

INSTRUCTOR MANUAL

Revised October 2024

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Foreword

“I see and I forget. I hear and I remember. I do and I understand”¹

The New-2-ICU course was set up in 2009 with a view to improving the safety of patients of on the intensive care unit (ICU). The European Working Time Directive, coupled with changes to postgraduate medical education has meant that doctors in training are now working on the ICU with less clinical experience than was the case previously. Furthermore, work on the ICU requires skills and knowledge which are often not transferable from other specialties. Doctors in training are placed on the ICU on-call rota as soon as their rotation begins, often without direct supervision; they have little or no time to be taught or to learn the skills which will make them able to work proficiently on the ICU or to manage dangerous or life-threatening situations competently until senior help arrives.

Such situations do arise on the ICU. Data from the fourth National Audit Project of the Royal College of Anaesthetists suggests that approximately 20% of all airway incidents occur on the ICU; these result in death or brain damage in 61% of occasions, being more serious than events occurring elsewhere in the hospital². Furthermore, 46% of these events occurred ‘out of hours’ and as such a significant proportion of them were managed by doctors in training. In addition, we know that airway displacement and the serious consequences of it occur more frequently after (not during) the placement of the device, reinforcing the view that problems may occur when senior help may not be available³. These studies demonstrate the importance of competence in understanding at least the initial management of airway displacement for doctors working on the ICU.

Data has shown that simulation can improve many aspects of the care provided by ICU doctors. It can improve staff interactions, teamwork, decision making as well as performance in ICU specific tasks^{4,5,6}. It allows realism in the rehearsal of the management of important and life-threatening clinical situations, whilst allowing this experience to be gained in a controlled environment⁷. The use of multimedia learning aids such as videos and lecture podcasts allows more time on the course for hands on practice, and our experience and has been that this further improves learning^{8,9,10,11}.

The New-2-ICU course addresses many of these problems by applying modern, evidenced based teaching and learning. Our data suggests the course is useful, relevant, and improves skills and confidence amongst candidates, and has proven its worth in a number of tracheostomy emergencies in our region.

Thank you for your help in teaching on the course and for supporting our doctors, and in turn our patients.

Andy Georgiou & Miguel Garcia Rodriguez
Course Creators

Lizzie Williams, Sara Bonfield & Aravind Ramesh
Course Directors

Organising the course and using this manual

This manual will guide course organisers and instructors through the process of organising, setting up and delivering the course. The course has been refined over many years, having been first established in 2009, and so the content and timings described here are as a consequence of much trial and error over the years and adjustment of the course according to candidate and instructor feedback. Appropriate briefing of the candidates and particularly instructors before the course is essential to ensure the course runs smoothly and candidates get the most out of the programme. Slide sets have been developed to support some of the teaching for the course- [these are available as links throughout this manual and on our website here](#). A schedule for organising the course is given below.

We have traditionally run the course twice a year just before or just after doctor rotation into ICU in February and August. With the increase in less than full time doctors, there may be some candidates that need to be included 6 months or more prior to their intensive care medicine (ICM) rotation. It is helpful if your acute care common stem (ACCS) ICM lead can provide the course date to each of the faculty tutors and rota coordinators in each of the hospitals from which your candidates will be drawn, to ensure you achieve maximal attendance and that candidates attend when most useful to them.

The course is heavily reliant on faculty. We have relied on senior doctors in training to fulfil this role, although any consultant input is always gratefully received. We encourage you to ask current ICM trainees of registrar level rather than non-ICM trainees. You will ideally need 10 or 11 faculty members plus 2 course directors for each course. This allows for each of the stations to have 2 faculty (3 for SIM), and having 2 course directors allows for cross-cover in the event of sickness amongst the faculty group on the day. Faculty members can use study leave to teach on the course, and have their contribution recognised as teaching experience for their CVs. We suggest certificates or letters of thanks are provided for the faculty as formal recognition of their contribution.

More than six months ahead of the course

- Agree funding arrangements with the Deanery or Trust(s).
- Identify and book a suitable location- this will need to have:
 - At least two SIM rooms, or one SIM suite room and other rooms able to accommodate basic manikins.
 - A room for introduction/closure with the ability to display slides.
 - Equipment as outlined in each of the sections below (mostly standard ICU equipment).
 - Three manikins, with the ability to simulate a tracheostomy in at least one (as the tracheostomy will be displaced in the scenario, it is acceptable to have tracheostomy tube through the skin of the manikin but outside of the trachea- meaning that a stoma into the trachea is not required).
 - An ultrasound machine.
 - A ventilator with a source of driving gas if required (not all ventilators require this).
 - A CD oxygen cylinder (to use with a Waters' circuit/BVM).
 - Ideally lunch provided.
- Advertise course dates to prospective candidates (email template below). Include deadline for replying.
- Advertise course dates to ACCS ICM lead and faculty tutors in every hospital in your region.

Six months ahead of the course

- Advertise course dates to prospective candidates again.
- Collate faculty. You will need a minimum of 10 faculty, ideally 11 to allow for two faculty to be present in each of the stations. Faculty are usually drawn from the pool of ICM registrars grade ST5 and above.

Six weeks ahead of the course

- Advertise course dates to prospective candidates again. Include deadline for replying.
 - Set up a spreadsheet with candidate information to include prior ICU experience and whether they have yet completed their ACCS anaesthetics block.
 - When sending group candidate emails always remember to use the BCC function to avoid any data protection (GDPR) issues.
- Write to the faculty:
 - Confirm their availability.
 - Allocate them to course stations according to skill mix.
 - Send them this manual so that they can study the requirements of them ahead of the course. This is particularly important as time on the course is tight and a clear awareness of what is required of them ahead of time is essential.
 - Depending on your course centre set-up ask faculty to bring with them a laptop and charger to display the slide sets for each of the stations if you don't have the ability to have individual rooms with projectors in them.

Four weeks ahead of the course

- Write to all candidates and ask that they complete the online learning (email template below). This requires them to:
 - [Study the candidate manual available on the website](#)
 - [Watch the online learning videos available on the website](#)
 - Watch the CO2 trace video - [Capnography: No Trace = Wrong Place | The Royal College of Anaesthetists](#)
 - Link to Pre-Course Questionnaire - <https://forms.gle/cq1sPCd8Q5gyPiLQ9>
- We advise against group allocation or timetable distribution prior to the course itself as lots of things change and this leads to confusion amongst candidates

Two days ahead of the course

- Send reminder email to candidates asking them to complete the information requested above (see email four weeks ahead of course), if not done so already.
- Confirm final numbers with your hosting venue if not already done so.

Email templates

Email advertisement for candidates

Dear **CANDIATE NAME**,

We are pleased to invite you to the New-2-ICU Course for **DATE**

The course will be held in **PLACE**, on **DATE** Further details and timings will be sent out closer to the day.

This course is **compulsory attendance for all ACCS trainees who are doing the ICU rotation between DATE and DATE**. If you are not doing ICU from **DATE** (or shortly afterwards), please let us know, as it is likely that someone else at your hospital should be invited in your place.

Your rota writers all know that you are expected to come on the course, so please let us know if you are unable to request the day of study leave.

Could you please reply to this email address (**COURSE EMAIL**) by **DATE FOR RESPONSE**, to let us know whether you are able to come to the course and if not please let us know why.

In your reply, please include:

1. **your parent specialty for ACCS,**
2. **your grade,**
3. **whether you have done your ACCS anaesthetic block yet,**
4. **whether you have any previous ICU or anaesthetic experience** (including COVID surge cover)
5. **any dietary requirements**

Any other questions, please do not hesitate to get in touch. We will send out further information and the course manual closer to the time, and look forward to meeting you in **MONTH OF COURSE!**

Kind Regards,

Pre-course email for candidates

Hi everyone,

We hope you are looking forward to starting your new ICU block!

Thank you all for confirming your attendance and providing the information requested.

We are looking forward to meeting you all on **DATE** for the New2ICU Course. Please meet in **LOCATION DETAILS**.

Registration starts at 0845. The day will start **promptly** at 0900 and finish equally promptly at 1645!

Lunch will be provided in **LOCATION**, as will morning and afternoon refreshments.

Just a few small things to do:

1. Pre-course Questionnaire:

Please could you fill this in before coming to the course. It is short and helps to improve the course each time we do it.

<https://forms.gle/cq1sPCd8Q5gypiLQ9>

2. Pre-Course Reading:

We have attached the course manual. You will find it helpful reference material to get you ready for the course, or to use afterwards as needed. You may have received something similar from your hospital, but we hope you find it a helpful resource during your time on ICU. A copy of the schedule for the day can be found in the manual. You'll be allocated to your groups on the day.

3. Please could you make sure you have watched this video, before the course.

<https://www.rcoa.ac.uk/safety-standards-quality/guidance-resources/capnography-no-trace-wrong-place>

4. Additional short videos

[Please try and watch the videos found here](#) that cover introductions to some common themes and topics. Watching these prior to the course will help you to get the most out of some of the discussions. They will also be available after the course for you to refer back to.

We're really looking forward to meeting you all next week.

Please get in touch with any concerns and call COURSE DIRECTOR CONTACT DETAILS for any on-the-day issues.

Good luck for the next week as you start ICU!

Course Programme : schedule and organisation

Candidate Timetable (please edit the locations to suit your needs)

0845 – 0900 Registration Atrium

0900 – 0910 Welcome Clinical Skills Room

0910 – 1315 Small Group Sessions: Seminar Rooms, Sim Space, Clinical Skills (75 minutes each)

	Airway Breathing Clinical Skills Lab	Circulation Clinical Skills Lab	ICU Patient Seminar Room 6	SIM SIMSpace	Tutorial Room 16
0910 – 1025	A	B	C	D	E
1030 – 1145	B	A	D	E	C
1200 – 1315	C	D	E	A	B

1315 – 1400 Lunch

1400 – 1635 Small Group Sessions: Seminar Rooms, Sim Space, Clinical Skills (75 minutes each)

	Airway Breathing Clinical Skills Lab	Circulation Clinical Skills Lab	ICU Patient Seminar Room 6	SIM SIMSpace	Tutorial Room 16
1400 – 1515	E	C	A	B	D
1520 – 1635	D	E	B	C	A

1635 – 1645 Wrap up, conclusions, post-course surey Clinical skills room
1645 Home

We aim to divide the candidates into groups according to their level of ICU/anaesthetic skill and prior experience. We have found that having groups of similar skill level will enable more tailored learning discussions throughout the day. This is the opposite of ALS where experience is mixed within any one group. We would strongly advise that the most experienced group of candidates start with the SIM station and that those with no prior anaesthetic/ICU experience complete the airway station prior to embarking on the SIM. This may not be possible if you have an entirely inexperienced cohort.

Candidate allocation

GROUP A

GROUP B

GROUP C

GROUP D

GROUP E

Faculty timetable and allocation

0800 Arrival, set-up

0845 – 0900 Registration Atrium

0900 – 0910 Welcome Clinical Skills Room

0910 – 1315 Small Group Sessions (75 minutes each)

	Airway / Breathing Clinical Skills	Circulation Clinical Skills	ICU Patient Room 6	SIM SIMSpace	Tutorial / Quiz Room 16
0910 – 1025	Faculty Name	Faculty Name	Faculty Name	Faculty Name	Faculty Name
	Group A	Group B	Group C	Group D	Group E
1030 – 1145					
	Group B	Group A	Group D	Group E	Group C
BREAK					
1200 – 1315					
	Group C	Group D	Group E	Group A	Group B

1315 – 1400 Lunch

1400 – 1635 Small Group Sessions (75 minutes each)

	Airway / Breathing Clinical Skills	Circulation Clinical Skills	ICU Patient Room 6	SIM SIMSpace	Tutorial / Quiz Room 16
1400 – 1515	Faculty Name	Faculty Name	Faculty Name	Faculty Name	Faculty Name
	Group E	Group C	Group A	Group B	Group D
1520 – 1635					
	Group D	Group E	Group B	Group C	Group A

1635 – 1645 Wrap up, conclusions and end of day Clinical Skills Room

1645 Candidates Home
Faculty Debrief +/- PUB!

Ideally try and allocate 2 faculty per station with any extras used to support the SIM station.

Introductory presentation

This is the opportunity to introduce the course, the faculty and the expectations of the day. The introductory presentation is usually given by the course director.

Stressing the importance of sticking to time is advisable.

Ask any candidates who have not completed the pre-course questionnaire to do so in the morning break.

Having obtained the pre-course questionnaire, it is important to explain that completing the post-course questionnaire is important for the ongoing oversight of the course.

[Click here to open the introductory presentation.](#)

Airway and breathing station

Aims:

1. Hands on experience of airway equipment commonly used in ICU.
2. Experience of Waters' circuit and bag-valve mask ventilation in the rescue airway scenario.
3. Experience of igel insertion.
4. Recognition of the displaced tracheostomy or tracheal tube and calling for help early.
5. Management of a displaced tracheostomy or tracheal tube using the displaced tracheostomy algorithm until more senior help arrives.
6. Understanding basic ventilator settings.
7. Hands on experience of adjusting a ventilator.
8. Learning how to increase oxygenation, pending arrival of senior help: increase FiO₂, increase PEEP, alter I:E ratio.
9. Increase familiarity of the ICU emergency scenario and working as a team to troubleshoot the problem and perform basic rescue manoeuvres.
10. The basics of the ABCDE assessment in an ICU patient.

Equipment list:

Computer
Airway head/manikin
Nasal prong
Non-rebreathe/reservoir mask
Self-inflating bag
Mapleson C/Waters' Circuit
Facemask 3/4/5
Nasopharyngeal airway – size 6/7/8
Oropharyngeal airway – size 3/4/5/6
iGel – size 3/4/5
pLMA – size 4/5
Endotracheal tube with subglottic suction port – size 6/7/8
Tracheostomy tubes – cuffed, with subglottic port – size 7/8
10ml syringe
Tracheostomy mask
Inline capnography
Yankauer sucker
Suction tubing
Laryngoscopes MAC 3 and MAC 4
Bougie
HME filter
Inline suction for ETT
Inline suction for tracheostomy
Intubation drugs – mock labelled syringes – no real drugs required
Ventilator
Displaced tracheostomy algorithms and bed head signs (local and national)
Intubation checklist

Session plan (75 minutes)

This session is all conducted in one 'station'. Note the tight timings.

1. Bag-valve-mask ventilation (10 minutes)
2. Drill 1: reintubation following unplanned extubation (15 minutes)
3. Drill 2: management of dislodged tracheostomy (15 minutes)
4. Drill 3: management of hypoxia (10 minutes)
5. Drill 4: management of hypercapnia (10 minutes)
6. Airway quiz (10 minutes)

The timings of this station will likely vary depending on the experience level within your groups. Those who have completed their ACCS anaesthetics block and have their initial assessment of competency (IAC) are likely to move through parts of this quicker than those with no airway experience or familiarity with the equipment.

[There are some resources/slides available on the website and by double clicking here.](#)

BVM/ Waters' circuit ventilation (10 minutes)

- Ensure all candidates show good technique: good jaw thrust, insertion of Guedel, good seal with mask, requesting and using second person for ventilation, use of ETCO₂ to confirm adequate ventilation.
- They should all have a go at using the Waters' circuit to understand how to use and adjust the APL valve.

Drill 1: reintubation following unplanned extubation (15 minutes)

- The aim of the drill is to get the candidates to:
 - Recognise urgency of loss of airway.
 - Get someone else to call for airway help.
 - Maintain oxygenation and ventilation with good BVM technique +/- insertion of igel.
 - Gather appropriate equipment for reintubation: airway trolley, videolaryngoscope, drugs, suction, consider HFNO/nasal cannulae at 15L/min for apnoeic oxygenation, consider looking at anaesthetic chart for intubation grade.
 - Begin checklist to aid preparation (to be completed with airway support person).
- Faculty member can be airway support person if no airway trained candidates – this is not about them intubating someone; it is about maintaining oxygenation and thinking forward to the next steps.

Consider the following scenario:

- Patient sedated, intubated and ventilated post laparotomy.
- Has been on ICU for 3 hours post theatre, but accidentally extubated on rolling.
- Ventilation: FiO₂ 0.4, Sats 96%.
- Sedation: Propofol and Alfentanil.
- Bedside nurse has used Waters' circuit to mask ventilate the patient (no ETCO₂ in circuit yet- candidates should ask for this).
- Haemodynamically stable initially.
- Candidates must call for help, maintain oxygenation, and coordinate equipment required for reintubation.
- ETCO₂ should always be used during bag ventilation.
- One candidate should be first responder, but all should be involved.
- Airway person should not lead the checklist.
- Discussion points:
 - Maintaining oxygenation is absolute priority.
 - Hypoxia/rapid desaturation in ICU patients likely.
 - Always use videolaryngoscopy (swelling, team view, best first attempt).
 - Drugs used:
 - Ketamine vs Propofol.
 - Fentanyl/alfentanil bolus from pump.
 - Rocuronium: (maintains good intubating conditions for much longer in failed intubation scenarios), no option to wake up, ICU patients have risk of hyperkalaemia).
 - Vasopressors: Noradrenaline/metaraminol/ +/- dilute adrenaline.

- The candidate manual contains the national intubation checklist- as illustrated below.

Invasive Procedure Safety Checklist: ITU INTUBATION

BEFORE THE PROCEDURE	TIME OUT	SIGN OUT
Preparation	Verbal confirmation between team members before start of procedure	
Have all members of the team introduced themselves? Yes <input type="checkbox"/> No <input type="checkbox"/>	Were difficult airway plans discussed? Yes <input type="checkbox"/> No <input type="checkbox"/>	Endotracheal position confirmed (EtCO2 trace)? Yes <input type="checkbox"/> No <input type="checkbox"/>
Is Patient Position Optimised? Yes <input type="checkbox"/> No <input type="checkbox"/>	Is senior help needed? Yes <input type="checkbox"/> No <input type="checkbox"/>	Tube depth checked (B/L Air entry)? Yes <input type="checkbox"/> No <input type="checkbox"/>
Are spinal precautions required? Yes <input type="checkbox"/> No <input type="checkbox"/>	Is role allocation clear? (Intubator, drugs, assistant, cricoid, MILS) Yes <input type="checkbox"/> No <input type="checkbox"/>	ETT secured and cuff pressure checked? Yes <input type="checkbox"/> No <input type="checkbox"/>
Pre-oxygenate: 100% FIO2 for 3 mins Yes <input type="checkbox"/> No <input type="checkbox"/>	Is difficult airway anticipated? Yes <input type="checkbox"/> No <input type="checkbox"/>	Nasal O2 Removed? Yes <input type="checkbox"/> No <input type="checkbox"/>
Are nasal cannulae for apnoeic ventilation needed? Yes <input type="checkbox"/> No <input type="checkbox"/>	Any concerns about procedure? Yes <input type="checkbox"/> No <input type="checkbox"/>	Appropriate Ventilator settings confirmed? Yes <input type="checkbox"/> No <input type="checkbox"/>
Is Water's circuit available and ready? Yes <input type="checkbox"/> No <input type="checkbox"/>	If you had any concerns about the procedure, how were these mitigated?	Analgesia and sedation started? Yes <input type="checkbox"/> No <input type="checkbox"/>
Is cricoid pressure considered and NGT aspirated? Yes <input type="checkbox"/> No <input type="checkbox"/>	<div style="border: 1px solid black; height: 40px; width: 100%;"></div>	ICP optimisation required? D/W Neurosurgeon? Yes <input type="checkbox"/> No <input type="checkbox"/>
Post intubation sedation ready? Yes <input type="checkbox"/> No <input type="checkbox"/>		Chest X-Ray required? Yes <input type="checkbox"/> No <input type="checkbox"/>
Equipment and Drugs		Hand over to nursing staff? Yes <input type="checkbox"/> No <input type="checkbox"/>
Is Monitoring attached ? (ECG, SpO2, BP on regular cycling, EtCO2) Yes <input type="checkbox"/> No <input type="checkbox"/>		Signature of responsible clinician completing the form
Is suction ready? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Is adequate venous access in place? Yes <input type="checkbox"/> No <input type="checkbox"/>		Patient Identity Sticker:
Are working Laryngoscope/s and bougie ready? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Are Endotracheal tube/s ready? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Are Oropharyngeal airways and iGels available? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Is Difficult airway trolley likely to be needed? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Are Drugs and Vasopressors ready? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Any Drug allergies Known? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Team		
Is senior help needed? Yes <input type="checkbox"/> No <input type="checkbox"/>	Procedure date: <input type="text"/> Time: <input type="text"/>	
Is Role allocation clear? (Intubator, drugs, assistant, cricoid, MILS) Yes <input type="checkbox"/> No <input type="checkbox"/>	Operator: <input type="text"/>	
Is difficult airway anticipated? Yes <input type="checkbox"/> No <input type="checkbox"/>	Observer: <input type="text"/>	
	Assistant: <input type="text"/>	
	Level of supervision: SpR <input type="checkbox"/> Consultant <input type="checkbox"/>	
	Equipment & trolley prepared: <input type="text"/>	

Drill 2: management of dislodged tracheostomy (15 minutes)

- The aim of the drill is to get each of the candidates to:
 - Identify the displaced tracheostomy tube and call for help early.
 - Run through the displaced tracheostomy algorithm (upper airway intact).
 - Learn the importance of managing the airway from above and not from the stoma.
 - Talk through the neck breather displaced tracheostomy tube algorithm.

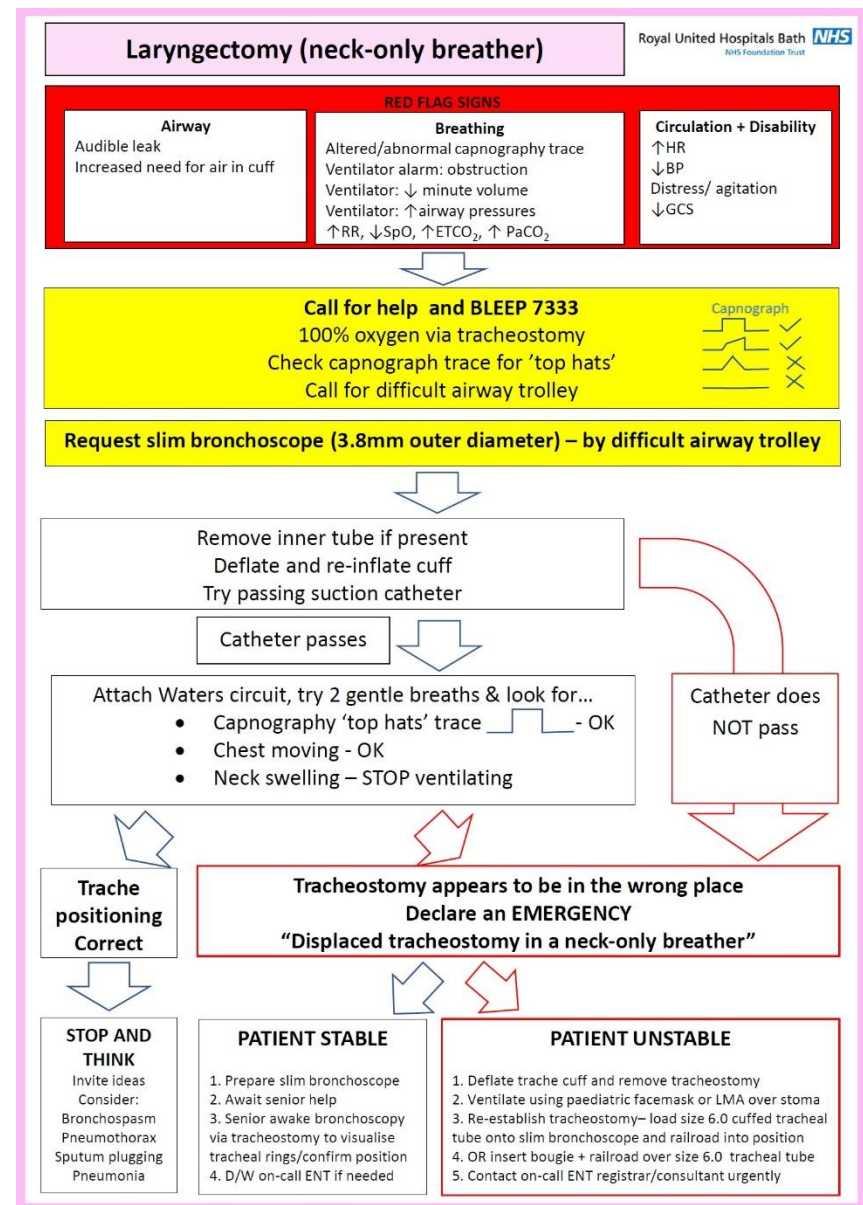
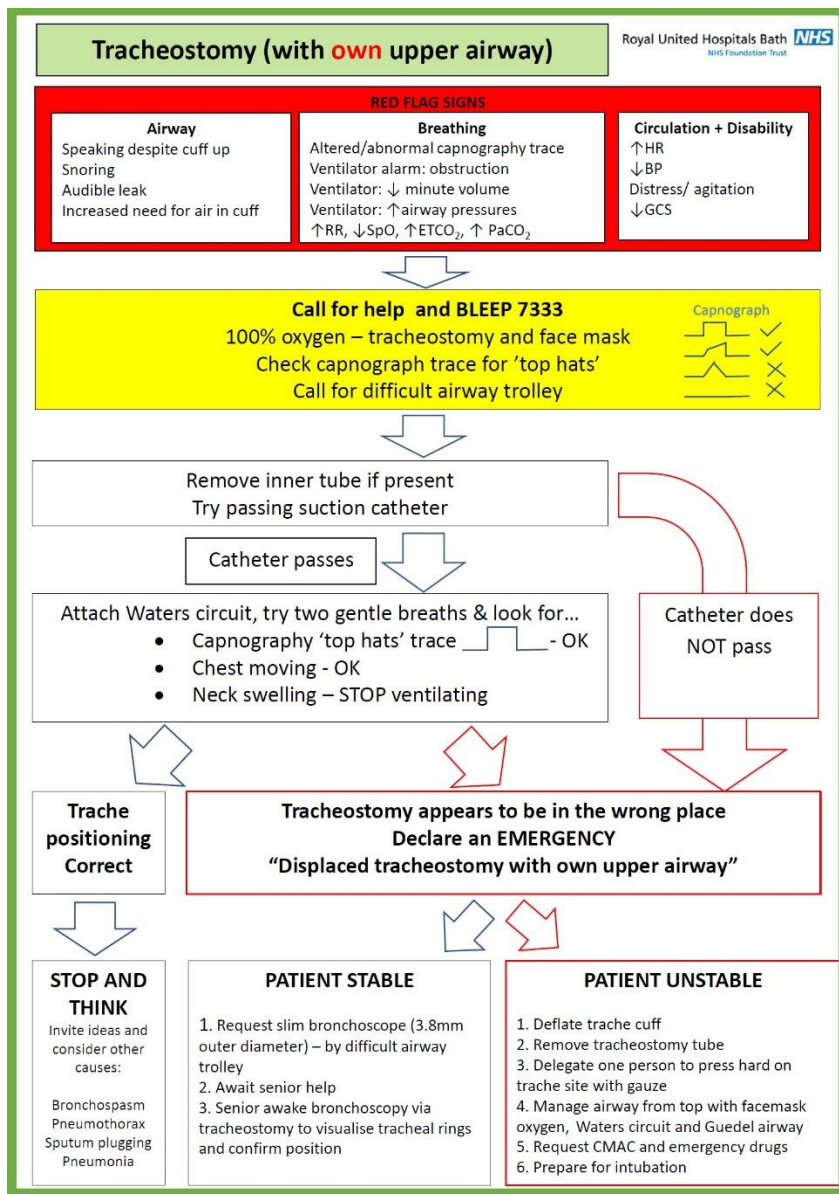
Consider the following scenario:

A 71-year-old morbidly obese woman with a neuromuscular disease of unknown aetiology is on your intensive care unit. She was admitted 3 weeks previously and a percutaneous tracheostomy was performed 2 days ago.

You are on call for the ICU and are called urgently by the nurse at 01:00, as the patient has become confused and has pulled out their tracheostomy tube. You arrive to find the patient with the tracheostomy tube on the floor, breathing spontaneously at a rate of 26/minute with an SpO₂ of 80% on room air. The heart rate is 120, and the blood pressure is 160/100mmHg.

- The candidate manual contains the local (ICU specific) and NTSP algorithms. Our experience is that the local algorithm is simpler for the candidates- what you teach should be dependent on what algorithms are used in units in your region.
- When discussing the NTSP algorithm, identify the important points that will enable them to act as an ICU/airway doctor, rather than a ward responder.
- Emphasize that capnography should always be used to help identify the presence or absent of a patent airway.
- Important learning points:
 - Waters' circuit enables assessment of spontaneous breathing.
 - Upper airway patent and should be first port of call.

- Having the fortitude and mental strength to remove a non-functional tracheostomy if the diagnostic tests (suction catheter, movement of Water' bag if breathing, chest movement, CO₂) suggests it is not in the trachea.
- Risk of trying to recannulate original stoma- false tract, surgical emphysema, loss of airway from swelling.
- Many tracheostomies on ICU may be newer than those on the ward.
- If the patient was not spontaneously breathing prior to the tracheostomy problems, they will need to carefully deliver two breaths via Waters' circuit (no more!) and watch the ETCO₂, chest movement, and watch for subcutaneous emphysema.
- Discuss use of bedhead signs/always having the algorithm behind the head of a patient.



Drill 3: management of hypoxia (10 minutes)

- The aim of the drill is to get each of the candidates to:
 - Learn how to make adjustments to the ventilator.
 - Learn the basics of how to improve the oxygenation of a patient on a ventilator.
 - Learn the basic difference between mandatory and spontaneous modes.

Candidates must use the ventilator to make appropriate adjustments in response to a blood gas.

[Blood gasses are on the power point slide](#), and also available below.

It is important that they interact with the ventilator- it's not a demonstration.

- Before starting, ensure all candidates understand the basics of lung protective ventilation and blood gas targets:
 - V_t 6ml/kg IBW
 - Plateau P <30cmH₂O
 - PaO₂ target 10 kPa initially, then 8 kPa (head injuries PaO₂ 13kPa, then 10kPa)
 - PaCO₂ such that pH >7.25
 - PEEP stratified to FiO₂ using ARDSnet tables

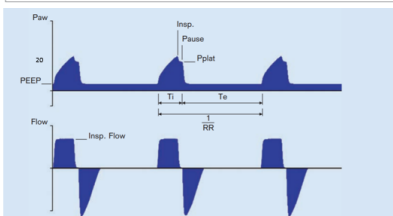
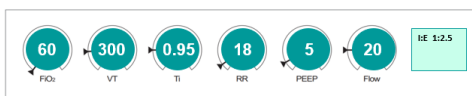
Consider the following scenario:

A 60kg (178cm tall) female is ventilated for pneumonia on your ICU. She is hypoxic and mildly hypercapnic, yielding a mild acidaemia. What should you do?

- Set the ventilator up as shown below. The V_t is deliberately suboptimal.

Pneumonia, 60kg female

VC - AC



ABG FiO₂ 0.6

pH	7.32
pCO ₂	5.8
pO ₂	6.3
HCO ₃	25
BE	-4
Lactate	3.1

- Optimize V_t : for a 178cm female this should be 414ms using the ARDSnet tables.
- Increase FiO₂ (not absolutely necessary if sats >88%, but should consider it). Worth explaining that this doesn't solve the underlying problem, but may make things better while the underlying problem is explored and corrected.
- Increase PEEP (do so gradually to see what it does to the Ppeak).
- Increase RR slightly and check to see if I:E linked (ensure inspiratory time optimized – consider changing to 1:2).
- PEEP, I:E and number of inspiratory breaths all contribute to an increase in mean airway pressure which is linked to PaO₂.
- Consider suctioning (ask bedside nurse if not done before).
- Check that parameters are improving (Sats, ETCO₂, Ppeak) and check a gas in 20-30 mins.
- Other things to consider: using muscle relaxants to mitigate dysynchrony, chest physio, bronchoscopy (but discuss with reg/senior nurse).

Drill 4: management of hypercapnia (10 minutes)

- The aim of the drill is to get each of the candidates to:
 - Learn how to make adjustments to the ventilator.
 - Learn the basics of how to improve the CO₂ of a patient on a ventilator.
 - Learn the basic difference between mandatory and spontaneous modes.

Candidates must use the ventilator to make appropriate adjustments in response to a blood gas.

[Blood gasses are on the power point slide](#), and also available below.

It is important that they interact with the ventilator- it's not a demonstration.

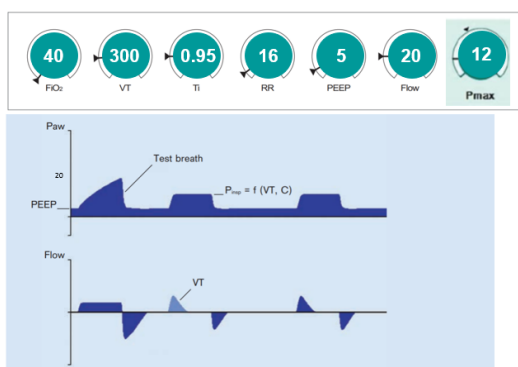
Consider the following scenario:

A 68kg (165cm tall) female is ventilated on your ICU for an exacerbation of COPD. She is very hypercapnic with acidaemia.

- Set the ventilator up as shown below.
- Consider the risk of pneumothorax given COPD/high peak pressures.

COPD Exacerbation, 68kg female

PC - VG



ABG FiO₂ 0.4

pH	7.10
pCO ₂	15.3
pO ₂	7.9
HCO ₃	28
BE	-3.4
Lactate	2.1

- Optimise V_t: for a 178cm female this should be 414mls using the ARDSnet tables.
- Increase RR and check to see if I:E linked (ensure I:E is such that expiration completes).
- Look at the flow patterns- as displayed above there is lots of 'wasted' time in which ventilation could occur.
- Observe P_{peak} needs adjusting (want to recognise the need to limit it somewhat in COPD, but recognise that P_{plat} is the key pressure limit to observe).
- Note that P_{max} is 12 and therefore, full TV will not be delivered if P required >12 (more than likely given COPD).
- Oxygenation is acceptable
- Other things to consider: suctioning, chest physio, using muscle relaxants to allow TV to be delivered with appropriate peak pressures, bronchoscopy (but discuss with reg/senior nurse).

AIRWAY QUIZ (10 minutes)

If time allows – see PowerPoint (at end of Airway and Breathing slides).

Each picture reveals something to be gathered for an ICU intubation.

Circulation Station

Aims:

1. Hands on experience of central line insertion using ultrasound.
2. Hands on experience of arterial line insertion.
3. Gain some understanding of assessing the fluid balance of an ICU patient.
4. Touch on the basics of commonly used cardiovascular drugs on ICU.

Session plan (75 minutes)

1. Line insertion and ultrasound technique
2. Fluid balance assessment
3. Cardiovascular drugs

Equipment list:

Ultrasound models/manikins – to practice needle visualization, vascular puncture and line insertion

Ultrasound machines x2 if available

Computer

2x Flow switch arterial line

1x Arrow arterial line

2x Quad lumen central venous line

1x VasCath

500ml 0.9% Sodium Chloride (x4)

Red food colouring

500ml pressure bags x2

1x Arterial line transducer set

1x Central line transducer set

Syringes: x2 of 5ml/10ml

2x blood gas syringes

Line insertion and ultrasound technique

The purpose of this station is to teach and give candidates practical experience of insertion of arterial and central venous lines. Ideally this should be achieved using central line insertion trainer manikins. Arterial access may be best demonstrated using an appropriate (brief) video.

The powerpoint series should be used to guide and support this session. Again, division of timings will depend on candidates' prior experience. Ideally aim to cover the theory first and then allocate plenty of time for hands-on practice with ultrasound machines and training models. It may be appropriate to ask one of the candidates or instructors to model their ultrasound anatomy.

Fluid balance assessment

This is covered through small group discussion. The power point slides accessible through the link above will help to guide the discussion.

Cardiovascular drugs

This is covered through small group discussion. The power point slides accessible through the link above will help to guide the discussion. The intention is to give only a brief overview of these drugs and the indications for their use. More formal instruction will be received by the candidates during their rotation.

The ICU Patient

Aims:

1. To understand what delirium is and how to assess it.
2. Recognition of different stages of delirium and how to manage them in the absence of immediately available senior help.
3. To gain a basic understanding of commonly used drugs for sedation on ICU.

Session plan (75 minutes)

1. Delirium videos (40 minutes)
2. Sedative drugs (15 minutes)
3. Delirium, CAM-ICU and DOLS (20 minutes)

Equipment list:

Computer and screen.

Delirium videos (40 minutes)

This part of the course presents an ICU patient to the candidates at different levels of delirium. The subsequent group discussion addresses the question of “what would you do” and guides the candidates through the decision-making processes and the therapeutic options for management of delirium. The videos are bespoke to the scenarios and are available through the links below.

Consider the following scenario:

- Jackie is a 58-year-old woman who has been on your ICU for 3 days following a laparotomy and small bowel resection with primary anastomosis for ischaemic bowel. She was extubated on day 1.
- PMH: Paroxysmal AF.
- Medications: Sotalol, rivaroxaban but admits to occasionally forgetting her medications.
- No allergies.

Video 1 (early delirium)

“It is 10 pm and the nurse looking after Jackie is worried.”

Watch video 1: [available via this link](#)

Discussion:

- How would you proceed as the ICU doctor asked to come and see her?
 - Encourage an A to E assessment
 - A- own
 - B- RR 24 SaO₂ 94% on 4L via NC but desaturates to 88% when not tolerating them. Equal air entry but quiet both bases, no wheeze.
 - C- HR 100/min regular BP 170/65 on 0.03 mcg/kg/min noradrenaline CRT 2s.
 - D- AVPU but agitated, picking at lines, distressed and disorientated to time and place. Temp 37.4. Glucose normal.
 - E- Midline laparotomy wound - no stoma, quiet bowel sounds, tender in LIF but not peritonitic. Abdominal drain – small volume of serosanguinous fluid. Urinary catheter in situ. Temp 37.6
- What other information might be useful?
 - Drug chart: regular Paracetamol and Tramadol (due now), PRN Oramorph (has needed 10-20mg every 4 hours today since wound catheters removed this morning), LMWH, PPI.
 - Drug and alcohol history: smokes 20/day, admits to 3 glasses of wine an evening and more if out for dinner with friends.
 - Sleep history: documentation of poor sleep last 2 nights since extubated day 1 post-op.

- What is in your differential diagnosis for her current condition?
 - Hypoxia: LRTI/Hospital Acquired Pneumonia/PE/hypoventilation due to intra-abdominal pathology +/- pain.
 - Infection: Chest/urine/intra-abdominal (anastomotic breakdown).
 - Pain.
 - Withdrawal: Nicotine/alcohol.
 - Polypharmacy/opiates.
 - Disrupted sleep/wake cycle.
 - Any combination of the above!
- What will you do now?
 - Analgesia.
 - Investigations: Bloods/ABG/Blood cultures/CXR.
 - CAM-ICU score.
 - Reassure and re-orientate patient.
 - Consider nicotine replacement.
 - Consider alcohol withdrawal regimen.
 - Surgical review if concerns re: abdomen.

Video 2 (deteriorating/unsafe patient)

"It's 4 am and you are called to review Jackie as she is getting worse...."

Watch video 2: [available via this link](#)

Discussion:

- How would you proceed as the ICU doctor who has been asked to come and see her?
 - Focussed A to E assessment but candidates need to recognise Jackie is becoming a danger to herself.
 - A- own.
 - B- RR 32 SaO₂ 92% on 8L via NRBM but desaturates to 86% when not tolerating. Poor air entry at bases, no wheeze.
 - C- Pulse 120-130 irregular, (AF on monitor/12 lead if they ask for one) BP 100/60 on 0.1 mcg/kg/min noradrenaline (increased), CRT 2s.
 - D- AVPU but extremely agitated, throwing things, disorientated and has pulled out urinary catheter.
 - E- Midline laparotomy wound - no stoma, quiet bowel sounds, tender in LIF but not peritonitic. Abdominal drain – small volume of serosanguinous fluid. Urinary catheter removed by patient but last urine output 20ml in hour before removal. Temp 37.9. Glucose normal.
 - Investigations: if asked for results or you can provide them
 - ABG – pH 7.29, PaO₂ 8.0, PaCO₂ 4.0, K 3.8, Lac 2.5, HCO₃ 20, BE -2.0, Hb 95.
 - CXR since previous review – loss of costophrenic angle on right, collapse/consolidation right base, no pneumothorax, CVC position okay, NG correctly sited.
 - Blood cultures and urine culture sent.
 - ECG – fast AF rate 128, no ischaemia.
- What do you think is the most likely diagnosis?
 - HAP precipitating fast AF and acute delirium.
 - Multifactorial delirium (sepsis, pain, poor sleep, opiates, alcohol and nicotine withdrawal).
- What do you need to do next?
 - Candidates should recognise patient at risk of removing lines and needs rescue sedation.
 - First line on ICU in this situation IV haloperidol 0.5mg increments titrated to response, however if they do not opt to give this, do not push them as video 3 will push them to do so!

- Once patient safe they can focus on management of fast AF/LRTI (if they start to move onto it before the patient has been given Haloperidol, move on to video 3).

Video 3 (Patient pulls out central line and deteriorates further)

“Let’s see what happens next”

Especially if candidates have failed to sedate or get senior help.

If they have done everything perfectly this is still useful to watch to emphasise further deterioration and importance of rescue sedation especially in patient on high dose vasopressor.

In the video the doctor has disappeared to get help.

Emphasise that it is correct to escalate to seniors but ideally do this from bedside if patient unsafe.

Watch video 3: [available via this link](#)

Discussion: Problems now faced:

- Loss of central access
 - Loss of ability to infuse noradrenaline / K⁺ / central amiodarone if needed.
 - Discuss changing to peripheral metaraminol or noradrenaline to maintain BP (**this requires a different concentration**).
- Severe delirium with danger to herself and staff
 - Need to treat delirium when unstable/unsafe.
 - If not already discussed: Haloperidol for rescue therapy 0.5mg IV but can increase to 1-2mg bolus if safety not achieved.
- Risks for delirium: major surgery, ICU admission, smoking, alcohol, pain, sepsis etc.
- Further discussion re delirium will continue later in the session

Video 4 (patient stabilised)

“It’s almost morning and your treatment seems to have done the trick”

Watch video 4: [available via this link](#)

Discussion:

- If not already discussed in previous sections, discuss the following:
 - Patient had rescue haloperidol and calmed.
 - Fluid boluses, potassium and magnesium given.
 - Antibiotics for HAP as per local protocol given.
 - Now tolerating oxygen.
 - Gases improved.
 - Discuss importance of handing over night time delirium so day team can make a plan for prevention and ongoing management.

Sedative drugs (15 minutes)

Basic discussion surrounding the various groups of drugs commonly used on ICU for sedation.

A slide set is [available here](#)

- Discuss sedation holds: benefits vs risks.
- Brief discussion about sedative goal and RASS. Target for sedated patients usually -1 to -2 in intubated patients but some groups require deeper sedation (TBI with ICP spikes, prone patients, paralysed patients).

Delirium, CAM-ICU and dols (20 minutes)

- The content of this section of the station will be variable depending on what has already been covered in discussions prompted by the video session.
 - Resident doctor role in identifying at risk patients.
 - CAM-ICU and delirium screening.

- Discussion around different forms of delirium.
- Thorough clerking including alcohol and drug history, risk factors including cognitive impairment and previous delirium.
- Identification and handover of patients with difficult management overnight (i.e. did not sleep, needed Haloperidol or other sedation).
- Significant difference in ward vs ICU management.
- High risk of life-threatening event occurring if patient pulls out line or drain.
- Better monitored patients mean risks of sedation are usually less or more easily managed.
- DOLS and applicability to ICU.

SIM

Aims:

1. To gain experience of being in an ICU critical event in the safe environment of a simulation.
2. To put into practice some of the skills and knowledge acquired on the course in a simulation scenario.
3. To practice technical and non-technical skills.
4. To encourage candidates to think creatively using the skills and knowledge they have already acquired.

These are rapid fire (10 minute) simulation scenarios with time (15 minutes) for debrief. It is important to stick to time.

We suggest that you use one faculty member as an in-situ member of nursing staff who can provide feedback on findings etc to help with fidelity. They will be “competent but lack initiative”.

The other faculty member can then control the manikin if no technicians are available to do so/observe for points to then cover in the debrief. It can therefore be helpful to have an extra faculty member in these stations especially if you are not supported by SIM suite staff to run the manikin.

Session plan (75 minutes)

1. SIM 1 – ED: upper GI bleed (10 minutes). Debrief (15 minutes).
2. SIM 2 – ICU: dislodged tracheostomy (10 minutes). Debrief (15 minutes).
3. SIM 3 – Ward review: sepsis (10 minutes). Debrief (15 minutes).

All scenarios contain blood gas results; we recommend that these are printed and therefore can be handed to the candidates for them to interpret rather than the results being verbally read to them.

Equipment list:

SIM manikin

Monitoring: Sats probe, NIBP, ECG, arterial line, CVL

Patient gown

Self-inflating bag

Waters circuit

Ventilator

Ventilator tubing

Reservoir/non-rebreathe mask

Nasal prongs

ETT, inline suction

Tracheostomy tube with inline suction

Displaced tracheostomy algorithm (upper airway available)

Trache mask

Trache box

iGel

4x Syringe pumps + 50ml syringes + thin infusion lines

Transducer sets x2

1000ml crystalloid IVF in giving set

Bowl of blood and tissues

Bloody sheets

Clean sheets

Available: ICU Resus/Airway trolley, Resus trolley, ICU grab bag, various cannulas and syringes, fluids

SIM 1 – ED: upper GI bleed (10 minutes), debrief (15 minutes)

Equipment List

SIM manikin.

Monitoring: Sats probe, NIBP, ECG

Patient gown

Bowl of 'blood' and tissues

'Bloody' sheets

Pink cannula with 1000ml crystalloid IVF attached

Available: Resus trolley, various cannulas and syringes, fluids

Scenario:

A 46-year-old male has presented to the Emergency Department. He is known to have alcoholic liver disease although claims to be abstinent for 3 months now. He has been admitted with a torrential upper GI haemorrhage and haematemesis. The ED team request your assistance.

The italics suggest the steps that candidates should take when given the information in normal text.

A: Talking

[Confirm clear as talking, non-threatened currently due to GCS/AVPU]

B: RR 26/min, chest clear, SpO₂ reading poorly

[Apply oxygen]

C: HR 120/min sinus rhythm, BP 75/45, peripheries cool and clammy, CRT 4 secs, heart sounds normal

[Obtain 2x large bore IV access, take bloods including FBC, U&E, clotting, fibrinogen, cross match, VBG (see VBG 1). Activate Major Haemorrhage protocol. Tranexamic acid, calcium chloride. Permissive hypotension acceptable. Caution against vasopressors or delaying further intervention for arterial line or central venous line]

VBG 1	
pH	7.30
pCO₂	3.4
pO₂	7.3
HCO₃	21
BE	- 8.1
Lactate	4.1
Hb	72

D: GCS 14/15 (E4 V4 M6), AVPU

[Glucose 5.7 if asked. Analgesia not required]

E: Fresh blood seen on bed, patient gown and in bowl

[Vitamin K, use team to urgently contact endoscopist on-call, theatre anaesthetist and theatre team. Urinary catheter required but must not delay transfer to theatre]

On-reassessment:

A: not protecting

B: RR 36/min, chest clear, SpO₂ poorly reading

C: HR 150/min SR, BP unrecordable, peripheries cold, CRT 6 secs, heart sounds normal. See VBG 2

VBG 2	
pH	7.15
pCO2	6.9
pO2	6.3
HCO3	19
BE	- 11.3
Lactate	5.7
Hb	59

D: GCS 10/15 (E2 V3 M5), AVPU

E: More blood and melaena seen if they delay transferring for care.

Candidates should identify the need for definitive care and be pushed to making decision to move out of ED ASAP.

- Call endoscopist/surgeon/anaesthetist if not done so already.
- Transfer to operating theatre. Discuss equipment for transfer.
- Discussion with anaesthetist/ODP for equipment required in theatre: RSI with ketamine, dilute adrenaline advisable, blood warmers, rapid transfuser, arterial lines, CVC/rapid infusion line.
- Ongoing transfusion as part of massive transfusion protocol.
- Discussion about further management from gastro team: banding/ Sengstaken Blakemore tube.
- Contact ICU nurse in charge for admission bed.
- Points to discuss if time:
 - Pre-induction arterial line if possible but not to delay definitive treatment.
 - Ketamine not propofol
 - Major haemorrhage protocols – important to remind candidates to be aware of their own local MH haemorrhage protocols as there is significant variability between trusts.

SIM 2 – ICU: dislodged tracheostomy (10 minutes), debrief (15 minutes)

Equipment List

SIM manikin

Monitoring: Sats probe, arterial line, ECG

Patient gown

Tracheostomy tube inserted through skin but in paratracheal space

Trache mask

Ventilator tubing

Self-inflating bag

Pink cannula

Trache box

Available: Resus trolley, Waters circuit, Airway Trolley

Scenario:

A 35 year-old male patient is day 28 after a road traffic collision with multiple fractures. His illness has been complicated by sepsis and ARDS. He is now recovering but has critical illness polyneuropathy.

A tracheostomy was inserted 3 days ago to aid respiratory weaning.

Current ventilation settings: CPAP pressure support 8 and PEEP 10, FiO₂ 0.5.

It is 2am. You are called into his bedspace as his sats have started falling after a roll. As you arrive the nurse is starting to connect an Ambu bag to the tracheostomy tube.

A: Talking. Tracheostomy sitting slightly proud. Ambu bag connected.
 B: RR 26/min, SpO2 88% on 100% O2.
 No ETCO2 connected – if connected by candidate, no ETCO2 seen. Ventilator disconnected and alarming. Fine basal creps. Last ABG as illustrated in ABG 1.
 C: HR 110/min, BP 160/92. Peripheries warm, CRT 2 secs. Heart sounds normal.
 D: GCS 14/15 (E4 V4 M6), agitated.
 E: Nil of note

ABG 1	
pH	7.21
pCO2	8.7
pO2	6.3
HCO3	26
BE	- 5.1
Lactate	3.1
Hb	112

The patient continues to talk and desaturate until the candidate assesses the viability of the tracheostomy, removes it and manages the airway from above. During any delay, the patient becomes more obtunded as the saturations continue to fall and the pulse rises. This makes managing the airway from above simpler, facilitating bag/mask or Waters' circuit ventilation or LMA/i-gel/Proseal LMA insertion without anaesthesia. If time, a discussion could be had about low dose sedation to facilitate airway management in the event a patient is fully awake.

SIM 3 – Ward review: sepsis (10 minutes), debrief (15 minutes)

Equipment List

SIM manikin
 Monitoring: Sats probe, NIBP, ECG
 Patient gown
 Reservoir/non-rebreathe mask
 Available: Resus trolley, ICU grab bag

Scenario

A 65 year-old female, previously fit and well, has been admitted 30 minutes ago with general malaise and shortness of breath. You are called to see her on the medical assessment unit due to increasing shortness of breath and concern from the medical doctors.

The italics suggest the steps that candidates should take when given the information in normal text.

A: own

[Confirm clear as talking, non-threatened currently due to GCS/AVPU]

B: RR 35/min, coarse creps right lung, SpO2 92% on 15lO₂ via reservoir mask. Moderately increased work of breathing.

[ABG on oxygen (see ABG 1), consider adding in additional nasal specs oxygen, sputum culture, blood culture, viral screen, COVID test, urine for legionella and pneumococcus, CXR, discuss HFNO with senior]

C: HR 110/min SR, BP 90/60, warm to elbows, cold hands, CRT 4 secs, heart sounds normal.

[Get IV access, take bloods including FBC, U&E, clotting, blood cultures, send urgently, VBG if ABG not done already- see VBG 1]

D: GCS 15/15 (E4 V5 M6), AVPU

[If asked glucose is 7.2]

E: temp 38.5°C

ABG 1	
pH	7.28
pCO2	3.4
pO2	9.3
HCO3	17
BE	- 4.7
Lactate	3.1
Hb	131

VBG 1	
pH	7.23
pCO2	3.7
pO2	6.3
HCO3	16
BE	- 5.1
Lactate	3.7
Hb	132

[Give antibiotics asap (within 1 hour) for presumed CAP as per guidelines, consider IV fluid bolus and reassess, urinary catheter]

They should plan to talk to their senior with current findings.

On re-assessment:

A: own.

B: RR 40/min, coarse creps right lung, SpO₂ 88% on 15lO₂ via reservoir mask, significantly increased work of breathing but now tiring. ABG/VBG 2 available if asked.

C: HR 120/min AF, BP 79/50, cool arms, cold hands, purple fingertips, CRT 4 secs, heart sounds normal.

D: GCS 13/15 (E2 V5 M6), AVPU

E: temp 38.5°C

Candidates should identify the need for intubation, resuscitation and vasopressors and be pushed to make this clear on discussion with their senior.

- Need for emergency intubation and ventilation
- Pre-induction arterial line if possible
- Optimise oxygenation pre-induction and plan for apnoeic oxygenation: HFNO or nasal prongs.
- Use of ketamine, availability of vasopressors and dilute adrenaline for induction.
- Call ICU nurse in charge to discuss need for urgent bed
- Plan for ICU: likely to need central access and vasopressors.

ABG 2	
pH	7.07
pCO2	6.1
pO2	6.3
HCO3	11
BE	- 8.6
Lactate	6.1
Hb	127
VBG 2	
pH	6.97
pCO2	6.7
pO2	3.3
HCO3	10
BE	- 9.1
Lactate	6.9
Hb	127

Tutorial

Aims:

1. To gain experience examining an ICU chart (be that on paper or electronic).
2. To begin to assimilate all of the data on an ICU chart and use that to make some decisions about patient care.

Session plan (75mins total)

This station is designed to increase the familiarity of candidates with an ICU chart. As course directors, you have a choice on how to present this station. You can either create ICU paper charts which can be sequentially unfolded or unveiled at time intervals to allow for progression of the case at hand, or you can create electronic versions that reflect any electronic systems that are used in your local ICUs. Paper charts may be easier and more reliable. A fictitious case allows the data to take on clinical relevance and discussions are had on what clinical steps may be appropriate given the data presented.

Equipment list:

Pre-completed ICU paper or electronic chart with data appropriate to the case described below. Examples of charts are provided below.

A method of unfolding or unveiling the data presented on the chart sequentially. In the examples below the red lines indicate where the chart could be folded to progressively unveil the case described below.

A computer with powerpoint slides pre-loaded and a display screen.

Buzzers for the quiz (or online equivalent).

Part 1: ICU chart tutorial (suggest 35 mins)

The exact content of the session will vary from group to group based on:

- Skill level, e.g. a group of new ACCS trainees with no ICU experience will have a different knowledge base compared to groups where all have some previous ICU experience.
- Specialty- there may be specialty specific differences in experience and learning requirements to which the instructors will need to adapt in order to make this a valuable session for candidates of all backgrounds, for example ED and anaesthetic candidates may have different needs.

Scenario:

You are the resident ICU doctor and it is 00:30am on a night shift.

Your registrar handed over a patient called Janet Other who was admitted with hypoxaemia, probably due to pneumonia. They have done the admission paperwork. Unfortunately, they then got fast bleeped away to ED. The bedside nurse has called you to come and review the patients as they are worried about her clinical state.

1st fold – up till 02:00 hrs. Key points from chart:

- Respiratory rate high initially then improved slightly after HFNC started. FiO₂ falling as well.
- ABG shows mixed acidosis initially, metabolic component improving with fluid, but CO₂ remains low.
- BP low that initially responded to fluid bolus but no longer.
- Urine output responded to fluid but now tailing off again.
- Febrile.

Potential discussion points:

- Use of HFNC- rationale, why RR may have improved, when it might not work, alternatives.
- Fluid boluses – what to use, how to give and assess response, what to consider if no response, why the CVP won't help guide fluid boluses.

- Alternatives for BP management/assessment - vasopressor, FICE echo, peripheral noradrenaline as an option if no central access, inotropes vs vasopressors.
- Does this patient need a CVC?
- Diagnosis – alternatives to pneumonia, check cultures sent, check antibiotic choice.

2nd fold – up to 06:30 hrs. Key points from chart:

- Respiratory rate climbing, FiO₂ climbing, paCO₂ normalising.
- BP falling, metaraminol started but infusion rate doubled almost immediately with still low BP.
- GCS dropping – becoming confused.
- Vomit.
- Urine output tailing off now despite further fluid and worsening metabolic acidosis.

Discussion points:

- Options to improve respiratory function- NHFC flow rate, positioning, physio.
- More advanced respiratory treatments – CPAP or NIV vs intubation? Why CPAP/NIV might not be a good idea in this circumstance (pneumonia, recent vomit, confused patient).
- Intubation on the ICU- team members required, who to tell (registrar/consultant/ nurse in charge/patient/relatives), logistics (e.g. informing nurse in charge as impact on staffing ratios), checklist, what one can do as the resident doctor whilst waiting for senior input.
- Difficult airway plans, utility of cricoid.
- Drugs for intubation, including choice of induction agent, emergency drugs e.g. dilute adrenaline and maintenance sedation.
- BP management beyond metaraminol (peripheral noradrenaline as a bridge to central noradrenaline) and options for metabolic state.

Chart open fully. Key points from chart:

- Patient has been intubated. Gas exchange has improved.
- Noradrenaline has improved haemodynamics.
- Urine output and metabolic state has improved.

Discussion points

- Mode of ventilation and basic ventilator settings.
- Post intubation things – e.g. CVC, NG tube, chest X-ray.
- Maintenance sedation choices.
- Why has urine output and metabolic state improved?
- Depending on level of group- more in-depth conversation of ventilation settings and conversation about what to do if oxygenation got worse post intubation (proning)?

Below are the examples of charts to be used in this session – the red lines represent the junctures along which the charts should be folded to allow the scenario described above to progress. Exact appearances will depend on your chosen chart style (be that paper or electronic).

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900
VENTILATION	FiO2	10L	70%	50%	60%	70%	100%	100%	0.7	0.5
	MODE	FM	HFNC	HFNC	HFNC	HFNC	HFNC	SIMV	SIMV	
	P. insp / TVset		50L	50L	50L	50L	50L	360	360	
	ASB							10	10	
	PEEP							8	8	
	RR MAND							20	25	
	RR SPON	30	32	23	26	28	30	34		
	TV							363	372	
	MV							4.1	4.2	
	PEAK PRESSURE							27	24	
	HUMID TEMP							36.5	36.4	
	I:E RATIO							1:1.5	1:1.5	
	SaO2	91	94	92	92	93	92	90	92	94
	EtCO2									
	CUFF PRESSURE (4 Hourly)									
	NEBULISER									
	SUCTION									
	SPUTUM SCORE									
BLOOD GASES	pH	7.31	7.35		7.30		7.23		7.31	7.35
	pCO2	3.1	3.4		3.2		4.1		5.9	4.9
	pO2	8.7	9.2		8.7		7.9		9.5	8.7
	HCO3	2.5	2.6		2.4		2.1		2.2	2.3
	BASE EXCESS	-4.2	-3.5		-4.9		-6.2		-4.2	-3.1
	HB	131	127		117		115		114	118
	SaO2									
	POTASSIUM (K+)	4.6	4.5		4.6		4.7		4.6	4.5
	SODIUM (Na+)	131	131		130		129		131	132
	BLOOD SUGAR	6.7	6.5		6.4		6.2		5.9	6.4
	LACTATE	3.5	2.7		3.1		3.7		2.6	2.4
	CHLORIDE (Cl)	107	108		110		111		110	111
	CALCIUM (Ca+)	1.20	1.17		1.15		1.16		1.15	1.16

HEART RHYTHM	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900
	ST	ST	ST	ST	ST	ST	ST	ST	ST	SR

DISABILITY	SET TEMP COOLGUARD/BAIR HUGGER																			
	BIS																			
	EPIDURAL RATE																			
	MOTOR FUNC R / L																			
	PCA A / D																			
	R SIZE / REACT / NPI																			
	L SIZE / REACT / NPI																			
	EYES	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	VERBAL	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	MOTOR	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
GCS	14	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	
PAIN SCORE																				
RASS SCORE																				

DRUGS	1 HARTMANN'S infusion	125																		
	2 HARTMANN'S bolus	250+250	250				250	250												
	3 PARACETAMOL ml		100															100		
	4 CLARITHROMYCIN ml		250																	
	5 METARAMINOL 0.5mg/ml							5	10	15		10								
	6 NORADRENALINE 4mg/50ml											2.5	5							
	7 PROPOFOL 2%											5	10							
	8 ALFENTANIL 500mcg/ml											1.5	3							
	9																			
	10																			
	11																			
	12																			

TIME →	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000
HARTMANN'S	125										
HARTMANN'S	500	250		250	250						
PARACETAMOL		100							100		
CLARITHROMYCIN		250									
METARAMINOL					5	10	15	10			
NORADRENALINE								2.5	5		
PROPOFOL								5	10		
ALFENTANIL								1.5	3		
NG FEED									10		
RUNNING HOURLY	625	600		250	255	10	15	19	128		
TOTAL CUMULATIVE TOTAL		1225		1475	1730	1740	1755	1774	1902		
URINE	20	40	30	20	20	15	10	40	150		
NG ASPIRATE											
BOWELS DATE (LAST OPENED) (TYPE OR BNO TO BE DOCUMENTED AT LEAST ONCE PER SHIFT)											
ULTRAFILTRATE											
SUBGLOTTIC PORT											
VOMIT						200					
RUNNING HOURLY	20	40	30	20	20	215	10	40	150		
TOTAL CUMULATIVE TOTAL	20	60	90	110	130	345	355	395	545		
BALANCE											
SIGN											

Part 2: Quiz (suggest 35 mins)

Based on the gameshow Jeopardy.

[The quiz is available here](#). We encourage use of buzzers, bells or electronic equivalent for the entertainment that this brings.

Post-course feedback and follow-up

Candidates assemble back in a single room for a brief closing talk from the course directors, summarising the experience they have gained. [Slides are available online here](#). There are QR code links to the post-course feedback (<https://forms.gle/Kovyt6iEZ9uiTYwh6>) and post-course confidence questionnaires (<https://forms.gle/iKkSR3zaBy8qss9r7>). The easiest way to ensure complete feedback is to get candidates to fill these in during the closing session. Candidates should be made aware that they will not receive their attendance certificates until feedback has been completed.

The feedback will be collated in a national database of all New2ICU courses. You can request your individual site feedback (pre and post course) by emailing new2icu@hotmail.co.uk. Please provide the date and location of your course along with a total of the number of candidates on your course, so that we can ensure your feedback is as complete as possible. As a contributor to the national New2ICU dataset, we are of course happy to share your course data with you alongside that of others in the UK should you feel this is helpful.

It is recommended that you provide a list of attendance to your ACCS ICM lead as well as providing attendance certificates for both candidates and faculty.

Thank you for your engagement with this course. We are really happy to take any questions, comments or feedback at new2icu@hotmail.co.uk.

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