a cross-sectional study consisting of a national survey of Canadian medical students graduating in 2021. All 17 department members of the Association of Canadian University Departments of Anesthesia were invited to participate in the study. The survey was distributed online to graduates by each individual institution with results collected anonymously through SurveyMonkey.

This survey was unvalidated and developed based on two previous surveys used for obtaining medical student's perspectives and understanding of anesthesiology. (4,5)

The study used a quantitative approach through primarily Likert-scale questions to measure the students' perspectives of anesthesia and a quiz to measure their understanding of the specialty. The Likert-scale responses were converted to percent favorability where 100% is considered the most favorable. The quiz had a highest possible score of 21. Comparisons between groups were made using t-tests and ANOVA tests as appropriate. The survey included questions with free text responses and was designed to elicit deeper explanations for the associated quantitative responses.

Results:

We received 331 complete responses representing 13 Canadian medical schools. A mandatory anesthesia rotation was associated with a more positive perspective of anesthesiology ($p = 0.008$), but it had no significant effect on the students' understanding of the specialty ($p = 0.068$). Mandatory rotations did not appear to impact whether students applied to anesthesia for residency ($p = 0.057$). Having any clinical experience in anesthesia (core or elective) improved perspectives ($p < 0.001$) and increased understanding ($p = 0.001$) of the specialty. It also positively impacted students' application to anesthesia ($p = 0.012$).

Except for previous educational level, no demographic factors demonstrated a statistically significant relationship with students' perceptions and understanding of the specialty.

Students cited “did not feel would excel” (42.0%), “found specialty uninteresting” (41.1%), and “lack of exposure” (35.3%) as most common reasons for not applying to anesthesia

Discussion:

Clinical exposure to anesthesia in medical school positively impacted students' understanding and perspectives of the specialty. A core anesthesia rotation’s improvement of perceptions of anesthesia may mitigate negative specialty stereotypes and subsequently improve interdisciplinary collegiality.

Core rotations can also address factors that influenced students’ decisions to apply to anesthesia residencies, including “lack of exposure,” “did not feel like would excel,” and “poor faculty models.”

Overall, this study reveals the benefits of a core anesthesia rotation, specifically on increasing positive perceptions of the specialty, while also revealing avenues for future research on how to further optimize a mandatory anesthesia rotation.

References:

1. Committee on Accreditation of Canadian Medical Schools. CACMS Standards and Elements, Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree. Ottawa, Ontario: Committee on Accreditation of Canadian Medical Schools (CACMS); 2019 Feb.
2. Watts RW, Marley J, Worley P. Undergraduate education in anaesthesia: the influence of role models on skills learnt and career choice. Anaesth Intensive Care. 1998 Apr;26(2):201–3.
3. Alston M, Cawse-Lucas J, Hughes LS, Wheeler T, Kost A. The Persistence of Specialty Disrespect: Student Perspectives. PRiMER. 2019 Jan 11;3:1.
4. Levin KJ, Friedman CP, Scott PV. Anesthesiology and the Graduating Medical Student [Internet]. Vol. 24, Survey of Anesthesiology. 1980. p. 196. Available from: http://dx.doi.org/10.1097/00132586-198006000-00064
5. Robertson EM, Henschke SJ, Friesen J, Tsui BCH. Survey of pre-clerkship medical students’ knowledge and perceptions of anesthesiology at one Canadian university. Can J Anaesth. 2015 May;62(5):550–2.

Emergency Airway Management in the Prone Position: A Mannequin-Based Randomized Cross Over Simulation Study

Authors:

Rajaleelan, Wesley[1]; Tuyishime, Eugene[1]; Unger, Zoe[2]; Venkataraghavan, Lakshmi[2]; Dinsmore,Michael[2]

[1] *Department of Anesthesia and Pain Management, The Ottawa Hospital, University of Ottawa, Ottawa, Canada*

[2] *Department of Anesthesia and Pain Management, Toronto Western Hospital, University Health Network, University of Toronto, Toronto, Canada*

Introduction:

Accidental extubation during prone positioning can be a life-threatening emergency requiring rapid establishment of airway. However, there is limited evidence on the most effective airway rescue method for this potentially catastrophic emergency. The aim of this mannequin based simulation study was to determine the most effective method, the time and number of attempts to secure the airway in case of an inadvertent extubation during prone positioning by comparing three airway devices namely the supraglottic airway(I gel) , video laryngoscope (CMAC), and fiberoptic bronchoscope, respectively on a mannequin placed in the prone position under Mayfield pins(mimicking cervical spine and posterior fossa surgeries) intended to simulate a real life scenario, and to compare the time taken to establish a definitive airway between these modalities.

Methods:

This a randomized cross-over study comparing the airway rescue performances of three devices namely the supraglottic airway (IGEL), video laryngoscope (CMAC), and fiber optic bronchoscope (FOB). Eleven anesthesiologists and twelve anesthesia fellows performed airway management on a mannequin in the prone position, stabilised by Mayfield pins (mimicking cervical spine surgery) with the 3 airway devices. Anesthesia participants (fellows and staff) were instructed to insert a standard #4 LMA igel, followed by endo tracheal intubation using the CMAC, followed by endo tracheal intubation using the fiberoptic bronchoscope. The participants were given the option of adjusting the height of the table prior to the airway intervention, however no other modifications to the mannequin position were permitted. Each participant were given 3 attempts with each of the airway devices. The success rate and the time required for definitive airway management were recorded. Statistical analysis was carried out using SPSS version 28.0(IBM, USA). Data were presented as mean ± SD as appropriate. The difference in mean time required for definitive airway management was compared using paired sample t-tests.

Results:

In our study we had recruited 23 participants (Staff -11, Fellows - 12).5 participants (23.8%) had a prior experience of handling an inadveratnt prone extubation in their career practice.The mean experience of the participants in anesthesiology as a speciality was 11.93 years. The success rates were 100% with supraglottic airway (I gel), 69.6% with the video laryngoscope (CMAC), and 91.3% with the fiberoptic bronchoscope. The mean time to insertion was 18.11 secs for the supraglottic airway, 78.73 secs for the video laryngoscope, and 56.88 secs for the fiberoptic bronchoscope. There was a significant differences between the mean time required for definitive airway management between the supraglottic airway and video laryngoscope (Mean = 69.64 sec, SD=36.32, $t(22)=9.19$, $p<0.001$), the video laryngoscope and fiber optic (Mean=27.84,SD=44.12,$t(22)=3.02$,$p=0.006$), the fiber optic and supraglottic airway (Mean=41.80sec,SD=27.30,$t(22)=7.43$,$p<0.001$).

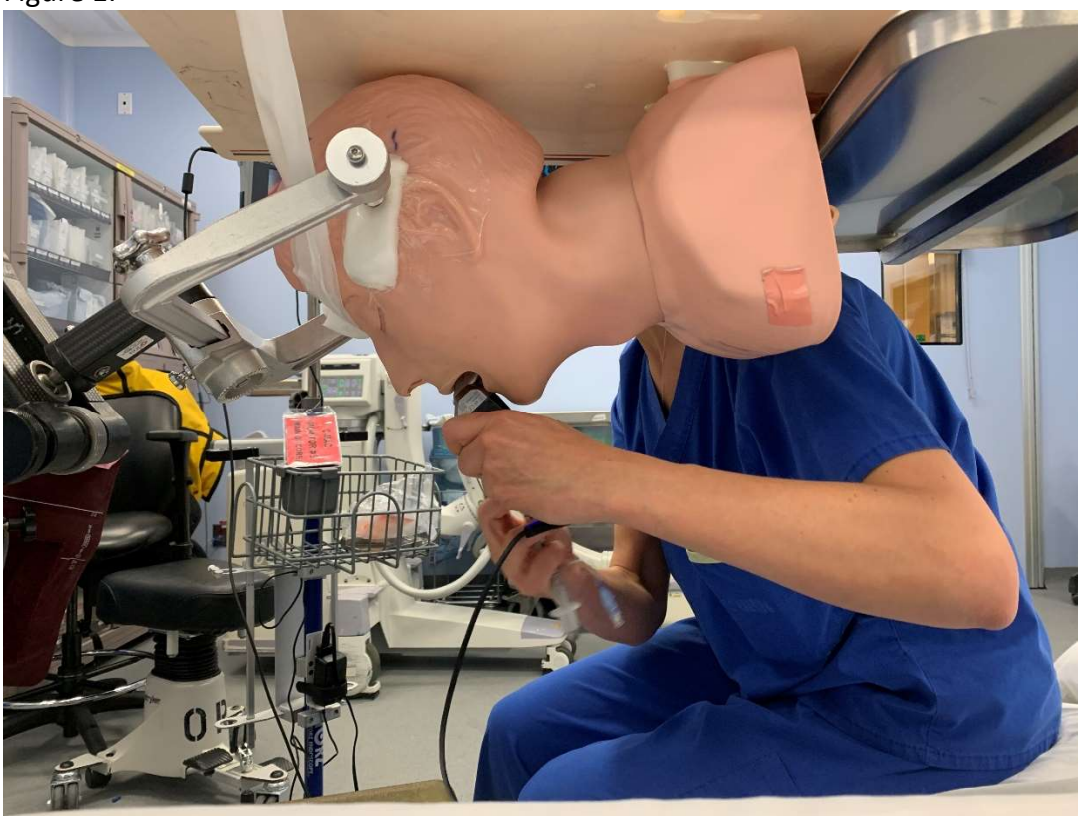
Discussion:

Accidental prone extubation can be an acute emergency. A LMA can be used as a temporary airway and the CMAC and FOB can be used to establish a definitive airway with an ET. Adequate training in prone intubation techniques should be part of the curriculum for training residents, fellows and staff during airway simulation education. In the case of accidental inadvertent extubation during prone position, the results of this mannequin based randomized cross over simulation study suggest that the supraglottic airway is faster and has higher success rate in comparison to the fiber optic bronchoscope and the video laryngoscope as a rescue airway device.

References:

1. Abrishami A, Zilberman P, Chung F. Brief review: Airway rescue with insertion of laryngeal mask airway devices with patients in the prone position. Can J Anaesth. 2010; 57:1014–20.
2. Thiel D, Houten J, Wecksell M. Accidental tracheal extubation of a patient in the prone position. AA Case Rep. 2014; 2:20–2.
3. Hung MH, Fan SZ, Lin CP, Hsu YC, Shih PY, Lee TS. Emergency airway management with fiberoptic intubation in the prone position with a fixed flexed neck. Anesth Analg. 2008; 107:1704–6.
4. Raphael J, Rosenthal-Ganon T, Gozal Y. Emergency airway management with a laryngeal mask airway in a patient placed in the prone position. J Clin Anesth. 2004; 16:560–1.
5. Ellard L, Wong DT. Should we induce general anesthesia in the prone position? Curr Opin Anaesthesiol. 2014; 27:635.

Figure 1:



Examining the Impact of Time Pressure in Regional Anesthesia: A Prospective Randomized Simulation-Based Study

Authors:

Lessard, Felix-Olivier[1]; Belanger, Marie-Eve [1,2]; Issa, Rami[1,2]; Blain, Julie[3]; Tanoubi, Issam[1,2]

[1] *Department of Anesthesiology and Pain Medicine, University of Montreal, Montreal, Canada*
[2] *Department of Anesthesiology and Pain Medicine, Maisonneuve-Rosemont Hospital CEMTL, Montreal, Canada*
[3] *Department of Respiratory Therapy and Anesthesia Division, Maisonneuve-Rosemont Hospital CEMTL, Montreal, Canada*

Introduction:

Time pressure (TP) is defined as insufficient time to achieve a task. TP engenders a psychological stress and can lead to unsafe actions and morbidity attributable to anesthesiology (1-3). The simulation setting is a safe environment where time constraint can be reproduced and experienced in a real-life situation, and where its impact on the anesthesiologist practice can be objectively measured. The goal of this prospective randomized simulation-based study is to examine the impact of TP on the anesthesiologist's performance, patient safety and cognitive workload experienced by the anesthesiologist during the realisation of an infraclavicular block.

Methods:

After ethic approval, 39 anesthesiologists and residents in anesthesiology were randomized to either the TP group (TPG), exposing participants to four interventions made to put pressure on them, or to the control group (CG). The interventions were four recorded phone calls made by an anesthesia assistant, a surgeon, and an anesthesiologist to urge the participant to complete his task. These interventions were played with stereo speakers in the block room at predefined times during the scenario. All participants had to perform an ultrasound-guided infraclavicular nerve block on a simulator (Central Line and Regional Anesthesia Ultrasound Training Model, CAE) fastened on a simulated patient (actor) in an in situ high-fidelity simulation environment. Participants were misled regarding the nature of the study. Three expert raters independently evaluated the videotaped performances (two camera angles) using a checklist and a global rating scale from the Regional Anaesthesia Procedural Skills (RAPS) Assessment Tool. The primary outcome was the anesthesiologists' performance and patient safety, measured with the RAPS scores. Secondary outcomes were the cognitive load measured with the NASA Task Load Index, time of task completion (seconds) and realism of the scenario (Likert 1-5).

Results:

35 participants completed the study, 42% were anesthesiologists and 58% anesthesiology residents, and they were equally distributed between the two groups (TPG 19 participants and CG 16 participants). RAPS scores were comparable between TPG and CG (74.7 (12.3) vs 76.3 (14.6) respectively; unpaired t test, p=0.7189). The cognitive load, measured with the NASA score, was significantly higher in the TPG than in the CG (52.4(13.3) vs 38.4(16.7) respectively; unpaired t test p=0.0082). Time of completion (sec) was not different (TPG 550 (230) vs CG 567 (278); unpaired t test, p =0.8410). Participants perceived a similar level of realism in both groups (TPG 4[4-4.75] vs. CG 4.5[4-5], Mann Whitney test, p= 0.1535).

Discussion:

In a high-fidelity simulation, time pressure leads to a higher cognitive workload during the performance of an ultrasound-guided infraclavicular nerve block. In contrast to existing literature (4), this increased cognitive load did not lead to an impaired performance and did not compromise patient safety during the scenario. The absence of impact might be explained by the low cognitive load of the chosen task in this study. Anesthesiologists and anesthesiology residents that were exposed to time pressure scenario did not accelerate in order to complete their performance, and the level of realism was high in both groups.

References:

1. Gaba, D.M., S.K. Howard, and B. Jump, Production pressure in the work environment. California anesthesiologists' attitudes and experiences. Anesthesiology, 1994. 81(2): p. 488-500.
2. Chai, J.X. and S.Y. Chong, Production pressures among anaesthesiologists in Singapore. Singapore Med J, 2018. 59(5): p. 271-278.
3. Kynes, J.M. and S.C. Watkins, A 'Wake up' call for our specialty-time to examine the impact of production pressure on patient safety. Paediatr Anaesth, 2016. 26(6): p. 667-8.
4. Yurko, Y.Y., et al., Higher mental workload is associated with poorer laparoscopic performance as measured by the NASA-TLX tool. Simul Healthc, 2010. 5(5): p. 267-71.

Figure 1:

"The Anesthesia App" – A Canadian-Based Anesthesia Phone Application for Medical Learners

Authors:

Liu, April (YiChen)[1]; Mathews, Ashish[2]; Khemani, Ekta[1]

[1]*Department of Anesthesia, McMaster University, Hamilton, Canada*
[2]*Michael G. DeGroote School of Medicine, Hamilton, Canada*

Introduction:

Smartphone and tablet use among the general population are increasingly prevalent and will continue to grow in the coming years. A similar trend is seen among medical learners as smartphones are becoming an easy method of accessing information in clinical environments. Numerous studies have shown the benefits of smartphones in education including improvements in learners' working efficiency, quality of teaching, and examination performance. During clerkship especially, medical students encounter a steep learning curve, rotating through many specialties in a short time frame. Smartphones can provide an easily accessible source of information for students during these rotations. Research has shown that having information, such as algorithms for operating room crises, easily accessible to medical learners and professionals can improve patient safety. As there are currently no Canadian smartphone applications for anesthesia, we aim to create an application to aid medical learners in their anesthesia rotations and promote patient safety.

Methods:

Medical students and residents from eight medical schools across Canada were surveyed to understand what features would be most useful in such an application. In the survey responses (n=24), algorithms for approaching anesthetic emergencies, a pre-operative checklist, and dosage guides for common medications were features requested by 96%, 83% and 75% of respondents respectively. When asked to rank which feature would be most desirable, 33% of respondents ranked algorithms for approaching anesthetic emergencies as first, while 29% and 21% of respondents ranked a pre-operative checklist and general drug dosages, respectively, as most desirable. With this feedback, we designed our smartphone application called "The Anesthesia App." Information for the development of this application was obtained from the Stanford Anesthesia Emergency Manual, The UCSF Pocket Anesthesia Reference Guide and Drug Monographs. The pre-operative checklist was developed with assistance from practicing anesthesiologists and current pre-operative checklists used at our hospital sites.

Results:

"The Anesthesia App" is equipped with three features: 1) a list of intraoperative emergencies and their management, adapted from the Stanford Anesthesia Emergency Manual; 2) a checklist of pre-operative history questions; and 3) a list of common anesthetic medications with suggested dosage ranges based on the patient's weight and age. In the checklist of pre-operative questions, learners are able to use checkboxes to quickly document patients' answers and later download them for reference and charting. In the medications list section, learners can input a weight and age and the application will automatically calculate dosage ranges for over 30 common medications in anesthesia, including dosage ranges for different indications (e.g. sedation, analgesia, anesthesia) for the same medication. The home screen allows students to easily navigate between these three tools. The app is currently being developed and piloted by select medical students at our institution.

Discussion:

Through continuous feedback, we aim to improve this application to be a supportive tool for learners during their anesthesia rotation(s). Additionally, literature has shown that access to emergency management algorithms improves patient outcomes during crises. By providing learners with an easy access to these algorithms, this application also promotes patient safety. As well, wrong dose errors are the second most common adverse drug events encountered in anesthesia. This application calculates drug dosages for learners and thus minimizes the chance of administering a wrong dose to a patient. As such, our app aims to improve both medical education and patient safety.

References:

1. Chase T, Julius A, Chandan J, Powell E, Hall C, Phillips BL, et al. Mobile learning in medicine: an evaluation of attitudes and behaviours of medical students. BMC Medical Education. 2018 Jun 27; 18(152). doi: 10.1186/s12909-018-1264-5
2. UCSF. Pocket Anesthesia Reference Card.UCSF Anesthesia Division of Global Healthy Equity. Version 9. (anesthesia.ucsf.edu/sites/anesthesia.ucsf.edu/files/wysiwyg/Anesthesia_Pocket_Guide_2020.pdf
3. Stanford Anesthesia Cognitive Aid Program,* Emergency Manual: Cognitive aids for perioperative crises, Version 4, 2021. See http://emergencymanual.stanford.edu for latest version. Creative Commons BY-NC-ND (https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode).
4. David L. Hepner, Alexander F. Arriaga, Jeffrey B. Cooper, Sara N. Goldhaber-Fiebert, David M. Gaba, William R. Berry, Daniel J. Boorman, Angela M. Bader; Operating Room Crisis Checklists and Emergency Manuals. Anesthesiology 2017; 127:384–392 doi: https://doi.org/10.1097/ALN.0000000000001731
5. Karen C. Nanji, Amit Patel, Sofia Shaikh, Diane L. Seger, David W. Bates; Evaluation of Perioperative Medication Errors and Adverse Drug Events. Anesthesiology 2016; 124:25–34 doi: https://doi.org/10.1097/ALN.0000000000000904

Figure 1: