*Appendix 1: Example of a workshop description*

**Flexible optical intubation 2**

Learning objectives:

After the session, the trainees should be able to:

* describe the indication for awake flexible optical intubation (e.g. expected difficult airway)
* conduct nasal/oral flexible optical intubation in an awake patient (manikin) and demonstrate the necessary skill

Method: Skill training – individually (one skill trainer per person)

Material: Part task trainers, list of necessary equipment to be used in the room, cognitive aids (tips and tricks, and difficult airway algorithm).

*Appendix 2: Example of a scenario description*

**Simulation ##**

Short resume of scenario: Elderly man with ileus for emergency laparotomy. The patient has ischemic heart disease. During the anaesthesia induction of this patient, the trainees are experiencing impossible intubation, but facemask ventilation is possible (‘cannot intubate, can ventilate’ situation). The patient desaturates and arrythmias are seen on the monitor. The trainees must recognise this situation, declare that they will awake the patient, and plan an awake flexible optical intubation.

Learning objectives:

After the session, the trainees should be able to:

* recognise a ‘cannot intubate, can ventilate’ situation
* communicate to the team that this is an emergency situation
* explain and implement the correct plan for this patient (awake the patient and plan an awake flexible optical intubation)

Facilitator manual comprises the following:

* Short scenario description
* Learning objectives
* Roles allocated to team (anaesthesia team, surgeon, scrub nurse, circulating nurse, observer)
* Short patient record
* Guidance for the scenario flow to facilitator and simulation operator including vital parameters for start of scenario and for each intubation attempt
* Guidance on how to provide feedback or debrief the scenario including examples of what to discuss

Material: Manikin-based simulator, list of necessary equipment to be used in the room, cognitive aids (e.g. difficult airway algorithm).

*Appendix 3: Overview of the resources used to run a course (in 2018)*

|  |  |
| --- | --- |
| Resources | * An established regional, simulation centre to host the courses
* The necessary number of rooms available for lectures, workshops, skills training, simulation and debriefing to be allocated to 6 teams of 5-6 trainees
* Part-task trainers (for training skills in e.g. conventional/videolaryngoscopic intubation, flexible optical intubation, supraglottic airway devices, facemask ventilation, cricothyrotomy), and manikin-based simulators with an airway that can be programmed for different degrees of obstruction
* Durable medical equipment (basic and advanced airway management devices, difficult airway trolley, etc.)
* Consumable supplies (medicine, syringes, gloves, etc.)
* Expert faculty – experts in advanced airway management and trained as simulation facilitator (4-day course in 2018: 5 anaesthesiologists on Day 1, 6 (Day 2), 6 (Day 3), and 12 (Day 4); 8 hours/day)
* Operators to run the simulators and medical students to assist with sessions (4-day course in 2018: 5 anaesthesia nurses/medical students on Day 3, and 11 on Day 4; 8 hours/day)
* Technical and practical staff members to set up the rooms
* Refreshments (breakfast, lunch, coffee/tea, fruit, cake for both participants and faculty members)
 |
| Support | * Salary support for faculty, anaesthesia nurses and medical students paid by the Danish Health Authority
* Institutional support from the Departments of Anaesthesiology (facilitators free from daily duties)
* Institutional support from our simulation centre (equipment, consumables)
 |
| Administration | * The course director is employed in the simulation centre (MR)
* The residency programme director, who is responsible for all the national mandatory courses for anaesthesiology trainees (DO)
* A secretary is responsible for administration of all the national mandatory courses for anaesthesiology trainees (employed in the simulation centre)
 |

*Appendix 4: Pre- and post-course test used on nine courses (2005-2010)*

***Provide the correct answer(s) for every question 4-8. Notice the possibility of more than one correct answer***

|  |  |  |  |
| --- | --- | --- | --- |
| **4.** | **What/which of the following is/are predictor(s) for difficult facemask ventilation?** | **Yes** | **No** |
|  | A | BMI < 26 | ❒ | ❒ |
|  | B | Age > 55 years | ❒ | ❒ |
|  | C | Macroglossia | ❒ | ❒ |
|  | D | Presence of beard | ❒ | ❒ |
|  | E | Edentulous patients | ❒ | ❒ |
|  | F | Obstructive sleep apnoea/snoring | ❒ | ❒ |

|  |  |  |  |
| --- | --- | --- | --- |
| **5.** | **What/which of the following is/are potential complication(s) of transtracheal jetventilation?** | **Yes** | **No** |
|  | A | Emphysema | ❒ | ❒ |
|  | B | Airway obstruction | ❒ | ❒ |
|  | C | Haematoma | ❒ | ❒ |
|  | D | Oesophageal perforation | ❒ | ❒ |
|  | E | Barotrauma | ❒ | ❒ |

|  |  |  |  |
| --- | --- | --- | --- |
| **6.** | **What/which of the following is/are predictor(s) of difficult intubation?** | **Yes** | **No** |
|  | A | Trismus, mouth opening less than 3 cm | ❒ | ❒ |
|  | B | Neck haematoma | ❒ | ❒ |
|  | C | Mallampati grade 1 | ❒ | ❒ |
|  | D | Thyromental distance > 6 cm | ❒ | ❒ |
|  | E | Cormack Lehane grade IV | ❒ | ❒ |

|  |  |  |  |
| --- | --- | --- | --- |
| **7.** | **In a ‘cannot intubate, cannot ventilate’ situation, what/which of the following technique(s) would you then use?** | **Yes** | **No** |
|  | A | Increase the anaesthesia depth and give a muscle relaxant drug | ❒ | ❒ |
|  | B | Place a laryngeal mask airway | ❒ | ❒ |
|  | C | Try repeatedly to intubate the patient > 3 attempts | ❒ | ❒ |
|  | D | Try Fiberoptic intubation | ❒ | ❒ |
|  | E | Jetventilate the patient after placement of cannula through the cricothyroid membrane | ❒ | ❒ |

|  |  |  |  |
| --- | --- | --- | --- |
| **8.** | **Fiberoptic intubation is your first choice in patients with…** | **Yes** | **No** |
|  | A | Blood in the airway | ❒ | ❒ |
|  | B | Adenoid vegetations | ❒ | ❒ |
|  | C | Tumors in the airway | ❒ | ❒ |
|  | D | Can’t mask ventilate can’t intubate situation | ❒ | ❒ |
|  | E | Can mask ventilate can’t intubate situation | ❒ | ❒ |

|  |  |
| --- | --- |
| **9.** | **Calculate the SARI Score of a patient with the following:** |
|  | A | Mouth opening < 4 cm |
|  | B | Thyromental distance = 6.0 – 6.5 cm |
|  | C | Mallampati score II |
|  | D | Neck mobility of 80 – 90o |
|  | E | Ability to prognath |
|  | F | Weight = 80 kg |
|  | G | No history of a prior difficult intubation |

**SARI Score**

**Imagine that you have examined three different patients, all scheduled for an elective colectomy.**

**The preoperative airway examination was as followed:**

|  |
| --- |
| 1. **Patient A:**

The patient has never been anaesthetised before:Results of the preoperative airway examination: Mallampati I, mouth opening = 4 cm, Neck mobility = 90°, ability to prognath, and a BMI = 25.Your plan for airway management of patient A (provide one or more possibilities): |
| * 1. Laryngeal mask airway ⬜
	2. Orotracheal intubation ⬜
	3. Fastrach ⬜
	4. Blind nasal intubation ⬜
	5. Awake fiberoptic intubation ⬜
	6. Other ⬜ what?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Comments:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |

|  |
| --- |
| 1. **Patient B:**

History of a prior anaesthetica, patients recalls “that he is uncertain, but maybe there was a problem with the placement of the tube.”The results of the preoperative airway examination: Mallampati I, Mouth opening = 4 cm, Thyromental distance = 6.5 cm, neck mobility > 90° and ability to prognath. A 2 cm scar over the cricothyroid membrane is noticed.Your airway management plan for patient B (provide one or more possibilities):Laryngeal Mask Airway ⬜Orotracheal intubation ⬜Fastrach ⬜Blind nasal intubation ⬜Awake fiberoptic intubation ⬜Other ⬜ what?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Comments:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  |

|  |
| --- |
| 1. **Patient C**

The patient has never been anaesthetised before.The results of the preoperative airway examination: Mallampati III, mouth opening = 3 cm, inability to prognath, Neck mobility = 80-90°, a short neck and BMI = 37 (165 cm / 101 kg)Your airway management plan for patient C (provide one or more possibilities): |
| * 1. Laryngeal mask airway ⬜
	2. Orotracheal intubation ⬜
	3. Fastrach ⬜
	4. Blind nasal intubation ⬜
	5. Awake fiberoptic intubation ⬜
	6. Other ⬜ what?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Comments:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

*Appendix 5: Pre- and post-course questionnaire used on nine courses (2005-2010)*

14. Which of the following statements describe yourself the best?

|  |  |  |
| --- | --- | --- |
| ❒ | A: | I am an expert on airway management |
| ❒ | B: | I feel competent in airway management |
| ❒ | C: | I feel incompetent in airway management |
| ❒ | D: | I am poor in airway management |

Provide the degree of agreement/disagreement with the statements listed below:

**Provide only one answer for each statement. Provide your grade of agreement on this scale**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Total disagreement | ① | ② | ③ | ④ | ⑤ | Total agreement |
|  |  |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| 11. | I am able to perform a preoperative airway assessment | ① | ② | ③ | ④ | ⑤ |
| 12. | I am able to use algorithm for airway management | ① | ② | ③ | ④ | ⑤ |
| 13. | I am able to handle difficult facemask ventilation | ① | ② | ③ | ④ | ⑤ |
| 14. | I am able to use intubation laryngeal mask airway | ① | ② | ③ | ④ | ⑤ |
| 15. | I am able to use fiberoptic scope | ① | ② | ③ | ④ | ⑤ |
| 16. | I am able to use emergency cricothyrotomy set | ① | ② | ③ | ④ | ⑤ |
| 17. | I am able to perform awake fiberoptic intubation | ① | ② | ③ | ④ | ⑤ |
| 18. | I am able to handle a “cannot intubate, cannot ventilate” (CICV) situation | ① | ② | ③ | ④ | ⑤ |
| 19. | I know my strengths and weaknesses regarding airway management | ① | ② | ③ | ④ | ⑤ |
| 20. | I have a clear understanding of the role of the team leader | ① | ② | ③ | ④ | ⑤ |
| 21. | I have a clear understanding of the role of an active team member | ① | ② | ③ | ④ | ⑤ |
| 22. | I ensure that roles in the team are clear | ① | ② | ③ | ④ | ⑤ |
| 23. | I prepare plans and make these clear for the team | ① | ② | ③ | ④ | ⑤ |
| 24. | I prioritise tasks according to level of importance | ① | ② | ③ | ④ | ⑤ |
| 25. | I inform the team of potential complications | ① | ② | ③ | ④ | ⑤ |
| 26. | I use clear communication | ① | ② | ③ | ④ | ⑤ |
| 27. | I use closed loop communication (*e.g. Person 1 says ”give 1 mg epinephrine”, Person 2 repeats the order, administers the medicine and answers ”1 mg epinephrine administered!”)* | ① | ② | ③ | ④ | ⑤ |
| 28. | I ensure that guidelines and plans are followed by the team | ① | ② | ③ | ④ | ⑤ |
| 29. | I re-evaluate the situation continuously | ① | ② | ③ | ④ | ⑤ |
| 30. | I receive input from the team in a constructive manner | ① | ② | ③ | ④ | ⑤ |

*Appendix 6: Examples of OSCE checklists*

The OSCE stations can be either skill demonstration, assessment of a simulated patient (medical student), full-scale simulations or MCQ (e.g. pharmacology). The first example is a combination of a simulated patient (where difficult airway management is to be expected), and a simulation where the assessor plays the role of a senior consultant. The second example is a full-scale simulation where the anaesthesia nurse calls for help from the trainee because of unexpected difficulties with intubation and facemask ventilation despite optimal positioning.

The trainees´ performance in the OSCE station is evaluated by a facilitator (trained in assessment) using the following scale ‘Good’, ‘Adequate’ or ‘Not done/Inadequate’ for each item on the checklist. Additionally, the trainees’ overall performance is rated using ‘Clear fail’, ‘Borderline’, ‘Clear pass’, ‘Good pass’ or ‘Excellent’. The facilitator also writes down narratives to be used as feedback to each trainee.

**Airway assessment and preparation of awake flexible optical intubation**

|  |  |  |  |
| --- | --- | --- | --- |
| The trainee… | Good | Adequate | Not done/Inadequate |
| Conducts a sufficient airway assessment of the patient |  |  |  |
| Communicates well with the patient and, if necessary, reassures the patient |  |  |  |
| Explains the patient about the plan: awake nasal flexible optical intubation |  |  |  |
| Obtains informed consent from the patient |  |  |  |
| Describes the correct plan for the senior consultant (assessor) |  |  |  |
| Administers glycopyrronium 0.2 mg/kg IV |  |  |  |
| Administers oxygen |  |  |  |
| Administers sedation/analgesia |  |  |  |
| Administers topicalisation in the nasal cavity |  |  |  |
| Administers transtracheal or ‘spray-as-you-go’ local anaesthesia |  |  |  |
| Provides alternatives to awake flexible optical intubation (retaining spontaneous respiration): retrograde intubation or tracheostomy in local anaesthesia |  |  |  |
| Overall performance rating |
| Clear fail | Borderline | Clear pass | Good pass | Excellent |
|  |  |  |  |  |

**Unexpected difficult airway in the operating room (‘cannot intubate, cannot oxygenate’)**

|  |  |  |  |
| --- | --- | --- | --- |
| The trainee… | Good | Adequate | Not done/Inadequate |
| Conducts optimal attempt at facemask ventilation (manipulations, 2-person 2(3)-hand technique and oral/nasal pharyngeal airways) |  |  |  |
| Asks the circulating nurse to call for the senior anaesthetist and the difficult airway trolley to come to the room immediately |  |  |  |
| Provides and explains an airway strategy to the team |  |  |  |
| Assures that the patient is still sufficiently anaesthetised and muscle paralysed |  |  |  |
| Conducts optimal attempt at intubation (manipulations, videolaryngoscope, hyperangulated blade, forcep and stylet) |  |  |  |
| Conducts optimal attempt at supraglottic airway (manipulations, optionally intubation through supraglottic airway) |  |  |  |
| Declares a ‘cannot intubate, cannot oxygenate’ situation to the team |  |  |  |
| Decides to perform an emergency cricothyrotomy |  |  |  |
| Asks the team to open kit and prepare the equipment for emergency cricothyrotomy |  |  |  |
| Optimises patient positioning for emergency cricothyrotomy |  |  |  |
| Initiates emergency cricothyrotomy |  |  |  |
| Starts ventilation/oxygenation through cricothyrotomy tube and verifies with capnography (and thoracic movements and stethoscopy) |  |  |  |
| Fixates the tube |  |  |  |
| Overall performance rating |
| Clear fail | Borderline | Clear pass | Good pass | Excellent |
|  |  |  |  |  |