

# CATT

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COVID-19 AIRWAY TEAM TRAINING

## INSTRUCTOR MANUAL

Version 1 (March 2020)

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# COURSE OUTLINE

## PURPOSE

To provide training and resources to healthcare staff involved in advanced airway management in order to allow safe rapid sequence intubation (RSI) of patients with confirmed or suspected novel coronavirus (COVID-19) infection. This may occur in either the operating theatre or in ED/ICU.

## TARGET GROUP

Members (or potential members) of COVID-19 intubating teams. Teams should ideally consist of 3 or 4 providers (senior critical care physicians and nurses).

## COURSE DETAILS

**Minimum/Maximum participants:** 3 – 8

**Faculty:** 2 faculty per 3-4 participants

**Training time:** 90 – 120 minutes

**Format:** 30 minute lecture followed by 60 – 90 minutes simulation scenarios

## LEARNING OBJECTIVES

- Importance of infection control during intubations
- Understanding equipment considerations for COVID-19 patients
- Understanding and practice with variations to routine practice
- Use of cognitive aids

## PRE-READING MATERIALS

- Safe Airway Society Consensus Statement: [\*“Principles of airway management and tracheal intubation specific to the COVID-19 patient group.”\*](#)
- [CEC Guidelines on infection control and PPE](#)
- [Queensland Metro Health Airborne PPE Demonstration Video](#)
- [Cabrini ED COVID-19 Intubation Demonstration Video](#)

# INFECTION CONTROL PRECAUTIONS

## PPE

Participants should be advised to bring their PPE in with them. It should be recycled by each user for the whole program.

Given potential restrictions on the use of PPE for non-clinical purposes (i.e. training) it is acceptable to use alternatives (such as fabric gowns, surgical masks etc...) in order to practice the key principles of donning and doffing PPE.

## SOCIAL DISTANCING

The course has been designed to keep the participants in the same break out rooms. Manikins and surfaces should be cleaned at the completion of the session. Faculty will remain with one group stream per course.

## LECTURE NOTES

<b>HOUSEKEEPING</b>	<ul style="list-style-type: none"><li>• Go home if you're sick!</li><li>• Phones and pagers</li><li>• Bathrooms and security</li><li>• Confidentiality</li><li>• <b>PPE</b></li></ul>
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Standard course introduction with 2 main differences:

- **Ensure no-one who is sick is on the course**
- **Explain PPE use during course**
  - Ideally should be brought by participants and reused by same participant between scenarios

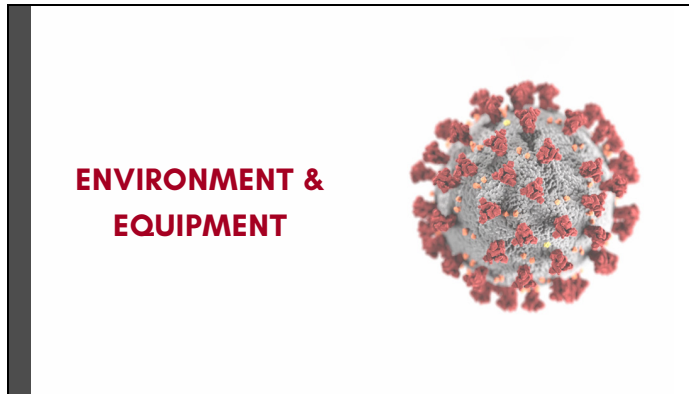
<b>LEARNING OBJECTIVES</b>	<ul style="list-style-type: none"><li>• Infection control for airway management</li><li>• Variations to routine RSI</li><li>• Resource and equipment considerations</li><li>• Simulation-based practice of RSI with use of cognitive aids</li><li>• <b>Developing a plan for how this will look at your place of work</b></li></ul>
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Introduction of learning objectives

Emphasise that course is not intended to provide proscriptive advice for every department/hospital, but (as much as possible) to educate participants on **general principles** as outlined in consensus guidelines (Safe Airway Society, CEC, WHO)

Primary aim is to have participants actively thinking about how they would implement these principles at their place of work

- Throughout slides, questions in **BLUE** are directed to participants to stimulate discussion around this



**GENERAL PRINCIPLES**

- Use **dedicated** spaces for intubation/extubation
- Use **disposable** (NOT reusable) items where possible
- Avoid **contamination** of general equipment

Introduce general principles

Not stated on slide, but an issue that may come up, is that departments should **use what they have and are familiar with** and not necessarily rely on new equipment (that may not arrive, require training to use etc...)

**LOCATION**

- Use a **designated area**
- Ideally, a negative pressure room with ante-room
- If unavailable, normal pressure room with closed doors
- **Where is this in your department?**
- **What if you run out of spaces?**

General principle: a designated area (such as specific rooms/theatres)

- Important to acknowledge that ideal location may not be available in a lot of departments
- Prompt participants to think about where this would be in their department/hospital

Forward planning – enquire whether participants have thought about what they would do when presentations increase, and whether they have a fallback option

- Potentially moving intubated patients out and reusing room for intubation
- What are the barriers to this? (cleaning, cohorting intubated patients)
- Wards designated for intubation
- Location of donning and doffing areas, PPE requirements for staff?

<b>EQUIPMENT</b>	<ul style="list-style-type: none"><li>• Decide what you want to take inside the room (and will get contaminated)<ul style="list-style-type: none"><li>• If disposable, is there enough stock?</li><li>• Do items need to be sterilised?</li><li>• Pre-prepared packs or checklists?</li></ul></li><li>• What needs to be immediately available outside the room?</li></ul>

General principle: use available equipment to make first attempt the best attempt but avoid contaminating scarce resources and resource intensive cleaning processes.

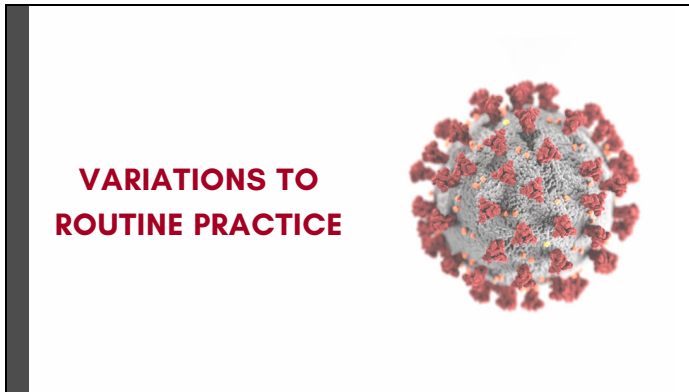
- Prompt participants to think about disposables, stock and sterilisations

General principle: avoid situations where staff need to constantly go in and out of the room to obtain equipment

- Discussion around how to avoid this (equipment checklists, prepared packs)
- Discussion around what they **definitely** need in the room vs. what they **might** need and can stay outside

This would also be an opportunity to discuss whether front of neck access and CPR should be performed (if those items are going to be available outside the room)

- The default position for most ED physicians would be to do both if the patient was appropriate for intubation
- However, it is important to make sure that the entire team is aware of this to avoid disasters inside the room



**GENERAL PRINCIPLES**

- Minimise **aerosolization** of virus
- Minimise **number** of staff exposed
- Minimise **time** staff are exposed

Introduce general principles

As much as possible, relate recommendations in following slides to one or more of these principles

Variations to practice are ok as long as they do not violate one of these principles

**INTUBATION TEAM**

- **Airway operator** - most experienced clinician
  - The anaesthetic consultant should not be there for 'backup'
- **Airway assistant** - experienced nurse/doctor
- **Second senior airway clinician** - team lead, administer drugs, surgical airway if required
- **Runners (up to 3)** - inside room (optional), in anteroom/at door, outside room
- **Who will fill these roles?**
- **What happens after hours?**

Explain team roles

- Emphasise that team should be senior/experienced in order to ensure intubation is quick
- No unnecessary staff in room – each should have a role
- There may be resistance to the idea of having a second clinician in the room – this can be further discussed in the simulation scenarios

A requirement for the airway operator is a correctly fitting P2/N95 mask – if an adequate seal is unable to be obtained, then another intubator will be required

Discussion around whether a team of this size is feasible for participants, and how composition might change depending on time of day



<b>PRE- OXYGENATION</b>	<ul style="list-style-type: none"><li>• Minimum flow of O<sub>2</sub> to maintain saturations prior to team entering room</li><li>• Once team enters, pre-oxygenate with either BVM or Mapleson circuit (with viral filter and ETCO<sub>2</sub> already connected)</li><li>• Avoid manual ventilation as much as possible and ensure leaks are minimised</li><li>• <b>NO</b> apnoeic oxygenation</li></ul>
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General principle for recommendations: minimise aerosolization

Clarify that pre-oxygenation does not start until team enters room

Explain pre-assembled circuit setup (viral filter, ETCO<sub>2</sub>) – may require practical demonstration

- PEEP valves if available

There may discussion around pre-oxygenating the agitated patient – delayed sequence intubation is ok to use

<b>INDUCTION</b>	<ul style="list-style-type: none"><li>• Rocuronium (&gt;1.5mg/kg IBW) or suxamethonium (1.5mg/kg)</li><li>• Be generous to minimise risk of coughing during instrumentation</li><li>• Ensure <b>≥ 60 seconds</b> post administration to prevent coughing</li><li>• Manual ventilation probably better than intubation with inadequate paralysis in the event of desaturation</li></ul>
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General principle: minimise aerosolization by avoiding coughing

There may be discussion around specific muscle relaxants:

- Rocuronium good due to duration of effect but suxamethonium quicker (patients WILL desaturate) and fasciculations allow confidence that patient will not cough
- Suxamethonium followed by rocuronium a perfectly reasonable option

Emphasis on providing adequate time for relaxants to work

- Desaturations likely – discussion around precipitously intubating vs waiting and manually ventilating patient

<b>INTUBATION</b>	<ul style="list-style-type: none"><li>• <b>1<sup>st</sup> attempt should be the best attempt</b></li><li>• Video laryngoscope if available – stand upright and use screen (indirect view)</li><li>• Depth correct on 1<sup>st</sup> attempt – minimise disconnections and cuff deflations</li><li>• Cuff up before ventilating</li><li>• Avoid contamination by used bougie/stylet/mask/laryngoscope – place on bluey for disposal</li></ul>
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General principle: minimise aerosolization and time by getting ETT in the right place as quickly as possible

Discussion around video laryngoscopes available and technique for use

Likely to tolerate less than perfect tube positions in these patients

For anaesthetic nurses – no listening for a leak as inflating cuff as per usual practice

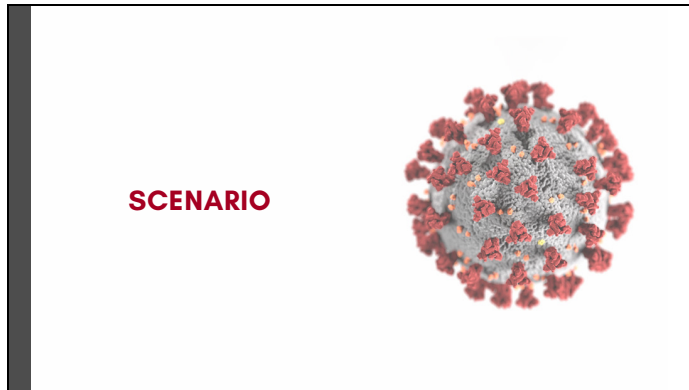
Some groups might choose to use a bin next to the bed or a large plastic sheet for contaminated equipment

<b>POST INTUBATION</b>	<ul style="list-style-type: none"><li>• Careful disposal of contaminated equipment<ul style="list-style-type: none"><li>• Clinical waste bins available and emptied?</li><li>• Sterilisation process and turnaround?</li></ul></li><li>• <b>PPE removal</b><ul style="list-style-type: none"><li>• How to ensure this is done correctly?</li></ul></li></ul>
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Prompt discussion (if it has not already occurred) on how waste will be managed

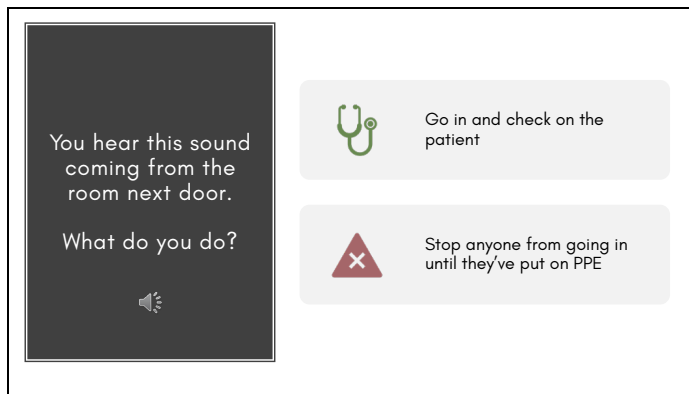
Emphasis on PPE removal as critical step

- Participants to consider how they would ensure this occurs correctly (buddy system, posters on how to doff correctly etc...)
- There may be discussion around transport/transfer



Explain to participants that you will briefly outline a situation they might find themselves in and ask them what they would do

Audio file should play automatically on clicking to the next slide



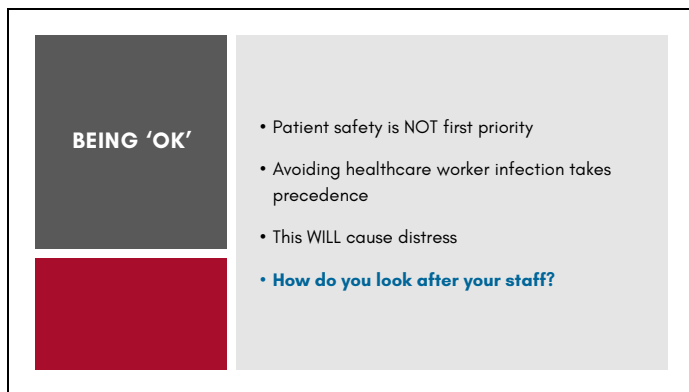
Audio file should play automatically

Explain situation and ask participants:

- What they **would do**
- What they would **want to do**

Can allow audio to continue playing until it finishes (1:08 duration) or click to next slide to stop

Ask for reactions and why people felt that way



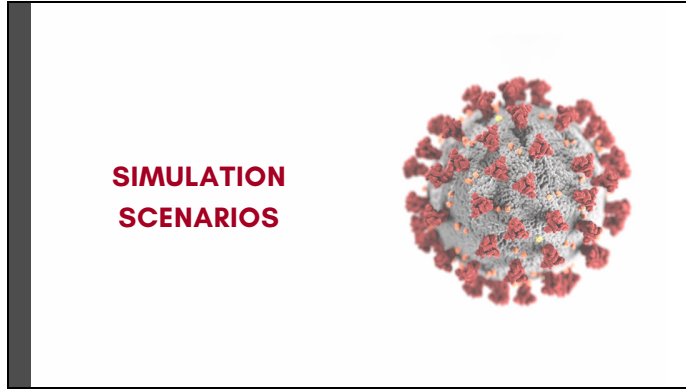
Emphasise need to keep healthcare workers safe

- Maintain workforce
- Avoid infection of colleagues
- Avoid infection of families of healthcare workers

Acknowledge that distress/moral injury is inevitable and could get worse if resources depleted

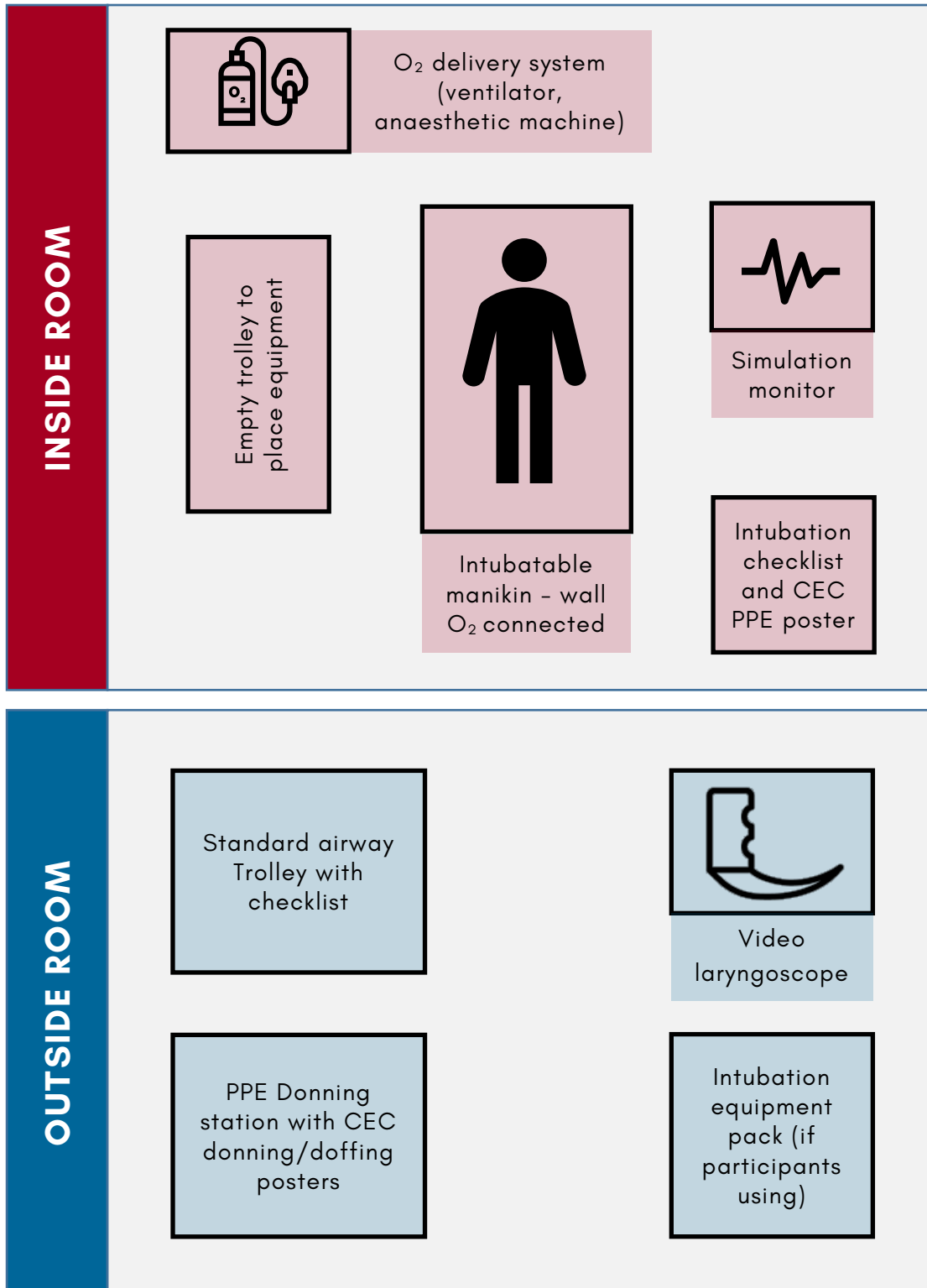
Some discussion around strategies to cope

Another significant learning point from this slide is that ED monitors will not routinely have tone modulation, and tone modulation is different between different monitors – cannot reliably tell SpO2 from tone



Breakup into groups and introduction  
to sim scenarios

## ROOM LAYOUT FOR SIMULATION SCENARIOS



# SIMULATION SCENARIOS

## GLOBAL LEARNING OBJECTIVES

- Demonstrate correct donning and doffing of PPE (dependent on availability of PPE for training)
- Formulate team-based airway management plans and strategies aiming to minimise aerosolization and staff exposure
- Demonstrate the ability to safely and efficiently conduct formulated airway management plans and strategies in a team
- Demonstrate effective role allocation
- Demonstrate sharing of common mental model
- Demonstrate the effective use of clinical checklists

## MODALITY

- Low-fidelity, semi-immersive scenarios
- Rapid cycle deliberate practice and/or pause and discuss

## TIME

- 60 – 90 mins

## EQUIPMENT

- O<sub>2</sub> delivery device appropriate for learner group (e.g. anaesthetic machine for anaesthesia, self-inflating bag for ED, Mapleson C circuit for ICU)
- Learner-sourced PPE for contact, droplet, and airborne precautions
  - If unavailable, alternatives such as fabric gowns and surgical masks may be used to go through important principles of donning and doffing
- Mannequin suitable for repeated intubations + IVC and drip
- Intubation equipment including standard setup + video laryngoscope + LMA + ETT clamp + protective plastic sheet
- Simulated drugs for RSI (ketamine, propofol, midazolam, fentanyl, suxamethonium, rocuronium)
- Monitor with SpO<sub>2</sub> tone modulation

## FACULTY

Two faculty members responsible for setup, technical operations, facilitation, debrief

## OPERATING THEATRE SCENARIOS

PHASE	STATE	LEARNING OBJECTIVES	EXPECTED ACTIONS	DISCUSSION POINTS
<p><b>Phase 1:</b> Emergent Surgery</p> <p><i>Otherwise healthy patient requiring emergent surgery</i></p> <p><i>* Surgery cannot be postponed</i></p> <p><i>* Surgery not amenable to sole regional technique</i></p> <p><i>* Patient asymptomatic from COVID-19</i></p>	<p>Example scenario</p> <ul style="list-style-type: none"> <li>- 35yo for appendicectomy</li> <li>- SpO<sub>2</sub> 99% on RA</li> <li>- HR 138 bpm ST</li> <li>- BP 112/75</li> </ul> <p>- ETO<sub>2</sub> 90% after adequate preO<sub>2</sub></p> <p>- ETCO<sub>2</sub> 58 once intubated</p>	<ul style="list-style-type: none"> <li>- All global learning objectives</li> </ul>	<ul style="list-style-type: none"> <li>- Discussion of shared airway plan and strategies</li> <li>- Role allocation</li> <li>- Don PPE</li> <li>- RSI (+/- using checklist)</li> <li>- Minimise BMV</li> <li>- Ascertain adequate paralysis</li> <li>- Stop high flow before removing face-mask</li> <li>- Cuff up prior to test ventilation</li> <li>- Doff PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Definition of an aerosol generating procedure (AGP)</li> <li>- Recognition of moments of RSI process which may lead to AGP – BMV, unsealed contaminated high-flow circuit, coughing</li> <li>- Importance of effective preoxygenation in attempt to avoid BMV</li> <li>- Importance of effective neuromuscular blockade at time of airway instrumentation</li> <li>- Importance of stopping high-flows before removing facemask</li> <li>- Role of VL in distancing intubator’s airway from patient’s airway</li> </ul>

<p><b>Phase 2: Emergent Surgery</b></p> <p><i>Morbidly obese patient requiring emergent surgery</i></p> <p><i>* As above</i></p> <p><i>* Features of difficult BMV and ETT</i></p> <p><i>* First intubation attempt fails with worsening hypoxia</i></p> <p><i>* GZ attained if LMA OR BMV with OPG and 2 hands</i></p>	<p>Example scenario</p> <ul style="list-style-type: none"> <li>- 35yo for appendicectomy</li> <li>- BMI 50</li> <li>- SpO<sub>2</sub> 95% on RA</li> <li>- HR 145 bpm ST</li> <li>- BP 145/87</li> </ul> <ul style="list-style-type: none"> <li>- ETO<sub>2</sub> 85% after adequate preO<sub>2</sub></li> <li>- Swift desaturation once induced 95% → 85% over 1 min</li> <li>- Recovery to 95% and ETCO<sub>2</sub> 58 with GZ manoeuvre and stable</li> <li>- Stop ETCO<sub>2</sub> and desaturate to 85% while intubating</li> </ul>	<ul style="list-style-type: none"> <li>- As above</li> <li>- Formulate green zone strategies while minimising aerosolization and staff exposure</li> </ul>	<ul style="list-style-type: none"> <li>- As above</li> <li>- Formulate airway plan for anticipated difficult airway</li> <li>- Gentle BMV or SGA</li> <li>- Formulate 'replace' plan and strategies</li> <li>- Execute 'replace' plan</li> <li>- Doff PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Adaptation of RSI to anticipated difficult airway</li> <li>- Recognition of green zone</li> <li>- Recognition of imperfectly sealed BMV and SGA ventilation as AGPs</li> <li>- Strategies of replacing in GZ while maintaining aerosolization and staff exposure at minimum</li> <li>- Assessment of adequacy of in-room resources</li> </ul>
<p><b>Phase 3: Emergent surgery with respiratory compromise</b></p> <p><i>Semi-elective intubation of patient with moderate clinical signs of pulmonary fibrosis</i></p> <p><i>* Features of difficult BMV and ETT</i></p> <p><i>* Baseline hypoxia despite suppl. O<sub>2</sub></i></p> <p><i>* PreO<sub>2</sub> improves but still hypoxic</i></p>	<p>Example scenario</p> <ul style="list-style-type: none"> <li>- 65yo</li> <li>- BMI 50</li> <li>- SpO<sub>2</sub> 88% on 15 l/min NRB</li> <li>- HR 135 bpm ST</li> <li>- BP 102/43</li> </ul> <ul style="list-style-type: none"> <li>- ETO<sub>2</sub> 75% and SpO<sub>2</sub> 93% after adequate preO<sub>2</sub></li> <li>- Swift desaturation once induced 93% → 35% over 30 secs</li> <li>- ETCO<sub>2</sub> 65 and recovery to SpO<sub>2</sub> 90% once intubated</li> <li>- Intubation successful on first pass</li> </ul>	<ul style="list-style-type: none"> <li>- As above</li> <li>- Demonstrate correct removal of existing O<sub>2</sub> delivery systems</li> <li>- Recognise the importance of adequate planning and donning of PPE despite time-critical nature</li> </ul>	<ul style="list-style-type: none"> <li>- As above in phase 1</li> <li>- Recognise the importance of adequate planning and donning of PPE despite time-critical nature</li> <li>- Formulate airway plan for anticipated difficult airway</li> <li>- Execute plan</li> <li>- Doff PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Recognition of the importance of adequate planning and donning of PPE despite time-critical nature</li> </ul>



## EMERGENCY DEPARTMENT SCENARIOS

PHASE	STATE	LEARNING OBJECTIVES	EXPECTED ACTIONS	DISCUSSION POINTS
<b>Phase 1</b>  <i>Patient presents to ED with resp distress. Bilateral pneumonia.</i> <i>Decision made to intubate.</i> <i>History of hypertension</i>	Example scenario  <ul style="list-style-type: none"> <li>- 62yo male</li> <li>- SpO<sub>2</sub> 91% NRB</li> <li>- HR 111 bpm SR</li> <li>- BP 112/75</li> <li>- T 38.4</li> </ul> Sats drop to 82% during induction	<ul style="list-style-type: none"> <li>- All global learning objectives</li> </ul>	<ul style="list-style-type: none"> <li>- Discussion of shared airway plan and strategies</li> <li>- Role allocation</li> <li>- Don PPE</li> <li>- RSI (+/- using checklist)</li> <li>- Minimise BMV</li> <li>- Ascertain adequate paralysis</li> <li>- Stop high flow before removing face-mask</li> <li>- Cuff up prior to test ventilation</li> <li>- Doff PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Definition of an aerosol generating procedure (AGP)</li> <li>- Recognition of moments of RSI process which may lead to AGP – BMV, unsealed contaminated high-flow circuit, coughing</li> <li>- Importance of effective preoxygenation in attempt to avoid BMV</li> <li>- Importance of effective neuromuscular blockade at time of airway instrumentation</li> <li>- Importance of stopping high-flows before removing facemask</li> <li>- Role of video laryngoscope in distancing intubator’s airway from patient’s airway</li> </ul>

<p><b>Phase 2</b></p> <p><i>Morbidly obese patient with respiratory distress.</i></p> <p><i>Decision made to intubate.</i></p> <p><i>History of DM and HTN.</i></p> <p><i>* Consider DSI</i></p> <p><i>* Features of difficult BMV and ETT</i></p> <p><i>* First intubation attempt fails with worsening hypoxia</i></p>	<p>Example scenario</p> <ul style="list-style-type: none"> <li>- 44yo male</li> <li>- BMI 50</li> <li>- SpO<sub>2</sub> 91% NRB</li> <li>- HR 122 bpm ST</li> <li>- BP 145/87</li> <li>- T 39.1</li> </ul> <ul style="list-style-type: none"> <li>- Becomes distressed with preoxygenation, pulling at face mask</li> <li>- Swift desaturation once induced 95% → 65% over 60 seconds</li> <li>- Green zone attained if LMA OR BMV with OPG and 2 hand grip</li> </ul>	<ul style="list-style-type: none"> <li>- As above</li> <li>- Plan for DSI</li> <li>- Formulate green zone strategies while minimising aerosolization and staff exposure</li> </ul>	<ul style="list-style-type: none"> <li>- As above</li> <li>- Consider DSI</li> <li>- Formulate airway plan for anticipated difficult airway</li> <li>- Gentle BMV or SGA</li> <li>- Formulate 'replace' plan and strategies</li> <li>- Execute 'replace' plan</li> <li>- Doff PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Adaptation of RSI to anticipated difficult airway</li> <li>- Recognition of green zone</li> <li>- Recognition of imperfectly sealed BMV and SGA ventilation as AGPs</li> <li>- Strategies of replacing in GZ while maintaining aerosolization and staff exposure at minimum</li> <li>- Assessment of adequacy of in-room resources</li> </ul>
<p><b>Phase 3</b></p> <p><i>Patient presents with severe resp distress and hypoxia</i></p> <p><i>Requires urgent RSI</i></p> <p><i>* Hypoxia worsens during induction</i></p> <p><i>* 1<sup>st</sup> pass success</i></p>	<p>Example scenario</p> <ul style="list-style-type: none"> <li>- 65yo</li> <li>- SpO<sub>2</sub> 88% on 15 l/min NRB</li> <li>- HR 135 bpm ST</li> <li>- BP 93/46</li> <li>- T 39.3</li> </ul> <ul style="list-style-type: none"> <li>- Swift desaturation once induced 88% → 35% over 30 secs</li> </ul>	<ul style="list-style-type: none"> <li>- As above</li> <li>- Demonstrate correct removal of existing O<sub>2</sub> delivery systems</li> <li>- Recognise the importance of adequate planning and donning of PPE despite time-critical nature</li> </ul>	<ul style="list-style-type: none"> <li>- As above in phase 1</li> <li>- Recognise the importance of adequate planning and donning of PPE despite time-critical nature</li> <li>- Formulate airway plan for anticipated difficult airway</li> <li>- Execute plan</li> <li>- Doff PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Recognition of the importance of adequate planning and donning of PPE despite time-critical nature</li> </ul>

## ADDITIONAL RESOURCES

1. [NSW Health website for COVID-19](#)
2. [Department of Health website for Health Professional resources for COVID-19](#)
3. British Journal of Anaesthesia (Feb 2020): [Outbreak of a new coronavirus: what anaesthetists should know](#)
4. WFSA: [Coronavirus - guidance for anaesthesia and perioperative care providers](#)