JOURNAL OF Surgical Simulation

Journal of Surgical Simulation (2016) **3,** 13–22
DOI: 10.1102/2051-7726.2016.0003

ORIGINAL ARTICLE

Development and evaluation of an interprofessional simulation workshop on assessment and management of tracheostomy and laryngectomy emergencies

Adnan Darr,[a] Zahir Mughal,[a,*] Somiah Siddiq[b] and Catherine Spinou[a]

[a]*Department of ENT, Russells Hall Hospital, Dudley, UK;* [b]*Department of ENT, New Cross Hospital, Wolverhampton, UK*

**Corresponding author at: Department of ENT, Clinical Offices Level 1 ENT Secretaries, Russells Hall Hospital, Dudley, DY1 2HQ, UK. Email: zahir5019@gmail.com*

Date accepted for publication: 6 May 2016

Abstract

Background: Tracheostomies are common procedures in head and neck surgery and critical care practice. Fifty percent of airway-related deaths on intensive care units are attributed to tracheostomy complications. The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) advocated the implementation of mandatory training for health care staff involved in the management of neck stoma patients. Despite these recommendations, effective training in emergency management of neck stoma patients remains substandard. **Methods:** We present the evaluation of a pilot 1-day workshop consisting of interactive lectures and high-fidelity simulation scenarios in a purpose-built clinical simulation centre. The simulation recreated commonly encountered clinical scenarios aimed at increasing participants' knowledge and confidence in assessing and managing common neck stoma emergencies. The workshop was an optional interprofessional training session for postgraduate nurses and doctors. Participants completed a multiple-choice question (MCQ) questionnaire before and after the workshop, and a 16-point post-workshop evaluation questionnaire. **Results:** A total of 14 participants attended the pilot workshop. The MCQ mean score improved from 53% (range, 50–70%) to 63.8% (range, 60–80%) following the workshop. All participants reported increased confidence in assessing and managing patients with neck stomas. They all felt the workshop was a valuable learning experience, and that training on neck stoma emergencies should be provided regularly in the postgraduate curriculum. **Conclusions:** The simulation workshop provided postgraduate clinical staff with safe and effective interprofessional training. The participants gained knowledge and increased confidence in the early recognition, practical assessment and management of tracheostomy and laryngectomy emergencies.

Keywords: *simulation; tracheostomy; laryngectomy; interprofessional*

Introduction

Tracheostomies are common procedures in head and neck surgery and critical care practice, performed approximately 12,000–15,000 times a year in the United Kingdom.[1,2] There is significant morbidity and mortality associated with tracheostomies.[2,3] The National Patient Safety Agency (NPSA) database identified 453 incidents involving tracheostomies over a 2-year period that directly affected patients, of which 75% suffered morbidity.[3] Tracheostomies are associated with significant mortality. On intensive care units (ICUs), 50% of airway-related deaths are attributed to tracheostomy complications, including obstruction or displacement.[2] Significant morbidity and mortality have been highlighted in tracheostomy patients when patient care has been de-escalated from an ICU to a ward environment.[4]

A high number of adverse incidents reported to the NPSA in the UK prompted an urgent need for national guidelines for tracheostomy and laryngectomy emergencies.[5] In 2012, multiple agencies involved in tracheostomy care undertook The National Tracheostomy Safety Project (NTSP). A national consensus guideline was produced on the management of tracheostomy and laryngectomy emergencies.[5]

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report, which evaluated quality of care delivered to tracheostomy patients in the UK, recommended that all hospitals should provide mandatory training for tracheostomy care.[1] In a nationwide survey of UK

hospitals, 85.4% delivered training programs on the management of tracheostomy.[1] Surprisingly, 27.9% did not provide training in the management of blocked and displaced tubes.[1] A further cause for concern was the lack of stoma management provided on courses delivered by the resuscitation council. Only 29% of hospitals included management of tracheostomy patients as part of mandatory resuscitation training.[1] There appears to be a deficiency in delivery of training in neck stoma emergencies despite NCEPOD recommendations.

First responders in the event of neck stoma emergencies tend to involve multi-disciplinary staff including nurses and junior doctors. Interprofessional education is "when two or more professions learn with, from and about each other to improve collaboration and the quality of care."[6] Cooperation between professions can aid in rationalizing educational resources, lessen duplication of training, enable practitioners to better understand each other and work more collaboratively, and ultimately provide a more effective, efficient and integrated service for patients.[6]

High-fidelity simulation aims to recreate genuine patient encounters in a realistic and interactive setting.[7,8] It is highly learner centred and allows instructors and learners to focus on teachable moments without distraction.[7,8] Simulation offers a safe and controlled learning opportunity while protecting patients from novice practice.[7]

We present our experience of developing and evaluating a multi-disciplinary high-fidelity simulation workshop for nurses and junior doctors on tracheostomy and laryngectomy emergencies.

Materials and methods

Workshop overview

Following an adverse incident in an Ear, Nose and Throat (ENT) ward at our district general hospital, a root-cause analysis identified several remedial factors including inexperience in neck stoma emergencies among clinical staff, and poor interaction and communication between health care professionals. To address these issues, an educational workshop was designed and implemented by the ENT faculty in conjunction with the hospital teaching faculty and resuscitation services. The aim of the workshop was to address key components highlighted in the global tracheostomy collaborative.[9] These included: (1) improving multi-disciplinary care, (2) broadening staff education by facilitating interprofessional team working in simulation training, and (3) improving knowledge, skill and confidence of health care professionals involved in the care of tracheostomy patients.

The workshop was led by a clinical teaching fellow in ENT, with supplementary supervision by an ENT consultant. The Chief of Surgery, Director of Nursing, Postgraduate Education Lead, and Resuscitation Services provided additional institutional support.

Nurses and doctors were invited to participate in a half-day interprofessional high-fidelity simulation workshop held at a simulation centre. The course incorporated a series of interactive lectures, followed by three simulated scenarios on tracheostomy and laryngectomy emergencies. Participants completed pre- and post-workshop questionnaires to assess knowledge and self-perceived confidence in managing neck stoma emergencies.

Instructors and participants

The course faculty was recruited by internal hospital emails as well as verbal invitation to provide voluntary teaching in the workshop. The faculty consisted of an ENT clinical teaching fellow, an ENT consultant, a clinical teaching fellow in medicine, a clinical nurse specialist in head and neck surgery, an ENT nursing matron, a resuscitation lead nurse and a simulation lead nurse, all of whom had attended formally accredited feedback courses.

Participants were invited by email invitation. The director of nursing advertised the workshop to nursing staff of all grades, and the postgraduate education coordinator contacted all hospital doctors.

Content and structure

The timetable for the course programme is outlined in Table 1. Three interactive lectures were produced and delivered by the ENT clinical teaching fellow, the clinical nurse specialist in head and neck surgery, and the ENT matron. Lectures incorporated anatomic considerations in neck stomas, physiology, indications for tracheostomy as well as the various types available, basic tracheostomy care, and assessment and management of common tracheostomy emergencies. A systematic approach following the airway-breathing-circulation-disability-exposure (ABCDE) algorithm was presented within the lectures.

The scenarios took place in the purpose-built, Ron Grimley Undergraduate Simulation Centre located on the hospital site. This facility was equipped with high-fidelity human patient simulation manikins (SimMan 3G), an audio/visual system allowing real-time interaction with the manikin, real-time electronic displays of vital signs, and debriefing software (SimView), which enabled video playback for analysis and group discussion. There were three simulation scenarios on tracheostomy emergencies as outlined in Table 1. All faculty members verified the clinical accuracy

Table 1 Workshop teaching program

Timetable		
Introduction	Pre-workshop MCQ quiz	10 min
Lectures	Anatomy and physiology	20 min
	Tracheostomy indications, types of tubes, basic tracheostomy care	20 min
	Emergency management in neck stoma patients	20 min
Demonstration	Walk through guide of SimMan	10 min
Coffee break		20 min
Simulation 1	Laryngectomy occlusion	20 min
Simulation 2	Tracheostomy displacement	20 min
Simulation 3	Tracheostomy occlusion	20 min
Coffee break		20 min
Plenary	Post-workshop MCQ quiz	10 min
Structure of simulation		
1	Introductory stem to case	
2	Airway-Breathing-Circulation-Disability-Everything assessment	
3	Review charts, notes, imaging and blood results	
4	Differential diagnosis	
5	Investigations	
6	Management plan	
7	Improvement or worsening of patient depending on management	
8	Debrief session	

of the material. The hypothetical emergencies were based on the most commonly encountered tracheostomy and laryngectomy emergencies, including tube occlusion and displacement.[2,3]

The resuscitation lead nurse and the simulation lead nurse provided participants with a tour of the simulation centre prior to the scenarios in order to facilitate familiarity with available resources including airway devices, oxygen apparatus, suction catheters, prescription pads, intravenous fluids, and intravenous cannulae, 12-lead electrocardiographs, bloods tests, arterial blood gas analysis, chest radiograph results, and scripted responses from faculty.

Training procedure

Instructors were provided with a user pack consisting of learning objectives, a summary of the scenario, a list of equipment required for the scenario, and a script of the scenario. The script included a brief description of the patient, history of their presenting complaint, past medical history, and baseline examination findings. The ENT clinical teaching fellow and ENT consultant produced the content. Members of the faculty alternated as instructors for each simulation scenario; other available members provided verbal responses for the manikin using a microphone that was played from an in-built audio system in SimMan.

Two participants, one nurse and one doctor, started the simulation scenario together. Information for the participants was provided in the script of the scenario, which the instructor provided at appropriate stages. Each scenario had two eventual outcomes, patient improvement or deterioration depending on whether participants initiated appropriate treatment. The instructor provided information on the patient's physiologic parameters and clinical picture according to the progression of the scenario. Management algorithms were in line with the national tracheostomy and laryngectomy emergencies guidelines.[5] A clinical vignette was then read out to the participants to demonstrate a second event leading to deterioration of the patient. A further nurse and doctor pair were introduced into the scenario at the second event if requested by the initial cohort. The remainder of the participating cohort were able to observe on a video display with audio in a debrief room.

Debriefing took place at the end of the simulation scenario. Debriefing best practice points were incorporated. These included tailoring discussion points to the learning objectives and participant deficiencies,[10] and ensuring that the debriefing took place within an environment separate from the active portion of the simulation to allow diffusion of tension and to provide a setting conducive to reflection.[10] Video playback of each scenario facilitated coverage of key aspects including communication, understanding of self-limitations, need for senior help, and clinical issues which reiterated the learning objectives.

Workshop evaluation and analysis

A pre-workshop questionnaire consisting of 10 multiple-choice questions (MCQs) and a post-workshop 15-question MCQ quiz was designed by the ENT clinical teaching fellow (Appendix 1). The questions tested basic knowledge of tracheostomy and laryngectomy stomas, and initial assessment and management of airway emergencies. Both questionnaires incorporated a unique set of questions in order to reduce recall bias and allow a more stringent assessment of

knowledge. The questions were piloted by health care staff within departments housing neck stoma patients, and were deemed appropriate by the departmental faculty. A questionnaire was also used to acquire demographic data and assess perceptions of the learning process. The primary outcome measures in this pilot study were knowledge acquisition and confidence.

Results

Participants

A total of 14 participants, including seven nurses and seven doctors, attended the workshop and all completed the pre- and post-workshop questionnaires and evaluation forms. All specified that they had received no formal postgraduate training in the assessment and management of stoma-related emergencies before attending the workshop. All were members of staff at our hospital and reported regular contact with neck stoma patients within a ward, intensive care, or emergency department setting. There were seven junior nurses (four band 5 and three band 4 nurses). Medical staff included two foundation year 2 doctors, three core trainee doctors from medical and surgical specialities, and two hospital trust grade senior house officers.

Workshop evaluation

The pre-workshop MCQ mean score was 53% (range, 50–70%). The post-workshop score improved to 63.8% (range, 60–80%). All the participants felt the workshop was a valuable learning experience, of which 71% strongly agreed. All participants felt that training on assessment and management of airway stoma patients should be provided regularly. Importantly, despite the daunting nature of such high-fidelity simulation sessions, all participants stated they would recommend the workshop to their peers. Table 2 shows participants' written feedback.

All participants felt their confidence in assessment and management of stoma patients had increased after attending the workshop. Fig. 1 shows the number and percentage of responses to the workshop evaluation questionnaire. Sixty-four percent felt strongly that the simulations helped them to recognize early signs of patient deterioration. The entire attending cohort stated that the simulation enabled them to apply knowledge gained from lectures, demonstrate and further develop their clinical reasoning skills, and develop decision-making skills. Several aspects of the workshop were found to aid learning. The most popular factors were questioning by facilitators (57% strongly agreed), the importance of lectures (57% strongly agreed), opportunity to reflect from the simulation experience (strongly agreed by 64%) and gaining feedback from facilitators (strongly agreed by 64%). All participants felt they received constructive feedback on their performance in the simulation, and all believed the debriefing facilitated personal reflection.

Table 2 Workshop feedback

Participants' comments
"A hands on learning opportunity. It helped ease my concerns"
"I found the whole lecture-based and practical experience a valuable learning situation, which should be made mandatory"
"Potentially very scary being watched but turned out to be fun and informative. Would highly recommend"
"I was nervous at first working with the doctor, but it was very productive as we worked together"
"I would normally let the doctor take charge, but this has given me confidence to step forward in emergencies"
"The nurses can be a great help, they know the patients, they know the ward, and often they know more than us. . .I will involve them more"

Discussion

High-fidelity simulation in tracheostomy and laryngectomy emergencies improved participants' knowledge with an increase in mean MCQ score from 53% to 63.8%. Learners reported an increase in self-perceived ability to recognize deteriorating patients, make decisions and engage in clinical reasoning. All participants reported an increase in confidence in assessment and management of neck stoma patients after attending the workshop.

Little literature exists regarding high-fidelity simulation training in neck stoma patients. To our knowledge, only one other study by Dorton et al.[11] evaluated high-fidelity simulation in the training of tracheostomy emergencies. In this study, the participants also incorporated multiple health care professionals including nurses, doctors and medical students, and the simulation scenarios included accidental tracheotomy decannulation and tube occlusion. Dorton et al.[11] also demonstrated improvement in knowledge through pre- and post-testing, and demonstrated an improvement in average comfort level of participants.

Our results provide further evidence for the role of simulation in medical education. We have demonstrated that a structured high-fidelity simulation aids knowledge acquisition and boosts learners' confidence. Improvement in knowledge through simulation training in medical education is supported by meta-analysis data.[12] Mounting evidence also demonstrates that simulation improves learners' confidence.[13]

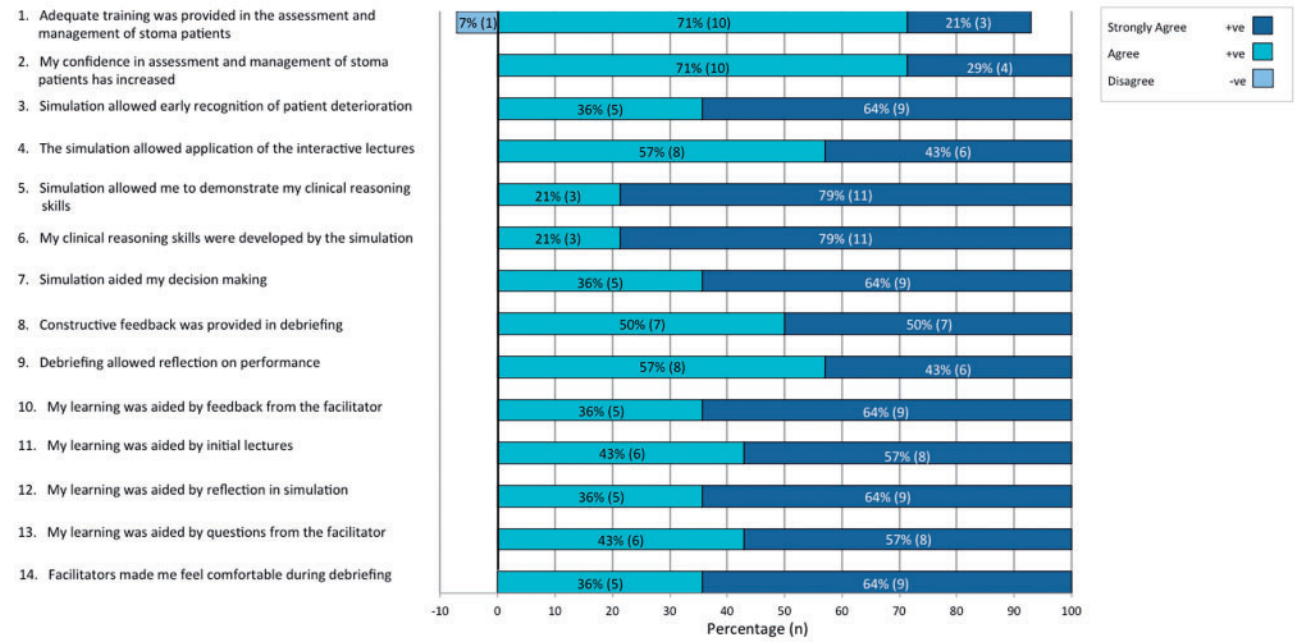

Figure 1 Participants' responses to the workshop evaluation questionnaire.

Limitations

The improvement in confidence demonstrated in our study is limited by self-reporting bias. The optional invitation to the workshop may have skewed the sample to a population with low starting confidence. The outcome measures of confidence and self-perceived competence do not necessarily equate to improved performance. For example, Morgan and Hogg[14] demonstrated that there was no correlation between level of confidence and performance in an anaesthetic simulation. The small sample size of 14 does not allow meaningful statistical testing of our data, and therefore we cannot conclude whether the improvement in MCQ scores was a random finding. There was only one round of feedback to assess changes in confidence levels, which is prone to inaccuracy and bias. The design of the study did not allow us to specifically differentiate between simulation and other learning modalities such as lectures on the outcomes.

High-fidelity simulation

There are several essential features of high-fidelity simulation for effective learning. These include repetitive and individualized practice,[7,8] which was achieved by learners rotating and taking active part in multiple simulation scenarios. Integration with other learning modalities[7] was achieved by providing lectures prior to simulations. All participants stated that their learning was aided by initial lectures, simulation and from debriefing feedback. Integration with curriculum and clearly defined outcomes[7] was achieved by setting learning objectives based on the national tracheostomy and laryngectomy emergencies guidelines incorporated within the instructors' pack and debriefing points.[5]

Feedback is one of the most important components of effective learning in high-fidelity simulation.[7] Feedback was delivered in the form of debriefing following the completion of each simulation scenario. Salas et al.[15] formulated several features of best practice in debriefing. This included providing a supportive and comfortable learning climate for debriefs,[15] where students feel valued and feel able to share their experiences openly and honestly.[10] One of the participants stated that the simulation was "potentially very scary", however their experience "turned out to be fun and informative".

Interprofessional education

We integrated an interprofessional component as a key feature in our high-fidelity simulation scenarios as it enhances the learning experience,[16] and can improve students' knowledge of tracheostomy care and professional roles.[17] Our questionnaire responses from two nurses demonstrated initial apprehension of working with doctors; this resolved as a result of this workshop: "I was nervous at first working with the doctor, but it was very productive as we worked together" and "I would normally let the doctor take charge, but this has given me confidence to step forward in

emergencies". The feeling was mutual as indicated by one of the doctor's comments: "The nurses can be a great help, they know the patients, they know the ward, and often they know more than us . . . I will involve them more".

Liaw et al.[16] designed simulation scenarios of deteriorating patients for joint participation of nursing and medical students, and demonstrated that both groups gained increased self-confidence in interprofessional communication and improved their perception towards interprofessional learning. Our data reinforce the impact of interprofessional education on learning about professionals' roles, improving perceptions, and reducing barriers to team working.

Implementation challenges and adjustments

Al-Ghareeb and Cooper[18] identified several barriers to using high-fidelity simulation in medical education including lack of time, human resources, trained staff, space and equipment, financial support, and a fear of technology. Trainee scheduling is also a common problem in simulation-based medical education.[8] The pressure of clinical duties, overwork, and perceptions that simulation-based education is less valuable than clinical experience can sabotage scheduling of simulation sessions into the postgraduate curriculum.[8]

Some of these effects may be mitigated by having a dedicated simulation coordinator, faculty training, and administrative and technological support.[18] We found gaining approval for use of the simulation centre was an obstacle. Discussions are recommended at least 4 months in advance with the simulation lead. Funding was also a contributory factor and is at the discretion of the individual centres. If the training is provided to staff affiliated with the trust, as in our case, any associated fees may be waived.

Future development

The NCEPOD report clearly highlighted the need for neck stoma training to be implemented on a local level.[1] Due to the overwhelming positive response received following the initial pilot study, the Chief of Surgery, Director of Nursing, as well as the Lead for Postgraduate Education within the trust have endorsed its implementation on a biannual basis.

The simulation component was a key feature of the workshop. Simulation-based practice follows a dose–response relationship whereby more practice yields better results.[8] Replacing the lectures could potentially allow a repeat of the circuit and thus more participants. However, the lecture-based aspect allows blended learning, which enhances the effectiveness of the simulation.[7] Increasing simulation coverage while preserving the lecture-based component may be reconciled by replacing lectures with pre-attendance e-learning modules. E-learning has been shown to be an effective learning modality and can enable greater knowledge acquisition when compared with traditional lecture-based teaching.[19]

There is a lack of research in evaluation of high-fidelity simulation in emergency tracheostomy and laryngectomy airway emergencies. Further research from larger cohorts is required to evaluate the simulation workshop against competing training modalities, to determine the effectiveness of interprofessional training and the translational effect of this intervention on patient care and health care outcomes.

Conclusions

This initial pilot project suggests that an interprofessional high-fidelity simulation workshop was highly valued by health care workers, and provided a safe learning interface for managing neck stoma emergencies. The participants gained knowledge and increased confidence in the early recognition, practical assessment and management of tracheostomy and laryngectomy emergencies.

Conflict of interest

None declared.

References

1. A report by the National Confidential Enquiry into Patient Outcome and Death. On the right Trach? A review of the care received by patients who underwent a tracheostomy. 2014. http://www.ncepod.org.uk/2014tc.htm. Accessed December 2, 2015. doi: 10.12968/hmed.2015.76.3.163.
2. Intensive Care Society. Standards for the care of adult patients with a temporary tracheostomy; Standards and Guidelines. 2014. http://www.ics.ac.uk/EasySiteWeb/GatewayLink.aspx?alid=2212. Accessed December 2, 2015.
3. McGrath BA, Thomas AN. Patient safety incidents associated with tracheostomies occurring in hospital wards: a review of reports to the UK National Patient Safety Agency. Postgrad Med J 2010; 86: 522–525. doi: 10.1136/pgmj.2009.094706.
4. Martinez GH, Fernandez R, Casado MS, Cuena R, Lopez-Reina P, Zamora S, et al. Tracheostomy tube in place at intensive care unit discharge is associated with increased ward mortality. Respir Care 2009; 54: 1644–1652. PMID: 19961629.
5. McGrath BA, Bates L, Atkinson D, Moore JA. National Tracheostomy Safety Project: multidisciplinary guidelines for the management of tracheostomy and laryngectomy airway emergencies. Anaesthesia 2012; 67: 1025–1041. doi: 10.1111/j.1365-2044.2012.07217.x.

6. Hammick M, Olckers L, Campion-Smith C. Learning in interprofessional teams: AMEE Guide no 38. Med Teach 2009; 31: 1–12. doi: 10.1080/01421590802585561.
7. Issenberg SB, McGaghie WC, Petrusa ER, Lee Gordon D, Scalese RJ. Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. Med Teach 2005; 27: 10–28. doi: 10.1080/01421590500046924.
8. McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003-2009. Med Educ 2010; 44: 50–63. doi: 10.1111/j.1365-2923.2009.03547.x.
9. The Global Tracheostomy Collaborative. The Global Tracheostomy Collaborative: mission and history. http://globaltrach.org/about/history. Accessed December 20, 2015.
10. Fanning RM, Gaba DM. The role of debriefing in simulation-based learning. Simul Healthc 2007; 2: 115–125. doi: 10.1097/SIH.0b013e3180315539.
11. Dorton LH, Lintzenich CR, Evans AK. Simulation model for tracheotomy education for primary health-care providers. Ann Otol Rhinol Laryngol 2014; 123: 11–18. doi: 10.1177/0003489414521144.
12. Yuan HB, Williams BA, Fang JB, Ye QH. A systematic review of selected evidence on improving knowledge and skills through high-fidelity simulation. Nurse Educ Today 2012; 32: 294–298. doi: 10.1016/j.nedt.2011.07.010.
13. Boling B, Hardin-Pierce M. The effect of high-fidelity simulation on knowledge and confidence in critical care training: an integrative review. Nurs Educ Pract 2016; 16: 287–293. doi: 10.1016/j.nepr.2015.10.004.
14. Morgan PJ, Cleave-Hogg D. Comparison between medical students' experience, confidence and competence. Med Educ 2002; 36: 534–539. doi: 10.1046/j.1365-2923.2002.01228.x.
15. Salas E, Klein C, King H, Salisbury M, Augenstein JS, Birnbach DJ, et al. Debriefing medical teams: 12 evidence-based best practices and tips. Jt Comm J Qual Patient Saf 2008; 34: 518–527. PMID: 18792656.
16. Liaw SY, Zhou WT, Lau TC, Siau C, Chan SW. An interprofessional communication training using simulation to enhance safe care for a deteriorating patient. Nurs Educ Today 2014; 34: 259–264. doi: 10.1016/j.nedt.2013.02.019.
17. Estis JM, Rudd AB, Pruitt B, Wright T. Interprofessional simulation-based education enhances student knowledge of health professional roles and care of patients with tracheostomies and Passy-Muir® valves. J Nurs Educ Pract 2015; 5: 123–128. doi: 10.5430/jnep.v5n6p123.
18. Al-Ghareeb AZ, Cooper SJ. Barriers and enablers to the use of high-fidelity patient simulation manikins in nurse education: an integrative review. Nurs Educ Today 2016; 36: 281–286. doi: 10.1016/j.nedt.2015.08.005.
19. Bhatti I, Jones K, Richardson L, Foreman D, Lund J, Tierney G. E-learning vs lecture: which is the best approach to surgical teaching? Color Dis 2011; 13: 459–462. doi: 10.1111/j.1463-1318.2009.02173.x.

Appendix 1: MCQ questionnaires

Pre-course MCQ: time limit, 15 min

(1) Which one method of oxygen delivery is most efficient in a patient with a cuffed tracheostomy tube?

(a) Face mask

(b) Stoma mask

(c) Face and stoma masks

(d) None of the above

(2) Which one of the following is not an indication for a tracheostomy?

(a) Upper airway obstruction

(b) Prolonged mechanical ventilation

(c) Tracheal toilet

(d) A retrosternal goitre

(3) Which one of the following is not a common delayed complication of a tracheostomy?

(a) Tracheal stenosis

(b) Tracheo-inominate fistula

(c) Tracheo-cutaneous fistula

(d) Tube displacement

(4) Which one of the following is the initial management strategy in the event of breathing difficulties in a patient with a tracheostomy?

(a) Oxygen delivery via nasal cannulae

(b) Oxygen delivery via the mouth

(c) Oxygen delivery via the stoma

(d) Oxygen delivery via the stoma and mouth

(5) Which one of the following statements regarding a laryngectomy is true?

(a) The laryngectomy stoma is the ONLY route for oxygenating the patient

(b) Tracheostomy tubes are never used in laryngectomy stomas

(c) A patient may be intubated through the orotracheal route in the event of a cardio-respiratory arrest

(d) A patient is unable to vocalise following a laryngectomy

(6) Which one of the following is not a variable used to determine the choice of tracheostomy tube used in a patient?

(a) The internal diameter of the tube

(b) The outer diameter of the tube

(c) The length of the tube

(d) The patient's FEV_1

(7) Which one of the following statements is true regarding tracheostomy size?

(a) The outer diameter should be 1/3 of the tracheal diameter

(b) The inner diameter should be 1/3 of the tracheal diameter

(c) The outer diameter should be 3/4 of the tracheal diameter

(d) The outer diameter should be 1/2 of the tracheal diameter

(8) Which one of the following statements is incorrect? Tracheostomy tubes can be:

(a) Cuffed or uncuffed

(b) Fenestrated or non-fenestrated

(c) Dual lumen or triple lumen

(d) Variable length or fixed length

(9) Which one of the following statements regarding a cardio-respiratory arrest in a laryngectomy patient is true?

(a) CPR is commenced after the airway has been assessed and secured

(b) If there is no improvement after an inner tube has been removed and the cuff has been deflated, then the outer tube must be removed

(c) If there is any doubt about the type of stoma present, then oxygen must always be applied to the mouth

(d) A laryngectomy stoma is NOT an end stoma

(10) Which one of the following statements is incorrect?

(a) More percutaneous tracheostomies are now being performed than surgical

(b) Patients in an ITU or CCU setting are unlikely to encounter airway-related complications in comparison to a ward setting

(c) In the early stages, displacement and occlusion are the most common complications encountered

(d) Health care professionals are more likely to encounter a tracheostomy patient than a laryngectomy patient in an emergency scenario

Post-course MCQ: time limit, 15 min

(1) Which one method of oxygen delivery is most efficient in a patient with a laryngectomy stoma?

(a) Face and stoma masks

(b) Face mask

(c) Stoma mask

(d) Nasal cannulae

(2) Which one of the following is not an indication for a tracheostomy?

(a) Facial trauma

(b) An obstructing laryngeal lesion

(c) Need for ongoing mechanical ventilation

(d) An early stage nasopharyngeal carcinoma

(3) Which one of the following types of tracheostomy tubes prevent speech?

(a) A cuffless tracheostomy tube

(b) A cuffed tube with the cuff deflated

(c) A fenestrated tracheostomy tube

(d) A tube with an inflated foam cuff

(4) To prevent excess pressure on the tracheal capillaries, the pressure in the cuff of a tracheostomy tube should be:

(a) Less than 15 mmHg or 20 cmH_2O

(b) Less than 20 mmHg or 25 cmH_2O

(c) Less than 25 mmHg or 30 cmH_2O

(d) Monitored every 2–3 days

(5) Which one of the following is not a common delayed complication of a tracheostomy?

(a) Pneumothoraces

(b) Tracheo-inominate fistula

(c) Tube occlusion

(d) Tracheo-oesophageal fistula

(6) Which one of the following is the initial management strategy in the event of breathing difficulties in a patient with a long-term tracheostomy?

(a) Oxygen delivery via nasal cannulae

(b) Oxygen delivery via the stoma and mouth

(c) Oxygen delivery via the stoma

(d) Oxygen delivery via the mouth

(7) Which one of the following statements regarding a laryngectomy is true?

(a) Complications are negligible

(b) Patient may only be oxygenated via the stoma

(c) If intubated, must be done through the orotracheal route

(d) May never vocalise post-procedure

(8) Which one of the following is not a variable used to determining the size of tracheostomy used in a patient?

(a) The outer diameter of the tube

(b) The length of the tube

(c) The patient's lung function

(d) The internal diameter of the tube

(9) Which one of the following statements is true regarding tracheostomy size?

(a) The outer diameter should be 1/5 of the tracheal diameter

(b) The inner diameter should be 1/5 of the tracheal diameter

(c) The outer diameter should be 3/4 of the tracheal diameter

(d) The outer diameter should be 1/6 of the tracheal diameter

(10) Which one of the following is not a manufacturer of tracheostomy tubes?

(a) Baxter

(b) Portex

(c) Tracheo-Twist

(d) Shiley

(11) Which one of the following is incorrect regarding tracheostomy tube variations?

(a) They may be cuffed or uncuffed

(b) They may be fenestrated or non-fenestrated

(c) They are available as single or dual lumen

(d) They are only available as a fixed length

(12) Which one of the following is not an indication for a tracheostomy?

(a) Upper airway obstruction

(b) Severe COPD

(c) Airway protection (due to risk of aspiration)

(d) Tracheal toilet

(13) Which one of the following statements regarding a cardio-respiratory arrest in a laryngectomy patient is true?

(a) If in doubt about the type of stoma, then oxygenate through the mouth

(b) If there is no improvement after an inner tube has been removed and the cuff has been deflated, then the outer tube must be removed

(c) CPR must only be commenced once you have secured the airway

(d) Laryngectomy stomas are more common than tracheostomy stomas

(14) Which one of the following statements is incorrect?

(a) Surgical tracheostomies are still more commonly performed than the percutaneous form

(b) A complication of a percutaneous tracheostomy is puncture/perforation of the oesophagus

(c) In the early stages, displacement and occlusion are the most common complications encountered

(d) ENT/Max Facs or anaesthetics should be contacted in the event of a stoma-related emergency

(15) The tracheostomy care kit present at the bedside includes which one of the following?

(a) Debakey forceps

(b) Yankeur sucker

(c) Tilley forceps

(d) A nasendoscope