RCEMLEARNING

RCEM BLOGS

ED STARTER PACK

INTRODUCTION

Author: Nikki Abela

THE ED IS A PLACE WHERE YOU WILL LEARN TO MANAGE YOUR TIME WELL

WELCOME TO THE ED

Welcome to the ED, home of anything and everything. Here you will see the well, the unwell, the scared and the alone.
You may want to laugh and cry all in the same shift. But remember, you will never be alone. Ask. Learn from others. Be outside your comfort zone and pick up the next card where you don't know where to start.
You'll make some great catches; you'll miss some serious diagnoses. It's all about risk management and weighing pros and cons of investigating symptoms further. Remember 'first do no harm'.

You will learn to move on from one patient to the next – even the ones that rattle you inside and the ones that make you want to cry – always greet the next patient with a fresh face and "what can I do for you?" attitude.

The time you spend in the ED is largely what you make it. It is a great place to learn as you will always be surrounded by people to teach you. If you are interested in subspecializing in emergency medicine, make yourself known to the senior doctors early, so that you will get plenty of opportunities doing "core" A&E stuff.

The ED is the place where you will learn to manage your time well. Learn to multitask and find ways to see patients quicker – you will find that the time spent writing takes long so do try to write while taking a history, and cut down the time spent between one patient and the next. Think about the ED mindset – our goal is not to get the diagnosis right every time (that helps!) but to manage the symptoms, and the risk.

In return, you will find that you should always leave on time – give good handovers and you will get the same back.

Remember, you are working as a team – if the department is busy then everybody should be working at a faster pace, including you. The same goes for when the department is nicer – everyone should benefit and try to make these times about doing things and seeing patients that interest you.

Working shifts may be tricky at first. Your body may take time to adjust (**Read these tips** on how to prepare and survive nights by St. Emlyn's), but try to see the positive sides of your rota – for example you will have rest days off during the week, when going shopping or to the bank isn't so busy, and working evenings during the winter may mean you get more time to enjoy the daylight hours. Looking after yourself is very important, and don't forget to do it – it's so important, we've written a blog on it!

"Get the best from your rest," as the St.Emlyn's team say

You may feel exhausted a lot of the time, but make the most of the time you're not at work. Go out when you can, and connect with the others working the same hours as you.
We hope you enjoy your time in the ED as much as we enjoy being part of the fab team that works there.

We have collected these blogs to get you started, but have plenty more on the site for those of you who want to take their learning further. The fab team at St.Emlyn's also have a **super induction** set for you all to learn more. Our monthly podcasts can be downloaded from iTunes/any android podcast player, and are an efficient way of staying up to date.
Some of our authors here are part of our new contributors team, and we hope you will agree with us that they've done a fab job in writing these topics.

In the next few months we hope to have a starter pack for those of you starting in Paediatric Emergency Medicine – so keep your eyes peeled for that. We might do an "induction part two" iBook, and we'd love to hear from you what we should put in it!
In the meantime, we hope you find these helpful, and that you realize the ED is your oyster – open her up to reveal her pearls.

TOP TIPS BY AN ED SISTER *CENSORED*

Author: Claire Fraser/ **Editor:** Nikki Abela

“popularity stakes go through the roof, even for a token packet of Jaffa cakes or crisps, home baking will get you a statue, pizza a shrine”

NURSE IN NAVY BLUE

Editors note: Claire is one of the best ED sisters I've worked with - she doesn't mince her words but she has a heart of gold. Her rough manner will throw you in at the deep end - but she will also jump in beside you to keep you swimming. Working in the ED is not easy, but it is incredibly rewarding and you will learn so much, especially because you will be surrounded by exceptional people like Claire.

So I was asked to write this as if I was talking to you pre-ED rotation and I was also asked would it need to be censored prepublication …. [Editor: You will find our sisters are very loving but fiesty folks, so there is definitely some censored content here].

One of the biggest issues coming in to any new ED is the general day-to-day workings of the unit and although there are some minute variances you will find that we all sing from the same hymn sheet.

- The nurse in navy blue tends to be the person that knows what's going on, we can be your solution to most things. Just remember we didn't get the job for being nice people, we got the job because on the whole we are vastly experienced clinical nurses with a lot of ED experience, so if you don't know, ask us and if we don’t know we will know somebody that will know. [Editor: This is also a skill you will pick up during your days in the ED]

- The nurse coordinator tends to be based in a specific area, don't sit in that space, don't use that computer and don't answer or use that phone. This is not because we are historically grumpy and control freaks, it's because trying to run an ED is like trying to herd cats. We have multiple different tasks all happening at the same time and using the chair is the easiest way to get yourself red carded or forcibly removed by security.

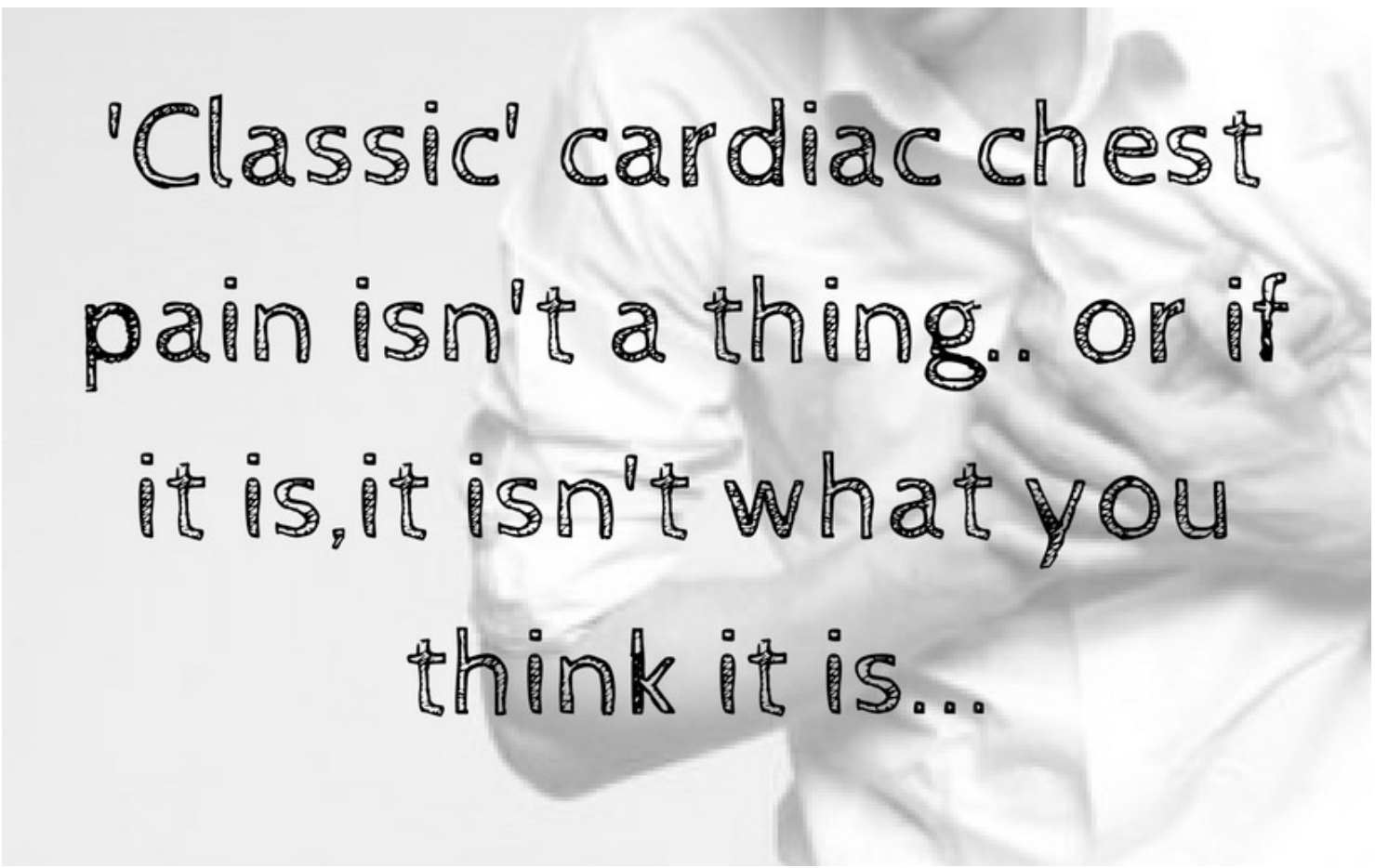
- Introduce yourself to the nursing team, they won't forget you.

Top tips by an ED Sister *Censored*

- If the phone is ringing at your station and you are sitting there - answer it. Take a message, apologise, put it on hold-
- Not answering it is a red rag to a bull for all humanity, even if it's the coordinator's phone. Unless they're standing next to the phone and able to answer it - in which case...don't answer it.
- Don't be too hard on yourself, it's a difficult environment and everybody will want something from you. It's perfectly reasonable to go into the sluice and drop the *f* bomb. It's not acceptable to sit at the station dropping the *f* bomb - walls have ears when people are stressed and angry, and it will fall back at your door.
- Be nice to your junior nurses, they are the people that will help you the most. ED nurses are feisty ballsy creatures and they will have your back if they can. If you are in the room talking to a patient for 40 minutes and then come out and ask the nurse to do your bloods or cannulas it's likely you will get “that” reputation and also the compliance and teamwork will drop. You may learn to multitask quite quickly in the first days you are with us. One of my most beloved professional relationships is with a current ED consultant who as a junior was often seen bringing cups of tea to her patients and also fetching commodes and pillows when she knew that we were busy. She is an amazing, grounded, well respected and well liked clinician who to this day still does the above and the nurses would jump through hoops for her. Try to be like her, for your sake and ours.
- Take your breaks and make sure you are well fed and watered because it will affect you. Have snacks in your pocket. If the senior nurse asks you if you have had a break it's likely she thinks you need one because some aspect of your behaviour / appearance / performance indicates this.
- We generally can't organise and pay for a taxi for patients.[Editor - and organising ambulances home is a privilege available for few. Don't offer it!]
- Not all drugs have to be given IV or IM, some can be prescribed orally.
- The pain ladder is really useful, however if you are asked to prescribe analgesia be mindful paracetamol doesn't always hit the spot for fractures.
- If you think you patient is a regular attender, speak to a senior nurse or senior doctor. We will know if they are and they will have a plan. This will make everything smoother for you and the patient.
- Most departments have a code for fresh brew and/ or food available when they declare it over the tannoy system - it's the infamous Mr and Mrs Brown where I work. Remember somebody has to buy this and popularity stakes go through the roof, even for a token packet of Jaffa cakes or crisps, home baking will get you a statue, pizza a shrine... get my point?
- I will be your nonjudgemental friend, I get you, I understand you and I want to help you succeed. Let me know if you are struggling, I've seen it before and I’ll see it again. I will be your biggest ally but I will also be your worst nightmare. You getting it right makes my job easier and we all want to be on that shift.
- The four hour rule is not mine, it's ours and I'm not personally trying to force on you to make rash decisions. I have to manage flow, I have to manage the department. And for the patients that are waiting on the ambulance corridors - they would also like you to make decisions. [Editor: And remember, the target is four hours from arrival to discharge, not arrival to referral!]
- Without being corny , it's ok not to be ok. One man’s rubbish is another mans treasure, so what may affect you may not affect somebody else. Don't take it home with you. As senior nurses we are static body in the ED. We are a good shoulder to lean on. Emotions run high after specific incidents and a constant exposure to these along with the mental application required from emergency trainees can be catastrophic. Compassion is inherent to all of us - you just have to tap into it.
- Good luck xxx

CHEST PAIN

Author: Chris Connolly / **Codes:** CAP5, CAP7, CC1, CC2, CC3, HAP5, HAP7, HAP8



CHEST PAIN

Chest pain is one of the most common reasons adults come to an ED. By the end of your placement you should be awesome at reading ECGs, and be some way along your journey to 'getting' who needs tests and who doesn't. Not an expert, not amazing, just better than you are now.

Expertise takes time…most of your seniors are still on that journey too (and I also put myself well and truly in that camp!!!). (make sure you have bookmarked LITFL ECG library and Dr Smiths ECG blogs as 2 go-to guides).
Let's take things by diagnosis of badness.

Myocardial Infarction or ACS

The first part of your patient encounter should include taking a history. We know about history taking in suspected MI right? Chest pain, radiating to the left arms and jaw, sometimes just left arm pain….easy? Nope.

There is a great summary of the bigger published papers on predictive features here from Salim Rezaie.

In terms of history features – there is NO FEATURE that can rule in or (more importantly) RULE OUT the cause as being cardiac or non-cardiac. Reproduction with palpation is not a valid reason to not investigate someone further, neither is a history of GORD or associated belching – in fact there's some evidence out there that the presence of belching may be associated with inferior MI.
The next part of you encounter MUST include a careful look at the ECG. Getting skilled at this is important, for EM, for medicine, for life….

Make sure you know what a STEMI mimic is. You have to know these as they are the first group of patients that can really trip you up. If you don't know what Wellen's syndrome is, you need to know. You can't diagnose what you don't know. And if you don't appreciate that ST depression doesn't localise, and therefore you should be looking for the reciprocal ST elevation, then you will NEVER call it. You have to be the master of this. Check out the EMDocs' posting on these.

Once you've identified a concerning history and hopefully decided there's no active ECG changes you'll probably want to do some further tests. It is important to know what your local policy is and what risk scoring system you use, there are hundreds to choose from, but commonly used and quoted are HEART, EDACS, ADAPT, T-MACs, TIMI, GRACE etc. etc. Interestingly there is also some emerging evidence (largely from Rick Body in Manchester) about limit of detection models using a high sensitivity troponin and a normal ECG to exclude significant cardiac disease. This is a really interesting and exciting area of research but as previously mentioned, relies heavily on the ECG interpretation.

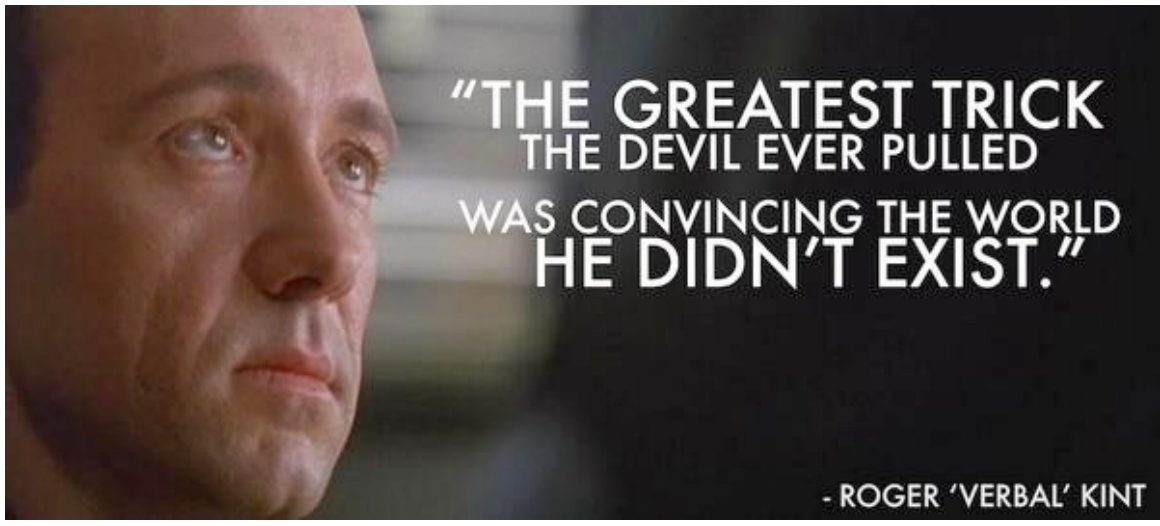
Aortic Dissection

"Remember that patient you saw on Sunday evening" - words that cause us all to feel sick to the pit of our stomachs. This is one of those diagnoses that make those words happen. ED misses these. It happens. It's devastating for the patient and family and clinician when it happens. Don't let it be you. The aorta will *%&" you up. One of the best talks from SMACC (well ever actually) is on this exact topic and I really hope you'll take the 20mins to go and listen to it.

The key learning point for me when thinking about dissection is that it can present in a multitude of ways, and the only way to diagnose it, is to think about it. I am concerned when someone has chest pain that makes them uncomfortable, not in a 'trapped wind' sort of way, but in a renal colic way. Sweating, needing lots of opiates, agitated. Patients like these need investigating.

Chest pain and limb ischemia: test them.

Dr Carr talks about the notion of chest pain +1 and this is a great mind-set to have when considering a diagnosis of aortic dissection. But remember if you don't think about it, even when its hiding in plain sight, you **CANNOT** diagnose it.



The test you want is an aortogram. This is the gold standard. I'm lucky, I'm a consultant that works in an ivory tower and can access a scan easily. I appreciate not all hospitals have this facility and ease of access. If this is your place find out how they want you to investigate, ultimately ending up at a CT –it may be a combination of Chest X-ray, D-Dimer and ECHO but please involve your senior colleagues as soon as you are considering dissection as a diagnosis.

Pulmonary Embolus

So, PE. This is a cause of great discussion on social media, in EDs and on the wards. It's probably because they kill young people. Often without warning. Patients may present with any number of symptoms including chest pain that may be constant and sharp and worse on breathing. It may not. It may cause them to have transient loss of consciousness. It may not. It may present with shortness of breath, dry cough, wet cough, haemoptysis an isolated tachycardia. It may not.

But don't worry too much.

What should you do?

First (and it goes without saying) check your department's suspected PE protocol. If they don't have one, why not write one?

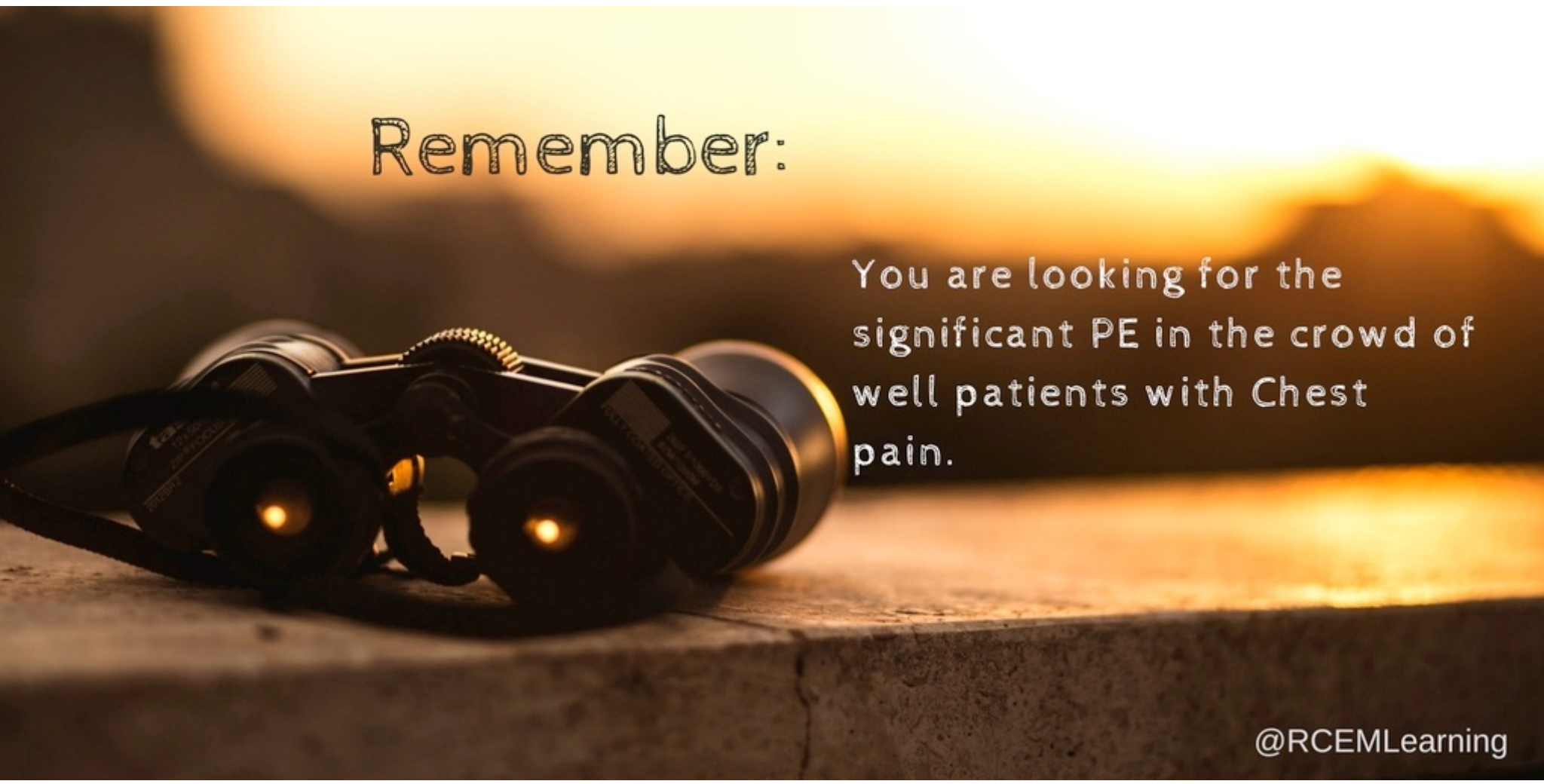
An approach that's used in lots of places is to apply the PERC criteria to patients with suspected PE. PERC works by trying and clinically 'exclude' PE by identifying those who are higher risk and also identifying those who won't benefit from further testing. I.e. we're back to the 'first do no harm' thing here.

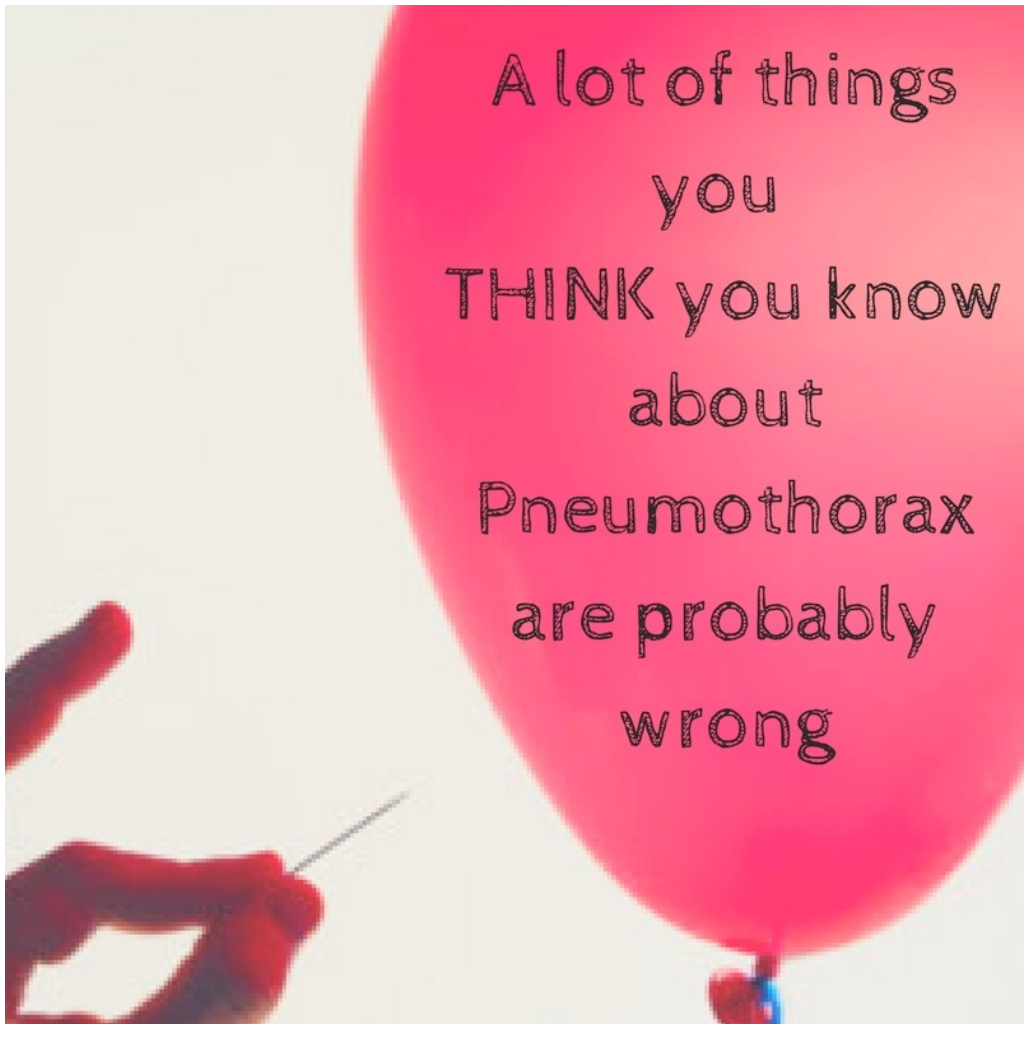
You may still miss around 1.5% of PEs.. BUT you are unlikely to miss a big one, and you are more likely to do harm by investigating further.. and the risks of false positive testing... and the harms from mis-treatment with anticoagulants.. and the 'incidental-omas'..the list goes on. (St Emlyn's have a superb piece on this)

Now an important thing to note is that the PERC negative patients have to have been assessed by the attending clinician to be low risk for PE in the first place. There is some debate about what this constitutes and a number of places I have worked have suggested that applying the Wells' score and a patient who is low risk on this is suitably and objectively deemed low risk.

Once you have deemed someone is not low risk for a PE, and you think they probably have a PE as the cause of their symptoms then depending on where you work you need to do more tests. This may include a D-dimer (depending on how not low risk they are), a Chest X-ray and then a CTPA.

Treatment for PE is with anticoagulation and in cases of instability consideration of thrombolysis – if you have an unstable patient in your department with a big PE then you MUST involve your senior docs and maybe get some help from your friendly ICU team depending on how your unit is set up. There is still some debate about who should get thrombolysis in certain circumstances, and what you're hoping to achieve by doing it – I think we're all happy in cardiac arrest and in the crashingly unstable patient but there is some debate about submassive PE (have a read of some great work here).





Pneumothorax

This is another relatively common reason for complaining of chest pain.

We all have learned the do's and don'ts with pneumothorax haven't we? The signs of a tension? The site for needle decompression in the tension situation? Course you have.

Check out the following links for the info that's needed to be real world knowledgeable on the subject:

1. Signs and symptoms in tension pneumothorax – chest pain and respiratory distress. I think of it as compartment syndrome of the chest, the patient looks scared, the patient looks sick. The other stuff, well that happens rarely – tracheal deviation <25% of cases, hyper-resonance <10%. Have a read here for the full open access article.

2. Decompression we all "know" is aimed for best with a needle in the 2nd intercostal space, mid-clavicular line right? Maybe not. I wonder if the increasing size of our population has to bear some responsibility here but have a look at this from REBEL-EM. In short, the better place is in the 4th or 5th IC space in the anterior axiliary line as you'll fail less often here. ATLS is updating their guidelines to reflect this too.

3. Diagnosis of pneumothorax is classically taught as X-ray findings and the BTS guidance talks about management based on size of the collapse at the hilar level. The emerging modality of lung POCUS should be considered as a diagnostic tool, but this is a skill to be learned and developed over time. Get your local trainers to show you how, develop some deliberate practice and go from there. These are a great set of videos to whet your appetite.

Other stuff…..

So, you have a patient with chest pain. They're in pain. Proper pain. But its none of these conditions. What else could be going on?

1. You're wrong and they have one of these conditions. Honestly, if a patient is telling you something is seriously wrong, believe them, get a senior review, challenge your diagnostic biases.

2. It could be shingles. Neuropathic pain from shingles can present after the rash or without the rash entirely. It can be really painful so if the pain is in a nerve root distribution then have this near the top of your working differentials.

3. Pain that radiates from the back or to the back could be from the thoracic spine. Be suspicious of this and examine carefully in the elderly (fragility fractures, myeloma), those with a history of cancer (mets) and those with a history of fever (discitis, TB, epidural abscess).

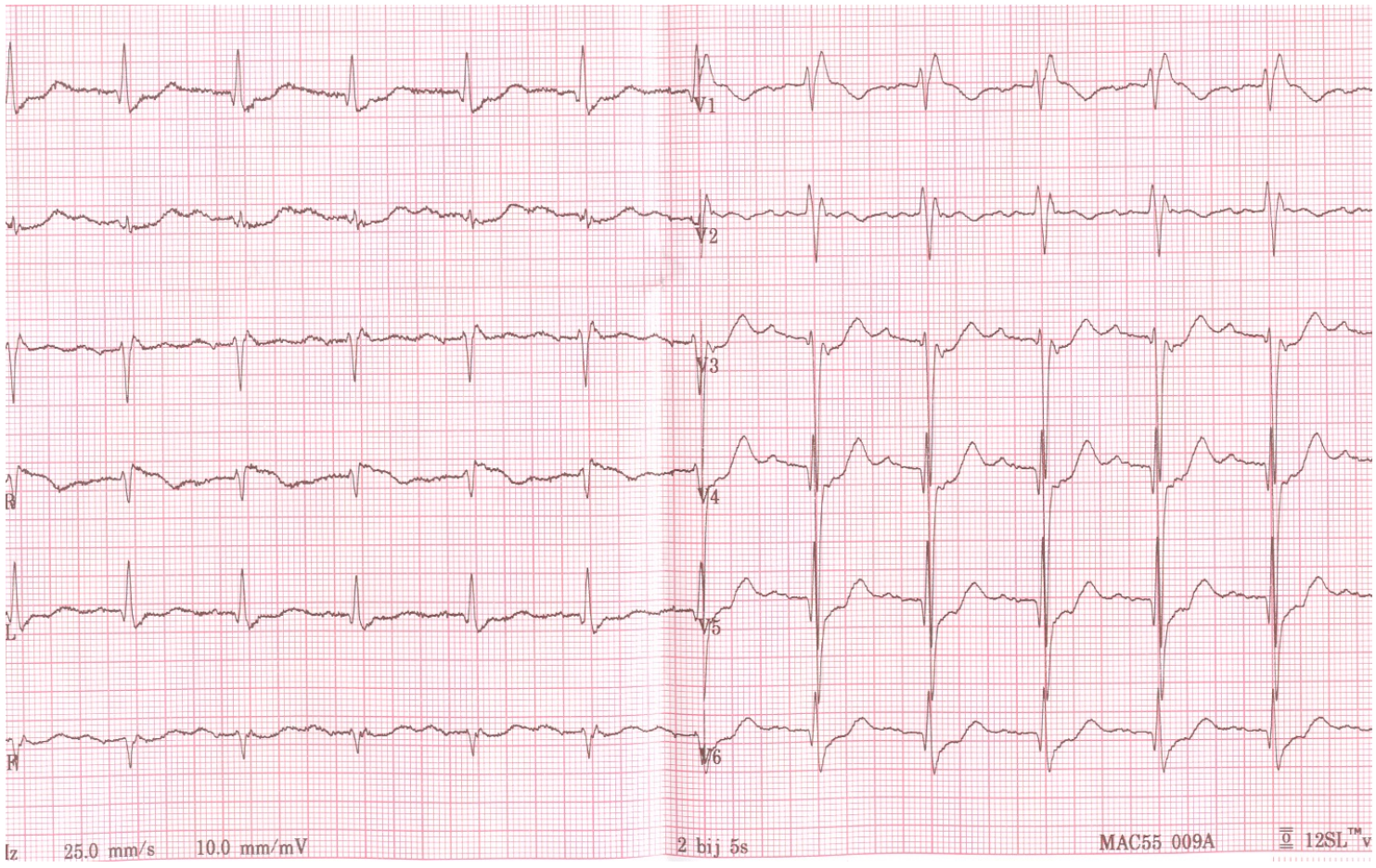
4. Be really cautious about making a diagnosis of 'musculoskeletal chest pain' in someone without a history that fits, i.e. if they weren't at the gym working the pecs the day before then don't go for it. You'll trip up eventually and the consequences could be disastrous!

This is a really brief run thorough of the challenges around diagnostics in chest pain. It's a really common reason to come to ED and some of the potential differential diagnoses are life threatening. If in doubt when assessing your patient ask. Remember the RCEM standard that anyone >30 with chest pain you want to discharge should be discussed with an ST4+ prior to discharge. Don't neglect this. Most importantly enjoy your time in ED, you'll learn more with us, see more, do more than in any other job you do. Promise.

DOCTOR CAN YOU CAST YOUR EYE OVER THAT ECG FOR ME?

Author: Nikki Abela / **Codes:** CAP5, CAP7, CAP12, CAP25, CAP32, CAP7, CC5, CMP5, HAP23, HAP25, HAP5, HAP8, HMP4

Doctor can you cast your eye over that ECG for me?



Trifascicular block.

IT'S A PHRASE YOU'LL COME TO KNOW WELL

It's a phrase you'll come to know well. Especially, you'll find, if you're sitting at a certain desk or in a certain area.
It's a phrase which at first may fill you with dread, but with a simple system, you will find you will soon become expertly efficient at picking out obvious problems.

Never say no unless you are in the middle of something important and stopping for a few minutes will be detrimental - it is important that we support whoever is tasked with needing to ask for ECGs to be checked and this is a great learning opportunity for you as you will always have someone to ask if you're not sure. Do remember though, to look at the ECG properly, and not to trust the computer read out!

This "safety-net" of getting doctors to check ECGs is a bone of contention for many senior doctors as it takes up a fair bit of time - but that is not for you to worry about, but it's so important that in some trusts, only senior doctors can do this.
The system of checking ECGs is primarily there to make sure we don't miss that all important STEMI that needs urgent transfer for primary PCI. But if you're only looking at the ST segments on ECGs in this "quick look", you're definitely missing a trick. Always ask or check the triage sheet for the presenting complaint - it will give you an idea of what you should be looking out for. In a patient with chest pain, for example, those ST segments are all the more important, in a patient who has taken an overdose, think about checking the QT and QTc, and in a patient with suspected sepsis, that new fast AF may be even more important.

There is a great summary of the bigger published papers on predictive features here from Salim Rezaie.

Look at the Rate

It's so basic isn't it? I'm not going to go into how to read ECGs medical school style though - if it's fast and they are in an irregular rhythm, or even regular (SVTs, for example), ask for a monitored bed and cast your eye over the patient. It's likely they need prioritising, either to have their rate/rhythm dealt with, or the underlying cause treated (think of sepsis, for example, where there is some good evidence that patients may not benefit from rate or rhythm control). In this time of departmental crowding, monitored beds may be hard to come by - cast your eye over the patient, and make sure the coordinating senior knows about the patient, so they can juggle beds as needed.

It may be slow, in which case they are even more likely to need a cardiac monitor, unless they are the "goes to the gym regularly" prototype. These patients are likely to need to be in resus, on the defibrillator, especially if they have adverse features (shock, syncope, chest pain or symptoms of heart failure). Ask for senior input early.
The rate may be normal, and so may the rhythm, but they may still have worrying features - like heart block greater than the first degree or trifascicular block (1. Prolonged PR, 2. Left anterior or posterior fascicular block, 3. RBBB, in case you were wondering) - so they are going to need that monitored bed and alarms should be going off in your head if their triage note says "collapse ?cause".

Check the QT and QTc

Sadly, we see a fair share of overdoses in the ED and when an ECG is shoved under our noses, we may not be aware of the presenting complaint. Most drugs and electrolyte deficiencies prolong the QT and QTc, digoxin and hypercalcaemia shorten it. If it's prolonged, especially in an overdose or patient with electrolyte deficiencies, this needs to be picked up for them to be treated asap. If the patient's rate is fast, don't trust the computer calculation of the QTc.

And of Course, Check Those STs

Yep, the ST segments have started the trend for checking ECGs, so don't neglect them. If they are elevated, go to see the patient straight away. Remember, time is myocardium so the quicker they get that PPCI, the better their outcome. Don't know how to get them this? Your hospital will have a policy, I'm sure.

Remember, that not everything that doesn't look like a STEMI isn't, and you need to know your atypical STEMI patterns and STEMI equivalents (do check the hyperlink for a super blog by emDOCs). If you're seeing a strange ST pattern, don't be afraid to google what it looks like if it reminds you of something but you can't remember what. I have often found myself googling "sinusoidal T-waves" to jog my memory about Wellen's syndrome, or looked up Brugada syndrome, if I'm worried my patient's ECG looks somewhat similar.

Life in the Fast Lane has an excellent ECG library that is very handy to reference. If you haven't come across it by now, you're going to kick yourself for spending medical school without it. If you want to scare yourself, look at their "Killer ECG patterns" post!

If the ECG just looks ischaemic, and the patient is in pain, do go and give them analgesia and get them prioritised - just because they aren't going for PPCI, doesn't mean they aren't having an MI.

When in Doubt, Check the old ECG

If you have easy access to old ECGs, do compare worrying signs with old ones as generally speaking, if they were there before, you likely don't need to worry as much. We should probably all give patients copies of their ECG, especially if they're abnormal. They can take a picture on their smart phone, then any doctor can easily compare ECGs. When you see a patient who doesn't have an old ECG to compare to, let that be a reminder to give them a copy!

If the ECG Analyser says normal sinus rhythm (NSR) - it probably is

There's an old adage that we shouldn't look at the analyser comments on ECG as it will bias our interpretation. However, emerging evidence shows that if it says NSR, it probably is NSR.

That is, until it isn't. You don't want to be the exception to this rule, so if you follow these simple steps, it is likely that you will be safe.

Remember, when someone asks you to "cast your eye over an ECG", it is not to check for the small nuances on the tracing, but rather to pick up issues that need prioritising. So don't sweat the small stuff, use this exercise as a valuable tool to become excellent at spotting the "sick ECG" - if in doubt, cast an eye on the patient, and speak to a senior.

TLOC

Author: Tania Minns / **Codes:** CAP15, CAP32, CAP5, HAP35, HAP5

VERY VARIED

This is a very common but also very varied ED presentation. A triage of "collapse ?cause" can mean anything from a young patient having fainted in phlebotomy to an elderly patient being found on the floor.

We probably all have a gut feeling that the second patient is higher risk for having had a potentially serious event but do you know who to investigate, who is high risk and who needs admitting? What about Bessie who collapsed after standing from the dinner table, Fred who woke up on the floor after going to the bathroom in the middle of the night or Tom who collapsed at the gym? Unfortunately the guidance out there is based mainly in expert consensus as there is a limited amount of evidence on this topic.

The first thing to do is to determine whether your patient has actually had a transient loss of consciousness (TLoC) or is there another serious condition accounting for a loss of consciousness e.g. pulmonary embolism, gastro-intestinal haemorrhage, sub arachnoid haemorrhage, ruptured ectopic pregnancy etc.

A useful definition of TLoC for this purpose is:

A loss of consciousness of rapid onset, short duration with spontaneous complete recovery

If your patient has still not returned to their baseline at the time of your assessment or has required some resuscitation you need to start thinking about other pathologies.

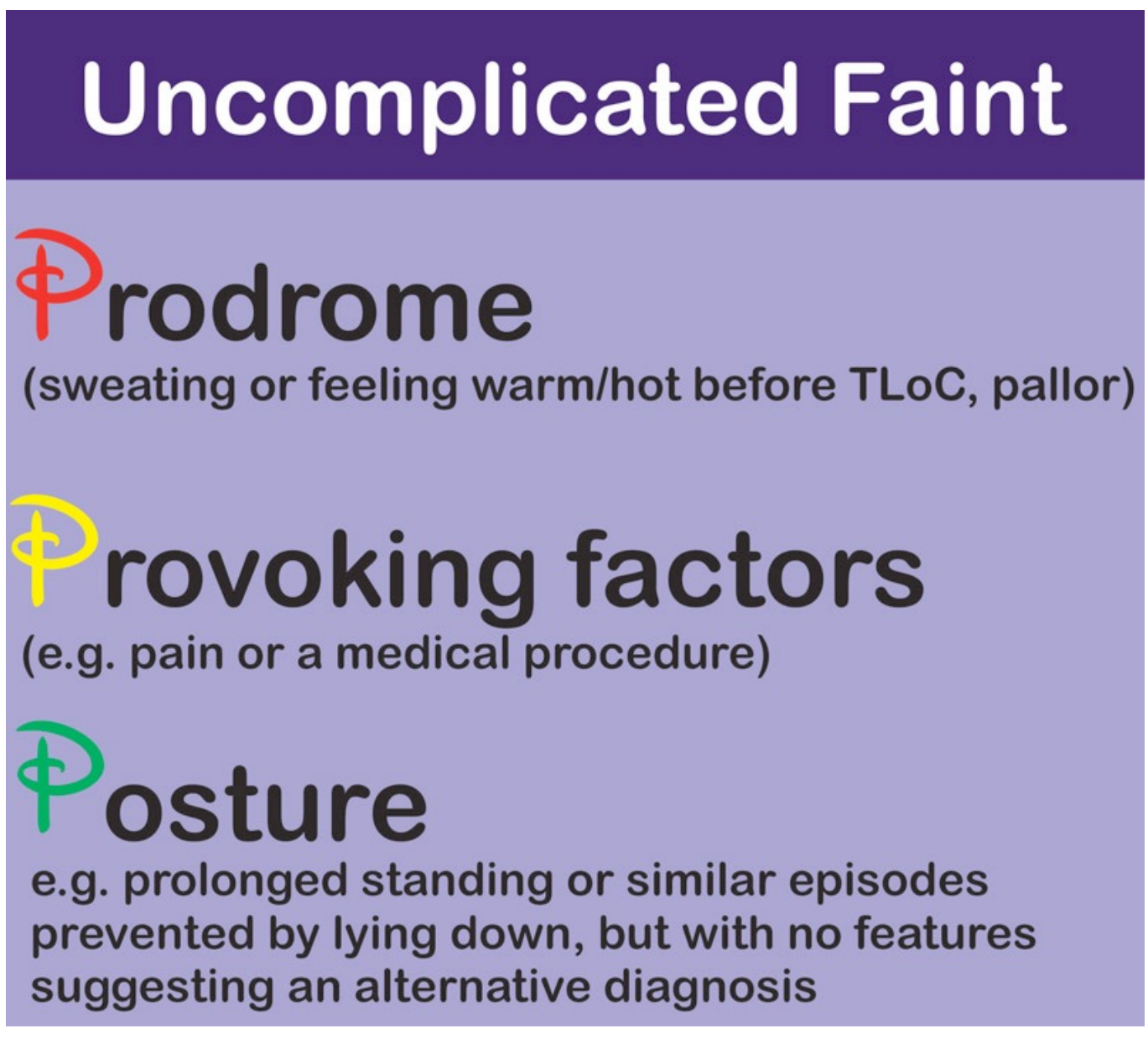
All patients require a thorough history, examination and ECG (lying and standing BP is also useful if it sounds orthostatic). Based on these you will probably be able to ascertain a diagnosis in about half of your patients.

They can be put into one of 5 categories:

1. Neurocardiogenic (vasovagal): including situational e.g. micturition/cough syncope- low risk
2. Orthostatic: beware a postural drop can occur in cardiac causes of syncope too
3. Neurological: least common
4. Cardiac cause: most likely to be life-threatening- 30% increase in risk of sudden death within 1 year
5. Unknown cause: these patients have a 30% higher mortality than in those who have not had a syncopal episode

Patients who may have had an uncomplicated faint include those with the 3 P's:

A Prodrome (sweating or feeling warm/hot before TLoC, pallor), Provoking factors (e.g. pain or a medical procedure) or associated with Posture e.g. prolonged standing or similar episodes prevented by lying down, but with no features suggesting an alternative diagnosis (see box 1). It is important to note that brief seizure-like activity can occur during an uncomplicated faint. If these patients have normal vital signs and examination, they can probably be discharged with safety netting advice and no further investigation.



·A bitten tongue
·Head-turning to one side during TLoC
·No memory of abnormal behaviour that was witnessed before, during or after TLoC ·Unusual posturing
·Prolonged limb-jerking
·Confusion following the event
·Prodromal déjà vu, or jamais vu [1.2.2.1]

BOX 1: NICE GUIDELINES CG109

If any features from box 1 are present consider a seizure as the cause for the TLoC and follow your local guidelines/referral pathways as appropriate. The trickier patients are ones without the 3 Ps or features suggestive of a seizure - in these patients you need to consider the possibility of a cardiac collapse. The NICE guidelines (CG109) list some red flags to help guide you as to which of these patients need an urgent cardiology assessment, these include:

1. ECG abnormalities (see box 2)
2. Heart failure (history or physical signs)
3. TLoC during exertion (note TLoC AFTER exertion more likely to be vasovagal)
4. Family history of sudden cardiac death aged 65 year olds

These patients require assessment for a structural or arrhythmic cause for their TLoC and will therefore need assessment by a cardiologist and likely an echocardiogram and/or ambulatory monitoring. Some hospitals have rapid referral pathways, dedicated clinics or observation units for these patients as inpatient assessment is not always required and often leads to a lot of expensive tests without an increase in diagnostic yield.

If we apply the above reasoning to the patients in the first paragraph, the young patient who collapsed after having blood taken in phlebotomy is likely to have had a simple faint and can probably be discharged, the elderly person found on the floor needs a bit more of a workup, it could be cardiac.

On automated interpretation: conduction abnormality, long or short QT, any ST segment or T wave abnormalities.

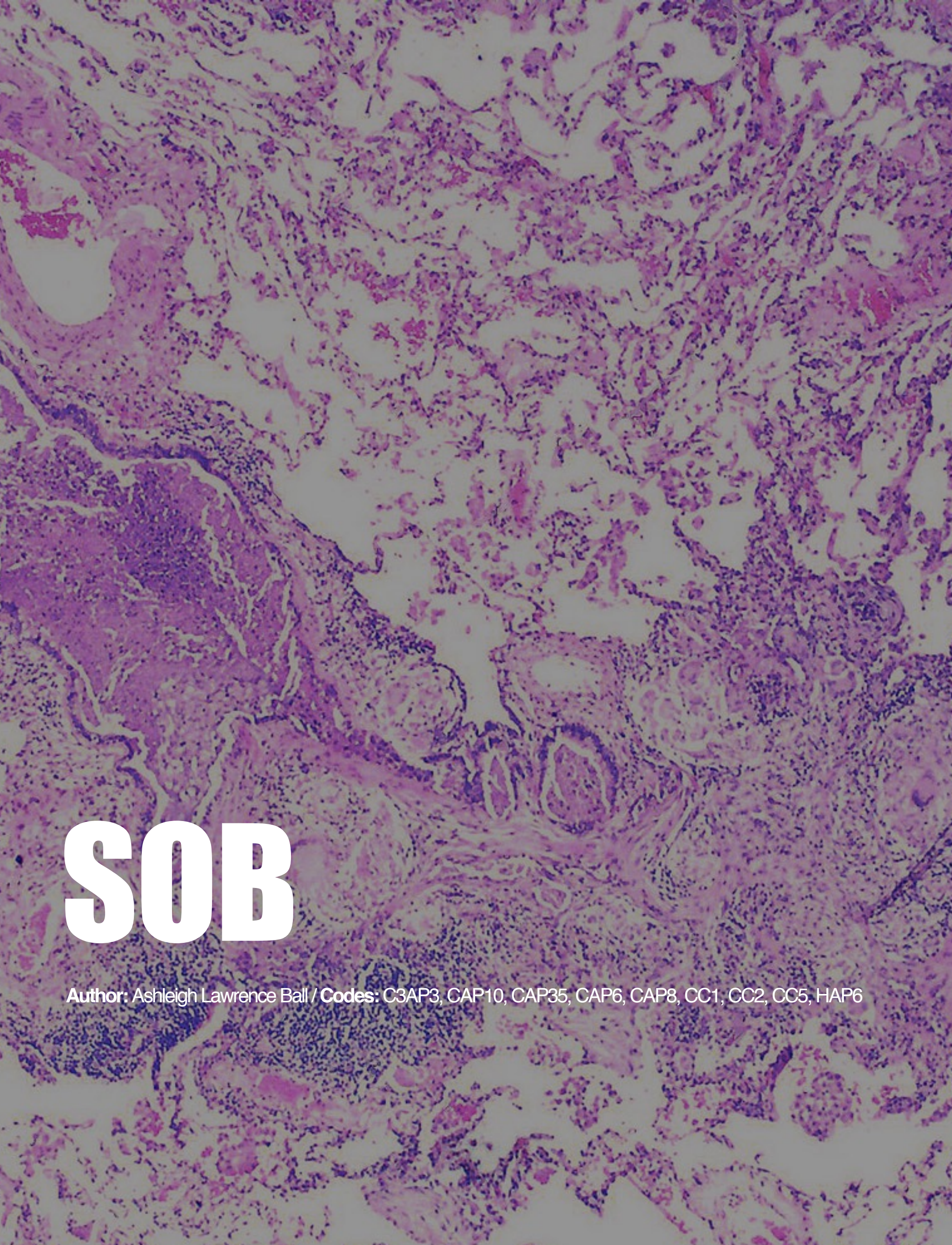
If not automated, manually review for: inappropriate persistent bradycardia, any ventricular arrhythmia, Long QT (corrected) over 450ms or short QT (corrected)<350ms, Brugada syndrome, ventricular pre-excitation (e.g. WPW), LVH/RVH, abnormal T wave inversion, pathological Q waves, sustained atrial arrhythmia, paced rhythm.

BOX 2: ECG ABNORMALITIES

this before, or Bessie's family state she went pale, complained of being hot and dizzy and then collapsed your assessment of their level of risk and your decision making becomes much easier.

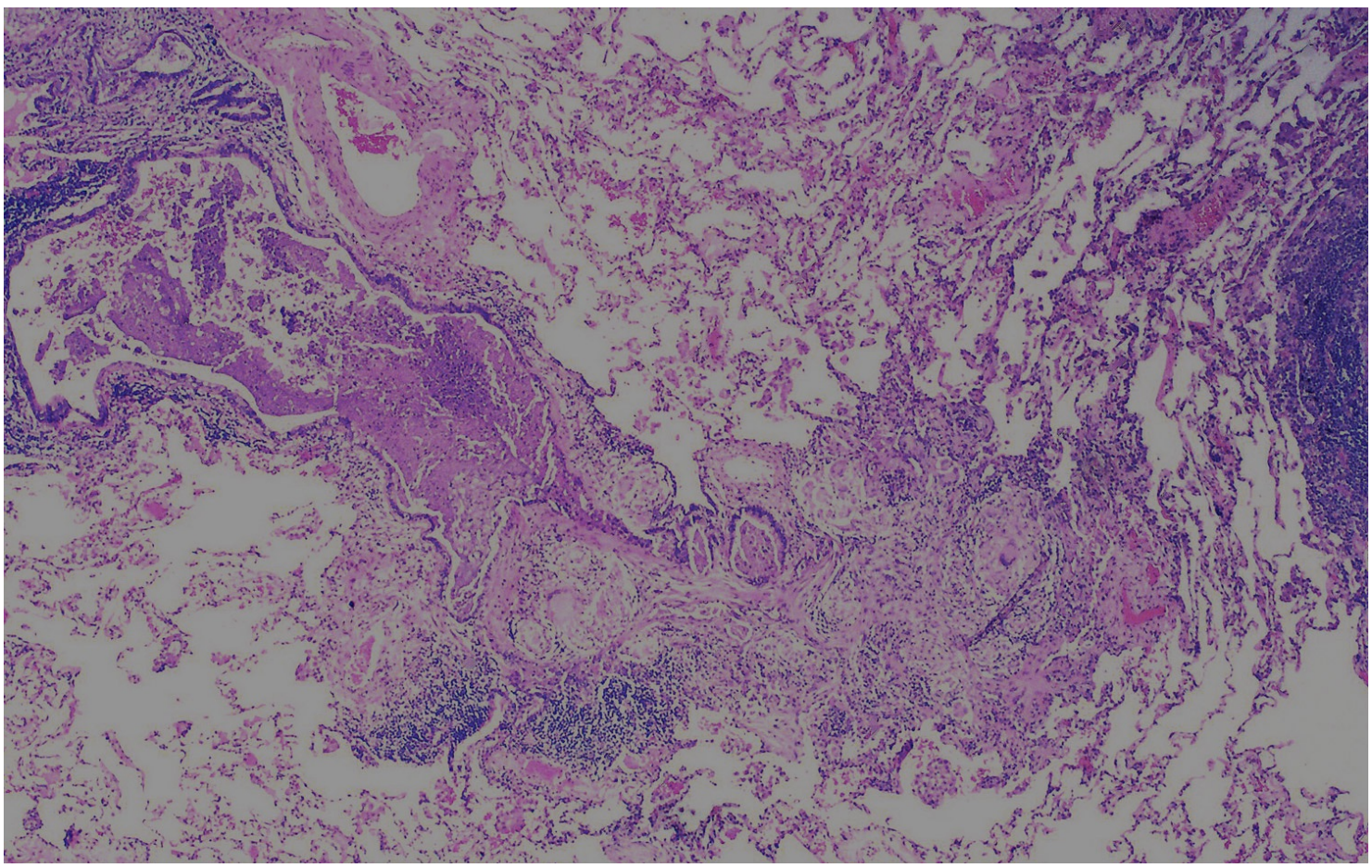
In summary, this can be a challenging presentation with a range of causes from the benign to life-threatening. Remember an ECG in all patients, a collateral history is always helpful and may provide your diagnosis, if in doubt the NICE guidelines Transient Loss of Consciousness in over 16s (guideline CG109) and local or departmental guidelines are good ports of call if you get stuck.

Good Luck.



SOB

Author: Ashleigh Lawrence Ball / **Codes:** C3AP3, CAP10, CAP35, CAP6, CAP8, CC1, CC2, CC5, HAP6



IT'S 5 AM

It's 5am, the pre-alert phone rings. The ambulance service are bringing in a patient with acute difficulty in breathing. From the observations you're given, the patient sounds sick. ETA: 5 minutes. What goes through your mind?

Acute shortness of breath can be due to number of causes – are the lungs full of fluid or thick infected phlegm? Is there life-threatening bronchospasm? Do you need to call ITU or can this patient be managed in a ward-based environment? Let's consider a general approach to shortness of breath in the ED and then the specific management of two of the commonest causes of acute dyspnoea – COPD and acute asthma.

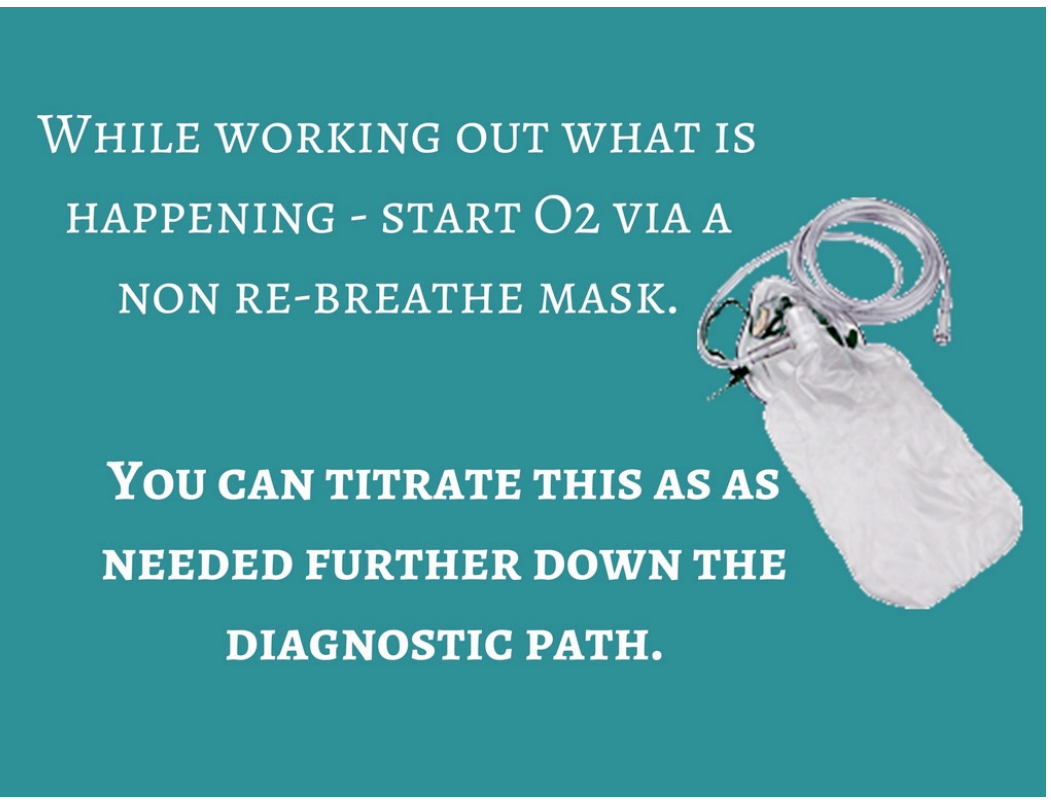
A General Approach

Difficulty in breathing is a non-specific symptom, and although we tend to immediately blame the lungs, there is a myriad of non-respiratory causes to consider. A good history and examination will help you to elucidate the cause – often easier said than done when the patient is in resus in extremis!

It's an old trope by now, but it works – start the assessment of all sick patients with an evaluation of the ABCDEs. This helps prevent bias from tunnelled vision – a problem can cause the perception of shortness of breath but may only be fixed by treating the underlying cause – for example, a partial airway obstruction may result in shallow breaths and use of accessory respiratory muscles or diabetic ketoacidosis will cause Kussmaul's respirations in order to compensate for the metabolic acidosis.

OXYGEN

A venturi mask is often the best way of doing this – The BTS oxygen guidelines (which we have gone over in a podcast) give you some tips on how to do this. Remember, hypoxia kills before hypercapnia. Do not be reluctant to put oxygen on – you can always turn it down once you've got some more information, but be aware that the oxygen may be the culprit if they start becoming drowsy.



Oxygen saturation monitoring will give you an idea of oxygenation but will not tell you about ventilation. An arterial blood gas may just change what you're going to do. Review the results carefully before labelling any changes as "chronic" – we've all been caught out, and any significant acidosis will be new.

Be judicious with fluid – acute pulmonary oedema may be the cause of the dyspnoea. Conversely, sepsis or metabolic derangement can result in tachypnoea – this may need large amount of fluid to stabilize the patient. Overload can occur, even in patients with previously normal LV function and may just make treating the patient that little more complicated. Make a careful assessment of the patient's fluid balance status and if you're not sure, give small but effective boluses and review the response.

Consider antibiotics in all patients with a cough or fever presenting with shortness of breath but remember that severe sepsis from any source (not just pneumonia) can cause difficulty in breathing and an oxygen requirement.
If your patient is tiring, or not oxygenating or ventilating adequately despite aggressive resuscitation, it is probably time to call your intensive care colleagues to consider invasive and non-invasive ventilation strategies.
We're now going to talk in a bit more detail about some of the more common causes of shortness of breath.

COPD

NICE define an exacerbation of COPD as "a sustained worsening of the patient's symptoms from their usual stable state which is beyond normal day to day variation and acute in onset."

We see many patients who attend the emergency department with an exacerbation of their COPD. They normally present with a worsening cough, shortness of breath, increased sputum production or a change in sputum colour. On examination, they are often wheezy, but may have areas of reduced air entry due to gas trapping or bullae. Arterial blood gas sampling may show hypoxia with or without hypercapnia.

The majority of these patients can be managed with simple measures. Standard medical treatment for these patients is – controlled oxygen to maintain saturations between 88-92%, nebulised salbutamol 2.5-5mg and ipratropium 500mcg (driven with air rather than oxygen), prednisolone 30mg and antibiotics if they report that their sputum is more purulent, or you suspect pneumonia. NICE has clear suggestions for when people can be treated at home with their exacerbation:

If oxygen is required to maintain an SpO2 of 88-92%, you can use nasal cannulae underneath the nebuliser mask. Nebulisers requires flow rate of 6-8l/minute, which may be too much oxygen in a subset of patients.

Non invasive ventilation (NIV) should be considered within 60 minutes of arrival to hospital in all patients

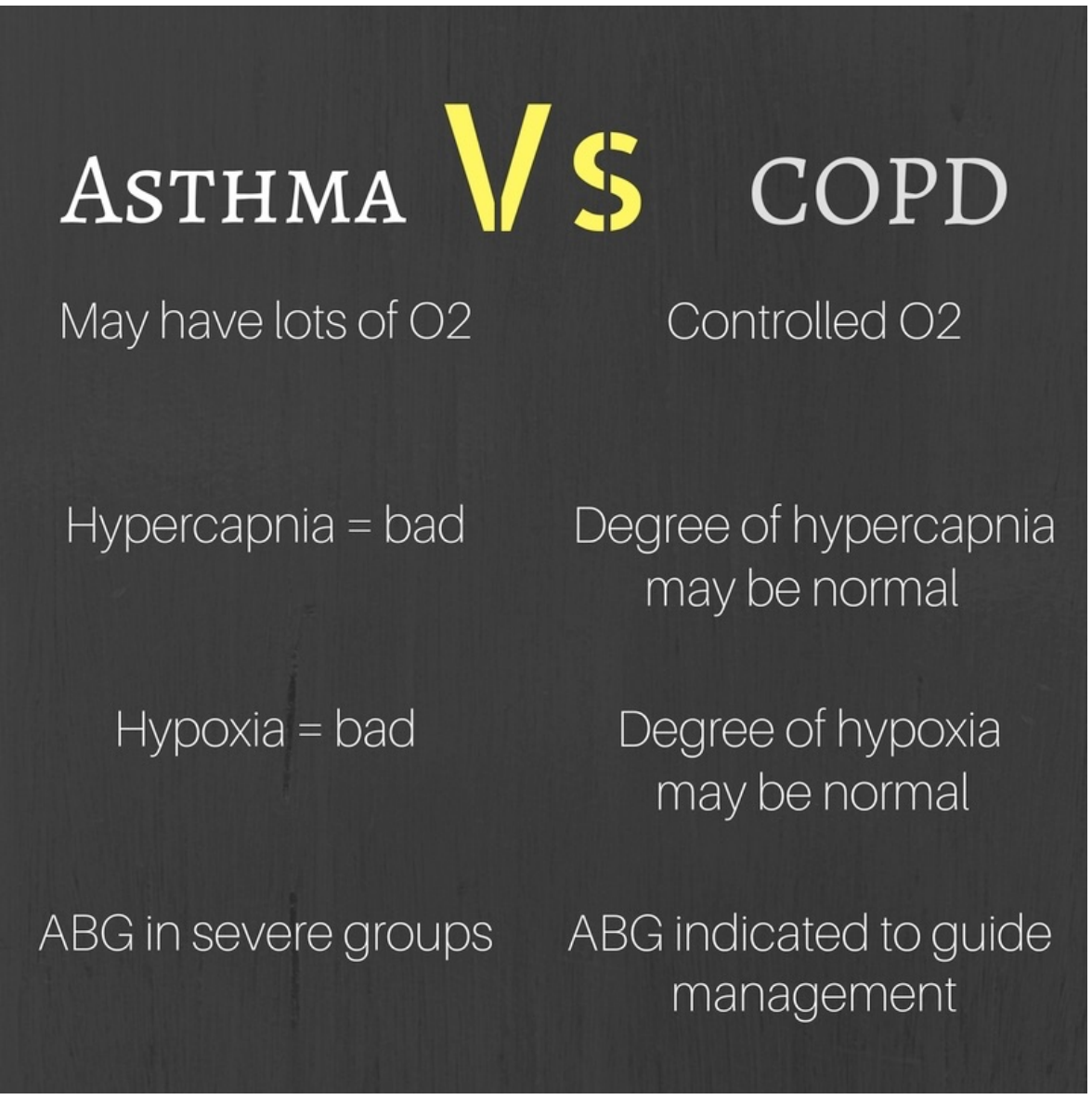
Factor	Treat at Home	Treat in Hospital
Can cope at home	Yes	No
Breathlessness	Mild	Severe
General Condition	Good	Poor/deteriorating
Level of activity	Good	Poor/confined to bed
Cyanosis	No	Yes
Worsening Peripheral Oedema	No	Yes
Level of Conciousness	Normal	Impaired
Already on LTOT	No	Yes
Social Circumstances	Good	Living alone/not coping
Acute Confusion	No	Yes
Rapid rate of Onset	No	Yes
Significant Comorbidity	No	Yes
Sats <90%	No	Yes
CXR changes	No	Yes
Arterial pH	>7.35	<7.35
Arterial PaO2	>7kPa	<7kPa

with an exacerbation of COPD and a persistent respiratory acidosis (pH <7.35 and PaCO2 >6 kPa) in whom medical treatment is unsuccessful. Many hospitals would require you to speak to a senior before commencing this. Repeat your arterial blood gas an hour after starting NIV, to see how treatment is helping. Patients with COPD need bilevel positive airways pressure (BIPAP) so you need to set the expiratory positive airway pressure (EPAP) and inspiratory positive airway pressure (IPAP). The British Thoracic Society recommend a starting EPAP of 4-5cmH20 and IPAP of 10.

Some patients will need a direct referral to ITU for consideration of intubation and mechanical ventilation. These patients are often very acidotic, very hypercapnoeic and too obtunded to protect their airway during NIV or too agitated to tolerate the tight

fitting facemask required for effective treatment. You should also consider asking ITU to review any patient with a pH of <7.26 as studies suggest they have a high failure rate for NIV and require earlier mechanical ventilation.

All patients starting on NIV should have a clear escalation plan documented in case they continue to deteriorate.



CXR = only if suspect pneumomediastinum, pneumothorax, consolidation, life threatening exacerbation, ventilation requirement, or failure to respond to treatment.

Finally

Don't forget to take a breath yourself! Patient's presenting with shortness of breath will be anxious and their anxiety makes their shortness of breath worse. If you stay calm, they'll relax (at least a little) and you'll give yourself time to think. The first steps are always the same – give high flow oxygen and assess the ABCDEs. Stabilise the patient and then you can worry about the rest.

Further reading:

RCEM reference section on breathlessness
RCEM breathlessness learning module

SEPSIS

Author: Yvette Ruddock / **Codes:** CC14, CC1, CC2, CC4, CC5, PMP5

RCEM Sepsis Standards

Observations:	Temperature, PR, RR, BP, Mental status, BM recorded on arrival.
Review:	Senior EM review within an hour
Treatment:	High flow O2 before leaving ED. 20mls/ kg fluid - 75% within an hour of arrival, 100% before leaving ED. Antibiotics - 50% within an hour, 100% before leaving ED.
Investigations:	Lactate, blood cultures before leaving the ED
	Urine output measured before leaving the ED.

It's worth mentioning that RCEM has sepsis standards and we should aim to meet them in 100% of cases! The standards for patients with sepsis and sepsis shock are in the image on the left:

SEPSIS IS A KILLER

Sometimes as a doctor it can feel as though everyone has 'sepsis' and the term is often bandied about. But this is with good reason. Sepsis is a killer. A major cause of morbidity and mortality. It is not discriminatory. It affects the young, the old.

Those previously fit and well with no risk factors who are suddenly in ITU after being struck down seemingly unluckily and out of nowhere. Sepsis is so important that the RCEM has an entire page about it!

There has been much research and focus into identifying and treating sepsis early. For someone in septic shock it has been shown that mortality shoots up compared to someone with sepsis. It has also been shown that prompt identification and timely administration of antibiotics and other treatments can reduce the mortality and save lives. For every hour that appropriate antibiotic administration is delayed in those with septic shock there is an 8% increase in mortality. So simple eh? Lets get out there and treat.

But hang on…not so simple as sometimes sepsis isn't easy to recognise. As a new doctor to the ED guidelines and tools are your friend. They will help you as you develop your experience. I know as a doctor who has worked on the wards previously you will understand that you identify sepsis, use your hospital formulary to prescribe the correct antibiotics and give other treatments including fluids and oxygen (if needed). This blog will talk more about how to recognise sepsis and use newer guidelines to ensure your management is correct.

Identifying Sepsis
When I was what was deemed a "house officer" back in 2012 we learnt about SIRS (systemic inflammatory response syndrome) criteria:

- **WCC <4 or >12**
- **HR >90bpm**
- **RR >20min**
- **Temp >38oC or <36oC**

And we learnt that sepsis was defined as SIRS with presumed infection which is a really important point to make, as without it, it can be difficult to use SIRS to pick out those with sepsis as many other conditions cause a SIRS response such as a pulmonary embolism, pancreatitis or even self limiting viral infections. RCEM sepsis guidelines, and the surviving sepsis guidelines still recommend the use of SIRS criteria to identify sepsis, and then they offer guidance on severity gradings.

Some studies have confirmed the SIRS criteria are non specific for identification of sepsis. They suggest using a “SOFA” (sepsis related organ failure assessment) score where a changing score of > 2 = mortality of 10%. The qSOFA is a quick bedside alternative, but this has not made its way into national guidelines because it is a tool for prognostication, not identification. (If you want to hear more about this, then listen to The Resus Room podcast on Sepsis).

- **The qSOFA takes into consideration 3 things: (think BAT)**
- **BP <100**
- **AMS (acute confusion as suggested by the AMS score)**
- **Tachypnoea with RR >22**

Recently NICE in 2016 have brought out new guidelines for identifying and treating sepsis. They recognise that diagnosing sepsis is difficult. They write:

"The signs and symptoms of sepsis can be very nonspecific and can be missed if clinicians do not think 'could this be sepsis?'. In the same way that healthcare professionals consider 'could this pain be cardiac in origin?' when presented with someone of any age with chest pain this guideline aims to make 'could this be sepsis?' the first consideration for anyone presenting with a possible infection".

There are just three things that NICE want us to do:

1. **Think, could this be sepsis? And have a low threshold for considering sepsis.**
2. **If it could be, make an assessment and recognise that some people are more at risk of sepsis than others.**
3. **Investigate, or manage and treat according to the traffic light system.**

It’s worth mentioning here that neutropenic sepsis often presents atypically, and guidelines suggest treating any unwell patient at risk of neutropenia as neutropenic sepsis until proven otherwise – get the antibiotics in even if the patient is afebrile. These patients include those who have had: chemotherapy within 6 weeks, haematological malignancy, bone marrow failure or transplant or splenectomy.

Investigations for Sepsis

The investigations for sepsis will depend on which guidelines you use, and whether your patient is low risk or high risk. In the majority of cases, you will manage and treat without waiting for the results of your investigations – but that doesn't mean you don't need to investigate these patients.

Start with the “taking” part of the sepsis six – take a lactate, take blood cultures, and take note of the fluid balance status of the patient.

Most guidelines also suggest that patients with any high risk factor should also have an FBC, U&E, creatinine, clotting and glucose – you will find you will be doing this for the patient anyway.

Other investigations to identify the source of the sepsis should also be considered – this might be a urine dip, a chest x-ray, or sputum cultures.

Treatment of Sepsis

The first priority in the treatment of sepsis is the "give" part – give IV fluids, give antibiotics and give oxygen if needed.

This is where you can make a real difference to your patient's care. If the patient's lactate (which should be back now, as you've almost certainly got point of care testing) is 2-4, they need an IV fluid bolus within an hour. The best way of ensuring this happens? Give the fluid yourself. If you don't know how to run fluids through, ask one of the nurses in your department -they'll be more than happy to show you how to do it. If your patient has sepsis, give them a proper fluid challenge – there is no point giving one litre of saline over four hours. 500ml over 15minutes, as per ALERT, is reasonable – these patients probably need more fluid. If you're hesitant to give too much fluid, especially if the patient also has signs of pulmonary oedema, get a senior involved early.

Next step is antibiotics, which also need giving as soon as possible. Most departments I've worked in seem to give anyone who triggers the sepsis criteria antibiotics whilst we're waiting - NICE have specified who they want us to be given antibiotics straight away to, and who we can wait a bit longer for and perhaps wait for some investigations to come back. The flow chart goes through this nicely.

Remember to check the allergy status before giving your patients antibiotics, and to follow your local guidelines as to which antibiotics are indicated.

Constant Review

All the guidelines emphasise that patients need reviewing regularly. If they are not improving, or are high risk, they need reviewing by a senior doctor. This means that you must get the ED registrar or consultant to review your patient, and check everything that can be done, is being done.

If your patient isn't improving, critical care may need to be involved. Typically, this will be if your patient isn't responding to fluids, and needs inotropic support or if they have a low GCS, or if they are needing ventilatory support – if your senior reviewer feels the patient is heading towards critical care, get them involved sooner rather than later.

Standards

It's worth mentioning that RCEM has sepsis standards and we should aim to meet them in 100% of cases! The standards for patients with sepsis and sepsis shock are:

RCEM Sepsis Standards	
Observations:	Temperature, PR, RR, BP, Mental status, BM recorded on arrival.
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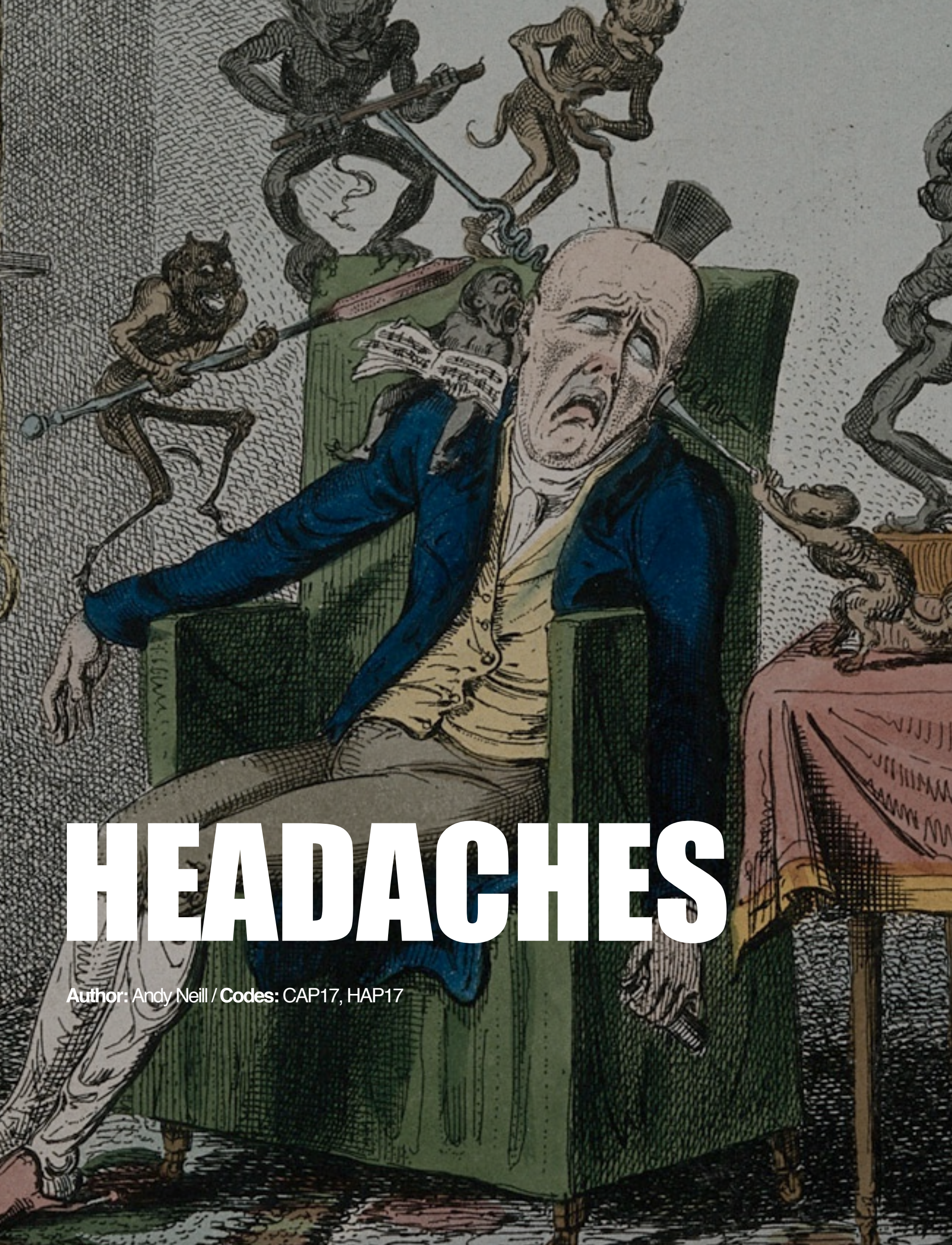
Investigations:	Lactate, blood cultures before leaving the ED
	Urine output measured before leaving the ED.

Further Reading:

RCEMLearning Recognising Paediatric Sepsis
RCEMLearning Sepsis Guidelines
The Resus Room: NICE Sepsis 2016



HEADACHES

Author: Andy Neill / **Codes:** CAP17, HAP17

As always there's a mnemonic.

SNOOP

HAVE A LIST OF POTENTIAL DIAGNOSIS IN YOUR HEAD

This is a hugely common presentation in the ED and often one many doctors try to avoid. Many of us love the "juicy minor" (a great term, kudos to my former colleague Zeshan Ali) - the minor injury with a clear pathway of what to do.

The patient fell hurt this bit of their limb and you do a pokey pokey at the sore bit and do an X-ray. You check to see the radiographer hasn't put a red dot on it and give the patient the wonderful news that their appendage isn't broken. They feel satisfied that they've had a doctory experience and more importantly you feel you've done a good doctory thing.

Contrast that with the headache. Most of them are miserable, so they're grumpy and fed up and they've probably already taken some paracetamol and an NSAID so immediately your go to feel good options are gone...

Headache is also a presentation which is dominated by symptoms rather than signs. Patients will tell you all manner of things about their headache (in great detail if you ask the right questions) but rarely will you be able to demonstrate anything on exam that might make this an easy sell for a CT or an admission.

Remember this is one of our key fall back positions in EM when encountered with something difficult - we make it an SEP - Somebody Else's Problem. Thus absolving the doctor involved of any responsibility to work out what's actually going on... this is usually a turn to the dark side in EM so beware of it.

We also don't have a nice easy test that we can bounce the decision to. While the CT may have become the ankle X-ray of headaches it actually isn't much use in making a diagnosis for the vast majority of ambulatory headache patients.
So this is where we're at. This is why the headache intimidates some of the new (and occasionally old) folk in the ED. We've a patient with miserable symptoms often resistant to our default paracetamol/ NSAID. We have lots of symptoms and no signs and no clear way to make it an SEP. They're expecting to feel better and they're expecting an answer.

First we need a list of ideas. Before you go in the room have a list of potential diagnoses in your head and then question your way through them.

Differential

Common and benign

- **tension headache**
- **migraine**

Common(ish) and serious

- **SAH**
- **meningitis**
- **temporal arteritis**
- **glaucoma**
- **carbon monoxide poisoning**
- **Venous Sinus Thrombosis**

Uncommon and serious

- **dissections**
- **tumours**
- **Pseudotumour cerebri (or whatever it's called these days...)**
- **clusters**
- **low CSF pressure headache**
- **Sheehan's syndrome**
- **(consults wikipedia for increasingly obscure causes of headache...)**

For lots of these, especially the uncommon ones, we won't be able to make the final diagnosis in the ED. But remember that's not what we have to do in ED - we need to pick up immediate life threats and know when to refer the others.

This is where 'red flags' come in.

Red flags first became a thing (I think) for low back pain. Components in the history that suggest the possibility of more serious disease. 90% of people will have an episode of low back pain in their life. The vast majority are completely benign. But there are some patterns of presentation that should ring alarm bells and we call these red flags. For example in someone with severe back pain and urinary incontinence we worry about cauda equina syndrome. For someone in their 80s with a history of breast cancer and new back pain we worry about metastatic spread.

There are a variety of red flags for headache and focussing your history on these is a great way not to miss anything important

SNOOP

As always there's a mnemonic

(note that many of these aren't particularly evidence based but you're just starting in the ED so worry about the EBM a bit later)

S - Systemic symptoms:

- people often feel quite muzzy with a headache and often quite weak but if you ask specifically about things like fevers and night sweats you'll find most don't have them. History of cancer and

immunosuppression would come as red flags in this category too

N - neurological symptoms and signs:

- funny feelings around the face are quite common in migraine but it's certainly unusual to have unilateral limb symptoms and finding neurological signs is are even more uncommon and certainly need to be taken seriously

O - Onset:

- **Two bits here.**

- Age > 40 for is unusual for new headaches and should be taken seriously.
- How the headache began in terms of its speed is also important. thunderclap headache: primarily we're interested in the speed of onset. There's various ways to ask this and various time limits given on how sudden is sudden. I usually use "how long from the headache beginning till it was at its worst." with some follow up questions and even some dramatic hand movements and claps to emphasise the sudden nature. (I'm a real dramatist in the history taking). Migraine and tensions headaches are often more gradual in onset. When you ask was it sudden, almost invariably patients say yes but really they're saying this as a surrogate for severe and significant headache. They want you to take them seriously. Often when you drill down into it the headache was gradual and getting worse over several hours.

O - other associated features:

- part of this is the pattern of the headache and all the SOCRATES questions. And don't forget the eye (glaucoma or cluster headache or a Horner's syndrome all involve the ye) Honestly this letter isn't as useful as the others in the mnemonic but SNOP would be a pretty crappy mnemonic...

P - Previous headache history:

- this can work both ways. The definition of migraine requires a pattern of recurrence so a recurring typical headache for them is probably a migraine and probably reassuring. However, if it was the same as all the others they probably wouldn't be in your ED so if there's instead a pattern of recurring worsening headaches or headaches with different features then take them seriously.

Red flag does not = CT

CT is a useful test in the right person but I suspect it reassures us and the patient and often doesn't help a great deal with the correct diagnosis. I think the red flags should make us consider imaging and discussion with a senior can be really helpful here. But primarily the red flags should make us pause and consider our differential more seriously. For example in temporal arteritis it's the S (systemic features) and O (age of onset) of our mnemonic that are the red flags but a CT won't tell us anything useful here.

Normal CT does not = no pathology

The history is what dictates most of the diagnosis. While we're doing less LPs for SAH (don't open that pandora's box here...) people will still have negative CT scans who have had a small SAH. CT is also useless in meningitis and even in things like dissections where you need contrast with your CT to see it. All that to say if you have just got a CT of your headache patient there's often still some doctory work left to do.

It's OK to ask the patient what they're worried about

I find this really helpful for all ED patients. Some are worried about brain tumours. Some know that it's anxiety and stress but are afraid to vocalise it (though do not dismiss headaches purely because the patient or you think they're stressed). Once you know what they're worried about it makes the conversation about reassurance and discharge (which is what will happen with the vast majority) so much easier.

Treatment

Finally some pearls on making them feel better. Don't wait for a definitive diagnosis to start treating your patient. Get the paracetamol and NSAID on early. Metoclopramide (sometimes in repeated

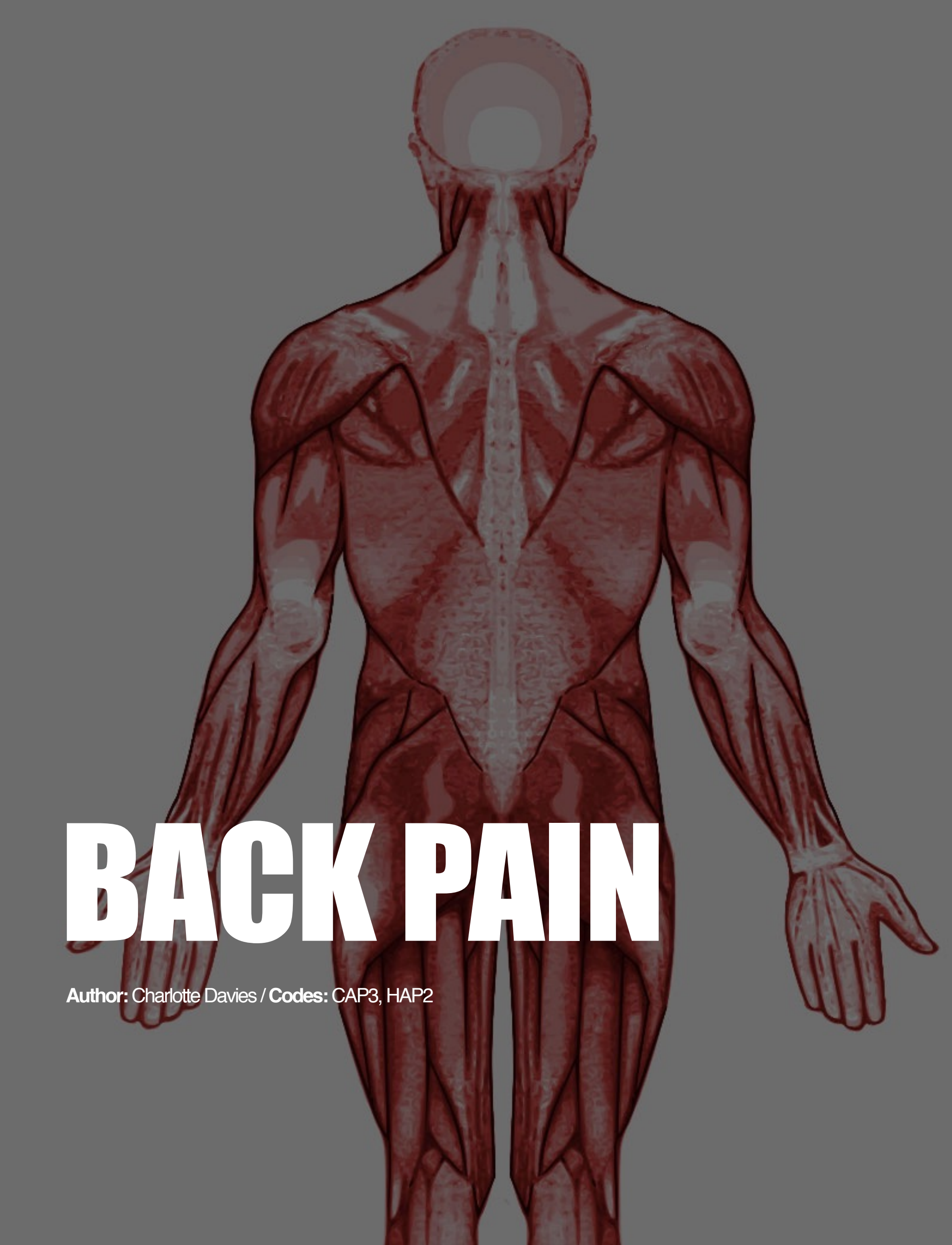
doses) works for almost every kind of headache no matter what the cause (so don't be reassured, just because the patient feels better they may still have an SAH). A litre of fluid with the metoclopramide often does wonders too (placebo or not) and if you have a clear diagnosis of migraine (and I'd get senior advice before making that diagnosis) then there's a whole plethora of other meds that can really help.

Summary

There's no need to panic next time you see a headache in the waiting to be seen box. The key to focus on is your history trying to tease out those red flags. And if you're in doubt just ask.

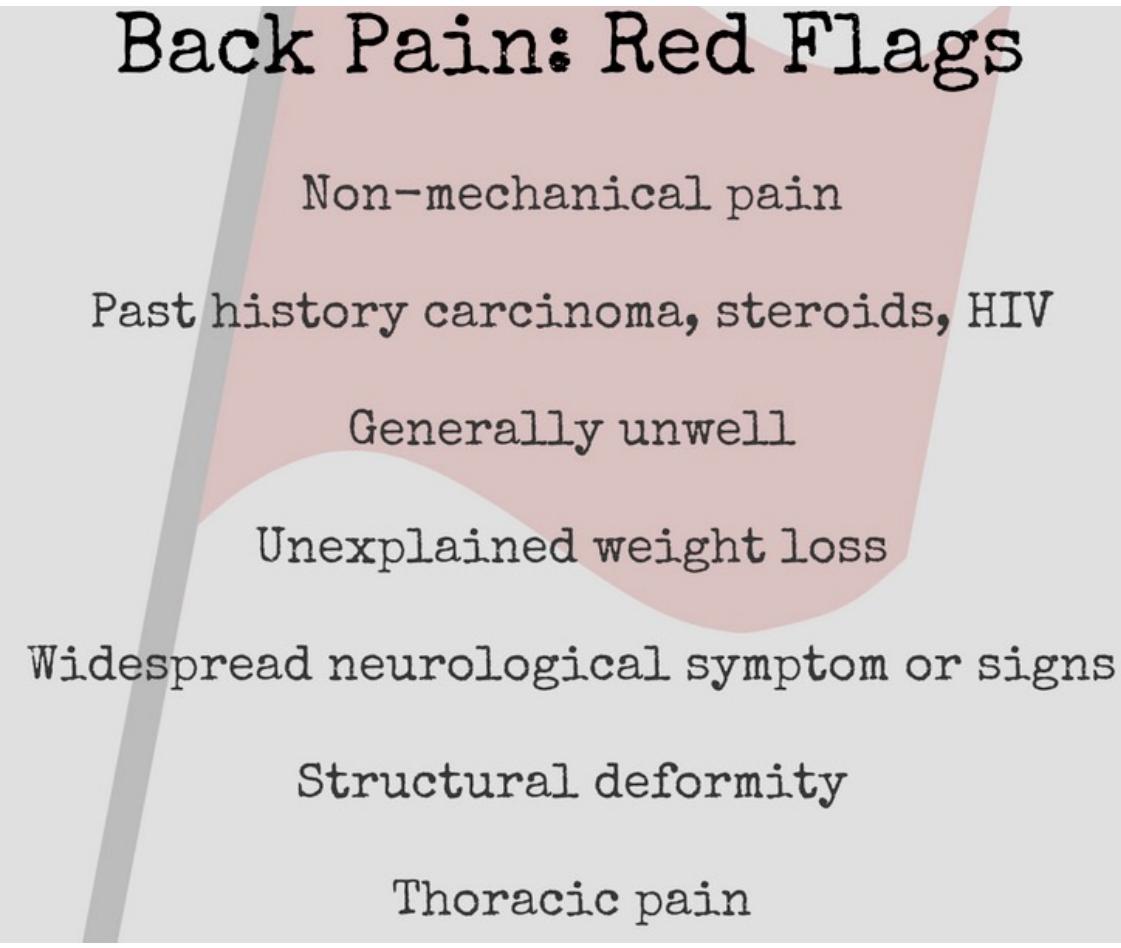
Further Reading:

- RCEM Reference
- Clinch CR. Evaluation of acute headaches in adults. Am Fam Physician. 2001 Feb
- 15;63(4):685-92. Review. PubMed PMID: 11237083.



BACK PAIN

Author: Charlotte Davies / **Codes:** CAP3, HAP2



There are red flags (above) for back pain - if you take a history you will elicit these.

TAKE A GOOD HISTORY

Back pain is really common in the emergency department, and it is vital that we manage it properly, because if is done at initial contact, it is less likely to be a problem. Here are the ten steps to managing most back pain in the emergency department safely.

1. Take a good history

I know everyone says this, but it's really important to take a history. It's only by taking a history that you know that actually, the "fall down stairs" was actually a fall over the bannisters, dropping 20 foot onto the floor. If your history is worrying for significant trauma, assess the patient as you would any major trauma patient - they're likely to get a CT!

Likewise, if your patient says I was diagnosed with cancer a year ago, and now I have really bad back pain...you're going to think about metastases. Back pain radiating to the groin...think aortic aneurysm. Back pain in an IVDU...think discitis. Ask the questions, and never assume it's "just musculoskeletal".

There are red flags (above) for back pain - if you take a history you will elicit these.

Age <20 years or >55 years has also been considered a red flag, but it should be borne in mind that non-specific back pain is not uncommon in these age groups. However, significant trauma may raise the possibility of vertebral fracture. Also beware of the patient with bilateral sciatica like symptoms - they are more likely to need an inpatient MRI.

There are also yellow flags, or risk factors for developing and or maintaining long-term pain and

disability, for back pain and you will begin to notice some of these. Once you've identified them you can gently start to correct some of the misplaced ideas.

Belief that pain and activity is harmful - encourage your patient to move!

- Belief that pain will persist
- Sickness, avoidant and excessive safety behaviours (like extended rest, guarded movements)
- Low or negative moods, anger, distress, social withdrawal
- Treatment that does not fit with best practice
- Claims and compensation for pain-related disability
- Problems with work, sickness absence, low job satisfaction
- Overprotective family or lack of support
- Placing responsibility on others to get them better (external locus of control)

2. Examine Carefully

There's three reasons to examine patients with back pain carefully.

Firstly, you really do want to know what's going on. Look at their abdomen if relevant incase there's a pulsatile mass making you think of an aortic aneursym. Look at their movement. Look at their neurology. And don't forget to do the PR (you have to at least offer it). You can even do some special tests like the femoral stretch test if you're feeling keen - but it isn't really going to alter your management!

Which brings me onto the second reason to examine patients carefully - this is a really high risk legal area. Missing cauda equina has a high cost to the trust (and the patient, and you) - perform a rectal examination, and act on it if it's abnormal.

Thirdly, the examination in back pain is your opportunity to start to reassure and treat the patient and start offering reassurance. As you're going through examining their movements be positive about their range of movement. I learnt a great technique based on Feldendraise - try it for yourself.

3. Give proper analgesia and quickly

I really believe that the quicker you give pain relief, the sooner it can begin to work. The longer patients wait for analgesia, the more tense and frustrated they can get - and the worse their pain gets. Be generous quickly. Every patient with back pain should have paracetamol (Even if they say it won't work), a NSAID (unless contraindicated) and consideration of a weak opiate. Sometimes, it's better to give oramorph than codeine - anything to break the spasm and get the patient moving again. Look at our other blog for some suggestions about treatment aims. There's a sparsity of evidence about all analgesia in back pain - stick to the analgesic ladder and you'll be OK.

4. Think about causes

Most back pain that we see is "simple" back pain. Sometimes we see more complicated back pain, and it is these that are easy. Your history and examination will have helped you to work out which of these it is. Once you've thought about a cause, it'll help you to guide your management further.

5. Don't do bloods routinely

The NICE guidelines for back pain management only advise blood tests in complicated back pain. This is excellent advice- when do bloods really change your management in "simple back pain"?
If you do need to do bloods (in complicated back pain) and the bloods are abnormal, think about your cause - again, a high CRP in an IVDU will make you think about a discitis, a high calcium in a patient with a history of weight loss will steer you towards malignancy.

6. Don't do x-rays

As soon as we x-ray patients, we encourage them to come back for x-rays again! The NICE guidelines are really clear - x-ray if they have risk factors! This is the really difficult area of "evidence" to follow. In young people, backs are really hard to break - so only x-ray them if the degree of trauma is significant. If you're thinking about x-raying them, just stop and pause, and think about whether you should be trauma calling them and getting CTs instead.

Remember the radiation risk from a lumbar spine x-ray is pretty high and needs careful consideration in younger patients especially! It's in the elderly that x-rays get difficult. The lumbar spine can break spontaneously in the elderly, and x-rays are then very difficult to interpret. I'm much more likely to image the elderly - if in doubt, have a chat with a senior.

I'm not sure there's ever a right answer

7. Don't tell the patient they need an MRI

Imaging is unlikely to be helpful, even MRIs. In asymptomatic people, MRIs show:

- Bulging discs in 20% to 79%
- Herniated discs in 9% to 76%
- Degenerative discs in 46% to 91%.

If you think the patient has cauda equina or spinal cord compression, they obviously need an urgent MRI. If you don't and they don't, their GP can review, they can have some physio, and go from there. An MRI is only really useful if they are at the stage of potentially needing neurosurgery on their back. Don't give your patients false hope! If your patient has bilateral sciatica with no neurology, an urgent / inpatient MRI might be useful - but not same day!

8. Prognosticate and safety net

Don't tell the patient they'll be better by tomorrow. Be carefully positive, and give them some good life style advice (see our other blog).

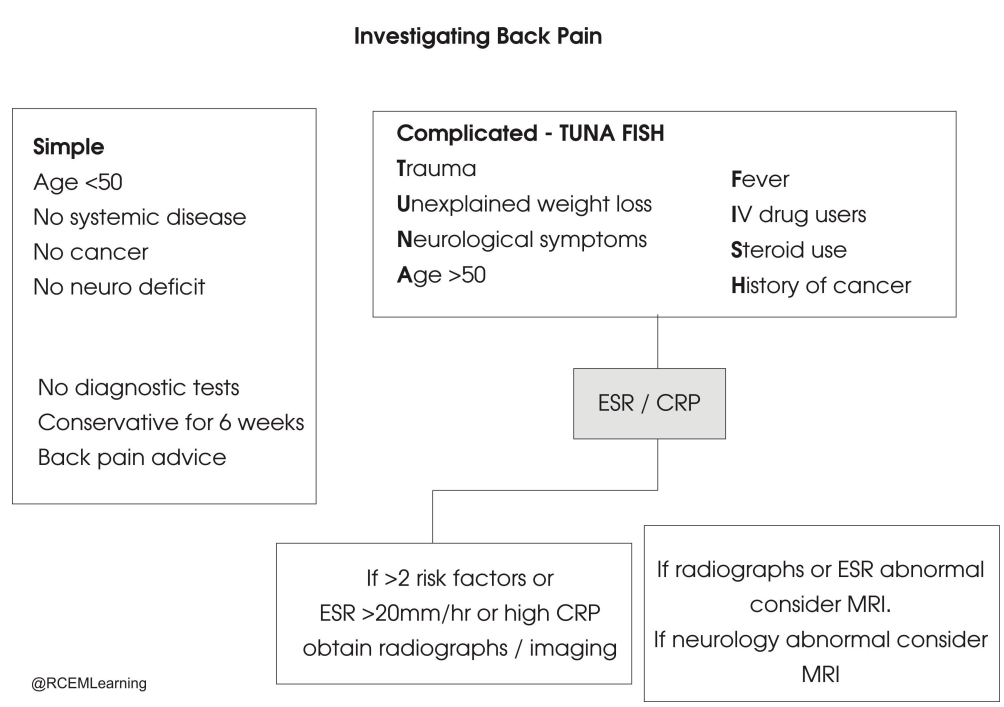
Tell your patients when to come back. Be clear and precise. Don't say come back if you're in pain. Say "come back if the pain is unmanageable at home" because we don't want you in pain at home. Don't say come back if you have any bladder problems - say return if you can't pee. You don't want to see all the patients returning because you've made them constipated which has given them a urinary infection and dysuria so they return!

9. Refer if needed

If your patient really can't cope at home with simple analgesia, then they can't go home. Which specialty they go to will depend on your trust. It seems sensible that the elderly frail patients with unresolved back pain get admitted under a medical team for pain relief optimisation, and good medical care. The young patients with uncontrolled back pain often cause controversy, but most hospitals admit them under the care of the orthopaedic doctors, and occasionally under ED in a clinical decisions unit. Know your trust protocol before you refer - and if you run in to problems, make sure you remember there's a patient in the middle, and escalate to your seniors early.

10. Exclude Red Flags

Before you discharge your patient, make sure you've really considered whether they have any other pathology. It's easy to think it's musculoskeletal - what are you missing?



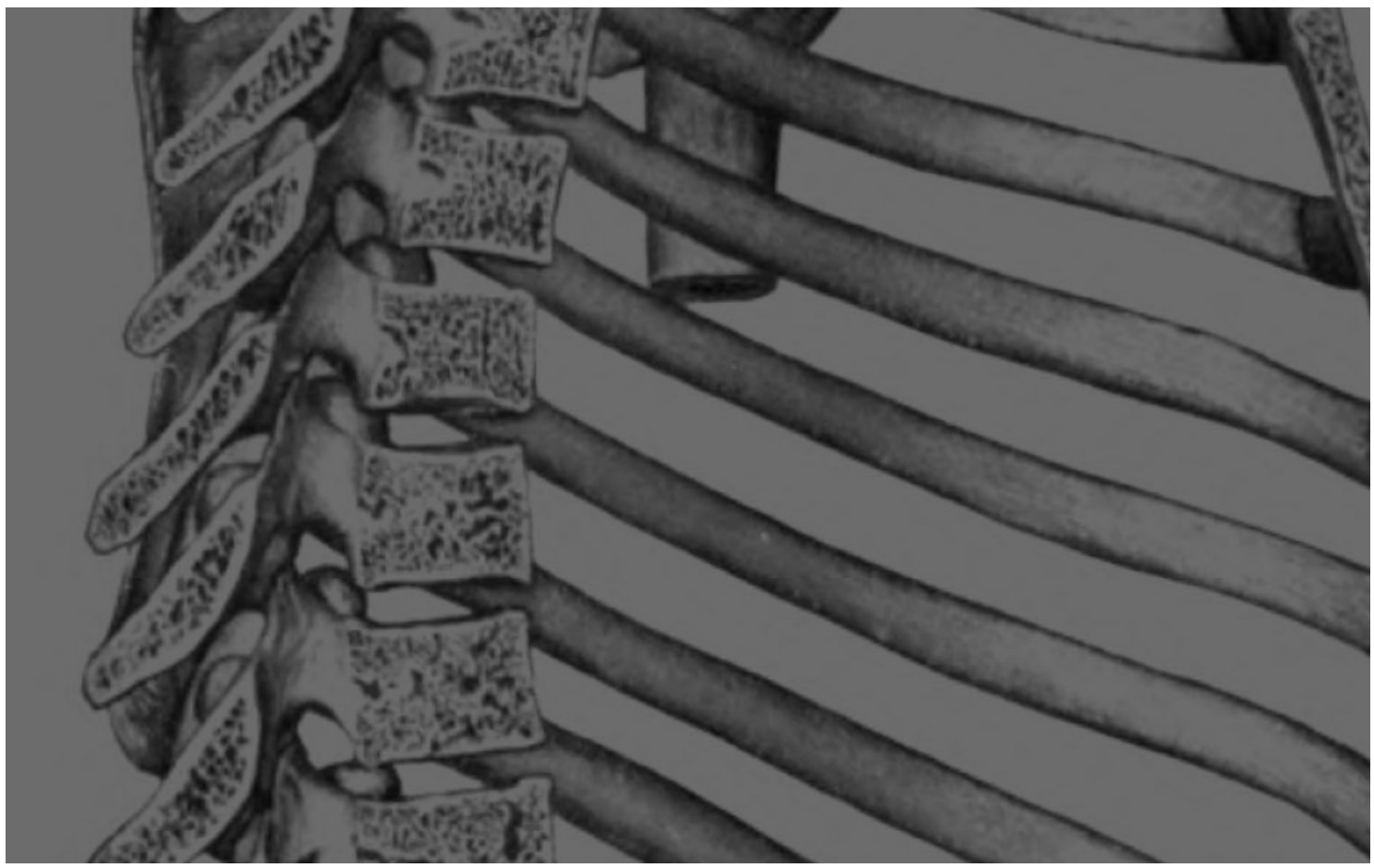
Further Reading:

RCEMLearning Blog: Back Pain Advice
Adult Emergency Medicine: Back Pain
Pain Management in Adults

RCEMLearning Reference: Back Pain
RCEMLearning Module: Lower Back Pain
Back Pain

C SPINE INJURY

Author: Charlotte Davies / **Codes:** CMP3, HMP3



DOCTOR TO CUBICLE 5

"Doctor to cubicle 5 for c-spine assessment please," you hear over the tannoy. Unfortunately, you're the only doctor around, and so, with a heavy heart, you pop to cubicle five, and try to think how you can assess the patient's c-spine.

Assessing c-spines always used to fill me with dread, as I didn't know what system to use, and I felt any missed injury would be significant. I still have a low threshold for imaging, but there are some patients, who just don't need imaging - and there's evidence to back it up. When I was an FY2 (a fair few year ago), one of my registrars said "Charlotte, to clear c-spines, you just need to have really big hairy balls". And that is a sentiment that has still stuck with me, when clearing c-spines in the conscious patient!

The actual incidence of c-spine injury in blunt trauma victims is 2-12%, with less than 1% in walking, neurologically intact patients. C-spine injury also occurred in 10-20% of patients with serious head injury, and 1 in 300 serious motor vehicle accidents. Of these fractures up to 14% will be unstable. The rate of missed c-spine injury is low at 0.01%. C-spine injury also occurred in 10-20% of patients with serious head injury, and 1 in 300 serious motor vehicle accidents.

There are two main sets of decision rules to help decide which patients should be imaged. RCEM has its own guidelines based on modified Canadian C-spine Guidelines. If you were thinking that you're better than the guidelines, think again - this is only 80% sensitive and 73.98% specific.

NEXUS Guidelines

NEXUS guidelines were the first set of guidelines created. They have a sensitivity of 99.6% with a 12.9% specificity- lower specificity than clinical judgement alone. The NEXUS study was large, and included lots of people, including children.

NEXUS looks at the following five points. If any one of these is present, you should have radiography:

- Focal Neurologic Deficit Present?
- Midline Spinal Tenderness Present?
- Altered Level of Consciousness Present?
- Intoxication Present?
- Distracting Injury Present?

So I think NEXUS is where the approach of "lets poke their neck and if it's sore get an x-ray" comes from. Midline spinal tenderness as a discriminator has been criticised as anyone has midline tenderness if you push hard enough, especially over C5!

The authors of the NEXUS rules have not defined what a distracting injury is. Some say any pain scoring more than 5/10 on a scale of one to ten. Recent studies suggest distracting injuries are chest injuries, long bone fractures, visceral injury requiring surgeons, large laceration, large burns or any injury producing functional impairment. There's a nice summary card from AliEM.

Canadian C-spine

The Canadian c-spine rules were validated in adult patients sustaining acute blunt trauma to the head or neck. The study excluded people with delayed presentatoin (more than 48hours), known vertebral disease, grossly abnormal vital signs and children. So this means that these rules have not been validated in children.

The Canadian C-spine rule is a three step process. Unlike the NEXUS guideline, it considers high risk factors first:

Anyone over 65, with a dangerous mechanism or paraesthesia mandates radiography. In the age of silver trauma, imaging everyone over the age of 65 has its own challenges.
If there are no high risk factors, safe factors are looked at next. If any one (single) low risk factor is present, range of movement can be assessed. The low risk factors are:

- Simple rear end shunt MVC
- Sitting position in ED
- Ambulatory at any time
- Delayed onset of neck pain
- Absense of midline neck tenderness

So you only need one of these to move on to the next step. You can get to this point without having looked carefully at the patient! It's really important to ask the patient when the neck pain started!
If they have any single low risk factor, you can then move on to see if they can rotate their neck. If they can, they don't need radiography!

Once the patient has cleared their own neck, I find it useful to give them a little exercise to do, based on the Feldenkrais method. Ask the patient to rotate their neck and look at what they can see. Then ask them to close their eyes, and imagine what they see when they move their neck. Then they can open their eyes and rotate their neck again. In the vast majority of people their range of movement improves!! Obviously, only do this once you have cleared their neck, and don't use it as part of the process to clear their neck!

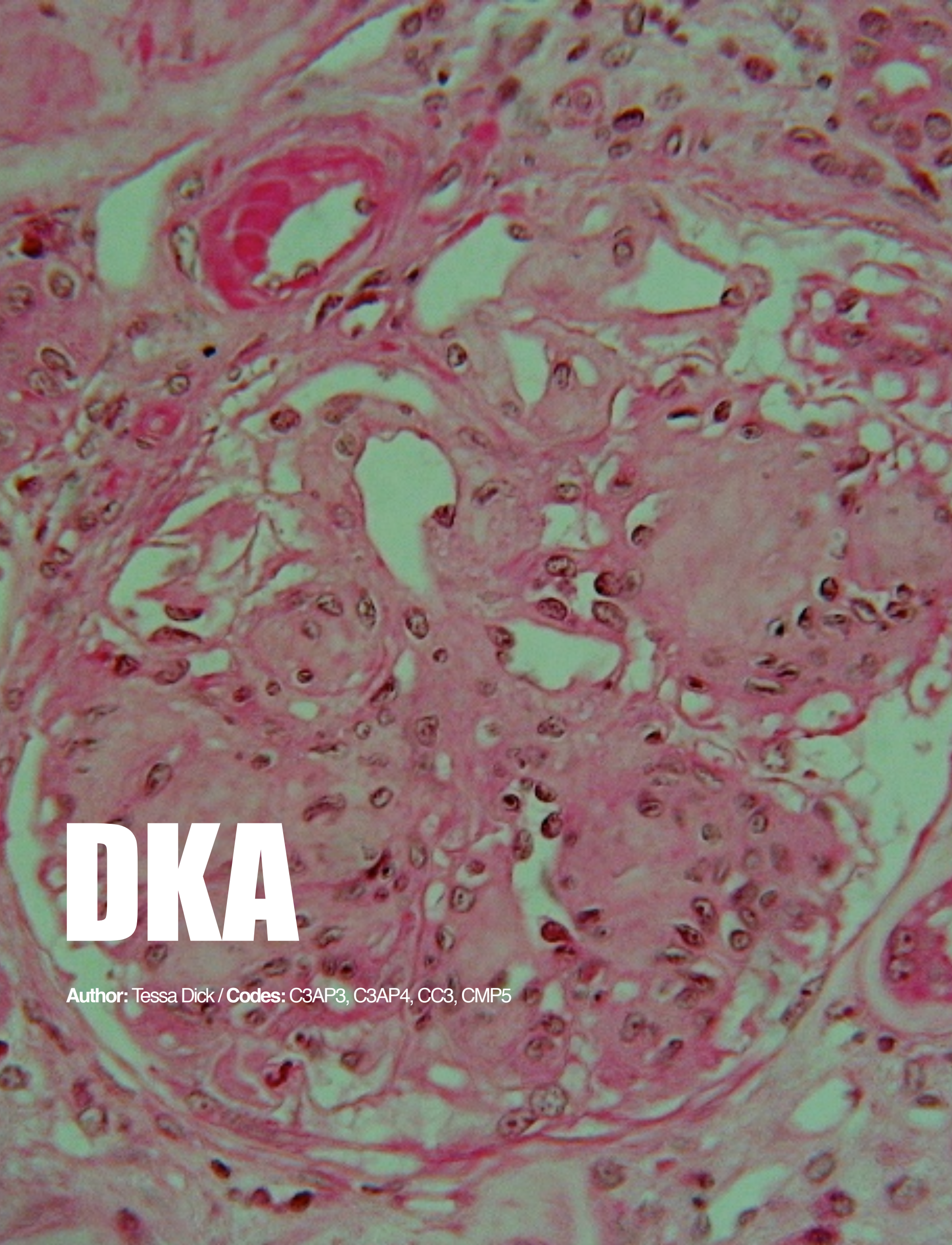
The NICE guidelines for imaging the c-spine are the Canadian C-spine rules in a different format. The RCEM guidelines use modified canadian c-spine guidelines. They have added two further risk factors:

- Severe neck pain (>7/10)
- Known vertebral disease

Once you've decided you can clear the neck, go ahead and treat the patient.
If you can't clear the neck, discuss with a senior whether to CT or X-ray the patient, as this will depend on the presentation and your departmental protocols. Whether to immobilise the patient or not is another thorny issue - stick with your departmental protocol.

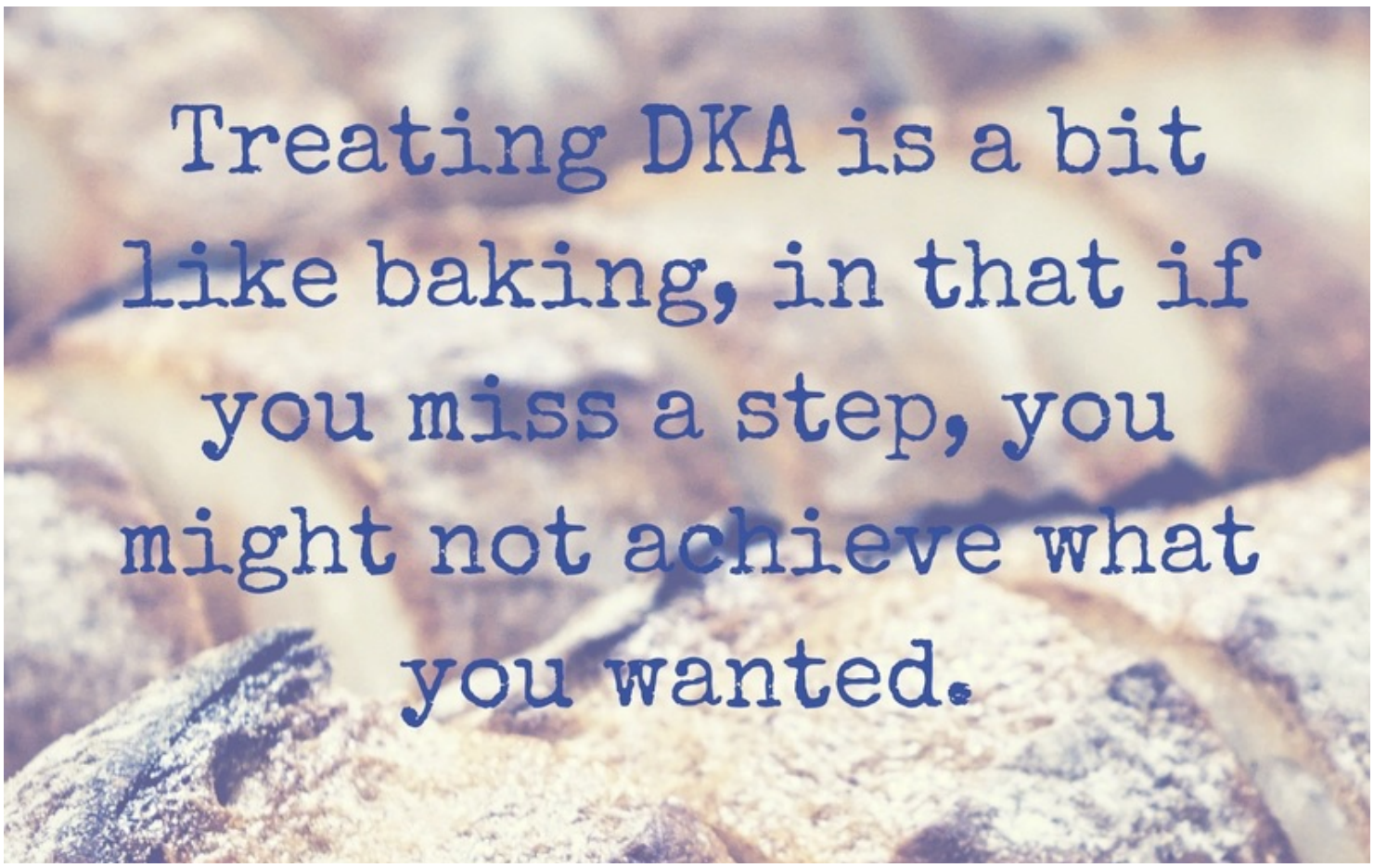
Remember, these decision rules are all based on acute presentations - they're not for the patient who comes to the ED with persisting pain two weeks after trauma.

Want to know more? A learning session was published recently on RCEMLearning. We also have a reference section on the site, if you want to have a look at that.



DKA

Author: Tessa Dick / **Codes:** C3AP3, C3AP4, CC3, CMP5



IN THE RIGHT ORDER

When I 15 years old I was admitted to hospital with DKA and diagnosed with diabetes. I thought all the doctors had to do was start me on insulin to get me better. It was only when I became a medical student and started working as a doctor that it became apparent that the management of diabetic ketoacidosis needed a lot more than just insulin, and that treatments needed to be started in the right order.

It is also easy to forget how sick patients can get in DKA because with increased patient education, DKA is being picked up earlier and treatment started even before coming to hospital. This change cause mortality associated with DKA improvement from 7.96% to 0.67% over a 20 year period.
So here are a few key points that I think will make the management of DKA clearer.

Make the diagnosis

I know this sounds obvious but known diabetics can be in DKA with lower than expected blood sugars so if a patient with diabetes is unwell then don't just check their blood sugar, do a gas to check their pH and check the ketones with a meter or a dipstick. To make the diagnosis of DKA, three diagnostic criteria need to be met.

It's not just about Insulin

In adults the first thing used to treat DKA is fluid and electrolytes. Due to the elevated blood sugars, fluid is drawn out of cells and is lost in the urine meaning rehydration is really important - not only to replace what is lost- but it is also thought to help correct hyperglycaemia as well. The flip side is that there has been a link made between fast fluid replacement and cerebral oedema, although this has mostly been seen in young adults and children. It has meant adult

guidelines suggest “slow fluid replacement” - aim to replace fluid losses over a 48 hour period. (a separate paediatric blog will be published in due course).

DKA Diagnosis

- Blood sugar >11 OR known diabetic

AND

- Ketones >3 mmol/L on a meter OR >2+ on a urine dipstick

AND

- pH <7.3 on a blood gas OR bicarbonate <15mmol/L

DKA diagnostic criteria

Potassium is the main electrolyte that seems to become deranged and cause problems in DKA. Refer to local DKA protocol to see how this is replaced in your trust, but be a little more cautious in anuric patients as they may have a raging AKI.

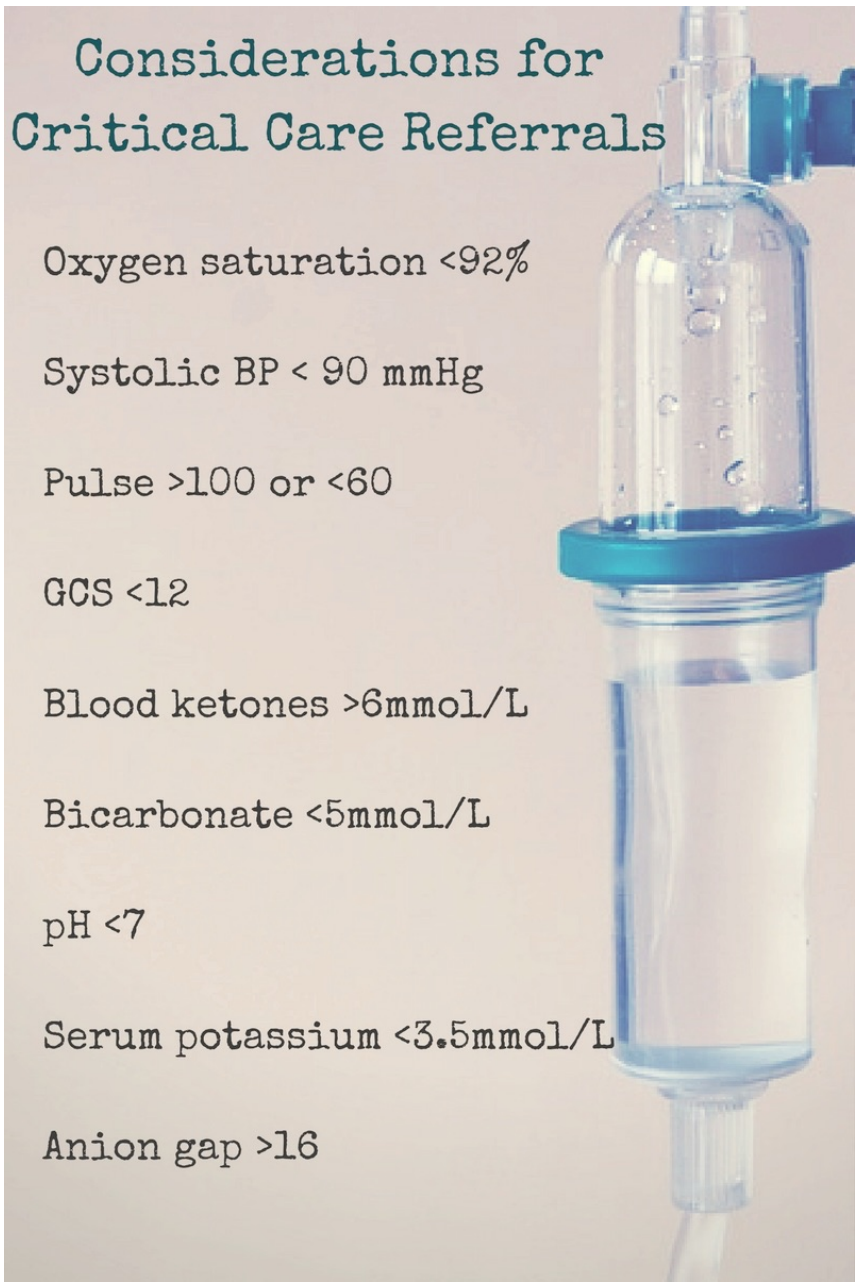
Keep monitoring ketones and blood sugar hourly, potassium and bicarbonate every 2 hours for the first 6 hours as treatment may need to be adjusted. In a busy Emergency Department this can be difficult but if you have referred to the medical team please keep an eye on this patient until they have been taken out of your department. It can sometimes take time for the medics to become available to see patients referred to them and even longer to find a bed on a ward or ITU. Please don't expect someone else to do it and make sure the patient is safe.

Insulin

Start an IV infusion of 0.1 unit/kg of insulin (no longer a sliding scale!) and continue long acting insulin if the patient is already on it as it is thought to reduce the incidence of rebound hyperglycaemia. Have a look at your protocol, and stick to it – adherance reduces the time to normoglycaemia.

Critical Care

Speak to ITU early if the patient isn't responding to treatment. The box below shows some of the specific criteria to consider getting them to review your patient. Patients can deteriorate quickly so involve ITU early if you think they are a candidate.



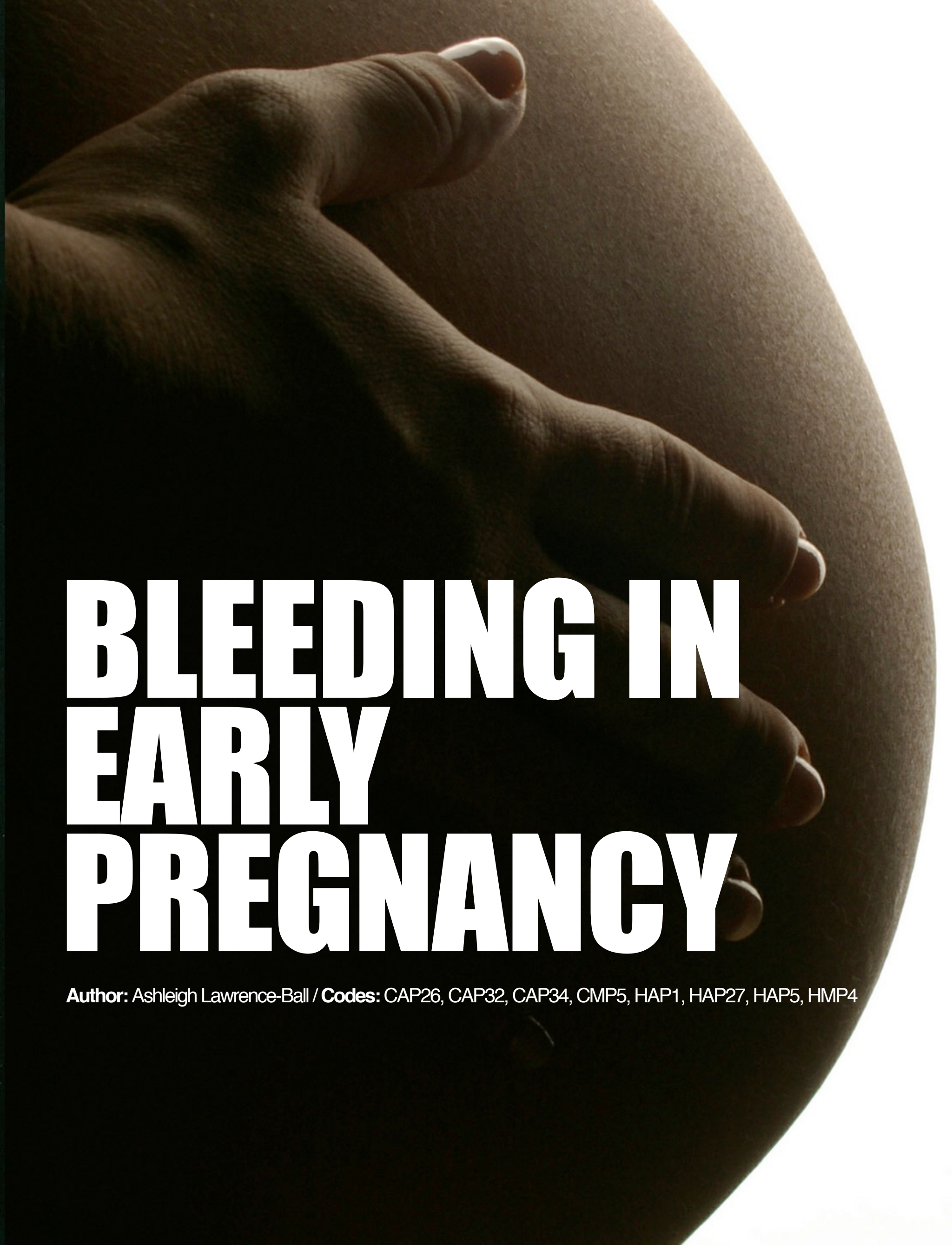
Considerations for referral to ITU

There are non diabetic causes of keto-acidosis, so if it looks like keto-acidosis (and smells like it), treat it the same. Alcoholic ketoacidosis is a common differential.

Further Reading

Joint Bristish Diabetes Societies Inpatient Care Group. The Management of Diabetic Ketoacidosis in Adults. Second Edition. Update September 2013.

Review of Evidence for Adult Diabetic Ketoacidosis Management Protocols. Tran et al. Frontiers in Endocrinology. June 2017. Volume 8. Article 106.



BLEEDING IN EARLY PREGNANCY

Author: Ashleigh Lawrence-Ball / **Codes:** CAP26, CAP32, CAP34, CMP5, HAP1, HAP27, HAP5, HMP4

CAN YOU GO AND SORT HER OUT QUICKLY PLEASE?

The nurse at triage comes to speak to you: "There's a pregnant 28year old with vaginal bleeding in the waiting room. She's been here nearly four hours – can you go and sort her out quickly please?"

Bleeding in early pregnancy is a common presentation to most EDs and up to 30% of women will have some kind of vaginal bleeding before 12 weeks gestation. Many of these women (50-80%) will go on to have a perfectly normal pregnancy, but do not underestimate the psychological stress the uncertainty can have on a woman (and her partner).

In this blog, we're going to talk about the 2 commonest causes of PV bleeding in early pregnancy (defined by NICE as less than 13 weeks gestation), some of the complications, and how they should be managed in the ED.

Ectopic Pregnancy

There's an old adage in emergency medicine – a young woman, with abdominal pain or PV bleeding must be assumed to have an ectopic pregnancy until proven otherwise – and this is wise because of the 11/1000 ectopic pregnancies, 0.02% of these women will die. This is a significant cause of mortality in young people.

History

Always ask patients if they could be pregnant. If they say no, it's worth asking why not – many people still just cross their fingers.

You should have a low threshold for performing pregnancy tests on young women who come through the department. Pregnancy tests can be negative so if your patient is sexually active, using no contraception, and you think they've got an ectopic be really careful in discharging them.
The majority of women presenting with PV bleeding will either not know they are pregnant or won't have attended their first dating scan at 12 weeks. This means for most patients, you won't know if the pregnancy is intrauterine or not.

- Presence of an intrauterine contraceptive device or current use of the progesterone only pill (including Micronor® Noriday® Norgeston® Cerazette®)
- The current pregnancy was conceived using assistive fertilisation techniques (e.g. IVF)
- Previous pelvic inflammatory disease, sexually transmitted infection or tubal surgery (including ligation)
- Previous ectopic pregnancy

Symptoms

Pain – abdominal or shoulder tip

Vaginal bleeding

Syncope

Ectopic pregnancies tend to have pain as their predominant symptom. If the pain lateralises to one side (right or left) an ectopic pregnancy is present until proven otherwise. If it's crampy lower abdominal pain, still think ectopic! Women can also have shoulder tip pain from diaphragmatic irritation by peritoneal blood. If you did a vaginal examination, women may show signs of cervical excitation.

Although pain is the predominant symptom, ectopic pregnancies can also present with vaginal bleeding so do not be falsely reassured by women who only report a small amount of blood loss. If an ectopic pregnancy does rupture, large amounts of blood collect in the peritoneal cavity and very little may be lost PV.

It is really important to think about the possibility of an ectopic pregnancy in patients who present with syncope. Even if they are well now, they could have compensated for the large amount of blood sitting in their belly. Consider doing a pregnancy test on all patients of childbearing age with syncope.

Investigations

The pregnancy test is the most important test. Bloods aren't going to change your ED management, but can be useful to guide further care – the Hb doesn't drop quickly, so might be normal in the ED. Progesterone and serum HCG levels are more useful as a trend not as a single level (See this BestBet for further details).

A "FAFF" scan might be useful, but remember, it's a rule in not a rule out. Be clear to the patient that you are NOT looking for fetal heartbeat, or even the presence of a fetus. A FAFF scan is a Focussed Assessment for Free Fluid and in the haemodynamically unstable young woman this may be useful to help guide your management when there's any diagnostic uncertainty.

Management

If your patient is unwell, and haemodynamically unstable, you need to be resuscitating them, and liasing immediately with senior emergency department, gynaecology and anaesthetic colleagues. Remember to get those large-bore cannulas in early and send off a group and save sample.

The stable patients are a little different to manage. Query ectopic pregnancies will require discussion with gynaecology for an Early Pregnancy scan. Read your department's policy to know how this happens where you work.

Miscarriage

Approximately 20% of all pregnancies in the UK will end in miscarriage. As doctors there is little to nothing we can do to prevent this outcome, and it's important that the patient and her family know that there is very little they could have done either. Many of these spontaneous early miscarriages are due to structural defects within the foetus or gestational sac itself, although the risk is also increased with certain systemic diseases or infections as well as smoking and drug use.

You should understand the terminology of miscarriage, as many of these patients will be managed as outpatients, and may re-attend, either with on-going pain and bleeding or with a complication of the miscarriage.

A **threatened abortion** is the presence of PV bleeding and pain but the cervical os is closed and there will be a foetal heartbeat. Many of these women will go on to have an otherwise normal pregnancy.

An **inevitable abortion** is the presence of PV bleeding and pain and the cervical os is open, meaning that the products of conception will eventually be passed. These pregnancies are **non-viable.**

An **incomplete abortion** is one where some of the products of conception have yet to be passed and may result in **cervical shock**.

A **septic abortion** is where the products of conception have become infected, leading to systemic illness. These patients should be referred to gynaecology for further management.

Assessment and Management

As always in emergency medicine, these patients need to be assessed for haemodynamic instability and resuscitated first. Bear in mind that young women may compensate well, and therefore may have lost a lot of blood (2 or more litres) before they become tachycardic or hypotensive.

If you've got a haemodynamically unstable young woman with a positive pregnancy test in front of you you're going to want to call the gynaecology team ASAP. Place your standard 2 large bore IV cannulae, hang the O negative and alert the blood bank that you may require the **massive transfusion protocol**. It is likely this woman will need to go to theatre promptly and is going to need help to stay stable.

In a patient with an incomplete abortion, products of conception can become lodged in the cervical os, causing vagal stimulation resulting in **cervical shock**. These women will be bradycardic and remain hypotensive despite aggressive fluid resuscitation.

I generally have to have a really good reason to perform a speculum examination in the ED and this would be one of those times. These patients can arrest, the treatment is relatively simple and can be done before gynaecology arrive, making you look like a hero. Move the patient to resus, give atropine (600mcg) if very bradycardic, call gynaecology and then insert the speculum and make sure you have a pair of long handled sterile forceps / gauze to hand. Visualise the cervical os and remove anything lodged in it (if it's small, sweep with gauze on the end of forceps. For larger products, insert the forceps closed, open, grasp the contents, rotate and remove). This will remove the vagal stimulus and the patient should make a rapid recovery.

What about the patients who are haemodynamically stable, I hear you cry. These patients often seem more complex to manage. How you manage these patients depends on your departmental policy – many say refer to gynaecology if the patient is haemodynamically unstable or requiring more than simple analgesia. If the patient is stable, and their pain is controlled with paracetamol, send them home

with safety net advice, and arrange an early pregnancy scan. It is worth thinking about referring some stable patients for inpatient management:

- Late first trimester (10-12 weeks) as they carry a greater risk of substantial haemorrhage
- Previous adverse or traumatic pregnancy experience (e.g. stillbirth)
- Coagulopathies or other disorders that increase the likelihood of significant haemorrhage
- Any evidence of infection (e.g. septic miscarriage)

If the woman is under 6 weeks pregnant, **not in pain** and stable, NICE recommend that they can be discharged to repeat a home pregnancy test in 7-10 days. If the repeat home pregnancy test is negative, then they have miscarried. If it is positive, they should attend either their GP or an EPAU or early pregnancy unit (if one is available). They should also represent if their symptoms continue or get worse.

Remember to be sensitive in how you approach these patients. The psychological trauma of miscarriage is often forgotten in the busy ED but many of the women will go on the have long-term mental health sequelae. It's useful to have a "spiel" that you say – something like:

"Vaginal bleeding and pain in pregnancy is common, and everyone always assumes they are miscarrying the fetus. This may be true, but isn't always. If this is what's happening, there's nothing you can do to change that, and nothing you've done to cause it. There's nothing me, or any of my gynae collegues can do to change the outcome. The scan is important so that you know what is happening, but it does't change our management."

A Final Note

To PV or not PV, that is the question. In bleeding in later pregnancy, PV examination is actively discouraged due to the risk of precipitating a massive haemorrhage in those with undiagnosed placenta praevia. However, in early pregnancy, whether os is closed or open will change the diagnosis given to the woman. Honestly, I tend leave this decision up to my gynaecology colleagues as I'm going to make the referral either way. (This BestBet might help)

Further Reading

BestBets: Speculum exam in BEP patients
RCOG: Patient advice on Bleeding in Early Pregnancy
NICE: Ectopic pregnancy and miscarriage