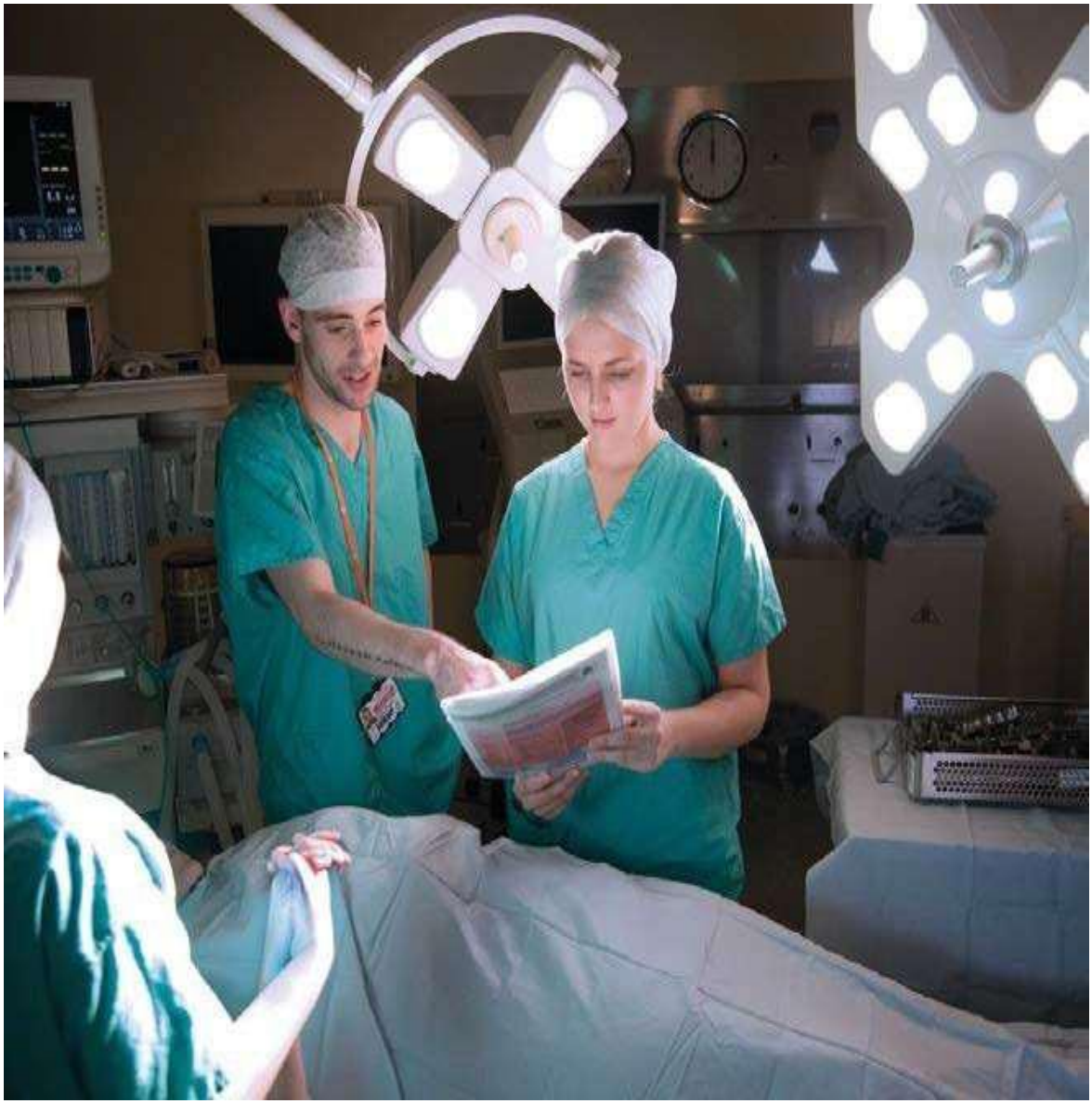
UNIVERSITY OF LEICESTER

Year 3 Surgical Apprenticeship

Workbook 2025-26



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Welcome to Surgery Block

Leicester Medical School "Year 3 Surgery Block" is designed to provide you with ample opportunity to learn knowledge, skills, aptitude and professionalism in Surgery. Surgery is a vast subject and your experience may vary slightly depending on your site. However, you should all be provided with learning opportunities related to your core topics in General / GI Surgery, T&O, Urology, Vascular Surgery and Breast Surgery. In addition, you will be expected to learn peri-operative topics which form an integral part of the overall management of a surgical patient.

During your block you will be expected to attend teaching sessions (lectures and clinical skills), ward-based experience (ward round, shadowing clinicians), clinics and observing operations in theatre. It is important that you take every opportunity to practice core skills such as history taking, examination and formulating a management plan based on your differential diagnosis. We suggest that you familiarise yourself with the interpretation of laboratory and radiological investigations that surgical patients commonly go through during their hospital stay.

The workbook is designed to give you guidance, signposting and to encourage with additional self-directed learning. Always talk to your supervising Consultant and the team doctors to find out what additional sessions you can attend to enhance your learning. Your key contact will be your undergraduate coordinator but do not hesitate to contact consultants / senior doctors if you feel you need senior support to resolve any clinical issues on the ward.

Always ensure that you adhere to the hospital/ward/theatre policy of your base hospital as there may be some variations in practice. You will need to manage your own timetable to some extent so that you can include your self-directed learning more efficiently. In addition, the reading list and the educational videos in surgery (Surgical Shorts) should support your journey thorough the surgical apprenticeship programme.

Aim and Summary of Learning Outcomes

Aim of the block:

The aims of the Surgery Apprenticeship block are that you should continue to improve your skills in history taking and clinical examination, presentation, communication and diagnostic reasoning. You should be able to recognise common conditions that present to hospital-based surgeons and be able to describe and interpret relevant investigation and formulate a management plan. You should also participate in pre and post-operative care of patients to assess and manage associated medical issues and/or complications of surgery. You should learn about patient safety issues and clinical governance through involvement with the ward teams.

Learning Outcomes - Summary:

Take a history from patients presenting to secondary care with acute and chronic conditions on surgical units (wards, outpatients and acute admissions)

Choose the most appropriate examination for each patient and perform it to a satisfactory standard.

Develop a differential diagnosis list

Develop a plan for investigation of the patient

Develop a plan for treatment and explain to the patient in an appropriate way

With regard to consent: Explain the consent process; Seek appropriate help if capacity is impaired; develop a pre-operative plan for the patient

Gain knowledge and experience in strategies used in intra-operative care

Perform a post-operative assessment

Develop knowledge of common post-operative complications and strategies to diagnose them

Demonstrate communication skills relevant to the stage of training and recognise the many levels at which communication takes place

While on placement, demonstrate skills and aptitude required for self-directed learning and reflection

The full list of outcomes are given at the end of this workbook.

Journey – Surgery Block

General Surgery

The block leads will work with undergraduate coordinators to assign students to either individual consultants or teams. In some hospitals you may be provided with a timetable. The timetables can vary depending on the hospital and speciality. Your default position should be to attend the ward at 8am every morning unless you have a dedicated timetable to attend a different activity. In the afternoon, you should attend a structured teaching session. A teaching clinic is considered as a structured teaching session. In the event of you not having a structured afternoon teaching session, you should attend your consultant's / firm activity (theatre, clinic, endoscopy etc.).

It is anticipated that some of you will experience more specialist experience from your own firm (e.g. colorectal surgery, Upper GI, HPB Surgery). However, the focus should be on acquiring general surgical experience to fulfil the apprenticeship curriculum requirement. Cancer topics in surgery should be covered with the emphasis on history taking, examination, knowledge of differential diagnosis, appropriate investigations and basic management strategies.

The tutorials will be delivered as topics or scenario-based discussion. You should seek to gain acute on-call experience by shadowing the on-call team. You are encouraged to attend one long day (till 9pm) every other week for both General Surgery and T&O. You should also shadow the on-call team for one weekend during their 12-week block (either General Surgery or T&O weekend).

Core Topics:

- **Abdominal pain history**
- **Abdominal examination**
- **Common acute surgical conditions / presentation (Intestinal Obstruction, Appendicitis, Peritonitis)**
- **Upper GI haemorrhage**
- **Lower GI haemorrhage**
- **Cancers (Stomach, Oesophagus, HPB, Colorectal)**
- **Hernia**
- **Gallstones**
- **Acute pancreatitis**
- **Intra-abdominal, subcutaneous and peri-anal sepsis**
- **Stoma**
- **Wound management**
- **Nutrition**

Urology

Arrangement should be made for you to acquire knowledge and skills in Urology during your surgical block. Approximately a week will be dedicated to urology. You should be given the opportunity to experience urology theatre, urology clinic and ward round at least once. In addition, five core topics should be delivered as a structured teaching session. You will be expected to learn about the urological cancers, in considering urological presentations (e.g. Haematuria, testicular lump) and so the emphasis should be on history taking, examination, differential diagnosis and appropriate initial and definitive investigations.

Detailed cancer management, staging, protocols and pathways do not need to be covered at this stage and will be specifically covered in the 4th year Cancer Care Block.

Core topics:

- **Haematuria**
- **Renal colic**
- **Incontinence**
- **Testicular lump including Torsion**
- **Obstructive uropathy**

Vascular Surgery

Vascular surgery experience should include lecture / tutorials / bedside teaching on

1. **Chronic arterial insufficiency**
2. **Venous disorders**
3. **Lower limb arterial and venous examination**
4. **Abdominal Aortic Aneurysm**
5. **Leg ulcers (venous, arterial and diabetic)**
6. **Examination of lower limbs (arterial and venous disease)**

Some hospitals may not have vascular surgery in patients. The clinical teachers should guide you to alternate methods of gaining vascular experience – vascular surgery clinics, in patient vascular review ward rounds and vascular laboratory.

Breast Surgery

You should be given the opportunity to learn skills in breast history taking and examination. The focus should be on benign breast disease. Breast cancer can be included (focus should be on history, examination, differential diagnosis and basic investigations) but detailed oncological management does not need to be covered at this stage, as it will be covered in the 4th year Cancer Care Block. As a minimum, you should be given the opportunity to attend at least one breast surgery clinic and a lecture / tutorial.

Core topics:

- **Common breast conditions (benign and malignant)**
- **Breast examination (understanding of issues related to sensitive examination - supervised, consent, chaperone)**

Trauma & Orthopaedic

The students can be allocated in a similar way to General Surgery arrangement. You are expected to gain experience in both acute and chronic orthopaedic conditions. You are also expected to attend theatre sessions, clinics and structured teaching / tutorials. Core topics:

- **Acute joint pain**
- **Lower back pain**
- **Examination of the following joints – Shoulder, Wrist, Hip, Knee, Ankle and Back**
- **Principles of fracture management (including practical skills in the application of plaster)**
- **Common fractures (including Hip, Colle's, Ankle and open fracture)**
- **Trauma and soft tissue injury (including shoulder, fingers and knee dislocation)**

Peri operative Medicine / Anaesthesia

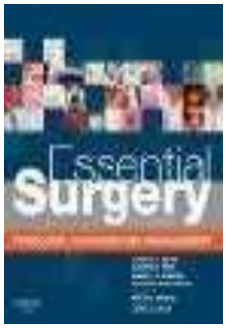
Students will be provided with approximately a week of experience in peri operative medicine / anaesthesia. A lot of perioperative care is part of the overall surgical journey. You should be provided with opportunities to attend theatre sessions with the anaesthetic team, preoperative assessment clinics (nurse led and consultants) and pain team clinics or ward reviews. Your clinical experience can be consolidated with structured tutorials covering core topics. You are NOT required to attend dedicated Intensive Care Unit sessions at this stage, as will do so in year 5. In some circumstances, you may wish to follow a particular patients' journey to ICU. This can be discussed with the consultant anaesthetist at the time so that you can then follow that patient's journey in the ICU setting.

Core topics:

- **Fluid prescription**
- **Pain – assessment and management (acute and chronic) o DVT (prevention and management)**
- **Management of surgical patients on (1) anti coagulation (2) steroids (3) diabetic treatment**
- **Sepsis and the safe use of antibiotics 6) Blood / Blood product transfusion 7) Assessment of critically ill patients (early warning score, initial resuscitation, common diagnosis)**

Each hospital will have slightly different format due to their local arrangement and available resources. However, the time spent, and the core contents will be similar in order for you all to complete a successful surgery apprenticeship programme.

Recommended Textbooks and Resources



Essential Surgery 5th Edit

https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20100675493

This is our recommended textbook as it is aimed at medical student level, it is up-to-date, has useful diagrams and illustrations and is easy to access via ClinicalKey.

Browse's Introduction to the Investigation and Management of Surgical Disease by Norman L. Browse, John Black, Kevin G. Burnand, and William E. G. Thomas

https://ebookcentral-proquest-com.ezproxy4.lib.le.ac.uk/lib/leicester/detail.action?docID=615869

This textbook has more surgical detail on procedures. We do not require you to know details of surgical procedures but understanding the principles is useful. The textbook is good for investigations. It has a very good chapter (Chapter 17) on abdominal pain which complements Essential Surgery and we will refer to this in subsequent sections.

Apley's Concise System of Orthopaedics and Fractures, Third Edition:

There is also the full version of this textbook: Apley's System of Orthopaedics and Fractures

https://ebookcentral-proquest-com.ezproxy3.lib.le.ac.uk/lib/leicester/detail.action?docID=967170

Clinical Anaesthesia by Carl L. Gwinnutt and Matthew Gwinnutt

This is more than sufficient information regarding anaesthesia. The focus of this block is on caring for the patient undergoing surgery and not on the details of anaesthetics.

https://ebookcentral-proquest.com.ezproxy4.lib.le.ac.uk/lib/leicester/detail.action?docID=1120614

Imaging textbooks:

Abdominal X-rays for Medical Students by Christopher Clarke, Anthony Dux

Chest X-rays for Medical Students by Christopher Clarke, Anthony Dux

Note: Library are in the process of purchasing these texts and links will be added as soon as available. For a general approach to thinking through common presentations:

Oxford Cases in Medicine and Surgery by Hugo Farne, Edward Norris-Cervetto, and James Warbrick-Smith .

https://ebookcentral-proquest-com.ezproxy3.lib.le.ac.uk/lib/leicester/detail.action?docID=1591374

If you need to look up a medical topic there are a range of general medicine textbooks.

Kumar and Clark's Clinical Medicine is available via ClinicalKey and will be more than enough information. It is useful as each chapter starts with a summary of the relevant physiology and basic science https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20140009860

History taking and examination

This is the core requirement of the block. You should make use of all opportunities. Teachers to facilitate opportunities on ward, in clinic.

GI and General Surgery: Lecture on history taking and examination given during Induction.

Link to YouTube video for standard abdominal examination:

Explanation: www.youtube.com/watch?v=SBgWtboujnU

Demonstration: www.youtube.com/watch?v=nKYIcshakf4

Textbook chapters provided.

Orthopaedics:

Lecture and plenary session delivered on history and examination during Induction.

Links to web for joint examination videos.

ARC: http://www.arthritisresearchuk.org/health-professionals-and-students/videoresources/rems.aspx

Macleod's: https://www.youtube.com/watch?v=wOpIC9qMfrU and whole series of Macleod's videos. Textbook chapter provided. Teachers to listen and observe students and provide guidance in as many settings as possible. Then move on to investigation and problem solving.

What is this workbook and how should you use it?

This is NOT a textbook.

It is a guide to help you focus your learning.

Most of them should be done as part of your work on the ward.

We have focused learning material and recommended textbooks. The relevant chapters are sufficient. Your task is to make the information meaningful. The only way to do that is to see patients and then link the patient with your learning and with the guidance of the clinicians. Do you have to complete every task and case study?

The workbook is for your benefit. The more you use it the more certain you will be that you have covered the required material.

Your supervisor will want to know that you have engaged with the learning and may ask you to demonstrate your engagement with the workbook.

We are also aware that different students work in different ways. You will have found patterns of working in Phase 1 that suit you. You will have to rethink this in Phase 2 as the sequence in which you learn will be different. You should hunt around for additional information and links and add them to your workbook (as you did in Phase 1). Make your own diagrams. Make your own notes. Take ownership of your learning. Self-directed learning is a lifelong skill that will serve you well in your professional career.

The workbook is your responsibility and should complement the teaching that is given. The teaching will cover many of the main topics. However, there will be some topics where you need to identify that you should look up information. The Surgical Shorts is a series of lectures covering core topics and can be found on Blackboard, please ask your Undergraduate Coordinator for a list of topics covered. The combination of the Induction teaching, the hospital teaching, the informal teaching that takes place on the ward and the many workbook tasks will ensure that you cover the majority of the topics. You will then be well placed to progress.

Portfolio Cases

Purpose

This workbook is full of tasks, cases, questions, guidance and links to reference material.

The risk is that you might feel this is a paper exercise to be achieved with a textbook or your iPad rather than talking to patients. In reality the opposite is true. You MUST spend the majority of your time with patients, talking to them and examining them. It is not always possible to have an hour to take a detailed history and perform an examination. In ten minutes at the end of a ward round you can return to a patient and ask to talk to them about one particular aspect of their care. Use that as a trigger for looking up information. If you are on call you must seek out the opportunity to talk to the patient yourself (even if you have already watched the SpR take a history). Then you can ask the patient if you can also perform a relevant examination.

Aim to make a brief note each time you take a history and do an examination.

The purpose of this activity is to provide you with an opportunity of formally recording some of the common surgical emergencies that you see. The adage: common things are common is an important concept for doctors. If you have good understanding of common presentations of disease, then (1) you will successfully manage most patients and (2) pass your exams!

As part of your Surgical Care apprenticeship, we are expecting that you will clerk a number of surgical emergencies or acute problems and for 10 of these, to formally write up in this workbook. In the future, this will provide you with a useful resource. But for now, it provides you with a series of cases to discuss with your peers and tutors

Structure

There are 10 structured templates for you to complete. These are placed on Blackboard as a separate file. One example follows on the next page. The orthopaedic section of this workbook has the equivalent portfolio cases for each of the important orthopaedic presentations which you can use in place of the template.

There are three key objectives:

1. **You become familiar with recording information in a structured format**
2. **You learn about the progress of patients throughout their admission**
3. **You improve your knowledge through a number of questions relating to each case**

You have a free rein to identify which cases that you wish to follow up and record. Clearly, identifying a broad mix of different clinical conditions is more likely to broaden your knowledge!

These cases are those that will you will see week to week and form the majority of patients who present to a 'surgical take'. At the back of this workbook is a CHECKLIST.

Aim to match patients you clerk with the list of patients and problems outlined there.

We therefore suggest that you include at least one patient who has presented with:

- **Lower abdominal pain (and linked to the Checklist) o Upper abdominal pain (and linked to the Checklist)**
- **A surgical emergency and poorly controlled diabetes (or some aspect of diabetic management). o A problem under the heading of Care of the Surgical Patient – for example a postoperative complication or a bleeding problem or any other. Talk to the patient about that problem and perform a relevant examination. o AND in addition you must complete as many of the Orthopaedic cases as you can. You should aim to do all those in the workbook but as an absolute minimum you must see a patient with a hip fracture and at least one other acute fracture. There are additional case studies on back pain and osteoarthritis which are both important and you must seek out patients to talk to and examine.**
- **We encourage you to also seek out patients from allied surgical specialities, including Vascular, Urology and Breast surgery.**

Depending on your hospital, you may be asked to present one of these cases on the ward or as part of a teaching session.

For each case look up some information in a textbook or look up the relevant NICE guidance. Links to a textbook are provided throughout the workbook. You can separately look up NICE

Portfolio Case 1

Patient (Gender and Age): **Date first seen:**

What is the history of the presenting complaint?

What is the relevant past history?

What other history did you elicit?

What did you find on clinical examination?

What was your differential diagnosis following the clinical examination? Please justify on the basis of the history and examination.

List the results of the initial investigations:

What was the working diagnosis following the initial tests? If it has changed, why?

What was the initial treatment?

Was any analgesia given? If so, was it effective?

What other investigations were undertaken? How did these impact on the original differential diagnosis and treatment?

Write out the patient's 'Problem List':

What evidence base / guidelines were used in the management of the patient?

What did you tell the patient about their illness and treatment?

What did the patient understand about their admission and treatment? Did they express any concerns to you?

Did they require immediate surgery and if so, what?

Were there any complications pertaining to their admission? (Post-op / Drug Rx/ presenting problem /medical co-morbidities etc.).

What happened to the patient on the days following their admission?

Where there any professionalism / ethical issues raised?

At discharge, what was the final diagnosis/es?

What treatment was the patient given as a TTO?

What are your reflections on the patient journey?

Tasks and Clinical Cases

This is the core requirement of the block. You should make use of all opportunities. Your teachers and staff will facilitate opportunities on the ward, in clinic and in teaching sessions. Opportunities to clerk patients will vary. On some days you will be able to take a history and perform an examination on 2 or 3 patients. On other days this will be less, but on admission days or when you are on-call this is likely to be more.

Take 'responsibility' for one or two patients on the ward. This will ensure you speak to and examine patients regularly.

Ward Round: Present a patient on a ward round. This will force you to focus your history-taking and examination and to present the results succinctly.

Outpatient clinics

- **Ask the Consultant or SpR if you can take the history on one patient.**
- **Ask if you can perform an examination on one patient.**

On-call and admissions unit: Use these opportunities to see a range of patients.

Ask staff to observe your examination and give you feedback.

Review the material provided during the Induction Week (see links on Blackboard):

GI and General Surgery:

Lecture on history taking and examination given during Induction.

Link to YouTube video for standard examination:

Explanation: www.youtube.com/watch?v=SBgWtboujnU

Demonstration: www.youtube.com/watch?v=nKYIcshakf4

Textbook chapter:

Essential Surgery: Non-acute abdominal pain and other abdominal symptoms and signs https://www.clinicalkey.com/#!/content/book/3-s2.0-B9780702046742000184

Browse's has a good chapter on the assessment of abdominal pain – Chapter 17

Joint and Musculoskeletal history taking and examination

Plenary session given during Induction week.

Orthopaedic textbooks:

Apley's Concise System of Orthopaedics and Fractures, Third Edition
https://ebookcentral-proquest-

com.ezproxy3.lib.le.ac.uk/lib/leicester/detail.action?docID=967170

Note: The 'Concise' version of this textbook contains an appropriate level of information and is recommended.

Apley's System of Orthopaedics and Fractures, Ninth Edition See Chapter 1. This is a fuller version of the 'Consise' textbook. https://ebookcentral-proquest-com.ezproxy3.lib.le.ac.uk/lib/leicester/reader.action?docID=665375&ppg=22

Videos of Joint and musculoskeletal examination:

ARC has videos of musculoskeletal and joint examination. They can all be found on this web link:

http://www.arthritisresearchuk.org/health-professionals-and-students/video-resources/rems.aspx.

The ARC videos can also be found on Youtube.

Youtube videos made by Macleod:

Macleod's knee examination: https://www.youtube.com/watch?v=wOpIC9qMfrU
Macleod's examination of the hand: https://www.youtube.com/watch?v=0TQkZwZ-xQE
Macleod's examination of the Hip joint:
https://www.youtube.com/watch?v=zxk6OJhsxCg
Macleod's examination of the shoulder:
https://www.youtube.com/watch?v=clmF_rM49ao
Macleod's examination of the cervical spine:
https://www.youtube.com/watch?v=vomRVWPYXfY
Macleod's examination of the thoracic and lumbar spine:
https://www.youtube.com/watch?v=3UhKFcR1Wbs
Musculoskeletal System Examination, GALS, gait arms legs spine examination, Rheumatology:

https://www.youtube.com/watch?v=b8eSqR9Pu24

General textbooks on Clinical Examination

These are suitable for 'Medicine' as well and will complement the teaching you receive on clinical examination. There are a number of similar textbooks.

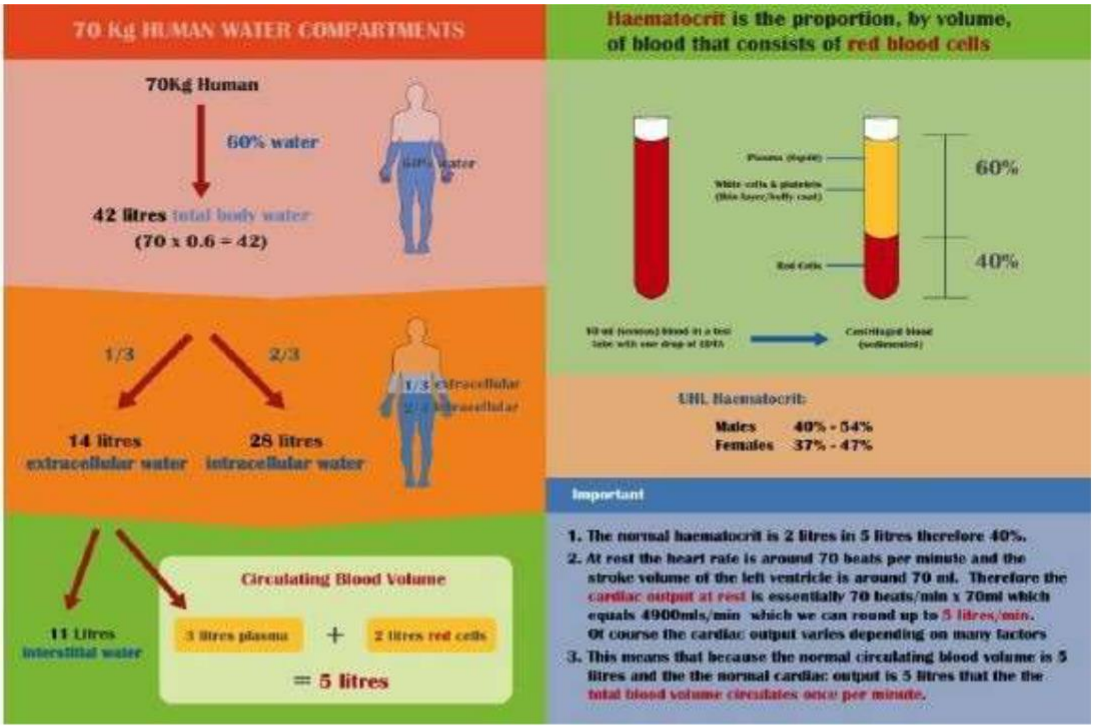
Macleod's Clinical Examination, 13th Edition. Available via Clinical Key:
https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20110697327
Macleod's Clinical Examination. Chapter 13 The Musculoskeletal system
https://www.clinicalkey.com/#!/content/book/3-s2.0-B9780702047282000148 Clinical Examination, 4th edition by Epstein.
https://www.clinicalkey.com/#!/browse/book/3-s2.0-C20090442818

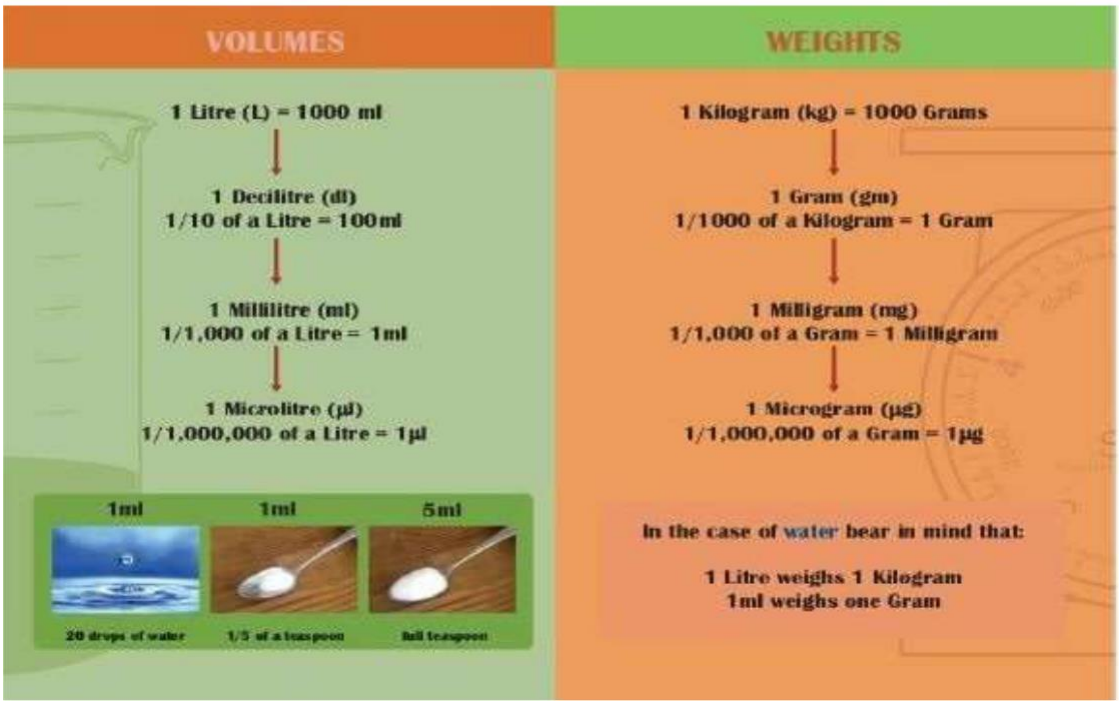
The Care of the Surgical Patient

1. Fluid prescription and nutrition in the surgical patient

Assessing the fluid requirements of a patient and prescribing fluids is one of the most important tasks of a doctor. The principles are straightforward providing that you have a clear understanding of the underlying physiological principles.

First, remind yourself of the normal fluid compartments in the body:





Second, revise the concept of osmolality:

Osmolality

- For practical purposes in medical use the terms osmolarity and osmolality are interchangeable. Osmolality is used in clinical practice.
- Serum/urine osmolality is measure using a freezing point depression technique

Normal plasma osmolality is **290** mOsmol/kg as measured by freezing point depression. The range is 285-295 mOsmol/kg

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Osmolality

- It is a function of the concentration of particles in solution. For this reason it is expressed in osmoles or milliosmoles (mOsm/kg)
- For glucose or urea the osmotic pressure is a function of the number of molecules present. For a solute that ionizes, such as NaCl which forms Na^+ and Cl^- then each mole in solution would provide 2 Osm.
- If a patient's plasma concentration of:
  - Sodium is 140 mmol/L
  - Potassium is 5 mmol/L
  - Urea is 5 mmol/L
  - Glucose is 5 mmol/L

The *calculated* total is 300 mOsm/kg. So on this occasion the calculated osmolality is close to the measured (which was 290 mOsm/kg)

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Serum Osmolality

Serum osmolality	Urine osmolality	Causes
Normal or increased	Increased	• Dehydration • Renal disease and uraemia • Congestive heart failure • Addison's disease • Hypercalcaemia • Diabetes mellitus/hyperglycaemia • Hypernatraemia • Alcohol ingestion • Mannitol therapy
Normal or increased	Decreased	• Diabetes insipidus
Decreased	Increased	• Syndrome of inappropriate ADH secretion (SIADH)
Decreased	Decreased (with no increase in fluid intake)	• Overhydration • Hyponatraemia • Adrenocortical insufficiency • Sodium loss (diuretic or a low-salt diet)

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Third, make sure that you know the composition of commonly used intravenous fluids:

Normal Saline and 5% Dextrose solutions

- Normal saline (0.9%) contains 150 mmol/l of sodium and 150 mmol/L of chloride. What is its calculated osmolality?
- Why is it called *Normal* Saline?
- A 1% solution contains 1 gram of solute per 100ml of solvent. So how many grams would a 5% solution contain in 1 litre?
- The molecular weight (molar mass) of glucose is 180 g/mol. How many moles in 1 litre of a 5% solution? How many millimoles in 1 litre of a 5% solution? What is the calculated osmolality therefore of a 5% dextrose solution?

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Question 1: If 1 gram of dextrose produces 14 kJ energy. How much energy is provided by 1 litre of a 5% dextrose solution? How many kJ does an average adult need? What happens to the dextrose given intravenously in a 5% dextrose solution?

Question 2: Do you think that the water in 5% dextrose is distributed amongst total body water or just extracellular water?

Question 3: Do you think that the water in Normal Saline is distributed amongst total body water or just extracellular water?

Question 4: What is the clinical significance of the above answers?

Question 5: Intravenous fluids prescribed in routine clinical practice are isotonic. What would happen to a patient's red cells if a hypotonic solution was given? What would happen to the red cells if a hypertonic solution was prescribed?

You should now understand that intravenous fluids need to be isotonic and that because the dextrose in 5% dextrose is metabolised to water that in effect it provides 'isotonic water'. The water is distributed throughout total body water. Normal saline is isotonic but because it contains sodium and chloride ions the water it contains is held in the extracellular water compartment. Please read the relevant pages in Essential Surgery. Managing physiological changes in the surgical patient.

There are nice guidelines on fluid management and daily fluid requirement / maintenance. You should familiarise yourself with the protocols. You will receive tutorials on fluid management during your peri-operative time.

Question 6: What factors may increase an individual's water losses?

The immediate postoperative phase (first 3 days)

Surgery is a major trauma and consequently the body mounts a trauma response.

Question 7: What is the body's physiological response to trauma?

Question 8: Using the answers to question 12, explain why potassium is not normally given in the immediate postoperative phase and why there is a normal postoperative phase of oliguria and sodium retention.

The approach to prescribing intravenous fluids

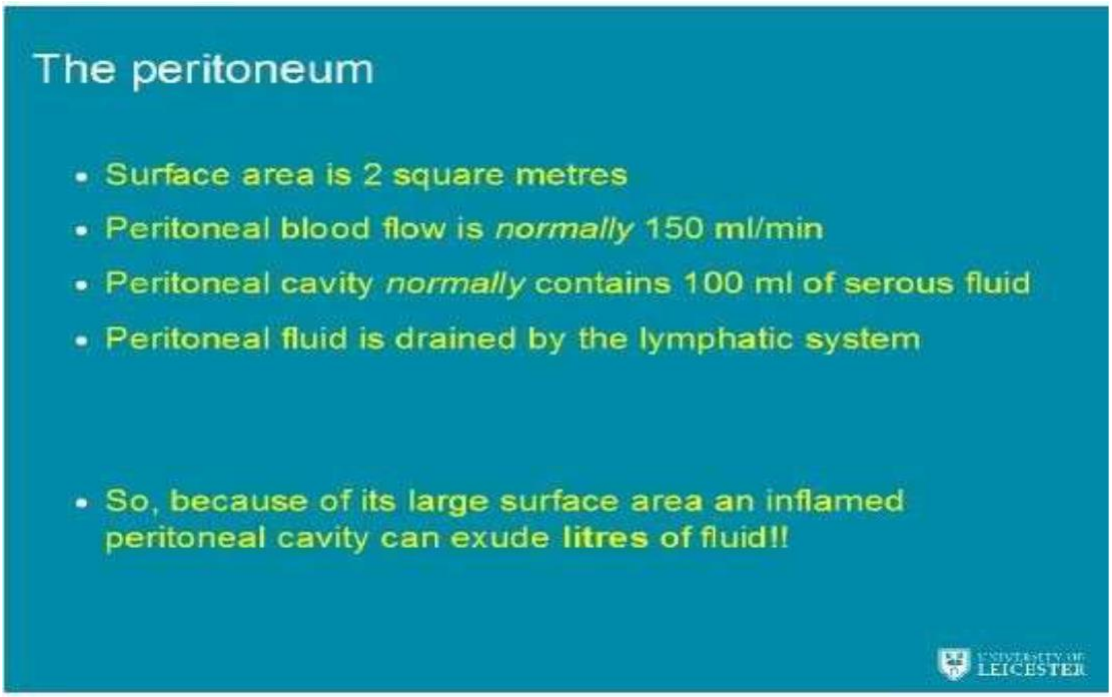
When prescribing intravenous fluids the following should be addressed in all patients:

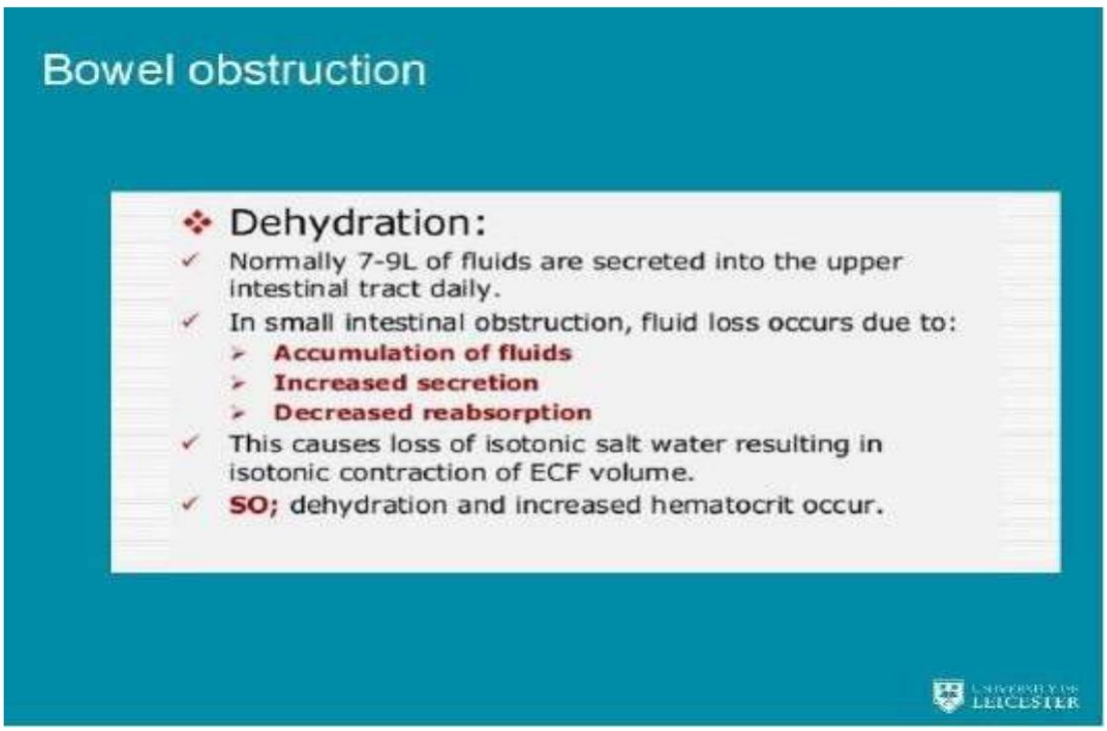
1. **Make sure that you look at the notes to understand the clinical setting**
2. **look at the patients most recent blood chemistry**
3. **Go and see the patient and inspect the fluid chart. Check the mathematics on the chart!!**
4. **Look at the patient's blood pressure chart.**
5. **Decide whether the patient is in a high risk group (renal and/or cardiac compromise, frail elderly)**
6. **Ask yourself if the patient is currently in balance or in deficit or surplus**
7. **If you are unsure about the current status assess the patient's hydration clinically**

Question 9: How can you clinically assess a patient's state of hydration?

The patient in fluid/electrolyte deficit

There are many reasons that surgical patients may be in fluid/electrolyte deficit, these include vomiting due to intestinal obstruction, fistulae, bleeding and peritonitis. The correction of fluid deficits in these patients is managed by experienced surgeons and anaesthetists. It is important however that you understand the principles. Please review the slides below:





It is possible to very quickly sequester 3 or 4 litres of isotonic fluid in the gut in bowel obstruction

When vomiting begins much of this is deposited in the sewers, leaving space in the gut for more to be sequestered

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This means that many patients are in hypovolaemic shock by the time of presentation because they may have lost up to 7 litres of fluid from their extracellular compartment (it has moved from the ECF to the gut lumen and then a proportion ends up in the sewers)

A raised haematocrit (>55%) and raised serum urea are useful indicators of dehydration in this context

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Bowel obstruction

- Isotonic hypovolaemia
- Vomiting leads to loss of hydrogen and chloride (HCl) ions which leads to a metabolic alkalosis
- Renal compensation for this metabolic alkalosis (loss of H+ ions) is to preserve H+ at the expense of potassium and thus hypokalemia ensues
- The end result is hypochloremic, hypokalemic metabolic alkalosis

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Fluid and electrolyte correction prior to anaesthesia

- Anaesthetic agents dramatically reduce sympathetic tone and many have a negative inotropic effect
- In a patient who is dehydrated the sympathetic nervous system is maximally activated to maintain vital organ perfusion. If the dehydration is not corrected prior to anaesthesia then the patient may become profoundly hypotensive and die at the induction of anaesthesia
- Because many anaesthetic agents affect cardiac muscle/conduction function, correction of either hypokalemia or hyperkalemia is also very important prior to anaesthesia

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Question 10: Why does the serum urea increase relative to the serum creatinine in dehydration?

Question 11: What can be measured in order to guide fluid/volume replacement in patients with severe and/or complex fluid/volume disturbances?

Nutrition

Nutrition is essential for recovery from surgery. You should have a basic understanding of nutritional requirements, as many hospitalised patients will require supplementation or maintenance feeding. Read the relevant pages in Essential Surgery Managing physiological changes in the surgical patient

Dietician: A dietician is attached to most wards. Introduce yourself to the dietician. If the dietician reviews your patient make sure you are involved in the discussion. Ask the dietician what factors they are considering. Spend time with dietician and observe the Total Parenteral Nutrition (TPN) team.

Question 17: What are the consequences of starvation prior to surgery?

Question 18: What additional demands does surgery place on the nutritional status of the body?

Question 19: What are the average daily kilocalorie requirements for adult male & female patients?

Nutritional provision is generally divided into enteral (feed delivered into the GI tract) and parenteral (feed delivered intravenously), often called TPN (total parenteral nutrition). The enteral route is always the preferred option if feasible. There are some patients where this is not possible, when the GI tract is not intact or is not functioning (ileus, fistula, massive small bowel resection). In these situations, the parenteral route is used.

Question 20: What are the disadvantages or complications associated with parenteral feeding?

The table below lists the various routes of enteral feeding.

Suggest when each may be used (type of patient or condition) and what its main benefit is.

Route of administration	When used?
Oral	
Nasogastric	
Nasojejunal	
Gastrostomy (surgical or PEG)	
Jejunostomy	

PEG = percutaneous endoscopic gastrostomy

2. Pain – Assessment and Management

The assessment and management of pain is a key task for any foundation doctor working on a surgical ward.

You MUST note and review how pain is managed in the following settings:

- **The management of a patient presenting acutely o The management of pain as part of anaesthesia o The management of pain in the immediate post-op period o The management of pain during the recovery phase of surgery**

Note the analgesia prescribed for the patients you are helping to look after on the ward. Look up some basic pharmacology on the drugs used. Make a note of the principles of action and the main side effects.

Understand how pain is assessed.

Know what to do if pain is not adequately controlled.

<u>TASK</u>

Formulate post-operative pain relief plans for patients undergoing different types of surgery Discuss the potential side effects and complications of proposed analgesia plans with your supervising anaesthetist.

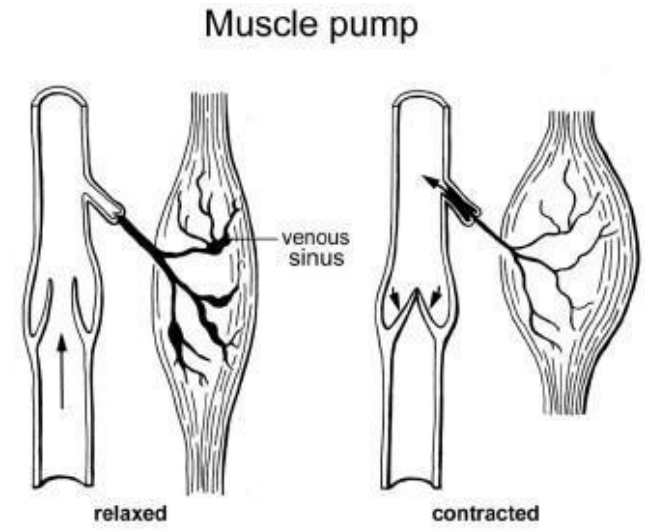
You must seek opportunities to attend ward or clinic review by the hospital pain team. This will help you to gain knowledge and skills in dealing with pain management issues (physiology, pharmacology, social and psychological issues related to pain management).

3. Management of the surgical patient on anticoagulants

Fatal pulmonary embolism is the commonest cause of preventable death in surgical patients. The Department of Health states that postoperative PE causes 25,000 deaths per year in the UK. Because the majority of these deaths are preventable the Department of Health requires hospitals and their staff to provide appropriate thromboembolism prophylaxis for all surgical patients. The NICE guidelines are available at NICE guidelines on DVT prophylaxis. Essential Surgery contains a section on DVT prophylaxis at Essential Surgery.

Why does surgery lead to DVT?

There are numerous reasons that surgery leads to DVT, however all of them require an understanding that nearly all surgical DVTs originate in the calf veins. You will recall that the Soleus and Gastrocnemius muscles contain venous sinuses that are critical to the function of the calf muscle pump and that the calf muscle pump is the single most important mechanism through which venous blood from the lower limb returns to the heart. See below:



Venous sinuses: effect of contraction of calf muscle

The other important fact to recall is that stasis of blood in veins may lead to thrombosis. This is a protective response in the sense that if a vein is bleeding then as the flow decreases thrombosis ensues and hopefully occludes the site of bleeding. Without appropriate prophylaxis surgical patients are at risk of developing thrombi in their soleal and gastrocnemius venous sinuses that may then propagate and extend proximally. As the thrombus extends into the popliteal and superficial femoral veins the risk of pulmonary embolism markedly increases. 'Classically' pulmonary embolism occurs 10 to 12 days postoperatively when the patient is straining at stool (because the venous pressure waves during straining cause the thrombus to fracture and embolise to the pulmonary circulation). Finally, do not forget that surgery is a major trauma and that one component of the body's response to trauma is to swing the thrombotic/thrombolytic pathways in favour of thrombosis.

Question 1: What preoperative factors do you think will increase the risk of postoperative DVT?

Question 2: What intraoperative factors do you think increase the risk of postoperative DVT?

Question 3: What postoperative factors do you think increase the risk of postoperative DVT?

Now that you have thought about the answers to the above questions look at NICE guidelines on DVT prophylaxis and Essential Surgery and make sure that you understand why certain groups of patients are defined as high risk of postoperative DVT. If you do not understand why some groups are at high risk then discuss with your supervising surgeons/anaesthetists.

How can postoperative DVT be prevented?

Fortunately, since the early 1990s the majority of postoperative DVTs can be prevented by the use of pharmacological prophylaxis (low molecular weight heparin). However, the following methods to reduce postoperative DVT always have been, and remain critically important:

1. **Pre-operative mobilisation - maintain mobility as close as possible to the time of surgery**
2. **Postoperative mobilisation – mobilise as soon as possible after surgery**
3. **Graduated compression stockings (GCS), also called anti-embolism stockings (AES)**
4. **Intraoperative intermittent calf compression**
5. **Maintain hydration**
6. **Stop pro-thrombotic drugs (such as the combined oral contraceptive pill)**

Question 4: How do graduated compression stockings reduce the risk of DVT?

The biggest advance in the prevention of postoperative DVT came as a result of randomised studies in the late 1980s that conclusively showed that low dose heparin around the time of surgery markedly reduces the risk of postoperative DVT. The rationale behind this approach was to find a dose of heparin small enough not to increase the risk of perioperative haemorrhage but anticoagulant enough to reduce thrombosis in the calf veins. It has been shown that low molecular weight heparin (LMWH) in a prophylactic dose reduces the risk of DVT by 95%. The commonest LMWH used for DVT prophylaxis in surgical patients is Dalteparin. There are NICE guidelines on DVT prophylaxis. In addition, all hospitals have their own DVT prophylaxis policy that you should follow. It has been shown that LMWH works synergistically with graduated compression stockings. All patients should be considered for graduated compression stockings in addition to LMWH.

Points to note:

1. **Randomised studies have shown that LMWH started within 12 hours of surgery finishing is as effective as LMWH started preoperatively**

Question 5: Explain the above

2. **There are 2 doses of prophylactic Dalteparin, 2,500 units and 5,000 units given subcutaneously once daily. The larger, 5000 units dose, is for high risk patients. In UHoL 85% of patients are high risk and all patients are therefore given the 5,000 units dose**
3. **Note that 4 hours must have elapsed since the insertion of an epidural before the administration of LMWH**

Question 6: Explain the above

4. **Although day case patients do not generally require LMWH, patients having laparoscopic day case procedures should receive LMWH (2,500 Units)**

Question 7: Explain the above

5. **There is no need to monitor anti-Xa levels in patients receiving prophylactic Dalteparin**

Question 8: If there is significant renal impairment (eGFR < 30 ml/min) does the dose of prophylactic Dalteparin need to be reduced? How does this compare with therapeutic Dalteparin? You may find the following link useful Prophylactic Dalteparin.

Question 9: What groups of surgical patients should receive prophylactic Dalteparin for up to 35 days after surgery?

Finally

Be sure to consider and understand the DVT prophylaxis being provided for all of the surgical patients that you encounter. If there is no prophylaxis provided then ask why not? – You might prevent a patient dying from a fatal pulmonary embolism!!

4. Care of the diabetic surgical patient and the surgical patient on steroids

If at all possible, you must identify diabetic patients and follow them through their surgical journey. You must be able to understand the principles and rationales behind the perioperative management of diabetes.

Please read the pages in Essential Surgery on Diabetes mellitus – Chapter 8: Medical Problems: Medical Problems in patients with diabetes. The following guideline from Diabetes UK is very useful Diabetes UK perioperative care of diabetic patients and the UHL guidelines on Diabetes in surgical patients are here UHL guidelines on perioperative management of diabetes.

The hospital you are attached to may have their own guidelines. You have been set some questions to investigate. All can be answered by reference to textbooks (online or offline). However, you may wish to discuss your answers with your clinical teachers.

Background

The management of diabetes around the time of surgery requires an understanding of the body's response to surgery (which is best viewed as the same as the response to any other major trauma such as a road traffic collision or major injury), the requirement to starve patients prior to surgery and the risks of hypo and hyperglycaemia.

Question 1: In respect of glycogenolysis and insulin secretion, what is the body's response to severe trauma such as surgery? Would these responses tend to raise or lower blood glucose?

Question 2: What are the symptoms and signs of hypoglycaemia?

Question 3: Would these symptoms and signs be apparent during general anaesthesia.? Explain your answer.

Question 4: What could be the consequences of hypoglycaemia during anaesthesia?

Question 5: Would the body's responses to surgery increase or decrease the risk of ketoacidosis in diabetic patients in the intraoperative and postoperative period.

Question 6: What is the target range of intraoperative blood glucose? Below what value does a low intraoperative blood glucose require 'Rescue Treatment'? Above what level should intraoperative hyperglycaemia be treated (either new treatment or additional treatment)?

Patients need to be nil by mouth for 6 hours prior to surgery to reduce the risk of the aspiration of gastric contents at the induction of anaesthesia.

Question 7: Why is there a risk of aspiration of gastric contents at induction of anaesthesia?

Question 8: Why is aspiration of gastric contents into the respiratory tract so dangerous?

Now that you have answered the above questions you will understand that the blood glucose in diabetic patients must be tightly controlled and monitored in the perioperative patient. In general terms, in respect of perioperative management diabetes falls into three categories:

1. Diet controlled

Because of the need to starve prior to surgery and the fact that many surgical patients are nil by mouth for a few days postoperatively, by far the majority of diet controlled diabetic patients require no specific intervention. Blood glucose must be monitored daily by BM stix. If the blood glucose rises above 11 mmol/L then advice should be sought from the diabetes team

2. Oral Hypoglycaemics

The commonest agents are Metformin and Gliclazide. The half-life of Metformin is 6 hrs and Gliclazide is 10 hrs.

Question 9: How many half-lives does it take for a drug to be totally cleared from the blood?

A potential risk with oral hypoglycaemic agents is intraoperative hypoglycaemia. Now that you have answered Question 8, examine Appendix 2 in UHL guidelines on perioperative management of diabetes and ensure that you understand the rationales behind the recommendations.

3. Insulin

The length of action of subcutaneous insulins depends on their formulation. You will see on page 31 of the UHL guidelines on perioperative management of diabetes recommendations for various types of subcutaneous insulin in the perioperative situation. You do not need to remember the specific recommendations, however, make sure that you understand the rationales behind the recommendations.

You will see on page 21 that the indications for a Variable Rate Insulin Infusion (VRII) are:

1. **Patients anticipated to have a long starvation period (i.e. 2 or more missed meals)**
2. **Decompensated or poorly controlled diabetes**

Question 10: What is the half-life of intravenous insulin?

Question 11: Use the answer to question 9 to help you explain why the two situations above are best managed with a VRII.

Question 12: Why do guidelines for fluid administration alongside a VRII recommend a solution containing glucose and potassium (e.g 5% dextrose with 20 mmol/l of potassium)?

Question 13: How many calories (kcal or kJ) does a litre of 5% dextrose contain?

Finally, do not forget that many patients are expert at the management of their diabetes and you must listen to them and explain what and why you are changing their regimen temporarily!

Management of steroids around surgery

Patients may be on long-term steroids for a number of reasons such as transplantation or polymyalgia rheumatica. Exogenous steroids cause hypothalamo-pituitary (HPA) axis suppression. The likelihood of HPA suppression depends on the potency of the steroid, the dose of steroid and the length of administration. It can be assumed that patients who are more likely to develop HPA axis suppression are those who receive high doses (>20-30mg prednisolone or equivalent) of systemic steroids for long periods (>3weeks) and those who appear to have Cushingoid features.

Question 1: Why do exogenous steroids cause HPA suppression?

Question 2: What normally happens to serum ACTH after a major trauma such as surgery?

Question 3: What is the benefit to the patient of your answer to Question 2?

Question 4: Describe Cushingoid features?

Many patients undergoing surgery are nil by mouth and cannot take their oral steroids.

Question 5: What is the Eponym of the crisis that may occur if a patient whose steroids are suddenly stopped undergoes a trauma such as surgery?

Question 6: Describe the clinical and biochemical features of your answer to question 5?

Question 7: Why is it very difficult to detect such a crisis in the operative and postoperative situation?

Given that it is very difficult to detect hypoadrenalism in the operative and postoperative situation, patients on exogenous steroids who cannot continue their oral medication are given intravenous steroids to 'cover' the intra and postoperative phases. A common regimen is 25 mg of hydrocortisone IV four times a day.

Question 8: Given that IV hydrocortisone has to be given four times a day, estimate the plasma half- life of hydrocortisone. See Hydrocortisone Data Sheet

Finally, always discuss these patients with the anaesthetist because he/she will need to provide cover at induction and during anaesthesia.

5. Use of antibiotics

Identify a patient where prophylactic antibiotics were prescribed.

Which antibiotics were prescribed and for what duration. You should copy out the prescription. Why were those particular antibiotics used?

Did the ward to any screening for microbes or drug resistant microbes prior to surgery?

What screening policy does the Ward follow?

Identify a patient who developed a fever post-operatively. What assessment of the patient took place?

What was the initial clinical assessment (prior to investigations)? What investigations were performed and what were the results? Did the investigations alter the management?

What was the patient/s course and outcome of the fever?

Identify if the hospital you are attached to has a 'Sepsis' policy?

What clinical features identify a patient with potential sepsis?

Review the lecture from the Induction week and Essential Surgery Chapter: Diagnosis and management of common postoperative problems has a few pages on post op fever – https://www.clinicalkey.com/#!/content/book/3-s2.0-B9780702046742000111

6. Management of post-op complications including cardiorespiratory, renal, CNS, wound, bowel and nausea and vomiting.

This is a fundamental part of your work looking after patients on a surgical / orthopaedic ward. You must identify and review the common and important post-op complications that you see.

As a minimum you need to have an approach to:

- **A post-op patient presenting with shortness of breath**
  TASK: Discuss with a member of staff the reasons why a patient may become hypoxic on the ward post-operatively

  TASK: Review with staff the difference between an airway problem and a breathing problem and understand how to assess and treat them. As part of this key task should be able to perform bag mask ventilation on a patient with a straightforward airway. If this is not taught to you ask if the anaesthetist linked to your unit or to the teaching can cover this. It is ideal to be taught in the skills unit.
- **A post-op patient with poor urine output**
- **A post-op patient who is confused**
- **A post-op patient with a problem relating to their wound**
- **A post-op patient with constipation or diarrhoea**
- **A post-op patient with nausea and vomiting**

TASK: Identify which patients are at high risk of post-operative nausea and vomiting and formulate a plan to prevent and/or treat this

All of the above should be identified as part of your routine work on the ward. Talk to the nurses, junior doctors and consultant staff about these issues and how best to approach the problem.

See how each problem is assessed. What clinical features do you look for? What investigations are ordered? If your patient has investigations for any post-op complication, make sure you review the results as soon as they are available. Do the investigations alter any planned management?

Post-operative complications may be linked to the surgery, the anaesthetic or the underlying clinical condition and the patients pre-existing medical problems. It is often a combination of factors.

Anaesthetic-related problems: This link gives access to patient information leaflets about post-op complications and side effects that might be useful. https://www.rcoa.ac.uk/node/428

Problem solving exercise:
Mr X has had a laparotomy (abdominal operation) to remove a tumour. Post-operatively on the ward he becomes hypotensive.
Discuss the possible causes and then how you would approach the patient to reach a diagnosis.

Mr X is pale, agitated, tachypnoeic and tachycardic with a low urine output and distended abdomen. What is the most likely cause and what would be your initial treatment

Review the chapter from Essential Surgery: Diagnosis and management of common postoperative problems. https://www.clinicalkey.com/#!/content/book/3-s2.0-B9780702046742000111

7. Blood Transfusion

About fifty percent of all blood/blood product use occurs in the peri-operative period. There is an increasing drive to reduce the use of allogenic blood/blood products for a multitude of reasons. These include cost of the products, adverse reactions associated with their use and infective complications. Whilst there are ways in which allogenic transfusions may be minimized, until there is a viable substitute for blood, allogenic transfusions remain a cornerstone of practice.

Review the lecture given during the Induction week as well as the specialist Haematology teaching

Essential Surgery has a useful chapter: Blood Transfusion

https://www.clinicalkey.com/#!/content/book/3-s2.0-B9780702046742000093

You MUST identify a patient requiring a blood transfusion.

Ways to avoid transfusion for surgery.

In what ways may haemoglobin concentration be increased prior to surgery? How long do pharmacological manipulations take to have an effect?

How may the need for blood transfusions may be reduced during major surgery.

8. Early Warning Score (EWS) and the assessment of the critically ill patient.

The use of Early Warning Scores and the assessment of an acutely ill patient on the ward is an important task for foundation doctors and for all the staff on the ward.

You will cover the management of acutely ill patients again in other blocks and they will be the focus of the Acute Care Block.

You should use the opportunity of observing staff on the ward assess and manage acutely ill patients, being aware that the care of the patient is the priority.

If you have a teaching session with an Anaesthetist, you could ask them to go over their approach to managing an acutely ill patient. The focus is on following an ABCDE approach.

EWS web link for copies of the National Early Warning Score charts and basic information: https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news

Clinical Anaesthesia Lecture Notes Chapter 8 is on "The Acutely ill adult patient on the ward". https://ebookcentral-proquest-com.ezproxy4.lib.le.ac.uk/lib/leicester/detail.action?docID=120614

The following is taken from Clinical Anaesthesia Lecture Notes Chapter 8:

In order to treat acute illness or the deterioration in a patient's condition, it first has to be recognized, often by the ward nurse in response to routine clinical observations. In the 1990s formal clinical scoring systems, often termed Early Warning Scoring Systems (EWS), were introduced to facilitate the process of assessing illness severity, 'flagging up' patients for urgent medical assessment and monitoring response to treatment. In 2007 the National Institute for Health and Clinical Excellence (NICE) published its recommendation that 'Physiological track and trigger systems should be used to monitor all adult patients in acute hospital settings.' All EWS systems are based on the premise that acute physiological deterioration precedes the development of life-threatening acute illness and cardiorespiratory arrest. Simple observations relating to the physiological and clinical status of the patient that can be performed at the bedside on a general ward are recorded and scores are allotted for each observation based on reference to a scoring table. NICE recommends that the minimum dataset should include: heart rate; respiratory rate; systolic blood pressure; level of consciousness; temperature; peripheral oxygen saturation.

Urine output is often also included. Another subjective category is sometimes added to include any patient about whom there are serious concerns, independent of the objective scoring assessment. The importance of this latter point cannot be overemphasized, particularly when the concern is voiced by an experienced nurse who 'doesn't like the look of' a particular patient. Although not a simple bedside observation, measurement of serum lactate concentration can provide valuable additional information. The individual scores derived from each variable are aggregated and trigger thresholds are set that

mandate action (for example, the ward nurse must contact the Foundation doctor who must attend the patient within a specified time frame).

NICE recommends a graded response dependent on whether the aggregated score is low, medium or high: low score – increased frequency of observations and nurse in charge notified; medium score –urgent call to patient's primary medical team; high score – emergency call to medical emergency team/critical care outreach team. The main advantages of such scoring systems are: simplicity, with the need for only the basic monitoring equipment, normally present on any acute hospital ward; reproducibility between different observers; staff require a minimum of training; their applicability to trainee doctors, nurses (both qualified and student) and other health professionals.

Clinical scoring systems are undoubtedly useful but they cannot be relied upon to the exclusion of sound clinical judgment. They fail to identify patients who are at risk (false negatives, low sensitivity) and identify patients as being at risk when they are not (false positives, low specificity).

Gwinnutt, Carl L., and Matthew Gwinnutt. Clinical Anaesthesia: Clinical Anaesthesia, John Wiley

& Sons, Incorporated, 2012. ProQuest Ebook Central,

http://ebookcentral.proquest.com/lib/leicester/detail.action?docl

D=1120614. Created from leicester on 2017-12-14 01:56:17.

9.Consent

You MUST take the opportunity to observe the consent process in a range of settings:

- **In an emergency setting • In an out-patient setting**
- **On the ward.**

The notes below provide some background to the ethical and legal issues relating to consent and highlight some of the changes brought in as a consequence of the Montgomery judgement.

The basics:

- **Consent is a precondition of autonomous decision making and is a requirement of lawful medical treatment.**

This is important because:

- **A doctor (or medical student) who intentionally touches a patient without consent can commit both a tort (a wrongful act or civil wrong which results in someone suffering a loss or harm) and a crime (i.e. subject to criminal law). All health professionals undertaking medical treatment must obtain valid consent.**
- **Failure to do so can give rise to action for battery or negligence (i.e. Tort) and can constitute battery or a crime of assault.**

Consent allows for a patient to have autonomy over their body and guards against paternalism, all too evident in medicine past.

<u>Preconditions for consent.</u>

The basics:

- **For a decision to be autonomous a patient must be able to freely state their consent having received appropriate information and having the required level of understanding.**

For consent to be legally valid, the following three requirement must be met:

- **Patient must give consent voluntarily (i.e. no overt or covert coercion)**
- **Have the capacity to consent. (if a patient is assessed as not having capacity, attempting to obtain consent will be futile)**
- **Understand the nature of the treatment in question (i.e. broadly aware of what is being consented to and this will include the nature and purpose of the treatment).**
- **Note: the mere signing of a consent form does not satisfy the necessary and sufficient conditions for valid consent. Informed consent is an open and meaningful communication transaction between a health professional and their patient.**

Patients may withdraw their consent at any time. If, after giving consent (and signing the form), a patient changes their mind and no longer wishes to go ahead with the operation, then the doctor no longer has a valid consent to treatment.

In 2015 in the case of Montgomery (see below) the law of informed consent was changed and seven Supreme Court justices unanimously abandoned a medical professionals test in determining whether a patient had been appropriately informed before treatment.

The Montgomery judgement clarified that doctors must now ensure that patients are aware of any 'material risks' involved in a proposed treatment, and of reasonable alternatives. As Lord Kerr and Lord Reed clarified:

"The test of materiality is whether, in the circumstances of the particular case, a reasonable person in the patient's position would be likely to attach significance to the risk, or the doctor is or should reasonably be aware that the particular patient would be likely to attach significance to it.

Let's summarise:

- **The consent process concerns individual patients. As we have seen from above it is not about the 'reasonable' doctor (Bolam) advising a 'reasonable' patient.**

To ensure informed consent is obtained:

- **A doctor must fully advise a patient of their treatment options and the material risks and benefits of each option.**
- **Patients must be given time to consider advice, reflect on their own individual life circumstances, wishes and advise their doctor what they would like to happen.**
- **Patients have the right not to go with the options provided and they need not give a reason for this It is sometimes worth asking for reasons (without undue pressure) since a refusal could hide an anxiety or details which given an opportunity for further discussion, could be resolved.**

What the Montgomery judgement has highlighted is the idea of 'material risk' of treatment options. The courts will consider this on a case by case basis by looking at the particular facts when deciding if;

- **A reasonable person in that patient's position would be likely to attach significance to the risk, or**
- **The doctor is reasonably aware that in this particular patient would likely to attach significance to the risk.**
- **In other words, the standard is what information a particular patient needs from their doctor to consider their position and arrive at decision.**
- **It is important to remember that language barriers in the NHS may result in patient not having given lawful consent, because there has been lack of understanding.**

Resources for you:

Judgement from the Supreme Court: Montgomery (Appellant) v Lanarkshire Health Board (Respondent) (Scotland) Hilary Term [2015] UKSC 11. The judgement is available for you on Blackboard.

For those who are visual learners, you can follow the case as the judgement was recorded. It will give you a feel for the Supreme Court in action and its impact on your future professional practice - https://www.youtube.com/watch?v=t5NcXFwX23Q

For a more detailed commentary on the implications of Montgomery go to: https://www.youtube.com/watch?v=omsbVFPrlYQ https://youtu.be/5J5iMDWtNzE?t=33 - This is a short video produced by the Medical Defence Union (MDU)

10. Use of Imaging

X- ray as part of a pre-op assessment of if there are respiratory or cardiac problThe use of imaging has revolutionised clinical care over the past 20 years.

Imaging provides a unique insight into anatomy and pathology.

You MUST go with your patient to the Radiology Department if any imaging is ordered. Speak to the radiologist or radiographer and ask if you can observe. You must also ask the patient for consent to do this. You may have to observe from a distance for safety reasons, but this is still valuable.

You must then look up the imaging result and review this with the report.

You are expected to report on a standard Chest X-ray, a standard Abdominal X-ray and a bone or joint X-ray by the end of Year 3. The surgical block will provide opportunities to review abdominal X-rays and x-rays of bones and joints. Many surgical patients will have a chest x-ray as part of their pre-op assessment or to evaluate a post-operative complication and you should take the opportunity to review the imaging.

You will also have the opportunity to see a range of cross-sectional imaging. This is extremely valuable. However, you will not be asked to report a CT Scan or a MRI scan in the Year 3 examination.

The sections below on the Chest X-ray, the Abdominal X-ray and Musculoskeletal radiology provides some basic information to provide a starting point.

In addition there will be an opportunity to attend virtual teaching session on imaging. Details will be disseminated via the UG coordinators

THE CHEST X-RAY (taken from Chest X-rays for Medical Students by Christopher Clarke, Anthony Dux)

The interpretation and reporting of a Chest X-ray will be common in your Medicine Apprenticeship block and you will have an opportunity to link a range of chest pathologies with findings on the Chest X-ray. However, a number of surgery patients will have a Chestems identified post-operatively.

The initial focus of your learning should be to identify the NORMAL anatomy of the Chest X-ray. If you are able to do this then you will always be able to work your way through the process of reporting on the Chest X-ray. And this standard process will ensure you pass any question in the exams, even if you do not fully identify the pathology.

Presenting a Chest X-ray

You should present a chest radiograph in a systematic way to ensure you cover all areas and do not miss anything important.

How you should present:

e.g. "This is a PA Chest X-ray of John Smith taken on the 1st January2019"

1. **Give the type of radiograph and projection**
2. **Give the patients name**
3. **Give the date the X-ray was taken**
4. **Briefly assess the film quality to ensure it is adequate**
5. **Run through the ABC of chest radiology**
6. **Give a short Summary at the end.**

ABC of Chest Radiology

A is for Airway

- **Look at the trachea, right and left main stem bronchi and right intermediate bronchi**

B **is for Breathing**

- **Look to see if the lungs uniformly expanded and compare the lung fields**
- **Look around the edges of each lung**
- **Look at the 4 silhouettes**

C **is for Circulation**

- **Look at the cardiac size**
- **Look at the great vessels (pulmonary vessels and aorta)**
- **Look at the mediastinum and hila**

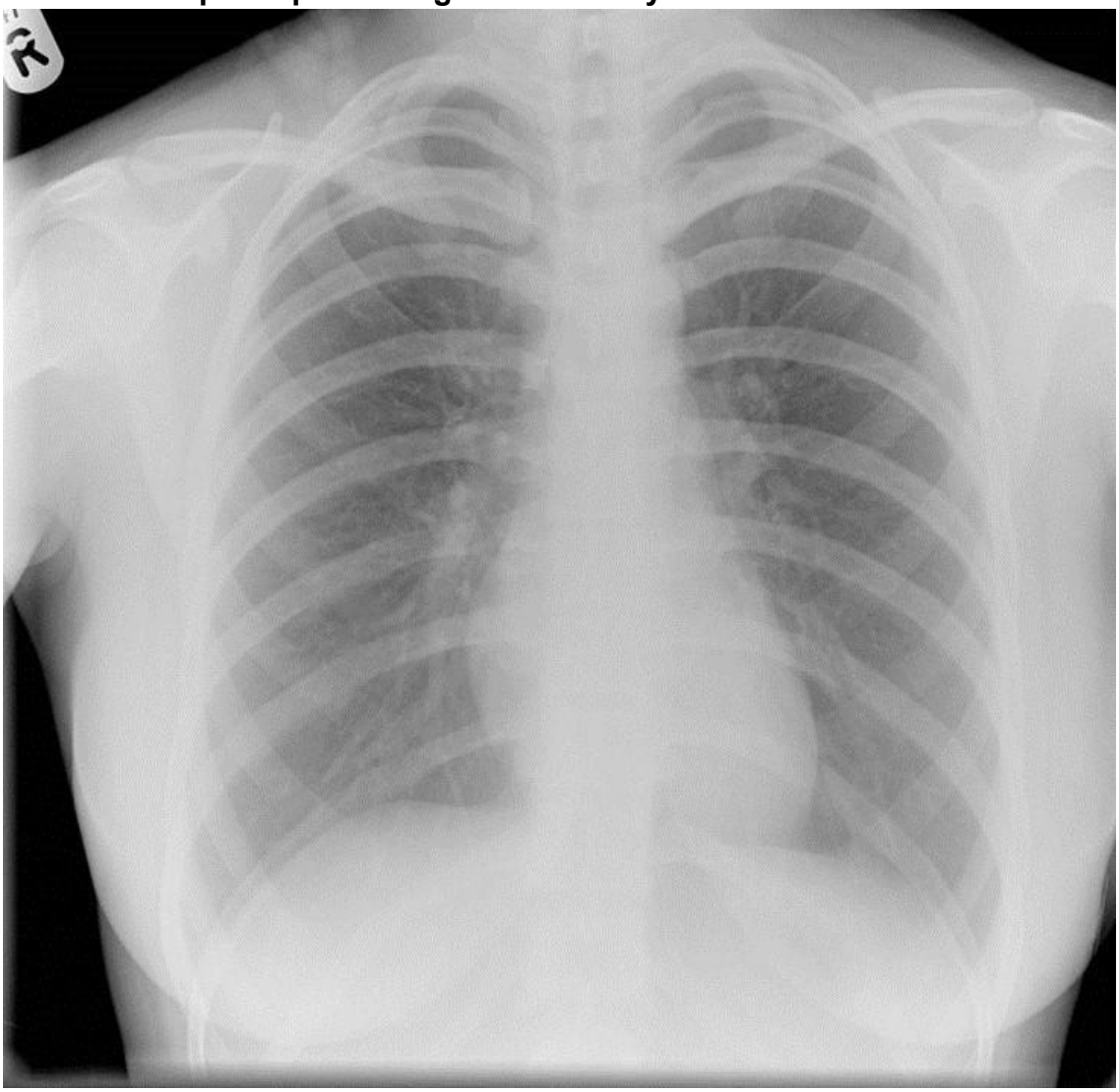
D is for Disability

- **Look for a fracture, especially of the ribs and shoulder girdle**

E **is for Everything else**

- **Look for air under the diaphragm**
- **Look at the edges for surgical emphysema**
- **Look for the breast shadows**
- **Look for foreign bodies and other 'unnatural presences'**

Example of presenting a Chest X-ray



Name: Mrs L.A. Age 50 years; Date taken 3/11/2017

"This is a PA chest X-ray of Mrs LA, taken on the 3rd November

2017 The patient is not rotated and there is adequate inspiration

A: The trachea is central
B: The lungs are uniformly expanded and the lung fields are clear

C: The heart size is normal. There is no mediastinal shift. The mediastinal contours and hila appear normal.

D: There is no fracture or bony abnormality

E: There is no evidence of air under the diaphragm, surgical emphysema or any foreign body

In summary, this is a normal chest x-ray"

THE ABDOMINAL X-RAY (taken from Abdominal X-rays for Medical Students by Christopher Clarke, Anthony Dux)

Indications for an abdominal X-ray
Only request an abdominal X-ray if it is the most appropriate test to answer the clinical question. Indications for a plain abdominal X-ray are as follows:

Suspected bowel obstruction - To look for dilated loops of small or large bowel or a dilated stomach.

Suspected perforation - To look for evidence of pneumoperitoneum. An erect chest X-ray should always be requested at the same time to look for free gas under the diaphragm.

Moderate-to-severe undifferentiated abdominal pain - May be useful if the provisional diagnosis includes any of the following: toxic megacolon, bowel obstruction and perforation.

Suspected foreign body - To look for the presence of radiopaque foreign bodies.

Renal tract calculi follow-up - To look for the presence or movement of known renal tract calculi.

For most other clinical situations, an abdominal X-ray is not recommended as there is a more appropriate alternative test. Common examples include:

- **Abdominal trauma: A CT scan of the abdomen and pelvis with intravenous contrast is much more sensitive and specific at looking for evidence of solid organ, bowel or bony injury and may identify the site of significant active bleeding.**
- **Right upper quadrant abdominal pain: An ultrasound scan of the abdomen is recommended to look for evidence of gallstones, inflamed gallbladder or an obstructed common bile duct.**
- **Suspected intra-abdominal collection: A CT scan of the abdomen and pelvis is recommended to look for a source of infection (collection of pus or fluid).**
- **Acute upper gastrointestinal bleeding: Endoscopy is indicated and enables diagnosis in most cases and can be used to deliver haemostatic therapy. If initial endoscopy is negative, then angiography or CT angiography may be useful to identify the source of the bleeding.**
- **Suspected intra-abdominal malignancy: A CT scan of the abdomen and pelvis is recommended to look for a malignancy and can be used to help stage the malignancy If found.**
- **Constipation: This is usually a clinical diagnosis without the need for any imaging tests. There is no evidence correlating abdominal X-ray findings with constipation. The only exception is in elderly patients where an abdominal X-ray may be useful to show the extent of faeca limpaction, but does not diagnose constipation.**

Reporting an Abdominal X-ray:

The following is the standard format you should follow when reporting the X-ray:

1. **Give the patient's name**
2. **Give the type of radiograph. e.g. "This is an AP supine abdominal**
3. **Give the date the radiograph was taken.**
4. **Briefly assess the radiograph quality to ensure it is adequate.**
5. **Run through the ABCDE of abdominal radiographs**
6. **Give a short summary at the end**

Overview of the ABCDE of abdominal radiographs

It is important to use a systematic approach when looking at an abdominal radiograph. The following ABCDE approach is easy to remember, so when it comes to your exams and you have a moment of panic after being asked to talk about an abdominal X-ray, you can stick to these basics, even if you don't have a clue what's going on!

A is for Air in the wrong place

- **Look for pneumoperitoneum and pneumoretroperitoneum**
- **Look for gas in the biliary tree and portal vein**

B is for Bowel

- **Look for dilated small and large bowel**
- **Look for a volvulus**
- **Look for a distended stomach**
- **Look for a hernia**
- **Look for evidence of bowel wall**

thickening ### C is for Calcification

- **Look for clinically significant calcified structures such as calcified gallstones, renalcalculus, nephrocalcinosis, pancreatic calcification and an abdominal aortic aneurysm(AAA)**
- **Look for a foetus (females)**
- **Look for clinically insignificant calcified structures such as costal cartilage calcification, phleboliths, mesenteric lymph nodes, calcified fibroids, prostate calcification and vascular calcification**

D is for Disability (bones and solid organs)

- Look at the bony skeleton for fractures and sclerotic/lytic bone lesions
- Look at the spine for vertebral body height, alignment, pedicles and a 'bamboo spine'
- Look for solid organ enlargement

E is for Everything else

- Look for evidence of previous surgery and other medical devices
- Look for foreign bodies
- Look at the lung bases

Musculoskeletal X-rays

Basic principles of requesting plain radiographs of bones and joints Which structures?

"Before requesting an X-ray, the clinician should already have a good idea of the likely nature of the clinical problem and which musculoskeletal structures may be affected and what may or may not be visualised on an X-ray. For example, radiographs are best at detecting pathological changes in bones, joints and cartilage, such as joint space narrowing, fracture, subluxation and dislocation. However, many soft tissue structures such as ligaments, tendons and synovium are not well visualised, and alternative imaging may be more appropriate to provide additional useful information to aid diagnosis and treatment.

Clinical assessment including the patient's symptoms and a physical examination will usually determine the site or region that is to be evaluated by X-ray. Exceptions may include a patient with rheumatoid arthritis where X-rays of both hands and feet may be used to evaluate the extent of disease or structural damage which may be repeated serially to compare any disease progression over time.

Which views?

It is important to consider which views are chosen to visualise a particular region of interest. This is because the X-ray beam creates a two dimensional shadow of a structure so selecting the correct view will maximise sensitivity. A basic principle is that two views should be requested, ideally 90° apart, which are usually obtained in antero-posterior (AP) and lateral or oblique views. This is particularly important in a trauma context where fracture or dislocation may be missed if only a single view is acquired but may be less important for the assessment of arthritis. There are a number of established techniques and protocols for optimal image acquisition using standardised views of most musculoskeletal sites.

Compare both sides and review previous images

Particularly in equivocal cases, it may be informative to compare findings in a symptomatic area with the same region on the opposite side of the body or to look at the same region on a previous X-ray. For example, in a patient with hip pain, an AP X-ray of the pelvis allows some comparison between both hip joints, or in a patient with rheumatoid arthritis, comparison with a previous X-ray of the hands allows interpretation of any progression of erosive joint damage.

Correlation with clinical and other imaging findings

Any X-ray findings always need to be interpreted in clinical context, with an individual's symptoms, clinical examination findings and any other investigation results in mind. It may be necessary to perform additional imaging using alternative techniques such as ultrasound, computed tomography or magnetic resonance imaging, which may offer important additional or confirmatory information.

Basic principles of examining and reporting plain radiographs of bones and joints

Everyone should have a straightforward strategy for reviewing and interpreting musculoskeletal X-rays, including some basic principles and a systematic approach that can be routinely followed. It can often feel intimidating to review, interpret and describe an Xray, but this need not be complex or jargon-heavy and confident use of simple descriptive language is all that is required. Undoubtedly, knowledge of musculoskeletal anatomy and understanding of pathological processes affecting bone, cartilage, joints and soft tissues will help, but a lot of information can be gained from describing any obvious abnormal or different appearances using simple descriptions, words and phrases. Even if you see an abnormality, it is still important to continue to evaluate the whole X-ray in case other findings are present. If an obvious change is not present or immediately apparent, then it is useful to be able to fall back on a standard framework with which to organise your thoughts and report your observations. An example of such an approach is outlined as follows:

1. **Check patient identification details and labelling.**
2. **Is the image quality satisfactory? Are imaging angles optimal?**

Describe any obvious abnormality using simple descriptive language.

3. **Name the specific bone (e.g. right tibia) and describe the location of any abnormality (e.g. proximal, middle or distal; head, neck or shaft; cortex or medulla). A combination of these terms and specific anatomical names should be used.**
4. **Use a systematic approach to consider specific musculoskeletal structures (bones, joints, cartilage and soft tissues).**
    - **Bone alignment – are there any changes in position which may suggest a fracture or dislocation?**
    - **Bone cortices – follow the outline of each bone as any breach in the cortex may indicate a fracture or an erosive arthritis.**
    - **Bone texture – Altered density or disruption in the usual trabecular pattern within the substance of the bone may indicate pathology.**
    - **Joint and cartilage – a careful look at the joint space may demonstrate changes such as joint space narrowing due to cartilage loss or calcification of the cartilage (chondrocalcinosis) or new bone formation (e.g. osteophytes in osteoarthritis).**
    - **Soft tissues – remember to look at the soft tissues as well as the bones as they can hold helpful clues. For example, it may be possible to see if joint swelling is present and, therefore, that there must be something significant wrong with that joint.**
5. **Review all views and X-ray images, compare both sides and adjacent joints and reexamine any previous imaging."**

Taken from: Musculoskeletal X-rays for Medical Students and Trainees by A. K. Brown and D. G. King

General and GI Surgical Cases

Investigation normal ranges

White Cell Count	4.0 - 11.0	$x10^9/L$
Red Blood Count	3.90 - 6.50	$x10^{12}/L$
Haemoglobin (New Units)	130 - 175	g/L
Mean Cell Volume	80.0 - 99.0	fL
Platelet Count	150 - 400	$x10^9/L$
Sodium	135 - 146	mmol/L
Potassium	3.5 - 5.3	mmol/L
Urea	2.5 - 7.8	mmol/L
Creatinine	60 - 120	umol/L
eGFR	>90	$mL/min/1.73m^2$
Albumin	35-50	g/l
Alkaline Phosphatase(ALP)	30 - 130	U/L
Alanine Transaminase(ALT)	10-49	U/L
Total Bilirubin	<21	umol/L
Amylase	<70	u/L
CRP	<5	mg/l
pH	7.35-7.45	
PaO2	10.5-13.5	kPa
PaCO2	4.7-6.0	kPa
HCO3-	22-24	mmol/L
Lactate	0.5-2.2	mmol/L
Base Excess (BE)	-2.0-2.0	mEq/L
Blood glucose	3.9-5.5	mmol/L
Adjusted calcium	2.2-2.6	mmol/L
Lactate dehydrogenase	140-280	Iu/L
INR	0.8-1.2	

Session 1

Case 1

Lianna, a 27-year-old woman attends the Surgical Assessment Unit at 16:00 following a referral by her GP. She has a 36-hour history of abdominal pain. The pain initially started in the periumbilical region and over the last 12 hours, has migrated to the right iliac fossa. She has lost her appetite and vomited gastric contents twice this morning. Her last menstrual period was 14 days ago. She has not noticed any vaginal discharge. She opened her bowels normally yesterday. She has no past medical or surgical history, takes no medications, and has no allergies.

On general examination she appears flushed, has a temperature of 37.9°C, pulse 90/minute, blood pressure 125/81 mmHg, respiratory rate 16/minute, O2 saturations 99% on room air. Capillary refill time is 2 seconds peripherally.

Abdominal examination reveals tenderness and guarding in the right iliac fossa. There are no palpable hernias.

- **What are the differential diagnoses for right iliac fossa pain in this patient?**

- **What investigations would aid diagnosis and why?**

The results of initial investigations are shown below:

White Cell Count	**18.5**	**x10^9/L**
Haemoglobin (New Units)	**124**	**g/L**
Platelet Count	**277**	**x10^9/L**
Sodium	**140**	**mmol/L**
Potassium	**4.2**	**mmol/L**
Urea	**5.9**	**mmol/L**
Creatinine	**88**	**umol/L**
Alkaline Phosphatase(ALP)	**80**	**U/L**
Alanine Transaminase(ALT)	**45**	**U/L**
Total Bilirubin	**15**	**umol/L**
Amylase	**84**	**u/L**

Urine dip:

Bld **negative**

Protein **negative**

Nitrites **negative**

Leucocytes **negative**

Beta HCG **negative**

Ultrasound scan of the pelvis: Verbal consent gained for the procedure. Kidneys, gall bladder, liver and spleen appear normal. Aortic diameter of 2.2cm. Both ovaries and uterus are visualised - no abnormality detected. Endometrial thickness of 2 mm. Trace of free fluid in the pelvis only. Appendix not visualised.

CT abdomen and pelvis: The appendix demonstrates mucosal enhancement and surrounding fat stranding. Appearances consistent with uncomplicated appendicitis. No perforation. Other visualised organs are unremarkable.

The consultant surgeon requests that antibiotics for appendicitis be prescribed and for the patient to be booked for laparoscopic appendicectomy the following morning.

- **The nurse looking after the patient on the ward asks how long she needs to be kept nil by mouth (NBM)? Why is this important and for how long must she be NBM for prior to her operation?**

Maintenance fluids will be required in the preoperative period while the patient is starved. Her weight is 65 kg. The following bags of fluid are available on the surgical ward.

7. **1L Normal Saline 0.9% + 40mmolKCl**
8. **1L Hartmann's solution**
9. **1L 5% glucose + 40mmolKL**
10. **1L 0.45% NaCl + 4% glucose + 40mmolKCL**
11. **Gelofusine**

Which of these fluids are crystalloids, and which are colloids?

- **How much Na+, K+, Mg++, Cl- do these fluids contain?**

- **What are Lianna's daily requirements of water and these ions?**

/ **Which of these fluids is therefore most appropriate in the surgical patient with normal biochemistry?**

Case 2

Svetlana, a 57-year old woman, is seen in the Emergency Department with a 2-day history of abdominal pain and two episodes of vomiting. The pain is on the left side of the abdomen, and has been associated with two small volume fresh rectal bleeds. She has a past medical history of hypertension and type-2 diabetes, but no previous operations. She takes amlodipine and metformin. She has no allergies. She lives with her family who are in attendance.

On examination she is alert, but appears unwell and in pain. Observations are temperature 38.8°C, pulse 104/minute, blood pressure 94/70 mmHg, O2 saturations 99% on air, respiratory rate 24/minute. Capillary refill time is 2 seconds. NEWS 2 score is 6. Blood glucose via finger-prick test is 8.2 mmol/L. Abdominal examination reveals tenderness and guarding in the left iliac fossa. Rectal examination reveals blood-stained faeces.

a) State five differential diagnoses for this presentation. Justify your answers.

b) What diagnostic investigations should be performed (bedside, bloods & imaging)?

The Emergency Department registrar suspects that the patient has sepsis.

c) What does sepsis mean?

d) Does she meet any criteria for sepsis?

e) What is meant by the term "sepsis 6"? What is the aim of the "sepsis 6" pathway?

The ED registrar is concerned about the patient's blood pressure and requests a resuscitation fluid prescription for this patient based on NICE guidelines.

- **Suggest a fluid prescription (fluid, volume, rate)**

It is now midnight. The following investigation results are received:

Mid stream urine specimen

Nitrites negative

Leucocytes negative

Beta HCG negative

Blood results

White Cell Count	**18.5**	**x10^9/L**
Haemoglobin (New Units)	**124**	**g/L**
Platelet Count	**277**	**x10^9/L**
Sodium	**133**	**mmol/L**
Potassium	**5.1**	**mmol/L**
Urea	**10.4**	**mmol/L**
Creatinine	**208 (baseline 95)**	**umol/L**
eGFR	**21**	**mL/min/1.73m^2**
Alkaline Phosphatase(ALP)	**80**	**U/L**
Alanine Transaminase(ALT)	**45**	**U/L**
Total Bilirubin	**15**	**umol/L**
Amylase	**84**	**u/L**

CT Abdomen and pelvis:

There is inflammatory change in the left iliac fossa encompassing the sigmoid colon, with evidence of diverticulosis. Small, localised perforation noted with early abscess formation. No free intraperitoneal air. Major vessels appear normal.

g) What are the important findings in the investigations?

h) What is the acute diagnosis? Justify your answer.

4. What biochemical disturbances need addressing urgently?

The nurse on the ward calls to indicate that the patient's BM now measures 21.2 mmol/L.

- **Why is this? What therapy should be prescribed to address this?**

Svetlana is taken to theatre for a laparotomy and resection of the inflamed, perforated sigmoid colon, with end colostomy.

k) What is the name of this procedure?

The fluid chart for the following 24 hours is given over the page.

8. What is the significance of the nasogastric tube output?

m) Calculate the fluid balance for this 24 hour period.

(6)

DAY OF SURGERY

FLUID BALANCE

Name: SVETLANA S Number: 12791871 Ward: 22 · Date: 2/8/18

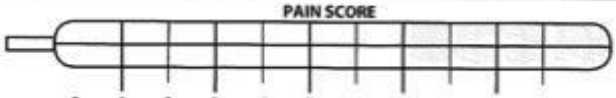
Ward Round Review Senior Decision Maker only: (Tick) ☐	Previous INPUT:	Previous 24 hours BALANCE:	Previous OUTPUT:	Patients Weight:

Time	INPUT							OUTPUT							BALANCE
	Oral Intake (ml)	Fluids IV or SC/ Blood	Bolus Drugs	Drug Infusions	PCA/ Epidural	NG/TPN/ PEG/Jej (ml)	Running Total In	Urine	Drains	Drains		Vomit/ NGT	Bowels/ Stoma	Running Total Out	
01.00	|	125						10							
02.00	|	125						20							
03.00		500						35							
04.00	NBM	500						40							
05.00	|	125						40							
06.00	|	125						25							
07.00	|	125					1625	30							
08.00															
09.00					IN	THEATRE									
10.00															
11.00															
12.00		83						25							
13.00		83						20				500	n.l		
14.00		83						35		200					
15.00	20	83						40							
16.00		83						35							
17.00		83						30							
18.00		83						20							
19.00	50	83						10							
20.00		83						10		50		500			
21.00		83						5							
22.00		83					2608	10						1690	
23.00															
24.00															
Totals															

Total INTAKE= mls **OUTPUT=** mls

Urinalysis Date: pH: Protein: Blood: Leucocytes: Glucose: Ketones: Nitrates:

PAIN SCORE



0 1 2 3 4 5 6 7 8 9 10

No Pain Mild Moderate Severe

SND005c 01/03/16

Session 2

Case 1

Simon, a 68-year-old man presents to the emergency department with a 3-hour history of sudden onset central abdominal pain radiating through to his back and left flank. He has vomited twice, and last opened his bowel this morning. He has not had this pain before and was watching television at the time of onset. He has a past medical history of intermittent claudication and can walk 100 meters on the flat before experiencing claudication pain in his legs. His medical history includes a MI and two TIAs. He takes aspirin, simvastatin, bisoprolol and ramipril. He lives at home independently with his wife, has a 40-pack year smoking history and drinks 30 units of alcohol a week.

a) List 4 differential diagnoses and justify your reasoning.

On examination he appears unwell, pale and is sweating profusely. His observations are temperature 36.1°C, pulse 148/minute, blood pressure 105/60mmHg, O2 saturations 98% on air, respiratory rate 25/minute. Examination findings include a body mass index of 38 Kg/m^2 and a normal cardiorespiratory examination. Abdominal examination reveals central abdominal tenderness and the presence of a palpable, supraumblical, expansile mass. There are no obvious herniae palpable.

b) What is the most likely diagnosis based on the above findings?

Initial laboratory investigations are shown:

White Cell Count	**8.2**	**x10^9/L**
Haemoglobin (New Units)	**76**	**g/L**
Amylase	**125**	**u/L**
pH	**7.31**	
PaO2	**12.8**	**kPa**
PaCO2	**3.5**	**kPa**
HCO3-	**13.2**	**mmol/L**
Lactate	**12.7**	**mmol/L**
BE	**-8.4**	**mEq/L**

Urine dipstick

Bld positive

Pro positive

Neu negative

Leu negative

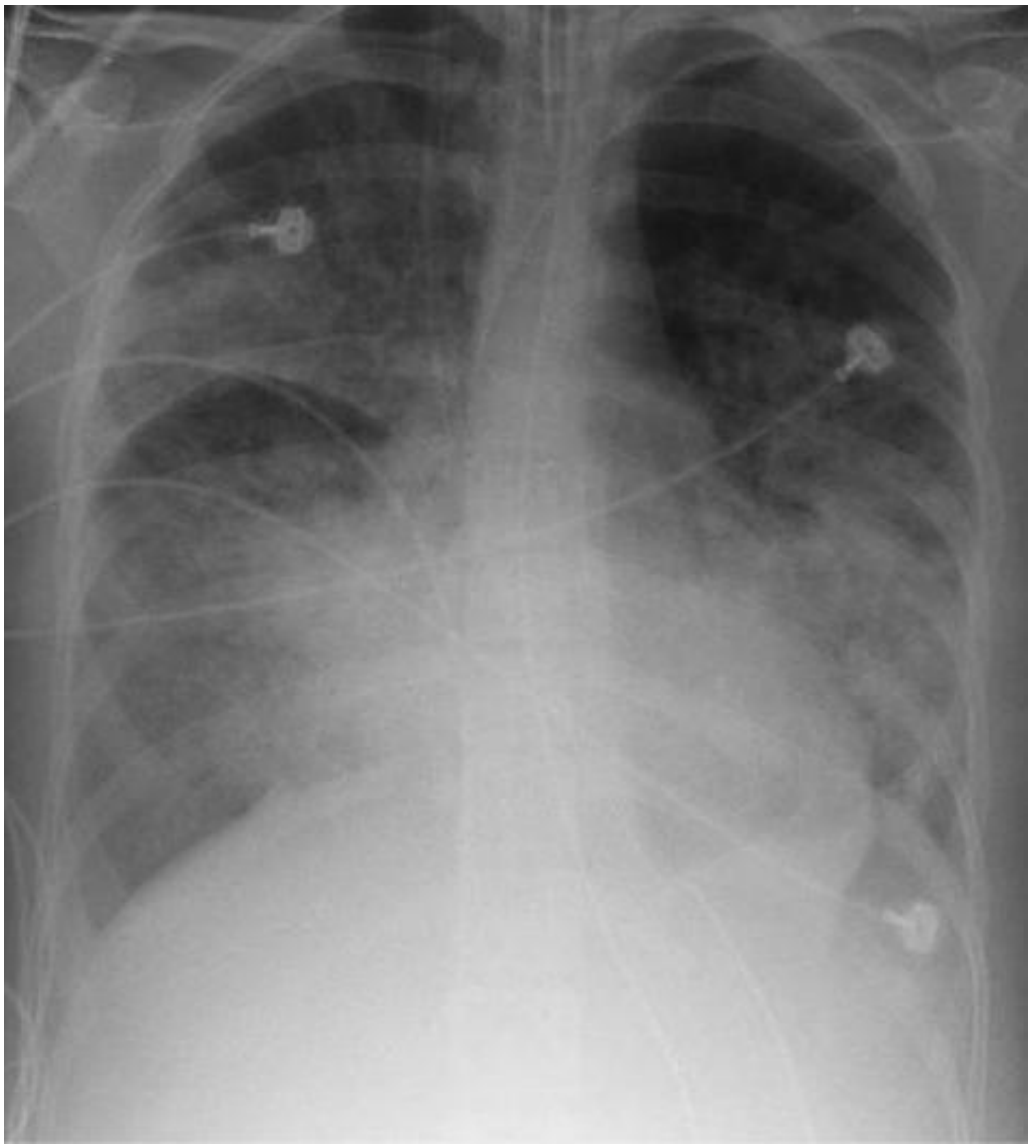
c) Interpret the blood results commenting on the patient's acid base balance

The on call vascular surgeon is called. An urgent CT angiogram and 4 unit cross match is requested.

d) What is the meant by group and save, and crossmatch?

Two large bore intravenous cannulas are placed and blood transfusion is commented. The CT angiogram confirms a ruptured abdominal aortic aneurysm, and the patient undergoes an emergency open repair.

24 hours after surgery, while the patient is in intensive care, it is becoming increasingly difficult to ventilate them, with higher lung insufflation pressures being required. The portable chest Xray is shown below:



- **What lung complication of massive transfusion has Simon suffered? Why has this occurred despite receiving typed blood?**

4. What is the clinical course of this condition?

Case 2

Satvinder, a 49-year-old man, presents via the Emergency department with a 12-hour history of epigastric pain. He states the pain came on this morning whilst driving to work. The pain is constant, dull in nature, but does not radiate. There are no exacerbating or relieving factors. He has a past medical history of type 2 diabetes and atrial fibrillation. He takes metformin, apixaban, simvastatin and bisoprolol. He lives independently with this wife and two sons, does not smoke, and drinks 20 units of alcohol a week.

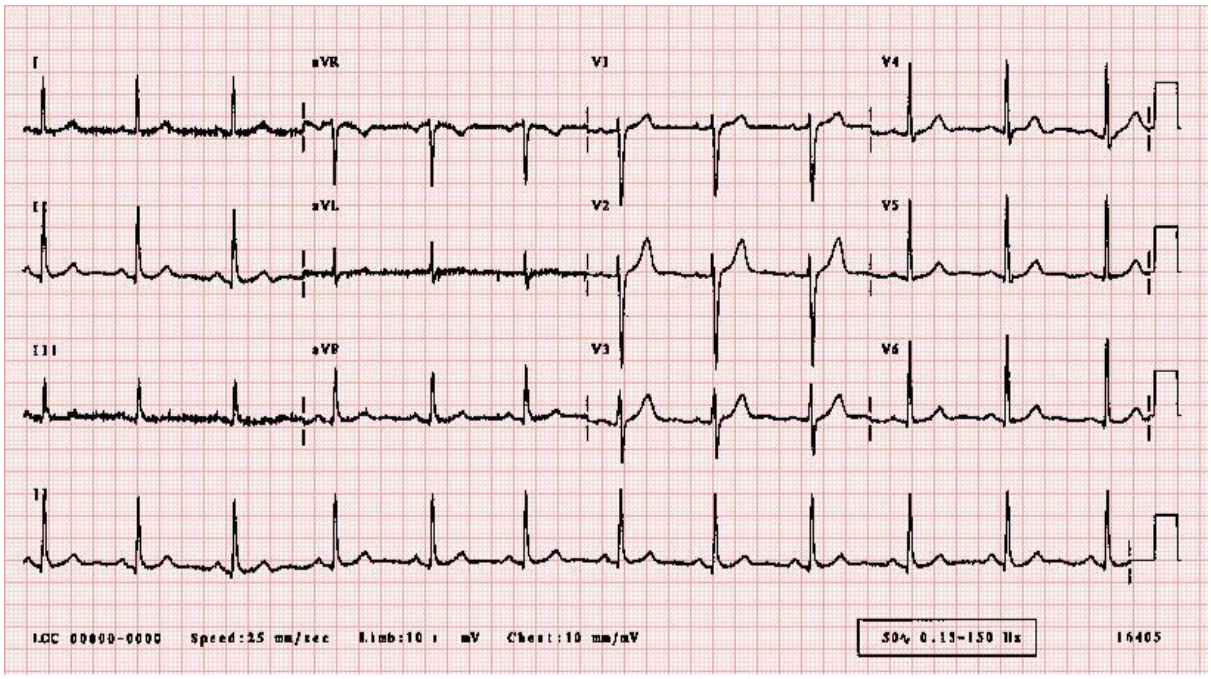
On examination, he appears well. His modified early warning score is 0. His observations are temperature 36.9^{O}C, pulse 84/minute, blood pressure 149/95mmHg, O2 saturations 100% on room air, respiratory rate 15/minute. Cardiorespiratory examination is unremarkable. Abdominal examination reveals mild tenderness in the epigastrium, but no guarding. There are no palpable herniae.

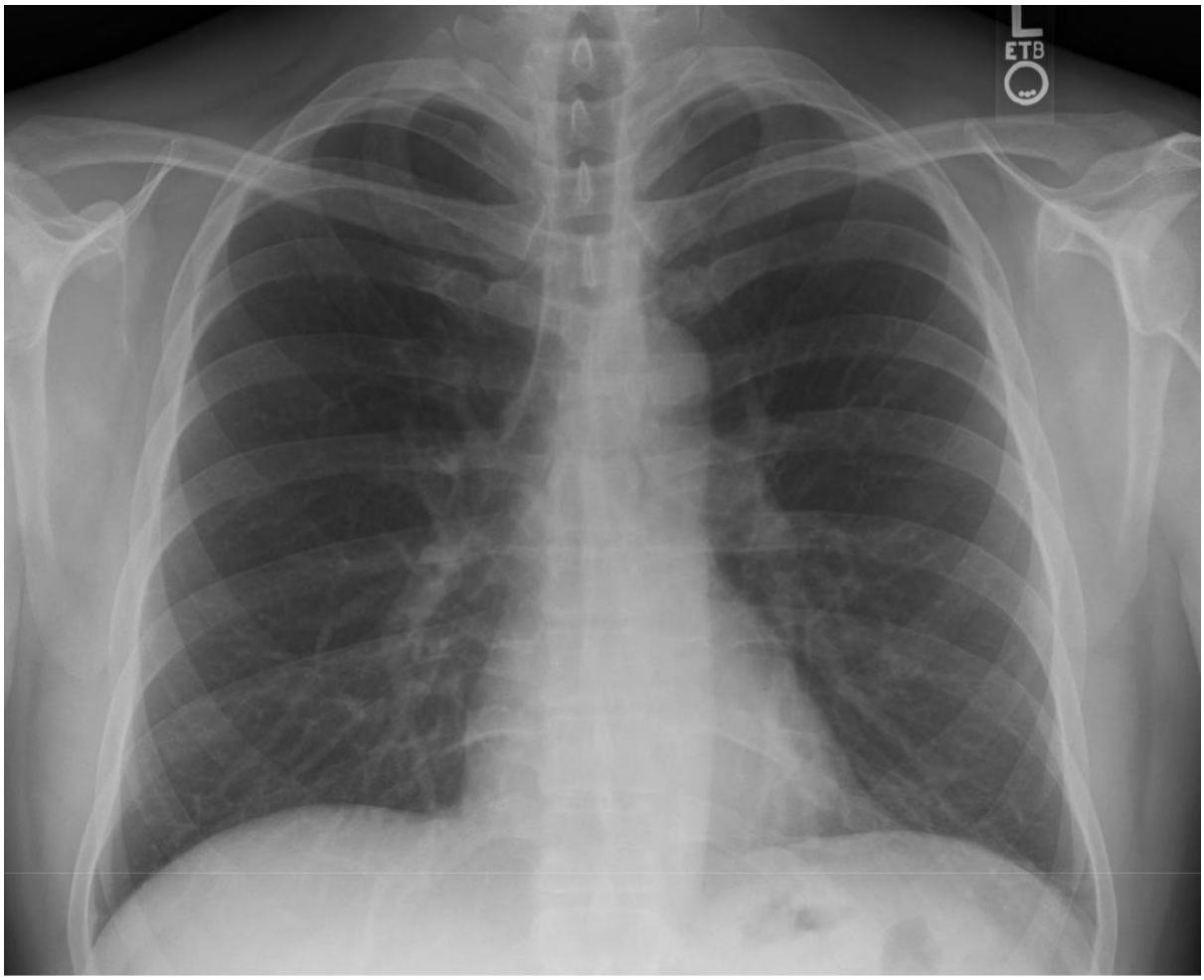
a) **List seven differential diagnoses for epigastric pain in this patient.**

b) **Suggest four investigations for the above patient while in the ED.**

Results of initial investigations are shown:

White Cell Count	**12.5**	**x10^9/L**
Haemoglobin (New Units)	**153**	**g/L**
Platelet Count	**311**	**x10^9/L**
Sodium	**133**	**mmol/L**
Potassium	**4.2**	**mmol/L**
Urea	**6.4**	**mmol/L**
Creatinine	**78**	**umol/L**
eGFR	**>90**	**mL/min/1.73m^2**
Alkaline Phosphatase(ALP)	**80**	**U/L**
Alanine Transaminase(ALT)	**45**	**U/L**
Total Bilirubin	**15**	**umol/L**
Amylase	**84**	**u/L**
Trop	**<10**	





7. Interpret the above investigations. Which differential diagnoses have been excluded?

d) What further investigations should be requested

The patient is transferred the surgical assessment unit. An ultrasound scan of the abdomen is requested and is reported as follows:

USS abdomen: Kidneys, gall bladder, liver and spleen appear normal. Pancreas is partially obscured due to bowel gas, though where visualised appears normal. Aortic diameter of 2.1cm. Appendix not visualised due to overlying bowel gas.

Satvinder is discharged home and an urgent outpatient upper GI endoscopy (OGD) is requested.

2. **How should his medications be managed (metformin and apixaban) immediately prior to his procedure?**

The endoscopy findings are:

OGD

FINDINGS:

Oesophagus – normal

Stomach – normal.

Duodenum – A single, well-demarcated ulcer measuring approximately 1 cm in diameter was identified on the anterior wall. The ulcer base appeared clean with no active bleeding or visible vessels.

CLO test – positive.

4. **What is the significance of the CLO test?**

5. **A course of eradication therapy is prescribed for Satvinder. To what classes of drugs do the three components of this treatment belong?**

h) What are their mechanisms of action?

Session 3

Case 1

Aaron, a 60-year old taxi driver has been referred from his GP to the upper GI clinic with a three month history of dysphagia. The dysphagia is worse with solids compared to liquids, and has become worse over that time. He has lost 10 Kg in weight. He has no other past medical history of note, but does smoke heavily, and drinks around 20 units of whisky a week.

a) **What is meant by the term "dysphagia?"**

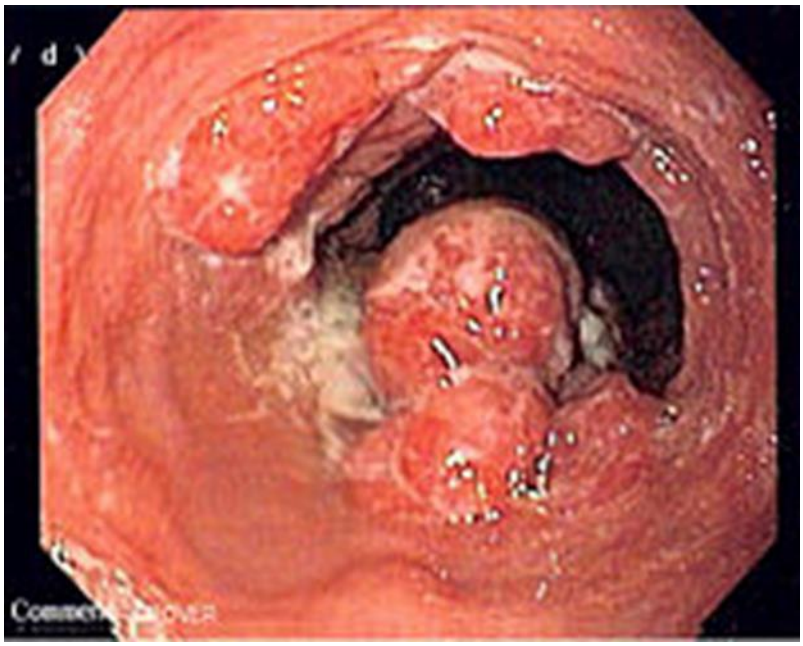
b) **State seven causes of dysphagia.**

Examination of the cardiorespiratory and abdominal systems are unremarkable.

c) What is the most appropriate diagnostic investigation for Aaron?

d) What referral pathway should this patient's investigations come under?

Aaron undergoes upper GI endoscopy (OGD). A suspicious abnormality is noted in the oesophagus (at 32 cm from the incisors):



Page 75

Biopsy of this lesion confirms a moderately differentiated adenocarcinoma.

e) **What are the risk factors for developing malignancy of the oesophagus?**

6. **What 3 further investigations are required in order to plan treatment? Where should these results be discussed?**

The patient is discussed at the upper GI cancer multi-disciplinary team (MDT) meeting. The CT scan of the thorax abdomen and pelvis reveal no distant metastases but local lymph node involvement (T2 N1 M0), endoscopic ultrasound (EUS) confirms a T2 N1 tumour. PET CT shows no distant metastatic disease.

The MDT consensus is that Aaron should receive neoadjuvant chemotherapy, restaging and potential surgical resection of the cancer.

3. **What procedure should be performed in this case to achieve clearance of the tumour? How is restoration of the upper GI tract achieved once the oesophagus has been removed (resected)?**

h) **What body cavities must be surgically entered in order to achieve this?**

Following his oesophageal surgery, Aaron will be allowed only fluids by mouth for the first 5 days.

How will his nutrition be provided during this time? Suggest 3 options

Aaron had a feeding jejunostomy placed.

What is meant by the term jejunostomy?

Aaron is prescribed an initial jejenostomy feeding regime running at 20 ml/hour, increasing up to 80 ml/hour over the next 7 days.

7. **What is the rationale for this regime? What are the consequences of rapid introduction of feeding regimens?**

Case 2

Fatima, a 65-year old, has been referred from her GP to the upper GI clinic with a troublesome history of "reflux." She states that over the past 18 months, following a meal she frequently experiences retrosternal burning, lasting from ten minutes to one hour. She denies any difficulty swallowing, or weight loss. She is otherwise well with no other medical problems. Her GP has previously treated her symptoms with omeprazole, although more recently these tablets have become ineffective, even at a higher dose. She is a non-smoker and does not drink alcohol.

Examination of the cardiorespiratory and abdominal systems is unremarkable.

a) **Which anatomical and physiological factors normally prevent gastro-oesophageal reflux?**

b) **What is the most appropriate initial investigation for this patient?**

Fatima is referred for an upper GI endoscopy. This reveals grade A reflux oesophagitis, above a 4 cm hiatus hernia. There is no evidence of Barrett's oesophagus.

c) **Define Barrett's oesophagus.**

d) **What is a hiatus hernia? State the three types of hiatus hernia.**

Fatima has been reading on the internet about anti-reflux surgery for her gastro-oesophageal reflux disease and has requested a procedure.

- **What investigation(s) should be performed as part of the workup for anti-reflux surgery? What information is obtained from these investigation(s)?**

- **What operative procedures can be performed to treat her reflux? How do they prevent reflux?**

80

Fatima undergoes an uneventful elective laparoscopic fundoplication. On the evening of her surgery while on the surgical ward, Fatima's EWS has risen from a baseline before surgery of 0 to 5.

The patient is reviewed and is experiencing central crushing chest pain radiating to her left arm. Her observations are pulse 110/minute, blood pressure 110/76 mmHg, O2 saturations 100% on air, respiratory rate 22/minute, temperature 36.5'c. Cardiorespiratory and abdominal examination are unremarkable.

g) **What are the possible causes of Fatima's new onset symptoms?**

h) **What immediate actions should be taken at the bedside? State three.**

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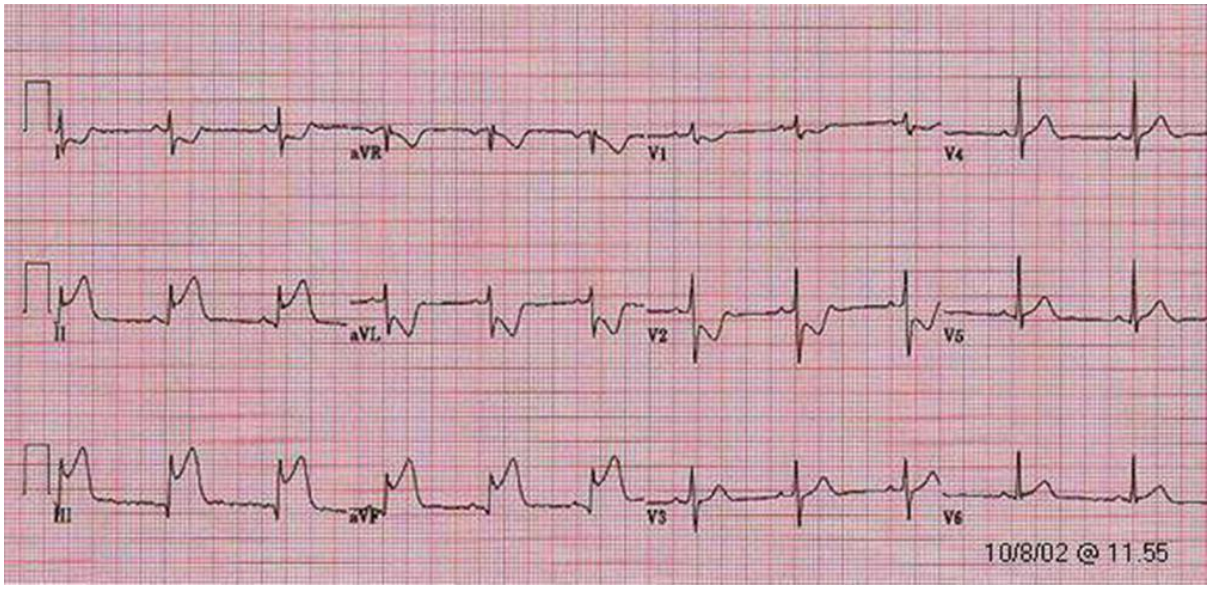
High flow oxygen is administered and intravenous access obtained. An ECG is shown below.



10. **What complication has Fatima developed?**

- **How should the patient be managed? How does being post-surgery affect the decision to administer thrombolysis?**

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Session 4

Case 1

A patient has been accepted for admission from the ED to the surgical assessment unit. The admission card indicates the following information:

'Juri, a 51-year-old male, has a 6-hour history of epigastric pain radiating through to his back. He has vomited twice and last opened his bowels earlier that morning. He has no past medical history of note. For the last three weeks, he has self-medicated a course of ibuprofen for a painful shoulder. He drinks 20 units of alcohol per week but does not smoke. He is allergic to Penicillin.'

a. **State four differential diagnoses for this patient.**

On examination he appears unwell with dry mucous membranes and is clearly in pain. His observations are pulse 105/minute, blood pressure 145/89mmHg, respiratory rate 17/minute, O2 saturations 99% on room air, temperature 37.1°c. He weighs 70kg. There is no lymphadenopathy or jaundice, capillary refill time is 2 seconds. Cardiorespiratory examination is unremarkable. On abdominal examination, there is marked epigastric tenderness with guarding.

b. **What is the most likely diagnosis? Explain your reasoning.**

c. **State three initial investigations for this.**

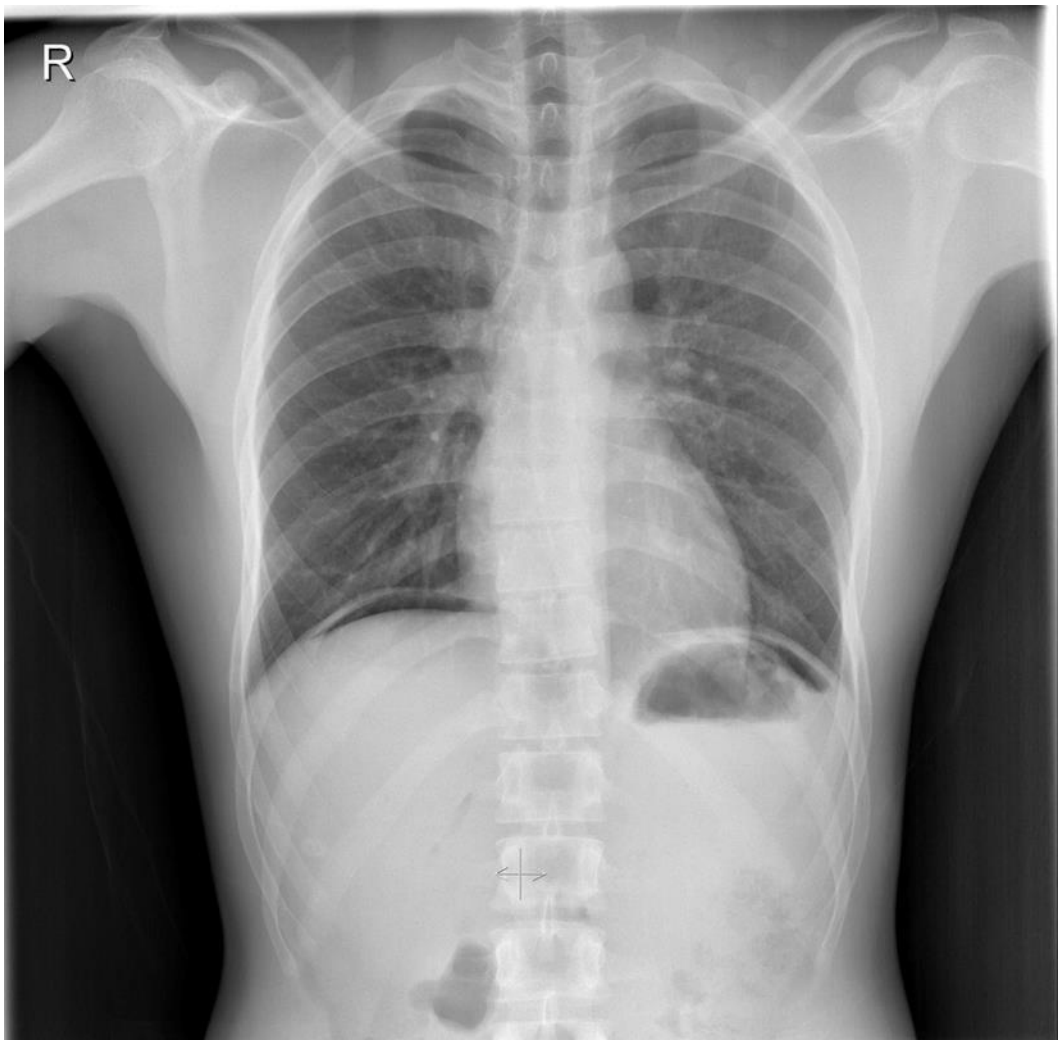
d. State 6 immediate interventions that should be started in this patient.

The investigations are reported as follows:

White Cell Count	**18.1**	**x10^9/L**
Haemoglobin (New Units)	**145**	**g/L**
Platelet Count	**225**	**x10^9/L**
Sodium	**143**	**mmol/L**
Potassium	**4.9**	**mmol/L**
Urea	**7.7**	**mmol/L**
Creatinine	**80**	**umol/L**
eGFR	**88**	**mL/min/1.73m^2**
Albumin	**38**	**g/l**
Alkaline Phosphatase(ALP)	**99**	**U/L**
Alanine Transaminase(ALT)	**70**	**U/L**
Total Bilirubin	**20**	**umol/L**
Amylase	**128**	**u/L**
CRP	**179**	**mg/l**
pH	**7.25**	
PaO2	**12.6**	**kPa**
PaCO2	**3.7**	**kPa**
HCO3-	**15**	**mmol/L**
Lactate	**11**	**mmol/L**
Urine dip	**Normal**	

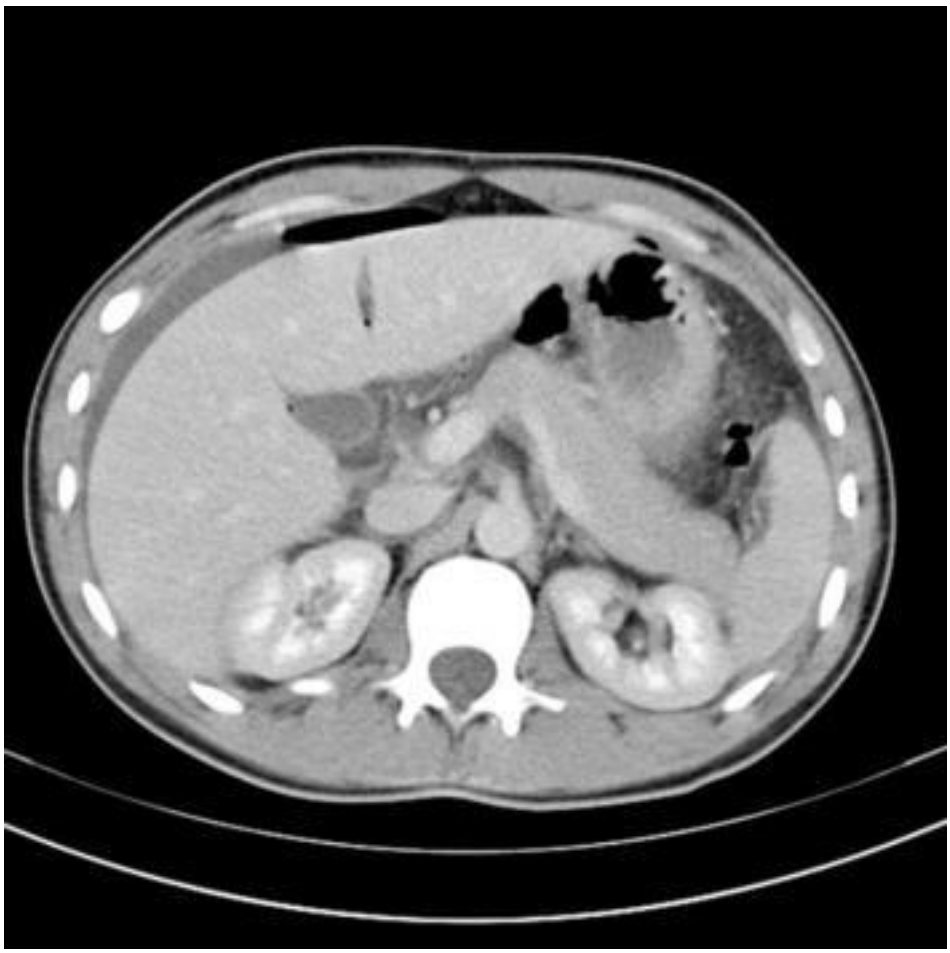
e. **Interpret these blood reports and ABG. Explain your reasoning.**

- **A chest Xray is taken (below). What does it show?**



g. What is the best investigation to confirm the diagnosis?

h. A CT abdomen/pelvis with intravenous contrast is obtained. What does it indicate?



https://radiopaedia.org/articles/pneumoperitoneum

The CT scan is reported as showing a perforated duodenal ulcer. Antibiotics are started.

- **What is the optimal management for this condition (in this patient)?**

The patient undergoes a laparoscopy and repair of duodenal ulcer.

On the fourth post operative day (his planned discharge day), there is concern that the patient's early warning score (EWS) has risen to 7 (from a baseline EWS of 1, 24 hours ago).

On assessment, Juri is noted to be breathless and coughing up green sputum. He is experiencing right sided chest pain. Bedside observations are as follows: temperature 38.1°c, respiratory rate 23/minute, O2 saturations 90% on room air, pulse 92/minute, blood pressure 133/89 mmHg, capillary refill time 2 seconds. Examination reveals a soft abdomen, healing incisions, reduced expansion and air entry to the right lung base, with dullness to percussion at the right lung base, and associated crackles on auscultation.

- **State three post operative respiratory complications.**

k. What is the most likely cause of his deterioration? How might this have been prevented?

A CT pulmonary angiogram indicates basal atelectasis and consolidation of the right lower lobe, suggestive of a lower respiratory tract infection.

- **Suggest two interventions/treatments for this patient.**

m. What 2 lifestyle and drug advice should be provided for Yuri on discharge?

Case 2

Reyansh, a 69-year old man presents to the ED with a 2-day history of the passage of black tarry stools and an abrupt 4-hour history of frank, bright red haematemesis. He states that he has never had this before but has had mild epigastric pain for the last 4 weeks. He has a past medical history of hypertension and gout. His usual medications are ramipril and allopurinol. He is allergic to penicillin. He lives independently with his wife, and is a retired warehouse manager.

a. **State 5 differential diagnoses for this patient's presentation.**

On examination he appears very unwell, is pale and sweating. Baseline observations reveal a pulse of 148/minute, blood pressure 69/38mmHg, respiratory rate 32/minute, O2 saturations 96% on room air, capillary refill time 5 seconds, temperature 36.3'c. His BM is 7.3 mmol/l.
Chest and abdominal examination are unremarkable. Rectal examination reveals melaena. The ED team are concerned that this patient is in shock.

- **Define 'Shock'.**

- **What form of shock does this patient have? Justify your answer.**

- **What are the other forms of shock? State their defining features.**

- **State 4 immediate management steps for this patient.**

The patient is considered to be suffering from hypovolaemic (haemorrhagic) shock. Two 16 guage (grey) cannulas are placed, one in each antecubital fossa, blood is taken for laboratory investigations and the patient is cross matched 4 units of blood.

Initial crystalloid fluid resuscitation is started and an arterial blood gas is sampled. Laboratory investigations are indicated below:

White Cell Count	**15.1**	**x10^9/L**
Haemoglobin (New Units)	**55**	**g/L**
Platelet Count	**455**	**x10^9/L**
Sodium	**143**	**mmol/L**
Potassium	**4.9**	**mmol/L**
Urea	**17.7**	**mmol/L**
Creatinine	**70**	**umol/L**
eGFR	**88**	**mL/min/1.73m^2**
Albumin	**38**	**g/l**
Alkaline Phosphatase(ALP)	**99**	**U/L**
Alanine Transaminase(ALT)	**70**	**U/L**
Total Bilirubin	**20**	**umol/L**
CRP	**39**	**mg/l**
pH	**7.18**	
PaO2	**9.4**	**kPa**
PaCO2	**3.3**	**kPa**
HCO3-	**15.4**	**mmol/L**
Lactate	**7.3**	**mmol/L**

f. Describe the acid-base status of the patient.

- **In light of these blood results, and given the patient's history, what is the most likely diagnosis?**

The most likely diagnosis is considered to be a bleeding duodenal ulcer. The patient responds appropriately to initial resuscitation.

h. What are the next steps in this patient's management?

The on-call endoscopist is contacted and the patient undergoes urgent upper GI endoscopy. A bleeding duodenal ulcer is diagnosed and a combination of cautery and adrenaline injection into the ulcer applied.

- **What two additional pharmacological measures should be employed to reduce the chance of the ulcer re-bleeding?**

Session 5

Case 1

Mary, a 71 year old woman, presents to the outpatient clinic with a 1-month history of bleeding per rectum. She states that the blood is associated with opening her bowels and can be found in the pan. Sometimes she passes mucus only. She has not lost any weight, and has no abdominal or pelvic pain. Her past medical history comprises a myocardial infarction 10 years earlier, and a stroke 6 years ago. Her medications comprise bisoprolol, clopidogrel, losartan, omeprazole, simvastatin . She has no drug allergies. She has made a good functional recovery following the stroke and lives independently, with her two pet cats. She is an ex-smoker and does not drink alcohol.

7. **What are the anatomical sites of potential bleeding in this patient?**

8. **State the three most likely differential diagnoses for the bleeding?**

c. **What would be the significance of fresh red rectal bleeding or melaena?**

On examination, she appears well with normal observations. Abdominal examination unremarkable. Rectal examination reveals soft stool.

d. **What is the most appropriate diagnostic investigation for this patient? Justify your answer.**

At flexible sigmoidoscopy, Mary is found to have a large, irregular polyp in the mid rectum, 12 cm from the anal verge. A picture is provided below.

Biopsies indicate rectal adenocarcinoma. Mary has been informed of the cancer diagnosis in the "new diagnosis" clinic in the presence of colorectal consultant and colorectal cancer specialist nurse.

- **What are the most appropriate staging investigations for this patient? Where should the results be discussed?**

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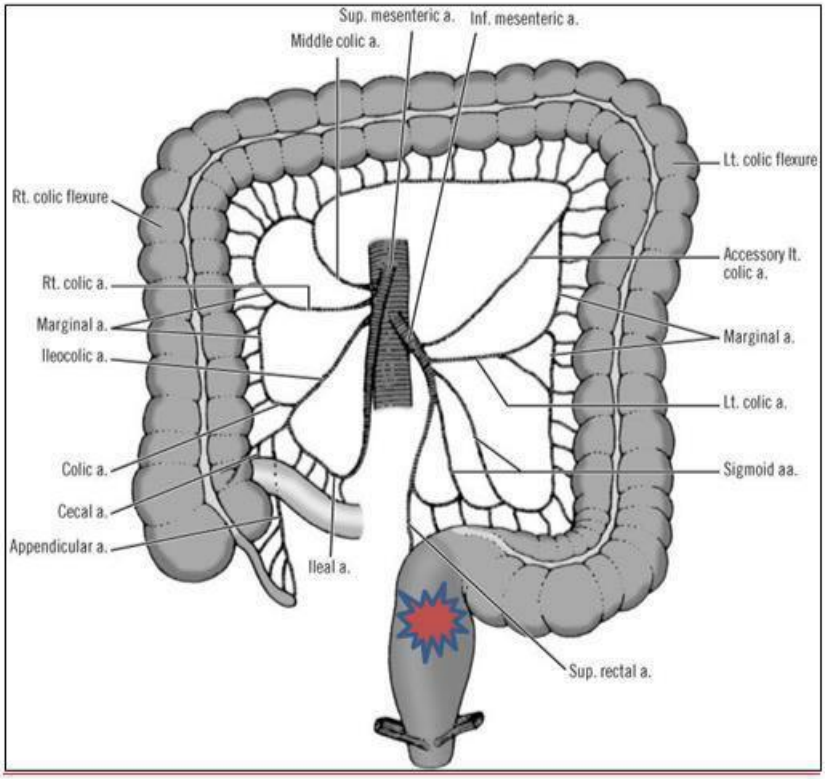
The patient is discussed at the colorectal cancer MDT and the outcome is indicated below:

MDT outcome 2nd February: T3a N0 M0 rectal moderately differentiated adenocarcinoma. Performance status 1. Treatment plan – for surgical resection.

The aim of surgery in this context is to remove the cancer and the draining lymph nodes.

B **Which lymph nodes drain the left side of the colon?**

B **Mary's tumour is indicated in the diagram below. Which blood vessel must be divided in order to achieve maximal lymph node harvest.**



95

C **An operation is performed, removing the cancer, joining (anastomosing) the two ends of the colon back together. A "covering" ileostomy is also performed. What is the name given to the operation that has been performed? What is the purpose of the covering ileostomy?**

Mary initially made an uneventful recovery following the surgery. She has been eating and drinking, has been mobilising around the ward, her pain has been well controlled and her ileostomy had started to function (500ml over a 24 hour period on day 2).

On the 3rd postoperative day, Mary experiences nausea and has vomited 600ml of bile stained fluid. Observations comprise pulse 92/minute, blood pressure 145/88mmHg, O2 saturations 97% on room air, respiratory rate 16/minute, temperature 36.8'c. Respiratory and cardiac examination are unremarkable. Abdominal examination reveals abdominal distension, but no tenderness or guarding. Her wounds appear healthy. Bowel sounds are absent. The stoma appears healthy, but there are no contents in the stoma bag. On review of the chart, the stoma has not been active over the last 12 hours.

- **What is the most likely cause of Mary's deterioration?**

A diagnosis of ileus is made.

F: What is the life-threatening complication of an untreated ileus, and what bedside intervention will reduce the risk of this complication? Name 2 additional interventions to manage the ileus?

Case 2

Robert, a 67-year old retired accountant, has been referred to the surgical clinic by his GP with a six week history of "loose stools". The patient states that he has not had diarrhoea *per se*, but whereas he used to open his bowels just once a day, he now does so 3 to 4 times, per day. He has not noticed any bleeding or weight loss. He is a keen hill walker, and for the last two months has noticed that he has struggled to keep up with other group members on long climbs.

Examination, including rectal examination is unremarkable.

His initial tests performed in primary care indicated a Haemoglobin of 97g/L, with an MCV of 79fl. A faecal immunochemical test (FIT) was positive at 125mg/g.

a) **State 4 differential diagnoses for this patient's abnormalities.**

b) **What is the most appropriate diagnostic investigation for this patient?**

Robert is referred for a colonoscopy.

c) What is the difference between flexible sigmoidoscopy and colonoscopy?

- **What bowel cleansing (preparation) is needed for these investigations? What are the risks of these bowel preparations?**

e) When consenting for colonoscopy what are three common risks of this procedure?

At colonoscopy, Robert is found to have the following abnormality in the caecum.

Biopsy reveals a poorly differentiated adenocarcinoma.

7. **What staging investigation is required for this patient?**

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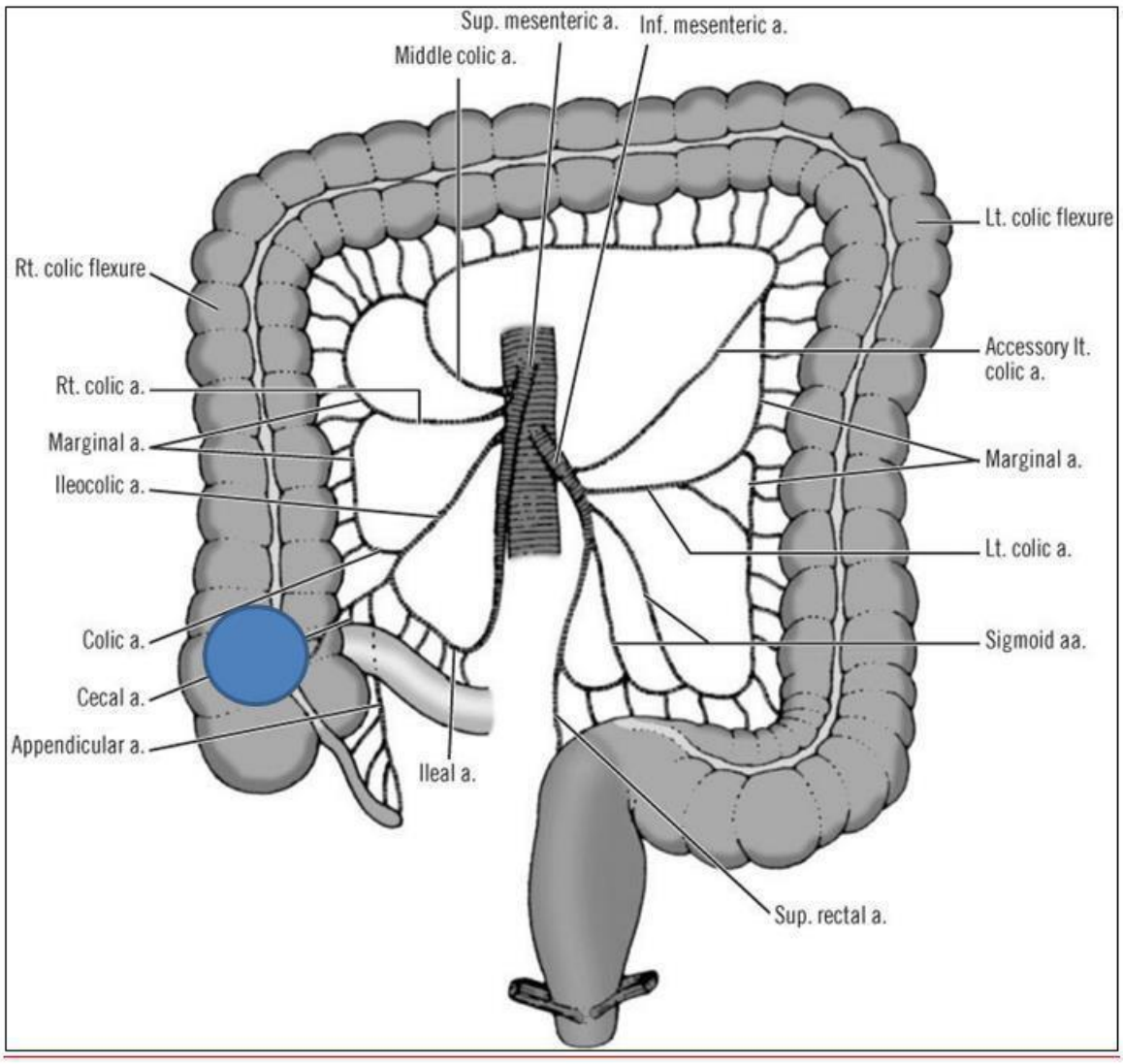
A **Robert's tumour is indicated on the image below. Which blood vessels must be divided in order to remove this patient's cancer and draining regional lymph nodes?**



h) What is the name of the operation that should be carried out in this patient?

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Robert undergoes a laparoscopic assisted right hemicolectomy. His post-operative management is according to an enhanced recovery after surgery (ERAS) protocol.

After an initial uneventful recovery, Robert deteriorates with increasing abdominal pain, and is reviewed on the fourth post operative day.

On examination his observations are pulse 144/minute (irregular), blood pressure 92/55mmHg, respiratory rate 22/minute, O2 saturations 96% on room air, temperature 38.2^{O}C, capillary refill time 2 seconds. Abdominal examination reveals generalised tenderness with marked guarding over the right side of the abdomen.

The results of initial laboratory investigations are indicated:

White Cell Count	**18.3**	**x10^9/L**
Haemoglobin (New Units)	**122**	**g/L**
Platelet Count	**355**	**x10^9/L**
Sodium	**139**	**mmol/L**
Potassium	**4.9**	**mmol/L**
Urea	**9.9**	**mmol/L**
Creatinine	**175**	**umol/L**
eGFR	**34.9**	**mL/min/1.73m^2**
pH	**7.22**	
PaO2	**12.3**	**kPa**
PaCO2	**2.5**	**kPa**
HCO3-	**16.3**	**mmol/L**
Lactate	**6.7**	**mmol/L**
BE	**-7.1**	**mEq/L**

B **What is the most likely cause of Robert's acute deterioration?**

- **What is the investigation of choice to confirm the diagnosis?**

A CT scan of the abdomen/pelvis with intravenous contrast reveals free fluid and air in the abdomen, consistent with an anastomotic leak. The patient is booked for an emergency laparotomy.

E **What additional pharmacological treatment should be offered to this patient while on the ward?**

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Session 6

Case 1

Janet Brigston, a 35-year old female, presents to the surgical assessment unit with a three-day history of worsening right upper quadrant (RUQ) pain radiating through to her right shoulder blade. She states that these pains come and go in waves. The pain is associated with vomiting. Her bowels are opening normally, she has no urinary symptoms. The patient finished their last menstrual period 5 days ago. The past medical history is unremarkable and there are no allergies.

a. **What further questions will help in making a diagnosis?**

On additional questioning, Janet says her pain always comes on 30-45 minutes after eating. There are no other associated relieving or exacerbating factors. The pain is severe and dull in nature.

Observations are temperature 37.1^{o}C, pulse 83/minute, blood pressure 119/68mmHg, respiratory rate 18/minute, O2 saturations 98% on room air. The patient has dry mucous membranes and is comfortable. Capillary refill is 1 second.

Her body mass index is 38 Kg/m^{2}. Abdominal examination reveals a soft abdomen with no scars. There is tenderness on palpation in the RUQ. Murphy's sign is negative. No cough impulses are felt over the hernial orifices.

b. Define Murphy's sign? What is the significance of this sign?

c. State four differential diagnoses for this patient. Justify your answers.

- **State four initial investigations for this patient (including one radiological investigation). Indicate the rationale for each.**

e. State two initial pharmacological treatments that should be prescribed for this patient?

Initial laboratory investigations indicate:

White Cell Count	**9.2**	**x10^9/L**
Haemoglobin (New Units)	**139**	**g/L**
Mean Cell Volume	**90**	**fL**
Platelet Count	**254**	**x10^9/L**
Sodium	**138**	**mmol/L**
Potassium	**4.5**	**mmol/L**
Urea	**5.0**	**mmol/L**
Creatinine	**82**	**umol/L**
eGFR	**>90**	**mL/min/1.73m^2**
Albumin	**40**	**g/l**
Alkaline Phosphatase(ALP)	**106**	**U/L**
Alanine Transaminase(ALT)	**49**	**U/L**
Total Bilirubin	**10**	**umol/L**
Amylase	**60**	**u/L**
CRP	**<5**	**mg/l**

Urinalysis and urinary pregnancy testing are normal.

Erect Chest Xray is unremarkable

f. Interpret the blood results. What is the most likely diagnosis?

An ultrasound abdomen is performed:

US – Abdomen Report:

Multiple gallstones in a thin-walled gallbladder. Normal intra-hepatic ducts. Common bile duct 5mm in diameter. The liver, spleen and both kidneys appear normal.

- **What is the significance of a thin-walled gall bladder and a common bile duct of 5 mm?**

The patient is diagnosed with biliary colic and discharged home with a view to elective day case laparoscopic cholecystectomy.

Two months after her admission, Janet attends the Emergency department complaining of severe abdominal pain. The patient is nauseated and has vomited three times over the last 24 hours. The pain is now constant and radiates to the right shoulder. She has also noticed that her urine is now dark. She has had bouts of uncontrollable shivering. Her partner has noticed that her skin appears darker and that her eyes appear "yellow".

Observations are temperature 38.3^{O}C, pulse 124/minute, blood pressure 88/61mmHg, respiratory rate 23/minute, saturations 97% on room air. On examination she is jaundiced. Abdominal examination reveals guarding in the right upper quadrant.

- **What is the most likely diagnosis?**

- **What is the name given to this constellation of clinical features?**

- **The clinical team suspect this patient has sepsis. Define sepsis.**

- **State 6 immediate bedside actions to treat the sepsis. What are these 6 actions collectively called?**

- **What is the pathophysiology of sepsis in this patient?**

Janet receives initial resuscitation and treatment in the ED.

m. What is the most appropriate radiological test(s) for this patient. State two.

Janet undergoes CT of the abdomen and pelvis. This is reported as a dilated CBD (at 9mm) with a stone in the distal CBD. Janet is diagnosed with ascending cholangitis secondary to a likely CBD stone. The patient is admitted to the High Dependency Unit for ongoing resuscitation.

- **After resuscitation and initial treatment, how should the condition be managed? State two definitive interventions.**

o. Name two potential complications of each of these procedures.

- **The patient undergoes ERCP, sphincterotomy and stone removal. What further intervention is required to prevent further biliary complications in this patient?**

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Case 2

David Smyth, a 47-year-old man, is admitted to the surgical assessment unit with a 12-hour history of severe abdominal pain and vomiting. The pain radiates through to the back. He has a past medical history of high cholesterol, asthma, and he admits to alcohol excess, drinking one bottle of vodka per day. He does not take any regular medications and has no drug allergies.

Observations are: temperature 37.6^{O}C, pulse 90/minute, blood pressure 147/90mmHg, respiratory rate 22/minute and O2 saturations 98% on room air. On examination there is marked epigastric tenderness with guarding. The clinical team suspect acute pancreatitis.

- **State two pathognomic eponymous signs of this condition. How often are these encountered in clinical practice?**

b) State four initial bedside steps in managing this patient.

Initial laboratory investigations indicate:

White Cell Count	16.0	$x10^9$/L
Haemoglobin (New Units)	138	g/L
Platelet Count	380	$x10^9$/L
Sodium	130	mmol/L
Potassium	4.4	mmol/L
Urea	16.1	mmol/L
Creatinine	195 (baseline 105)	umol/L
eGFR	38	$mL/min/1.73m^2$
Albumin	37	g/l
Alkaline Phosphatase(ALP)	390	U/L
Alanine Transaminase(ALT)	40	U/L
Total Bilirubin	19	umol/L
Amylase	1872	u/L
CRP	237	mg/l
pH	7.32	
PaO2	8	kPa
PaCO2	2.9	kPa
HCO3-	14.9	mmol/L
Blood glucose	12.1	mmol/L
Adjusted calcium	2.1	mmol/L
Lactate dehydrogenase	376	Iu/L

c) Interpret these blood tests including the acid-base balance.

- **State two radiological investigations that would confirm a diagnosis of acute pancreatitis in this patient. Are radiological investigations required to make a diagnosis of acute pancreatitis?**

- **What scoring systems can be used to classify the severity of this condition? Calculate the score for this patient using one of these scoring systems?**

f) What is the likely cause of acute pancreatitis in this patient? State 6 other causes.

Despite regular paracetamol and intravenous tramadol, David is still complaining of significant pain and nausea.

- **What escalation in analgesia could be considered for the patient? Which clinical team would you be the most appropriate to advise on this?**

115

Twenty-four hours after admission to the surgical assessment unit the patient deteriorates with observations as follows: temperature 37.5^{o}C, pulse 123/minute, blood pressure 105/72 mmHg, respiratory rate 30/minute, saturations 92% on high flow oxygen via a non rebreathe mask.

- **Given the patient's clinical appearance, what is the most appropriate next step in this patient's management?**

The patient is moved to the high dependency unit for a higher level of care.

i) **What is meant by this term "higher level of care" and how can it be categorised?**

j) **What level of care is likely to be required by this patient?**

Following a stay on HDU, David recovers and is now abstinent from alcohol. He is seen 2 months later in the outpatient clinic. He now complains ongoing upper abdominal discomfort.

An ultrasound demonstrates an 8cm cystic mass arising from the tail of the pancreas.

k) What complication has this patient now developed?

l) Suggest two possible treatment options for this complication.

m) State two other long-term complications of pancreatitis?

Seminar 7

Case 1

Stephen, a 76-year old retired HGV driver, is reviewed on the surgical assessment unit. He complains of worsening back pain and yellowing of the skin for the last five days. On more detailed discussion, the patient tells you that he has had a decrease in his appetite and 5Kg loss in weight over the last 3 months. He also states that he has a past medical history of two myocardial infarctions, the last being 2 years ago, and takes aspirin regularly, along with simvastatin, ramipril and bisoprolol.

On examination: temperature 36.5^{o}C, pulse 80/minute, blood pressure 127/88mmHg, respiratory rate 14/minute. He appears dehydrated and is visibly jaundiced. Abdominal examination reveals a smooth palpable mass in the right upper quadrant 8cm in diameter, which you can get below but not above. There is no tenderness or guarding. There are no hernias. Rectal examination is normal.

a) **State three differential diagnoses for this patient.**

b) **What initial laboratory investigations should be performed? Justify each investigation.**

The following laboratory investigations are returned:

White Cell Count	**10.1**	**x10^9/L**
Haemoglobin (New Units)	**104**	**g/L**
Platelet Count	**355**	**x10^9/L**
Sodium	**143**	**mmol/L**
Potassium	**4.3**	**mmol/L**
Urea	**17.7**	**mmol/L**
Creatinine	**280**	**umol/L**
eGFR	**20**	**mL/min/1.73m^2**
Albumin	**29**	**g/l**
Alkaline Phosphatase(ALP)	**698**	**U/L**
Alanine Transaminase(ALT)	**189**	**U/L**
Total Bilirubin	**293**	**umol/L**
Amylase	**107**	**u/L**
CRP	**25**	**mg/l**
INR	**3.5**	**mmol/L**

c) Interpret these blood results. Why is the INR above the normal range?

- **How can the causes of jaundice be classified or sub-divided? What type of jaundice does this demonstrate?**

120

- **What is the relevance of the palpable mass in the right upper quadrant? How does this relate to Courvoisier's law?**

- **State an appropriate pharmacological intervention for this patient in light of the deranged INR.**

g) State the most appropriate initial radiological investigation for this patient?

121

A CT of the abdomen and pelvis with IV contrast is requested.

h) The radiologist suggests correction of this renal failure prior to his CT. Why is this?

122

After fluid optimisation, Stephen's eGFR improves to 40 mls/min/1.73m^2 .

His CT is report as follows:

Portal-venous phase.

Lung bases are clear.

There is no free fluid, free air or signs of perforation.

There is marked intra and extra-hepatic bile duct dilatation down to a narrowing in the distal CBD, adjacent to a 45mm mass lesion in the head of the pancreas. There is invasion of the portal vein, multiple enlarged regional lymph nodes, bilobar liver metastases and at least three pulmonary metastases. The kidneys, spleen, unprepared bowel and adrenals are normal.

Conclusion: T4 N2 M1 pancreatic cancer. Suggest referral to the hepatobiliary MDT.

i) **State a definitive treatment for jaundice in this patient.**

Case 2

Reginald, a 72-year old retired builder, is reviewed in the surgical outpatient department with a 3-month history of a lump in the right groin. He states that this lump bulges out when he coughs or strains but can be reduced when he lies down. He has had no vomiting or abdominal pain and is otherwise well. He denies any weight loss, urinary symptoms or change in bowel habit. His past medical and surgical history is unremarkable aside from a DVT 3 months ago after a long-haul flight. He takes warfarin and has no allergies. He has a 30-pack year smoking history.

On examination: temperature 36.5^{O}C, pulse 80/minute, blood pressure 127/88mmHg, respiratory rate 14/minute. Body mass index is 31 Kg/m$^{2.}$ He appears clinically well with a soft, reducible mass in the right groin above the inguinal ligament, immediately superior and medial to the pubic tubercle. The abdomen is otherwise soft and the testicles normal.

- **State five differential diagnoses for this patient's lump in the groin.**

- **Define a hernia?**

- **How are femoral and inguinal hernias differentiated clinically? Is this patient likely to have a femoral or inguinal hernia?**

d. State three risk factors for developing an inguinal hernia in this patient.

The clinical team diagnose an inguinal hernia.

e. State a definitive intervention for this patient.

- **State five common complications of inguinal hernia repair that this patient should be warned of when consenting for intervention.**

The patient is consented for a repair of his right sided inguinal hernia and given an elective date for repair in 3 months' time.

However, three weeks after review in the clinic, Reginald is admitted as an emergency to the surgical assessment unit, with severe right sided groin pain. He states that for the last 24 hours the hernia has been "stuck out," and he cannot reduce it as before. He has been vomiting and has not opened his bowels for 2 days.

On examination: temperature 36.5^{o}C, pulse 82/minute, blood pressure 126/78mmHg, respiratory rate 16/minute, saturations 98% on room air. His abdomen is soft and has no tenderness.

There is a right sided mass in the right groin as before, but it is now tender, and irreducible. There are no skin changes visible.

g. What complication has arisen in this patient's hernia?

h. Name four initial management steps in the surgical assessment unit?

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The following laboratory investigations are returned:

White Cell Count	**10.1**	**x10^9/L**
Haemoglobin (New Units)	**145**	**g/L**
Platelet Count	**255**	**x10^9/L**
Sodium	**143**	**mmol/L**
Potassium	**4.9**	**mmol/L**
Urea	**7.7**	**mmol/L**
Creatinine	**80**	**umol/L**
eGFR	**90**	**mL/min/1.73m^2**
Albumin	**38**	**g/l**
Alkaline Phosphatase(ALP)	**99**	**U/L**
Alanine Transaminase(ALT)	**70**	**U/L**
Total Bilirubin	**20**	**umol/L**
Amylase	**128**	**u/L**
CRP	**22**	**mg/l**
pH	**7.38**	
PaO2	**15.4**	**kPa**
PaCO2	**5.3**	**kPa**
HCO3-	**24.4**	**mmol/L**
Lactate	**1.3**	**mmol/L**
INR	**5.2**	

- **Interpret the blood results and acid-base status of the patient.**

The patient has a CT of the abdomen and pelvis with IV contrast. Images are visible below:

- **Interpret the CT scan. What are the radiological findings?**

- **How should this patient be managed?**

Reginald is consented for an emergency inguinal hernia repair.

- **Given his INR, name a pharmacological intervention to allow him to proceed safely to surgery?**

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Case 3

Jason, a 70-year-old retired farmer is reviewed in the surgical outpatient clinic. He complains of a 12-month history of mild intermittent abdominal discomfort at the site of a known midline hernia. He has previously undergone two open paraumbilical hernia repairs 15 and 18 years ago. His medical history comprises hypertension for which he takes amlodipine. Review of his primary care records reveals that he has not consulted for over five years. He has no known allergies

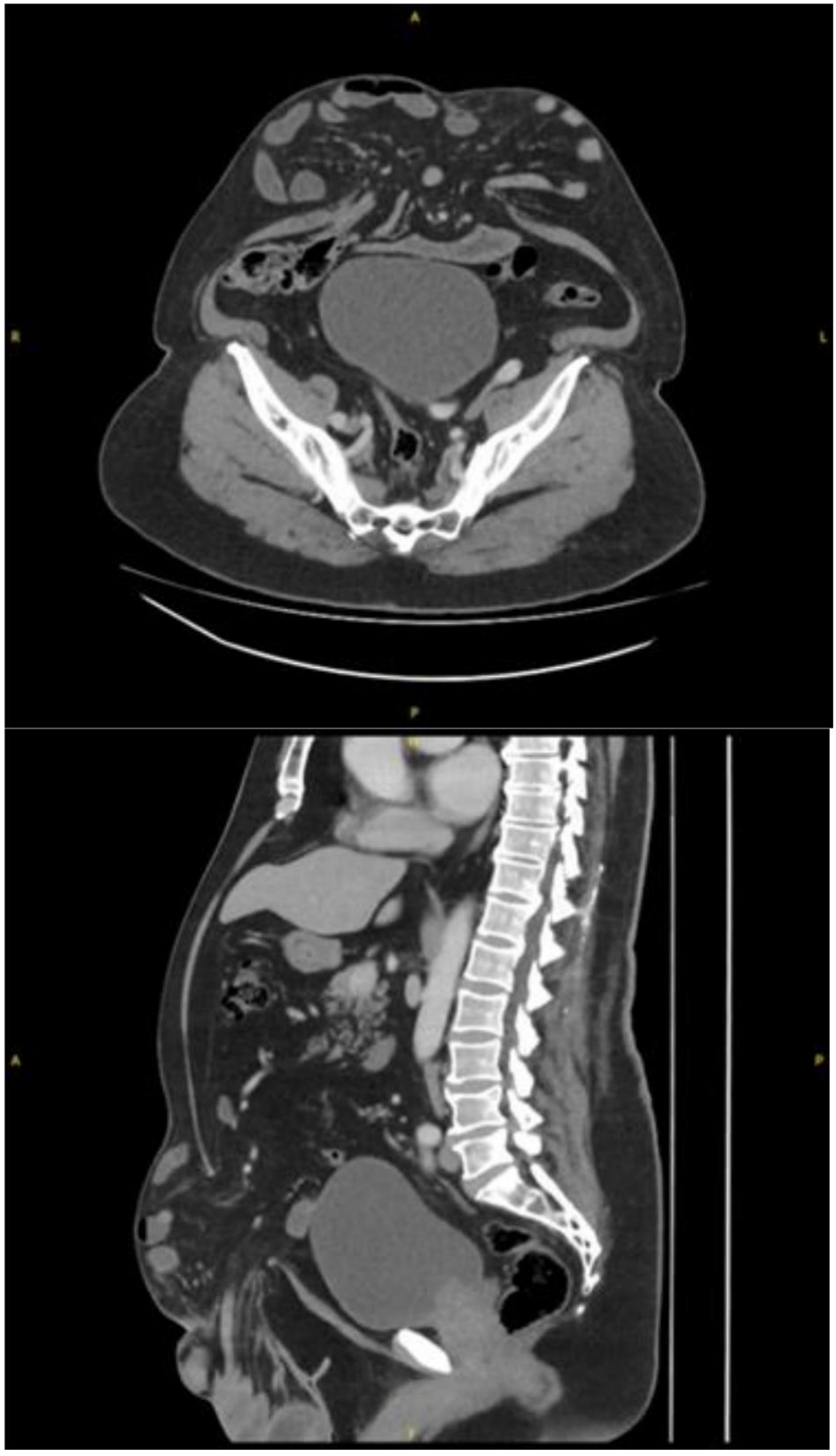
On examination: temperature 36.5^{o}C, pulse 80/minute, blood pressure 127/88mmHg, respiratory rate 14/minute. Body mass index is 51 Kg/m^{2}. He has a large non-reducible, non-tender abdominal wall incisional hernia.

a) **State three risk factors for developing an incisional hernia in this patient?**

b) **State an appropriate radiological investigation for assessing this hernia?**

The patient is sent for a CT of the abdomen and pelvis. The images are shown below.

c) What are the contents of the hernia? Justify your answer.



The patient would like to explore what treatment options are feasible.

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d) What are the potential treatment options for this patient's hernia?

- **How would you establish "fitness for surgery" in this patient? Suggest three dynamic tests of fitness and the principle behind each one.**

- **What scoring systems can be used to grade "fitness for anaesthesia/surgery"? State three.**

- **What factors in this patient increase perioperative risk?**

h) How can these risk factors be managed in the pre-operative setting?

Seminar 8

Case1

Abdulla, a 44-year-old man, presents to the surgical assessment unit with an eight-hour history of severe, constant, pain in the anal region. He does not complain of any bleeding or discharge per rectum. He has type 1 diabetes mellitus and takes Humulin I 14 units BD and Novorapid 6-8 units before breakfast, lunch and dinner. He does not smoke or drink alcohol. He lives with his wife. He has no allergies.

On examination: temperature 36.5^{o}C, pulse 80/minute, blood pressure 127/88mmHg, respiratory rate 14/minute. Body mass index is 21 Kg/m^{2}.

There is an erythematous, fluctuant and tender swelling palpable on left side of the perianal region (8 o clock) 2cm from the anal verge.

a. **State four differential diagnoses for this patient.**

The clinical team diagnose a perianal abscess and commence antibiotics.

b. State a definitive intervention to treat this abscess.

135

- **The patient is consented for incision and drainage of the abscess. State three common complications that the patient should be warned about when taking consent.**

d. How should the patients diabetes be managed in the perioperative setting?

Case 2

Linda, an 85-year old woman, is reviewed on the surgical assessment unit. She states that for the last 2 days she has been suffering with multiple episodes of vomiting and has not opened her bowels to stool or flatus. She has central colicky abdominal pain, which is vague in nature. She has a past medical history of hypertension and takes amlodipine regularly. She underwent an open hysterectomy for fibroids 30 years ago. She lives independently alone at home. She has no allergies.

On examination: temperature 36.5^{o}C, pulse 88/minute, blood pressure 129/83mmHg, respiratory rate 14/minute. Body mass index is 23 Kg/m^{2}. The patient appears alert and dehydrated. Abdominal examination demonstrates a distended abdomen with no tenderness. Hernial orifices and PR examination are normal. On auscultation, tinkling bowel sounds are heard.

The clinical team suspect small bowel obstruction.

a. **State four causes of small bowel obstruction.**

b. **What is the most likely cause of obstruction in this patient? Justify your answer.**

c. **What is the most appropriate diagnostic investigation for this patient?**

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A CT abdomen and pelvis with IV contrast is requested. Images from this investigation are visible below:

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- **Interpret the CT images. What is the diagnosis?**

- **State four initial management steps.**

The patient is administered IV fluid and analgesics. A nasogastric tube is placed and NG gastrografin is administered. Following 24 hours of conservative management the patient is reviewed on the ward. The clinical team find that the patient's abdominal pain has worsened. Observations are repeated and given as follows: temperature 39.0^{o}C, pulse 110/minute, blood pressure 100/63mmHg, respiratory rate 20/minute.

Laboratory investigations are reported as below:

White Cell Count	**18.6**	**x10^{9}/L**
Haemoglobin (New Units)	**129**	**g/L**
Platelet Count	**254**	**x10^{9}/L**
Sodium	**138**	**mmol/L**
Potassium	**4.5**	**mmol/L**
Urea	**16.0**	**mmol/L**
Creatinine	**260**	**umol/L**
eGFR	**32**	**mL/min/1.73m^{2}**
Amylase	**60**	**u/L**
CRP	**127**	**mg/l**
pH	**7.32**	
PaO2	**10.3**	**kPa**
PaCO2	**3.9**	**kPa**
HCO3-	**19.7**	**mmol/L**
Lactate	**4.7**	**mmol/L**

ii) Interpret the acid-base status and renal function of this patient. How should this patient now be managed?

The patient is consented for an emergency midline laparotomy and is taken to theatre. At laparotomy a necrotic segment of small bowel secondary to adhesions is discovered and resected. The surgical team decide that anastomosis is not favourable given the acid-base disturbance. A double-barrelled ileostomy is spouted.

h. State two common complications of ileostomy formation?

Case 3

Khalil, a 43-year-old with a known history of terminal ileal Crohn's disease, is reviewed on the gastroenterology ward by the surgical team. He has spent the last 5 days admitted under the gastroenterology team with a 3-month history of worsening right iliac fossa pain, weight loss and diarrhoea. He has a known history of ileocaecal Crohn's disease and has been prescribed 40mg of prednisolone daily for the last 6 weeks. He has no allergies and has a body mass index of 17kg/m^2. He lives independently at home with his partner.

A CT abdomen and pelvis has been performed demonstrating a localised perforation of the terminal ileum within a short segment of terminal ileal Crohn's disease. The surgical team have made a decision to take this patient to theatre and resect this segment of bowel via midline laparotomy.

a) **State 4 clinical and pathological differences between Crohn's disease and ulcerative colitis?**

b) **How should Khalil's steroid prescription be managed after surgery?**

c) State four common risks for this procedure the patient should be when taking consent?

- **In UK law, what 4 four domains of capacity does a patient require to have the ability to consent ?**

Themes and subthemes of each chapter

Session number	Topic	Subthemes
1	Right iliac fossa pain Diverticulitis	Fluid prescribing (NICE guidelines) Maintenance and resuscitation
2	Aortic aneurysm Acute abdominal pain	Blood products Arterial blood gas interpretation Management of patient on DOAC
3	Oesophageal cancer Hiatus hernia	Nutrition Postoperative complication (acute coronary syndrome)
4	Upper gastrointestinal perforation and bleeding	Postoperative complication (atelectasis) Reversal of DOAC
5	Lower gastrointestinal bleeding Colorectal cancer	Postoperative complication (ileus, anastomotic leak)
6	Gallstones Acute pancreatitis	Sepsis Referral to other specialty (intensive care)
7	Pancreatic cancer Groin hernia Incisional hernia	Jaundice Management of patient on anticoagulation Fitness for anaesthesia/surgery
8	Perianal abscess Small bowel obstruction Inflammatory bowel disease	Management of patient with diabetes Imaging in surgery Consent and capacity Management of patient on corticosteroids

GMC MLA Mapping

Session number	MLA mapping - Condition	MLA mapping - Capabilities
1	Appendicitis Acute abdominal pain Peritonitis Diverticulitis	Prescribes, reviews, communicates and monitors the effects of medicines safely and effectively Utilises evidence-based guidelines appropriately Identifies and requests relevant investigations, interprets results and ensures they are acted on appropriately in the context of the clinical situation, avoiding over-investigation
2	Aortic aneurysm Shock Transfusion reactions Low BP Acid-base abnormality Acute abdominal pain Peptic ulcer disease Patient on anti-coagulant therapy	Assesses and generates management plans in emergency and acute presentations Assesses and manages risk
3	Oesophageal cancer Malnutrition Hiatus hernia Gastro-oesophageal reflux disease Post-surgical care and complications	Prescribes, reviews, communicates and monitors the effects of medicines safely and effectively Deals appropriately with complexity and uncertainty including managing multimorbidity and prioritising tasks
4	Gastrointestinal perforation Sepsis Peptic ulcer disease Post-surgical care and complications Deep vein thrombosis Bleeding from upper GI tract Patient on anti-coagulant therapy Shock	Identifies and requests relevant investigations, interprets results and ensures they are acted on appropriately in the context of the clinical situation, avoiding over-investigation Assesses and generates management plans in emergency and acute presentations Assesses and generates management plans to promote health and prevent disease Assesses and generates management plans in emergency and acute presentations Assesses and manages risk Deals appropriately with complexity and uncertainty including managing multimorbidity and prioritising tasks
5	Bleeding from lower GI tract	Obtains relevant information about the patient

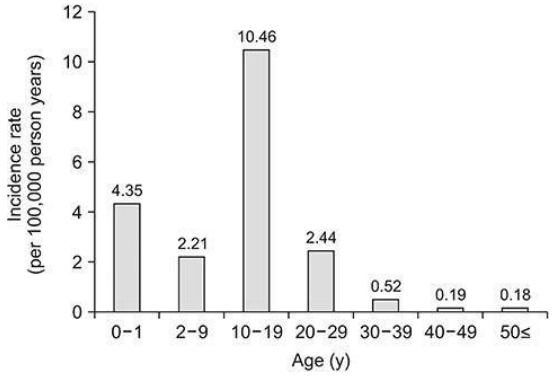
	Intestinal obstruction and ileus **Change in bowel habit** **Colorectal tumours** **Post-surgical care and complications** **Imaging of colorectal tumours**	**through appropriate history and physical/mental health examination, formulating a prioritised list of problems and differential diagnoses** **Identifies and requests relevant investigations, interprets results and ensures they are acted on appropriately in the context of the clinical situation, avoiding over-investigation** **Assesses and generates management plans in emergency and acute presentations** **Identifies and requests relevant investigations, interprets results and ensures they are acted on appropriately in the context of the clinical situation, avoiding over-investigation** **Assesses and generates management plans in emergency and acute presentations**
6	**Gallstones and biliary colic** **Acute cholangitis** **Sepsis** **Acute pancreatitis** **Acute abdominal pain** **Deteriorating patient**	**Communicates effectively with health care professionals, patients, relatives, carers and other advocates**
7	**Jaundice** **Pancreatic cancer** **Hernia** **Patient on anti-coagulant therapy**	**Identifies and requests relevant investigations, interprets results and ensures they are acted on appropriately in the context of the clinical situation, avoiding over-investigation** **Assesses and generates management plans in emergency and acute presentations Includes recognising the possibility of serious illness and initiating initial management**
8	**Perianal abscesses and fistulae** **Intestinal obstruction and ileus** **Imaging of intestinal obstruction and ileus** **Intestinal ischaemia** **Inflammatory bowel disease** **Electrolyte disturbances**	**Deals appropriately with complexity and uncertainty including managing multimorbidity and prioritising tasks.** **Demonstrates understanding of patient capacity, consent and confidentiality in delivering care**

TESTICULAR TORSION

It is expected that you will be taught in testicular torsion during your urology attachment. It is a urological emergency. The following summarises the relevant clinical information regarding testicular torsion and its management.

Testicular torsion is the twisting of the testes and the spermatic cord within the scrotum with resulting venous occlusion and oedema. The longer this persists, arterial occlusion and ischaemia results which then leads to infarction and necrosis of the testicle. This has implications for fertility (although most patients will have a healthy contralateral testes) but also hormone production (testosterone). It is therefore a urological emergency.

Testicular torsion most commonly occurs in neonates and prepubertal boys with a peak incidence between 10 and 14 years old; however has been reported in males of any age.

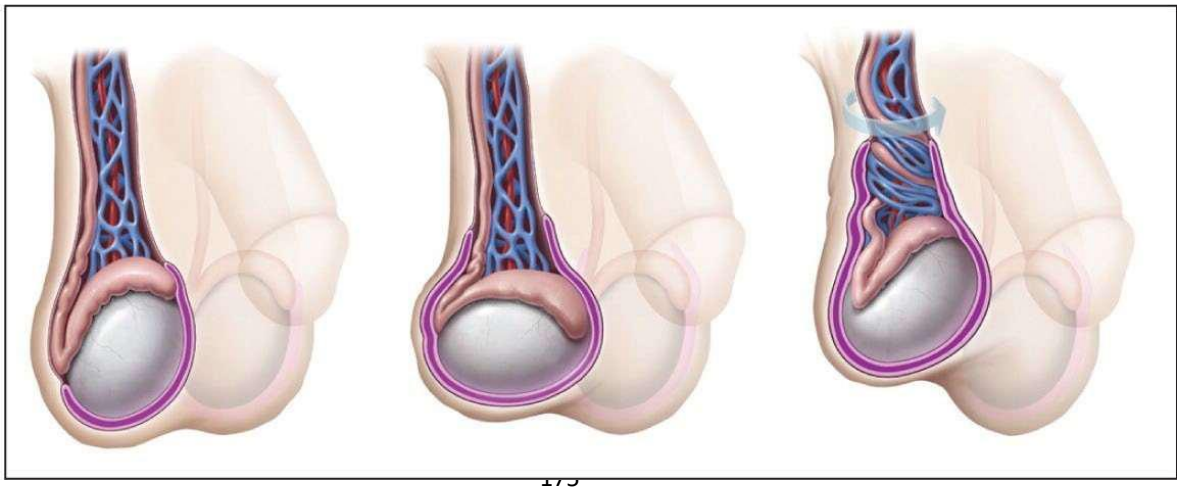


Risk factors:

Age
- **Cryptorchidism (undescended testes) Bell clapper deformity**

Previous testicular torsion
Family history of testicular torsion

Anatomy:
The testes is anchored into the scrotum by the tunica vaginalis, attaching posteriorly to the scrotal wall and epididymis. The gubernaculum fixes the testes at its lower pole to the base of the scrotum. The most common type of torsion, intravaginal torsion, occurs when the pos-terolateral fixation is lacking, allowing the testes to swing and rotate freely; this is called a bell-clapper deformity.



Clinical features:

The typical presentation is

Sudden onset unilateral testicular pain Lower abdominal pain
Nausea and vomiting
Short history (<24 hours)
Consider risk factors, past surgical history, sexual history and epsiodes of previous testicular pain (suggestive of intermittent torsion).

Clinical examination:

Tender unilateral testes
There may be swelling and erythema
Bell-clapper deformity – horizontal lie, high-riding
Consider eliciting Prehn's sign – pain relieved on elevating the testes (unreliable)
Consider eliciting the cremasteric reflex – stroke the inner thigh to elicit whether the L1/L2 spinal reflex causes an upward movement of scrotal contents (this should be absent) – also unreliable

Differential diagnoses:

1. **Epididymo-orchitis**
    a. **Older patients**
    b. **Sexually active, recent new sexual partner(s)**
    c. **Gradual onset history**
    d. **History lasting days (rather than hours)**

2. **Testicular tumour**
    a. **Slow enlargement**
    b. **Solid mass palpable in addition to testes**
    c. **10% present with pain**

3. **Torted Hydatid of Morgagni**
    a. **Blue dot sign (tender nodule with blue discolouration on the upper pole of the testis)**
    b. **Usually seen in boys aged 7-12**

Investigations

1. **Urine dip**
2. **Observations including heart rate and temperature**

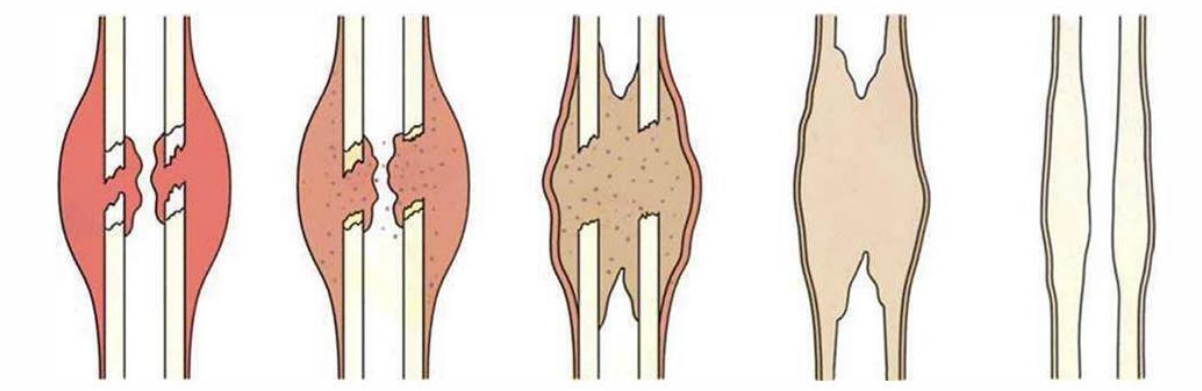
There is no value in USS as can be inconclusive. Doppler can show poor blood flow to testes but this can also be seen in infection. Therefore, history and examination are key.

If torsion is suspected, surgical exploration is warranted. This is performed under a general anaesthetic urgently. The affected testes is explored and if torted, it is de-torted. If it appears viable, it is replaced and bilateral orchidopexy performed (i.e. fixed into place with sutures, on both sides). If the testes is non-viable, then an orchidectomy is performed and the contralateral testes fixed (to prevent future torsion).

Orthopaedic Tasks and Cases to see and review

Orthopaedic Tasks and Cases

1. **Consider the biology of fracture healing. Discuss it with your team Your understanding of the management of Trauma patient will be improved by understanding the biology of fracture healing and understanding the principles of fracture management. Some of this material will be included in the plenary session, but you should aim to have a basic understanding of the following material**
2. **Fracture healing Five stages of healing.**
   (a) Haematoma: tissue damage and bleeding at the fracture site; the bone ends die back for a few millimetres.
   (b) Inflammatory reaction: inflammatory cells appear in the haematoma.
   (c) Callus: the cell population changes to osteoblasts and osteoclasts; dead bone is mopped up and woven bone appears in the fracture callus.
   (d) Consolidation: woven bone is replaced by lamellar bone; the fracture has united.
   (e) Remodelling: the newly formed bone is remodelled to resemble the normal structure.



Apley's Concise System of Orthopaedics and Fractures, Third Edition.

- **Explain how is fracture healing is influence by:**
  - **External fixation**
  - **Intramedullary nails**
  - **Screws & plates**

- **Name 3 growth Factors involved with bone healing**

- **Give 3 examples in each category of factors that pre- dispose to Non and delayed union:**
  a) Patient factors

b) **Fracture factors**

c) **Treatment factors**

Look up NICE guidance on the use of ultrasound in stimulating fracture healing – EXOGEN

You should know the basics about the effects of smoking on fracture healing – give a brief explanation below on how the adverse effects occur:

What are the ideal properties of a Bone graft? Name 3:

What types of bone graft are available- name 3?

It is anticipated that some of you will experience more specialist experience from your own firm (e.g. trauma surgery, Upper Limb, Lower Limb, Spine). However the focus should be on acquiring general orthopaedic experience to fulfil the apprenticeship curriculum requirement. Core topics should be covered with the emphasis on history taking, examination, differential diagnosis, appropriate initial and definitive investigations, staging as well as surgical management.

Below are the cases you are expected to work through during your trauma and orthopaedic rotation. The answers to the cases will be covered in your relevant seminar sessions, so please have your answers prepared prior to each seminar session. The cases below have been designed to act as a guide for your learning, however this is not a full curriculum. You will encounter further presenting complaints and pathologies during your time on placement and in surrounding further reading. Please use these further learning opportunities to supplement your workbook in order to provide you with a comprehensive coverage of the curriculum

Plenary 1 – Lower Limb Trauma & Emergency Trauma

Case 1

A 20-year-old male is brought by ambulance to A&E having being involved in a road traffic accident as the driver where his car hit a tree. He was wearing a seatbelt and the airbag deployed. A&E have performed preliminary blood tests and observations which are available for you to view below.

Respiratory Rate	**22**	**White Cell Count**	**12.0**
Blood Pressure	**86/60**	**Haemoglobin**	**83**
Heart Rate	**120**	**C-Reactive Protein**	**25**
Oxygen Saturation	**97% on RA**	**INR**	**1.0**
Temperature	**37.4**		

1. **What abnormalities can you see in the above table and what do they indicate?**

2. **Given the above observations what are the first principles of management?**

3. **Why do you think the blood pressure is low and how would you manage this?**

4. **The patient is now stable. What questions would you want to ask in the history?**

5. **You note from the bedside examination that the patients upper leg looks deformed. They are also complaining of pain in their thigh. Combining the mechanism of injury and the history and examination findings what are your top two differentials?**

6. **An X-ray is acquired: Describe the X-Ray below including the side of the body, location, view type, fracture pattern and whether it is displaced.**

7. **The above is a femoral shaft fracture due to high energy trauma; *however other pathologies may increase the risk of fracture*. List 3 pathologies that could predispose to a femoral shaft fracture.**

8. **In the instance of a femoral shaft fracture that is pathological i.e. due to a pathology such as a malignancy, which other blood tests may be required and why?**

9. **Which additional investigations may be required to investigate a pathological fracture?**

10. **The bleeding in this patient is likely a result of the femoral fracture. How would you manage this bleeding pre-operatively?**

11. **The patient is in agony and is requesting pain relief. You note that they have been prescribed IV Paracetamol QDS (4 times a day). What additional analgesia should you prescribe to manage the level of pain and why?**

There is also an option to add in additional pain relief via a regional block.

12. **What is a regional block?**

13. **What is the area in which the regional block for this presentation is inserted in and what nerves does it act upon?**

14. **The patient is immobilised with traction splinting. Describe what traction splinting is and the benefit of using this with a femoral shaft fracture.**

15. **As this is a young, fit adult the decision is made to operate. What is the standard fixation used to stabilise a femoral shaft fracture?**

16. **State 3 complications that can occur from this fracture?**

The patient undergoes surgery and has an IM nail inserted. A few days later his respiratory rate increases to 30 BPM and his oxygen sats drop to 92% on air. Below are the A-E findings. You as the FY1 has been asked to review the patient.

<u>Airway</u> – Patent, patient can talk to you

<u>Breathing</u>: Talking in full sentences but appears breathless, complains of some chest pain, new O2 requirement started on 15L via non-rebreathe, now RR = 24, Trachea is central, breath sounds heard both sides with crackles

<u>Circulation</u>: Pulse = 115, BP = 118/78, normal JVP, heart sounds normal

<u>Disability</u>: GCS 15/15, Temperature 38.1, PEARL

<u>Exposure</u>: Abdomen soft non tender, last passed urine 5 hours ago

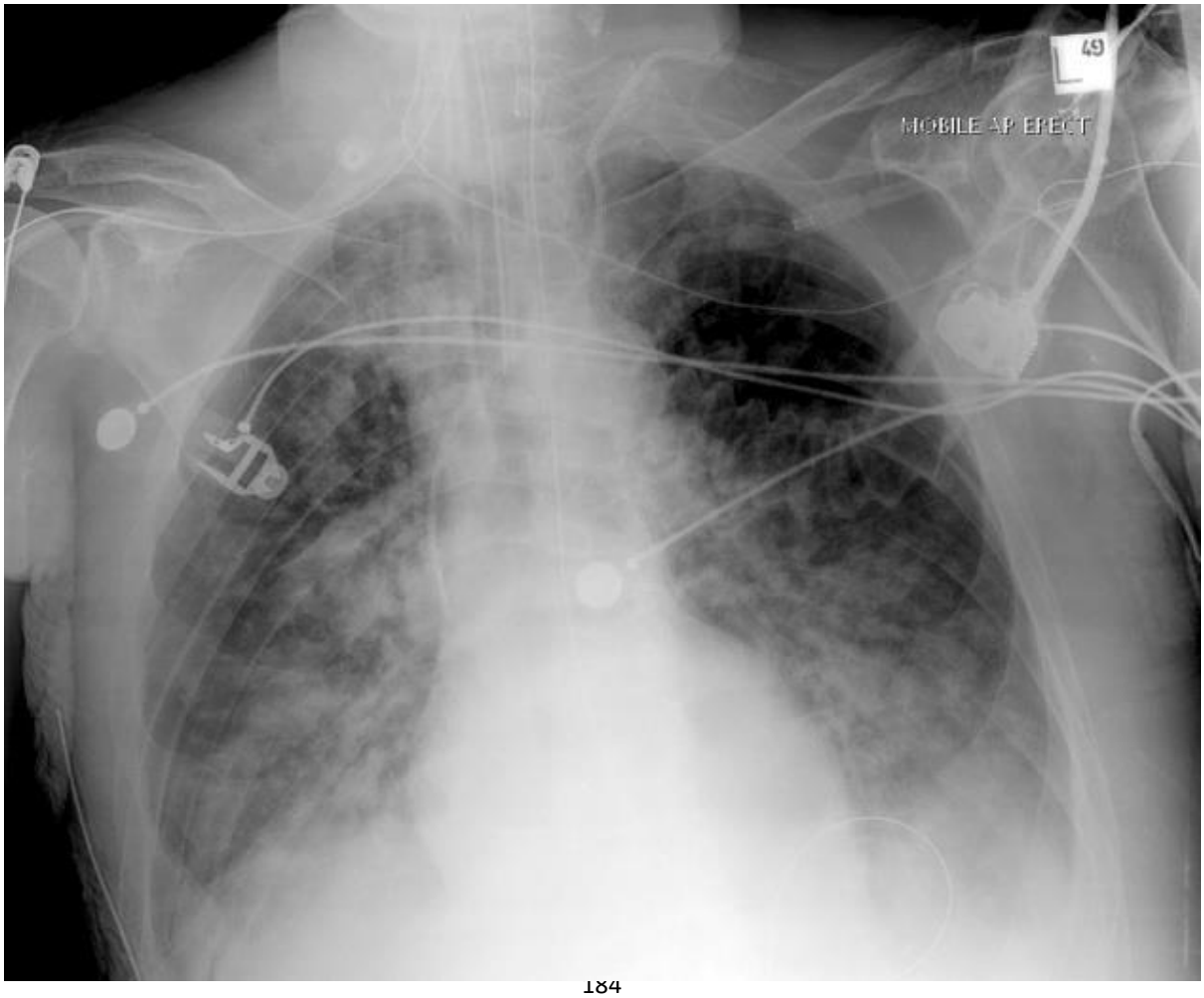
17. **What initial investigations would you request and why? Attempt to divide them into bedside, bloods and imaging.**

    Bedside:

    Bloods:

    Investigations:

18. **CXR is available. What is the most likely diagnosis and why?**



19. **What are your top diagnoses currently- name 2?**

20. **Given that his sats remain at 92% how would you now manage this patient?**

<u>Case 2</u>

A 35-year-old male presents to the Emergency department having fallen from his motorbike at 60mph. You are on a night shift and have been asked to review this patient. Pictures from his injuries can be seen above. AMPLE history has been taken.

1. **What is the type of fracture visible in the image.**

2. **Define an Open Fracture- when may an open fracture not be obvious?**

3. **What 2 things are important to assess in the examination?**

4. **What is the Gustillo Anderson Classification? Write out or tabulate the classification below:**

5. **What grade of fracture do you think this is?**

6. **It is evident the patient has an open fracture, how would you manage this initially in A&E assuming ATLS/primary survey has been completed and the patient is stable?**

7. **If this injury occurred in a farmyard, would this alter the antibiotic regime you suggested?**

8. **Why is it important to ask about immunisation history? Which vaccination specifically would you ask about?**

9. **How urgently do these patients need to go to theatre? Look up the BOAST guidelines on open fractures**

10. **Which other departments input might be required given the tissue loss?**

11. **What type of surgical fixation is he likely to have?**

Further Reading:

- **TeachMeSurgery:** Open Fractures - Classification - Management - TeachMeSurgery
- **Orthobullets:** Open Fractures Management - Trauma - Orthobullets
- **NICE:** Overview | Fractures (complex): assessment and management | Guidance | NICE
- **Tetanus:** Tetanus vaccine | Treatment summaries | BNF | NICE

Case 3

A 30-year-old footballer presents to A&E after a collision in a tackle. He complains of pain in his mid shin. He was helped off the pitch by his colleagues and was unable to get up or weight-bear on his own.

1. **State 3 things you would look for in his lower leg on examination to assess the injury and its severity.**

2. **What nerves and arteries are you testing for in a neurovascular examination of the leg?**

3. **What imaging would you want to perform and describe all the views required.**

4. **His X-ray is shown below, describe the x-ray.**

5. **What treatment options are available for a tibial shaft fracture and when would they be used?**

6. **What is the usual surgical management of a tibial shaft fracture?**

The patient is taken to theatre and an IM (intra-medullary) nail is inserted to fix the fracture.

Post surgery the patient returns to the ward and several hours later complains of severe pain not responding to pain relief such as Oramorph. You have been asked to review this patient.

7. **What is your most important diagnosis to confirm/exclude?**

8. **State the most important clinical sign on physical examination for compartment syndrome**

9. **What is compartment syndrome?**

10. **What is the pathophysiology of compartment syndrome?**

11. **What type of fractures are at higher risk of compartment syndrome?**

12. **What are the late signs of compartment syndrome?**

13. **If compartment syndrome is missed what condition can this lead to?**

14. **How many fascial compartments are there in the lower leg? What are they?**

15. **Are investigations required to diagnose compartment syndrome? If so, which ones would you use?**

You have discussed the above case with your registrar and you both agree that this is a case of compartment syndrome.

16. **What is the correct treatment for compartment syndrome?**

17. **Prior to the patient going to theatre – what initial management can you can do at the bedside as a resident doctor?**

18. **Within what time frame should the patient be taken to theatre?**

19. **Why is it that after the initial surgery the skin incisions are left open for a period of a few days?**

Once the patient returns from theatre, the post-op instructions say to repeat bloods tests particularly U&E and CK and monitor the urine output – why is this?

Further Reading:

Orthobullets: Tibial Shaft Fractures - Trauma - Orthobullets

Orthobullets: Leg Compartment Syndrome - Trauma - Orthobullets

Zero to finals: Compartment Syndrome – Zero To Finals

Pathophysiology of Reperfusion Injury - Mechanisms of Vascular Disease - NCBI Bookshelf

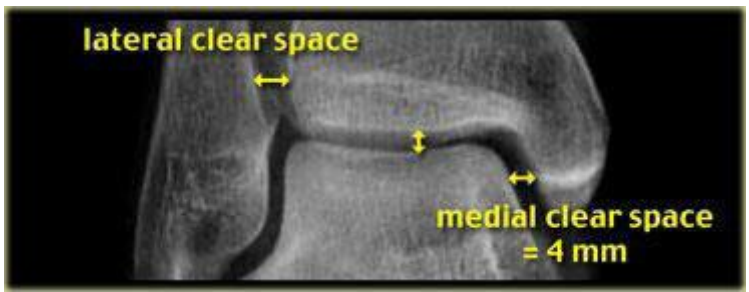
Case 4

A 20-year-old woman present to the ED having fallen down 5 steps. She is complaining of severe ankle pain, ankle deformity and is unable to weightbear. She is otherwise fit and well with no past medical history and does not take any regular medications.

1. **What are the Ottowa rules for Xray?**

2. **How many x-ray views are required when imaging ankle fractures? Please state the names of these views.**

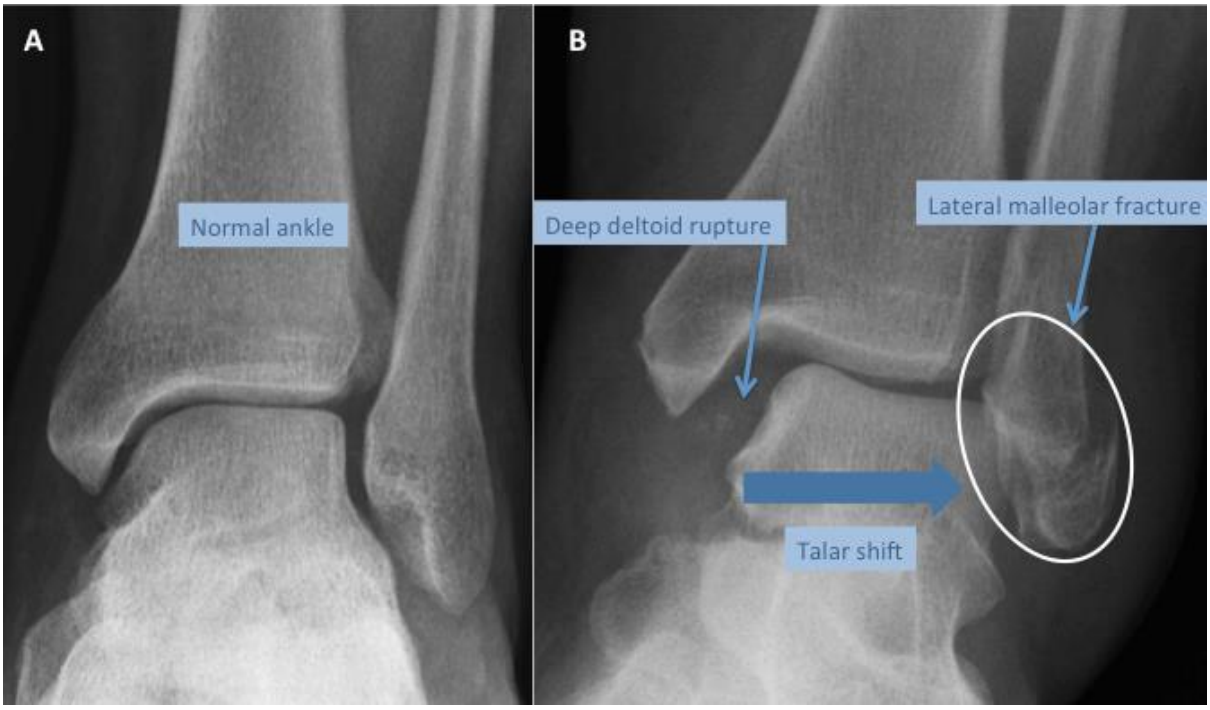
3. **What is a mortise view and why is it needed in addition to the AP and lateral views?**



4. **What is the medial clear space and what is its normal measurement?**

5. **What bones and ligaments make up the ankle joint?**

6. **What is talar shift?**



7. **State 3 differential diagnoses for her ankle injury.**

8. **How do we classify ankle fractures?**

9. **The patient above goes ahead and had an X-ray. Below is an X-ray which shows the ankle joint.**

10. **Describe the fracture above and the potential problem this displacement causes?:**

11. **State 1 instance where the Ottawa rules are useful and 2 instances where they cannot be used?**

The orthopaedic registrar is consulted and wants to go ahead and reduce the fracture.

12. **Post-reduction what examination and investigation need to be carried out?**

13. **What method of immobilisation should be used and why?**

14. **Rather than plaster casting what other form of immobilisation can be used for the conservative management of an ankle fracture?**

15. **Please state 2 types of ankle fractures that would require surgery?**

16. **What is the surgical procedure commonly performed for ankle fracture?**

17. **There are some instances where the patient is intitally managed conservatively as the surgery must be delayed and will occur at a future date – could you list some of these reasons.**

A few days after surgery the patient re-presents with a red, swollen, painful calf.

18. **State 3 differentials.**

19. **What do you think could have been done to reduce the occurrence of a DVT prior to discharge?**

Further Reading

1. **NICE VTE prophylaxis Guideline:** Overview | Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism | Guidance | NICE

2. **Radiopaedia:** Ankle fractures | Radiology Reference Article | Radiopaedia.org

3. **BOFAS: BOFAS > Hyperbook > Trauma > Ankle Fracture**

Plenary 2 – Neck of Femur Fracture, Elective Joint Replacement & Pre-Operative Assessment

Case 5

A 77-year-old woman presents to ED via Ambulance. She has fallen at home whilst putting out the bins. You and the CT trainee have been asked by ED to review this patient.

1. **Conduct a falls history. Suggest 3 stages in the history when enquiring about the fall and state 3 questions you would ask in each section**

   Pre Fall

   During the Fall

   Post Fall

2. **What are important questions to ask in the social history and why?**

3. **What is an AMT and why is it performed when clerking in neck of femur fracture patients?**

4. **State 2 medical causes of a fall that are critical to rule out.**

When you go to see this patient, they are confused and unable to give you much history. However, from the bedside you note the position of her left leg – it is shortened and externally rotated.

5. **What diagnosis could this indicate?**

To confirm your suspicion, you want to perform a few investigations.

6. **State and justify which ones you would like and divide them into bedside, bloods and imaging and why you would like to do these.**

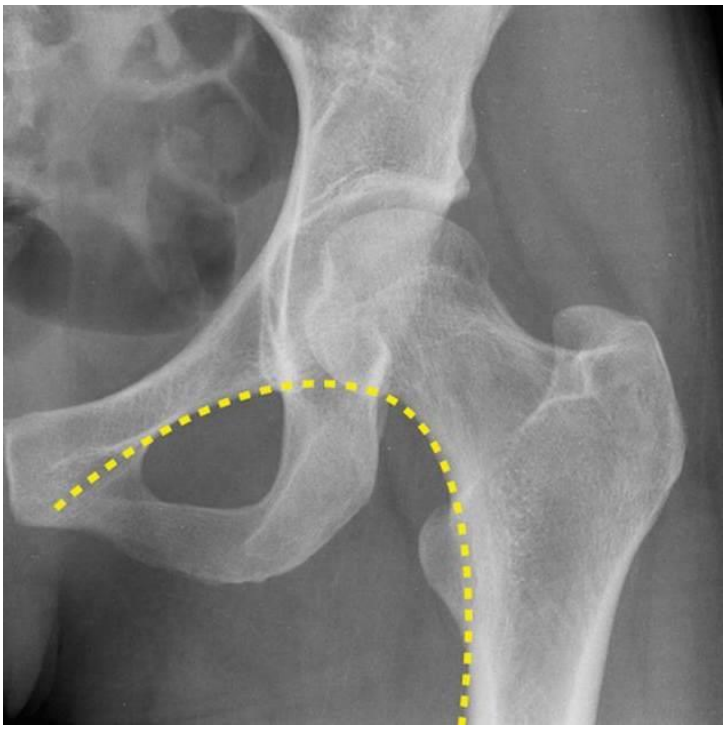
    a. **Bedside**

    b. **Bloods**

    c. **Imaging**

7. **The patient has an x-ray and the AP is shown below. Please describe the fracture and state whether it is displaced or non-displaced**

8. What is Shenton's Line and why is it useful?



9. **How are proximal femoral fractures (this includes neck of femur fractures) classified?**

10. **Why do displaced intracapsular NOF fractures have a high risk of avascular necrosis? What 3 structures does the blood supply to the femoral head run in?**

11. **The patient is in a lot of pain: in addition to pharmacological medication what else can be administered in ED to aid pain relief for proximal femoral fractures?**

12. **What other medications may need to be started or stopped and why :**

The patient is listed for Theatre tomorrow. You have instructed the nurse to keep the patient nil by mouth from midnight – the nurse has asked you to prescribe some fluids.

13. **Which fluids would you prescribe and why?**

14. **What is the pre-operation haemoglobin and INR targets for patients?**

15. **What is the surgical management for this type of fracture in this patient?**

16. **Fill in the table below:**

Fracture	Surgical Procedure
Non-displaced intracapsular fracture	
Displaced intracapsular fracture	
Extracapsular fracture	
Subtrochanteric or Extracapsular reverse oblique fracture	

17. **How it is decided whether a patient should have a total hip replacement rather than a hemi-arthroplasty**

You have to take consent from the patient. The patient appears confused. You perform a capacity assessment.

18. **State the principles of a capacity assessment.**

19. **If the patient is unable to give consent, who may you contact? Who can give consent on behalf of a patient?**

Often elderly patients need a RESPECT form discussion in case they become poorly and are unable to express their wishes. The 6 month mortality rate post a hip fracture is significant at up to 30%.

20. **What is the RESPECT form?**

21. **Can an F1/F2 sign a respect form?**

The patient has returned to the ward. This is the patient's post-operative x-ray.

22. **What operation has been performed?**

23. **What features will the team be looking for on this post-operative X-Ray?**

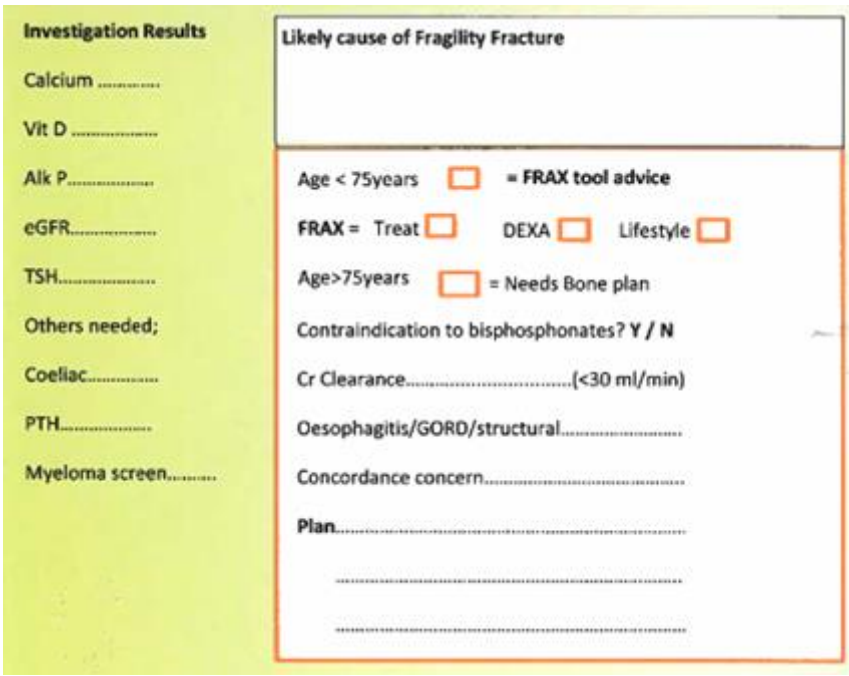
24. **State 5 post-op instructions that the surgical team might write in the post-op notes for the ward doctors to follow?**

The patients relatives attend the ward are able to provide you with some history. The patient was unwell for the last few days and had a cough. They are also able to tell you that the patient likely fell after tripping sideways with their Zimmer frame as has happened previously.

25. **What is a fragility fracture?**

26. **What is the pathophysiology of osteoporosis?**

27. **What is the treatment of osteoporosis?**



28. **State the role of the MDT members stated below in the journey of an elderly patient through hospital and beyond.**

The above patient likely suffering from delirium in the pre-operative period which may be due to an infection of the chest source or from the neck of femur fracture itself.

29. **One of the other complications is DVT. State which chemical and mechanical prophylaxis you would like to start this patient on to prevent a DVT? Please note patient was admitted on Apixaban.**

Further Reading:

NICE: Recommendations | Hip fracture: management | Guidance | NICE

Radiopedia: Intracapsular fracture neck of femur | Radiology Case | Radiopaedia.org

VTE: Recommendations | Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism | Guidance | NICE

UHL VTE: Thromboprophylaxis for Venous Thromboembolism UHL Guideline.pdf

Royal Osteoporosis society: Royal Osteoporosis Society | 404

Case 6

A 79yr old female presents to the arthroplasty clinic with bilateral painful hips that are affecting all aspects of her life. She has a past medical history of ischaemic heart disease, hypertension and a TIA. She mobilises with a walking stick.

1. **What 3 symptoms would you like to ask about in the history of this patient?**

2. **State 3 questions that are important to ask in a social history and why.**

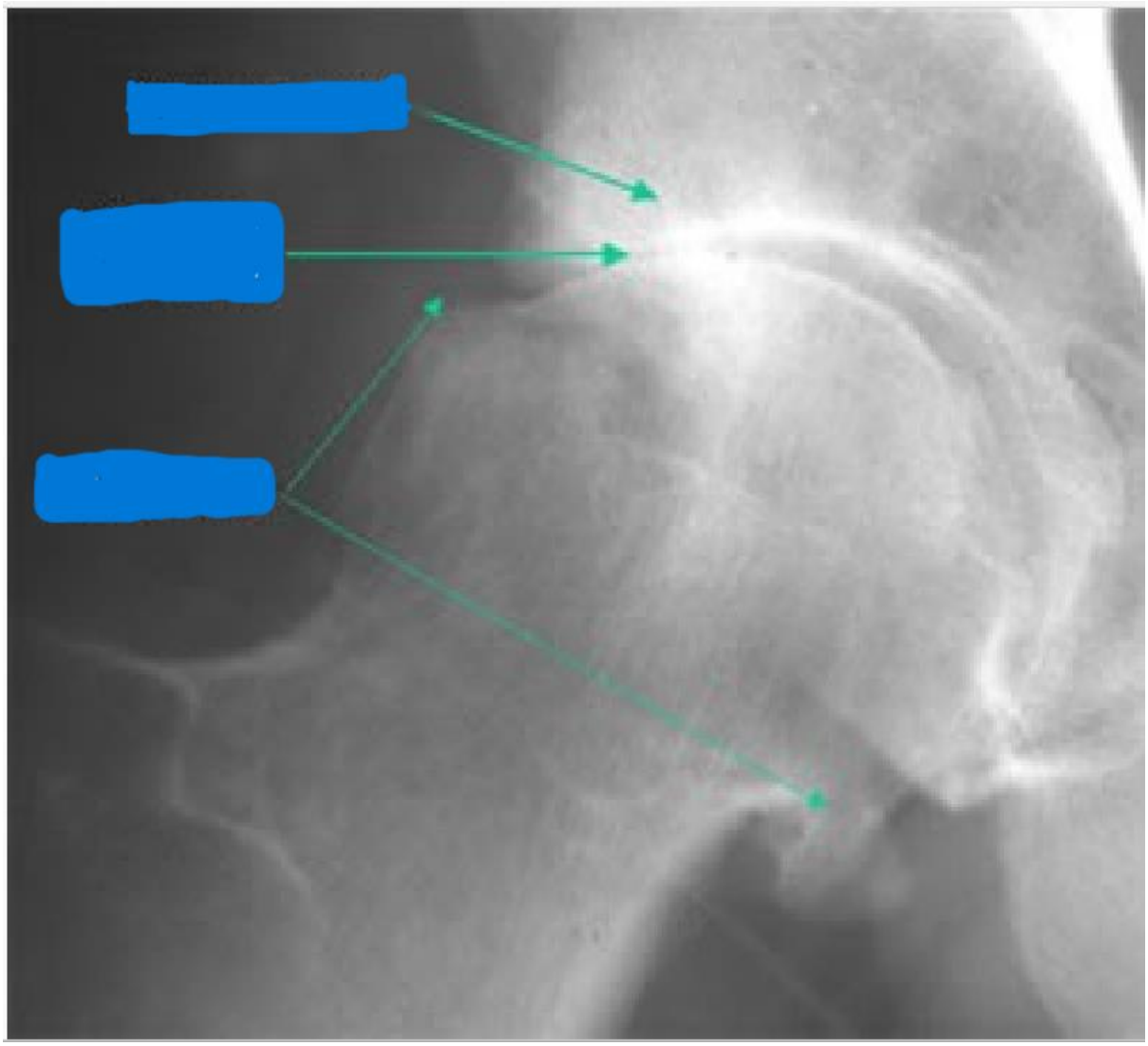
3. **State one positive examination finding you may encounter for hip osteoarthritis.**

4. **State 3 risk factors of osteoarthritis.**

5. **What is the pathophysiology of osteoarthritis?**

Your consultant in the clinic looks at the above X-ray that was performed on arrival to the clinic. Please see the x-ray below.

6. **Label the X-Ray of the pelvis shown above. This shows 3/4 of the common findings found in osteoarthritis. Label the 3 and state the 4th one.**



7. **How do the above X-ray findings differ from the x-ray findings of a patient with rheumatoid arthritis?**

8. **State 3 differential dignoses for hip pain.**

The patient mentions to you that she has been given some exercises by the physiotherapist in the GP practice to perform but this has had minimal benefit. The condition is very debilitating, and she would like further help.

9. **Physiotherapy is a form of conservative management. Can you state 3 more conservative management options?**

The patient is happy to carry on with the conservative as well as medical management options you have provided. They are wondering if there is any type of surgery that is available for this condition.

10. **State the most common type of surgical intervention for hip osteoarthritis.**

11. **What are the 6 most important complications of a total hip replacement to mention?**

12. **How long does a hip joint replacement last?**

The patient returns to the clinic with no benefits with the current management and several weeks later undergoes a total hip replacement.

Post operation she is recovering on the ward where the nurse asks yourself to prescribe the patient VTE prophylaxis.

13. **Give 2 instances where mechanical prophylaxis may be contraindicated.**

14. **Give 2 instances where chemical prophylaxis may be contraindicated.**

15. **Use the NICE guidelines to determine the length of course of VTE prophylaxis for a patient who has undergone a Total hip replacement, which agents are commonly used?.**

16. **How does VTE prophylaxis differ for Total knee replacement?**

The patient is then discharged a few days later.

2 months later the patient re-presents to the hospital feeling generally unwell. They are diagnosed with sepsis of unknown origin. The patient also complains of pain at the site of the arthroplasty. The on-call orthopaedic team is asked to review.

Your registrar suspects it's a prosthetic joint infection.

17. **State 3 history or examination findings in a prosthetic joint infection.**

18. **State what investigations you would request on review splitting these into bedside, bloods and imaging.**

    a. **Bedside:**

    b. **Bloods :**

    c. **Imaging:**

19. **Is a joint aspirate indicated and if so what will this show? Where should this be performed?**

20. **Should antibiotics be started at this point?**

Gram stains have returned from the fluid aspirate and show Staphylococcus aureus.

21. **Below are two surgical approaches that may be used: State what these are and write down when these may be indicated.**

    DAIR:

Revision Arthroplasty- either single or two stage

22. **Given the above what antibiotic would you want to switch the patient to?**

23. **How long would you continue the antibiotic for?**

Other joints in the body are also prone to osteoarthritis. Below are some questions on the knee, shoulder and ankle.

24. **What surgical options are available for knee osteoarthritis, name 3?**

25. **What is a partial knee replacement?**

26. **What is the benefit and risks with a partial knee replacement vs Total Knee Replacement?**

27. **What is total knee replacement?**

28. **How long do knee replacements last?**

The ankle joint is also another area of the body that can develop osteoarthritis. The principles of the condition remain the same.

29. **Describe methods of activity modification that can be used as a non-operative measure.**

30. **Describe the two main surgical options.**

31. **Which patient group may arthrodesis be preferred in and in which may a total arthroplasty be preferred in?**

32. **How successful are ankle replacements, how many last 10 years?**

Further reading:

AAOS: Arthritis of the Foot and Ankle - OrthoInfo - AAOS

Teachmesurgery: Knee Osteoarthritis - TeachMeSurgery

Royal College of Surgeons: Debridement, antibiotics and implant retention (DAIR) following hip and knee arthroplasty: results and findings of a multidisciplinary approach from a non-specialist prosthetic infection centre | The Annals of The Royal College of Surgeons of England

Orthobullets: Total Ankle Arthroplasty - Foot & Ankle - Orthobullets

Total Knee Replacement Step by Step

Case 7

An 82 year old male patient arrives at the elective pre-operative assessment clinic. They were referred to orthopaedics by their GP originally due to failed conservative management of right sided knee osteoarthritis. In the elective orthopaedic clinic, they were consented for a right sided total knee replacement (TKR). They have a PMHx of hypertension, congestive cardiac failure (moderate reduction in ejection fraction), atrial fibrillation, aortic stenosis, gastro oesophageal reflux disease, type 2 diabetes meliitus and chronic kidney disease (CKD3). They take the following medications:

- **Ramipril 10mg OD**
- **Bisoprolol 5mg OD**
- **Metformin 500mg TDS**
- **Dapagliflozin 10mg OD**
- **Apixaban 5mg BD**
- **Lansoprazole 30mg OD**

They have no known drug allergies.

1. **State 4 questions that would be important to ask in a pre-operative assessment clinic for someone having a TKR (PMHx and DHx are already known)?**

2. **Please fill in the table below regarding how these medications may need to be altered pre-operatively. Please answer each of these questions in the box provided:**
    a. **Does this medication need to be stopped/altered pre-operatively? If yes, answer further questions below. If no, move onto the next medication.**
    b. **Why does this medication need to be stopped/altered pre-operatively?**
    c. **What action needs to be taken with this medication? Please include changes to dose and frequency. If it needs to be stopped/altered, please state how long prior to the surgery it needs to be paused/altered for.**
    d. **When can the patient return to the normal regime of this medication?**

Drug	Action
Ramipril 10mg OD	**a)** **b)** **c)** **d)**
Bisoprolol 5mg OD	**a)** **b)** **c)** **d)**
Metformin 500mg TDS	**a)** **b)** **c)** **d)**

Dapagliflozin 10mg OD	**a)** **b)** **c)** **d)**
Apixaban 5mg BD	**a)** **b)** **c)** **d)**
Lansoprazole 30mg OD	**a)** **b)** **c)** **d)**

3. **For this patient specifically, what investigations should be ordered/reviewed as part of the pre-operative work-up?**

4. **When should this patient be scheduled on the list for the day of the surgery? Please justify your answer.**

5. **There are other members of the multi-disciplinary team who will be involved in this patients' care. Please state 2 of these and their role pre-operatively and post-operatively.**

6. **The high-risk anaesthetic assessment clinics are for those with medical conditions which may be significantly affected by the anaesthetic. Should this patient be referred there? Please justify you answer.**

7. **What method of anaesthetic would be most appropriate to use for this patient? Please justify your answer.**

8. **In addition to pain relief please state 2 medications that should be prescribed for John post-operatively**

John is now admitted to the day-case ward for his TKR. He has his surgery in the morning and has just come back to the ward for the afternoon.

9. **What form of antibiotic prophylaxis is routinely used in joint replacement surgery? When should it be given?.**

Further Resources

a) **UHL Guidelines: Surgical Management of Diabetic Patients - Diabetes Patients Undergoing Surgery UHL Guideline.pdf**

b) **UHL Guidelines: Managing Anticoagulants Peri-Operatively - Anticoagulation Management ("bridging") at the time of Elective Surgery and Invasive Procedures (Adult)**

c) **NICE Guidance: Routine Pre-Operative Tests for Elective Surgery - Routine preoperative tests for elective surgery**

d) **UHL Guidelines: Antibiotic Guidance for Surgical Prophylaxis in Adults - Antibiotic Guide for Surgical Prophylaxis in Adults**

e) **NICE Guidance - Pre-Operative Tests for Elective Surgery - Traffic Light Guide**

f) **TeachMeSurgery - The Pre-Operative Assessment - TeachMeSurgery**

Penary 3 - Elective Hand Cases + Upper Limb Trauma + Animal Bites

Case 8

A 54-year-old female presents to her GP with a 6-month history of intermittent numbness and tingling in her right hand. She reports that the symptoms are worse at night, occasionally waking her from sleep. She finds some relief by shaking her hand. She works as a ward clerk and spends several hours a day typing. She denies any recent trauma. On examination, there is reduced sensation in the thumb, index, middle, and radial half of the ring finger. There is visible wasting of the thenar eminence.

She has a past medical history of hypothyroidism and obesity (BMI 33). She takes levothyroxine and no other medications. She does not smoke and drinks socially. There is no relevant family history.

1. **What is the diagnosis? Name four different risk factors for this condition.**

2. **Name three other differentials for this condition and explain how they differ in presentation.**

3. **Which nerve is involved in this condition?**

4. **Under what structure does the median nerve enter the hand and what is this space called?**

5. **Name the other contents of this anatomical area.**

6. **How would you test the nerve function of the three nerves supplying the hand?**

7. **Why is the patient's palm spared in this condition?**

8. **Why will this patient's pain be worse at night?**

9. **What specific examination tests would you perform and explain how they are performed.**

10. **What is the significance of thenar muscle wasting?**

11. **Name two conservative management options for this condition.**

The patient fails to improve despite your conservative measure and progresses to surgical intervention.

12. **What structure is released for the treatment of carpal tunnel syndrome?**

13. **Name two potential non-infective complications for this operation.**

<u>Case 9</u>

A 46-year-old presents with a four month history of numbness and tingling affecting the little finger and ulnar half of the ring finger of their left hand. The symptoms are worse when their elbow is flexed for long periods, such as when using a phone. On examination, there is visible clawing of the 4th and 5th digits, and weakness in finger abduction. Tinel's sign at the elbow is positive.

1. **Which nerve is affected in this condition?**

2. **Where can compression of the ulna nerve occur in the upper limb? Which site is most common?**

3. **What is the 'ulnar paradox' and how does it present clinically?**

4. **Describe Fromment's sign which can be used in examination of this condition.**

5. **What investigation would confirm your clinical diagnosis?**

6. **What surgery can be performed to the nerve the level of the elbow?**

Further Reading:

Carpal Tunnel:

Orthobullets - https://www.orthobullets.com/hand/6018/carpal-tunnel-syndrome

NICE Guidance - https://cks.nice.org.uk/topics/carpal-tunnel-syndrome/

TeachMeSurgery - https://teachmesurgery.com/orthopaedic/wrist-and-hand/carpal-tunnel-syndrome/

Cubital Tunnel:

Orthobullets - https://www.orthobullets.com/hand/6021/cubital-tunnel-syndrome

TeachMeAnatomy - https://teachmeanatomy.info/upper-limb/nerves/ulnar-nerve/

Case 10

A 72-year-old male presents to the GP complaining of difficulty straightening the fingers of his right hand. He reports a gradual progression over the past year. He denies any trauma. Examination reveals thickened nodules in the palm and a fixed flexion deformity of the ring and little fingers. The deformity is not passively correctable.

He has a history of type 2 diabetes. He drinks 20 units of alcohol per week and is an ex-smoker. He reports that his father complained of a similar issue.

1. **What is the underlying pathophysiology of this condition and what is it called?**

2. **List three risk factors associated with this condition.**

3. **Name a specific test that can be performed for this condition and it's positive finding.**

4. **Outline the conservative and surgical options for managing this condition.**

5. **What features would make the risk of recurrence higher after treatment?**

6. **List four different potential complications of the surgery.**

Case 11

A 48-year-old presents with a locking sensation in their right index finger, especially in the morning. When this happens, they report that their finger is locked in flexion, and they have to massage it back to an extended position.

1. **What is the anatomical cause of triggering in this condition?**

2. **Which site will this most commonly occur at, and which joint does this overly?**

3. **Name two associated co-morbidities for this condition.**

4. **List two surgical management options for this patient.**

Further Reading:

Dupuytren's Contracture:

Orthobullets - https://www.orthobullets.com/hand/6058/dupuytrens-disease

TeachMeSurgery - https://teachmesurgery.com/orthopaedic/wrist-and-hand/dupuytrens-contracture/

NICE Guidance - https://cks.nice.org.uk/topics/dupuytrens-disease/

Trigger Finger:

Orthobullets - https://www.orthobullets.com/hand/6027/trigger-finger

TeachMeSurgery - https://teachmesurgery.com/orthopaedic/wrist-and-hand/trigger-finger/#:~:text=Introduction,spontaneously%20in%20otherwise%20healthy%20individuals.

TeachMeAnatomy - https://teachmeanatomy.info/upper-limb/misc/flexor-system-hand/

Case 12

A 23-year-old rugby player is brought to A&E following a fall onto their outstretched arm during a tackle. They are holding their arm in abduction and external rotation. On examination, there is a loss of shoulder

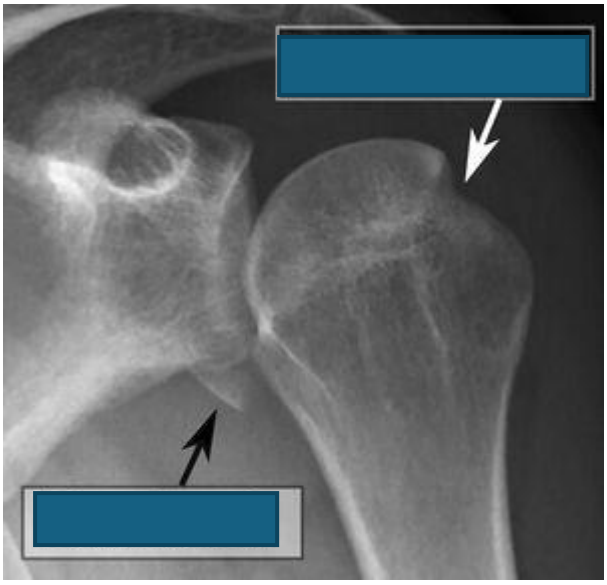
contour and very limited range of motion which is extremely painful. Sensation is reduced over the lateral deltoid.

1. **Why is the glenohumeral joint particularly susceptible to dislocation?**

2. **What position of the arm is an anterior dislocation most likely to happen in if force is applied?**

3. **What imaging views would you like to obtain?**

4. **Label on the imaging below two radiographic features that can occur as a result of an anterior shoulder dislocation.**



5. **What are the signs of axillary nerve injury and how does this injury occur in dislocation?**

6. **When a patient attends A&E with a shoulder dislocation, what would be included in your initial approach to managing the patient, prior to reduction?**

7. **Describe two methods of reducing the anterior dislocation.**

8. **After relocation what examination and investigation should be performed to confirm successful reduction? How should the arm be immobilised?**

9. **What are the differences between soft and bony Bankart lesions?**

10. **How does the management change if there is a large bony Bankart lesion?**

11. **Name two mechanisms of injury where a posterior dislocation may occur.**

12. **Which type of dislocation in shown on the radiograph below, and what is the sign called? (2 marks)**

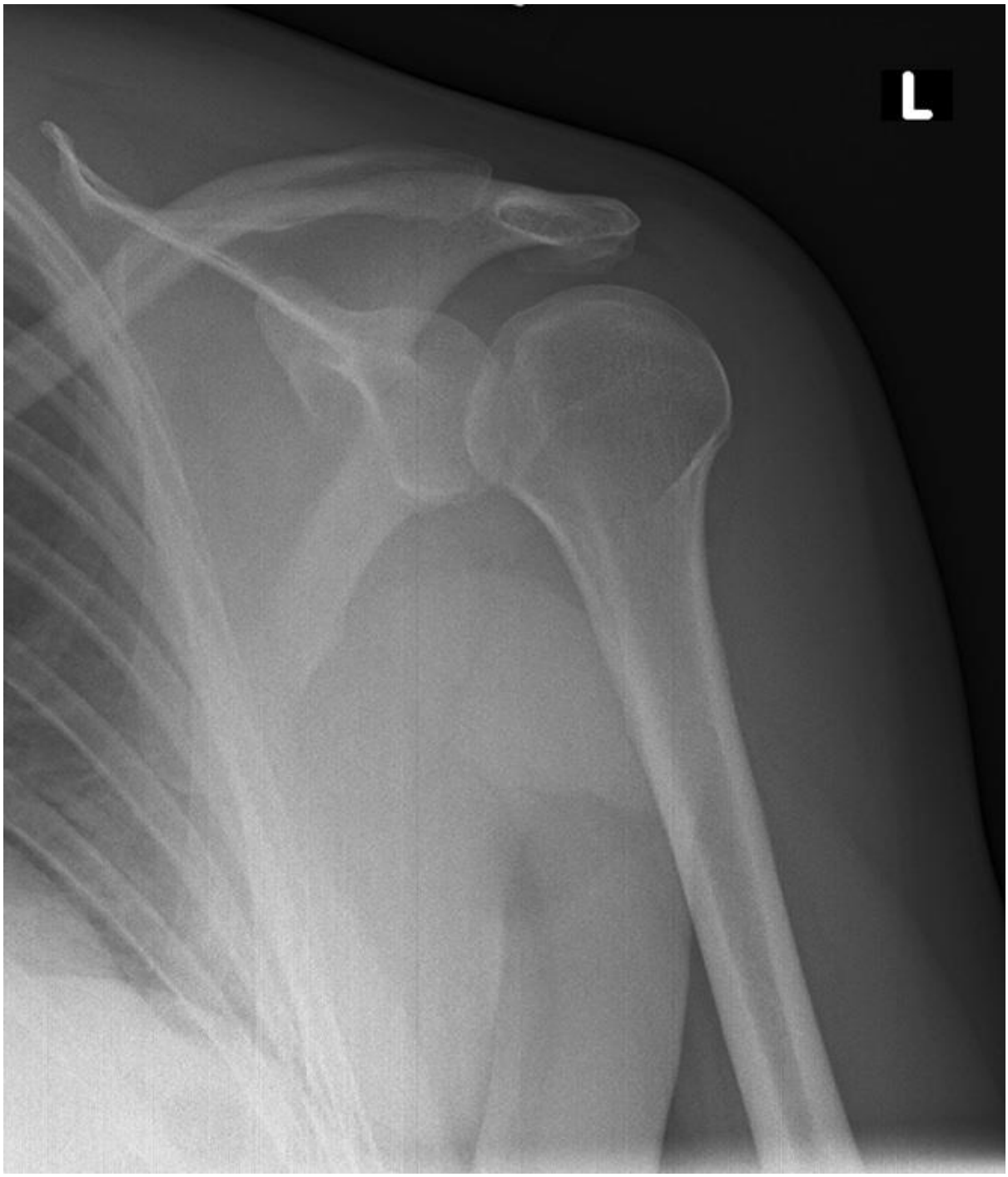


Image From: https://teachmesurgery.com/orthopaedic/shoulder/dislocation/

Further Resources:

TeachMeAnatomy - https://teachmeanatomy.info/upper-limb/joints/shoulder/

TeachMeSurgery - https://teachmesurgery.com/orthopaedic/shoulder/dislocation/

Orthobullets - https://www.orthobullets.com/shoulder-and-elbow/3050/traumatic-anterior-shoulder-instability-tubs

NICE Guidance - https://cks.nice.org.uk/topics/shoulder-pain/management/instability-disorders/

CASE 13

A 85-year-old slips on wet pavement and lands on their outstretched hand. They present to A&E with wrist pain, swelling and visible dinner-fork deformity.

1. **What is the eponym typically associated with this fracture?**

2. **What is a fragility fracture? Name two other common sites of fragility fractures.**

3. **What is the key difference between Colles' and Smith's fractures in terms of fracture displacement and mechanism of injury?**

4. **Name four risk factors for a distal radius fracture.**

5. **What radiographic measurements would you look for when assessing a distal radius fracture? State at least 2?**

6. **Please describe the fracture**


L
LEFT

Images From: https://radiopaedia.org/cases/distal-radial-fracture-28?lang=gb

7. **List two options for analgesia during fracture reduction and briefly describe how you perform them.**

8. **Why should a cast not completely encircle the limb?**

9. **The patient has an MUA and is discharged home with follow-up in fracture clinic in one week. Her X-rays show a worse position after 1 week- what features on the X-ray would lead to the patient being listed for surgery, are there any measurements we use?**

10. **What are three complications of distal radius fractures?**

11. **A patient re-presents with ulnar-sided wrist pain. What complication could have happened?**

Case 14

A 24-year-old presents with wrist pain following a fall onto an outstretched hand while playing football. They report mild tenderness at the base of their thumb.

11. **What are the examination findings suggestive of a scaphoid fracture?**

12. **After clinical examination the clinician suspects a scaphoid fracture and orders an X-ray, the imaging is shown below? How would you treat this patient?**

Image From: https://radiopaedia.org/cases/normal-wrist-x-rays?lang=gb

13. **What imaging steps should follow if pain persists after 6 weeks?**

14. **Explain why early diagnosis is essential in scaphoid fractures.**

15. **How would your treatment vary depending on the location of the fracture?**

16. **Define the boarders of the anatomical snuffbox.**

Further Reading:

Distal Radius Fracture:

Orthobullets - https://www.orthobullets.com/trauma/1027/distal-radius-fractures

TeachMeSurgery - https://teachmesurgery.com/orthopaedic/wrist-and-hand/distal-radius-fracture/

BOA - https://www.boa.ac.uk/resource/boast-16-pdf.html

Scaphoid Fractures:

BSSH - https://www.bssh.ac.uk/_userfiles/pages/files/professionals/Trauma%20standards/Scaphoid%20standards.pdf

Orthobullets - https://www.orthobullets.com/hand/6034/scaphoid-fracture

Case 15

A 84-year-old falls into a low wall and hears a crack associated with pain in their upper arm. Examination reveals wrist drop and reduced power in wrist and finger extension.

1. **What injury has likely occurred and what is the anatomical explanation for wrist drop?**

2. **What type of conservative treatment would you use?**

3. **How would you treat the radial nerve palsy?**

A 12-year-old boy falls while climbing. X-rays reveal a proximal ulnar fracture with radial head dislocation at the elbow.

3. **What is the name of this injury pattern?**

4. **How does it differ from a Galeazzi fracture?**

A 22-year-old presents with pain and swelling in their hand after punching a wall. There is significant tenderness around the ulna border of the hand.

5. **What is the most likely diagnosis?**

6. **A rotational deformity is a common reason for a patient requiring surgical fixation for this fracture. How would you assess for rotational deformity?**

7. **What is the importance of orthogonal imaging in this setting?**

Further Reading:

Humeral Shaft:

Orthobullets - https://www.orthobullets.com/trauma/1016/humeral-shaft-fractures

TeachMeSurgery – https://teachmesurgery.com/orthopaedic/shoulder/humeral-shaft-fracture/#:~:text=Introduction,patients%20following%20low%20impact%20injuries.

Monteggia Fracture:

Orthobullets - https://www.orthobullets.com/trauma/1024/monteggia-fractures

Galeazzi Fracture:

Orthobullets – https://www.orthobullets.com/trauma/1029/galeazzi-fractures

Metacarpal Fractures:

Orthobullets - https://www.orthobullets.com/hand/6037/metacarpal-fractures

TeachMeSurgery - https://teachmesurgery.com/plastic-surgery/hand-trauma/metacarpal-fractures/#:~:text=Boxer's%20Fracture%20%E2%80%93%20a%20fracture%20of,taping%20and%20then%20full%20mobilisation

Case 16

A 9 year old boy attends the A&E department following a fall. He was bouncing on the trampoline with his brother when he lost control and bounced off the trampoline and onto the floor. He is now crying in pain and says that his elbow hurts. He has no PMHx and takes no regular medications. He has no allergies. The child is clinging onto his Mum and is making good eye contact with her.

1. **Why is it important to assess the relationship between the child and have a clear account of the mechanism of injury?**

The child is very tender around the elbow joint. You also notice that he is holding his elbow in a flexed position, supported by his other arm. The clerking SHO suspects a fracture might have been sustained.

2. **What is the most important part examining a suspected fracture in this patient?**

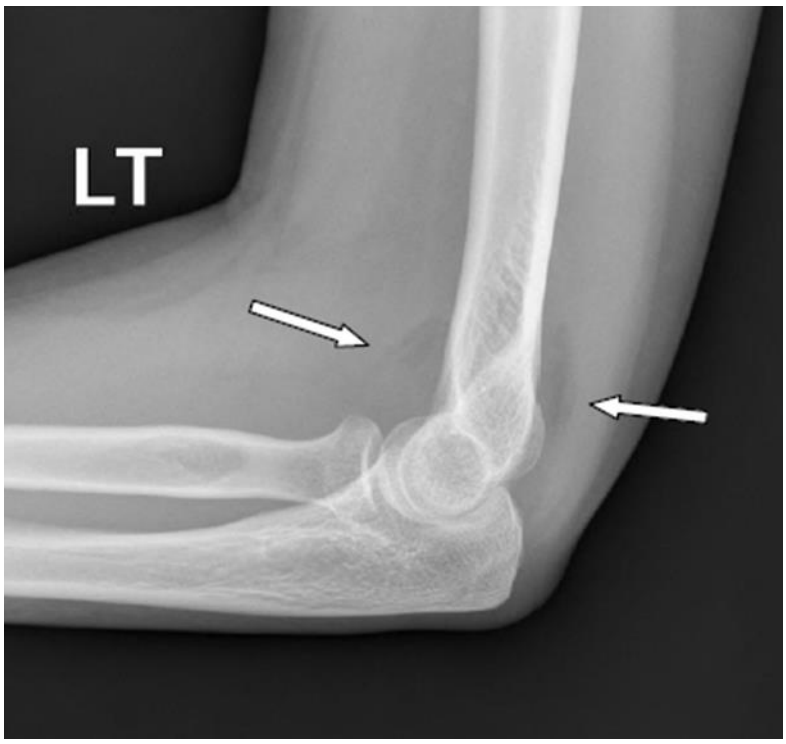
An x-ray is ordered. The images are shown below

Name: James Taylor Age: 9yrs 4 mths Sex: Male S Number: S1234567 Side: Right

Reference for Images - [Supracondylar humeral fracture | Radiology Reference Article | Radiopaedia.org](#) (Case 9)

3. **Please fully describe the x-ray images above. Please also state the specific fracture that this patient has suffered.**

4. **These fractures are sometimes hard to detect on x-ray. Is there another sign on the x-ray that might indicate this fracture without seeing a clear cortical defect in the bone? Please describe why this sign occurs.**



5. **After seeing this fracture, what is the most common nerve palsy that might occur? How would you assess the function of this nerve in this patient?**

6. **Please state 3 other nerves that could be affected by a supracondylar fracture.**

The patient has been referred to orthopaedics and A&E are awaiting their input. However, a nurse finds the SHO 30 minutes later to express concerns about the patient. The nurse states that the arm is looking very pale. The SHO reviews, the affected arm is now pale and pulseless. The capillary refill time is absent.

7. **What blood vessel is most likely to have been compromised as a result of the supracondylar fracture?**

8. **After confirming a vascularly compromised limb, what is the most important task for the SHO to perform?**

The orthopaedic registrar arrives down in A&E. They discuss the case with the clerking SHO down in A&E. The orthopaedic registrar states that they are extremely busy and have other referrals to see. They state that this is an urgent case that will need fixation in theatre as soon as possible, but ask the clerking SHO to consent the patient for surgical fixation. The clerking SHO has no experience of how to perform the procedure on this case.

9. **Should the clerking SHO consent this patient? Please justify your answer.**

10. **What other specialty might be required in theatre for this patient? Please justify your answer.**

11. **What complication can occur from this fracture causing vascular compromise that makes this case so urgent?**

There are occasions with supracondylar fractures where the distal aspect of the upper limb is pulseless, but is warm and has a normal capillary refill time.

12. **Why might this occur?**

13. **If you were the clerking doctor in this case and it came in overnight, would you consider this urgent and require management overnight or could it wait till the morning? Please justify your answer.**

Further Resources

- **BOAST Guidelines - BOAST Guidelines - Supracondylar Fractures in Children**
- **Orthobullets - Supracondylar Fracture - Pediatric - Pediatrics - Orthobullets**
- **StatPearls - Supracondylar Humerus Fractures - StatPearls - NCBI Bookshelf**

Case 17

A 19 year old female patient attends the emergency department 48 hours after she was attacked by an animal whilst walking through a park. She sustained a bite injury to her left hand. She has a PMHx of T1DM for which she takes a long acting Insulin once a day and a short acting insulin 3 times a day with meals. She has no allergies. The photo below shows the injury that has been sustained

1. **Please state 2 further pieces of information that should be obtained from the history that are specific to the presenting complaint.**

2. **What is the most critical part of this examination? Please state in detail how you would assess each aspect of this examination.**

3. **Please state 3 investigations you would want to order in this patient, justifying each one.**

The A&E department are waiting for orthopaedics to come down and review the patient.

4. **Whilst awaiting specialist review, state 2 management steps the A&E SHO could implement.**

Orthopaedics review and have decided that this patient requires an inpatient admission. They have placed the patient on their multi-disciplinary team meeting to decide how to definitively manage this patient. They advise you to start the patient on a course of co-amoxiclav prior to admission to the ward.

5. **Why is co-amoxiclav often given as an initial antibiotic prior to any culture results coming back?**

6. **Why in this patient would infection be more of a concern? Please state 4 further patient factors, not specific to this case, that would increase the risk of infection.**

Orthopaedics have scheduled the patient in for theatre for 8am the next morning. It has been decided that vascular surgery and plastic surgery will also be present and assisting in the case.

7. **This patient is first on the list due to her type 1 diabetes. How would you go about managing her insulin medication? It is currently 18:00pm the evening before her surgery. She usually takes 20 units long acting insulin at night and 4-6 units rapid acting insulin 3x/day with meals.**

8. **Post-operatively, how would you convert this patient back to their regular insulin medications?**

9. **What potential involvement would plastic surgery have with this case? What other specialities with injuries similar to this might also be required?**

Dog Bites are not the only bites injuries seen. Cat bites are very common, and human bites are also often seen in the emergency department.

10. **How do cat bites differ from dog bites in terms of their presentation? What consequence can this have for the patient?**

11. **Of dog bites, cat bites and human bites, which one poses the highest risk of infection? Why?**

Further Reading:

- **UHL Guidelines - Orthopaedic Infection in Adults UHL Guideline.pdf**
- **Orthobullets - Dog and Cat Bites - Hand - Orthobullets**
- **StatPearls - Animal Bites - StatPearls - NCBI Bookshelf**

Plenary 4 - Elective Shoulder + Painful Knee (Incl Septic) + Foot & Ankle

Case 18

John, a 71 year old male, presents to the emergency department with pain in his right knee. This pain started 2 days ago and has been gradually getting worse over this time. He describes the pain as getting bad enough now that he is struggling to put any weight through it or even move it. He has a PMHx of T2DM, CCF, HTN, and Left THR. His previous surgery was over 1 year ago. He takes Metformin, Dapagliflozin, Ramipril and Amlodipine. He is allergic to penicillin.

1. **What is your differential diagnosis? List 4**

Upon further history taking and examination, the clerking doctor suspects this might be Septic Arthritis.

2. **What is the cardinal examination sign in a patient with septic arthritis?**

3. **Please state 4 blood investigations to investigate septic arthritis and the other differential diagnoses. Please justify each investigation chosen.**

4. **What other non-invasive investigation would be useful?**

The case is discussed with the on-call orthopaedic registrar and there is agreement that this is likely septic arthritis. The current observations are provided by the nurse:
RR – 16
SATs – 98% o/a
HR – 90
BP – 110/71
Temp – 38.2

5. **Do you think it is appropriate to start this patient on antibiotics now? Please justify your answer**

6. **What would the next most appropriate investigation be?**

7. **If this patient had a knee replacement in situ would this change your decision?**

The aspiration is carried out in ED and purulent fluid is obtained. Antibiotics are then started.

8. **What are the commonest infecting organisms? State 3**

9. **What first line antibiotic regime would you instigate initially and for how long?**

10. **State 3 tests that will be done on the aspirated synovial fluid to rule in and rule out differential diagnoses.**

The patient is transferred to the orthopaedics ward. Overnight however, the nurse calls on the call ward doctor as they are concerned about this patient. The observations are as below:
RR – 28
SATs – 96% o/a
HR – 118
BP – 102/66
Temp – 39.1

The doctor performs an A-E examination, which only reveals an erythematous, swollen, painful right knee. There are no other positive clinical signs to indicate another source of infection.

11. **What is the likely diagnosis? Be specific.**

The doctor wants to give IV Meropenem

12. **Please provide 1 further reason why the doctor should be cautious about giving IV Meropenem to this patient. What further information should be acquired to help inform this decision?**

13. **What definitive treatment should be considered in this scenario? What is the definitive treatment for septic arthritis?**

The patient has a joint washout. 2 days later, the results come back and it has shown gram positive cocci that have grown in clusters on the gram stain.

14. **What is the most likely organism to have grown in this patient?**

15. **State 3 ways that infection can spread into a joint space.**

Further Reading:

- **UHL Guidelines - Orthopaedic Infection in Adults UHL Guideline.pdf**
- **Orthobullets - Septic Arthritis - Adult - Trauma - Orthobullets**
- **StatPearls – Septic Arthritis - StatPearls - NCBI Bookshelf**

Case 19

A 65-year-old presents with a 6-month history of progressive shoulder pain, worse with overhead activity. They report weakness when lifting objects and disturbed sleep due to pain.

1. **Define painful arc syndrome. What tendon is involved and what structure normally causes the problem?**

2. **What differential diagnoses could be considered (name 3)**

3. **Name the four rotator cuff muscles and their main functions.**

4. **Name and describe one examination test for each rotator cuff muscle.**

5. **What are the typical causes of a cuff tear?**

6. **What imaging would you consider in a patient presenting with acute on chronic shoulder pain?**

7. **What are two conservative treatments for rotator cuff injury?**

8. **When should surgical referral be considered?**

9. **What surgical treatment is available for painful arc syndrome?**

Case 20

A 50-year-old with type 2 diabetes presents with gradual onset shoulder pain and stiffness. Both active and passive range of motion are restricted. They report that it is preventing them from taking part in their local bowls society.

8. **What is the typical pattern of disease progression in frozen shoulder and how long do the 3 phases last?**

9. **Describe the main examination finding.**

10. **What conditions are associated with frozen shoulder? What age and gender are most at risk?**

11. **How would you exclude other causes of shoulder pain?**

12. **List three treatment options for adhesive capsulitis.**

Further Reading:

Rotator Cuff:
Geeky Medics - https://geekymedics.com/shoulder-examination/
TeachMeSurgery - https://teachmesurgery.com/orthopaedic/shoulder/rotator-cuff-tear/
Orthobullets - https://www.orthobullets.com/shoulder-and-elbow/3043/rotator-cuff-tears
Frozen Shoulder:
TeachMeSurgery - https://teachmesurgery.com/orthopaedic/shoulder/adhesive-capsulitis/
Orthobullets - https://www.orthobullets.com/shoulder-and-elbow/3059/adhesive-capsulitis-frozen-shoulder

Case 21
A 20-year-old male presents to you having injured his knee when going in for a tackle whilst playing football.

1. **State 3 key questions you would want to illicit from the history in the history and why?**

The patient mentions that he was turning towards the ball when suddenly he felt a pop and experienced significant amount of pain. A few minutes after there was swelling of his knee.

2. **State 2 of your main differentials currently and why?**

3. **What is the action of the following and what is the mechanism of injury:**
   - **Anterior Cruciate Ligament**
   - **Posterior Cruciate Ligament**
   - **Menisci**

4. **What is the significance of the timing of the swelling?**

5. **Why is there swelling in the knee joint after an injury to the cruciate ligaments?**

6. **What is the ”unhappy triad”?**

You conduct a physical examination of this patient.

7. **State what examination findings you would expect for ACL tears, PCL tears and Meniscal Tears?**

8. **Why is examination often repeated after 2 weeks?**

Your registrar requests an X-Ray as a preliminary investigation.

9. **What can the X-Ray help rule out in this presentation?**

The X-ray identifies no bony injuries, but it is unclear from this alone if there is an ACL/PCL/ meniscal injury.

10. **What is the gold standard investigation for this presentation?**

11. **Below are pictures of an MRI scan that was also conducted. Circle the pathology.**

The registrar confirms it is an ACL tear.

12. **What is the first principle of management in this injury which will help with the pain as well as the swelling?**

13. **If managing this conservatively what sort of a splint is used for support?**

14. **What is the weight bearing status?**

15. **How would you manage a chronic anterior cruciate ligament tear?**

16. **In terms of surgery: when is this performed?**

17. **What is the main surgical approach and is this usually this is done arthroscopically or open?**

One of the main other differential diagnoses was a meniscal tear.

18. **During examination, sometimes the patient's knee can lock in slight flexion. Why does this occur?**

19. **What is the initial approach to management?**

20. **Describe the approach to surgery if the tear is in the outer third, middle third or inner third.**

21. **Lastly state the most common complications that can occur after injury to ACL/Menisci tear:**

Further reading:

Anterior Cruciate Ligament Tear

Orthobullets: ACL Tear - Knee & Sports - Orthobullets

StatPearls: CE Activity | Anterior Cruciate Ligament Knee Injury | NPs

Meniscal Tears:

Orthobullets - Meniscal Tears - Knee & Sports - Orthobullets

AAOS - Meniscus Tears - OrthoInfo - AAOS

Case 22

A 40-year-old woman presented to the GP with complaints of left toe pain and difficulty in wearing shoes which has been ongoing for a many months but has worsened in the past few weeks. The GP referred them for an X-Ray which is now available for view.

1. **Describe the deformity of the left foot that is seen in the above picture.**

2. **How does a Valgus deformity differ from a Varus deformity?**

The GP confirms your suspicions and agrees this is a likely diagnosis of Hallux Valgus.

3. **Describe what is meant by Hallux Valgus with respect to the bones involved in this condition.**

4. **Which demographic (age/gender) of patients does Hallux Valgus tend to affect most?**

5. **List 3 risk factors that increase the chances of developing Hallux Valgus?**

6. **Which views are recommended from an X-ray for this presentation?**

7. **Below is the X-ray that was performed: Please describe the pathology visible on the on the**

X-ray.

An X-ray is also useful in giving you the degree of lateral deviation which is worked out as the angle between the first metatarsal and the 1st proximal phalanx. A further angle can be measured between the first and second metatarsal shafts (intermetatarsal angle, should be <9 degrees)

8. **How do you measure the hallux valgus angle?**

9. **What angle is diagnostic of Hallux Valgus?**

10. **What is the difference between hallux Valgus and Hallux Rigidus?**

11. **State 3 broad conservative management options.**

The patient is happy to begin with some conservative management but is curious of future surgical options if required.

12. **Describe what a surgical procedure involves that is used to treat Hallux Valgus, can you name one technique that is commonly used for hallux valgus.**

13. **State 4 complications of hallux valgus surgery.**

14. **Some patients may want a surgery due to cosmetic reasons: is this a valid indication for this?**

Further Reading:

- **OrthoBullets:** Hallux Valgus - Foot & Ankle - Orthobullets
- **NIH StatPearls:** Hallux Valgus - StatPearls - NCBI Bookshelf
- **BOFAS:** BOFAS > Hyperbook > Forefoot > Hallux Valgus
- **ZerotoFinals:** Understanding Bunions (Hallux Valgus)
- **Radiopedia:** Hallux valgus | Radiology Reference Article | Radiopaedia.org

Plenary 5 – Spinal Cases

Case 23

A 31 year old male presents to the GP surgery by an GPST1 doctor with acute onset lower back and leg pain. He was at the home and bent down to pick something up from the floor, when he experienced sudden onset lower back pain, forcing him to lie down. This was then associated with what he described as a "muscle spasm" on his right side and shooting pains radiating down the back of his right leg, going all the way down

to his lower calf/ankle. He has nil relevant PMHx and nil regular medications. He is allergic to paracetamol, which induces an anaphylactic reaction.

1. **State 4 further questions you would want to elicit from the history of this patient. What are the "Red Flag Signs" and why are they important to ask?**

2. **In this patient, what nerve provocation test is likely to be positive in this patient on examination? Please describe how this is performed.**

Upon examination, the patient has lumbar spinal tenderness and spasm in the right sided paraspinal muscles. He also has weak right sided great toe extension and reduced sensation over the right great toe. The GPST1 suspects mechanical back pain with sciatica.

3. **Please define the term "mechanical back pain". What is the difference between mechanical back pain and referred neurological leg pain (sciatica)?**

4. **Please define the terms "dermatome" and "myotome".**

5. **Given the findings upon peripheral nerve examination of his lower limbs, which nerve root do you think has been affected?**

    a. **L2**
    b. **L3**
    c. **L4**
    d. **L5**
    e. **S1**

6. **Please define the terms "radiculopathy" and "myelopathy". Which of these categories does the patient have and why?**

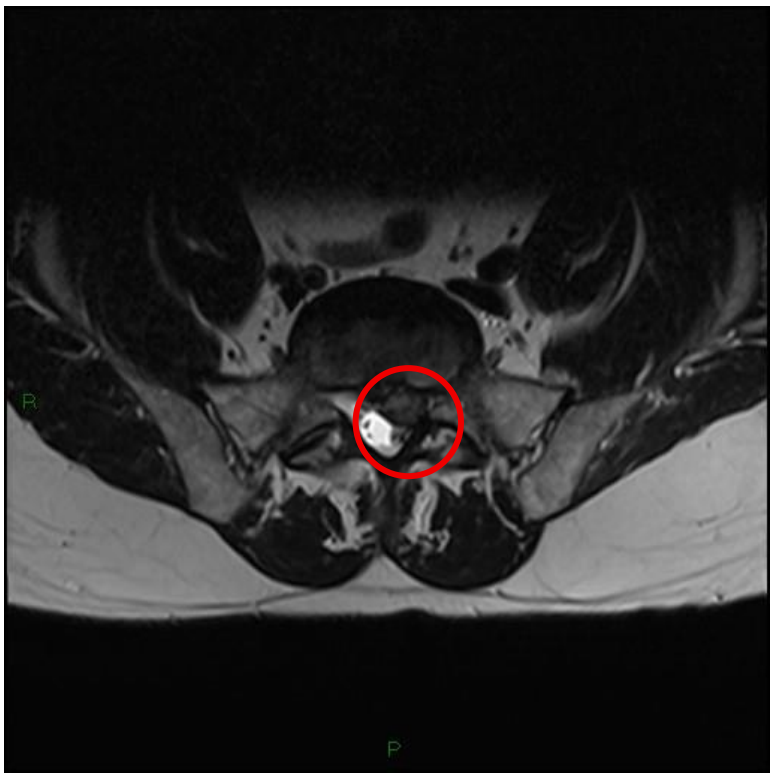
The GPST1 is suspecting an acute disc herniation as the cause of the patients' symptoms. They discuss the case with their supervisor and state they think an MRI lumbosacral spine should be ordered. However, the GP advises against this, stating that they have commence conservative treatment and should only order this if symptoms persist for ≥ 6 weeks despite conservative management.

7. **Why is the GP supervisor advising that an MRI should only be ordered if symptoms continue for ≥ 6 weeks despite conservative management?**

8. **Please describe 4 methods of conservative management for this patient and explain why they are used.**

The patient engages with conservative management, however he returns 2 months later complaining that the pain has not improved. He has had his pain medication dose increased within the 2 months he has been taking it, but there has been no improvement. He still has significant lower back and shooting leg pain on his right side. He states he has been compliant with all aspects of conservative management previously discussed. An MRI Lumbosacral Spine is ordered. Please see the images below.

9. **On both images, what does the circled area show?**



Reference for Images - Disc extrusion | Radiology Reference Article | Radiopaedia.org (Case 19)

10. **There are 3 types of disc herniation (based on anatomical location). Which one of these is more common and explain how each herniation affects a different part of the spinal cord/spinal nerves**

11. **What symptoms would a patient predominantely need to have for a spinal surgeon to consider surgery in a patient with a lumbar acute disc herniation?**

12. **If a spinal surgeon reviewed the case and stated that surgical intervention was not appropriate, could any procedure be done to reduce the pain from the disc herniation? If so, explain how this helps treat the condition in the long term**

13. **What common surgical procedure can be done for an acute, focal disc herniation?**

Links for Further Reading

- **ASIA Chart - Link to ASIA Chart**
- **BMJ Visual Summary of Mechanical Back Pain - BMJ Visual Summary of Management of Mechanical Back Pain**
- **Orthobullets Acute Lumbar Disc Herniation - Lumbar Disc Herniation - Spine - Orthobullets**
- **NICE Guidance - Overview | Low back pain and sciatica in over 16s: assessment and management | Guidance | NICE**

Case 24

A 71 year old female patient presents to the GP practice. She describes a gradual onset of pain in her posterior neck that has gotten worse over the past 12 months. She has a PMHx of hypertension and T2DM for which she takes Ramipril, Amlodipine and Metformin. She has no allergies.

1. **State 4 further questions from the history you would like to ask to acquire further information.**

2. **State what physical examinations you would like to perform in this patient.**

The patient describes paraesthesia in both hands bilaterally and feeling like she is losing her balance frequently. Her friends have also said how clumsy she is as she is constantly dropping things like her phone and drinks.

3. **Please state what the most likely diagnosis is, justifying the diagnosis by relating the symptoms to the relevant anatomy.**

4. **If the patient had solely unilateral paraesthesia in one hand with no other symptoms, state 2 further possible differentials**

5. **The GP wants to order imaging to confirm the diagnosis. Please state what modality of imaging and the region to be imaged is required and explain your reasoning for why you have selected that specific region to be imaged.**

Imaging is performed, which confirms the diagnosis of cervical myelopathy secondary to spondylosis.

6. **Please define the term spondylosis and state 3 pathological changes that occur within the spine as a result of spondylosis.**

7. **Will this condition provoke upper motor neurone (UMN) symptoms, lower motor neurone (LMN) symptoms, or both? Please justify your answer relating to the relevant anatomy.**

The GP discusses the diagnosis with the spinal team at the hospital and conservative management is opted for.

8. **Please describe 4 aspects of conservative management for these patients**

9. **If after a trial of conservative treatment, with good adherence, there is no improvement in symptoms, are there any interventional treatments that could be offered?**

Links to Further Resources

- **Orthobullets Cervical Myelopathy - Cervical Myelopathy - Spine - Orthobullets**
- **BMJ Best Practice (Cervical Spondylosis) - Degenerative cervical spine disease - Symptoms, diagnosis and treatment | BMJ Best Practice**

Case 25

A 44 year old man presents to the GP with ongoing leg pain. He states that the pain is in both legs and comes on after walking around 200 metres. He then stops to sit and leans forward, both of these resolve the pain after a few minutes. He will then start walking again and the pain will develop again. This started around 6 months ago after a day of significant heavy lifting. The pain was initially in both hamstrings, but over the past month has also affected his calves. He has also noted some lower back stiffness over the last 6 months. He states he works on a construction site. He has nil PMHx and takes no regular medications. He has no allergies. The GP suspects this might be neurogenic claudication.

1. **State 3 ways from history and examination we can differentiate between neurogenic and vascular claudication**

2. **Please state 3 further questions you would want to ask in the history to rule in/rule out the cause of the patients' symptoms.**

3. **With the lower back stiffness and neurogenic claudication, the GP suspects a lumbar spine pathology. What is the gold standard investigation for the GPs' suspicion?**

4. **Should this investigation be ordered immediately or delayed by 6 weeks? Please justify your answer.**

The imaging comes back and confirms the GPs' suspicions, lumbar stenosis with nerve root compression. The patient is referred to the spinal team at the hospital. After the appointment, the consultant recommends a trial of conservative management.

5. **Apart from a disc herniation, state 4 other potential causes of a lumbar stenosis.**

6. **Lumbar stenosis affects the central spinal canal, much like cervical myelopathy. Therefore, why is lumbar stenosis not described as lumbar myelopathy?**

Conservative management for lumbar stenosis is similar to that for sciatica (see section above).

Conservative management is advised to the patient. 3 months later, he returns to the GP practice. He admitted to non-compliance with rehabilitation and continued to lift heavy pieces of equipment at work. Yesterday, he experienced acute onset severe lower back pain after lifting some bricks, alongside new, sharp pains going down both legs.

7. **Please state 1 diagnosis you want to rule out and 3 further questions that are critical to ask this patient which relate to this diagnosis.**

The patient is sent to A&E by the GP with suspected Cauda Equina Syndrome

8. **Please state 1 factor the GP needs to consider when advising an A-E department to the patient when referring out of hours.**

9. **The patient in A&E is clerked by an orthopaedic SHO doctor. The SHO performs a digital rectal examination and asks for a post-void bladder scan to be performed. Why is it important to perform these examinations/investigations alongside imaging of the spine?**

10. **What is the gold standard imaging for a suspected Cauda Equina Syndrome?**

    a. **MRI Lumbosacral Spine**
    b. **MRI Thoracic + Lumbosacral Spine**
    c. **MRI Whole Spine**
    d. **X-Ray Lumbosacral Spine**
    e. **MRI Sacral Spine**

11. **Imaging confirms Acute Cauda Equina Syndrome secondary to disc herniation. The case has been discussed with the on call spinal consultant who is now coming into the hospital. Prior to definitive management, please state 3 aspects of general initial management the SHO needs to perform for this patient to be ready for surgery.**

12. **What is the definitive management of Cauda Equina Syndrome? Within what time frame should this be done?**

The patient undergoes surgery to resolve the Cauda Equina Syndrome. He is now 2 days post-op and has been progressing well, until this morning where the patient is complaining of worsening lower back pain. He also spiked a temperature during the morning at 38.3°C. He states he is also feeling generally unwell. His current EWS is below:

RR – 18
SATs – 95% o/a
HR – 98
BP – 112/74
Temp – 38.5

On the previous ward round, his spine has been declared as stable and he is for full mobilisation. A nurse has asked you to review the patient.

13. **State 3 assessments/examinations that you would want to perform on this patient. What symptoms/signs would you be looking for in the context of this patient in these assessments/examinations?**

14. **From the above information, please state 4 investigations you would want to order, providing justification for each one.**

The case is discussed with the spinal consultant who has requested an MRI Lumbosacral spine. It has revealed an epidural abscess. As the report is being read, a nurse comes over very concerned about the patient and shows you the below observations:

RR – 26
SATs – 95% o/a
HR – 128
BP – 99/69
Temp – 38.7

15. **Please state what you think the diagnosis most likely is, in the context of this patient, and the immediate management steps required**

16. **Apart from an epidural abscess, name 2 other infections that can occur within the spine.**

Links for further reading:

- **Overview of Cauda Equina Syndrome - Cauda Equina Syndrome - An Overview**
- **Orthobullets - Cauda Equina Syndrome - Spine - Orthobullets**
- **NHS England Getting it Right First Time Guidelines - Suspected Cauda Equina Syndrome - GIRFT Pathways**
- **NICE Red Flag Signs for Cauda Equina Syndrome - Red flag Symptoms and Signs - Lumbar Radiculopathy/Cauda Equina Syndrome**

Case 26

1. **Please define the term "Spondylolysis"**

2. **What region of the spine is this injury usually seen in?**

3. **Please state 3 possible symptoms a patient may suffer from Spondylolysis**

4. **What are the typical demographics of a patient who suffer from spondylolysis?**

Case 27

1. **Please define the term "Spondylolisthesis".**

2. **Please state 2 possible symptoms of spondylolisthesis.**

3. **Please explain the relationship between spondylolysis and isthmic spondylolisthesis?**

4. **Apart from isthmic, please state 1 other type of spondylolisthesis and provide a brief description of the pathology.**

Simulation and Clinical Skills Teaching

At least one simulation teaching session should be provided during the surgical block. The organisation of may vary depending on the local facilities.

You will have the opportunity to learn/gain exposure to the following skills. Core clinical skills (can be learnt either on the ward or in the clinical skills laboratory):

Measuring vital observation (temperature, BP, HR, SaO2) ECG
Venepuncture
ABG Blood culture
Blood glucose
measurement Urine
dipstick
Taking body swabs (nose, throat, wound) Nutritional assessment
Administration of Oxygen IV access (fluid and antibiotics prescription) Male and female catheterization
Wound care / basic dressing
Hand washing (use of gloves, gowns, masks –should be taught at the base hospital. There is a video available as a learning adjunct and not replace the base hospital training in scrubbing)
Safe disposal of sharps
Breast examination (should be taught at the base hospital)
Digital rectal examination (should be taught at the base hospital) Application of plaster back slab

Radiology Tutorial

Dr V. Shah (Consultant Radiologist UHL) will provide Radiology Tutorial's online. At the start of your apprenticeship please ask your Undergraduate Coordinator for the details and how to access.

End of Block Assessment

This is a formative assessment to prepare you for the end of year summative assessment. The feedback is an important component of the assessment which allows you to reflect and prepare for their end of year examination.

CONSULTANT TUTOR ASSESSMENT - You should complete two consultant tutor forms (General Surgery and T&O). The block lead will give an overall grade based on the two forms. The overall consultant grade will be either satisfactory or unsatisfactory.

Unsatisfactory report will result in overall block failure. Therefore, it is important that you demonstrate your engagement and progress to support your overall clinical performance.

ACADEMIC ASSESSMENT: This consists of three assessments. SAQ – fail, borderline, pass, good, excellent SBA – fail, borderline, pass, good, excellent OSCE – fail, borderline, pass, good and excellent.

THE FINAL BLOCK GRADE - Fail, Borderline, Pass, Good, Excellent

If the consultant assessment was satisfactory, then the final block grade will be the average of the SAQ, SBA and OSCE grade.

If the consultant report was unsatisfactory, then it will be an overall block fail regardless of the academic assessment.

One fail out of three (SAQ, SBA and OSCE) can be compensated by satisfactory performance in other areas to pass the block. If two fails, then it will be an overall block fail

A failure in any section will be referred to the head of Year 3 at the medical school for discussion and possible remedial action.

Student with Difficulties and Poor Attendance/ Engagement

Any issues / concerns should be discussed with the consultant / the block lead. This can then be referred to the Head of Year 3 and / or Director of Clinical Studies at the medical school. If you are faced with any difficulties that affect your progress / attendance, please seek help early. We are here to support you.

Case Presentation & Prizes

You should keep a log book of patient clerkings for reflection and learning. There may be opportunities for you to present your cases to the group to improve your presentation skills. Some hospitals may organise local prizes for the best-case presentation or end of block performance.

Year 3 Surgical Care Apprenticeship

AIMS

The aims of the Surgery Apprenticeship block are that students should continue to improve their skills in history taking and clinical examination, presentation, communication and diagnostic reasoning. Students should be able to recognise common conditions that present to hospital-based surgeons, and be able to describe their investigation and treatment. They should participate in pre and post-operative care of patients to assess and manage associated medical issues and/or complications of surgery. Students should learn about patient safety issues and clinical governance through involvement with the ward teams.

OUTCOMES

By the end of the block students should be able to:
Take a history from patients presenting to secondary care with acute and chronic conditions:

- **Take a focused history related to the disease process or acute condition presenting**
- **Include in the history questions relating to the disease process or acute injury encountered.**
- **Listen attentively and recognise the patient's verbal and non-verbal cues.**
- **Explore patient's view of their problem, answer questions they have and understand what the patients want from the consultation**
- **Identify vulnerable patients including; alcohol abuse, mental health, violent and aggressive patients as well as those at risk of non-accidental injury (NAI) or safeguarding concerns**
- **Demonstrate patient centered communication that is compassionate, holistic, friendly but professional.**

Choose the most appropriate examination for each patient and perform it to a satisfactory standard:

- **Perform a focused examination of all body parts or systems with awareness, though not necessarily practise in, intimate examinations.**
- **Use diagnostic equipment safely and appropriately,**
- **Demonstrate an awareness of infection prevention on entering the patient zone; including appropriate hand washing**
- **Perform the examination in a patient-centered manner, sensitive to the patient's discomfort and needs during examination**

Develop a differential diagnosis list

- **Demonstrate ability to consider the most likely causes of the presentation and assign order**
- **Modify the differential list upon review of investigations**
- **Embrace the challenge of improving knowledge base in order to be more effective.**
- **Identify areas for Self-Directed Learning with appropriate strategies.**

Develop a plan for investigation of the patient:

- **Interpret basic investigations relating to the presentation**
- **Display a working knowledge of the relevant investigations and how they are used. Is aware of the risks of investigations**
- **Identify the most relevant investigation pathway without performing irrelevant investigations. Shows an understanding of the economic issues associated with investigations.**

•Demonstrate the ability to link the abnormal result to the presenting pathology or injury.

•Show a patient and case-centered approach to the use of investigations.

Shows an understanding of the problems of using some investigations with particular patients

• Develop and demonstrate the

With regard to consent:

- **Explain the consent process**
- **Make an assessment of capacity**
- **Demonstrate an awareness of the discussion that must take place during the written consent process**
- **Where appropriate puts the principles into practice e.g. intravenous cannulation • Obtain consent demonstrating a holistic, empathic and sensitive, patient-centered approach**

Develop a pre-operative plan for the patient:

- **Demonstrate a knowledge and practice of acute resuscitation of patients.**
- **Demonstrate a knowledge of preparation of patients for surgery including: Decision to starve**
  - **o VTE assessment**
  - o **Operation specific preparation e.g. bowel preparation o**

    Identify when it is appropriate to ask for anaesthetic review
- **Write up drug charts including electronic, Intravenous fluids, antibiotics, analgesia and anti-emetics and thromboprophylaxis**
- **Communicate the pre-operative plan in the medical notes, verbally to other staff and electronically**
- **Educate other members of staff where required**

Participate in intra-operative care:

- **Demonstrate knowledge of hand washing, scrubbing up and infection prevention and how to behave in theatre**
- **Demonstrate knowledge of the pre-operative surgical check list**
- **Demonstrate ability to wash hands correctly and to scrub up correctly**
- **Participate in check listing**

- **Participate in lifting and handling correctly**
- **Answer questions about the case effectively exhibiting knowledge of the surgical anatomy and pathology**
- **Demonstrate an attitude appropriate to be an effective member of the surgical team ensuring patient safety.**

Perform a post-operative assessment:

- **Undertake a post-operative assessment of patients to identify problems**
- **Make appropriate note entries**
- **Demonstrate the use of Early Warning Score (EWS) to identify problems and uses the information to problem solve**
- **Formulate and write an action plan for the problems identified and communicate these to staff**
- **Demonstrate a knowledge of the mechanisms in place for reporting concerns**
- **Make the care of the patient your first concern.**
- **While on placement play an active role in ensuring patients are reviewed and looked after; and raise concerns where necessary**

Demonstrate communication skills relevant to the stage of training and recognise the many levels at which communication takes place; including:

•With regard to patient communication to develop and demonstrate patient-centered communication that is compassionate and holistic, friendly but professional, •Record the history, examination, differential diagnosis and investigation plan in the medical notes

• Update electronic handover

•Develop and demonstrate the ability to accurately summarize and presents findings verbally in a professional manner

•With regard to participation on ward rounds to o Understand the process and engage with the use of systems to prepare for the senior review of patients

Play an active role in the presentation of new cases and in updating the team with respect to existing patient progression through their journey

- **Demonstrate a patient centered approach and accept responsibility.**

While on placement demonstrate skills and attitudes required for self-directed learning and reflection:

- **Identify the need to learn about new presentations, pathology, systems and processes encountered during the working day**
- **Plan learning to advance understanding**
- **Undertake a literature review**
- **Arrange team based sessions to test understanding of new knowledge and concept acquired**
- **Display a mature and professional attitude towards advancing own knowledge and effectiveness as a clinician**

- **Demonstrate reflection in arranging sessions with team members and clinical teacher to discuss cases after furthering own knowledge • Raise concerns around patient safety, use DATIX appropriately**
- **Initiate Quality improvement work as a result of experiences**
- **Display a mature and professional attitude towards advancing own knowledge and effectiveness as a clinician**

Take every opportunity to follow-up patients over time, so that you see the success / failure of treatment plans, and emerging and changing diagnoses as investigational strategies are worked through, and concomitant diseases/harm (such as side effects, or Hospital acquired infection etc.) occur.

Professional Identity:

Professional identity is how you think of yourself as a doctor. The development of your professional identity is progressive throughout the course. The Year 3 junior apprenticeship blocks are an important and essential part of this process. The headings for the learning outcomes are:

BE INVOLVED / GAIN AWARENESS IN THE WORK OF MULTI-DISCIPLINARY TEAMS

Awareness / Involvement with a quality improvement project in a primary care, community or hospital setting
Deal with your own thoughts and feelings in complex situations and understand the role of Mindfulness for developing personal resilience
Demonstrate ethical practice at this early stage of your medical career Demonstrate an understanding of diversity

Links to Prior Learning and Vertical Themes

Basic Sciences

Normal Anatomy and Physiology

Pathology

Pathophysiology of common surgical conditions

Microbiology

Microbiology associated with common surgical infections

Imaging

Interpretation of normal Xrays
Basic understanding and the uses of other imaging / interventional modalities (CT, MRI, PET, ECHO, USS, MRCP, ERCP)

Clinical Pharmacology

Knowledge of the common drugs used to treat surgical conditions (indications, contra indications and significant side effects)

Palliative Care

Awareness of end of life care and Multi-Disciplinary Team involvement

Professionalism, Law and Ethics

Respect patients as individuals and act with honesty and integrity
Understand the principles of ethics
Consent

Communication Skills

Patient centred communication
Discussion / Explanation regarding preventative measures
Breaking bad news
Communication with patients, relatives and colleagues

Public Health Disease Prevention

Understand the principles of risk identification, disease prevention, surveillance and screening programmes
Awareness of notifiable diseases

Patient Safety

Patient safety should be the first concern for every healthcare professional Communication with patients regarding risk Vs benefit
Drug prescription