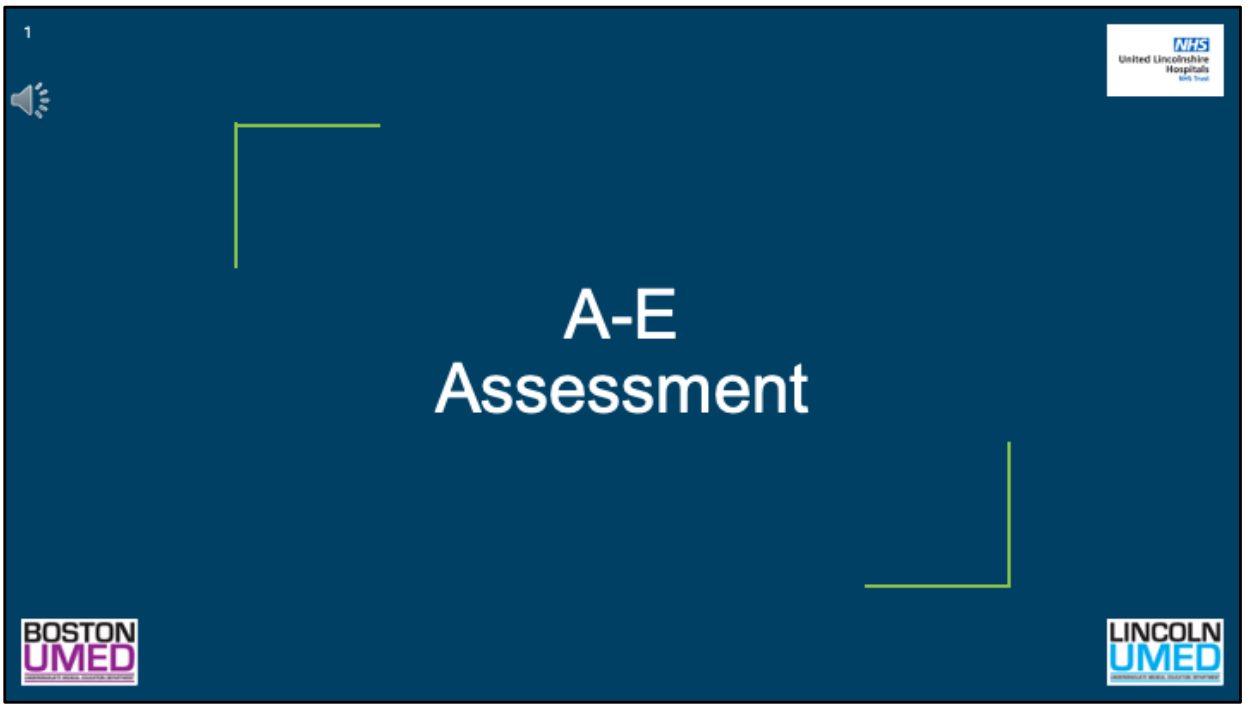
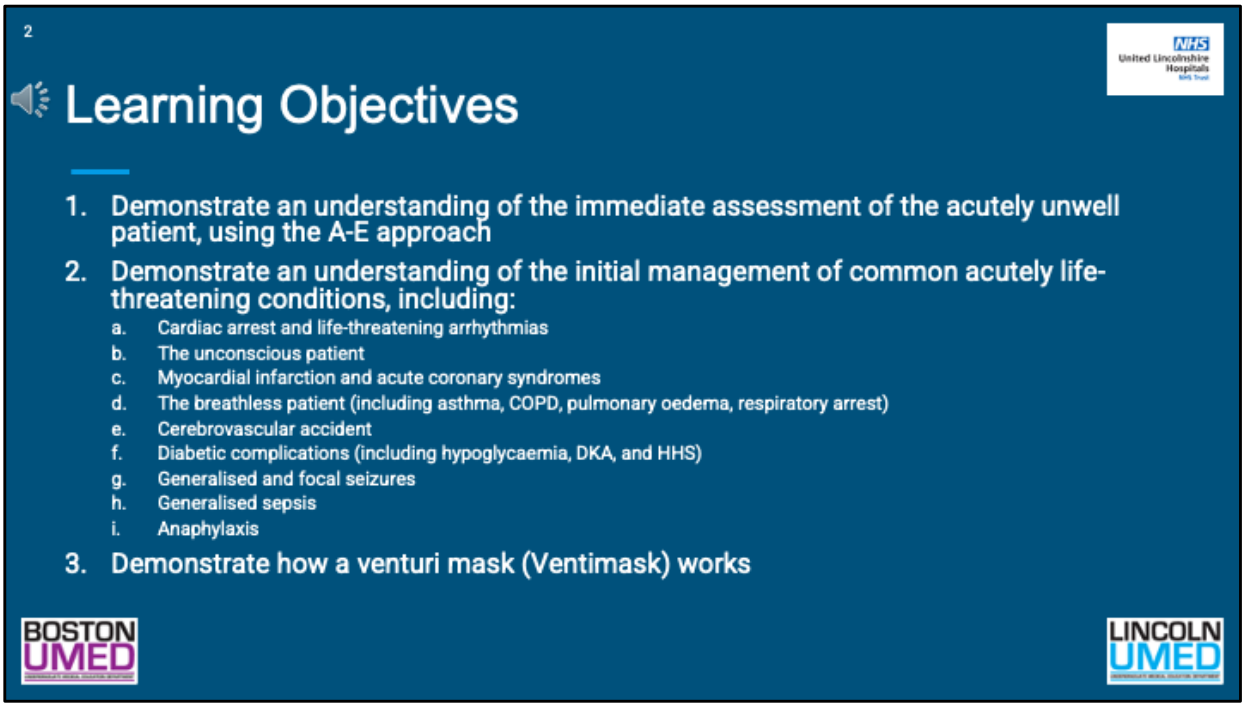
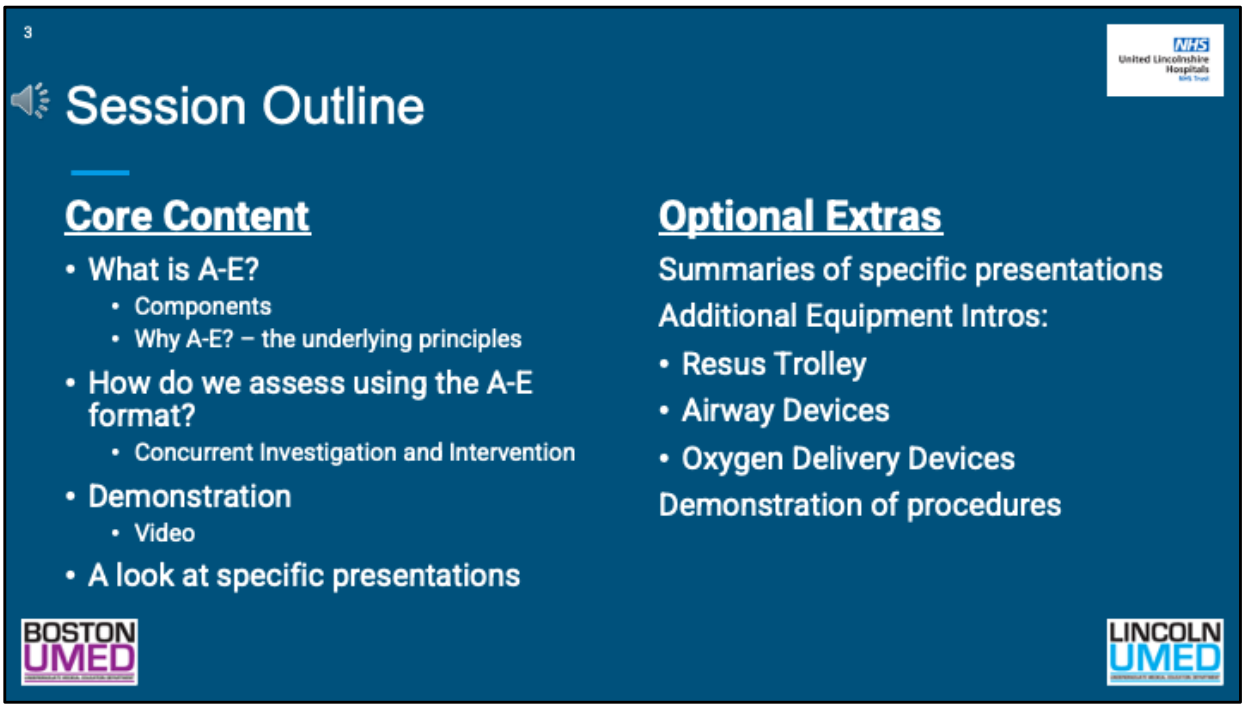



Hello and welcome to your session on A-E Assessment. Hopefully you have already tackled the Shock and Sepsis sessions, as this leads on from those. If you haven't, can I suggest that you stop here, and work your way through the other two sessions first.

Before we start today's session, I'll briefly point out a few things about this topic.
First, this is a very practical topic, so it isn't best suited to distance learning of theory. However, as you progress through your course, you will get plenty of opportunities to try your hand at this skill, especially in the Critical Illness module that you'll undertake in CP3, and during your ILS course and SIM day. Having said that, I have done my best to make this as practical as I can, and have included videos of me demonstrating the assessment and its components through the course of the session, in order to give you an idea of how it might be put into practice.
That said, go easy on me, and please don't expect perfection…!




The learning objectives for this session are fairly short.
The first is that you should be able to demonstrate an understanding of the A-E approach to assessing the acutely unwell patient
The second is to be able to demonstrate an understanding of the initial management of certain common life-threatening conditions, and those conditions are listed below. I will cover some of these in this session, however there is a good degree of overlap of these in other areas of the CP1 course, so I won't go into a huge amount of detail about them.
Finally, an objective that was tagged onto the breathless patient section was that you should be able to demonstrate an understanding of how a Venturi mask works. I'll cover this briefly, but I have to admit that the chances of this particular sub-objective being assessed are minimal, so if you don't like physics, I suggest you don't worry yourself overly about this!

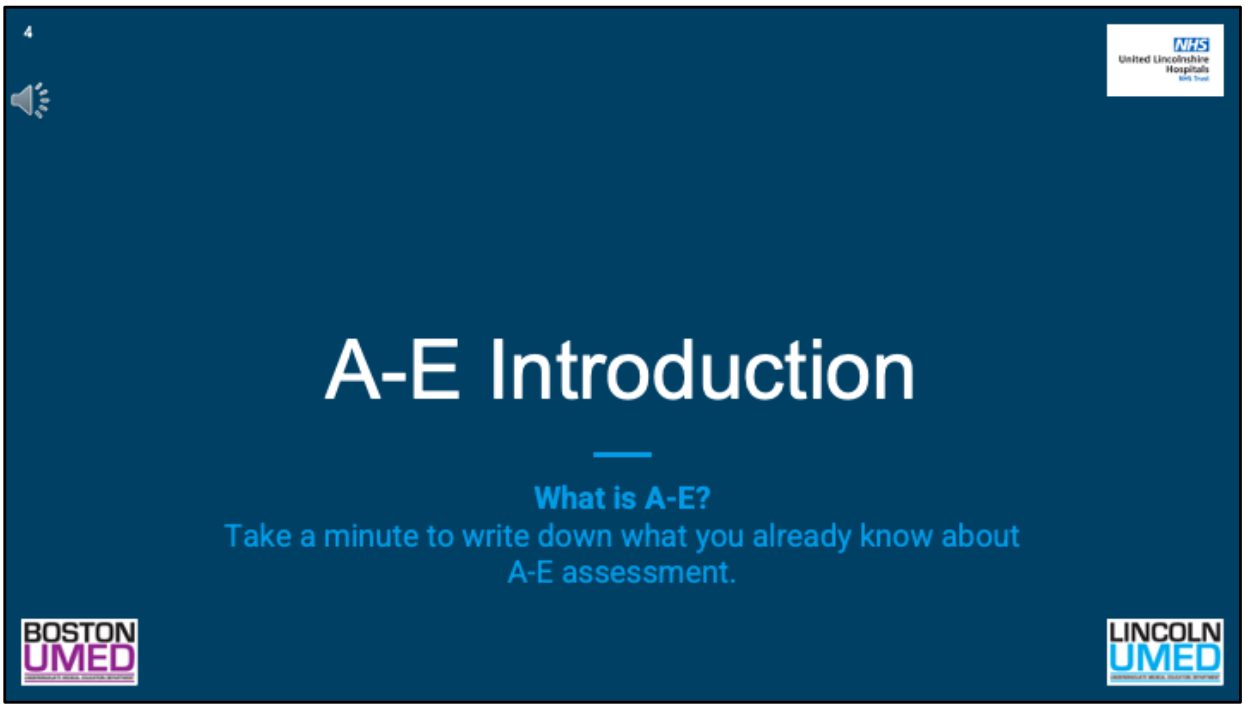



In terms of how we're going to cover those objectives, we're going to split the session into core content, contained in this video, and some optional extras which give you some more information about the various bits of equipment we are likely to use when dealing with acutely unwell patients.

In terms of the core content, first we shall discuss what an A-E assessment is, including what is involved, and why it is that we assess in this manner (because the answer actually isn't that it just follows the alphabet – it's just very convenient that it does!)

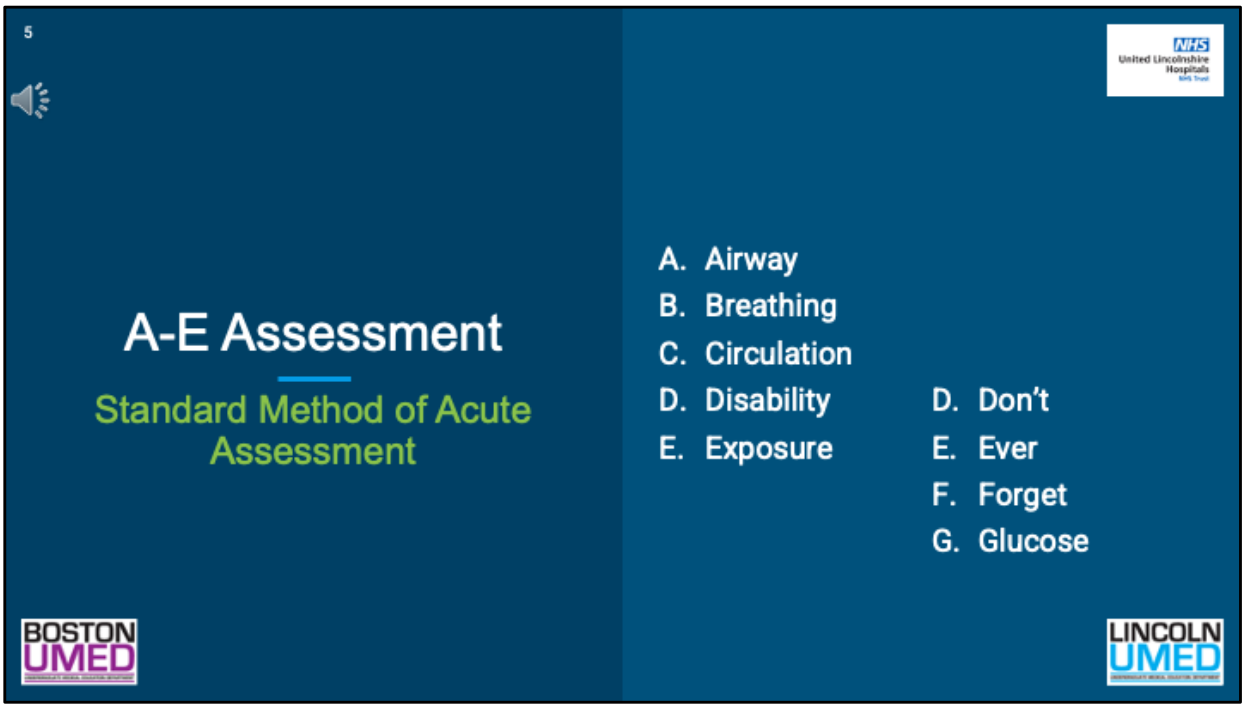
Having given the context of why, we'll get down to the how, talking about how we assess within the various components of A-E, but also discussing the rapid and often life-saving interventions that we can commence as we go.

As we run through each of the components, I'll finish off with a video demonstration of the assessment of that particular area. Then towards the end of the session once we've covered them all, I'll include a demonstration of the full assessment. Through the course of the session we'll touch on the immediate management of a number of conditions that have been listed in the second objective for the session. Any that aren't covered in the course of introducing the assessment, I'll leave in the optional extras section in the powerpoint.



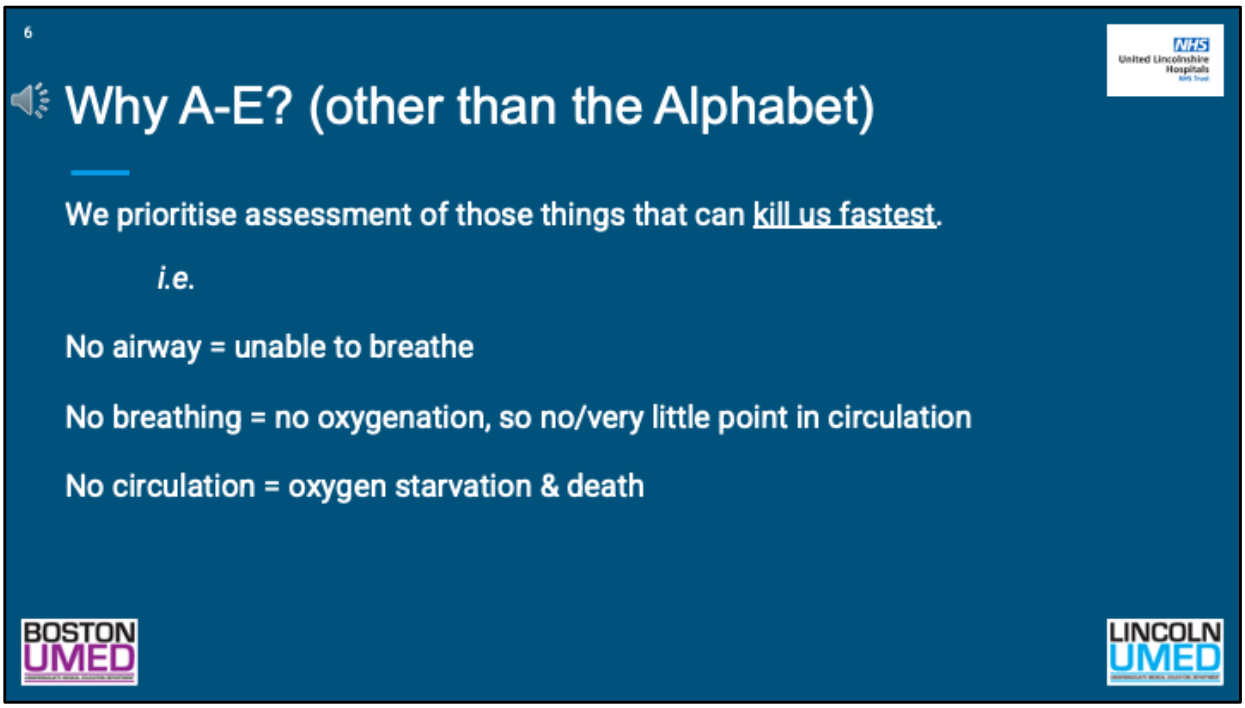

So what do you already know about A-E assessment? I'll give you a minute to write some things down. As a guide, here are a few things to think about:

1. What is the purpose of A-E assessment?
2. What does it stand for?
3. Why do we do it in this order?

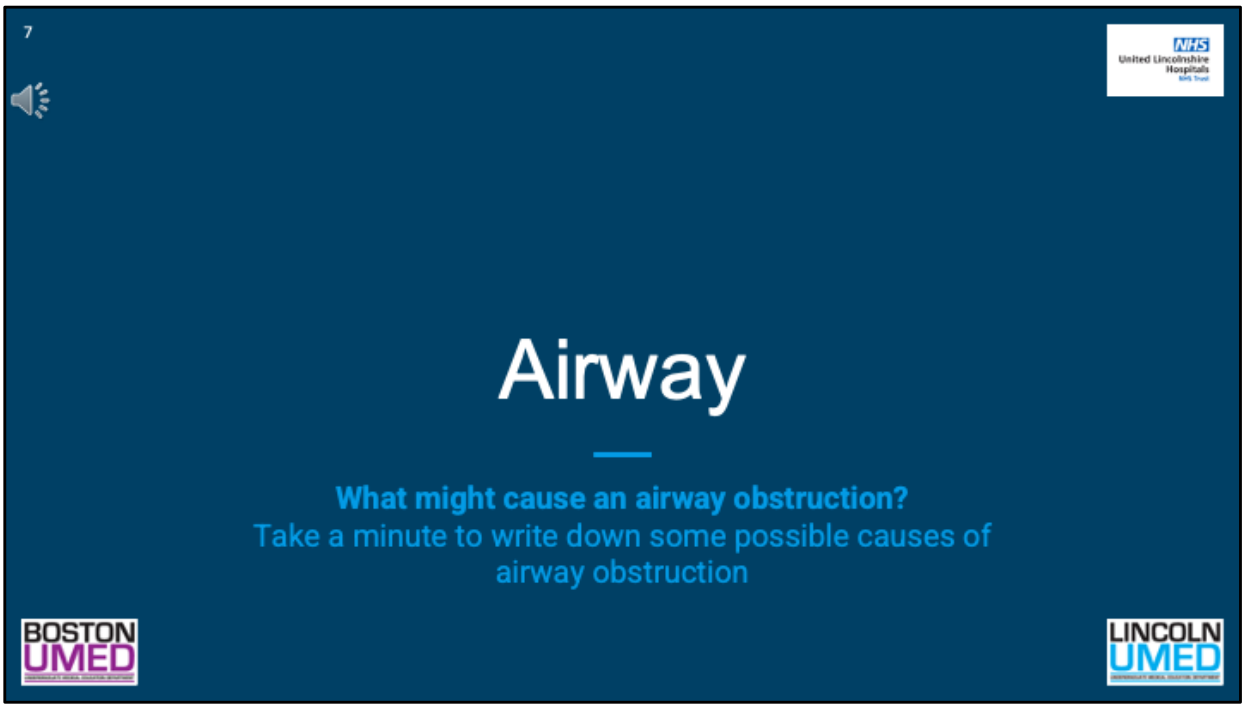



A-E assessment is the standard method of acute assessment, used by all health professionals, and forms the basis in varying degrees of detail and complexity from BLS and first aid, right through to the management of a trauma call.
ABCDE stand for different systems to assess.
A is Airway
B is Breathing
C is Circulation
D is Disability (think of this as mainly neurological status)
E is Exposure (and everything else) – a good moment to take the opportunity to consider context – try to put the whole story together into one unified picture (if possible)

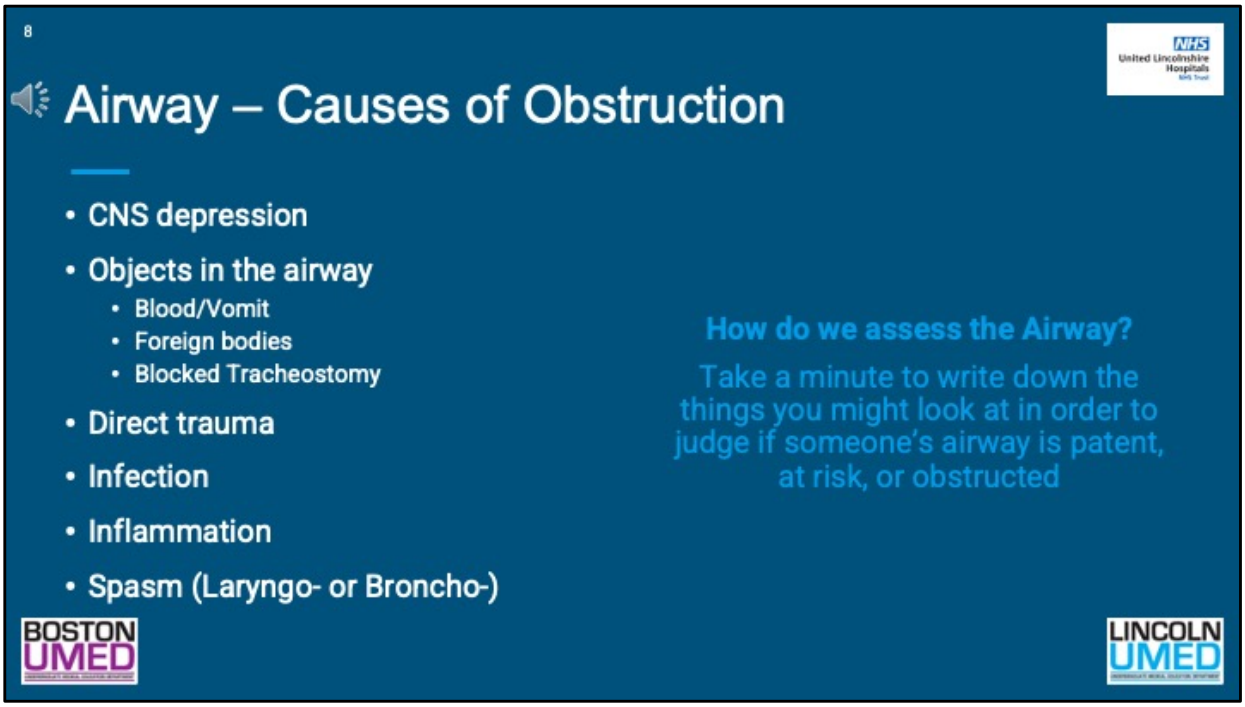
Some people add a DEFG at the end, standing for Don't Ever Forget Glucose, as this is something that is easily overlooked. This is important, as hypoglycaemia is a common and very dangerous cause of reduced consciousness that is reversible if identified and managed appropriately.




The philosophy behind A-E assessment is that we first identify the problems that can kill our patient the fastest. The Airway is where these fastest problems occur – without our airway, we cannot breathe, so get no oxygen on board to supply our tissues. Without this… well, we die. The purpose of identifying these most rapidly-lethal problems is so that we can intervene to solve them. A-E assessment is not just an examination – we take an assess and treat, or "treat as you go" approach, so within each section we will be taking steps to manage any problems we identify.




The first step in our assessment is to assess the airway. What kinds of things might cause an obstruction of the airway? Take a minute to write down some possible causes of airway obstruction.

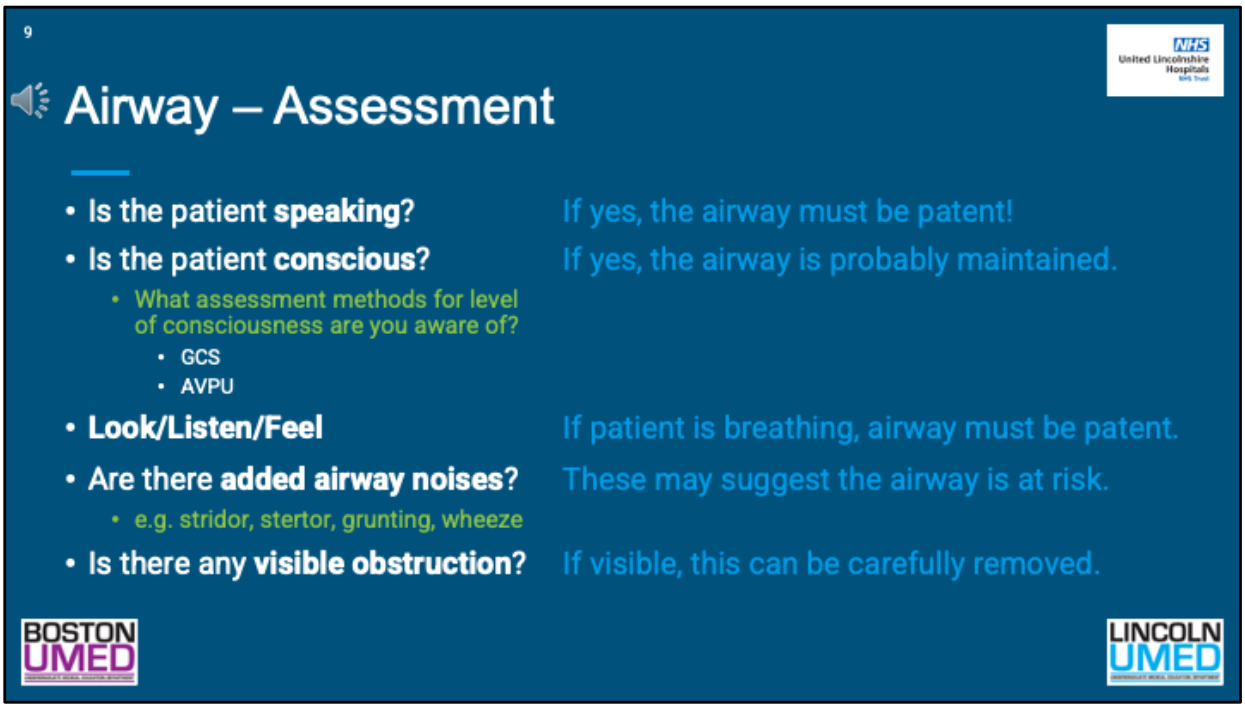



The airway can become obstructed for a number of reasons.
In order to maintain our airway, we need to maintain our smooth muscle tone, and for that we need a certain level of consciousness. So, in the case of Central Nervous System depression, we can lose the ability to maintain our own airway.

Perhaps the most obvious cause of obstruction is an object in the airway – this includes our own fluids such as blood and vomit, and also mucus plugs in a tracheostomy for instance, but it also includes foreign bodies.

The airway can also become impaired due to direct trauma, infection, inflammation, or laryngo- or broncho-spasm.

Considering the breadth of potential causes, how might we go about assessing the airway? Take a minute to write down what you already know about how we assess the airway – what might we look at?




There are a number of things we can do to assess the airway.
One of the biggest clues to its patency will be if the patient is talking – if so then clearly the airway is patent.

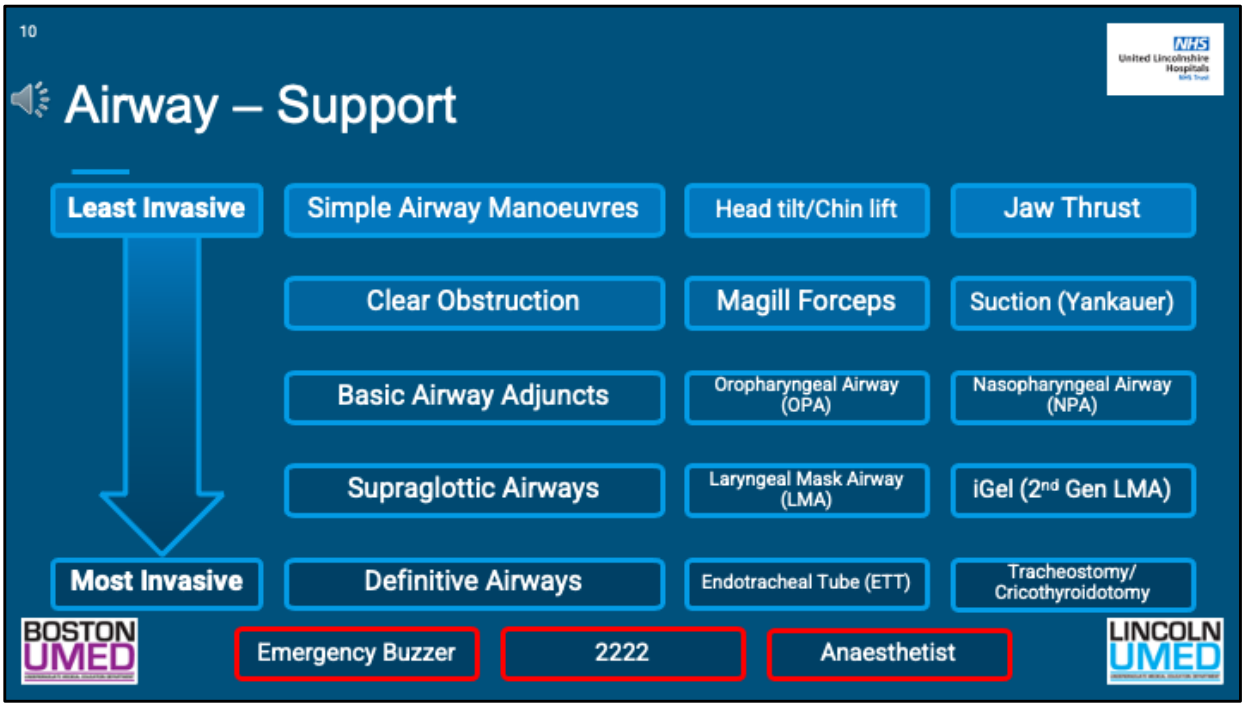
Another thing to consider is whether the patient is Conscious. As mentioned on the last slide, patients lose the ability to protect their airway with reducing levels of consciousness. There are some scores that we use to assess levels of consciousness. Can you name any?

We tend to use the Glasgow Coma Scale (GCS) to give us the most reliable assessment of patient's consciousness, which forms a score out of 15. Bear in mind that there are three categories within this (Eyes, Verbal and Motor) and the minimum score for each is 1, so the minimum score overall is 3. Don't say a number lower than this, because you're likely to look like a bit of a wally. However, much more easily-used and communicated is the AVPU scale, which stands for Alert, Voice, Pain, Unresponsive. The purpose of discussing these scales now, is that patients are generally able to maintain their own airway if their GCS is above 8 (corresponding to either A or V on AVPU). Any lower than 8, or P or U on AVPU, and their airway is likely to need support.

Another thing to consider is assessing whether the patient is breathing. If they are, they must be doing so through a patent airway.

If the patient is breathing, we should listen to the breathing – are there any added noises? If so, whilst they are encouraging in that the patient must be moving air, they are also concerning as they suggest the airway is at risk. These noises include: Stridor – a high-pitched whistling kind of sound; Stertor – also called snoring; grunting, gurgling, and wheeze.

Finally, we can look in the mouth if we suspect a foreign body obstruction of the airway. If there is an obstruction that is visible, this can be carefully removed – don't use your fingers for this though!




To guide our support of the airway, there is an airway ladder.
This ladder starts us with the least-invasive interventions, and moves in a step-wise manner to the most invasive. I'll now go on to briefly outline the ladder and its components. If you want any more information on any of these interventions, I have included some optional slides at the end of the powerpoint with a brief introduction to each of them. You can access these by clicking on their box (if in presentation mode), or by holding the Ctrl button and clicking if in the edit view. The box on the right hand side of each of those slides is a link to bring you back here when you're done – in presentation view just click on this, in edit view right click and select "Go to Slide".

The least invasive supportive measures for the Airway are the Simple Airway Manoeuvres. There are two of these that are commonly used. The most common is the Head tilt/Chin lift. However, as this involves movement of the neck it is inappropriate in patients in whom we suspect a cervical spine injury. In these patients, we use the Jaw Thrust manoeuvre, which is performed without any movement of the neck.

If we suspect or observe any foreign object obstruction of the airway, we should remove this if we are able to do so. There are two absolute rules when it comes to removal of obstructions, however.

1. We should NEVER put any part of our fingers or hands into the patient's mouth, unless we wish to lose those fingers
2. We should only work within direct line of sight – we should always be able to see the tip of any instrument we are using

The two pieces of equipment we can use for removing obstructions are Magill Forceps, used for solid foreign bodies, and suction, which can relieve liquid obstruction such as blood or vomit.

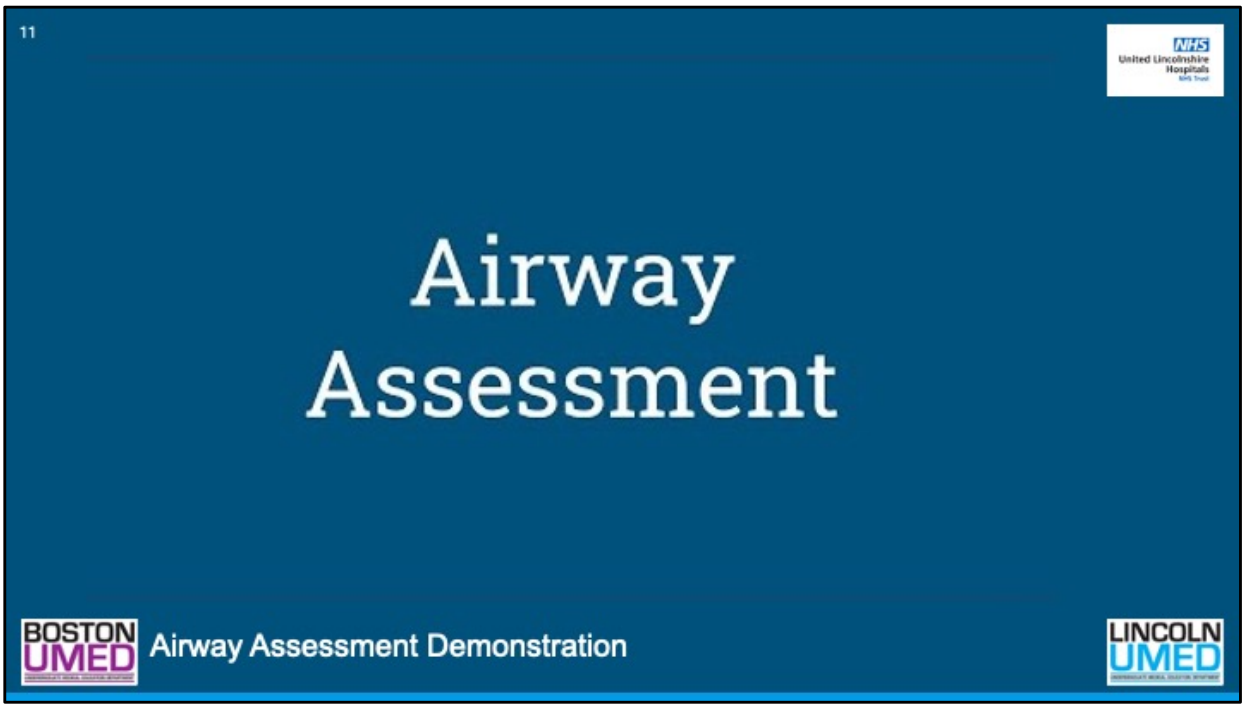
Our next step, in patients who aren't able to maintain their own airway, is to try Basic Airway Adjuncts. We have two choices here: the Oropharyngeal Airway, often referred to as a Guedel Airway; and the Nasopharyngeal Airway. As you might be able to tell from their names, each goes only as far back as the pharynx (although via

different routes, of course), helping to relieve soft-tissue obstructions of the upper airway. The oropharyngeal airway is limited to use in unconscious individuals, due to its stimulation of the gag reflex, which will lead to vomiting and aspiration in conscious patients. The alternative is the Nasopharyngeal airway, which doesn't tend to stimulate the gag reflex, so is better-tolerated in conscious patients. However, the Nasopharyngeal airway shouldn't be used where skull fractures are suspected, for instance.

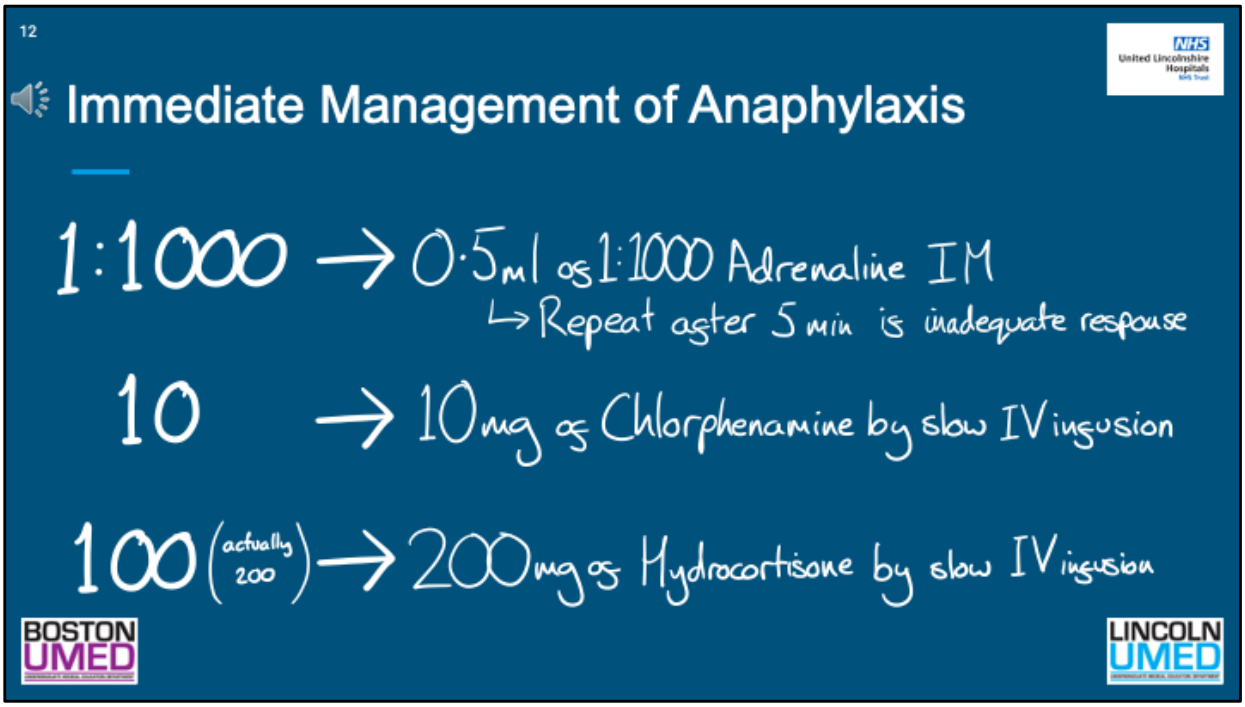
Beyond basic airway adjuncts, we then have the supraglottic airways. These tend to sit like a mask over the glottic opening, hence are also called laryngeal mask airways. There has been some development of this principle in the past few decades, with inclusion of bite blocks (to protect the tube), oesophageal aspiration ports (to provide greater protection to the airway from aspiration), and in the case of the iGel a moulding gel design that doesn't require inflation of a cuff, meaning it is simple to use, and suitable for insertion by less-skilled personnel.

Definitive airways include standard endotracheal tubes (insertion of which we commonly call intubation), and alternative routes to definitive airways through the front of the neck, including the emergency Cricothyroidotomy, and the elective Tracheostomy.

Of course, if you're dealing with a patient with an airway obstruction, you're going to want to get help quickly. There are a few ways of doing this. The first you're often taught is to put out a loud shout for help. In a ward environment, you'll have the additional aid of the emergency buzzer, which can shout just a touch louder than you, and tends to do a good job of grabbing peoples' attention… Ideally, you would send the first person that arrives to help away again, in order to put out a crash call, or perhaps an airway emergency call. In the UK, we now have an almost-universal in-hospital emergency number, which is 2222. This is used for all medical emergencies, so it is important to state what kind of emergency this is, and what resources are required. Finally, in any airway emergency, my first wish would be to have an anaesthetist on scene as soon as possible.




Of course, looking at this video, I really should have put some oxygen on! (but would have done very early in breathing assessment, I'm sure)




The immediate management of Anaphylaxis can be remembered using the 1, 10, 100, 1000 aide-memoir.

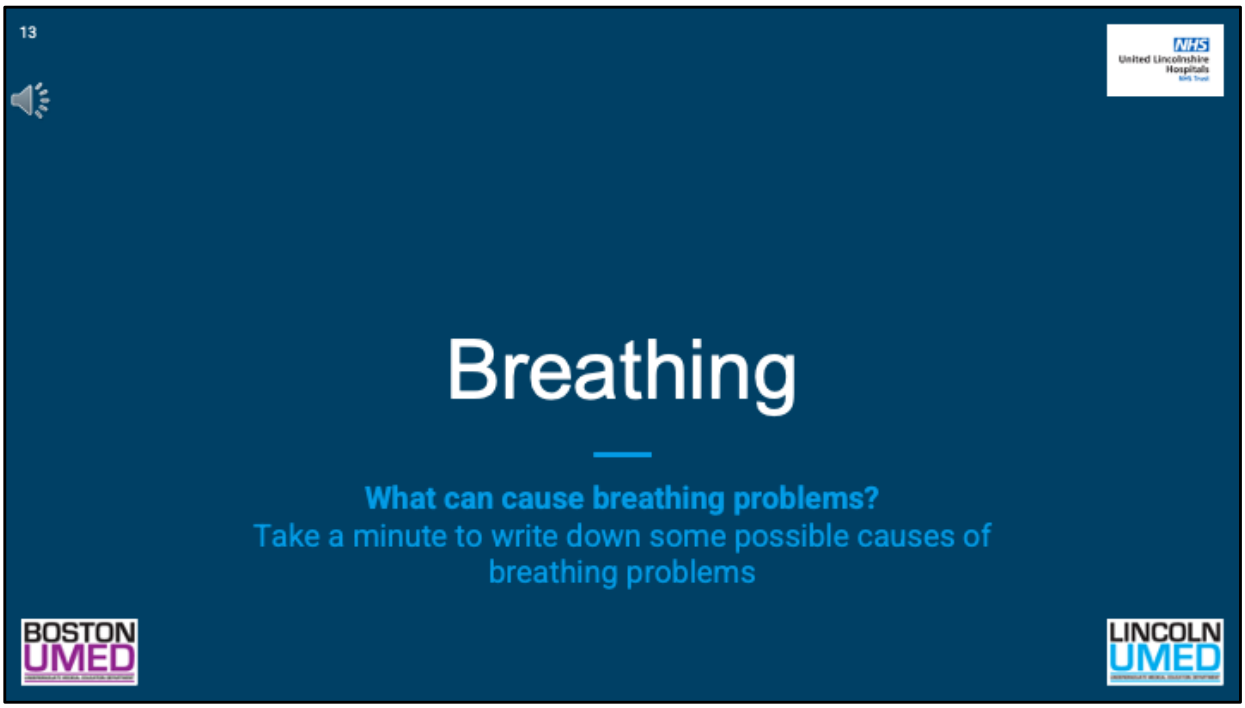
The most pressing step is to administer an initial dose of 0.5ml of 1:1000 Adrenaline by IM injection. If there is no improvement after 5 minutes, this dose should be repeated.

The next step is to give 10mg of Chlorphenamine by slow IV infusion (although this can also be given IM)

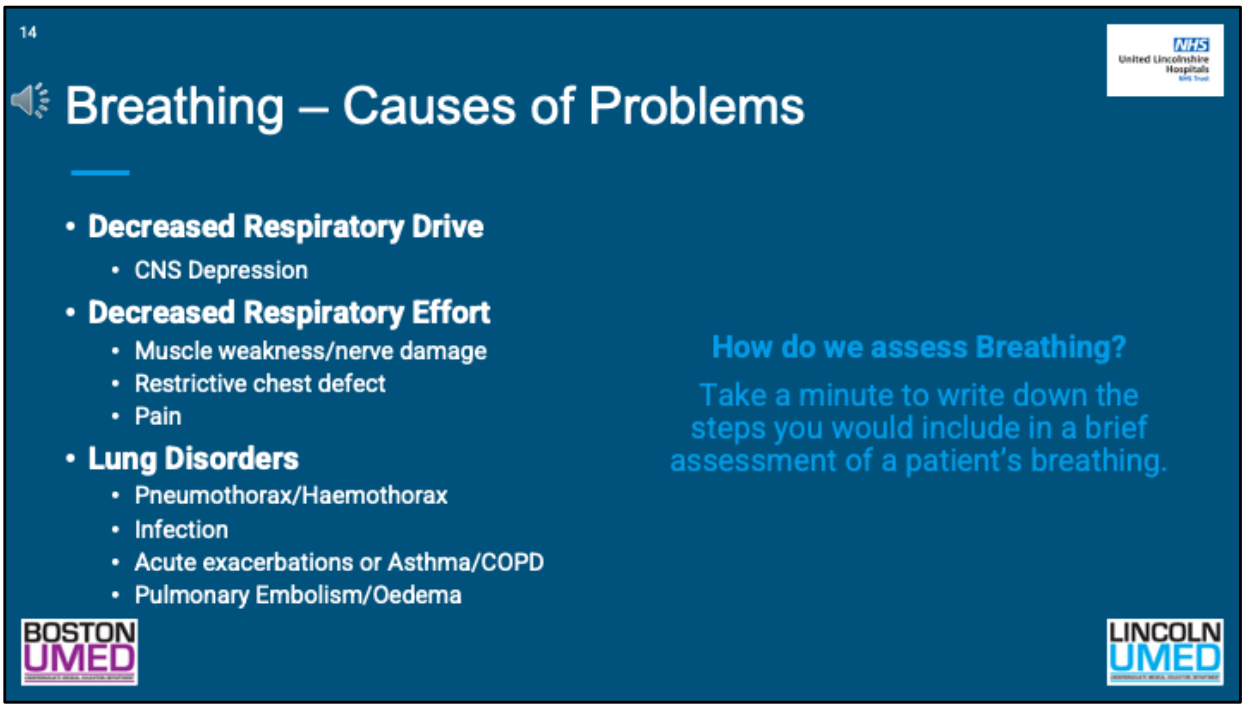
Finally, we should administer 200mg Hydrocortisone, also by slow IV infusion (although this too can also be given IM)

Of course, we should also ensure that we've removed the trigger – for instance, by stopping a recently-started infusion of penicillin antibiotics.

Other actions to take include commencing 15L of Oxygen via a non-rebreathe mask (which I didn't mention in the video), lying the patient flat with their legs raised in the air, and administering fluid boluses – the latter two of these to help with the mixed distributive and hypovolaemic shock that is occurring.

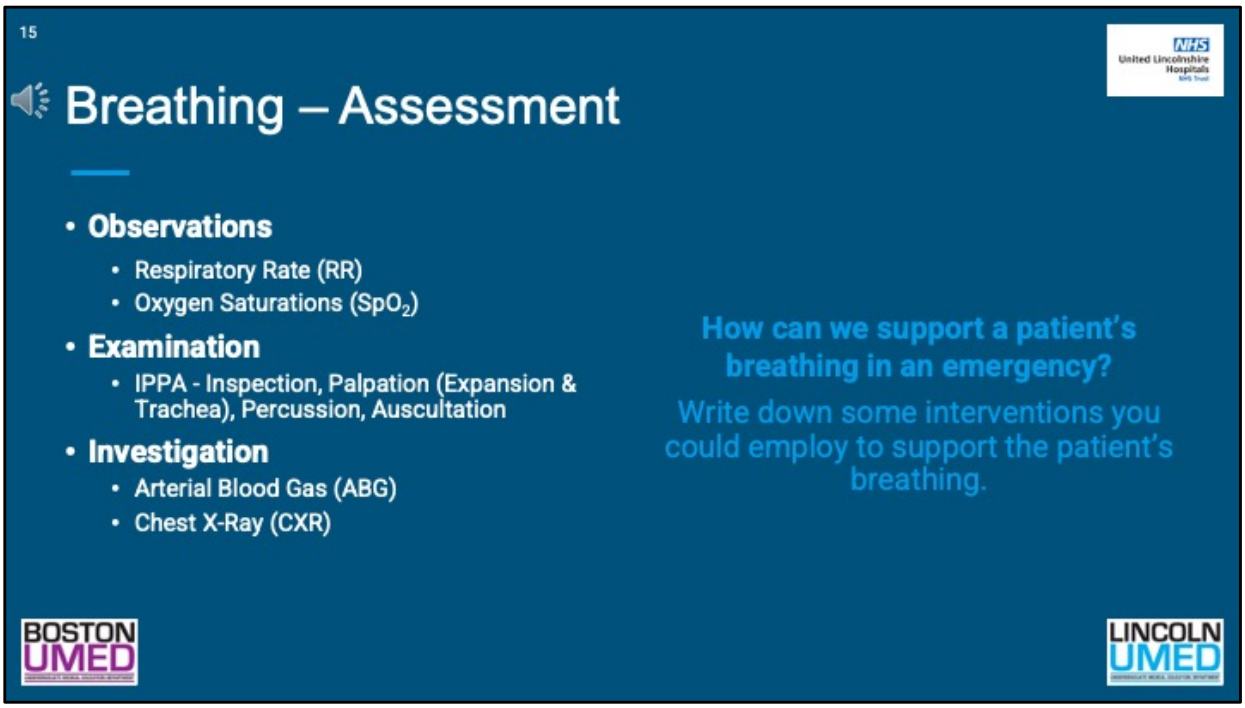



Having dealt with our airway, we now need to move on to assess the patient's breathing.
I'll give you a minute here to write down some possible causes of acute breathing problems.




There are three major routes through which breathing problems can occur:
Decreased respiratory drive, such as in CNS depression
Decreased respiratory effort, such as with MSK problems including deformities, pain, weakness or neuropathy impairing chest wall movement.
And disorders of or around the lungs themselves, including some that are listed here.

So, with these causes in mind, how might we go about assessing breathing? I'll give you a minute to write down the steps you'd include in a brief assessment of a patient's breathing.




Probably the first thing you should do, or should ask to be done, is to check the respiratory rate and the oxygen saturations. This could be done as part of a full set of observations. Whilst doing this, you can also observe the patient's work of breathing – are they comfortable, or huffing and puffing?

We will also want to examine the chest. You're likely to already be aware of IPPA – Inspection, Palpation, Percussion and Auscultation. Each of these steps is useful in examination of the chest. In terms of palpation, this includes feeling for the position of the trachea at the base of the neck, and checking chest expansion to see whether this is equal bilaterally. Percussion and Auscultation should be performed in 3-4 zones both front and back if possible.

In terms of investigations, we could consider taking an arterial blood gas, and requesting a chest x-ray.

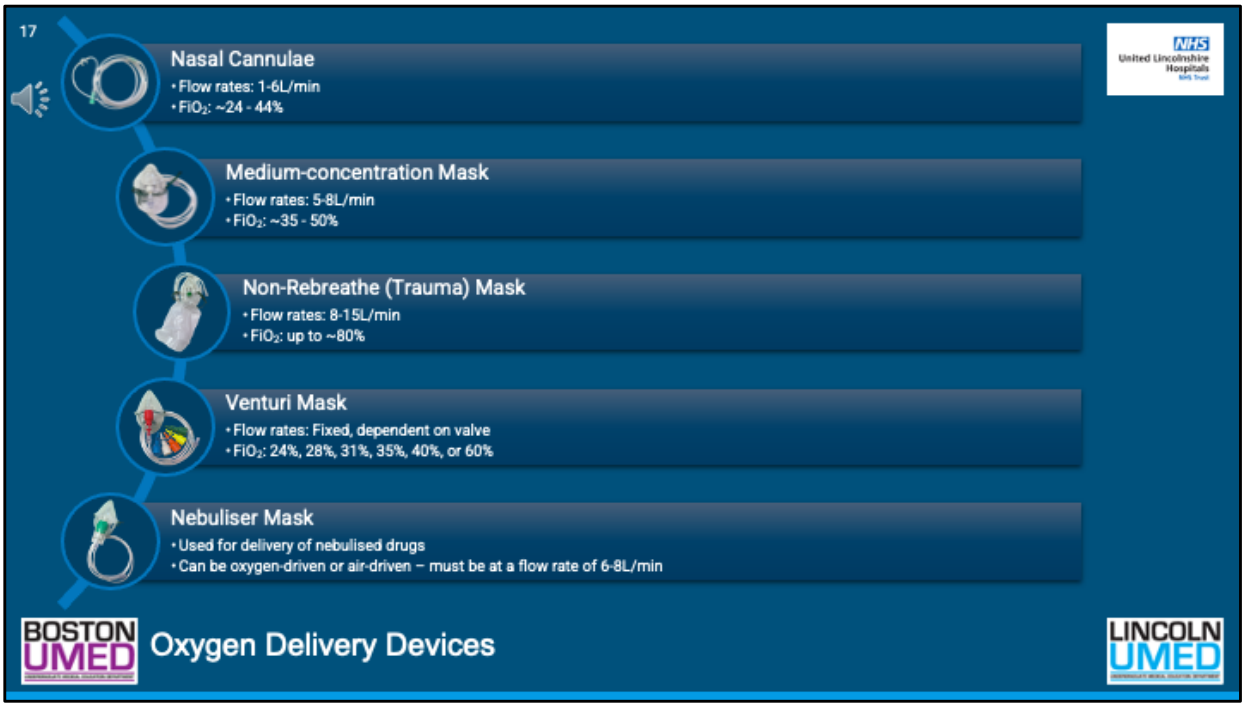
Having assessed the patient's breathing, how we might support their breathing, or treat any problems that we've found? Take a minute to write down what you're able to think of.


Hopefully one thing you've all written down is oxygen. This is often the first bit of management that we do, although there's been a shift in recent years towards more careful administration of oxygen even in the acute setting, with titration to specific target saturation ranges now indicated in MIs and Strokes, for instance.

If the patient is wheezing, we may wish to administer nebulised medications to help treat this – Salbutamol and Ipratropium are common choices.
If the patient is suffering with acute pulmonary oedema, we may wish to administer IV diuretics in order to offload some of this fluid and improve symptoms.

Of course, if the patient's respiratory drive is impaired, and their respiratory rate insufficient as a result, we can ventilate with a Bag-Valve-Mask system.

Another intervention that's occasionally required is a Needle Decompression (also called a needle thoracostomy, or air aspiration), which is performed in Tension Pneumothorax to relieve the intra-thoracic pressure




Thinking about Oxygen then, we have a number of delivery devices at our disposal. I'll briefly discuss these here, however if you want more information, you can click on the pictures that come up in the Powerpoint file (Ctrl+click if in edit mode) and you'll be taken to a slide with further details. If you want to get back here, click on the small image of this slide to the right of the video (if in edit mode, right click and select "Go To Slide").

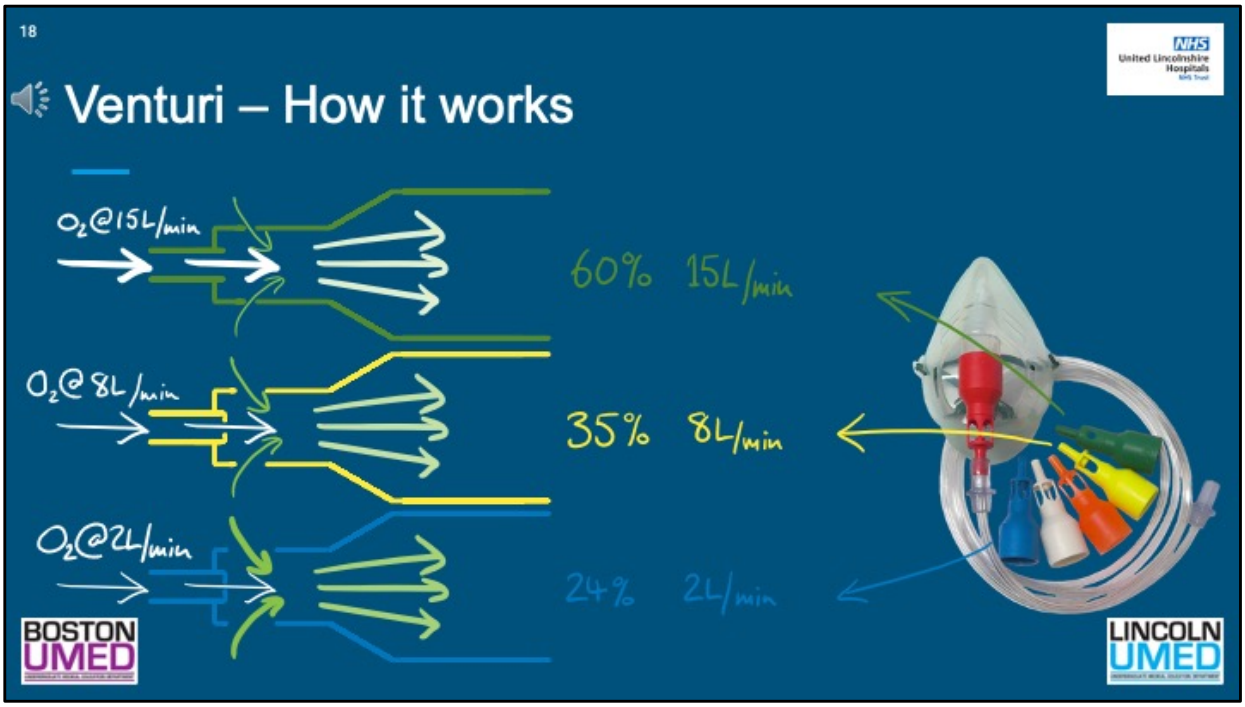
The first device we'll discuss is nasal cannulae. These are capable of delivering inspired percentages between approximately 24 and 44%, with flow rates between 1-6L/min. Higher flow rates through these tend to dry out the nose, causing discomfort, so we tend usually to stick to around 2L/min.

Next is the medium-concentration (or Hudson) mask. It's fairly rare to see these as we usually just use a non-rebreathe mask. In fact, I really struggled to get hold of one for this session! These are capable of delivering inspired percentages between approximately 35 and 50%, with flow rates between 5-8L/min.

The non-rebreathe mask is probably the most commonly-used mask of all. This is capable of delivering the highest percentages of inspired oxygen – up to around 80-90%, depending on fit and other factors. This can be used with flow rates between 8-15L/min, but we tend to use mostly 15L/min.

The Venturi devices are the only method of delivering a known percentage of oxygen to the patient. Each of the valves has a set flow rate and delivered percentage, and there is a universal colour code for these. We'll discuss how they work in some detail shortly, and there is further information about how they are used which you can access by clicking on the picture if you're interested.

The Nebuliser mask is used to deliver medications to the lungs and airways. These can be driven by oxygen or by air, but must be driven at a flow rate between 6-8L/min.



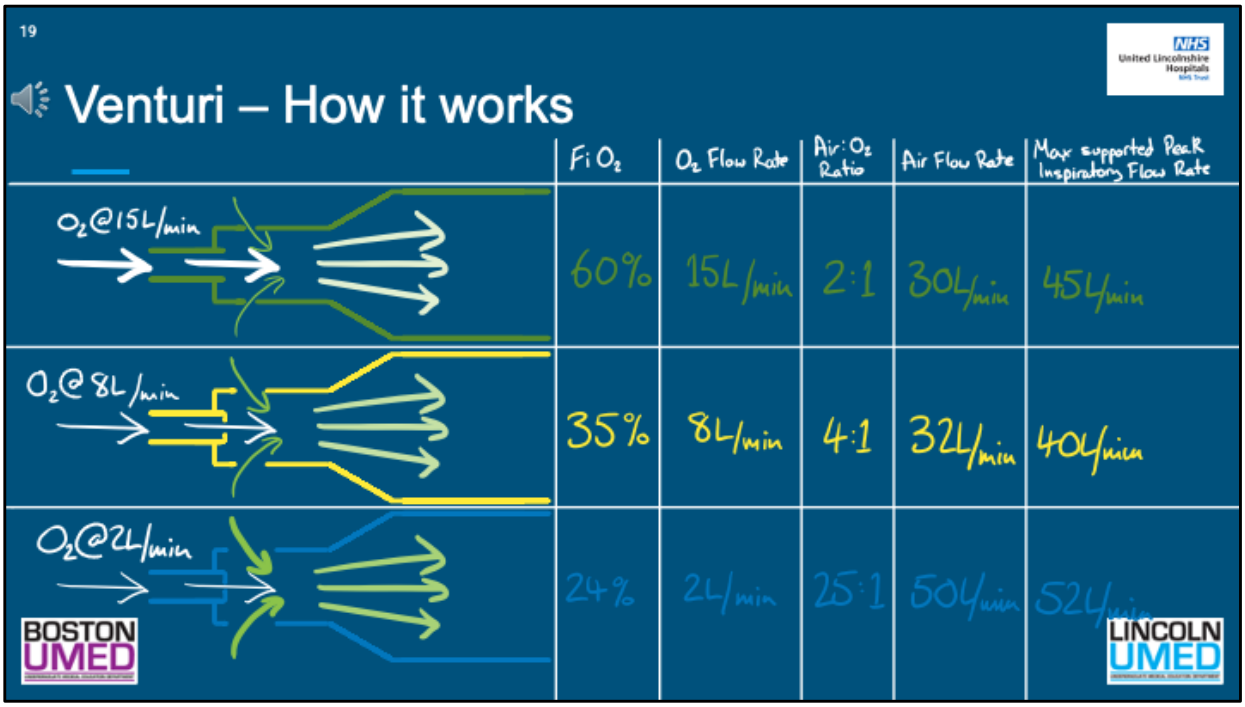

The venturi device delivers a fixed percentage of oxygen to the patient. Each valve has a colour code, to indicate the percentage it delivers.

If we take the yellow valve, this delivers 35% oxygen to the patient, requiring an oxygen flow rate of 8L/min
On the left, I've drawn a diagram of the cross-section of a yellow venturi. On this diagram, the oxygen tubing is attached on the left hand side, with the mask being on the right hand side.
The oxygen flows through the central channel into the barrel of the venturi, which has air ports on the side. The flow of oxygen through the barrel draws air in through these ports, in a constant ratio – this is air-entrainment. The ratio is dependent on the size of the air ports, and the aperture for the oxygen.

For instance, the blue venturi delivers 24% oxygen, a much lower percentage. In the blue venturi, the oxygen aperture is much smaller, and the flow rate much lower, whereas the air ports are usually larger. This gives a much higher proportion of air to oxygen.

At the opposite end of the scale, the Green venturi delivers 60% oxygen. This has a much larger oxygen aperture through which we deliver 15L/min of Oxygen, and much smaller air ports, giving us the much higher proportion of oxygen to air in the mixture.

For each of these, the mixture concentration can only be guaranteed up to a certain peak inspiratory flow rate, which can be worked out based on the mixture ratio and the oxygen delivery flow rate.

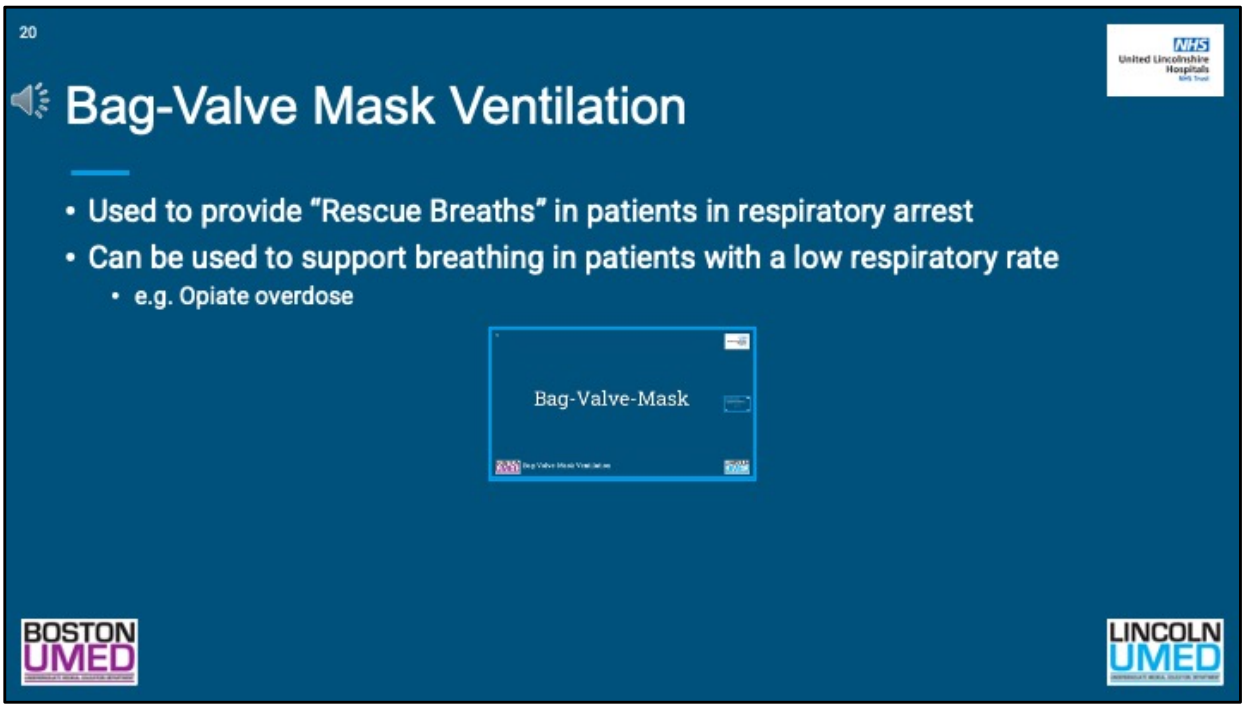



So, let's turn this into a table.

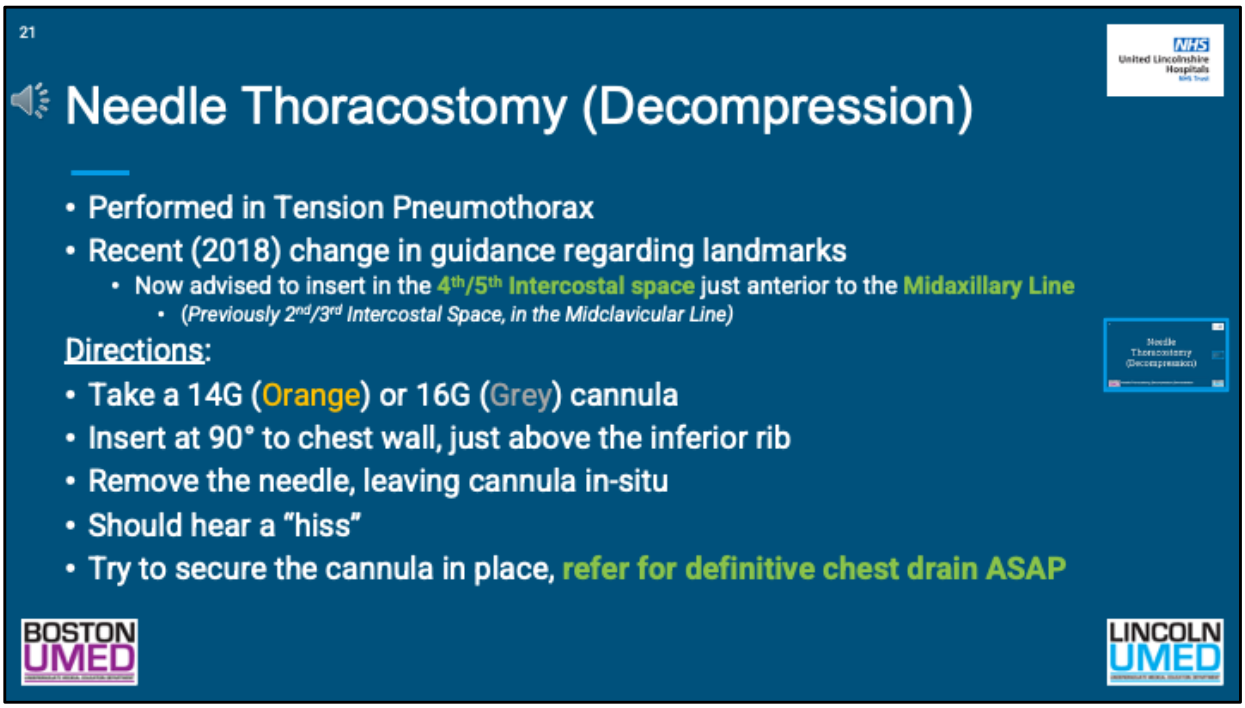
For each, we have the delivered inspired oxygen percentage (or FiO2), and the oxygen flow rate. Each of the valves produces a different mixture ratio between air and oxygen. For the Green 60% valve the mixture is 2 parts air to 1 part oxygen, for the Yellow 35% valve it is 4 parts air to 1 part oxygen, and for the Blue 24% valve it is 25 parts air to 1 part oxygen.

So, multiplying the air component of the ratio by the oxygen flow rate gives us the correct air flow rate for the valve – for the 60% valve it's 30 L/min, for the 35% it's 32 L/min, and for the 24% it's 50L/min.

Adding the air and oxygen flow rates together, we get the total flow rate through the system – for 60% it's 45 L/min, for 35% it's 40 L/min, and for 24% it's 52 L/min. As this flow rate is usually vastly in excess of the inspiratory flows required, any excess is vented through the sides of the mask. However this value also represents the maximum peak inspiratory flow rate at which the FiO2 can be guaranteed, so if your patient is gasping the air in particularly quickly, they may be getting a lower oxygen percentage than expected.



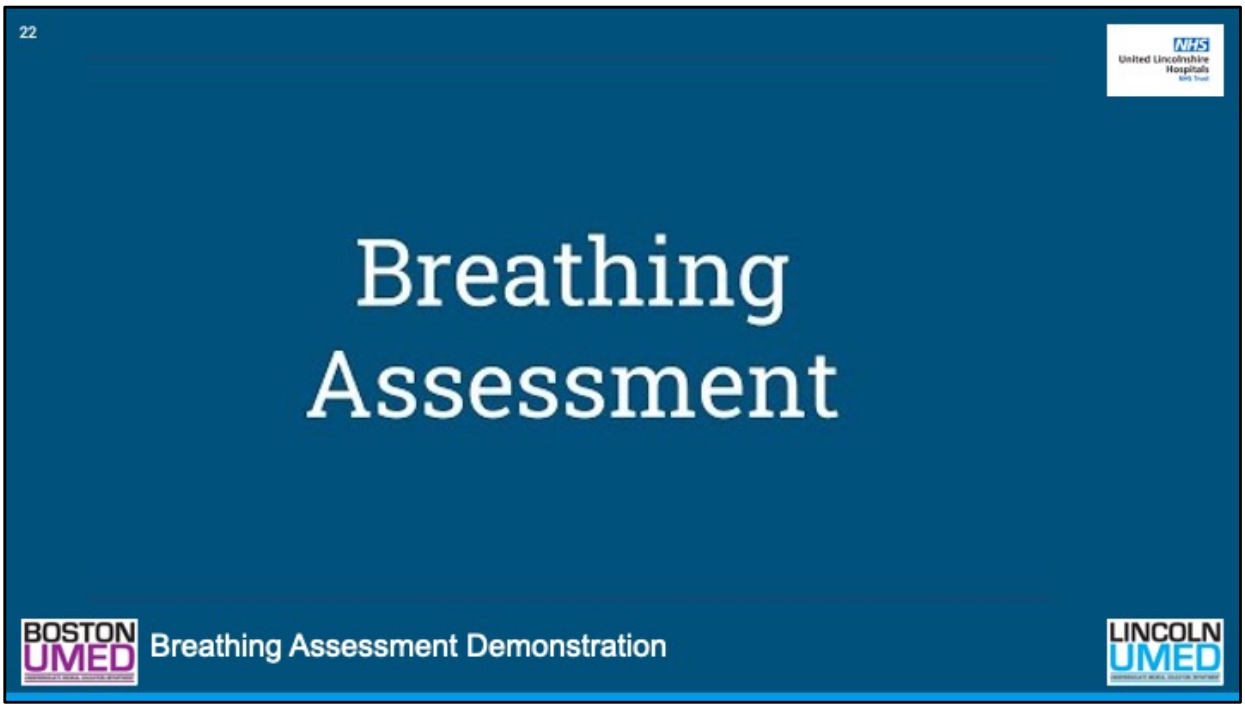

Bag-Valve-Mask ventilation is used to provide rescue breaths and ventilation in respiratory and cardiac arrest. It can also be used to support breathing in those with a suppressed respiratory drive, such as in opiate overdose. There is a demonstration video available in powerpoint via the link on this slide. This can be attached to an oxygen source, either piped from the wall or from an oxygen cylinder, or alternatively can be used with room air.




A needle decompression is performed to relieve intrathoracic pressure in tension pneumothorax.
There has been a recent shift in advice regarding the best landmarks to use. Whilst previously the advice was to insert the needle in the 2nd or 3rd ICS in the midclavicular line, there were issues here as the thoracic wall thickness is too great, resulting in a high failure rate. Therefore the advice has changed to recommend insertion in the 4th or 5th ICS just anterior to the Midaxillary line. The thoracic wall thickness laterally is much less, providing a higher success rate, although there are issues here around securing the cannula following insertion whilst awaiting formal chest drain – particularly so if the patient is being transported (i.e. in prehospital care).

The directions are fairly simple. We take the longest, fattest cannula we can lay our hands on, usually an Orange, but if that isn't available a Grey is the next best thing.
We identify the correct landmark, and stick the needle straight into the chest in the intercostal space, just above the lower rib. We then remove the needle, leaving the cannula in-situ, and should hear a hissing noise as the trapped air escapes.
We should attempt to secure the cannula in position, but really do need to ensure a definitive chest drain is placed as a matter of urgency.

There is a demonstration video available in powerpoint via the link on this slide.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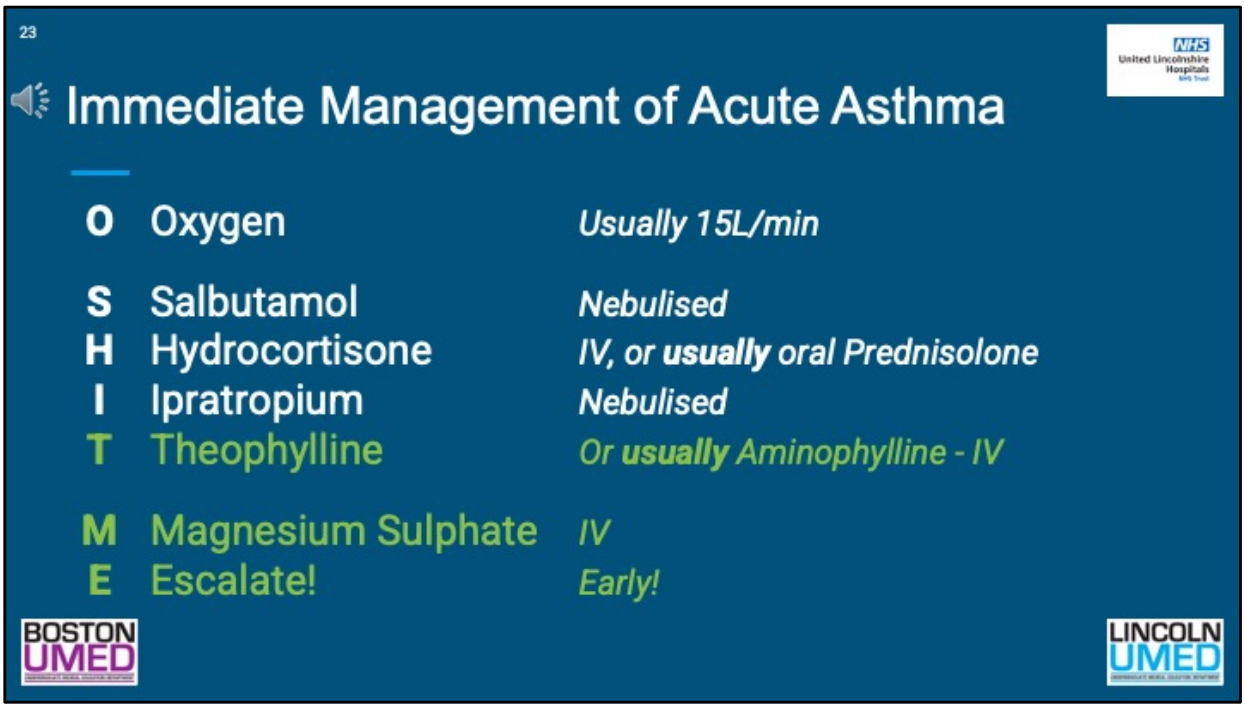
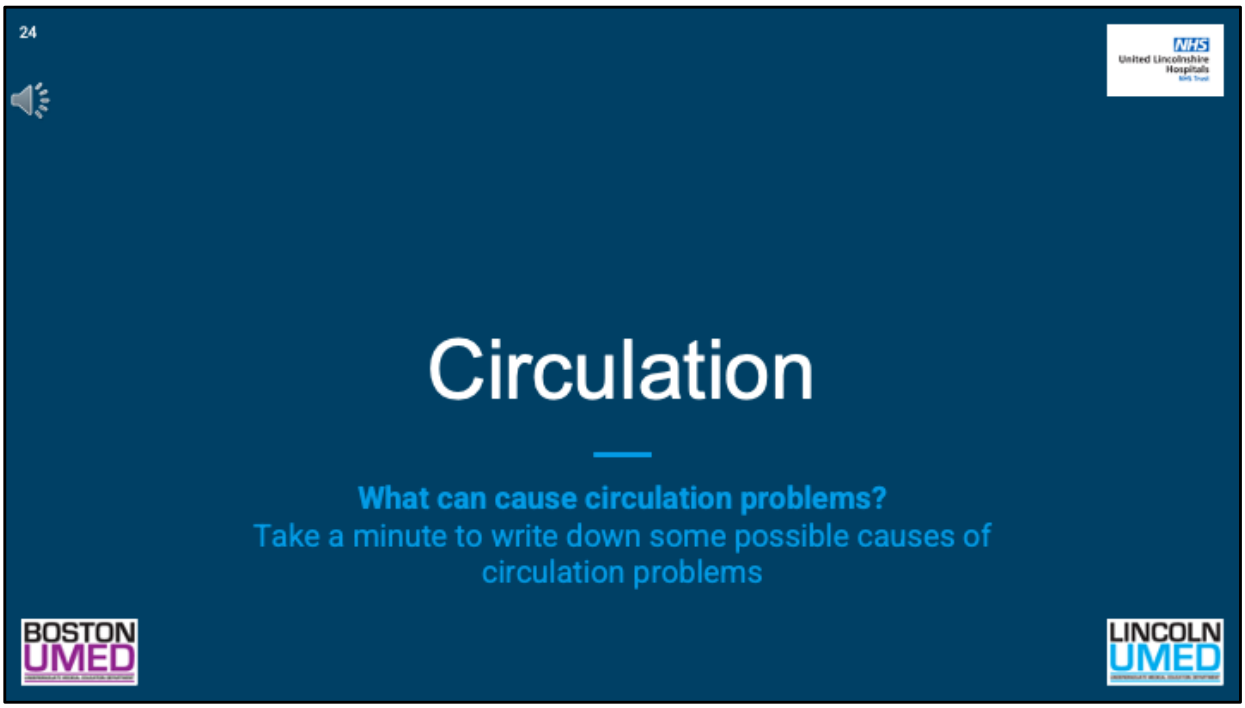
NHS
United Lincolnshire Hospitals
Breathing Assessment
BOSTON UMED
Breathing Assessment Demonstration
LINCOLN UMED



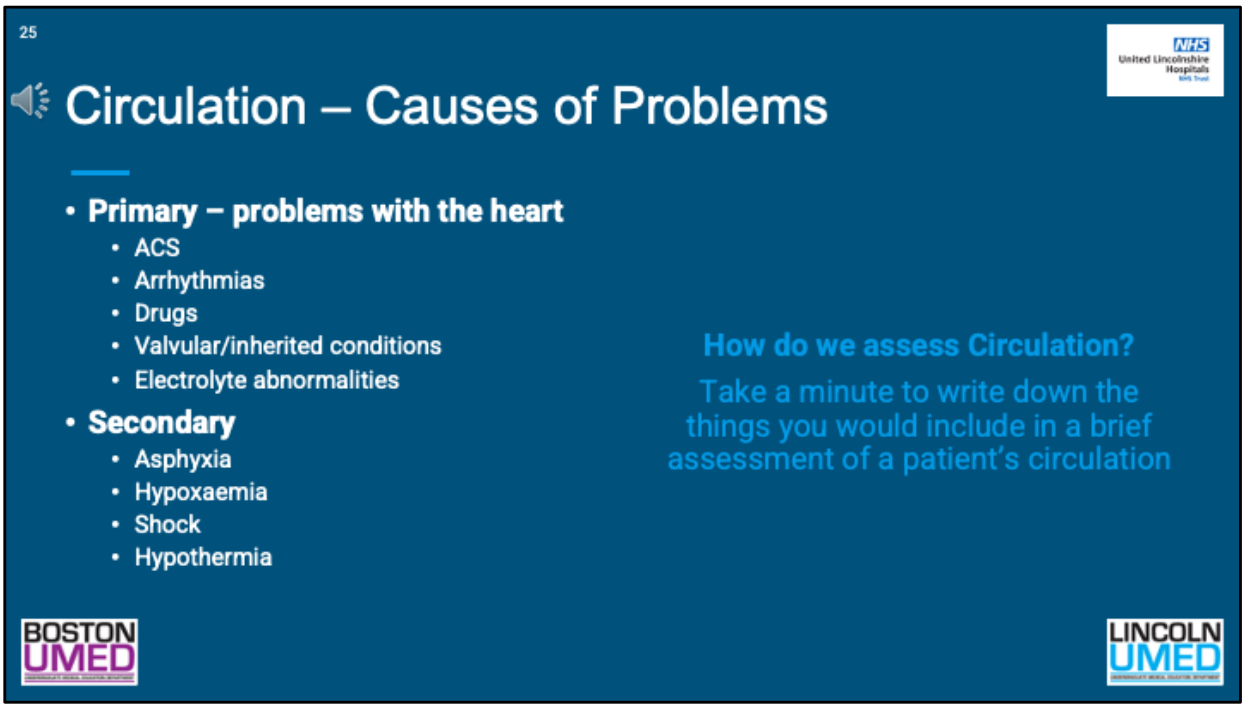

The immediate management of asthma is fairly easy remember. Helped, of course, by a rude mnemonic!
This mnemonic is particularly helpful because not only is it memorable due to it being your reaction upon seeing a patient suffering with a life-threatening exacerbation of asthma, but it also broadly follows the order in which the medications should be given.

So, O Shit Me. What does it stand for?
Well we start with oxygen. Usually, we'll be giving this at 15L/minute through a non-rebreathe mask.
We'll also want to get some bronchodilators into the patient though. The easiest and most-targeted way of doing this is by administering nebulised salbutamol.
Steroids are helpful, with the option of IV hydrocortisone (if the patient is unable to take anything orally) or, more commonly, oral prednisolone.
If salbutamol alone isn't doing the trick, we can run nebulisers back-to-back, and can also add Ipratropium to subsequent doses.

If these interventions haven't got things under control, anything in Green I'd be wanting a senior's help with.
Which explains what E is – it stands for Escalate!
T stands for theophylline (although we tend to use aminophylline), and M for Magnesium sulphate. Each of these last two is an IV medication

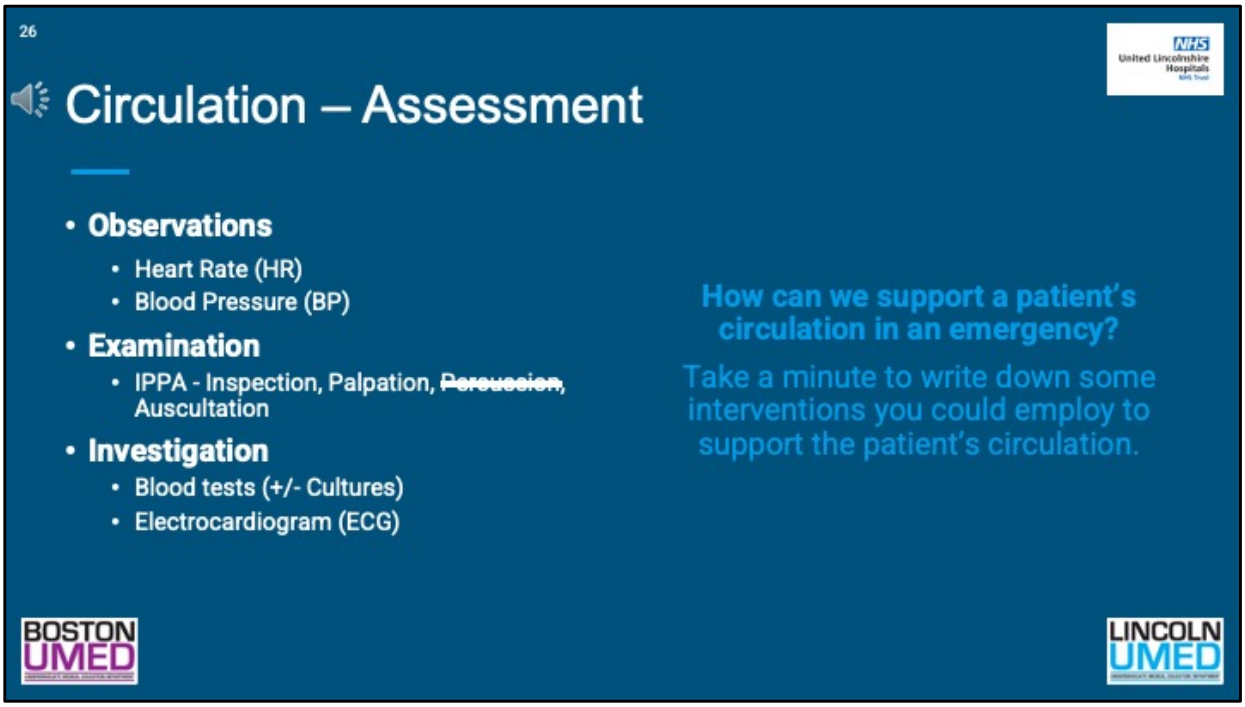



Having dealt with breathing, we now need to move on to assess the patient's circulation.
I'll give you a minute here to write down some possible causes of circulation problems.




Broadly, we can divide the causes of circulation problems into Primary (those of the heart) and Secondary (those not).
Primary problems include our Acute Coronary syndromes, arrhythmias, drugs affecting cardiac function, electrolyte abnormalities.
Secondary causes of circulatory problems include asphyxia, hypoxaemia, hypothermia, and pretty much all the shocks except for cardiogenic.

So, how do we assess Circulation? Take a minute to write down the things you would include in a brief assessment of a patient's circulation. Think back to the session on Shock – what signs and symptoms might we look at, that we haven't already?




Perhaps the first stage should be to get the observations that are relevant to circulation – the blood pressure, and whilst this is being measured, check the heart rate. Note that this should ALWAYS be palpated as a pulse, whether central or peripheral. DO NOT TRUST THE HR ON YOUR MONITORING (Sats, BP etc.)

Then, we move on to examination
In terms of inspection, think about fluid status – mucous membranes, JVP, UOP
When palpating, again think about fluid status – How do the peripheries feel? Are they warm? Cool? Clammy? Sweaty? What is the capillary refill time?
Finally, we should auscultate for the heart sounds. You might also consider checking the ankles for oedema, although unless this is particularly urgent, I leave this until E.

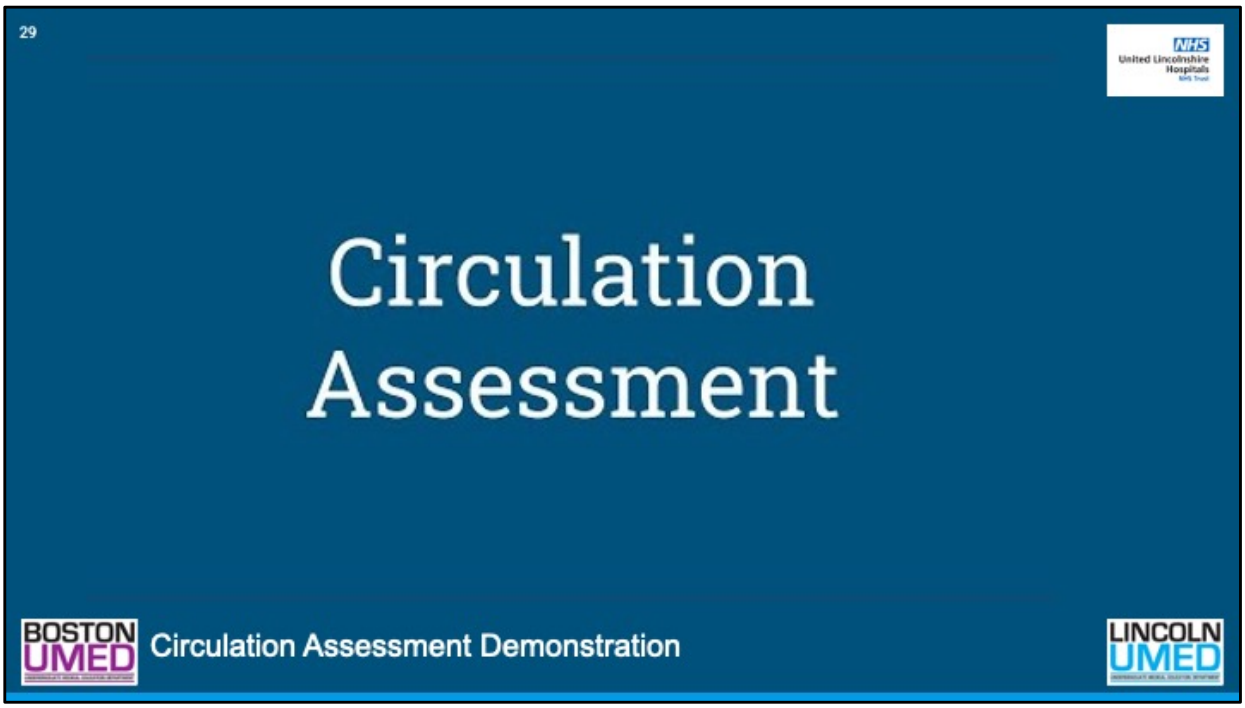
We should also consider our investigations. We can take bloods, including cultures if indicated, and should obtain a 12-lead ECG if possible.

So, how can we support a patient's circulation in an emergency? Take a minute to write down some steps you could take to treat any circulatory abnormalities.


Almost universally, when assessing an acutely unwell patient, we will want to gain IV access. This gives us a route by which to fluid resuscitate with crystalloids, but also blood products if necessary. It is also a route through which we can administer medications to help with blood pressure – either to support or control!
In a patient who is bleeding, often Tranexamic acid is given, as this helps to promote clotting.


IV access is usually gained with a simple peripheral IV cannula.

You'll soon get a good idea of the size of each of these colours of cannula, and the indications for each. However, one confusing thing is the scale, which uses the "Gauge" measurement. In this case, the thinner the cannula, the larger the number, so the Blue cannula is the smallest, and the orange is the storm sewer. I could give you an aide-memoir for the order of these, but it would probably get me sacked, so I shan't!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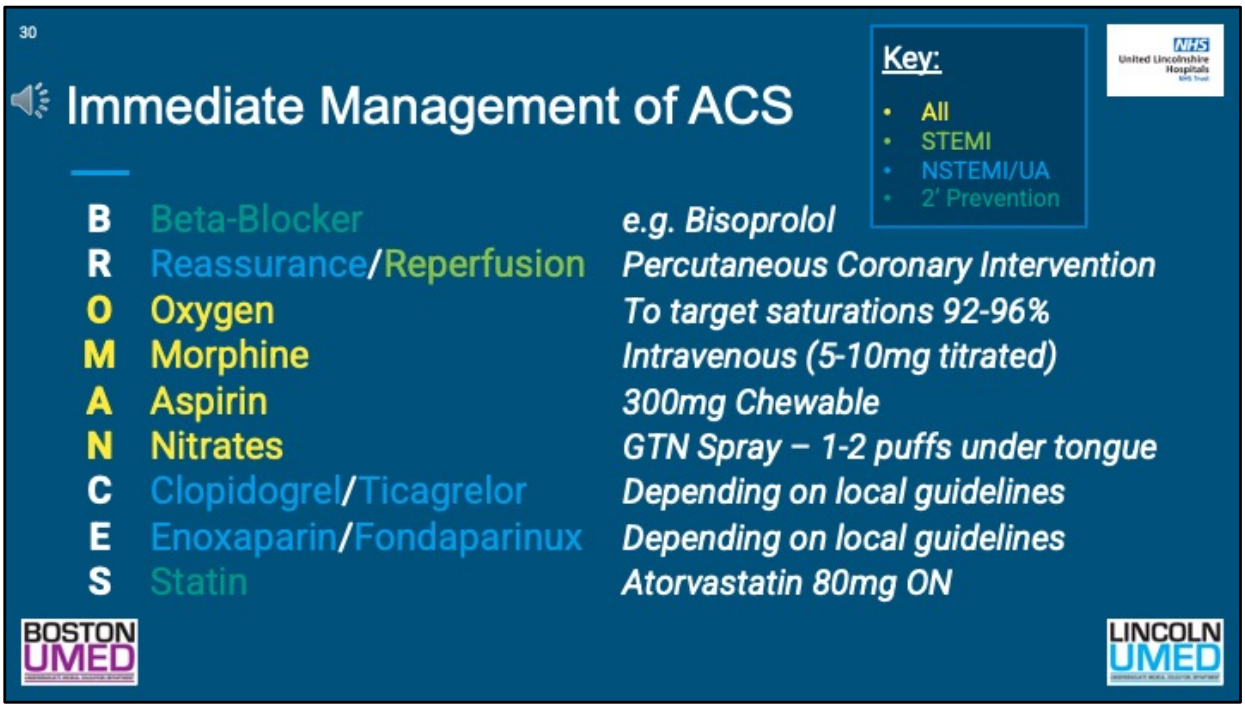


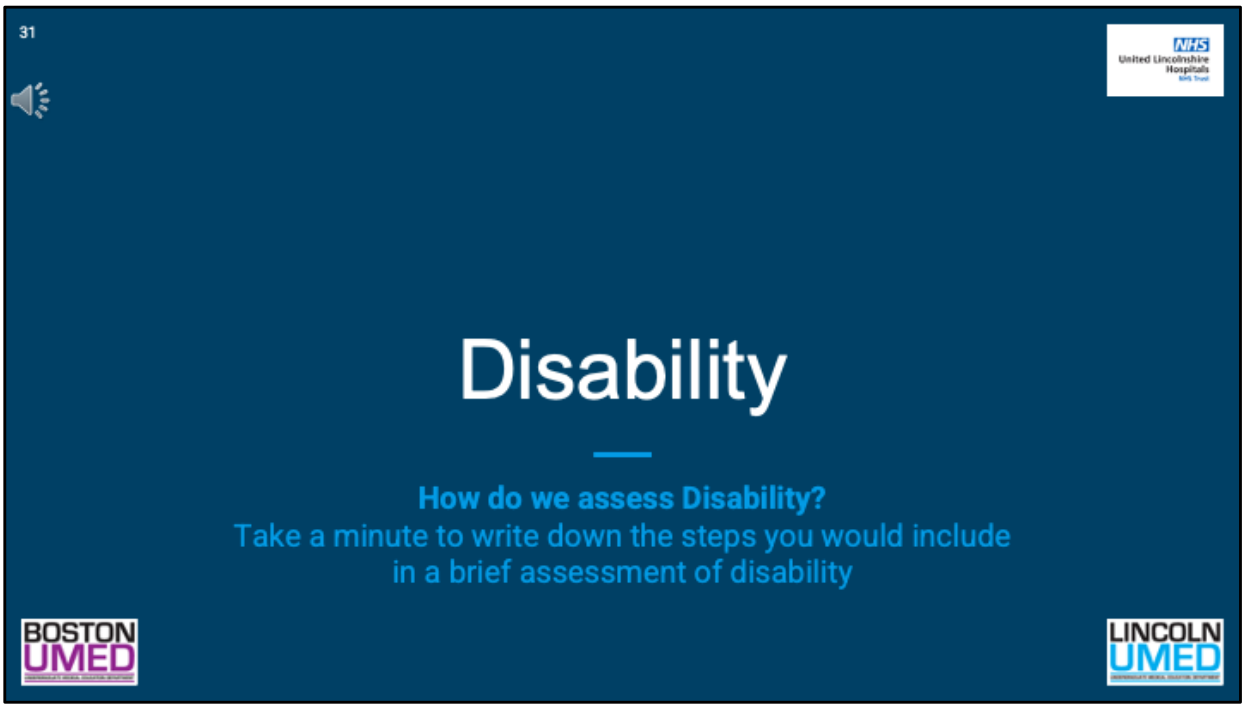

The management of the Acute Coronary Syndromes also has a mnemonic.
In this case, it is BROMANCES.

You may have heard of MONA in the past – these are the four central letters of BROMANCES, and are the four steps in our immediate management, regardless of the ACS, so in STEMI, NSTEMI or Unstable Angina.

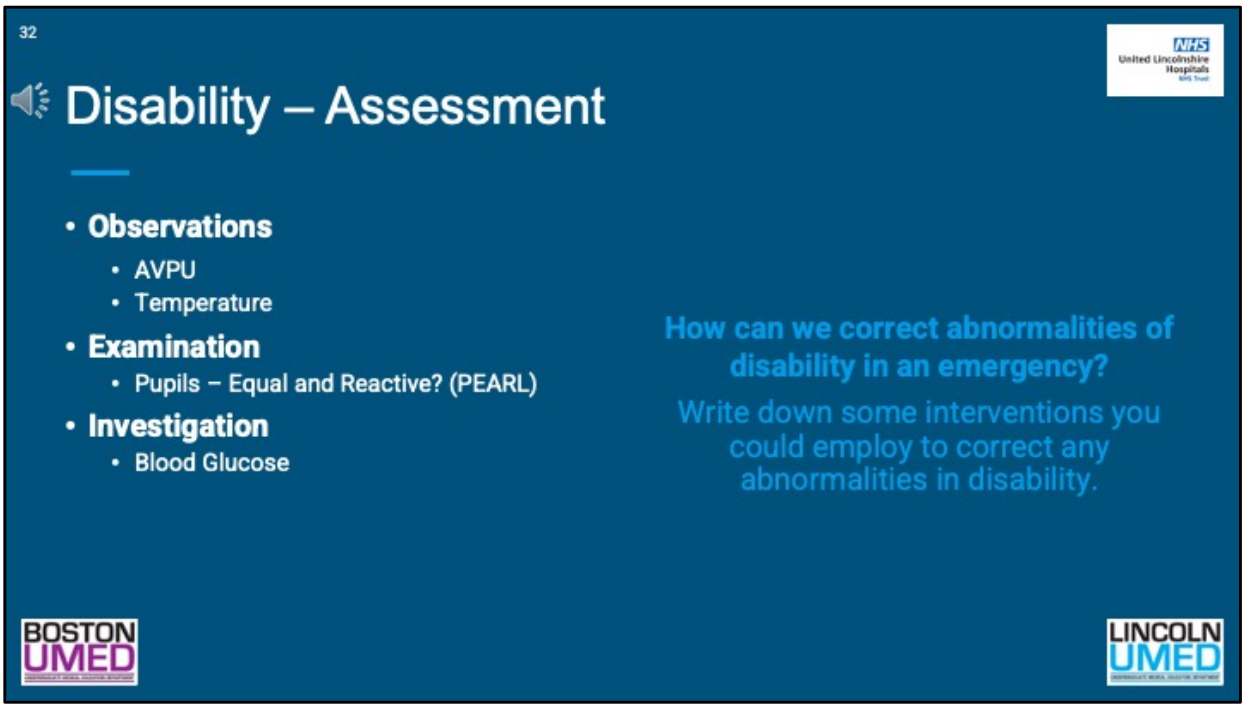
The remaining letters depend on the syndrome. In a STEMI, Reperfusion is vital, and urgent, as time is tissue. So this takes priority, and the other steps can be taken by the cardiology team thereafter. Unfortunately I missed this out from my plan at the end of my Circulation Assessment Demonstration video on the last slide.

IN Unstable Angina and NSTEMI, Reassure the patient – as fluffy as this sounds, by reducing the patient's anxiety, you reduce their heart rate, and this helps to reduce the myocardial oxygen demand. Simple, but a winner! We also give these patients a second antiplatelet medication, and a low-molecular weight heparin.

The remaining steps form our secondary prevention measures. These aren't used to treat the current event, but reduce the risk of further events. These include a Beta-blocker and a Statin, specifically Atorvastatin 80mg at night.




Having dealt with our circulation, we now move on to Disability. This is a chance to assess the neurological state of the patient in a little more detail.
So how might we assess Disability? Take a minute to write down the steps you would include in your brief assessment of disability.

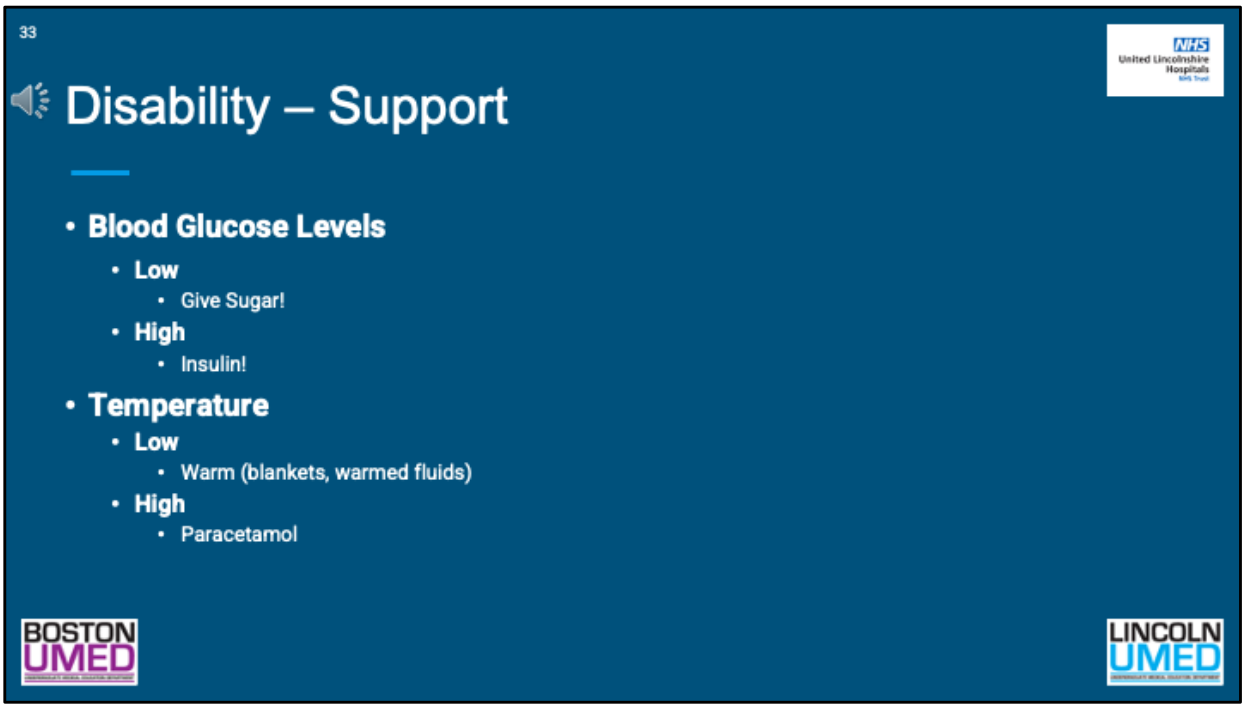



Once again, I'd tend to start with the relevant observations.
We can take this opportunity to reassess the patient's level of consciousness, using AVPU.
The other component of NEWS2 that is relevant to D is the patient's temperature.

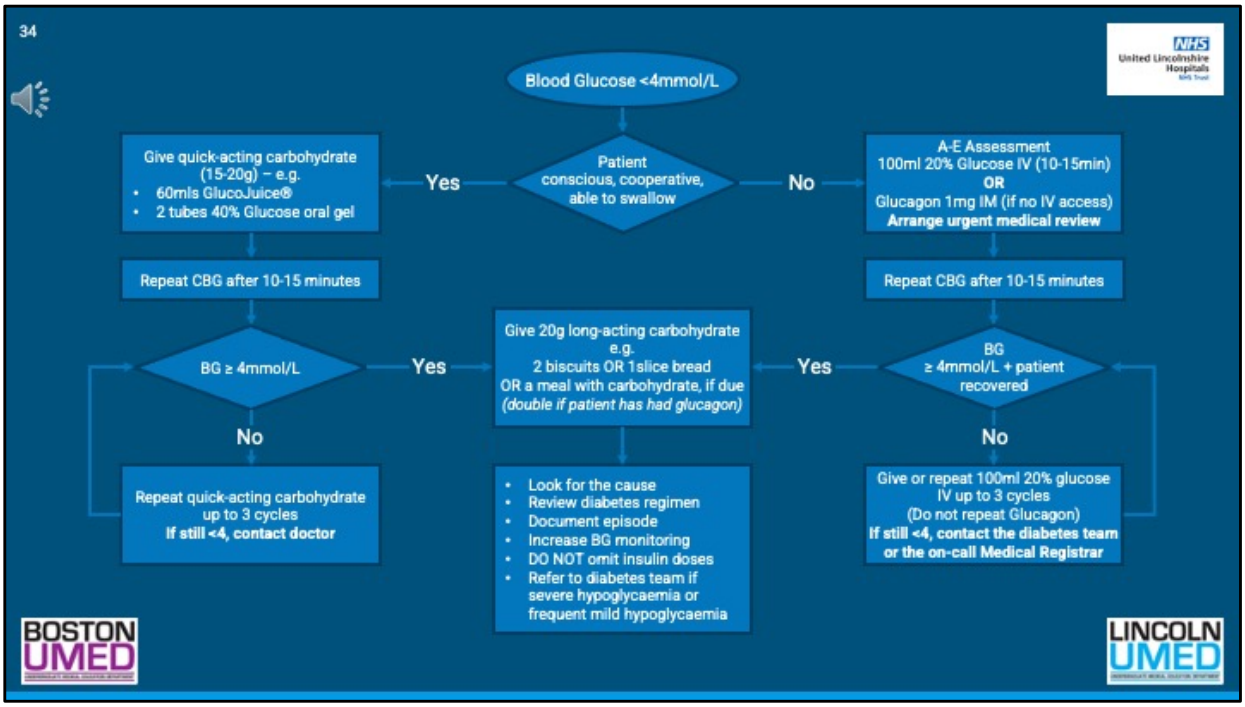
It will also be useful to examine the pupils. Are they equal and reactive to light? If not, there may be intracranial problems, such as bleeds. Otherwise, are they pinpoint, or abnormally dilated? There may be drugs involved.

One final thing to do is to check the Blood Glucose. It really is vital to check this, hence the DEFG (Don't Ever Forget Glucose) addendum to the ABC. If you miss a hypo because you've not checked the sugars, the patient can deteriorate rapidly, where you would have had an opportunity to treat this.

So, what can we do to correct abnormalities of disability in an emergency? Take a minute to write down your thoughts.




Management will of course depend on the cause, and in disability is fairly simple.
If the sugars are low, we give some more. If they are high, we can consider administering Insulin.
If the temperature is low, we need to warm the patient. We can use blankets (including the heated air blankets), and warm any fluids we're administering.
If the temperature is high, we can think about removing unnecessary layers of clothing (whilst maintaining dignity), administering antipyrexials such as Paracetamol, and should also take account of the additional insensible losses when calculating fluid balance.




Management of hypoglycaemia, whilst glibly summarised as “give sugar” on the last slide, is somewhat complicated.
This slide is the treatment algorithm taken from the NUH guidelines.
Our first action depends on whether the patient is cooperative and able to swallow. If they are, we can give some quick-acting carbs by mouth, such as Glucojuice or Glucogel. Having done this, we repeat the measurement after 10 or so minutes, and if the glucose level has not come up sufficiently, can repeat this up to a total of 4 times. If it has not normalised at this point, the patient will need to be escalated. When the blood glucose levels have normalised, we need to give some long-acting carbohydrates, such as biscuits or bread. Of course, we then need to consider the patient’s ongoing care, including identifying the cause.

If the patient is initially unable to swallow (or non-cooperative, or unconscious), we need to treat with a higher level of urgency. An A-E assessment is required, and if we have IV access, we can administer Glucose through this. If there is no IV access, we can administer IM Glucagon. Similar to the conscious patient pathway, we repeat the measurement after 10 minutes, and can repeat the glucose infusion up to a maximum of 4 times. We aren’t able to repeat Glucagon administration, so if you’ve had to give this, I’d suggest spending at least a portion of the 10 minutes before a repeat measurement attempting to gain some IV access! Once again, if repeated treatment is unsuccessful, we should escalate the patient to our seniors.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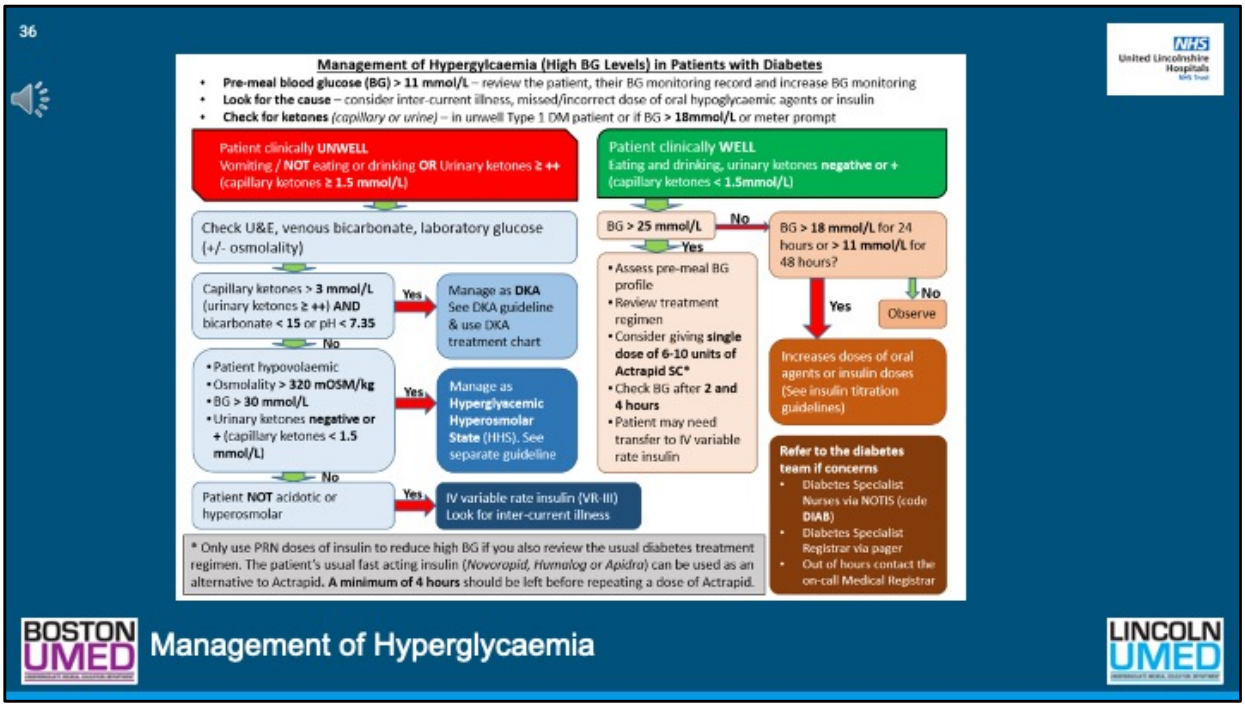
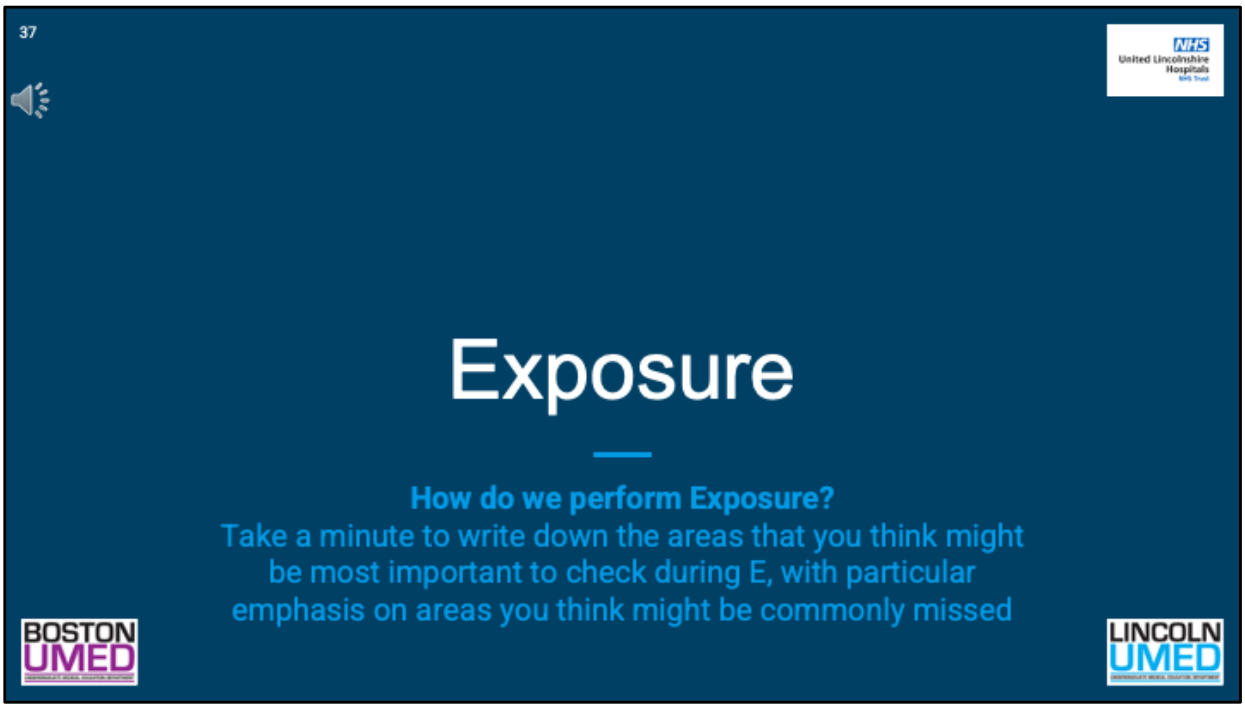



Management of Hyperglycaemia depends on its cause.
The two main conditions of concern in hyperglycaemia are Diabetic Ketoacidosis (DKA), and Hyperglycaemic Hyperosmolar State (HHS).

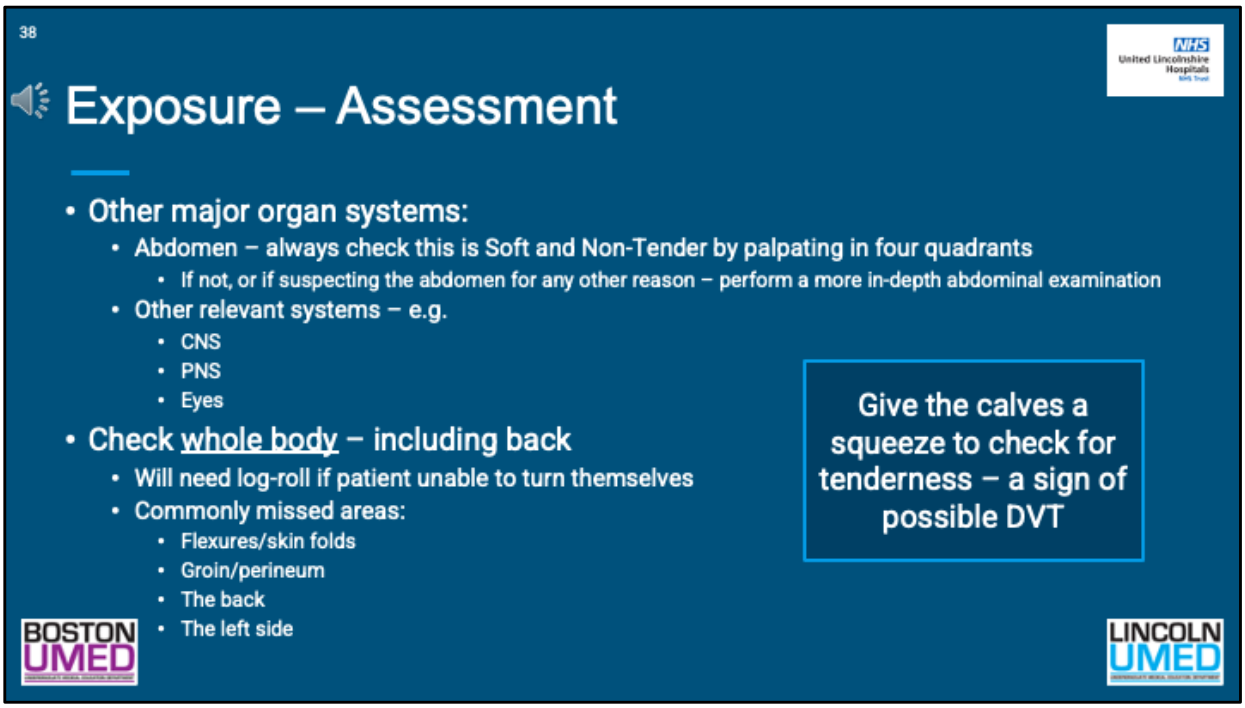
DKA is fairly easily diagnosed, as the three criteria correspond to the three initials.
For Diabetic, we need a high blood glucose level.
For Ketosis, we need evidence of ketones (either capillary or urinary)
For Acidosis, we need evidence of acidosis (or a low bicarbonate)
Simples.

For HHS, things are a little more complicated. However, we need a profound hyperglycaemia, a lack of significant ketosis, and a high osmolality (which we can calculate by adding twice the sodium levels to the glucose levels and urea levels).

The mainstay of management for each is significant fluid resuscitation, with careful consideration of the potassium levels. In both cases, we are likely to produce a hypokalaemia, so will need to replace this in our fluids. The difference between the management of each is in the administration of insulin. In DKA, we immediately commence a fixed rate infusion of insulin (based on the patient's body weight), whereas in HHS (unless the ketones are elevated) we hold off the insulin until the rate of blood glucose reduction has dropped below 5mmol/L/hr, and the dose we give is half the strength.




So, having dealt with Disability, we move onto exposure.
In my experience, this is an area that is often done poorly. So in the next minute, have a think about how we perform exposure, writing down the areas that you think are the most important to check, and think particularly about the areas that are easy to miss.




E is for both exposure, and for everything else.
So, it is an opportunity to check our other major organ systems. For instance, the abdomen. As a minimum, I would palpate the abdomen in four quadrants and auscultate for bowel sounds in every A-E assessment I perform. If you suspect the abdomen may be the source of the problem, for any reason, I would tend to perform a more in-depth examination.
Depending on the circumstances, you may want to perform more in-depth examinations of other organ systems, such as the CNS or PNS, or the eyes.

The exposure component of E means just that. We need to expose the whole body, including the back, to look for anything we may have missed or that is just hiding from us.
Commonly neglected areas include flexures and skin folds, the nether regions, the back and, due to the convention of examining from the patient's right hand side… the patient's left hand side!
Whilst you're looking at the legs, this is a good opportunity to give the calves a squeeze, which in the case of DVT, will often demonstrate calf tenderness. You could also check for pitting oedema at the ankle at this point.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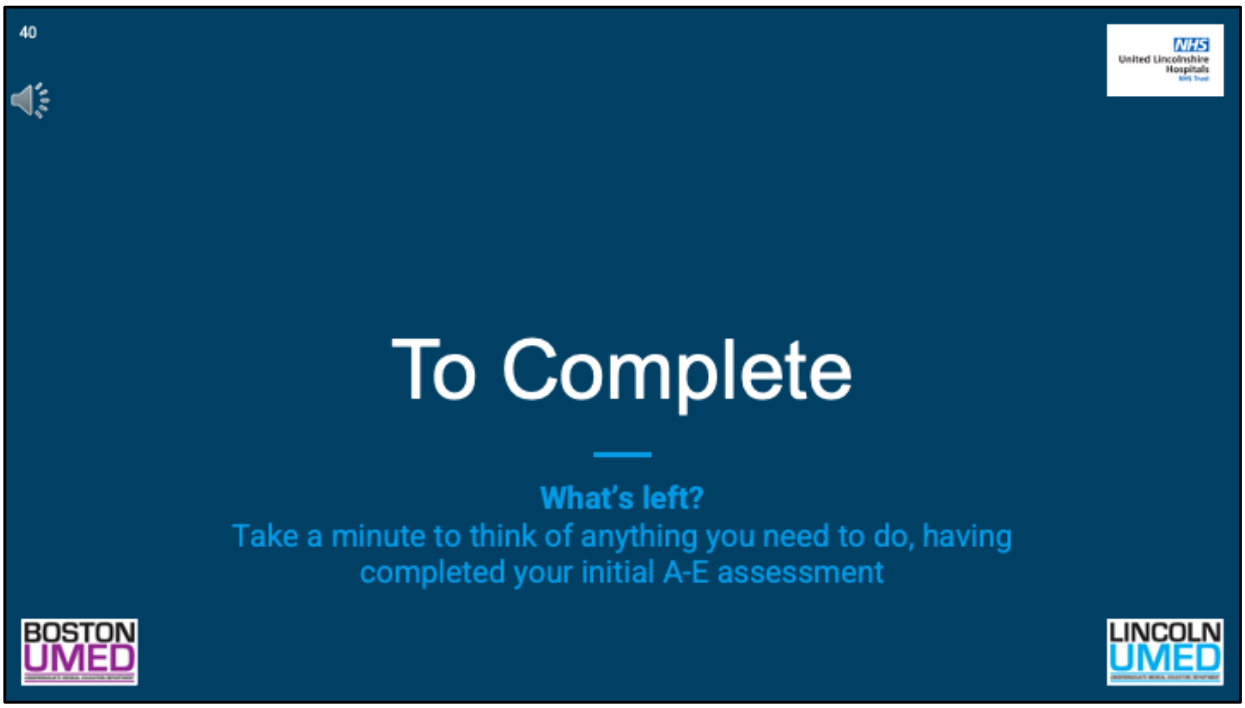
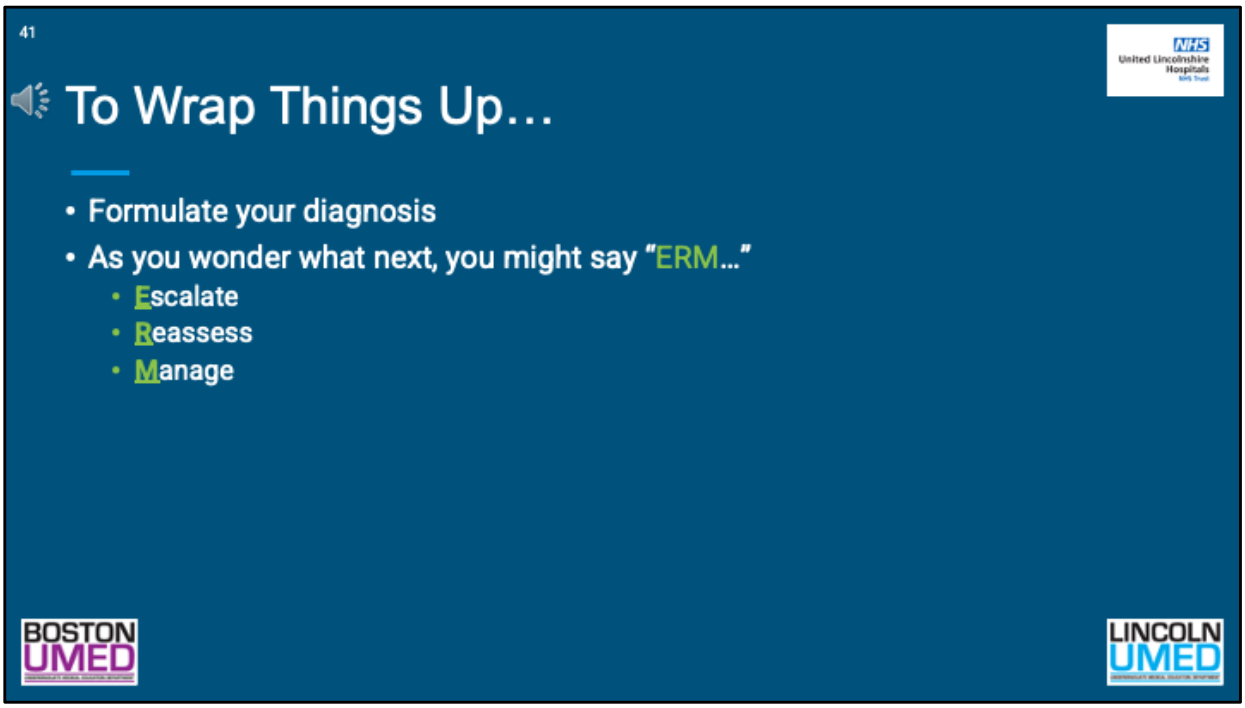
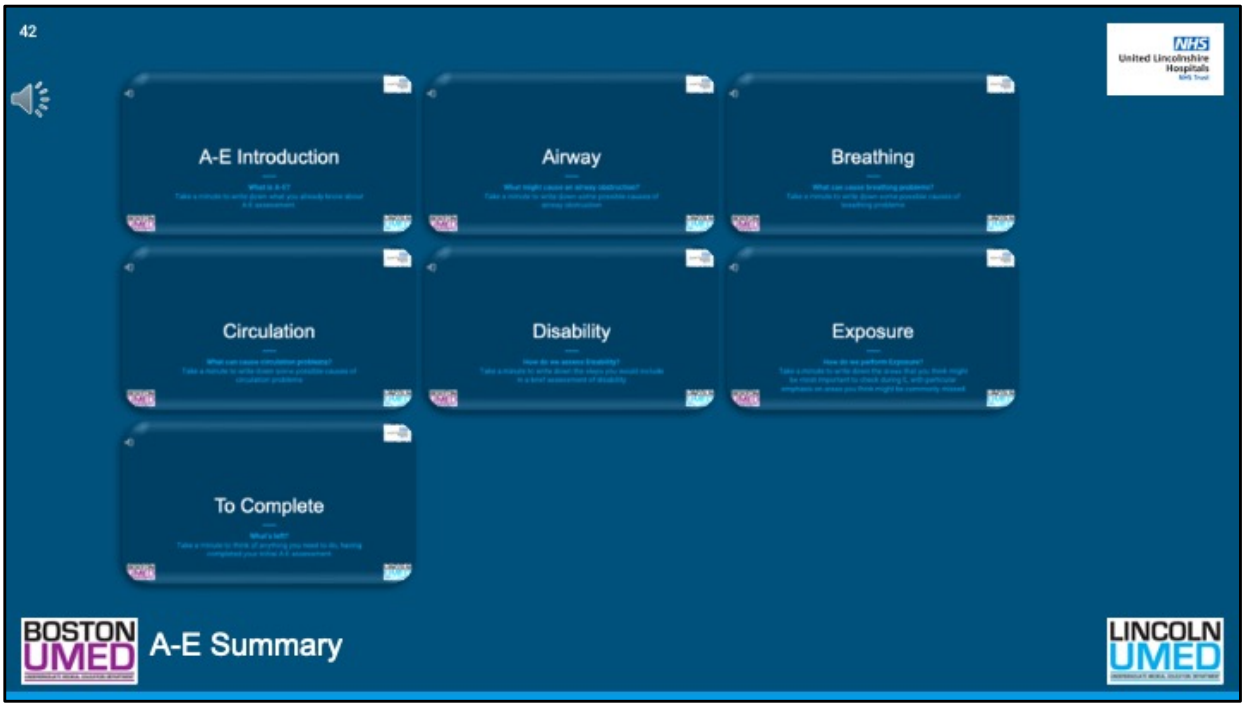



Finally, having completed your initial A-E assessment, there are a few things to do in order to finish off. What do you now need to do? I'll give you a minute to have a think.



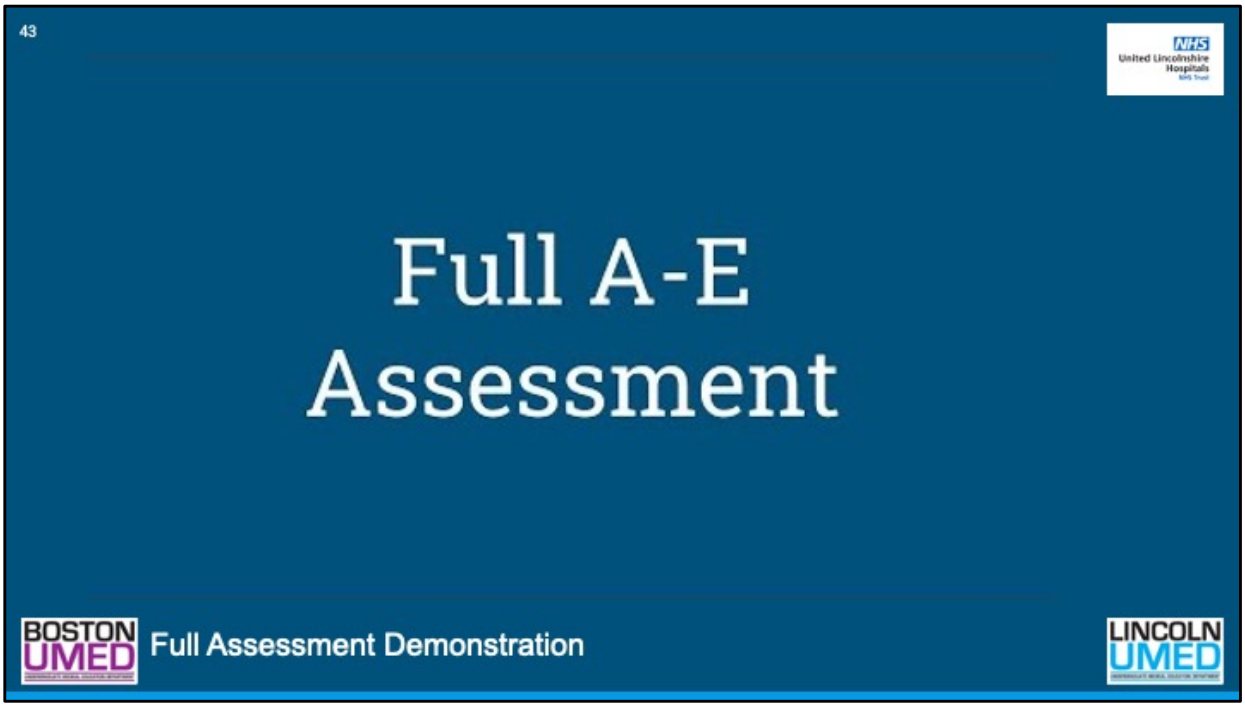

So, having performed this rapid assessment, you've hopefully found all the individual abnormalities, but now is the time to put these together into an overall picture, and come up with a diagnosis.

Having thought of a diagnosis, you might still be wondering "what next?". Often this makes you say "ERM…", which is composed of the letters E, R and M.
Now these are another mnemonic. Standing for: Escalate – get your seniors involved, and refer appropriately; Reassess – see what the response has been to your interventions so far; and Manage – what is the definitive management for this condition?




So, to recap what we've covered in this session, we've discussed the purpose of A-E assessment as a standard method of acute assessment that prioritises recognition and management of the things that kill us quickest.
We've discussed the problems, assessment, and management of each of Airway, Breathing, Circulation, Disability and Exposure.
And Finally, we discussed the actions that are left following the A-E Assessment, including Escalation, Reassessment, and Management.

If you're using the powerpoint version of this session, you can use the thumbnails on this slide as links to take you back to a section if you want to recap anything. Otherwise, we'll move on to demonstrating a full assessment.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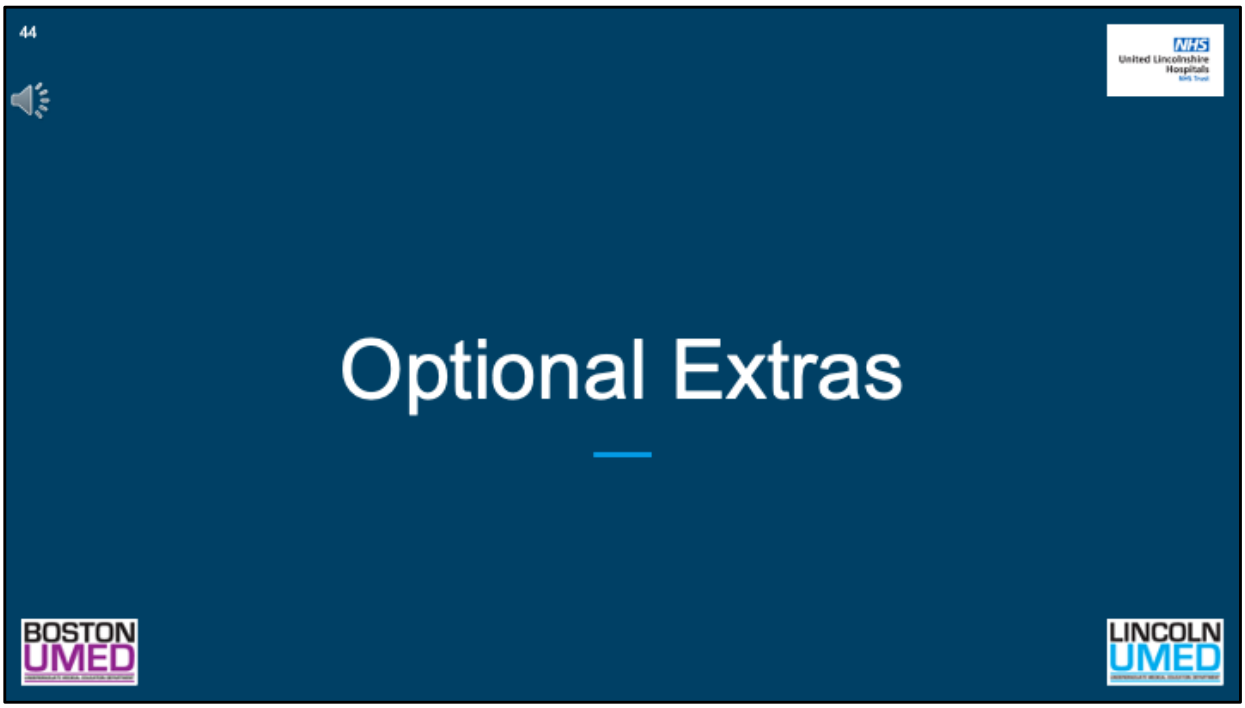
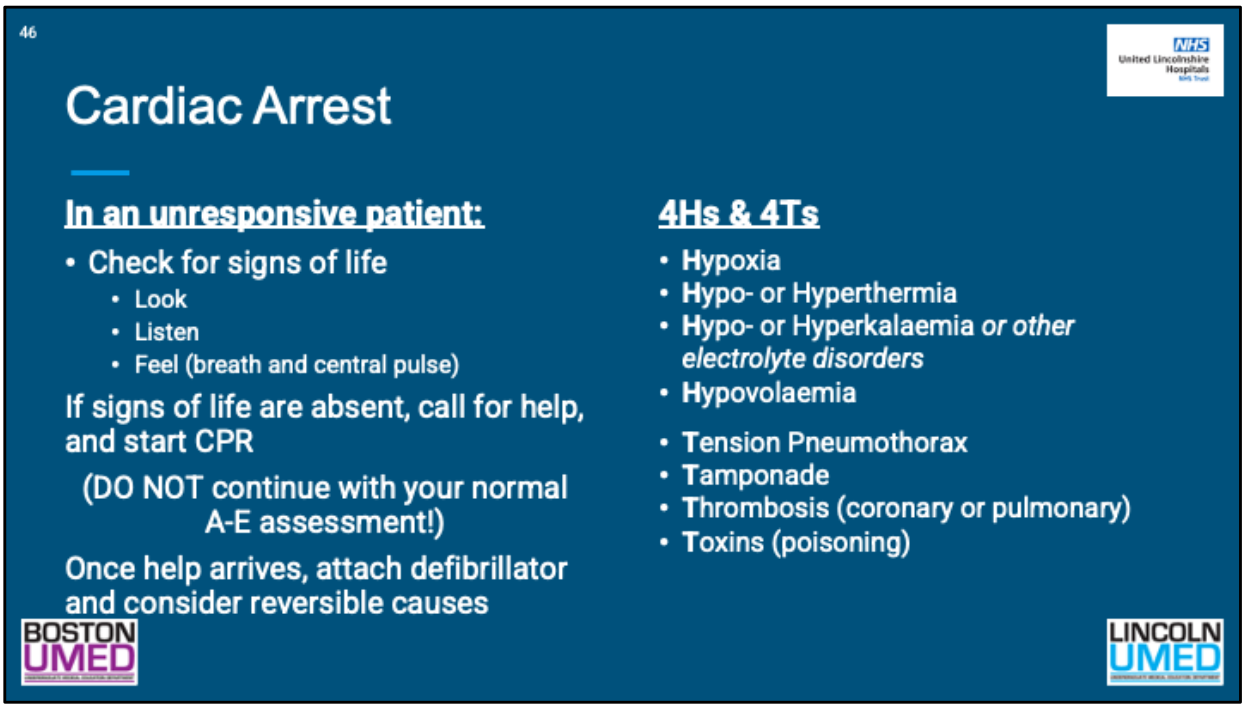



I hope this session has been useful. As discussed previously, in the powerpoint file there are a number of optional extras available, predominantly covering equipment, airway manoeuvres, and some other procedures, but starting with some brief summaries of the acute management of conditions I've not yet covered. I hope you've also enjoyed the game of spot the duck!

My thanks go out to Dr Jessica Richmond, for her help in the filming for this session.


From here onwards, I have included some brief notes on the management of some specific conditions, and any alterations to our acute assessment process required in each.

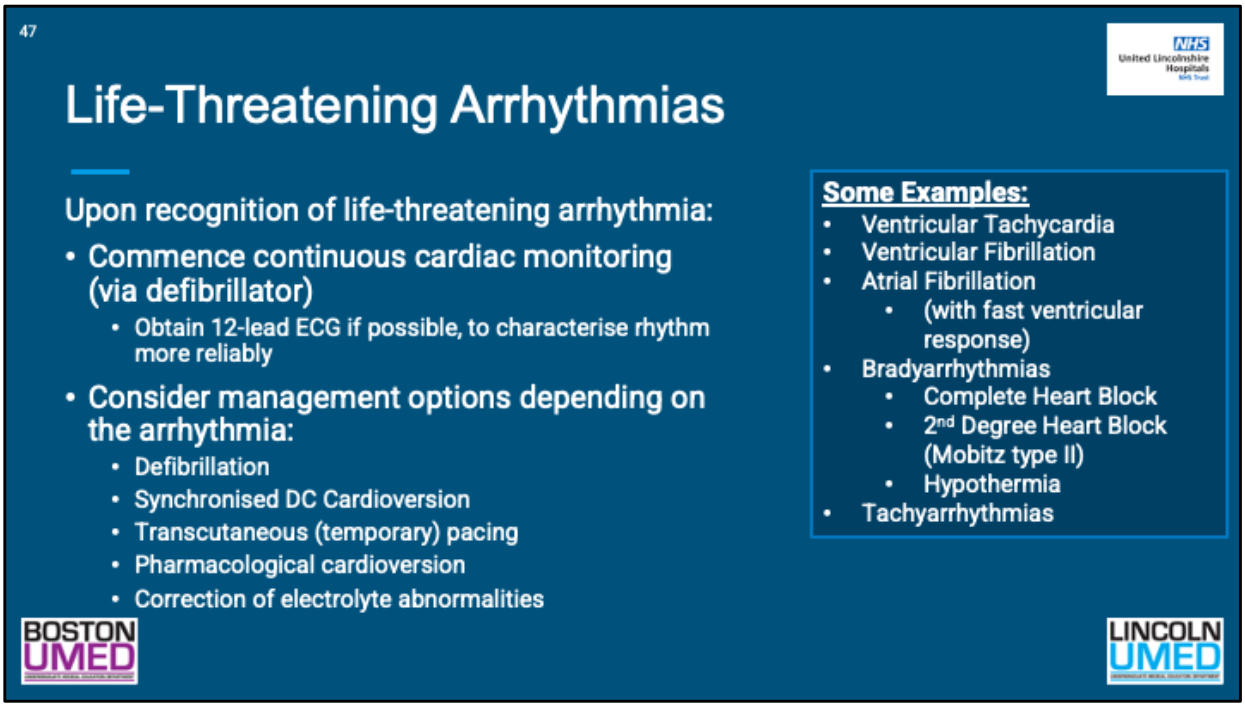



In cardiac arrest, we need to recognise this promptly by checking for signs of life. We do this in the unresponsive patient.
The check for signs of life involves looking for chest movement, listening for breath sounds, and feeling for a central pulse, and also for breath on your ear.

If signs of life are absent, we have confirmed cardiac arrest. The first action to take is to start CPR, whilst simultaneously calling for help by whatever means available. Do NOT attempt to continue with a normal A-E assessment!

Once you have help, and can share the workload of compressions and airway management, and start to attach the defibrillator pads and analyse the heart rhythm, administering shocks if indicated (in VF or pulseless VT). You can also start to think about the reversible causes of cardiac arrest, and how we can manage any we think are present.
These are summarised by the 4Hs and 4Ts shown on this slide.

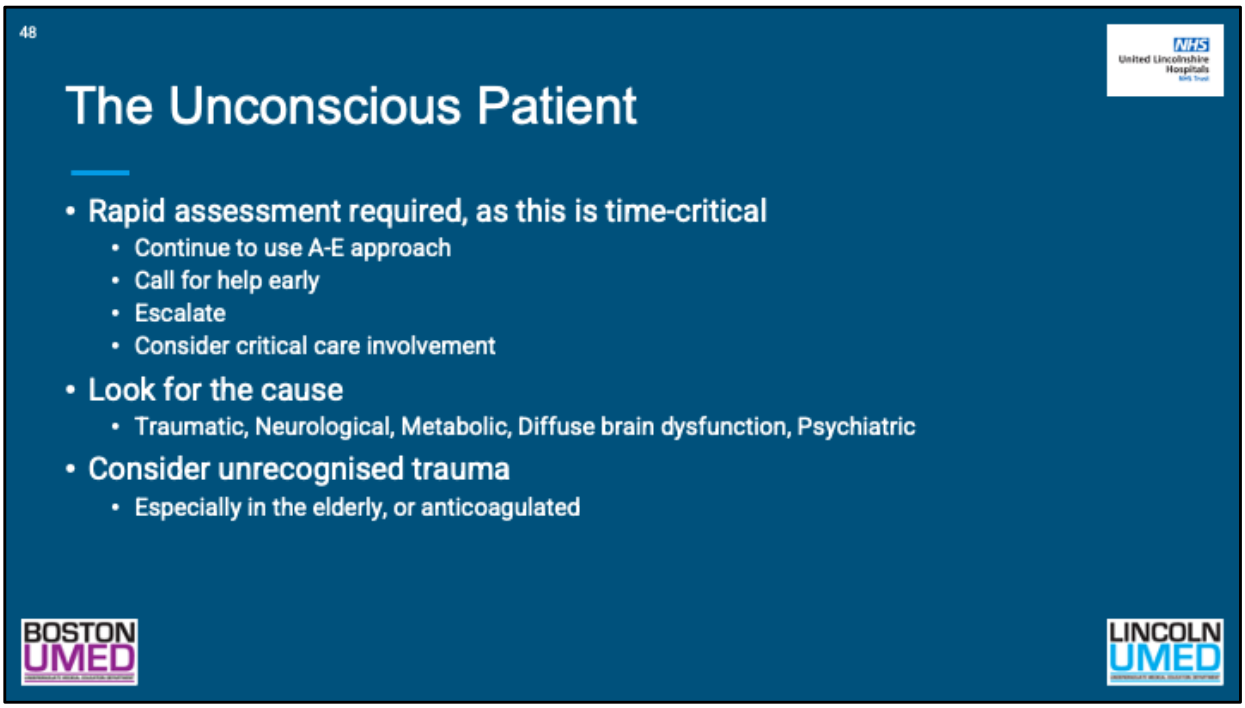
You'll get much more detailed training on this when you get to do your ILS course.




There are some examples of life-threatening arrhythmias listed on the right hand side.
VF is one of our cardiac arrest rhythms, as is VT (if pulseless), so these are by definition life-threatening!
The remaining examples all have an effect on cardiac output in extremis, and need careful management.

On recognition of a life-threatening arrhythmia, we should commence continuous cardiac monitoring. The easiest way to do this on every ward is to attach the defibrillator leads to the patient, and also hook up the 3-lead monitoring with this, if present. Ideally, we would have the chance to record a 12-lead ECG also, but this isn't always possible.

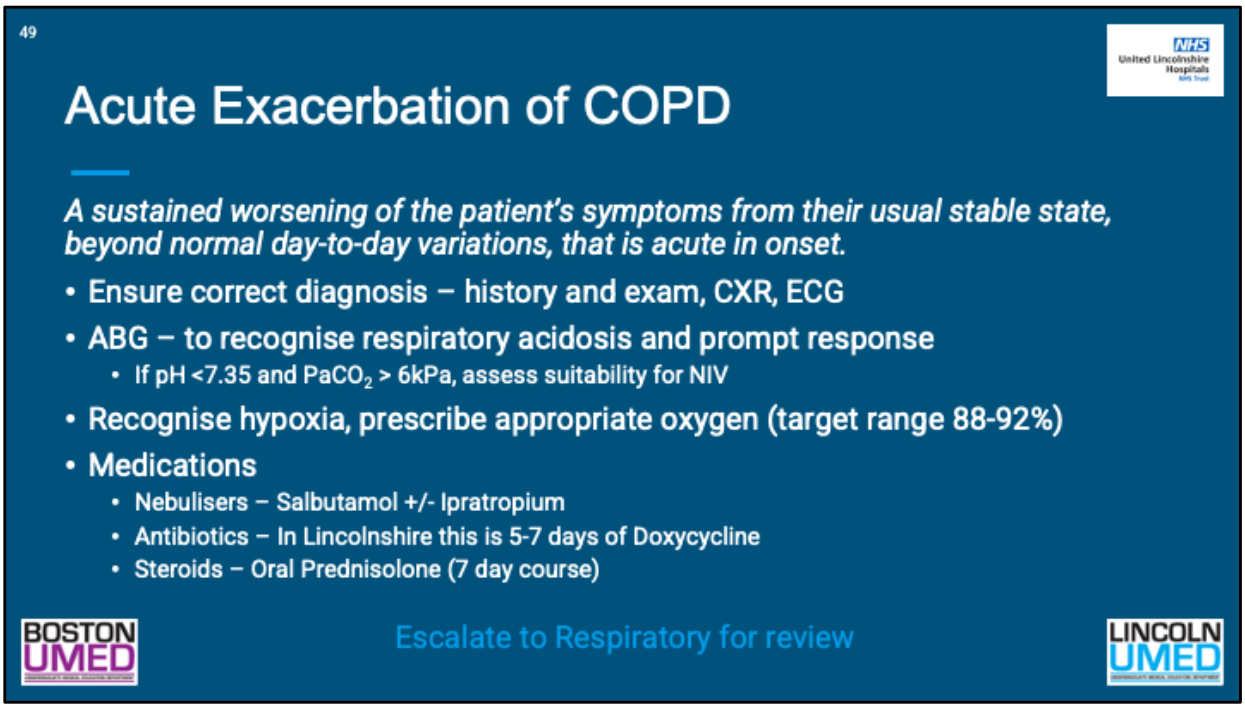
Management options of course depend on the arrhythmia. Some will require defibrillation (VF and pulseless VT – our Shockable rhythms). Others may require cardioversion – this can be achieved electronically, with synchronised DC cardioversion, or pharmacologically with a number of different medications. In bradyarrhythmias, we often require temporary transcutaneous pacing, prior to insertion of a permanent pacemaker. Hypothermic patients should be gradually warmed – however poor the outcome looks, you're not dead until you're warm and dead!
Of course, if the arrhythmia is secondary to an electrolyte abnormality (perhaps suggested by the ECG morphology, or by blood gas results), we should correct this abnormality.




The difficulty with the unconscious patient is two-fold:

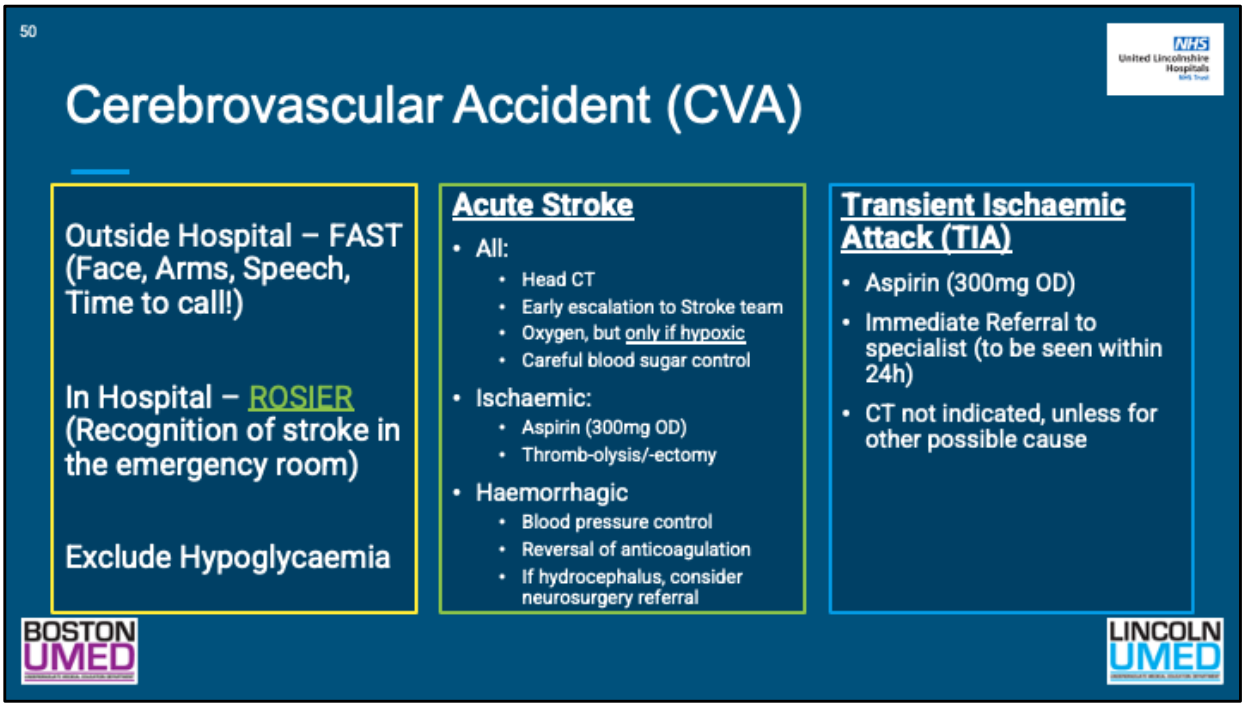
1. It is absolutely time-critical, as these patients are often very unwell, and are unlikely to be maintaining their airway – we need help early
2. We're not going to get any help from the patient by way of a history, so it's down to what we're able to find.

On that note, we need to be looking for the cause, some general categories of which are listed on the slide. Bear in mind that in certain groups, relatively mild head trauma can cause significant damage, such as in the elderly or the anticoagulated.




An acute exacerbation of COPD should be managed with careful oxygen supplementation to target sats of 88-92%, and consideration of Non-Invasive Ventilation in patients with Respiratory Acidosis. We also administer nebulised salbutamol (with or without Ipratropium), oral steroids, and where there is suspicion of an infective exacerbation - antibiotics. The antibiotic choice will depend on your area. In Lincolnshire, it is Doxycycline for 5-7 days.

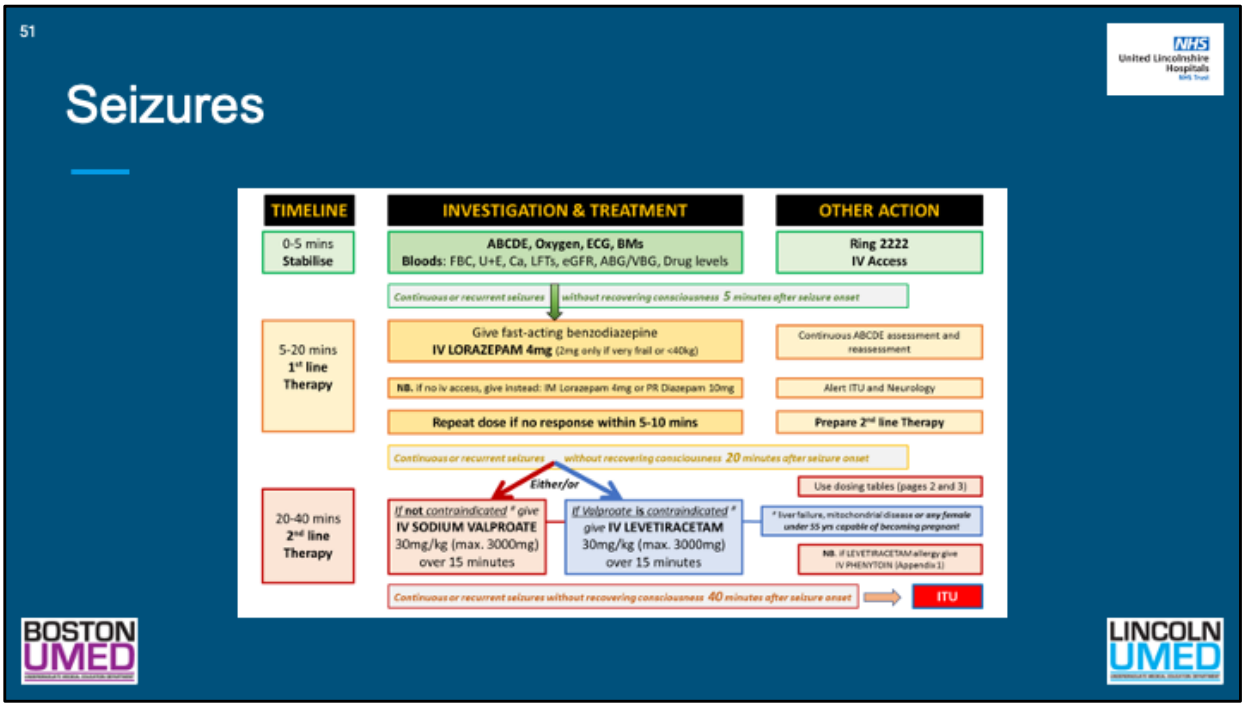
Having started our initial management, we'll need to refer to the Respiratory team. If there is any indication for NIV, this should be escalated immediately. Different hospitals will have different pathways for NIV, but this is likely to be through Respiratory or Critical Care.




In the case of Cerebrovascular accident, we first need to recognise this. There are two tools commonly used: FAST is used outside the hospital setting; whereas in A&E, the ROSIER tool is used. The MDCalc page for ROSIER is linked on the slide.
One common mimic of CVA symptoms is hypoglycaemia, so Don't Ever Forget Glucose!

If the episode is deemed to be an acute stroke, there are some common steps to management – we will need a head CT for all, and early escalation to the Stroke team. We should administer oxygen only if the patient is hypoxic (threshold is $SpO_2$ <95%), and ensure tight glycaemic control.
Management depends on the form of acute stroke. In ischaemic stroke (where haemorrhage has been excluded by CT imaging), we should administer Aspirin (300mg), and consider Thrombolysis or Thrombectomy – speak to the stroke team for this!
In Haemorrhagic stroke, depending on indications, we may need to initiate aggressive blood pressure control, reversal of anticoagulation, and in the case of hydrocephalus – referral to neurosurgery.

If the episode is deemed to be a Transient Ischaemic Attack, we should give Aspirin (300mg OD), and immediately refer to the specialist stroke team for review within 24 hours. These patients do not require a CT scan, unless we're trying to rule out other causes.




This slide shows the NUH guidelines for Convulsive status epilepticus
You'll note that management in the first 5 minutes of any seizure activity is A-E assessment, stabilisation, and escalation, without any administration of anti-epileptic drugs.

However, if seizure activity continues beyond 5 minutes, or restarts without recovery of consciousness, the patient is deemed to be in Status Epilepticus, at which point AEDs should be commenced. We start with a STAT dose of Lorazepam IV (or if no access, IM Lorazepam, or PR Diazepam). This can be repeated after 5-10 minutes if there is no response.

In this period, we should be continuously assessing, alerting Critical Care and Neurology, and preparing second-line therapy in the form of either Valproate or Keppra infusion, depending on patient factors.

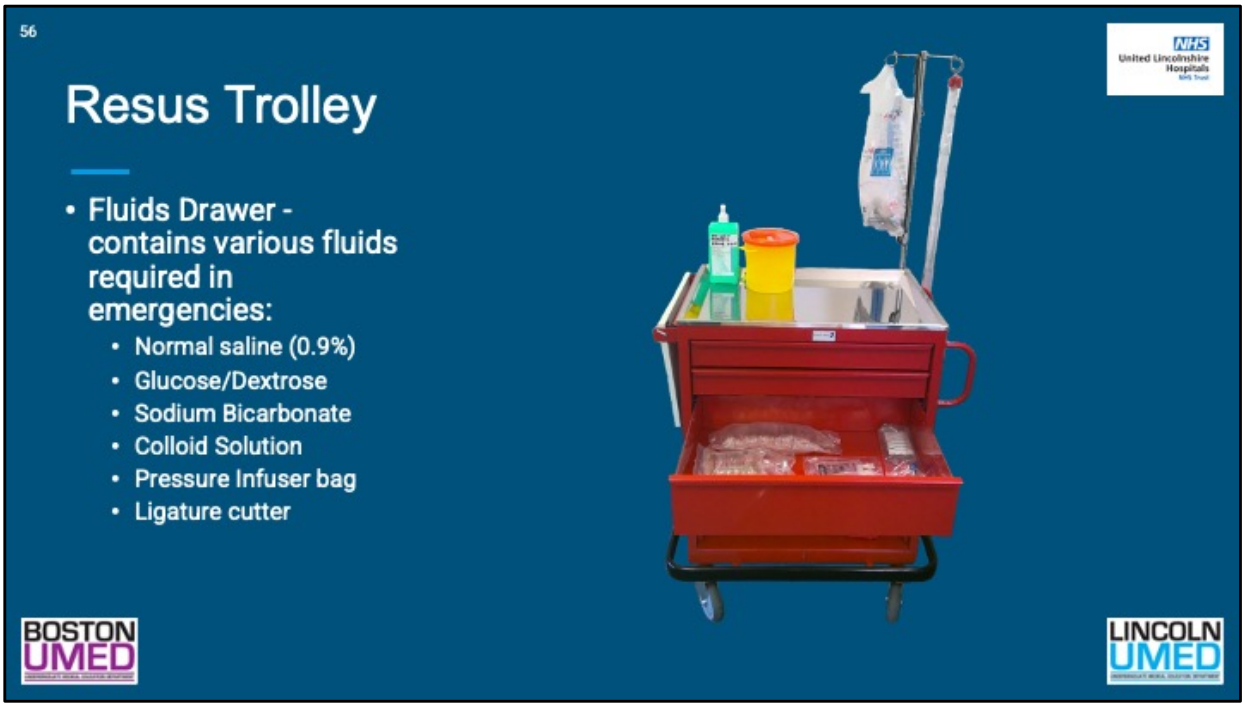

As a brief guide to the resuscitation trolley – this is usually the big red trolley in the middle of the ward. It usually has a defibrillator sat on top, which isn't present here.

What we can see here are hand sanitiser, a sharps bin, a bag valve mask system, and a boujie holder (a boujie is used for difficult intubations)


The resus trolley is generally locked. The drawers can only be opened if the flap covering the bottom of the trolley has been lifted up and stowed in the trolley by pushing it backwards. In order to do this, you must first break the seal at the bottom of the trolley.

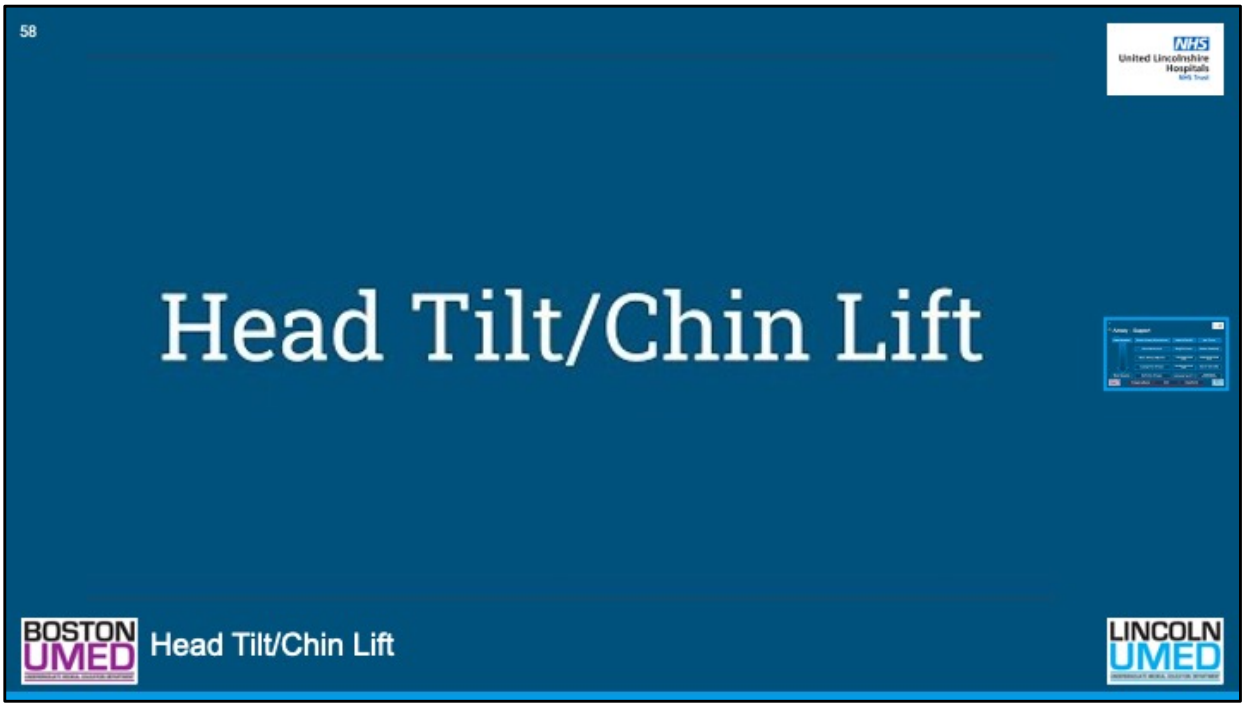

Having opened the trolley, we can look in the drawers.
The top drawer is an airway drawer, containing all the airway equipment that is immediately required in an emergency. This includes laryngoscopes, iGels, Magills forceps, a suction catheter, a Non-rebreathe mask, Endotracheal tubes, oropharyngeal airways, and nasopharyngeal airways.


The second drawer contains equipment for gaining IV access, taking blood samples, and administering medications and fluids

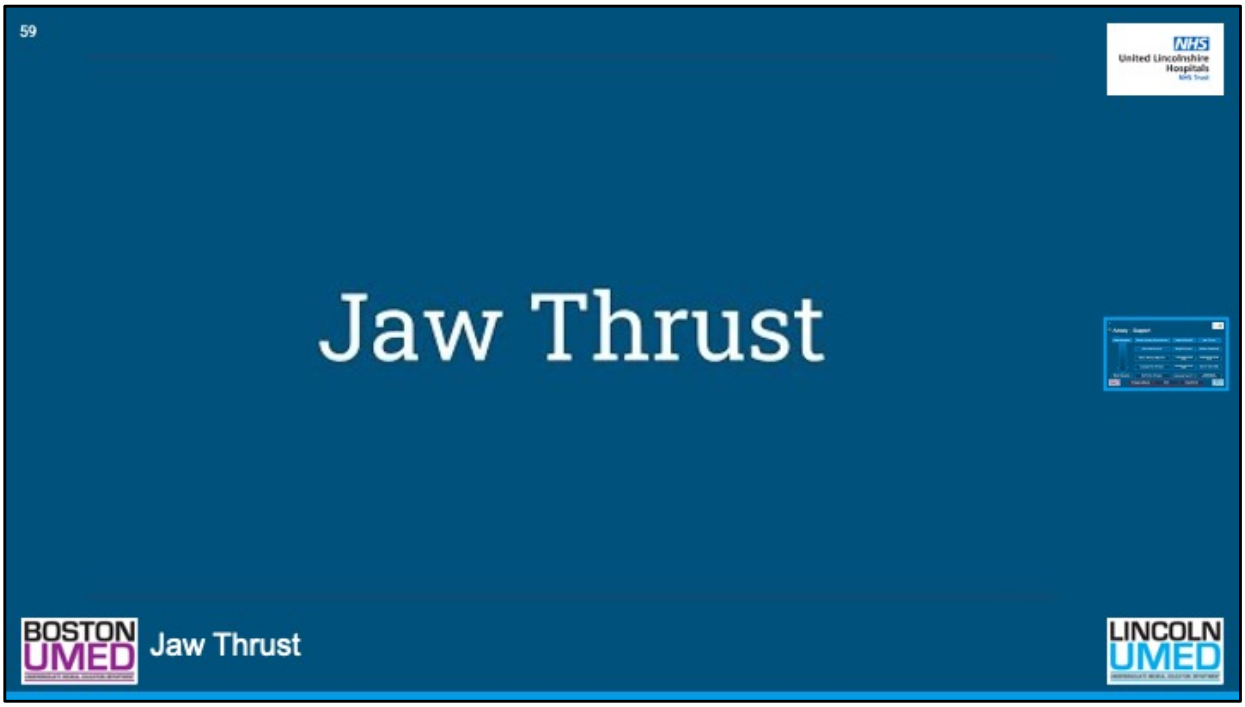



The third drawer is used to hold the fluids we tend to use in an emergency. There are a selection here, however the most commonly used are the normal saline and glucose/dextrose.
This drawer will also usually contain a pressure infuser device, for rapid administration of fluids, and a ligature cutter


The contents of the bottom drawer will depend on the location of the resus trolley. All will contain a red emergency drugs box, which holds adrenaline.
Certain trolleys in designated areas will contain second-line drugs and an IO insertion device.
You'll note that many of the emergency drugs begin with A. Good luck remembering what they're all for, and which does which!

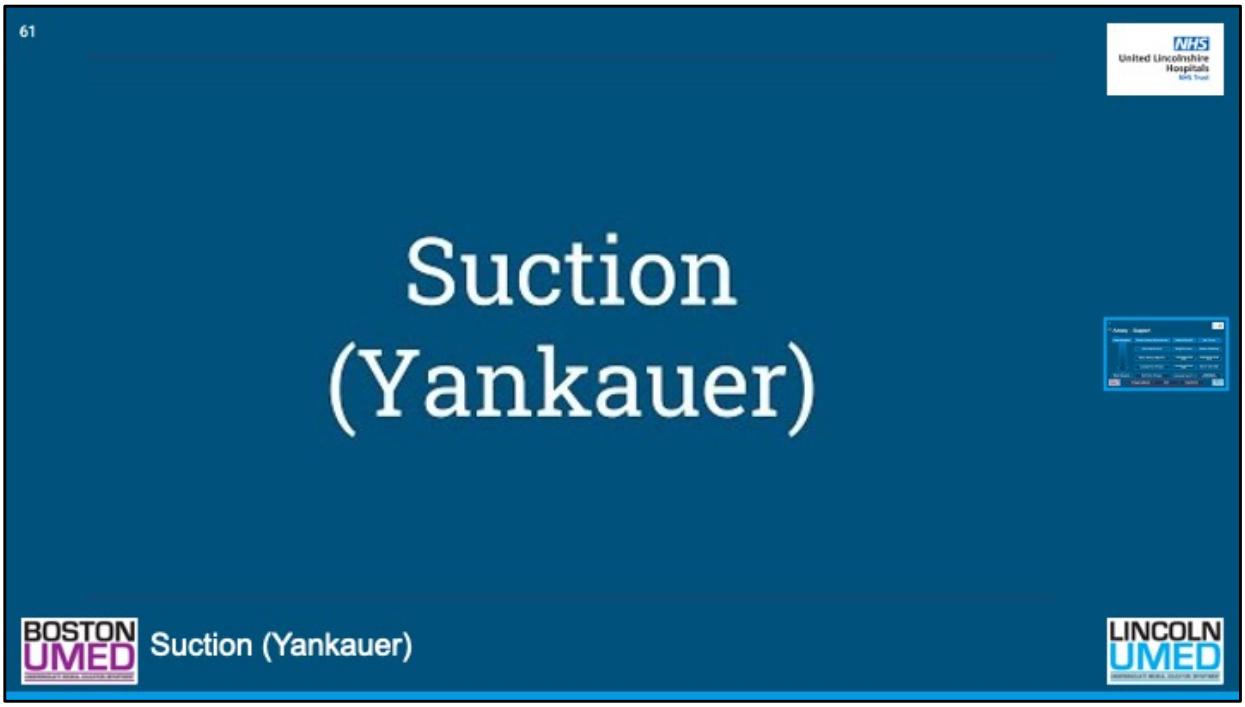



To perform the head tilt, chin lift manoeuvre, place one hand on the chin, and the other on the top of the head. Gently rotate the head back, lifting the chin. This brings the tongue off the back of the throat, opening the upper airways. Remember that this manoeuvre should not be performed in patients where we suspect injury to the cervical spine.

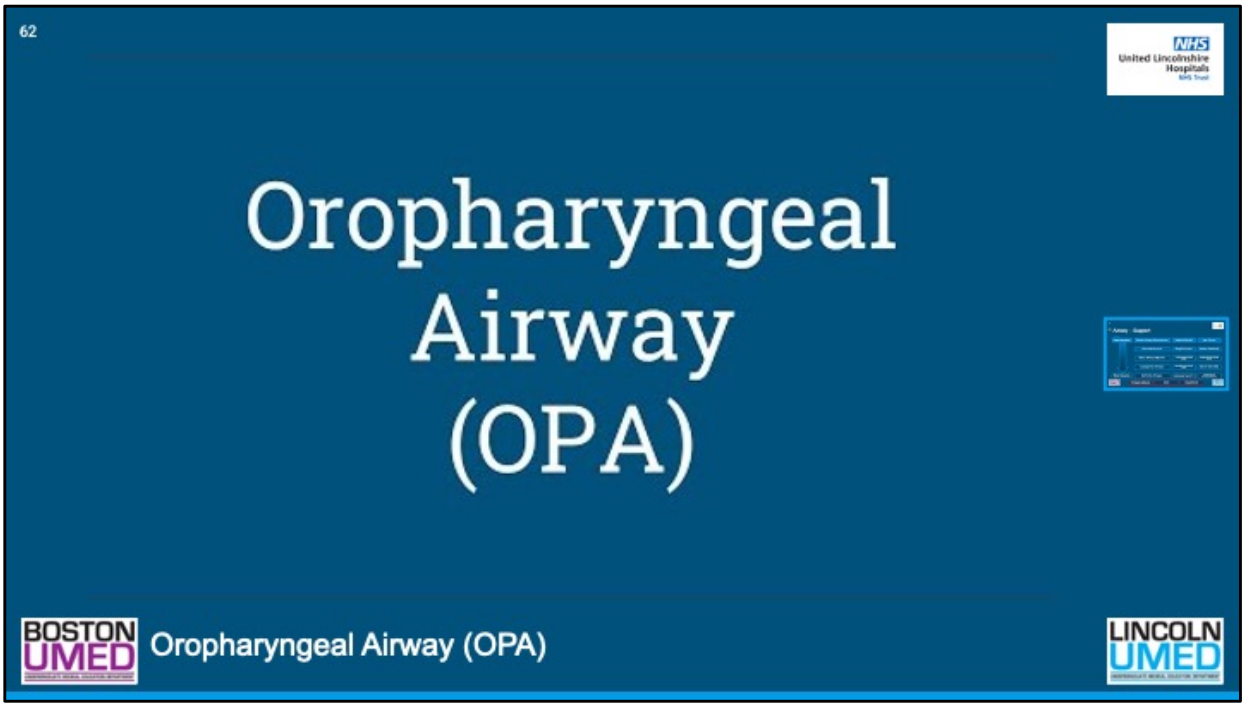



To perform the Jaw Thrust manoeuvre, place the base of your thumbs on the patient's cheekbones. With your fingers, find the angle of the jawbone. Push the jaw forwards with your fingers, making sure to press on the bone, not on the soft tissues. A modified form of this manoeuvre is used to maintain the airway when ventilating with a Bag-Valve-Mask system


Magill forceps are used to remove solid objects from the upper airway. They have a bend in them, which helps to keep the hand out of the way so you can visualise their end better when working within the confined space of the mouth.



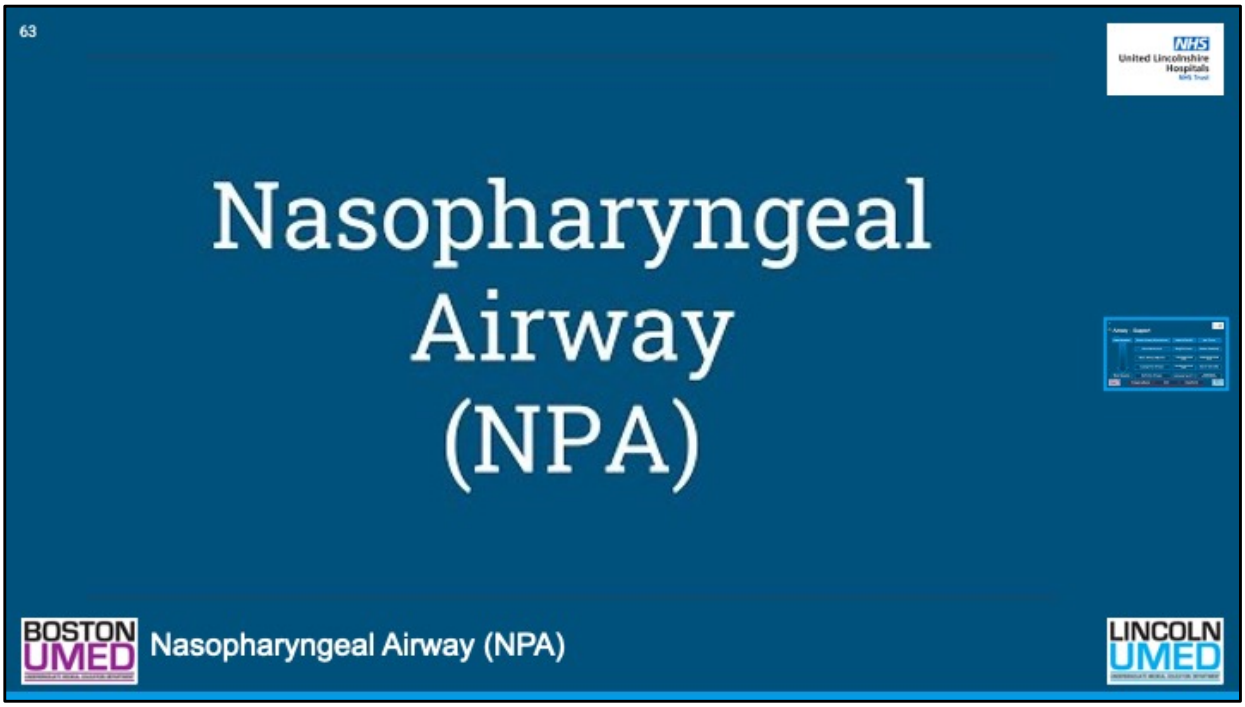

A Yankauer suction catheter should be attached to the suction port either of a portable device, or piped vacuum from the wall.
There is a port on the suction catheter that allows you to moderate the suction at the end of the catheter. In order to apply the most suction, you should cover this port with your finger.




The oropharyngeal airway comes in a number of sizes, from the Red (which is generally the largest, although I believe a purple one exists) down through Green (which is the smallest generally used in adults). There are also a number of smaller versions available, including neonatal-sized versions.

This means they need to be sized appropriately.
This can be done by measuring against the side of the face – the OPA should be equal to the distance from the angle of the mandible to the level of the front incisors.

The OPA will sit in the mouth, with the curve running down towards the throat. However, in order to insert these in adults, we should start with it the wrong way up – end pointing towards the roof of the mouth. As we push the airway back into the mouth, we twist the airway around so it turns to rest in the correct final position. This helps to sweep the tongue out of the way – without this action, we'd likely push the tongue to the back of the mouth, worsening obstruction.
Take note, however, this is only applicable to adults – the method of insertion in children is different, and will be covered during your paediatrics placement.
Another caution is that an Oropharyngeal Airway is not tolerated by a conscious patient, and will stimulate the gag reflex, so insertion in a patient that is too alert may lead to aspiration of vomit.

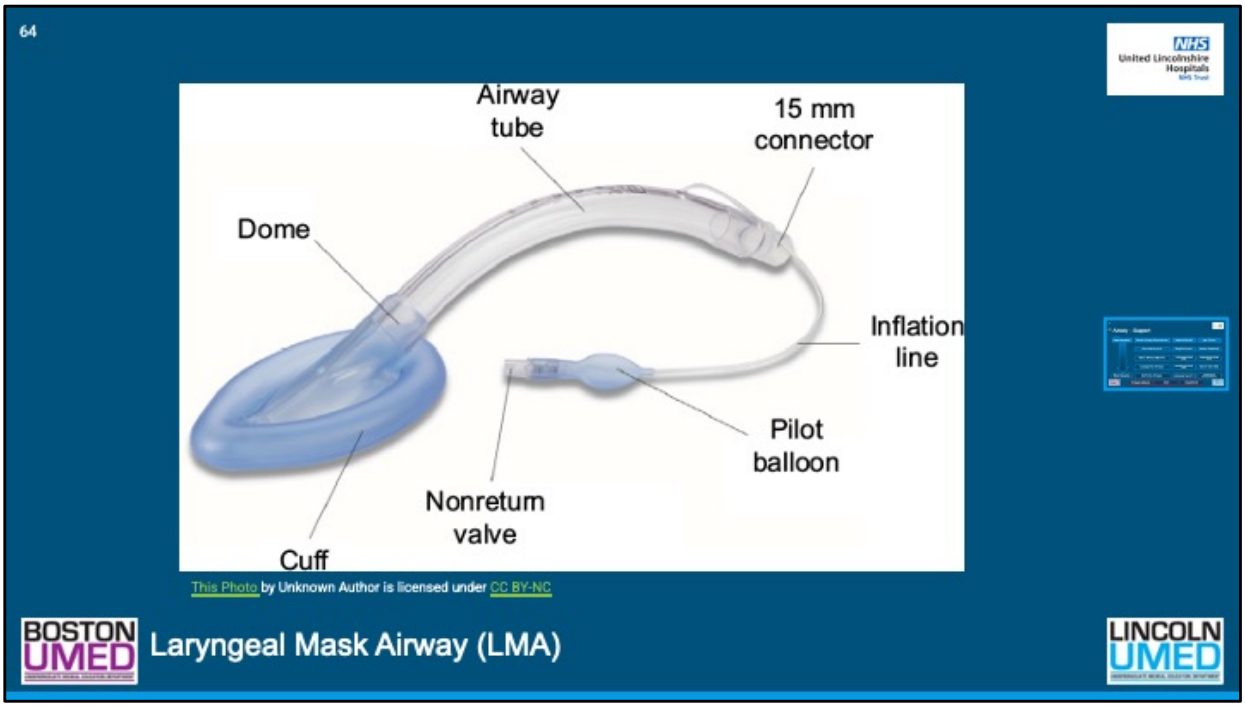



The nasopharyngeal airway is available in a few sizes, with the most commonly used being sizes 6 and 7. We sometimes don't formally size these, using the larger size for men, and the smaller size for women. For insertion, you'll also need some lubricating jelly.

However, NPAs can be measured by lying the them along the cheek. The NPA should be equal to the distance from the tragus of the ear to the tip of the nose.

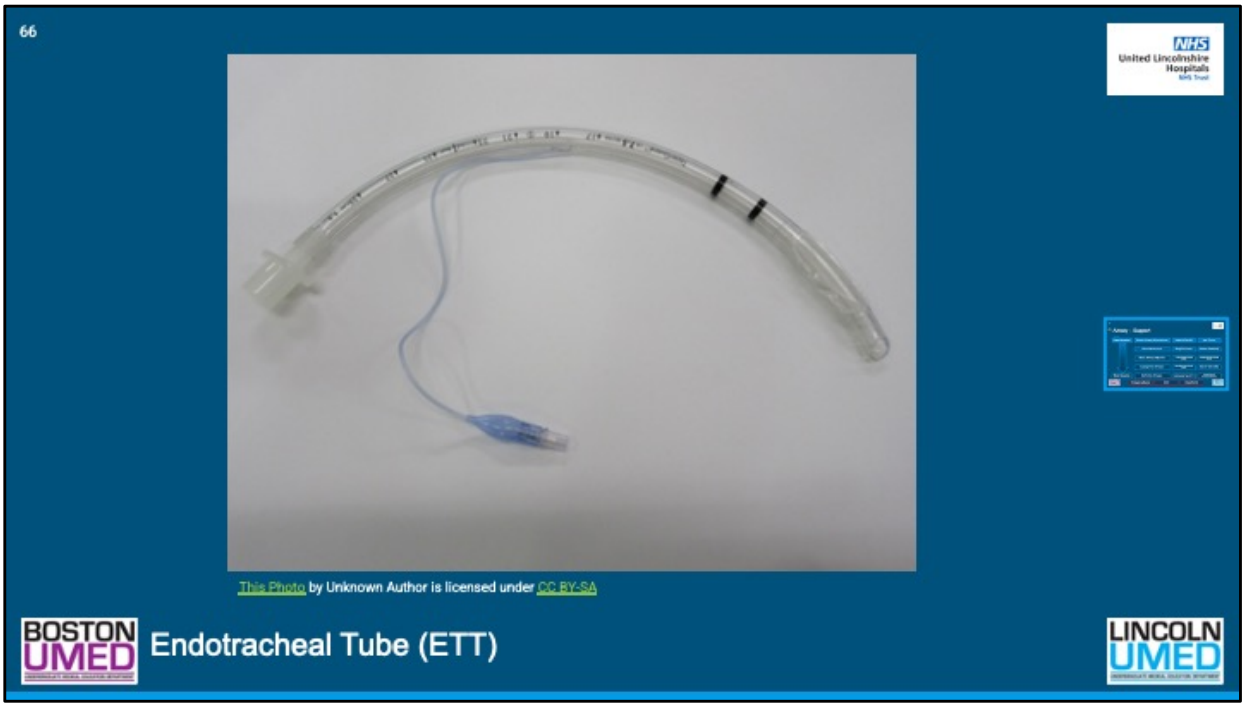
When inserting, ensure the NPA is lubricated. Pick a nostril, and with the curve of the NPA directing it down towards the throat, push this straight back along the bottom of the nasal cavity. If resistance is felt, stop and try the other nostril.

A note of caution is that there are absolute contraindications for insertion of an NPA, which include signs of basal skull fractures, and any facial trauma.




The laryngeal mask airway is one of our supraglottic airway devices.
The mask sits over the glottic opening, and the cuff is inflated in order to achieve a seal. You can see the inflation line which runs separate to the airway itself, and a Pilot balloon near the end of this that gives an indication of the level of inflation of the cuff.


The iGel is another form of Laryngeal Mask Airway, so also sits with the mask over the glottic opening.
It is a 2nd generation LMA device, with some improvements over the original.
The device includes a bite block, which protects the lumen of the airway against the patient biting down on the tube. It also incorporates an oesophageal aspiration port – you can see this small tube running down towards the very end of the device. This allows for aspiration of oesophageal contents, meaning that we can give greater protection against aspiration than is possible with the original LMA.
Finally, the iGel is manufactured from a self-moulding gel, that at body temperature moulds to fit the airway, forming the best seal possible without the complication of inflating cuffs to the correct pressures. Given this greater simplicity of use, these can be inserted by relatively less-skilled professionals.




The endotracheal tube is a simple tube that comes in cuffed and non-cuffed forms. The version shown here incorporates a cuff.
These are used as definitive airways – they sit “below the cords”, and afford the greatest level of protection of the airway against aspiration. They do, however, require muscle relaxation prior to insertion.
Similar to the LMA, you can see the inflation line running alongside the tube, and the pilot balloon which gives an indication of cuff pressures.

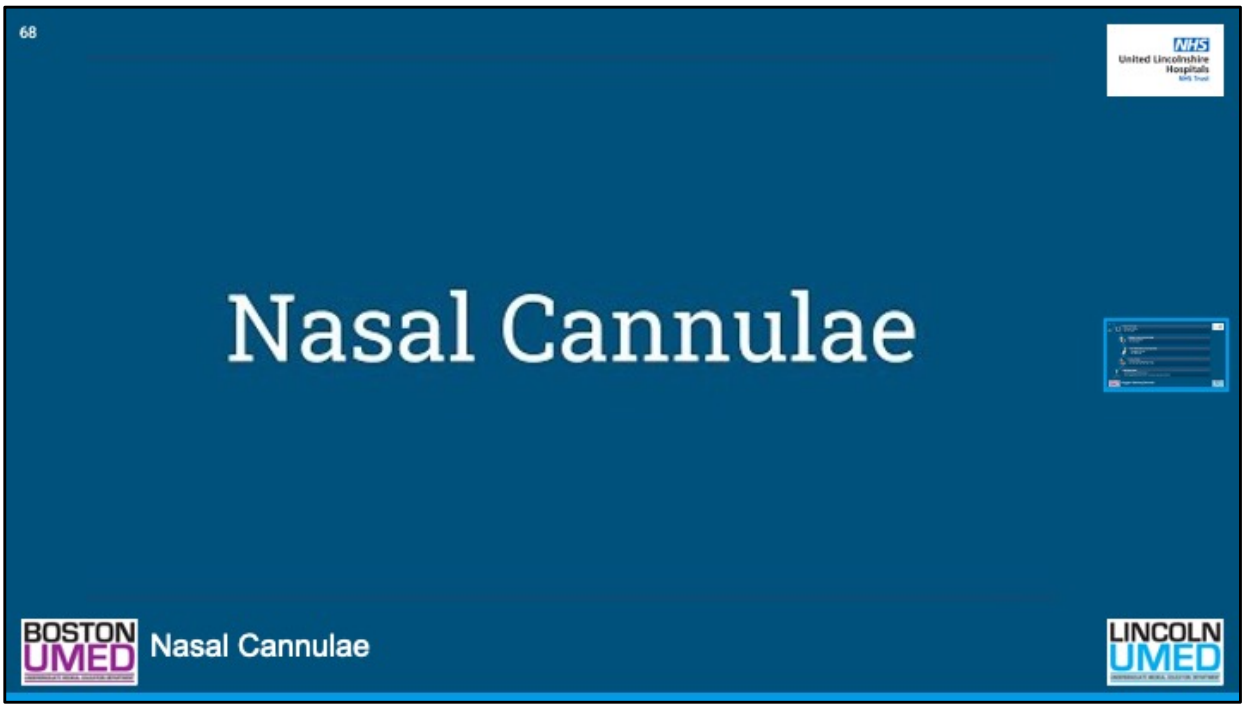
# Tracheostomy/Cricothyroidotomy

## Tracheostomy

- **Elective** – generally used to allow waking of the patient during weaning from prolonged ventilation
- Performed below the cricoid cartilage
- Either open (surgical) or percutaneous (bedside)

## Cricothyroidotomy

- **Emergency** – indications:
  - Inability to obtain oral or nasal airway in patient requiring emergent intubation
  - Severe facial or head/neck trauma
  - Acute loss of airway due to supralaryngeal obstruction (e.g. tumour, anaphylaxis, foreign body, trauma, burns)
- Inserted through the cricothyroid membrane, between the thyroid cartilage and the cricoid cartilage




Nasal cannulae come as a single set of tubing, which ends in a loop. On that loop, there is a pair of prongs, which are curved. You will also note a thin plastic tab between these prongs.

In order to put these on your patient, you should place the two prongs so they are just inside the patient's nostrils, with the small tab resting over the philtrum. Then, loop the tubing on each side over and behind the patient's ears, with the two sides of the loop joining in front of the patient's neck. There is a slider around the tubing that can be adjusted to ensure the nasal cannulae are kept in place, but be careful not to over-tighten this, as tight nasal cannulae can cause pressure damage behind the ears, in front of the neck, over the cheeks, and on the nose.

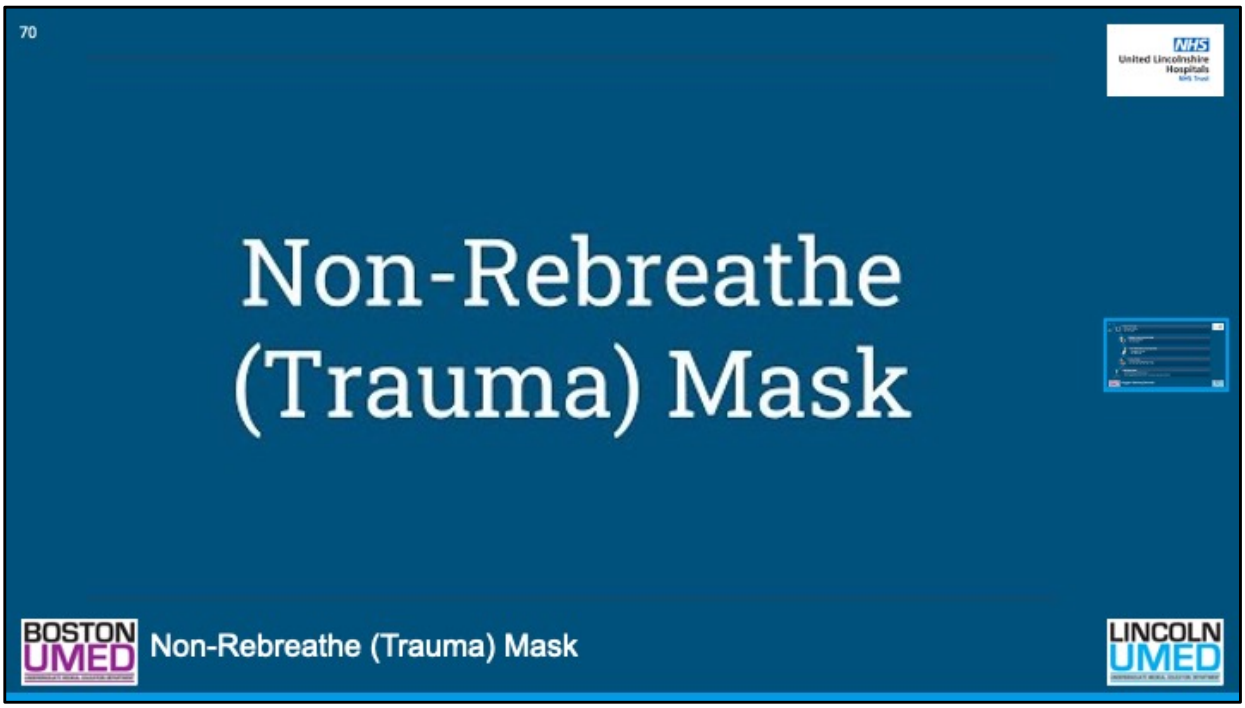
Attach the other end of the tubing to the Oxygen supply, whether that is piped oxygen at the wall, or an oxygen cylinder. Ensure the flow rate is correctly set – between 1-6L/min is achievable, but most commonly we use 2L/min. This device can deliver estimated concentrations between 24-44%, but these will vary from patient to patient.


A Medium Concentration Mask, or Hudson Mask, is a simple facemask that allows delivery of… medium concentrations of oxygen!

This comes as a single set of tubing attached to a mask.

It should be applied to the patient by placing the mask over their nose and mouth, and placing the elastic behind their head. The elastic strap can be gently tightened by pulling where it is attached to the facemask on either side. Be careful not to over-tighten the straps, as this can cause pressure damage behind the head, and over the ears.

Attach the other end of the tubing to the Oxygen supply, whether that is piped oxygen at the wall, or an oxygen cylinder. Ensure the flow rate is correctly set – between 5-8/min is achievable. This device can deliver estimated concentrations between 35-50%, but these will vary from patient to patient.




A Non-Rebreathe Mask, or Trauma Mask, is a facemask that incorporates a reservoir bag, and one-way valves, allowing it to meet peak inspiratory flow rates in excess of the maximum-delivery rate of 15L/min of oxygen, which means that this mask can deliver high concentrations of oxygen. Because there will never be a perfect seal, it still won't be able to deliver inspired oxygen concentrations of 100%

This comes as a single set of tubing attached to a mask with a reservoir bag. It should first be primed – attach the tubing to the Oxygen supply, whether that is piped oxygen at the wall or an oxygen cylinder. Ensure the flow-rate is correctly set – we can deliver 8-15L/min, but most commonly go for 15L/min. This can deliver estimated inspired concentrations up to ~80%, but this will differ from patient to patient. The most critical step in priming is to ensure the reservoir bag becomes inflated. In order to do this, place a finger over the valve in the nose of the mask – this will ensure all the oxygen being delivered is forced into the reservoir bag, inflating it.

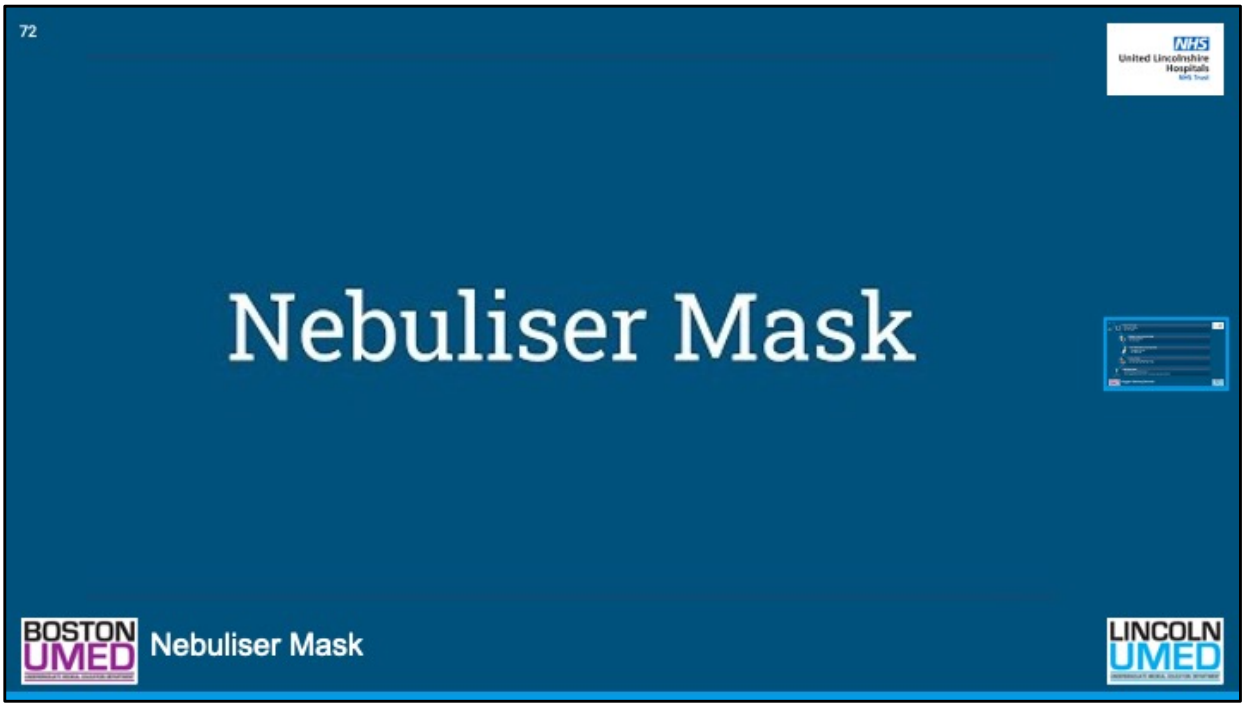
Having primed the mask, it should be applied to the patient by placing the mask over their nose and mouth, and placing the elastic behind their head. The elastic strap can be gently tightened by pulling where it is attached to the facemask on either side. Be careful not to over-tighten the straps, as this can cause pressure damage behind the head, and over the ears.


As discussed in the main presentation, Venturi Masks are used to deliver a fixed concentration of oxygen to the patient. This is particularly useful in patients with chronic hypercapnic respiratory failure, who are at risk from over-oxygenation.

Delivery of fixed concentrations of oxygen is achieved through use of interchangeable venturi “valves” that come in a variety of colours. Unfortunately the manufacturers missed a trick when they decided not to match their respective concentrations to the rainbow order, so it’s much more difficult to remember than it might have been. However, we’re in luck, as each valve has moulded into its side the percentage it delivers, and the oxygen flow rate that should be used.

To use these, you will need the appropriate venturi valve for your patient, a length of standard oxygen tubing, and a standard face mask. Attach the wide end of the venturi valve to the mask, and the thin end of the venturi valve to the oxygen tubing. Attach the other end of the oxygen tubing to the oxygen source, whether piped oxygen at the wall or an oxygen cylinder. Set the appropriate flow-rate for the venturi valve that you are using.

Attach the mask to the patient in the same manner as for the medium-concentration and non-rebreathe masks – placing the mask over the nose and mouth, running the elastic strap behind the head, and tightening the straps gently until the mask is held in place, but the patient is still comfortable.




Nebuliser masks are used to deliver inhaled liquid medications in very small droplets. They require a set flow-rate of between 6-8 L/min in order to produce the correct size of droplets for effective medicine administration. Nebulisers can be delivered by oxygen or air. In the case of oxygen, this can again be delivered by piped oxygen from the wall, or from an oxygen cylinder. Air can be delivered by piped air from the wall, or by a nebuliser machine such as I'm using here.

In order to set up the nebuliser, assemble your equipment. You will need a standard mask, a length of standard oxygen tubing, and the nebuliser unit which is composed of three pieces: the reservoir, the cap, and the baffle (which is easily left out, but an absolutely critical component). In addition, you will also need the medication that you are planning to administer. If delivering nebulisers in the community, you will need a nebuliser machine.

Rest the reservoir on a flat surface, place the baffle into the reservoir, and then pour the desired quantity of medication into the reservoir. Attach the cap to the reservoir. Keeping the nebuliser unit upright, attach the oxygen mask to the top of the unit. Lift the mask and nebuliser off the surface, and attach the oxygen tubing to the bottom. Attach the other end of the oxygen tubing to the delivery device – in this case, an air compressor unit. If using piped gases or a cylinder, set the flow to 6-8L/min. If using an air compressor like this, simply switch it on. When on, you should see a fine mist being emitted from the mask.

Before applying the mask to the patient, ensure that the delivering gas is turned off. This is important, as certain nebulised medications such as salbutamol are irritant to the eyes, and will be blown directly into the eyes if the mask is placed on the patient with the nebuliser running. Apply the mask to the patient in the same way as for each of the other mask devices, however in this case it is important that the patient is sat at least some way up, so that the nebuliser is upright. Once the mask is in place, with as good a seal as you can manage, start the delivering gas once again.

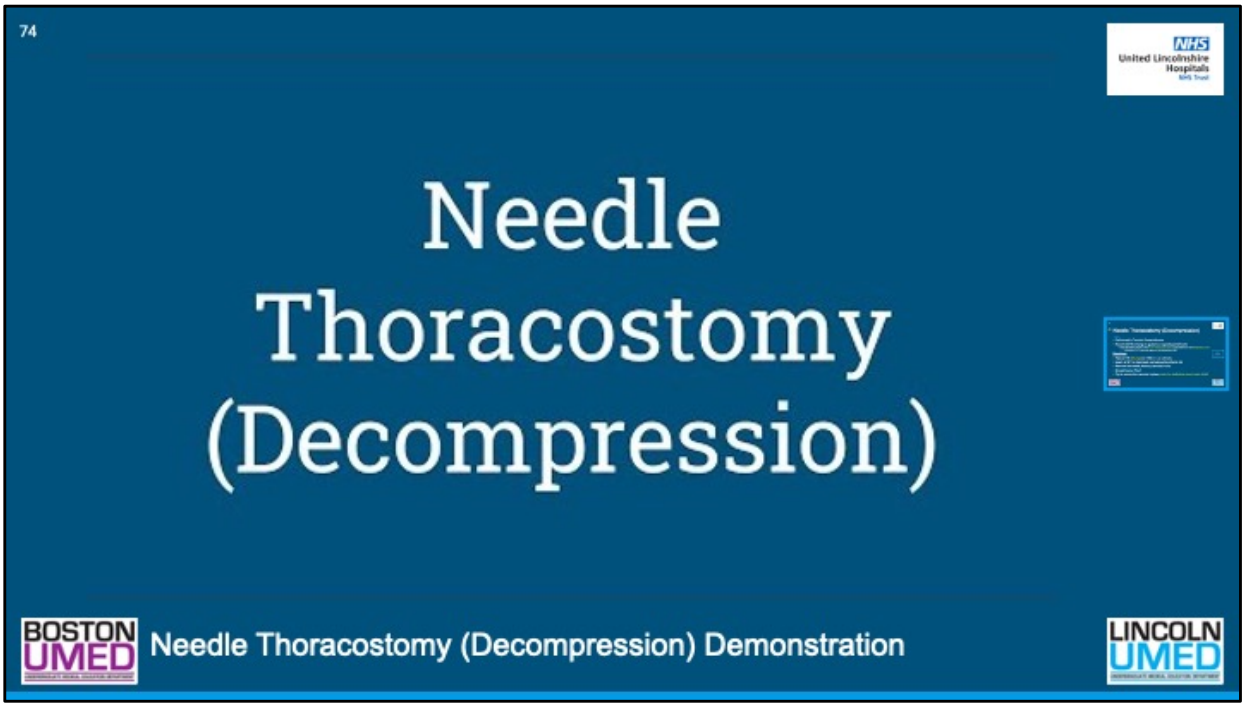
Nebulisers tend to take about 10 minutes to complete, so at the end of those 10 minutes, turn off the delivering gas and remove the mask, replacing with another form of oxygen delivery device if this is required


Bag-Valve-Mask Ventilation is provided to patients early in cardiac arrest, or to support their ventilation in cases where they are significantly bradypnoeic. This tends to occur in opiate overdoses.

The Bag-Valve-Mask is imaginatively named, as it consists of a Bag, a Valve, and… you guessed it: a Mask!

It is generally best to have two people to provide Bag-Valve-Mask ventilation, unless you're an anaesthetist, at which point you'll want to show off your one-handed technique.
It is important to ensure the mask forms a seal over the mouth and nose, and also that the patient is positioned such that their airway is kept patent. The instinct, when struggling to achieve a seal, is to push the mask into the face of the patient, however we should actually be bringing the face into the mask – this is done with a good Jaw Thrust manoeuvre, which we discussed earlier. If you hold the mask with both hands, in a C-shape you've made with your thumb and index finger on each side, then pull the patient's jaw up into the mask using your fourth and fifth fingers, this both creates a seal and helps to maintain a patent airway. **If you are really struggling to achieve a seal, you can also use an NPA, or a Guedel to assist.**

If using the two-person technique, your assistant should provide breaths by pressing the bag. People have a tendency to want to empty the bag quickly into the patient's lungs, however the bag has a much larger capacity than your normal tidal volume, and over-vigorous ventilation will cause damage to the lungs due to the high pressures involved. So, they should gently compress the bag with one hand, roughly in time with their own breathing, which is likely in an acute scenario to be just that little bit of tachypnoea that the patient might need.




A needle thoracostomy, or needle decompression, is performed to urgently relieve the intra-thoracic pressure in a tension pneumothorax. As we discussed in the Shock session, this is important in order to relieve obstruction of the Vena Cava and restore adequate Preload to the heart, treating the cause of the obstructive shock, and allowing cardiac output and blood pressure to return to normal.

We first need to confirm clinically that we have a tension pneumothorax, and that we are confident of which side this is on (it's easy to confuse these in the heat of the moment!). Check the trachea – this will be deviated away from the side of the Tension (to the left in this case). Listen to the chest – breath sounds will be reduced or absent on the side of the Tension (the right in this case). Percuss the chest – the percussion note will be hyper-resonant on the side of the Tension (the right in this case). Check the chest expansion – the side without the Tension will be expanding better than the side with the Tension (in this case, the Left will expand better than the right).

We then need to grab our equipment – a wide-bore cannula (Grey or Orange are best).

Next, we need to identify our site – this is the 4$^{th}$ or 5$^{th}$ intercostal space just anterior to the mid-axillary line. Take your cannula, and insert it just above the inferior rib, perpendicular to (straight into) the chest wall – push it all the way in. Keeping the plastic cannula in place, remove the needle, and listen out for a "hiss", which indicates the air escaping from the pleural space.

Next, attempt to secure the cannula in place, re-examine the chest to check for resolution, request a chest x-ray, and arrange for insertion of a formal chest drain as soon as possible.