



OSCE 13

Candidate Instructions

This is a **7 minute** Simulation station.

You are the on-call consultant who has just arrived in the Emergency Department (ED) after being called back by the night registrar to help them manage a 22 year old asthmatic who arrived 10 minutes ago.

The patient was intubated by paramedics following a respiratory arrest 15 minutes previously, using fentanyl and suxamethonium. Cardiac output was present throughout.

The registrar is currently managing the patient – His current observations are:

HR 130 bpm
BP 80/50 mmHg
SaO₂ 80% (on 100% O₂)

There are two competent emergency nurses assisting in the resuscitation room.

Your task is to:

- Lead your team in managing the care of this patient

The registrar will provide all examination findings. The registrar and nursing staff are capable of performing any procedures which you direct them to perform (you are not expected to perform any interventions or procedures on the mannequin). Any information provided to you by the registrar or nursing staff will be accurate.

You should answer any questions the registrar asks you.

You will instruct / guide / assist the registrar in any interventions. You will not directly manage the patient (mannequin).

This OSCE will assess the following domains:

- Medical Expertise – 50%
- Prioritisation and Decision Making – 30%
- Teamwork and Collaboration – 20%



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Examiner Instructions

This is a **7 minute** Simulation station.

This case tests a candidate's ability to effectively manage an intubated asthmatic, with particular regard to safe and effective ventilation. The candidate is expected to teach the registrar as to their strategy for patient management and is not required to directly manage the airway.

This OSCE will assess the following domains:

- Medical Expertise – 50%
- Prioritisation and Decision Making – 30%
- Teamwork and Collaboration – 20%

The case involves a 22 year old male patient (70kg), who has been intubated by the ambulance for a witnessed respiratory arrest. There was no loss of cardiac output. The patient was intubated 15 minutes previously after administration of 100mcg of fentanyl and 100mg of suxamethonium. It was a Grade 1 intubation view (first pass).

The patient arrived ten minutes prior to the candidate entering the room.

The confederate registrar is having difficulty managing the patient. The patient is difficult to ventilate, and the vital signs show hypoxia and hypotension. The patient has not been administered any sedative agents and the paralysis is beginning to wear off.

Vital signs on candidate arrival are:

Temp	37.2 °C
HR	130 bpm
RR	16 /min (on ventilator)
SaO ₂	80 % (on 100% O ₂). The high pressure alarm is sounding on the ventilator.
BP	85/40 mmHg
ETCO ₂	70 mmHg



Upon entering the room, the confederate will state:

“Thanks for coming in – can you help me with this patient? The ventilator keeps alarming”

The candidate will be expected to rapidly assess the severity of the situation and recognise that they need to rapidly act to stabilise the patient.

Expected actions:

Rapid establishment of the team and themselves as team leader

Rapid assessment and communication of critical situation – high ventilator pressures, low blood pressure and low oxygen saturations.

Remove the patient from the ventilator, and manage them with a bag-valve-tube.

Rapid adjustment of ventilation to ensure appropriate for asthma – slow respiratory rate

Rapid assessment for key causes of high airway pressures:

- Tension pneumothorax
- Tube obstruction
- Ventilator desynchrony / inadequate sedation
- Severe bronchospasm
- Inappropriate ventilator settings

The confederate registrar has seen a post-intubation chest x-ray (and if asked, performed a chest US) that shows no evidence of pneumothorax, appropriate endotracheal tube position and no focal consolidation.

There are no current clinical findings of tension pneumothorax.

The registrar does note that the patient seems to be making some spontaneous breaths.

After removing from the ventilator, the vital signs will improve slightly to:

SaO₂ 85 % (on 15 Lpm O₂)

BP 90/50 mmHg



If the confederate registrar is instructed to hand-ventilate the patient using the bag and valve, they should state

“They are hard to bag”

and if asked to listen to the lungs they should state

“Both lungs are very wheezy and symmetrical”.

This should prompt the candidate to attempt to optimise the management of the severe asthma.

If the candidate has not paralysed/sedated the patient, the confederate should re-alert them to this by stating

“He seems to be coughing and gagging on the tube”.

Expected actions:

Obtain summary/review of what treatment has already been given (i.e. by ambulance)

Start sedation and paralysis

Prescribe maximal bronchodilation

Nebulisers – salbutamol (albuterol) continuous, ipratropium x 3

Intravenous – salbutamol (infusion 5-20mcg/min)

Some may use neb/IV adrenaline (epinephrine)

Potential role for IV ketamine also

Magnesium sulphate 10-20mmol

IV aminophylline/volatile anaesthetics

Set up appropriate ventilation

Slow resp rate

Adequate time for expiration

(may disconnect from circuit to allow assisted expiration)

no PEEP (or low PEEP<5)

Tolerance of higher peak airway pressures



Once they have stabilised the patient and addressed maximal medical therapy, the candidate will need to explain the principles of mechanically ventilating an unwell asthmatic. This will be prompted by the confederate asking;

“He seems to be a bit more stable now. When he is a bit more settled, what ventilator settings should we use?”

Expected features of candidate response:

- Increased expiratory time (or low I:E ratio)
- Permissive hypercapnia (low resp rate, tolerate resp acidosis)
- Increased inspiratory flow rate
- Increased peak inspiratory pressure limits (accepting that the large airways are contributing significantly to the increased resistance to flow here and the risk of barotrauma is very low)
- Measurement of plateau pressures by using an inspiratory pause. Keep <30 cm H₂O
- Low PEEP due to presence of gas trapping
- Measurement of extent of gas trapping by using an expiratory hold
- Deep sedation and paralysis
- Use of bronchodilator agents (e.g. ketamine for sedation)

Ideally candidates will explain their rationale for their settings as they go. Otherwise candidates should ask

“Can you explain why you are using those settings?”



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Registrar Role-player Instructions

This is a **7 minute** simulation station.

This station requires one FACEM role player (to perform the role of ED registrar) and two nurses.

First confederate (registrar)

- Gender: Can be either
- Age range: Any
- Role to be played by: FACEM

Second and third confederates (resus nurses)

- Gender: Can be either
- Age range: Any
- Role to be played by: Nurse

You are an ED registrar (middle grade) with competent airway skills. Your primary role is to take direction from the candidate (team leader) in managing this patient (a mannequin) with respect to airway + ventilation interventions

- Your role is important in moving the scenario in the correct direction in a timely manner
- You provide information to the candidate about examination findings
- You will be responsible for providing prompts/questions to the candidate about the patient – please refer to prompts in the script.

However

- You will not show initiative or suggest solutions/problems e.g. If the BP is low you will merely state:

“The BP is 75”

Try to avoid statements that tend to suggest that there is a problem needing fixing eg *“The BP is still low at 75, should we do something about that?”* or potential solutions *“Would you like to give some fluid for that?”*.

This can be difficult as it is the opposite of good medical/nursing practice.

- If a candidate has mentioned a particular treatment/ management earlier in the scenario which has not actually been delivered it is appropriate to give a reminder e.g.

“What did you say earlier about nasal prong O₂?”

You have just taken handover from the ambulance for a 22 year old male patient who has had a witnessed respiratory arrest from severe asthma. He is a known asthmatic who has been unwell for several days and whose family called the ambulance for severe respiratory distress tonight. The ambulance state he had been using his salbutamol puffer through a spacer 12 puffs every 15 minutes for the last 2 hours.



The ambulance told you the patient never lost cardiac output but that he became unresponsive and apnoeic. They intubated him successfully with fentanyl 100 mcg and suxamethonium (100mg) 15 minutes ago and state there were no problems with the intubation (Grade 1 laryngeal view with first pass success). He has two working IV cannulae.

You have placed him on the ventilator but are worried as the ventilator keeps alarming for “high pressures”. He is on 100% oxygen but his sats are low at 80% and his blood pressure is low at 80/50 mm Hg. You are happy managing airways usually, but this is the first asthmatic patient you have had to ventilate and not exactly sure what to do.

You currently have the ventilator set as:

FiO₂ 1.0
Resp rate 16/min
Tidal Volume 500ml
PEEP 10cmH₂O
I:E ratio ‘normal’ at 1:2

The patient’s initial vitals are:

Temp Normal
HR 130 bpm
RR 16/min (ventilated)
Sats 80% FiO₂ 100%
BP 80/50 mmHg
ETCO₂ 70 mmHg

As the candidate comes into the room, state:

“Thanks for coming in – can you help me with this patient? The ventilator keeps alarming”

The candidate will need to demonstrate a rapid approach to dealing with an unstable patient on a ventilator. The candidate will need to quickly assume the role of team leader and demonstrate this clearly.

The candidate would be expected to remove the patient from the ventilator and manage them on a bag and valve. The key element here is decreasing the rate – if they do not specify that there should be either a pause in ventilation or a significant decrease in rate (e.g. to <10), then there should be the same outcome as below (i.e. registrar continues at 16/min)

If the candidate doesn’t explain the reasoning behind their decisions, ask for clarification

“Why are you doing that?” or “How does that help?”

By 1 minute

If the candidate does not remove the patient from the ventilator, by one minute the sats should continue to drop. Once the sats drop to 75% you should state again

“Things are getting worse. He is not ventilating at all.”

See next page for strategy if candidate intends to decompress the chest at this point.



By 1:30 the sats will fall to 70% and if the candidate still does not remove the patient from the ventilator, you should state

“I’m taking him off the ventilator – it’s not working”.

Once bagging him you will then say, ***“I will try a bit slower”*** and use a rate of 8/minute.

- Note: This is a rescue action to prevent arrest and allow the scenario to continue. If it gets to this point, then the candidate cannot be marked any higher than ‘Well below standard’ in the ME domain

In the situation where the candidate switches to bag ventilation but does not slow the rate, after 30 seconds state

“He is very hard to bag”.

If not prompted here to slow the rate as above, state

“I will try a bit slower” and use a rate of 8/minute.

- This is also a rescue action to prevent arrest. Although the candidate has placed the patient on the bag, they have failed to rescue the patient and cannot pass the medical expertise domain.

In a difficult-to-ventilate patient, good candidates will improve control through sedation and paralysis. If this is not done automatically, state

“He seems to be coughing and gagging on the tube”.

Candidates will be expected to work through important differentials for this set of challenges (hypoxia, hypotension, difficult to ventilate).

This will likely include tension pneumothorax. If this is raised, you should state that

“Air entry is equal, but he isn’t moving much air”.

If asked to percuss the chest, state

“The percussion note is symmetrical but resonant”.

If asked directly about the breath sounds, state

“There are wheezes everywhere and symmetrical”.

If asked,

“Trachea is midline”.

If asked about tube location, state it is at

“22cm at teeth”.

If asked about whether the tube is patent, state

“I can’t see anything in the tube, how do I check?”



Candidates will be expected to instruct passage of a bougie or suction catheter to exclude a blocked tube.

Other differentials may also be considered by candidates, including anaphylaxis. If the candidate asks about this, say

“There is no rash or swelling”

You have already seen a chest x-ray (do not volunteer this until asked about an x-ray) which occurred after patient arrival 10 minutes ago, which confirmed appropriate ETT position and did not identify any pneumothorax. If the candidate asks you to perform an ultrasound to look for pneumothorax, state

“There is no evidence of pneumothorax on ultrasound”.

(If at any stage they look for consolidation clinically, on x-ray or ultrasound state

“There is no evidence of consolidation”.)

If the candidate still intends to perform thoracostomy/Intercostal catheterisation despite this information, you should state again that the x-ray 10 minutes ago showed no pneumothorax and repeat the above findings about air entry, percussion note and tracheal position.

If a candidate still want to perform thoracostomy despite this information, you should ask them to talk you through the procedure

“What do you want me to do?”

and follow instructions as to landmarks and technique (for either needle or finger techniques). After entering the thorax, state

“There is no release of air” and if asked, state ***“He is still hard to bag”***.

- Candidates who perform decompression as part of a strategy that includes manual ventilation and slowing the rate appropriately can still pass the domain of medical expertise. However, candidates who decompress before slowing the rate cannot pass this domain as they have failed to demonstrate a safe, systematic approach.

As the patient is now starting to stabilise on the bag, the focus should shift to maximising the medical management of the bronchospasm.

With correct management the patient will improve to sats of 85% (+ other obs).

You should not guide this, but if the candidate does not transition into medical therapies to treat the asthma, by 3 minutes you should prompt them by stating:

‘His sats are 85%, he is still tight and wheezy, what do we do now?’

If the candidate suggests specific therapies, repeat the order to confirm it, and, where necessary, ask for doses if these are not stated.

If the candidate asks what treatment they have had to date, state

“The ambulance gave continuous salbutamol nebs, and we’ve given two more salbutamol nebs via the tube”.



The candidate will be expected to cover the major components of critical asthma pharmacotherapy, including:

- Salbutamol (albuterol) 5mg nebulised (repeated at a high frequency)
- Ipratropium 500mcg nebulised (repeated to at least three doses at 20 minute intervals)
- Steroids. Parenteral hydrocortisone or dexamethasone at appropriate doses
- IV magnesium sulphate (25-50mg/kg)
- IV ketamine (70-140 mg/hr)
- IV salbutamol (boluses up to 1mg infusion 5-50mcg/min)
- IV adrenaline (epinephrine) (boluses up to 50mcg, infusion 5-50mcg/min) or IM
- IV aminophylline (Load 400-500mg over an hour then ~35 mg/hr with level monitoring) if all others used

Other reasonable therapies include IV fluid loading.

Other therapies may be suggested (i.e. Heliox) – you should state that

“This is not available”.

The patient should, provided candidates have used appropriate bagging technique and initiated above medical therapies, continue to improve slightly (sats to 92%, BP to 90/50, HR 110/min).

After medical optimisation, you should ask the candidate about how to ventilate the patient, by asking:

“He seems to be a bit more stable now. When he is a bit more settled, what ventilator settings should we use?”

If the candidate does not explain their rationale for their ventilator settings, ask them to clarify by asking:

“Can you explain why you are using those settings?”

High level candidates will reason through their answer and show a good understanding of safe ventilatory parameters – lower performing candidates will simply state a number or not display reasoning around this.



Role player 2 and 3: Resus Nurses

You are an experienced ED nurse. You are ALS competent, able to draw up necessary drugs.

Only perform tasks if requested. Try not to anticipate.

You can attach monitoring / HFNP O₂ / Fluids - monitoring + single IV access already attached.
You can report vital signs (Displayed on monitor)

Nurse – “The BP / HR is...”

However:

- You will not show initiative or suggest solutions/problems e.g. If the SaO₂ is low, you will merely state

“The sats are 80”

Try to avoid statements that tend to suggest that there is a problem needing fixing eg *“The sats are still low at 75, should we do something about that”* or potential solutions *“Would you like me to help you bag?”*

This can be difficult as it is the opposite of good medical/nursing practice.

- If a candidate has mentioned a particular treatment/ management earlier in the scenario which has not actually been delivered it is appropriate to give a reminder e.g.

“What did you say earlier about nasal prong O₂?”

When asked to perform a task – if a drug confirm dose and acknowledge when given. If a task, acknowledge when performed.

- All drug doses or infusion rates must be provided by the candidate. Clarify orders as required. Write down drugs or doses on the whiteboard where possible
- When drawing up a drug it will take approximately **1 minute** from the order to the delivery
- We want to ‘reward’ effective communication/planning - if a candidate prepares by asking you to make up something earlier in the scenario then it will be ready immediately when they ask for it. Also, if they have clearly specified drug dose once then this does not need to be re-clarified each time.
- If asked to do multiple things at the same time, state

“I will not be able to do all of these at once, in what order do you want me to do them?”



Simulation Coordinator Instructions

Candidates are tasked with managing an asthmatic who is hypoxic and hypotensive post intubation. In this case, the deterioration is due to dynamic hyperinflation and we are testing the candidate's ability to medically optimise and appropriately ventilate a critical asthmatic.

Initial settings:

Temp Normal
HR 130/min
RR 16/min (ventilated)
Sats 80% FiO2 100%
BP 80/50 mm Hg
ETCO₂ – 70 mmHg

Prompt: Difficult to bag, high airway pressures

Expected action: Candidate removes patient from ventilator and connects to bag/valve/tube

- If they do this, and slow resp rate to <10/minute, increase sats to 85% (over 30 seconds), BP to 90/50

If they do not do this by 1 min, decrease sats to 75%

If they do not do this by 90 seconds, decrease sats to 70%.

If the candidate decompresses a suspected tension pneumothorax (this is NOT present), there should be no change to vital signs.

At this point, if not already requested by candidates, the confederate registrar will remove the patient from the ventilator and connect to a manual bag.

They will continue to hand ventilate at 16/min until instructed to decrease the rate.

If no prompting from the candidate, they will (at 2 minutes i.e. 30 seconds after hand-bagging the patient) state that the patient is difficult to bag and they will slow the rate down themselves.

Once the rate is decreased to <10, sats should increase to 85%.

At this point (i.e. once on hand bag and at slow resp rate) the station will shift to optimal medical management of the asthma.

Candidates should paralyse the patient and administer KEY therapies: in-line nebulisations (salbutamol and ipratropium) and IV adrenaline or salbutamol. If these are all given, increase sats to 92%.

If any of the above medications are NOT given, increase sats to 88% only (irrespective of other administered therapies)

Other therapies including fluids may be given

Increase BP to 110/50 if an appropriate fluid load is given (i.e. 1 litre bolus) but ONLY if other key aspects (ventilation and KEY medical therapy) are given



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Props list

- Registrar confederate (examiner or FACEM role-player)
- 2 x resus nurses
- SimCo
- Mannequin
- Endotracheal tube
- Bag-valve-mask
- Ventilator tubing
- ETT tie
- Stethoscope
- Ventilator or photo of Oxylog or similar
- Monitor
- SimPad
- IV fluids and cannula
- Medication trolley
- Nebuliser medications

Note from Examiners: We must have a section on the whiteboard with ventilator settings c/w dynamic hyperinflation.

ETCO₂-trace ON MONITOR - high (e.g. 70-80).



CANDIDATE
barcode

EXAMINER
barcode

Domain	Criteria and comments	Marking rules to be 'at a minimum level of competence' (i.e. 'just at standard')	Criteria met / not met
Medical Expertise (50%)	<i>Comment: Overarching aim in this domain is demonstration of knowledge of issues in ventilating asthmatics, such as increased large airway pressures/ obstruction to expiration/ dynamic hyperinflation.</i> Specific criteria to be observed for marking includes: • Demonstrates knowledge and rationale regarding stabilising an asthmatic post-intubation e.g. Removes from ventilator and hand-ventilates / Excludes tension pneumothorax / Suctions tube to exclude obstruction / Slow RR (less than 10 breaths/minute)/ Removes or lowers extrinsic PEEP / Higher pressure tolerance / Paralyzes and sedates patient/ Gives fluid bolus (vasodilation from B-Agonist or sedative drugs etc, septic, dehydrated, decreased venous return secondary raised IT pressure etc.) • Medical management of severe asthma B-agonist therapy (nebulised, IV, ETT)/ Anticholinergics/ Magnesium (considering risk of worsening hypotension) / Ketamine / Steroids/ Adrenaline (epinephrine) (IV) / Aminophylline / Volatile anaesthetics – Isoflurane • Demonstrates knowledge of key aspects of mechanical ventilation in severe asthma Chooses appropriate settings for: Pressure limits - Plateau pressure <30 (20-25) / PEEP (<5cm H₂O) / Tidal volume (5-7ml/kg, accept range 400-450mls / Respiratory rate (low, must be less than 10/minute) / I:E ratio (accept 1:4 or lower) Permissive hypercapnia <i>Comment: lower marks if:</i> • Fails to remove pt from ventilator • Fails to slow RR • ICC insertion prior to manual ventilation or slowing RR • Use paralysis without sedation • Heliox without appropriate justification	Knowledge of ventilating asthmatics: • Nil of criteria required as standalone quotes from candidate Knowledge and rationale re stabilisation post intubation: • Removes patient from ventilator and hand-ventilates • Slow RR • Lowers extrinsic PEEP • Requires paralysis and sedation Medical Mx: • Appropriate aggressive B-agonist Rx • Steroids administered • Two other treatments given Ventilator- covers at least 3 of: • Pressure limits with plateau pressure <30mmHg • Tidal volume 5-7ml/kg • PEEP 5cm H₂O or less • Resp rate is low and less than 10/min • I:E ratio 1:4 or lower	



Prioritisation & Decision Making (30%)	• Demonstrates rapid assessment and management of time-critical issues ○ Removes patient from the ventilator ○ Discusses and seeks to identify life-threatening causes of hypotension and hypoxia in ventilated patient: - tension pneumothorax / tube misplacement / dynamic hyperinflation / tube obstruction / anaphylaxis / sepsis / hypovolaemia • Prioritises taking control through early sedation/ paralysis of critically unwell patient and initiation of appropriate medical therapies • Escalating medical management plan. Explains the roles of all the medical therapies if asked • Demonstrates a structured approach to mechanical ventilation of severe asthma	• Removes patient from ventilator early • Seeks life threatening causes of hypotension and hypoxia- Must mention three possible causes • Prioritises early sedation and paralysis • Provides a logical escalating medical management plan	
Teamwork & Collaboration (20%)	• Confirms team member roles at start e.g.: ○ Introduces self ○ Rapidly accepts leadership role and confirms team member roles & skills ○ Establishes team environment by stating decision-making rules and when they can be questioned • Fosters effective team performance e.g.: ○ Clearly and effectively communicates current tasks and priorities/ shares mental model ○ Uses closed loop communication ○ Monitors team members performance and completion of tasks ○ Makes team feel at ease to ask questions ○ Maintains calm • Communicates future plan/needs, to allow preparation • Create opportunities for team feedback/ contribution • Answers team members questions • Verbal recaps/ Team summaries	• Initially confirms team member roles • Foster effective team performance- covers two of listed points • Answers/deals with team members questions	