

Case-Based Learning
Dysgu ar sail achosion

“My back is killing me and I can’t get out of bed”
“Mae fy ngefn i’n lladd a dwi methu codi o’r gwely”



STUDENT GUIDE

CANLLAW HWYLUSYDD

Year/ Blw: 18/19
Unit/ Uned: Adult
Year/ Blw: 2
Case/ Achos 14

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Young adult

Adult

Older adult

Mother and child

Contents/ Cynnwys

CASE 14 TIMETABLE/ AMSERLEN ACHOS 10	2
UNIT 6 OVERVIEW / TROSOLWG UNED 6	3
CASE 14 WELCOME	4
INTRODUCTION TO CASE 14 FROM THE CASE LEAD	4
DEFINING AND EXPLORING KEY FEATURES	5
LEARNING OUTCOMES/ AMCANION DYSGU	6
HIGHER LEVEL LEARNING OUTCOMES (MAPPED TO OUTCOMES FOR GRADUATES)	6
SPECIFIC LEARNING OUTCOMES.....	7
SMALL GROUP CASE BASED (LOWER LEVEL) LEARNING OUTCOMES	7
SPIRAL CURRICULUM/ CWRICWLWM TROELLOG	8
PRIOR LEARNING THAT WILL RELATE TO THIS CASE	8
FORTHCOMING LEARNING THAT WILL RELATE TO THIS PRACTICE CASE.....	8
SOCIOLOGY WORKBOOK / GWEITHLYFR CYMDEITHASEG	9
PLENARY SESSIONS / SESIYNAU LAWN	9
PRACTICAL TUTORIALS / SESIYNAU YMARFEROL A THIWTORIAL	11
<i>Practical and Tutorials</i>	11
CLINICAL SKILLS / SGILIAU CLINIGOL	11
<i>Clinical Skills</i> :.....	11
<i>History and Examination Session</i>	11
COMMUNITY CLINICAL LEARNING / DYSGU CYMUNEDOL CLINIGOL	13
<i>Palliative Care Session</i>	13
LEARNING OBJECTIVES FOR PERSONAL AND PORTFOLIO DEVELOPMENT	14
WRAP UP / CRYNHOI	14
RESOURCES / ADNODDAU	15

Case 14 Timetable/ Amserlen Achos 10

Monday	Tuesday	Wednesday	Thursday	Friday
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Week 1

Morning	First Aid / BTA	Case 14 CBL SDL (Reading List)	0900 / 1100 History and Examination Spine / SDL	Palliative Care / Patient Clinics / SDL (Reading List)	0900 Plenary Normal Nerve Physiology and Nerve Injury 1000 Plenary Normal Bone Health and Disease
Afternoon	First Aid / BTA 1600 Plenary Introduction Case 14	Case 14 CBL SDL (Reading List) 1600 Plenary Spinal Radiology	SDL / Sport	Palliative Care / Patient Clinics / SDL (Reading List)	1400 Plenary Spinal Pathology 1 1500 Plenary Spinal Pathology 2 1600 Plenary Guest Lecture

Week 2

Morning	Spinal Anatomy Lumbar Puncture Cord Syndromes	Case 14 CBL SDL (Reading List)	0900 / 1100 History and Examination Spine / SDL	Palliative Care / Patient Clinics / SDL (Reading List)	Case 14 CBL
Afternoon	Spinal Anatomy Lumbar Puncture Cord Syndromes	Case 14 CBL SDL (Reading List)	SDL / Sport	Palliative Care / Patient Clinics / SDL (Reading List)	1400 Plenary Spinal Pathology 3 1500 Plenary Wrap Up Part 1 1600 Plenary Wrap Up Part 2

Unit 6 Overview / Trosolwg Uned 6

UNDERSTANDING HEALTH – INTEGRATING SCIENCE AND THE LIFE COURSE:

UNIT 6: ADULT YEAR 2

This is the second visit to the adult part of the life course and will build on work undertaken in the first year.

The palpitations case in this Unit of Study focuses on developing the principles of cardiac electrophysiology. The integrated science of recording and interpreting electrocardiograms (ECG) will be introduced in physiology practical sessions. Pharmacological and therapeutic concepts such as mechanisms of action of antiarrhythmic drugs will be related to their effect on cardiac electrophysiology. Ethical debate will be encouraged in relation to evidence-based medicine and therapeutic strategies, focusing on the risks and benefits of anticoagulation in atrial fibrillation.

The second case will be used to explore the common symptom of back pain. You will learn about the normal functional anatomy of the spine and will discover the many different causes of back pain and their underlying pathophysiology. The impact of spinal disease on the normal functioning of the nervous system will allow you to expand your knowledge of the physiology of motor and sensory nerve conduction and explore further some of the pain pathways. You will also be introduced to the concept of red flag symptoms and signs and how they are used to identify patients with significant disease.

Case 14 Welcome

Introduction to Case 14 from the Case Lead

Welcome to Case 14! During the next two weeks, you will gain a vast amount of knowledge about the spine and about low back pain. Cardiff University is one of the first medical schools to dedicate a whole two weeks of study to the spine and low back pain. In General Practice, low back pain is second only to the common cold as a presenting complaint and most General Practitioners see one to two patients a day complaining of low back pain. Despite being exceedingly common, low back pain is poorly understood. During this two-week module, you will learn how to take a low back pain history, identify things called red flags (and yellow ones), perform a physical examination of the spine and a neurological examination of the upper and lower limbs. You will learn anatomy, physiology and pathology of the spine. Neurology is often one of the most challenging and worrying parts of the undergraduate curriculum. This module will make you more confident and comfortable in assessing neurological symptoms and signs.

The reading list is extensive, but reading is how you will learn throughout your medical careers. There is ample time in your schedule for study. Unfortunately, due to the high clinical demand of this module, it is split into a heavy week and a light week. Half of you will start with a light week. Use this time wisely to study and get the reading done. Those of you starting with the heavy week will have time to reflect and read up on your clinical sessions during the second week. On day one I would recommend that you read up on the anatomy of the spine.

The Consultants have spent a lot of time arranging clinical sessions for you to meet and examine patients with spinal conditions. The purpose of the Wednesday morning sessions is to prepare you for the Thursday ones. I am sure that you do not need to be told that I expect you to dress and behave appropriately! You would be surprised what I have seen over the years and hence why I have written this! The feedback for this Case has been very good and I am sure that you will enjoy it. Please make sure you do. Finally, please remember that I am an Orthopaedic Surgeon and you will need to keep things simple for me to understand. I will try my best to do the same for you!

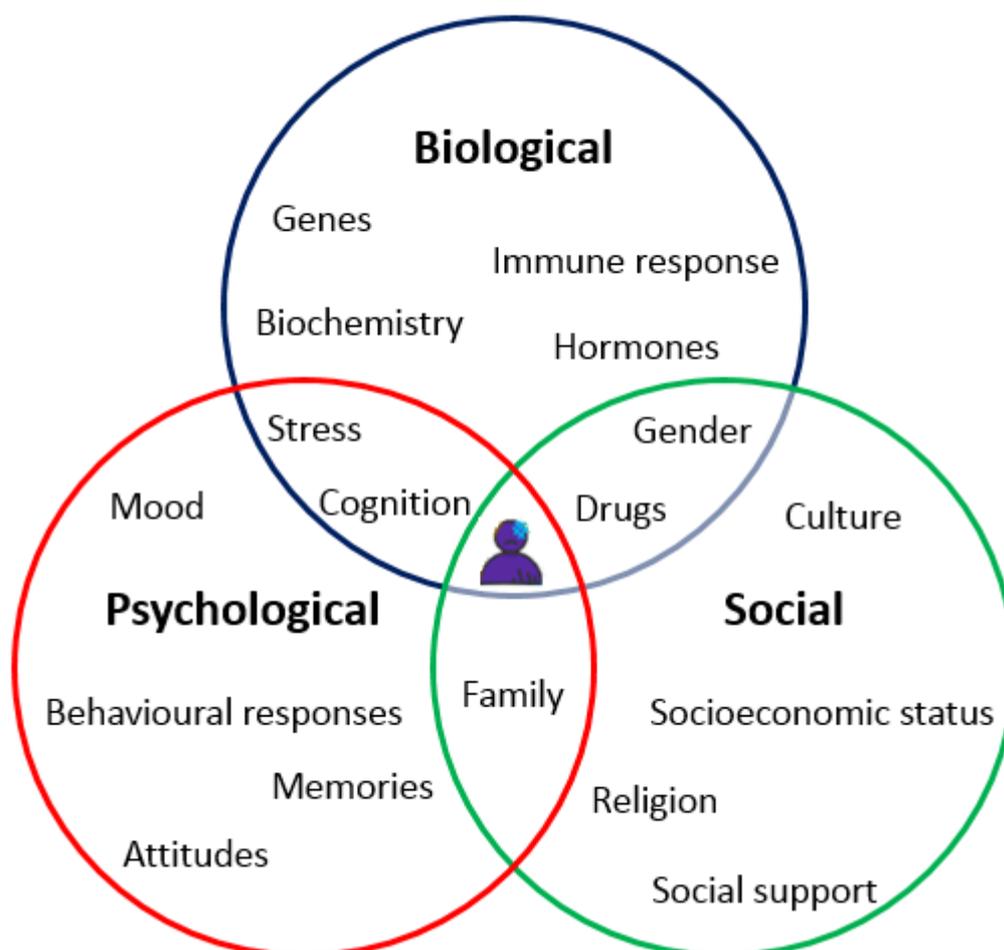
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Consultant Spinal Surgeon and Honorary Senior Lecturer

Defining and exploring key features

When considering the main factors and features of the case scenario, students are encouraged to adopt a patient-centred perspective whereby biological, psychological and social factors (and the complex interplay between these factors) are considered.

Students should be discouraged from separating clinical factors from social factors when dissecting the case scenario. Instead they should be implementing a holistic approach when considering the patient's background, presentation and management.

Students should be encouraged to dissect key features in a multidimensional, holistic and patient-centred manner, for example:



This approach will help prepare students for clinical practice by enabling them to reflect on the wide range of important, and interacting, factors that should be considered when taking a history from a patient, composing a differential diagnosis, and implementing a management plan.

Learning Outcomes/ Amcanion Dysgu

Higher Level Learning Outcomes (mapped to Outcomes for graduates)

Science

- H1. Describe the structure and function of the back and spine (22a)
- H2. Outline the functional anatomy and physiology of the spinal cord and peripheral nerves (22a)
- H3. Describe the anatomical relationship of the spinal cord and peripheral nerve roots to the vertebral column (22a)
- H4. Describe the physiology of nerve conduction (22a)
- H5. Explain the difference between upper and lower motor neurone lesions (14b 22a 22b)
- H6. Explain the pathological mechanisms responsible for the development of back-pain (22a 22b)
- H7. Describe the features of medically significant causes of back pain (red flag symptoms and signs) including metastatic disease their investigation and management (15 22a 22b)
- H8. Outline the physiology of bone health (22a)
- H9. Describe the epidemiology of back pain and sickness related absence from work (25a 25c 25d 25e 25j)
- H10. Apply knowledge about the social aspects of chronic illness to understanding patients' experiences of back pain, and to clinical practices of information, support and referral (9c 10b 20a 25a)

Practice Outcomes

- H11. Perform an examination of the spine (14b)
- H12. Perform a neurological examination of the upper and lower limbs (14b)

Professional Behaviour Outcomes

- H13. Describe the role of palliative care teams in supporting patients (6e 6g 15 18l)
- H14. Describe the legal framework of work and ill health and processes for sickness and disability certification (4)

Evidence based medicine and numeracy

- NUM. Demonstrate competence to compute, analyse and interpret numerical data, evidence based medicine data and physiological data.

Specific Learning Outcomes

The higher-level learning outcomes above have been used to create lower level learning outcomes that form the basis of the support sessions for this case. The learning outcomes are divided between the small group case-based learning sessions, the plenaries, practical, support materials and e-learning resources, and community learning. There is some overlap between sessions in terms of learning outcomes, although most learning outcomes have been allocated to a particular session.

For the purpose of the case-based learning sessions, and to avoid repetition of content that is covered in the other support sessions, the lower level learning outcomes are classified as being essential, adding value or of academic/specialist interest only, to help guide group discussions. **Essential** lower level learning outcomes to be covered and met during case-based learning sessions are highlighted in **green**, learning outcomes that **add value** but don't require detailed discussion (may also be covered in other support sessions) are highlighted in **orange**. Learning outcomes of academic or **specialist interest** only can just be touched on in case-based learning sessions and are highlighted in **red**.

Small Group Case Based (lower level) Learning Outcomes

The traffic light system above is not strictly applicable to this case. If the students are struggling then they can be guided / prompted through the list of structured questions below.

Spiral Curriculum/ Cwricwlwm Troellog

Prior learning that will relate to this case

These are examples of what you have already covered and will expect to cover during the course.

Platform for Clinical Science

Neurology practical
Cell and tissue structures and biochemical functions
Organ structure and function
Spinal Anatomy
Neurophysiology

Cases

Case 1: Musculoskeletal assessment, Analgesics and Pain plenaries
Case 8: Anaesthetics plenary (Regional and Spinal anaesthesia)
Case 12: Neurophysiology plenary (Brain)

Clinical Skills

You have had introductory teaching to musculoskeletal examination and history in Year 1.

Forthcoming learning that will relate to this practice case

Case 16: Head Injury and Trauma
Year 3: Chronic disease module
Year 3: Hospital front door
Year 4: Lumbar Puncture

Feed FORWARD

From the feedback that your predecessors provided us last year we have kept;

EVERYTHING

We have changed;

MORE LECTURES WERE REQUESTED:

- ADDED AN INTRODUCTORY LECTURE
- ADDED SPINAL PATHOLOGY 3 LECTURE
- ADDED SPINAL RADIOLOGY LECTURE
- REVISED THE WRAP UP LECTURE

REDUCED THE READING LIST

Think FORWARD - SSCs

If there is a subject area that you are interested in, look for the practical's and sessions on the topic. Then, please, introduce yourself to a staff member involved in the session to see if you could work together on an SSC in the future.

Sociology Workbook / Gweithlyfr Cymdeithaseg

Back Pain from a Patient's Perspective [available on Learning Central]

We know that treating and alleviating pain is a primary role of medicine. What makes this difficult, however, is that what constitutes pain is subjective, value-laden, personal, and difficult to define and measure. This workbook will present you with some information to help you consider back pain from a patient's perspective.

The core part of this workbook will take about 75 minutes to complete. You are expected to complete the tasks as requested. A list of, and some links to, optional readings have been made available to students. SBA questions related to the workbook may be included in your exam.

A version of the workbook in the Welsh language is available. This workbook is designed to provide an alternative perspective and stimulate you to think about the issues, and discuss with colleagues where appropriate. There is also an optional section at the end of the workbook for students to reflect on what they have learnt and how they will take this into their future learning and training.

Plenary Sessions / Sesiynau Lawn

Introduction to Case 14

- See Anatomy Practical Below

Spinal Radiology

- Understand normal radiological imaging of the spine (X-rays, CT and MRI) and be able to demonstrate anatomical structures
- Understand the key concepts, indications, contraindications and basic physics principles behind X-Ray, CT, MRI, Bone scan, Myelogram and DEXA scan

Normal nerve physiology and nerve injury

- Describe the physiology of normal nerve conduction at a cellular level including the maintenance of a resting and action potentials via sodium and potassium gated channels
- Describe transmission of an electrical signal along a nerve axon and the role of the myelin sheath
- Describe the release of neurotransmitters at pre-synaptic junctions and subsequent generation of a post-synaptic action potential
- Describe the afferent and efferent pathways involved in the detection of a peripheral stimulus and the resulting motor response
- Describe the response of a nerve to injury in terms of neural regeneration, comparing and contrasting the peripheral and central nervous systems
- Demonstrate understanding of nerve physiology and synapses with specific example of mechanism of action of local anaesthetic and other agents e.g. depolarising muscle relaxants

Normal bone health and bone disease

- Understand the structure and function of bone and articular cartilage
- Explain the role of osteoblasts and osteoclasts in normal bone remodelling
- Understand the relationship between calcium, vitamin D and parathyroid hormone in normal bone remodelling
- Describe the bones response to injury and the normal healing process for a fracture
- Describe the factors that prevent normal fracture healing
- Understand the concept of osteoporosis as a state of reduced bone mineral density and the resultant increased risk of fracture

- List protective factors and risk factors for the development of osteoporosis
- Name at least two medications used in osteoporosis for fracture prevention
- Describe the clinical consequences of vitamin D insufficiency (rickets and osteomalacia)

Serious Spinal Pathology 1 – Spinal Trauma

- Be familiar with the epidemiology and main causes of spinal cord injury
- Be familiar with the presenting features of spinal cord injury including spinal shock, neurogenic shock and autonomic dysfunction
- Explain the initial physiological consequences of spinal cord injury on the cardiovascular and respiratory systems
- Explain the concept of complete and incomplete spinal cord injury
- Explain the initial management and investigation of patients with spinal cord injury

Serious Spinal Pathology 2 - Metastatic Spinal Cord Compression and Spinal Infections

- Be familiar with the epidemiology of spinal metastases and metastatic spinal cord compression
- Identify key clinical features that would raise suspicion of metastatic spinal disease
- List the more common malignancies which metastasize to bone
- Explain the ways in which spinal metastases can cause spinal cord compression
- Recognise metastatic spinal cord compression as a medical / surgical emergency and understand the initial steps in its investigation and management
- Recognise the difficulty in the management of some cases of metastatic spinal cord compression and be aware of sources of support (palliative care / oncology / Macmillan / support groups etc.)
- List the presenting features and risk factors for spinal infections
- Explain the ways in which spinal infections can cause spinal cord compression
- Recognise spinal infection as a serious condition and understand the initial steps in its investigation and management
- Recognise epidural abscess as a surgical emergency
- List the more common infective agents that can cause spinal infections (including tuberculosis)

Serious Spinal Pathology 3 – Low Back Pain in the Child and Stenosis / Spondylolisthesis

- Recognise the serious causes of back pain in a child
- Understand the principles and causes of childhood spinal deformity
- Understand and explain the pathology and clinical features of spinal stenosis and spondylolisthesis
- Be able to differentiate spinal stenosis from vascular claudication

Practical Tutorials / Sesiynau Ymarferol a Thiwitorial

Practical and Tutorials

Anatomy Practical / Lumbar Puncture / Cord Syndromes (and the Introductory Lecture)

- Know the macroscopic and microscopic anatomy of the bones, ligaments and muscles around the spine, the intervertebral disc, the spinal cord, meninges and nerves
- Demonstrate the main spinal cord motor and sensory tracts and the deficits that result as a consequence to injury
- Explain the different spinal cord syndromes – anterior, posterior, central, Brown-Sequard and cervical myelopathy
- Explain the difference between upper and lower motor neuron lesions with clinical examples
- Explain the presenting features of cauda equina syndrome
- Identify the main causes of cauda equina syndrome
- Recognise cauda equina syndrome as a surgical emergency and understand the initial steps in its investigation and management
- Demonstrate the anatomical landmarks and principles for performing epidural and spinal injection / catheter insertion

Clinical Skills / Sgiliau Clinigol

Clinical Skills:

- Be able to conduct an appropriate history from a patient with a spinal complaint / condition
- Perform an examination of the spine
- Perform a neurological examination of the upper and lower limbs

History and Examination Session

Wednesday Morning Practical Weeks 1 and 2 – Year Split

Thursday Clinical Weeks 1 and 2 – Year Split

This is an opportunity to practice and gain confidence in taking a musculoskeletal history from patients. Here are some of the key points. Please refer to the Clinical Skills module for the full guidelines on these skills.

History

- Be able to conduct an appropriate history from a patient with a spinal condition
- Describe and determine the nature of the pain in terms of Site, Onset, Character, Radiation, Associations, Time course, Exacerbating / relieving factors and Severity (SOCRATES)
- Describe and determine any associated features such as arm / leg pain, weakness, numbness, bladder / bowel involvement
- Be able to screen for any red flag features
- Be able to screen for any yellow flag features
- Assess risk factors for the complaint / condition
- Determine the medications / treatments which have been utilised

- Outline a full employment history and its impact on the clinical problem
- Determine the functional limitations as a consequence of the pain
- Outline a full social history including smoking history and sports activities
- Make an enquiry as to the emotional consequences of the spinal condition
- Ascertain and address the ideas, concerns and expectations of a patient with a spinal complaint

Back Examination:

Look

- Be able to conduct an appropriate physical examination on a patient
- Perform a physical inspection of the spine (assess for normal thoracic kyphosis and lumbar lordosis, presence of any spinal deformities, scoliosis, skin changes etc)

Feel

- Palpate vertebral spinous processes for tenderness and paraspinal muscles for muscle spasm
- Palpate over the sacroiliac joints / PSIS for tenderness
- Palpate any region of interest for tenderness

Move

- Assess cervical and thoracolumbar spine movements actively and passively
 - Flexion
 - Extension
 - Lateral bending
 - Left and right rotation (fix hips for thoracolumbar rotation)

Special tests

- Perform Schobers test – measure the lumbar spine flexion – place fingers on 5th lumbar vertebrae; patient touch toes, your fingers should separate; reduced in example ankylosing spondylitis
- Perform Adams forward bending test to assess for any fixed spinal deformity – patient bends forward; stand behind and look for abnormality of spinal curve – lordosis/kyphosis/asymmetry/tilt etc
- Assess straight leg raising (Lasègue’s sign)

Neurological examination of the upper and lower limbs

Inspection

- Look!

Tone

- Assess muscle tone – passive movements elbow wrist flexion / extension / supination / pronation; knee flexion / extension – rigidity / flaccidity?

Power

- Assess power / strength (MRC – Medical Research Council grading) according to the myotomes described by the American Spinal Injury Association (ASIA) (see extra sheet)
- MRC Grading – 5 muscle contracts against full resistance; 4 strength reduced but still move against resistance; 3 further reduced – move only against gravity; 2 movement only if gravity removed; 1 – trace movement; 0 no movement

Reflexes

- Assess deep tendon reflexes – hyper and hyporeflexia – Biceps C5/6; Brachioradialis C5/6; Triceps C7/8; Patellar L3/4; Achilles/Ankle S1/2

Sensation

- Assess sensation according to the dermatomes described by the American Spinal Injury Association (ASIA) (see extra sheet)
- Modalities of sensory testing (pain, temperature, light touch, vibration, joint position sense)

Coordination

- Finger movements, finger nose test, heel shin test

- Assess gait and Rombergs sign – patient stands and closes eyes – shouldn't wobble or fall – tests proprioception through the dorsal column of spinal cord

Special tests

- Assess plantar responses
- Perform Hoffmans test – flick terminal phalanx of middle finger – when abnormal induces flexion in terminal phalanx of thumb (problems in corticospinal tract)
- Assess for clonus – rapidly dorsiflex foot – watch gastrocnemius – should be no more than 5 beats of clonus
- Assess for saddle anesthesia and anal sphincter tone

Other

- Briefly assess other non spinal joints for sources of pain / pathology e.g. shoulder, elbow, wrist, hand, sacroiliac joint, hip, knee, ankle, foot (GALS screen)
- Be familiar with Waddell's signs – non organic physical signs in low back pain. Tenderness tests: superficial and diffuse tenderness and/or nonanatomic tenderness. Simulation tests: these are based on movements that produce pain, without actually causing that movement, such as axial loading and pain on simulated rotation. Distraction tests: positive tests are rechecked when the patient's attention is distracted, such as a straight leg raise test. Regional disturbances: regional weakness or sensory changes that deviate from accepted neuroanatomy. Overreaction: subjective signs regarding the patient's demeanor and reaction to testing

Professionalism

- Learn to be respectful and courteous to both staff and patients in both verbal and non-verbal communication
- Dress appropriately

Community Clinical Learning / Dysgu Cymunedol Clinigol

Palliative Care Session

Thursday Clinical Weeks 1 and 2 – Year Split

See Separate Workbook and Learning Outcomes section above.

The purpose of the day / half day is to define the needs of patients and families who are faced with incurable illness by visiting a hospice. The interface between specialist palliative care and primary care will be discussed. You will be taken on a short tour around the hospice and then meet in small groups with a patient who has a terminal illness. The patient will have been asked to discuss with you and your colleagues about their illness, their journey so far and the impact this has had upon themselves, family and friends. This session should give an introduction and preliminary insight into the following areas of clinical care:

- The care of patients and their families at the end of life, including management of symptoms, practical issues of law and certification, and effective teamwork and communication
- The adaptation to major life changes, such as facing a terminal diagnosis and bereavement; comparing and contrasting the abnormal adjustments that might occur in these situations
- The variable extent to which patients want to be involved in decision-making about their care and treatment
- The patients' perspective concerning appropriate communication in difficult circumstances, such as when breaking bad news

Learning objectives for personal and portfolio development

The following learning objectives are **stipulated by the GMC** as part of your on-going development. These are professional behaviours that will help develop you as a doctor and help you to be the best practitioner that you can be. Although, these are not formally assessed, be mindful of these explicit learning objectives and to adhere to them. If it is identified that you are behaving in a manner that is contradictory or inconsistent with these objectives, your case will be escalated on professional behaviour misconduct (ME2103).

- Communicate clearly, sensitively and effectively with individuals and groups regardless of their age, social, cultural or ethnic backgrounds or their disabilities, including when English is not the person's first language. (15b)
- Be polite, considerate, trustworthy and honest, act with integrity and maintain confidentiality. (20c)
- Respect all colleagues and others regardless of their age, colour, culture, disability, ethnic or national origin, gender, lifestyle, marital or parental status, race, religion or beliefs, sex, sexual orientation, or social or economic status. (20d)
- Recognise the rights and the equal value of all people (20e)
- Acquire, assess, apply and integrate new knowledge, learn to adapt to changing circumstances. (21a)
- Establish the foundations for lifelong learning and continuing professional development, including a professional development portfolio containing achievements. (21b)
- Manage time and prioritise tasks and work autonomously when necessary and appropriate. (21d)
- Recognise own personal and professional limits and seek help from colleagues and supervisors when necessary. (21e)
- Understand and respect the roles and expertise of professionals in the context of working and learning as a team. (22a)
- Work with colleagues in ways demonstrating flexibility, adaptability and a problem-solving approach. (22c)
- Demonstrate ability to build team capacity and positive working relationships and undertake various team roles including leadership and the ability to accept leadership by others. (22d)

Wrap Up / Crynhoi

The case writers will go over the case, feedback to the students and provide some formative questions that cover the material that they should have learnt. The afternoon will be concluded with a question and answer session.

Resources / Adnoddau

Unfortunately, there is no one book that covers all of the topics in this 2-week module. You are NOT expected to read everything. In your feedback please let us know which books and E-Learning resources you found helpful, those that were unhelpful, and any resources / books not listed below that you found and think we should include.

Preparatory Reading – 1st Monday - ANATOMY:

Moore, K. L. et al. 2015. [Essential clinical anatomy](#). 5th ed. Philadelphia: Wolters Kluwer Health / Lippincott Williams & Wilkins.

Chapter 4 - Back p265-307

Crossman, A. R. et al. 2015. [Neuroanatomy : an illustrated colour text](#). 5th ed. Edinburgh: Churchill Livingstone Elsevier. [Also available as an ebook](#).

Chapter 8 – Spinal Cord p69-90

CBL Reading:

See E-Learning Resources and **ONE OF:**

Elias-Jones, C. et al. 2013. [Rheumatology and orthopaedics](#). 3rd ed. Edinburgh: Mosby Elsevier. [Also available as an ebook](#)

Chapter 9 - Back Pain p53-63

Chapter 10 – Altered Sensation and Weakness p65-68

Chapter 13 – Spondyloarthropathies p85-91

Solomon, L. et al. 2014. [Apley and Solomon's concise system of orthopaedics and fractures](#). 4th ed. Boca Raton, FL: CRC Press/Taylor & Francis Group.

Chapter 11 - Peripheral Nerve Injuries p137-149

Chapter 18 – 219-241

History and Examination Reading:

See E-Learning Resources and **ONE OF:**

Doherty, M. and Doherty, J. 1992. [Clinical examination in rheumatology](#). London: Wolfe.

Chapter 6 – Spine p75-94

Doherty, M. 1999. [Rheumatology examination and injection techniques](#). 2nd ed. London: W.B. Saunders.

Chapter 7 – The Spine p71-85

Innes, J. A. et al. 2018. [Macleod's clinical examination](#). 14th ed. Edinburgh: Elsevier.

Chapter 7 – The Nervous System p133-150

Chapter 13 – The Musculoskeletal System p258-264

McRae, R. 2010. [Clinical orthopaedic examination](#). 6th ed. Edinburgh: Churchill Livingstone Elsevier. [Also available as an ebook](#).

Chapter 2 – Peripheral Nerves p11-32

Chapter 3 – The Cervical Spine p33-47

Chapter 8 – The Thoracic and Lumbar Spine p131-168

Glynn, M. and Drake, W. M. 2012. [Hutchison's clinical methods : an integrated approach to clinical practice](#). 23rd ed. Edinburgh: Saunders Elsevier. [Also available as an ebook](#)

Chapter 13 – Locomotor System p249-253, p262-265, p269-270

Chapter 14 – Nervous System p301-310, 314-324

Fuller, G. 2013. [Neurological examination made easy](#). 5th ed. Edinburgh: Churchill Livingstone Elsevier. [Also available as an ebook](#).

Anatomy Session Reading:

Additional resource:

Barker, R. A. et al. 2012. [Neuroanatomy and neuroscience at a glance](#). 4th ed. Chichester: John Wiley & Sons. [Also available as an ebook](#)

Multiple chapters

Plenary Supportive Reading:

In addition, see E-Learning Resources below:

Kumar, P. J. and Clark, M. L. 2017. [Kumar & Clark's clinical medicine](#). 9th ed. Edinburgh: Saunders/Elsevier. [Also available as an ebook](#)

Chapter 19 - Diseases of Bone

Chapter 21 – Neurological Disease

Waugh, A. et al. 2018. *Ross and Wilson anatomy & physiology in health and illness*. 13th ed. Edinburgh: Elsevier.

Chapter 7 – The Nervous System p154-162, p171-182, p199-202

Chapter 16 – The Musculoskeletal System p422-474

Pocock, G. et al. 2018. *Human physiology*. 5th ed. Oxford: Oxford University Press.

Chapter 7 – Nerve Cells and their Connections p101-119

Chapter 22 – Calcium / Parathyroid / Vitamin D p326-332

Chapter 51 – Bone p841-850

Lodish, H. F. 2016. [Molecular cell biology](#). 8th ed. Basingstoke: Macmillan Higher Education.

Chapter 22 – Nerve Cells p1025-1058

Community Resources

WHO definition of Palliative Care:

<http://www.who.int/cancer/palliative/definition/en/>

Introduction to Palliative care:

<http://www.patient.info/doctor/palliative-care>

Treatment and care towards the end of life, good practice in decision making, GMC:

http://www.gmc-uk.org/guidance/ethical_guidance/end_of_life_care.asp

Pain Control:

<http://www.patient.info/doctor/pain-control-in-palliative-care>

E-Learning

<https://whelf-cardiff.alma.exlibrisgroup.com/leganto/public/44WHELFCAR/lists/5189316360002420?auth=SAML>

Make sure you read this website:

<https://gpcpd.walesdeanery.org/index.php/low-back-pain>

Make sure you read the Sociology Workbook on Learning Central:

Back Pain from a Patient's Perspective

Make sure you read and know the ASIA publications:

https://asia-spinalinjury.org/wpcontent/uploads/2016/02/International_Stds_Diagram_Worksheet.pdf

http://asia-spinalinjury.org/wp-content/uploads/2016/02/Motor_Exam_Guide.pdf

http://asia-spinalinjury.org/wp-content/uploads/2016/02/Key_Sensory_Points.pdf

http://asia-spinalinjury.org/wp-content/uploads/2016/02/Auto_Stan_Worksheet.pdf

The following websites are very helpful:

www.nice.org.uk/guidance/NG59

www.patient.info

www.orthobullets.com

www.orthoinfo.org/menus/spine.cfm

www.spinedragon.com

www.radiopaedia.org

The following can be found on Learning central:

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