Assessing the Acutely Unwell Patient

Introduction to Emergency Medicine 2023

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Learning Objectives

- By the end of the session, students will be able to:
  - Know when the A-E assessment is used
  - Know the steps of an A-E assessment and what examinations/investigations should be performed at each stage, including expected normal findings and common pathological findings
  - Perform a thorough A-E assessment on an unwell patient with a common emergency presentation in a simulated environment
  - Be familiar with commonly used equipment in an A-E assessment and where to find it

What would you do?

You're walking in to university when you find a man collapsed in the car park. He does not respond to your voice and you're not sure what's wrong with him. What do you do?

- Panic?
- Pretend you didn't notice him?
- Call 999?
- Shout for help?

Why is it so important?

- You will be managing acutely unwell patients
- You will panic
- Practice makes perfect

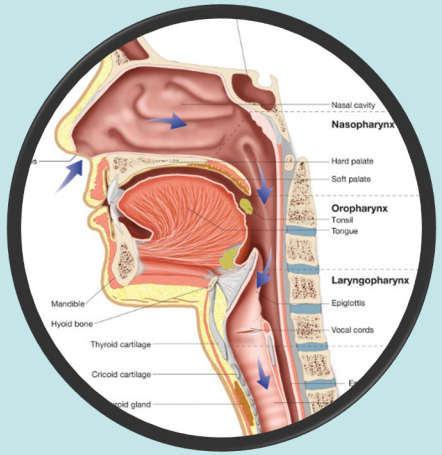
- It comes up in exams!

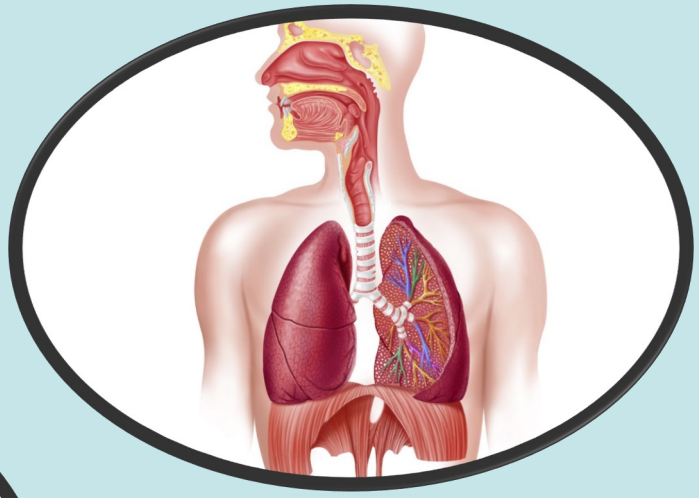
ABCDE

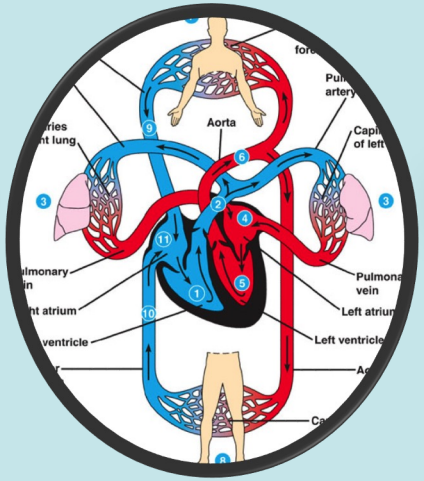
- A method of assessing and stabilising a patient in a stepwise approach
  - Treat abnormalities as you go
  - Reassess to see if your treatments have worked
  - Designed to stabilise the patient before definitive treatment of the underlying problem

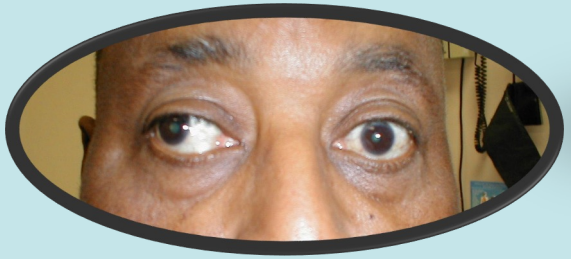
ABCDE

- A - Airway
- B - Breathing
- C - Circulation
- D - Disability
- E - Exposure









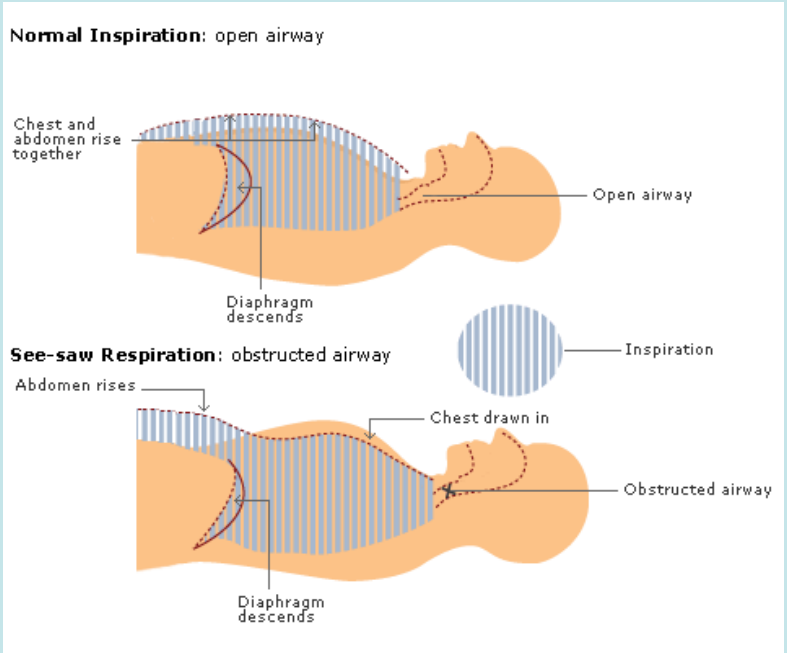
Airway

- *"Hello, are you OK?"*
  - Are they talking?
  - If the patient responds, you know their airway is **patent**
  - Ensure to speak loudly into each ear
- If no response, shake the patient by the shoulders
- Cause a painful stimulus using trapezius squeeze or sternal rub
- Always call for help in an unresponsive patient

Airway

Unresponsive patients need further airway assessment

- Look
  - Cyanosis
  - See-saw breathing
  - Use of accessory muscles
  - Visible airway obstruction
- Listen
  - Absent breath sounds – complete obstruction
  - Stridor/stertor/wheeze/gurgling – partial obstruction
- Feel
  - Place your face/hand over the patients mouth



Causes of airway compromise

CNS Depression

Blood, vomit or secretions

Foreign Body

Direct trauma to face/throat

Epiglottitis

Pharyngeal swelling (infection, oedema)

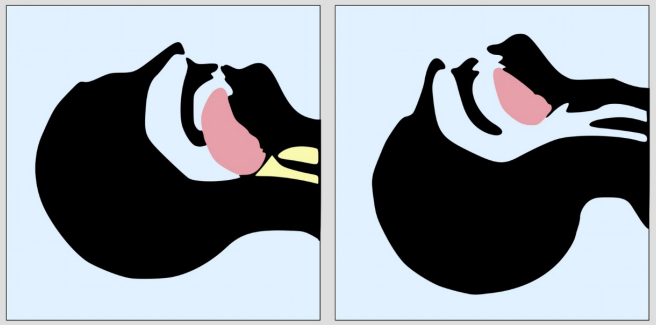
Anaphylaxis

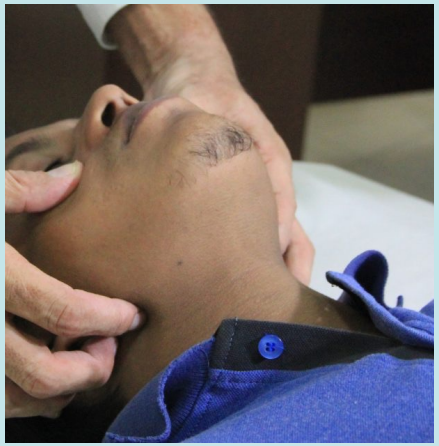
Laryngospasm

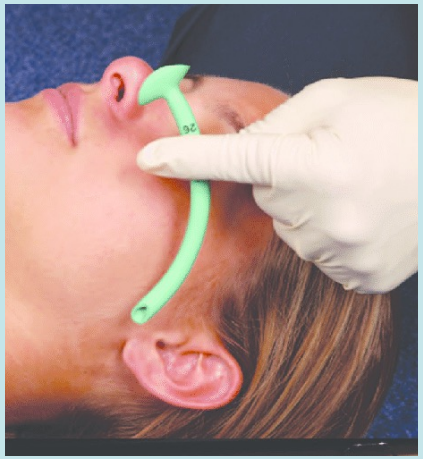
Blocked Tracheostomy

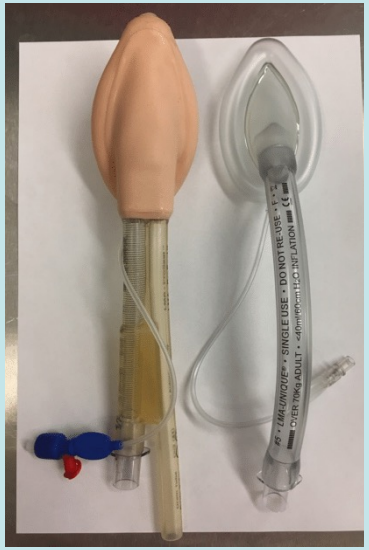
Mass effect

Airway Interventions









Airway Interventions

- Get expert help quickly!
- In the meantime:
  - Head-tilt chin-lift / jaw thrust
  - Remove visible foreign body
  - Suction
  - Bag-valve-mask (BVM)
  - Oropharyngeal airway (OPA)
  - Nasopharyngeal airway (NPA)
  - Supraglottic airways – i-gel or LMA

OPEN the airway

- Definitive management – intubation with ETT
- Surgical airway – cricothyroidotomy / tracheostomy

PROTECT the airway

RE-ASSESS

Breathing

Breathing

Look

- Dyspnoea
- Cough
- Accessory muscles
- Cyanosis
- Pursed lip breathing
- Tripod positioning
- Flail chest

Feel

- Tracheal deviation
- Chest expansion
- Percussion note

Listen

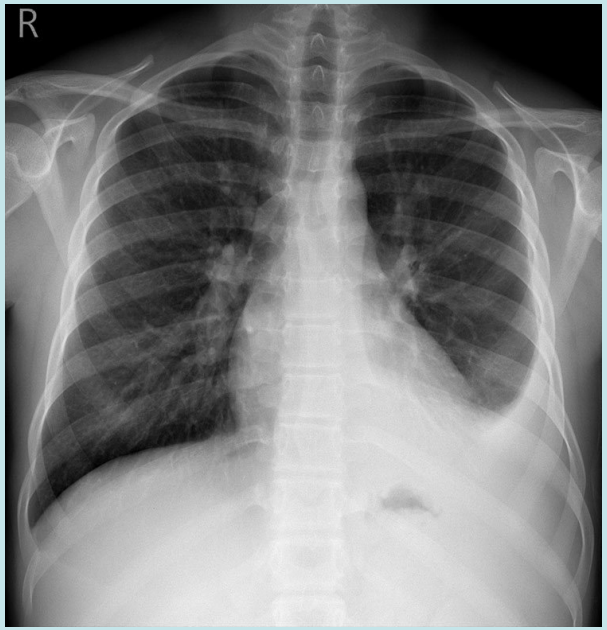
- Abnormal breath sounds
- Reduced breath sounds
- Wheeze
- Stridor

Breathing

Investigating abnormal breathing

- SpO2
- RR
- Peak flow
- ABG
- Chest XR

Blood gas values			
↑ pH	7.499		[7.350 - 7.450]
pCO_2	5.54	kPa	[4.50 - 6.00]
pO_2	12.2	kPa	[10.0 - 13.0]
↑ $cHCO_3^-(P)_c$	32.3	mmol/L	[22.0 - 26.0]
↑ cBase(B)$_c$	8.4	mmol/L	[-2.0 - 2.0]
Temperature-corrected values			
pH(T)$_c$	7.510		
$pCO_2(T)_c$	5.38	kPa	
$pO_2(T)_c$	11.7	kPa	
Oximetry values			
↓ ctHb	73	g/L	[115 - 174]
sO_2	98.6	%	
FO_2Hb	96.2	%	
$FCOHb$	1.7	%	
$FMetHb$	0.7	%	
$FHHb$	1.4	%	
Electrolyte values			
cNa^+	138	mmol/L	[135 - 145]
cK^+	3.8	mmol/L	[3.5 - 4.5]
cCl^-	99	mmol/L	[98 - 107]
cCa^{2+}	1.13	mmol/L	[1.12 - 1.32]
Metabolite values			
↑ cGlu	11.2	mmol/L	[3.9 - 8.0]
cLac	1.3	mmol/L	[0.4 - 2.2]



Causes of breathing difficulty

Respiratory drive

- CNS depression

Respiratory effort

- C-spine damage
- Myasthenia gravis
- MS, Guillain-Barre
- Restrictive abnormality
- Pain from fractured rib

Lung disorder

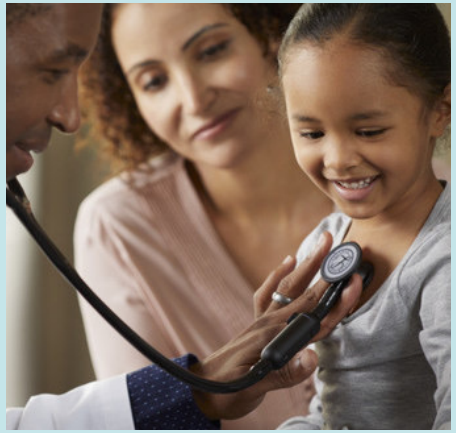
- Infection
- COPD
- Asthma
- PE
- Pulmonary oedema

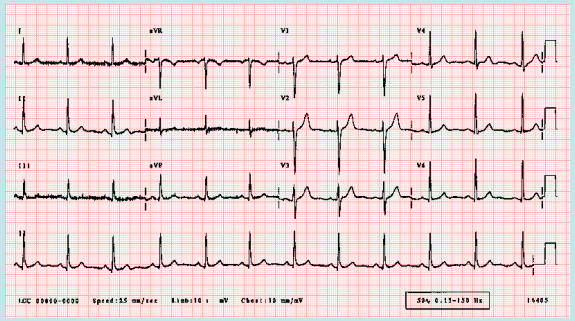
Breathing Interventions

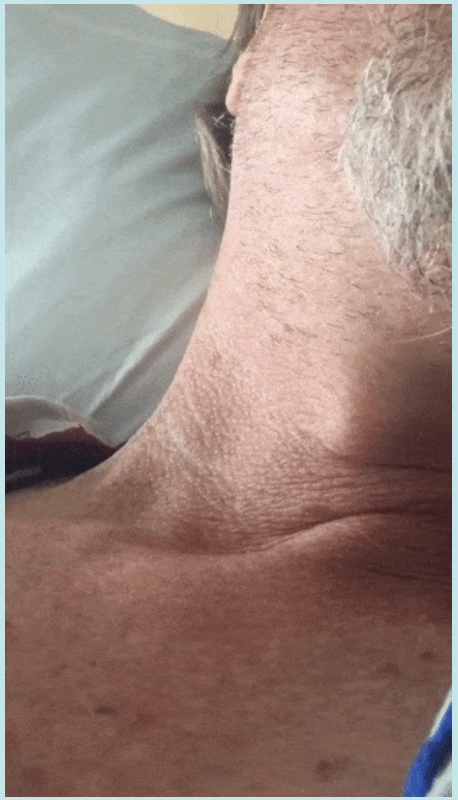
- Oxygen - 15L/min via non-rebreathe mask
- Dependent on cause
  - Tension pneumothorax – needle decompression
  - Asthma exacerbation – nebulised salbutamol / ipratropium
  - Anaphylaxis – adrenaline / steroids / antihistamine
  - Infection – ?sepsis, antibiotics

RE-ASSESS

Circulation







Circulation

Look

- Pallor
- Oedema
- Sweating
- Blood loss
- JVP
- Urine output

Feel

- Temperature
- CRT
- Pulse

Listen

- Heart sounds

Circulation

14G	Orange	240 ml/min
16G	Grey	180 ml/min
18G	Green	90 ml/min
20G	Pink	60 ml/min

Measure/calculate:

- Heart rate
- Blood pressure
- Fluid balance (consider catheterisation)
- Temperature
- CRT
- JVP

Investigate:

- Insert a cannula (or two!) - 14G/16G
- Blood tests and cultures
  - All should get FBC, LFT, U&Es
  - Additional depending on presentation (e.g. CRP, lactate, blood cultures in ?sepsis)
- 12-lead ECG
- Consider continuous ECG monitoring
- POCUS

Causes of Circulatory Collapse

Hypovolaemia

- Dehydration
  - Including D+V, burns
- Haemorrhage
- Third spacing

Fluid Distribution

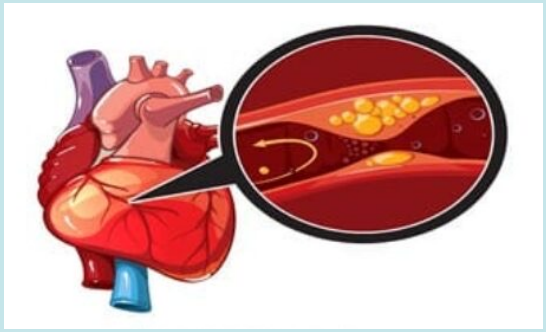
- Sepsis
- Anaphylaxis
- Spinal cord injury

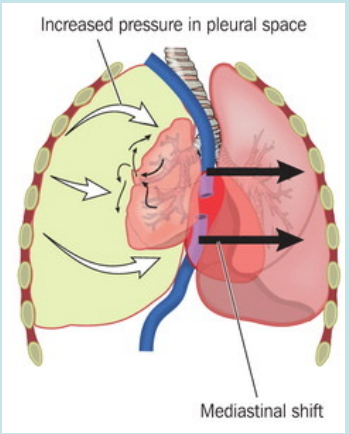
Cardiac

- ACS
- Aortic dissection
- Arrhythmias
- Cardiomyopathy
- Myocarditis

Obstruction

- PE
- Pneumothorax
- Tamponade
- Coarctation of the aorta



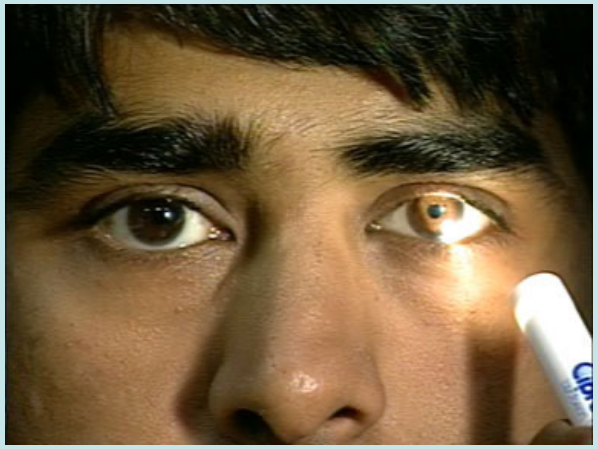


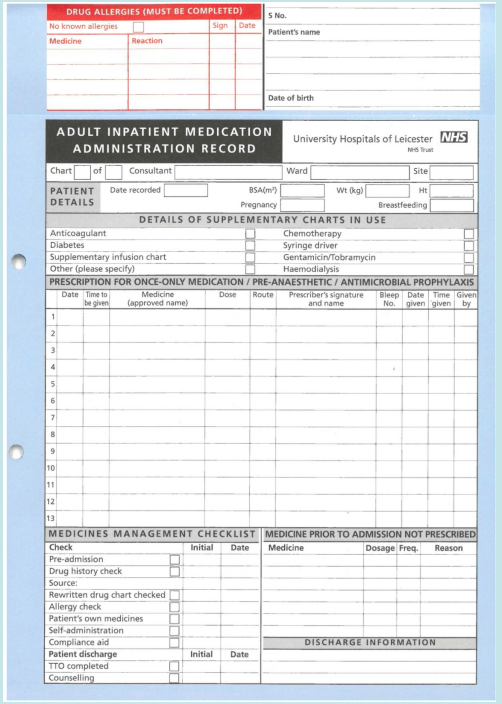
Circulation Interventions

- Fluid resuscitation – normal saline or Hartmann's – 500ml over 15 mins
  - 250ml if risk of fluid overload
  - Repeat until 2000ml
- Blood transfusion - in haemorrhage (replace like for like!)
- Vasopressors and inotropes
- Haemorrhage
  - Haemostatic measures - pressure, packing, tourniquet, antifibrinolytics (TXA), local agents (adrenaline), coagulation, ligation
  - Anticoagulant reversal
  - Massive haemorrhage protocol
- ACS – Aspirin, Nitroglycerine, Oxygen, Morphine/Diamorphine
- Tamponade – Pericardiocentesis
- Tension pneumothorax – Needle decompression, chest tube
- PE – Thrombolysis, embolectomy
- Anaphylaxis - IM adrenaline
- Sepsis - IV Antibiotics
- Adrenal crisis – Hydrocortisone
- Hypertensive crisis – IV antihypertensives

RE-ASSESS

Disability




DRUG ALLERGIES (MUST BE COMPLETED)

No known allergies | Sign | Date

Medicine | Reaction

S No.

Patient's name

Date of birth

ADULT INPATIENT MEDICATION ADMINISTRATION RECORD

University Hospitals of Leicester NHS

Chart of Consultant Ward Site

PATIENT DETAILS

Date recorded BSA(m²) Wt (kg) Ht

Pregnancy Breastfeeding

DETAILS OF SUPPLEMENTARY CHARTS IN USE

Anticoagulant | Chemotherapy

Diabetes | Syringe driver

Supplementary infusion chart | Gentamicin/Tobramycin

Other (please specify) | Haemodialysis

PRESCRIPTION FOR ONCE-ONLY MEDICATION / PRE-ANAESTHETIC / ANTIMICROBIAL PROPHYLAXIS

	Date	Time to be given	Medicine (approved name)	Dose	Route	Prescriber's signature and name	Bleep No.	Date given	Time given	Given by
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										

MEDICINES MANAGEMENT CHECKLIST

Check	Initial	Date
Pre-admission		
Drug history check		
Source:		
Rewritten drug chart checked		
Allergy check		
Patient's own medicines		
Self-administration		
Compliance aid		
Patient discharge	**Initial**	**Date**
TTO completed		
Counselling		

MEDICINE PRIOR TO ADMISSION NOT PRESCRIBED

Medicine	Dosage	Freq.	Reason

DISCHARGE INFORMATION

L.W.E.M.S.
LEICESTER WILDERNESS AND EMERGENCY MEDICINE SOCIETY

Disability

- Check for common causes of unconsciousness/abnormal neurological status
  - Calculate AVPU/GCS
  - DEFG - DON'T EVER FORGET GLUCOSE! (+ ketones)
  - Pupillary response – equal and reactive
  - Temperature (if not already checked in C)
  - Medications (check the drug chart!)
  - Toxins – alcohol & drugs
  - Urine pregnancy test
  - Focal neurological signs – e.g. hemiplegia, seizures, weakness, speech/vision/hearing loss
  - Signs of increased ICP – headache, confusion, vomiting, papilloedema, irregular breathing
  - Signs of head trauma – head wound, racoon eyes, CSF otorrhoea/rhinorrhoea, haemotympanum
- Do they meet CT head criteria?

Causes of reduced neurological status

- *Hypovolaemia*
- *Hypoxia*
- *Hypercapnia (e.g. COPD)*
- Metabolic disturbance (e.g. hypoglycaemia, adrenal crisis, myxoedema coma)
- Epilepsy
- Raised intracranial pressure or other neurological insults (e.g. stroke, TBI, cerebral contusion)
- Infections (e.g. meningitis, encephalitis)
- Drug overdose/toxins
- Iatrogenic causes (e.g. administration of opiates)
- Delirium (in older patients, secondary to underlying cause)

Disability interventions

- If the patient is unresponsive or only responsive to pain, intubation is usually necessary
  - Beware raised ICP!
    - Take measures to reduce ICP (raise head of bed to 30º, hyperosmolar therapy with hypertonic saline or mannitol, dexamethasone)
    - Laryngeal manipulation → sympathetic reflex → raises ICP
    - Induction agents (e.g. propofol) lower BP → reduced cerebral perfusion pressure
- Status epilepticus → benzodiazepines
- Hypoglycaemia → oral glucose or IV dextrose
- Hyperglycaemia → assess for DKA/HHS → fluids, insulin, K+
- Intoxication → naloxone for opiates, 100% oxygen for CO etc
- ?ICH → neurosurgery review
- Iatrogenic → stop medication and give reversal agent if available

RE-ASSESS

Exposure

Exposure

- Rapid inspection to check for other injuries or clinical signs
  - Prioritise patient dignity and preservation of body heat
  - Maintain C-spine precautions where necessary

- Do they have any pain anywhere?
- Inspect the skin for: wounds, rashes, bruises, swelling, erythema, tenderness, needle track marks, medication patches
- Inspect any IV access for: erythema, discharge, extravasation
- Inspect the calves for signs of DVT
- If any active bleeding:
  - Estimate blood loss and rate of loss
  - Re-assess for signs of shock
  - Regions often neglected include the scalp, the back, the orifices, the axillary, inguinal, and perineal regions, and body parts underneath dressings

Exposure interventions

- Treat the underlying condition (e.g. sepsis)
- Remove wet/contaminated clothing and provide clean/dry clothes
- Remove allergens/medications (e.g. insect stings, IV infusions)
- Infections – wound swabs/cultures
- Hypothermia
  - External rewarming – blankets, Bair Hugger™
  - Warm IV fluids
  - Core warming – airway warming, thoracic/peritoneal lavage, extracorporeal blood rewarming
- Hyperthermia – surface cooling, cold IV fluids
- Haemorrhage – IV access, blood tests, fluids/blood, MHP
- DVT – Well's score, D-dimer, USS, anticoagulation

RE-ASSESS

Next steps…

- Take a focussed history from the patient – SAMPLE
  - Symptoms/Signs
  - Allergies
  - Medications
  - Past medical history/pregnancy status
  - Last meal/drink/menstrual period/opened bowels and bladder
  - Events leading up to deterioration
- Take a collateral history where possible (e.g. friends, family, staff)
- Review the patient's notes and charts
- Review the results of recent laboratory or radiological investigations
- Record what you've done and the patient's response
- Refer for further investigations/review from specialists and handover to the next team on shift

Worked example

- Ambulance handover:

"The patient is Jamie Smith, a 22 year old male with progressive dyspnoea over the last four hours. He is tachycardic at 124/min, tachypnoeic at 32/min and has low sats of 86% on air. BP, temp, GCS are normal.

He's been put on 15L/min O2 via NRB. 3-lead ECG in ambulance showed sinus tachycardia.

He has no known allergies and doesn't take any medications. Normally fit and well."

What do you want to do?

- A-E assessment!

- Airway
  - *"Hello Mr. Smith, I'm X one of the A&E doctors, can you tell me what's going on?*
  - *"I… just… can't… breathe"*
  - Talking, but can't complete full sentences. Audible wheeze
  - What does this mean?
    - Airway is patent, but likely partial obstruction

Intervene
- Nothing necessary right now

A-E assessment

- Breathing
  - Look – dyspnoea (unable to complete sentences), coughing, use of SCM during inspiration
  - Feel – normal chest expansion and percussion
  - Listen – bilateral biphasic wheeze
  - Measure
    - SpO2 – 87%
    - RR – 30/min
    - Peak flow – 260 L/min
- What could be going on?
  - Asthma exacerbation, anaphylaxis, pneumothorax, PE, pneumonia, foreign body, heart failure

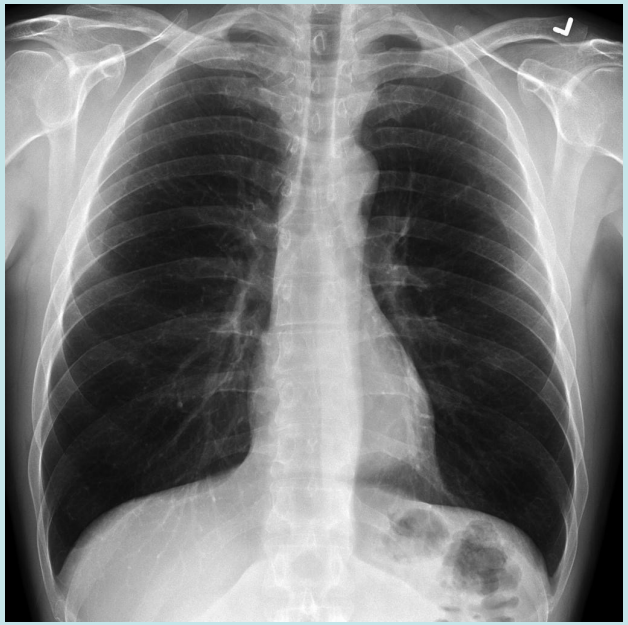
A-E assessment

1. Asthma exacerbation
2. Anaphylaxis
3. ~~Pneumothorax~~
4. PE
5. ~~Pneumonia~~
6. ~~Foreign body~~
7. ~~Heart failure~~

Intervene

- Already on O2
- SABA – Salbutamol 5 mg via nebuliser (O2 driven)
- SAMA – Ipratropium 500 micrograms via nebuliser (O2 driven)
- Systemic corticosteroids – 40-50mg prednisolone orally

- Investigations
  - Chest XR
  - ABG



PaO2	9	*11-13kPa*
pH	7.49	*7.35-7.45*
PaCO2	3.6	*4.7-6.0kPa*
HCO3-	24	*22-26 mEq/L*

Electrolytes, Hb and lactate all within normal range

A-E assessment

1. Asthma exacerbation
2. ~~Anaphylaxis~~
3. ~~Pneumothorax~~
4. PE
5. ~~Pneumonia~~
6. ~~Foreign body~~
7. ~~Heart failure~~

- Re-assess!
  - @ 10 mins - Airway patent. Sats 88%, RR 30/min, audible wheeze and only able to say a couple of words at a time

- Circulation
  - Look – mild pallor, no peripheral oedema, no angioedema, normal JVP, warm and dry skin
  - Feel – CRT <2 secs, pulse is fast but normal rhythm and character
  - Listen – I + II + 0
  - Measure
    - BP – 136 / 90
    - HR – 121/min
    - Temp – 37.2 C

A-E assessment

1. Asthma exacerbation
2. ~~Anaphylaxis~~
3. ~~Pneumothorax~~
4. ~~PE~~
5. ~~Pneumonia~~
6. ~~Foreign body~~
7. ~~Heart failure~~

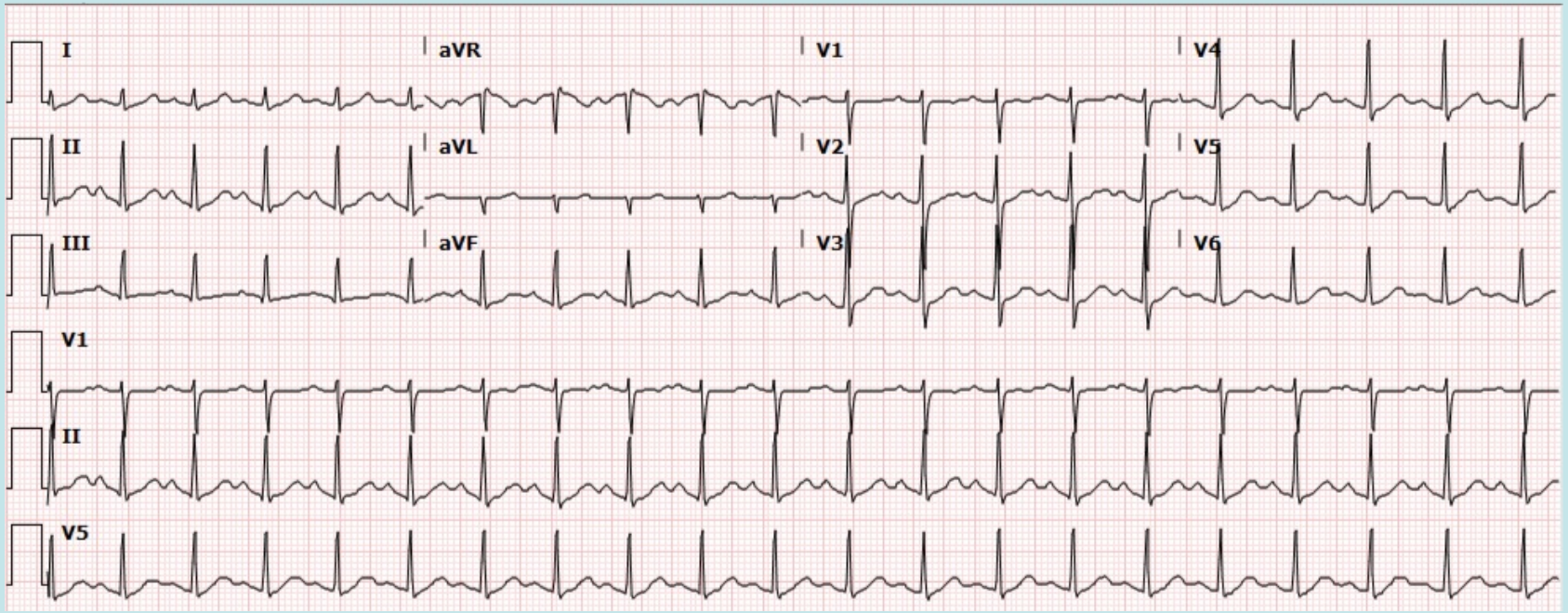
Intervene

- Nothing necessary right now… but keep monitoring!

- Investigate
  - Insert a cannula
  - Bloods – FBC, U&Es, LFTs, CRP, lactate, d-dimer
  - 12-lead ECG
- Re-assess!
  - @ 20 mins – Airway patent. Sats 89%, RR 29/min, audible wheeze, only able to say a couple of words at a time. HR 119. BP 132 / 86. CRT < 2.
  - Is our treatment working? What could we add?
  - Magnesium sulphate

A-E assessment

- Bedside ECG



- Awaiting bloods

1. Asthma exacerbation
2. ~~Anaphylaxis~~
3. ~~Pneumothorax~~
4. ~~PE~~
5. ~~Pneumonia~~
6. ~~Foreign body~~
7. ~~Heart failure~~

A-E assessment

1. Asthma exacerbation
2. ~~Anaphylaxis~~
3. ~~Pneumothorax~~
4. ~~PE~~
5. ~~Pneumonia~~
6. ~~Foreign body~~
7. ~~Heart failure~~

- Disability
  - Very agitated
  - AVPU – Alert / GCS 15
  - Bedside glucose – 5.2. mmol/L
  - PEARL
  - No neurological signs

Intervene
- Nothing necessary right now

- Re-assess!
  - @ 25 mins – Airway patent. Sats 91%, RR 28/min, audible wheeze, only able to say a couple of words at a time. HR 115. BP 134 / 84. CRT < 2.
  - Magnesium has been given. Nebuliser has finished
  - What do you want to do?

A-E assessment

1. Asthma exacerbation
2. ~~Anaphylaxis~~
3. ~~Pneumothorax~~
4. ~~PE~~
5. ~~Pneumonia~~
6. ~~Foreign body~~
7. ~~Heart failure~~

- Exposure
  - Mr Smith says his chest feels very tight
    - "like a band round my chest", 7/10
  - No wounds, rashes, bruises or swelling
  - No active bleeding

Intervene
- Nothing necessary right now

- Re-assess!
  - @ 30 mins – Airway patent. Sats 92%, RR 25/min, audible wheeze, can say 4-5 words in a row. HR 112. BP 132 / 83. CRT < 2. PEFR 310 L/min. Alert and agitated
  - Is our treatment working?

A-E assessment

- @ 1 hour - blood results are back

Hb	172	*135-180*
WBC	6.89	*4-11*
Plt	236	*150-400*
RBC	5.74	*4.5-6.5*
MCV	98.1	*78-100*
MCH	30.4	*27-32*
MCHC	342	*310-370*
Neut	3.41	*2-7.5*
Lymph	2.63	*1-4.5*
Mono	0.56	*0.2-0.8*
Eosino	**0.38**	***0.04-0.3***
Baso	0.05	*<0.1*

Sodium	137	*133-146*
Potassium	3.8	*3.5-5.3*
Urea	6.8	*2.5-7.8*
Creatinine	68	*60-120*
eGFR	98	*>60*

Albumin	38	*35-55*
Total bilirubin	17	*3-20*
ALT	26	*3-40*
AST	15	*3-30*
ALP	96	*30-100*
GGT	<10	*0-70*

CRP	<5	*<10*

Lactate	2.2	*0.5-2.2*

D-dimer	120	*<500*

A-E assessment

- Re-assess!
  - @ 1 hour – Airway patent. Sats 94%, RR 22/min, quieter wheeze, can speak in short sentences. HR 104. BP 129 / 82. CRT < 2. PEFR 390 L/min. Alert, now more relaxed. Chest feels less tight (5/10).
  - Is our treatment working?
  - Is our diagnosis correct?
- Repeat any investigations
  - ABG

PaO2	11	*11-13kPa*
pH	7.46	*7.35-7.45*
PaCO2	4.5	*4.7-6.0kPa*
HCO3-	23	*22-26 mEq/L*

Electrolytes, Hb and lactate all within normal range

A-E assessment

- Diagnosis: acute severe asthma exacerbation
- What now?
  - Take a thorough history and full respiratory examination
  - Re-assess frequently and continue treatment as needed
  - Escalate treatment if patient deteriorates
    - IV SABAs/steroids, intubation and ventilation, ICU admission
  - Record everything in the patient's notes
  - Consult with senior in ED and handover to respiratory team
    - Severe asthma exacerbation will likely need hospital admission for further tests and treatment plan
    - Respiratory team will perform assessments, come up with a care plan and prescribe discharge medications

A-E assessment

- Specialty handover:

"Hello my name is X, I am calling from ED resus as I would like your input on a patient with a first episode of acute severe asthma exacerbation.

The patient is an otherwise well 22 year old male who has had increasing dyspnoea and work of breathing throughout the day.

He was brought in by ambulance with features of acute severe asthma. On admission, he had sats 86%, PaCO2 of 3.6 and PEFR 260L/min. I have given him back-to-back nebulisers, oral steroids and IV magnesium over the last 2 hours. He is responding well to treatment so far, sats are now 94% and PEFR is 390L/min.

Can you please come to assess whether you feel hospital admission is required and arrange onward care for his new asthma diagnosis."

Time for a break!

Simulation

- Simulated scenarios to practice A-E assessment in small groups
- All will be on concepts taught in phase one
- Each station will have an patient actor and an assistant, who will watch what you're doing, tell you examination findings/results, and point you in the right direction
- Anyone who isn't doing the scenario – think about what the team did will and what they could improve
  - A-E assessment
  - Team work and leadership
  - Communication with each other and the patient
- 'What happens in simulation stays in simulation'
  - This is the place to get things wrong!
  - The more you try, the more you'll learn

Thank you for coming!

- Next week (16th Feb @ 6:30pm) – Cardiac arrest
  - Understanding the cardiac arrest team
  - The ACLS algorithm
  - Airway management – including inserting adjuncts and intubation
  - Using a defibrillator

- Please give us session feedback!