To assist you as you complete the online component, the following pages comprise the sections from the Part A Course Manual that cover the first five modules from this course. Your complete Course Manual will be provided to you at the live course.

Remember, completion of this online component and a 75% pass on the final test at the end of the five modules is required for your entry into the live course.

The online component will take approximately five hours to complete. This projected time includes watching the content and videos, reviewing before and after each quiz, and also the review of the entire component following the final test completion before attending the live course.
MODULE ONE

INTRODUCTION AND EPIDEMIOLOGY

Objectives

By participating fully with this module, a participant will be able to:

1. Describe the cardinal features of the McKenzie Method of Mechanical Diagnosis and Therapy (MDT) and contrast it with other management approaches.

2. Describe the major epidemiological factors associated with low back pain.

3. Describe the risk and prognostic factors of low back pain.
1. Describe the cardinal features of the McKenzie Method of Mechanical Diagnosis and Therapy (MDT) and contrast it with other management approaches.

Cardinal features
- Classification of sub groups (syndromes) - based on symptomatic and mechanical responses
- Focus on centralisation and directional preference
- Self-treatment
- Progression of forces
- Patient education

Recognises major aspects of back pain experience
- Recurrent / episodic nature of back pain
- Role of everyday mechanical loading
- Importance of patient involvement in therapy
- Psychosocial aspects of back pain experience

Contrast with other treatment approaches
- Repeated movements for assessment and management
- Emphasis on patient independence
- Avoidance of therapist dependency
- Use of minimal intervention
- Combination of exercise and therapist intervention as necessary
- Exercises used for pain relief

2. Describe the major epidemiological factors associated with low back pain.

Prevalence of back pain
- 50-80% of adult population will experience back pain at some point in their life
- 40% have back pain in any one-year
- Back pain is normal

The natural history of back pain
- Considerable variability in natural history
- Recurrent episodes and persistent symptoms are common
- Acute and chronic definitions are insufficient to describe reality of back pain

Implications of back pain
- Back pain is one of the commonest causes of disability in working population
- Total costs of back pain are larger than for any other disease for which economic analysis is available
- Medical costs represent 7% to 34% of total societal costs
Part A : The Lumbar Spine

Module One

Introduction and Epidemiology

- 25% to 40% of those with back pain seek healthcare
- Back pain accounts for 3% to 5% of primary care physician consultations

Management
Little or no evidence to support the use of:
- Ultrasound, laser, traction, thermal modalities, electrical stimulation, acupuncture, TENS, bed rest for back pain or sciatica, back school in a non-occupational setting.
- NSAIDs provide short-term pain relief in acute back pain, not clearly better than simple analgesics, none proven better. Not proven to be helpful in chronic back pain or sciatica

Some evidence to support a role for:
- Education, behavioural therapy, manipulation – short-term benefit in some sub-groups, and exercise.

3. Describe the risk factors and prognostic factors for back pain.

Risk factors
Three classes of risk factor:
1. Individual and lifestyle
   - History of back pain
2. Physical or biomechanical
   - Heavy or frequent lifting
   - Whole body vibration (as when driving)
   - Prolonged or frequent bending or twisting
   - Postural stresses (high spinal load or awkward postures)
3. Psychosocial

Prognostic factors
- Psychosocial factors have a role in the development of chronic pain and disability.
- Heavy manual work, sitting occupation, low job satisfaction, lower income associated with poor prognosis.
- Leg pain, sciatica, previous back pain, lack of centralisation associated with poor prognosis.
PREDISPOSING FACTORS

MCKENZIE IDENTIFIES TWO LIFESTYLE FACTORS PREDISPOSING TO LBP

These appear to have a close association with the development of back pain but lack support from the literature to date.

1. Poor sitting posture
   - Slouched sitting places the spine in flexion and is similar to the fully flexed standing posture.
   - In the sitting position the more the lumbar spine approximates kyphosis, the higher the intradiscal pressure; the more the spine approximates lordosis, the lower the intradiscal pressure.
   - The slouched sitting position also causes overstretching of posterior spinal ligamentous structures at end range.

   Some LBP is caused and nearly all LBP is aggravated and perpetuated by poor sitting.

2. Frequency of flexion
   - From rising in the morning until returning to bed at night people are predominantly in flexed spinal postures and activities, and rarely extend. Frequent and sustained flexion stresses are present during work and during daily activities.

   These two predisposing factors, when combined, eventually lead to a loss of extension.
# REFERENCES FOR MODULE ONE


MODULE TWO

PAIN AND CONNECTIVE TISSUE PROPERTIES

Objectives

By participating fully in this module, a participant will be able to:

1. Identify the structures in the lumbar spine that have a nociceptive innervation.

2. Describe and differentiate chemical, mechanical and chronic pain.

3. Identify and differentiate the various stages of tissue healing applicable to the trauma/recovering trauma subgroup of OTHER.
1. Identify the structures in the lumbar spine that have a nociceptive innervation

- Pain is a sensory, cognitive and emotional experience
- Nociception is the means by which information concerning tissue damage is detected and transmitted to the cortex
- Innervated structures that are possible sources of pain are:
  - the capsules of the zygapophyseal and sacro-iliac joints,
  - the outer part of the intervertebral discs,
  - the interspinous and longitudinal ligaments,
  - the vertebral bodies,
  - the dura mater,
  - nerve root sleeve,
  - connective tissue of nerves,
  - blood vessels of the spinal canal,
  - and local muscles
- Wide distribution of nociceptors throughout the lumbar spine make it impossible to devise testing procedures that selectively stress individual components of the spinal segment
- Kuslich et al (1991) has shown that the disc is a possible and common source of back pain.

Types of pain

- Somatic – relates to pain derived from any musculoskeletal structure. Somatic referred pain is deep and aching in quality, vague and hard to localise. The stronger the noxious stimulus the further pain spreads down the leg.
- Radicular - relates to nerve root pain. Radicular pain is experienced in the leg. Radicular pain associated with dermatomal pain patterns, abnormalities of nerve conduction such as weakness or paraesthesia, and abnormal tension tests
- Central – pain is facilitated by the central nervous system, often referred to as central sensitisation
- Visceral – relates to pain derived from internal organs

Nociceptors activated by three mechanisms

- Thermal
- Mechanical
- Chemical – inflammatory process following trauma or with inflammation / infection
2. **Describe and differentiate chemical, mechanical and chronic pain**

**Key factors in the identification of pain of a chemical nature**
- Constant pain
- Recent onset (traumatic or possibly insidious)
- Cardinal signs may be present – swelling, redness, heat, tenderness
- Lasting aggravation of pain by all movements
- No movement found which abolishes, centralises or makes the pain better.

**Key factors in the identification of pain of mechanical origin**
- Mechanical pain is more commonly intermittent but may be constant.
- Certain repeated movements cause centralisation or make the pain remain better
- Movements in one direction will improve symptoms, whereas movements in the opposite direction may worsen them
- The mechanical presentation will improve as the symptoms improve

**Key factors in the identification of Chronic pain**
- Chronic pain may be influenced by non-mechanical factors
- The link to the original tissue damage may become minimal
- There may be neurophysiological, psychological or social factors
- Length of time symptoms have been present does not mean a mechanical assessment should be withheld
- Some will respond normally, so all should be assessed mechanically
- Response may be more gradual
- Some may not respond to mechanical therapy and may need a more multifaceted approach, including cognitive – behavioural therapy.

**Pain generating mechanisms**

<table>
<thead>
<tr>
<th>STATE OF TISSUES</th>
<th>PAIN MECHANISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Abnormal stress – mechanical</td>
</tr>
<tr>
<td>Inflamed (acute)</td>
<td>Predominantly chemical – somatic and/or radicular</td>
</tr>
<tr>
<td>Healing (sub-acute)</td>
<td>Chemical / mechanical interface</td>
</tr>
<tr>
<td>Abnormal (structurally impaired)</td>
<td>Mechanical – somatic and/or radicular</td>
</tr>
<tr>
<td>Abnormal (derangement)</td>
<td>Mechanical – somatic and/or radicular</td>
</tr>
<tr>
<td>Persisting hypersensitivity (chronic)</td>
<td>Peripheral / central sensitisation</td>
</tr>
<tr>
<td>Barriers to recovery (acute to chronic)</td>
<td>Psychosocial factors</td>
</tr>
</tbody>
</table>
3. **Identify and differentiate the various stages of healing applicable to the trauma / recovering trauma subgroup of OTHER**

**Repair process**
Following tissue injury recovery is divided into three overlapping phases:
- Inflammation – Hours to days
- Repair – Days to weeks
- Remodelling – Weeks to months

**MATCHING THE STAGE OF THE CONDITION TO MANAGEMENT**

<table>
<thead>
<tr>
<th>Injury &amp; Inflammation</th>
<th>Protect from further damage. Prevent excessive inflammatory exudate. Reduce swelling. Mid-range movements. Isometric contractions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours to days</td>
<td></td>
</tr>
<tr>
<td>Repair &amp; Healing</td>
<td>Gentle tension &amp; loading without lasting pain. (Prod. NW.) Progressive return to normal loads &amp; tension.</td>
</tr>
<tr>
<td>Days to weeks</td>
<td></td>
</tr>
<tr>
<td>Remodelling</td>
<td>Prevent contractures. Full range movements. Normal loading &amp; tension to increase strength &amp; flexibility.</td>
</tr>
<tr>
<td>Weeks to months</td>
<td></td>
</tr>
</tbody>
</table>

Failure of any of these processes may result in inadequate or ineffectual repair leading to either chronic pathological changes in the tissue or to repeated structural failure.
REFERENCES FOR MODULE TWO


NOTES FOR MODULE TWO

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MODULE THREE

MECHANICAL DIAGNOSIS
CLASSIFICATION AND DEFINITION OF TERMS

Objectives

By participating fully in this module, a participant will be able to:

1. Identify and discuss indications and contra-indications for MDT.
2. Describe the clinical characteristics of the Derangement Syndrome.
3. Describe the clinical characteristics of the Dysfunction Syndrome.
4. Describe the clinical characteristics of the Postural Syndrome.
5. Describe the clinical characteristics of Spinal OTHER.
6. Differentiate between Derangement, Dysfunction, Postural and OTHER.
MODULE THREE

MECHANICAL DIAGNOSIS:
CLASSIFICATION AND DEFINITION OF TERMS

1. Identify and discuss the indications and contraindications for mechanical therapy

- Less than 15% of back pain can be given a specific diagnosis
- Classification systems use non-specific labels e.g.
  - Quebec Task Force (QTF) – pain patterns
  - Agency Health Care Policy and Research (AHCPR) and Clinical Standards Advisory Group (CSAG) use:
    - serious spinal pathology
    - nerve root problems
    - mechanical back pain

Indications for MDT

- Nerve root problems
- Mechanical back pain
  - Mostly aged 20-55 years at onset
  - Lumbosacral region, buttocks and thighs
  - “Mechanical” in nature, that is the pain varies with physical activity and over time
  - Patient is generally well

Contraindications for MDT

- Serious spinal pathology
- Cauda equina, cancer, cord signs, infections, fractures, widespread neurological deficit
- The literature suggests the incidence of these is < 2%
2. Describe the clinical characteristics of the Derangement Syndrome

THE DERANGEMENT SYNDROME

Derangement Syndrome is a clinical presentation associated with a mechanical obstruction of an affected joint. Directional Preference is an essential feature and Centralisation is an important phenomenon observed in the spine.

Features of Derangement

Derangement is the commonest of the three mechanical syndromes. Inconsistency and change is a characteristic of Derangement. Its clinical presentation is variable;

Pattern in the history:
- Location of pain may be local, referred or radicular or a combination
- Symptoms may move from side to side, proximally and distally
- Symptoms may be constant or intermittent
- Therefore they are variable during the day and over time
- Pain may arise gradually or suddenly, often with an insidious onset
- Onset may be accompanied by sudden disability
- Symptomatic and mechanical presentations are influenced by postural loading strategies during activities of daily living
- Movements and postures cause symptoms to increase/decrease, centralise/peripheralise, produce/abolish
Sustained postures and activities can rapidly and progressively worsen or improve the severity and spread of pain
May have history of previous episodes

Pattern in the examination:
- Mechanical presentation always includes diminished range or obstruction of movement
- May include temporary deformity, e.g. kyphosis, lordosis, lateral shift
- May display deviation of normal movement pathways.
- Loading strategies can cause lasting changes
- Repeated movements cause symptoms to produce/abolish, increase/decrease, and pain to centralise/peripheralise
- Repeated movements cause increase/decrease in range of movement

In the Derangement Syndrome forces must be applied that achieve reduction, and in doing so these loading strategies will centralise or make symptoms remain better.

The most common reason for patients to seek assistance is as the result of Derangement – this is the entity that is most commonly seen in the clinic.

DEFINITION OF TERMS:

Centralisation
- **Centralisation** describes the phenomenon by which distal pain originating from the spine is progressively abolished in a distal to proximal direction. This is in response to a specific repeated movement and / or sustained position and this change in location is maintained over time until all pain is abolished. As the pain centralises there is often a significant increase in the central back pain. If back pain only is present this moves from a widespread to a more central location and then is abolished.

- **Centralising** means that during the application of loading strategies distal pain is being abolished. The pain is in the process of becoming centralised, but this will only be confirmed once the distal pain remains abolished.

- **Centralised** means that as a result of the application of the appropriate loading strategies the patient reports that all distal pain has abolished and now the patient only has back pain. The central back pain will then continue to decrease and abolish.

Characteristics of Centralisation
- Only occurs in Derangement Syndrome
- Occurs in response to loading strategies (repeated movements or postures)
- Is usually a rapid and always a lasting change in pain location
- Can be reliably assessed
Peripheralisation:

- **Peripheralisation** describes the phenomenon by which proximal symptoms originating from the spine are progressively produced in a proximal to distal direction. This is in response to a specific repeated movement and / or sustained position and this change in location of symptoms is maintained over time. This may also be associated with a worsening of neurological status.

- **Peripheralising** means that during the application of loading strategies distal symptoms are being produced. Symptoms are in the *process* of becoming peripheralised but this will only be confirmed once the distal symptoms remain.

- **Peripheralised** means that as a result of the application of the inappropriate loading strategies the patient reports that the distal symptoms that have been produced remain.

Characteristics of Peripheralisation

- The lasting production of distal symptoms
- Occurs in response to loading strategies (repeated movements or postures)

**Directional Preference**

- Directional Preference describes the clinical phenomenon where a specific direction of repeated movement and / or sustained position results in a clinically relevant improvement in either symptoms and / or mechanics though not always the Centralisation of the symptoms. It is an essential feature of the Derangement Syndrome.
Differences between Centralisation and Directional Preference

Directional Preference encompasses a broader range of responses than Centralisation. **Centralisation** refers to the lasting change in the location of pain as a result of loading strategies, whereas **Directional Preference** results in a lasting improvement in symptoms and / or mechanics though not always a change in location of pain. Thus all centralisers have a directional preference **But** not all those who have a Directional Preference are centralisers.

Characteristics common to Centralisation and Directional Preference

Who do they occur with?
- Occurs in Derangement Syndrome
- Occurs in both acute and chronic patients

What do they occur with?
- Occurs with specific repeated movements or sustained postures
- Occurs most commonly with extension
- Occurs less commonly with lateral movements or flexion

What are they accompanied by?
- Are accompanied by improvements in mechanical presentation

What do they indicate?
- The classification of Derangement
- The correct movement / sustained position for management
- A good prognosis
- Failure to achieve indicates poor prognosis

Descriptions of Derangements

**Posterior Derangements** – this term is used to describe spinal Derangements that have a directional preference for extension procedures / positions.

**Anterior Derangements** – this term is used to describe spinal Derangements that have a directional preference for flexion procedures / positions.

Some Derangements have a directional preference for combined directions and are described accordingly e.g. postero/lateral, antero/lateral.

**Pain Locations of Derangements** – The location of pain in Derangements is categorised under three headings:
- Central or Symmetrical
- Unilateral or Asymmetrical above the knee
- Unilateral or Asymmetrical below the knee
Deformities Observed in the Lumbar Spine

Kyphotic Deformity
The patient’s lumbar spine is positioned in flexion and the patient is unable to extend.

Lordotic Deformity
The patient’s lumbar spine is positioned in extension and the patient is unable to flex.

Lateral Shift Deformity
The patient’s trunk and shoulders are positioned laterally in relation to the pelvis and the patient is unable to correct the shift.

Lateral shift

Right and left lateral shift
- A RIGHT lateral shift exists when the vertebra above has laterally flexed to the right in relation to the vertebra below, carrying the trunk with it. The upper trunk and shoulders are shifted to the right.
- A LEFT lateral shift exists when the vertebra above has laterally flexed to the left in relation to the vertebra below, carrying the trunk with it. The upper trunk and shoulders are shifted to the left.

Contralateral and ipsilateral shift
- CONTRALATERAL shift exists when the patient’s symptoms are in one leg and the shift is in the opposite direction. For instance, right leg pain with upper trunk and shoulders shifted laterally to the left.
- IPSILATERAL shift exists when the patient’s symptoms are in one leg and the shift is to the same side. For instance, right leg pain with upper trunk and shoulders shifted laterally to the right.

Criteria to establish the clinical relevance of a lateral shift
- Upper body is visibly and unmistakably shifted to one side
- Onset of shift occurred with back pain
- Patient is unable to correct shift voluntarily
- OR, if patient is able to correct shift they cannot maintain correction
- Correction affects intensity of symptoms
- Correction causes either centralisation or worsening of peripheral symptoms
3. Describe the clinical characteristics of the Dysfunction Syndrome

THE DYSFUNCTION SYNDROME

Pain from the Dysfunction Syndrome is caused by mechanical deformation of structurally impaired soft tissues. This abnormal tissue may be the product of previous trauma, or inflammatory or degenerative processes. These events cause contraction, scarring, adherence, adaptive shortening, or imperfect repair. Pain is felt when the abnormal tissue is loaded. Articular or contractile structures can be affected – the former is most common in the spine (described below). When affecting articular structures, it is characterised by a painful restriction of end range movement.

Pattern in the history:
- History of trauma, derangement, or years of poor posture or degenerative changes
- Present for at least 8-12 weeks
- Pain is Always local except in the case of an Adherent Nerve Root (ANR)
- Pain is ALWAYS Intermittent and produced only when loading structurally impaired tissue
- Symptoms cease when loading is ended, and the pain never lasts

Pattern in the examination:
- Consistent direction and amount of movement produces pain
- Restricted movement(s) in one or more planes
- Appropriate repeated movement will produce symptoms, which do not remain worse

4. Describe the clinical characteristics of the Postural Syndrome

THE POSTURAL SYNDROME

Pain from the Postural Syndrome is caused by mechanical deformation of soft tissues or vascular insufficiency arising from prolonged positional or postural stresses affecting the articular structures or the contractile muscles, their tendons or the periosteal insertions. No pathological changes occur in this syndrome. Patient’s with Postural Syndrome rarely present for treatment in the clinic, but the prevalence is high in certain populations groups – students.

Pattern in the history:
- Usually young
- Sedentary lifestyle
- Time is an essential causative factor
- Symptoms always local and intermittent
- But may have simultaneous cervical, thoracic, and lumbar pain
- Brought on only by prolonged static loading of normal tissues
- No pain with movement or activity
- Most common provocative posture is slumped sitting
Pattern in the examination:
- Poor posture – forward head posture, increased thoracic kyphosis, reduced lumbar lordosis
- Posture correction abolishes
- No loss of movement
- Repeated movements have no effect
- Pain produced / abolished on static tests

5. **Describe the clinical characteristics of Spinal OTHER**

- Do not display the symptomatic or mechanical responses of Derangement, Dysfunction or Postural Syndromes
- No lasting favourable response
- Inconsistent responses
- Sub groups of OTHER may present with recognizable symptomatic and mechanical responses or non-recognizable patterns or response
- Definitions contained in Table of OTHER (see below)
## McKenzie Classification – Spinal OTHER

<table>
<thead>
<tr>
<th>Category</th>
<th>Clinical findings (Red Flags)</th>
<th>Clinical Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>Age &gt;55, history of cancer, unexplained weight loss, progressive, not relieved by rest</td>
<td>May be primary site or metastases</td>
</tr>
<tr>
<td>Cauda equina syndrome /cord compression</td>
<td>Bladder / bowel dysfunction, saddle anaesthesia, global or motor weakness in legs. Clumsiness in legs</td>
<td></td>
</tr>
<tr>
<td>Spinal fracture</td>
<td>History of severe trauma, older age, prolonged steroid use OR young, active with sport related back pain</td>
<td>Compression fracture, stress fracture of the pars</td>
</tr>
<tr>
<td>Spinal related infection</td>
<td>Fever, malaise, constant pain, all movements worsen</td>
<td>Epidural abscess, discitis, transverse myelitis</td>
</tr>
<tr>
<td>Vascular</td>
<td>Vascular disease, smoking history, family history, age over 65, male&gt;female, History of trauma, dizziness, diplopia, dysarthria and multiple other non-mechanical symptoms</td>
<td>Abdominal aortic aneurism, cervical artery dysfunction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Definition</th>
<th>Criteria (common)</th>
<th>Clinical examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Pain Syndrome</td>
<td>Pain-generating mechanism influenced by psychosocial factors or neuropathological changes</td>
<td>Persistent widespread pain, aggravation with all activity, disproportionate pain response to mechanical stimuli, inappropriate beliefs and attitudes about pain.</td>
<td></td>
</tr>
<tr>
<td>Inflammatory</td>
<td>Inflammatory arthropathy</td>
<td>Constant pain, morning stiffness, excessive movements exacerbate symptoms</td>
<td>RA, sero-negative arthritis, ankylosing Spondylitis</td>
</tr>
<tr>
<td>Mechanically Inconclusive</td>
<td>Unknown musculoskeletal pathology</td>
<td>Derangement, Dysfunction, Postural and subgroups of OTHER excluded. Symptoms affected by positions or movements BUT no recognisable pattern identified OR inconsistent symptomatic and mechanical responses on loading</td>
<td></td>
</tr>
<tr>
<td>Mechanically Unresponsive Radiculopathy</td>
<td>Radicular presentation consistent with a currently unresponsive nerve root compromise</td>
<td>Symptoms presenting in a radicular pattern in the upper or lower extremity. Accompanied by varying degrees of neurological signs and symptoms. There is no centralisation and symptoms do not remain better as a result of any repeated movements, positions or loading strategies</td>
<td></td>
</tr>
<tr>
<td>Post-Surgery</td>
<td>Presentation relates to recent surgery</td>
<td>Recent surgery and still in post-operative protocol period</td>
<td></td>
</tr>
<tr>
<td>Sacro-iliac (SIJ)/Pregnancy-Related Pelvic Girdle Pain (PGP)</td>
<td>Pain-generating mechanism emanating from the SIJ or symphysis pubis</td>
<td>Three or more positive SIJ pain provocation tests having excluded the lumbar spine and hip</td>
<td>If related to pregnancy: PGP</td>
</tr>
<tr>
<td>Spinal Stenosis</td>
<td>Symptomatic degenerative restriction of spinal canal or foramina</td>
<td>Lumbar Spine: older population, history of leg symptoms relieved with flexion activities and exacerbated with extension, longstanding loss of extension. Cervical Spine: arm symptoms consistently produced with closing foramen, abolished or decreased with opening</td>
<td>Lumbar stenosis, cervical lateral foraminal stenosis</td>
</tr>
<tr>
<td>Structurally Compromised</td>
<td>Soft tissue and/or bony changes compromising joint integrity</td>
<td>Mechanical symptoms (ROM restricted, clunking, locking, catching). May have sensation of instability Long history of symptoms or history of trauma. Irreversible with conservative care.</td>
<td>Painful structural scoliosis, painful osteoporosis, grade 3-4 spondylothesis, upper cervical structural instability – RA</td>
</tr>
<tr>
<td>Trauma/Recovering Trauma</td>
<td>Recent trauma associated with onset of symptoms</td>
<td>Recent trauma associated with onset of constant symptoms / recent trauma associated with onset of symptoms, now improving and pain intermittent</td>
<td>Post whiplash</td>
</tr>
</tbody>
</table>
6. Differentiate between the Derangement, Dysfunction, Postural and OTHER

History and Physical Examination

Exclude Serious Pathology

Provisional MDT classification

- Loading strategies centralise or make symptoms better
- Pain only produced at limited end range
- Pain only on static loading, no effect of repeated movements
- Not consistent with the 3 McKenzie Syndromes

Derangement
Dysfunction
Postural
OTHER

Classification confirmed within 3-5 visits
(reduction or remodelling process may continue for longer)
REFERENCES FOR MODULE THREE


NOTES FOR MODULE THREE
MODULE FOUR

HISTORY AND PHYSICAL EXAMINATION

Objectives

By participating fully in this module, a participant will be able to:

1. Discuss the aims of the history taking.

2. Describe the components of the history section of the McKenzie lumbar assessment form and discuss the clinical relevance of each section.

3. Discuss the use of effective patient questioning strategies and the interpretation of the patient’s responses to the history questions.

4. Discuss the aims of the physical examination.

5. Describe the components of the physical examination section of the McKenzie lumbar assessment form and discuss the clinical relevance of each section.

6. Define and demonstrate the appropriate use of terms involved in completing the McKenzie lumbar spine assessment form.

7. Accurately complete a McKenzie Lumbar assessment form.
MODULE FOUR

HISTORY AND PHYSICAL EXAMINATION

1. Discuss the aims of history taking.
   - An overall impression of the clinical presentation
   - Site of the back pain: central / symmetrical, or unilateral / asymmetrical; if unilateral is the pain in the back or thigh, or referred below the knee
   - The stage of the disorder – acute / sub-acute / chronic
   - The status of the condition – improving / unchanging / worsening
   - Identification of ‘red flags’ or contraindications
   - Baseline measurements of the symptomatic (and mechanical presentations) against which improvements can be judged
   - Factors which aggravate and relieve the problem, and role of posture, which may help guide future management
   - The severity of the problem which may guide the vigour of the physical examination
   - The functional limitations that the condition has caused on the patient’s quality of life
   - An impression of any potential psychosocial issues that may impact the management and outcome. For example; the way the patient is responding to their condition, and how much encouragement, information, reassurance or convincing they may need to be active participants in their own management
   - A hypothetical diagnosis by syndrome

2. Describe the components of the history section of the McKenzie lumbar assessment form and discuss the clinical relevance of each section.
   - Patient
   - Age
   - Occupation / leisure activities
   - Functional disability
   - Symptoms
     - Symptoms this episode – Body chart
     - Duration
     - Status
     - Onset
     - Symptoms at onset
     - Constant or intermittent
     - What makes the pain worse / better?
       - Circle used to signify “always”
       - Underline used to signify “sometimes”
       - Oblique line used to signify “no effect”
     - Diurnal pattern
Previous history
  - Back pain / treatment
  - X-ray / imaging

Specific questions
  - Tingling / numbness / weakness
  - Red flags

Red Flag Clues
  - Age (>55)
  - History of cancer
  - Unexplained weight loss
  - Constant, progressive, non-mechanical pain, worse at rest
  - Systemically unwell
  - Persisting severe restriction of lumbar flexion
  - Widespread neurological deficit
  - Prolonged steroid use
  - History of intravenous drug use
  - History of significant trauma enough to cause fracture or dislocation (X-rays will not always detect fractures)
  - History of trivial trauma and severe pain in potential osteoporotic individual
  - No movement or position centralises, decreases, or abolishes pain

3. Discuss the use of effective patient questioning strategies and the interpretation of the patient's responses to the history questions.

Active listening is an integral part of the communication process - that is to understand the underlying meaning behind the words used. Hearing is a passive act, whereas listening is an active process. The following techniques are recommended to maintain a patient-centred approach and effective communication. These may also facilitate a reduction in the patient’s apprehension and fear and may assist in addressing psychosocial issues when present, promote understanding and encourage compliance

  - Simple open-ended questions
  - Active listening
  - Being non-judgemental
  - Adjusting vocabulary to individual patients
  - Providing ‘normative permission’ (suggesting that the patient’s situation or attitudes are common so they are comfortable discussing them)
  - Encouragement with verbal and non-verbal prompts (non-verbal cues can convey 70-90% of your message)
  - Clarifying and summarising – in order to bridge the gap between the patient’s meaning and the practitioner’s interpretation:
    - Paraphrasing to encapsulate what the patient has said
    - Ask further probing questions
    - Summarising to give an overview of the patient’s comments
4. Discuss the aims of the physical examination

- Usual posture
- Symptomatic response to posture correction
- Any obvious deformities or asymmetries that are related to this episode
- Neurological examination
- Baseline measures of mechanical presentation
- Symptomatic and mechanical response to repeated movements
- Symptomatic response to static testing

Conclusions:
- Provisional classification
- Principle of management
- Appropriate loading strategy

5. Describe the components of the Physical examination section of the McKenzie lumbar assessment form and discuss the clinical relevance of each section

Postural Observation
- Sitting posture and its effect on pain
- Posture correction – better, worse, no effect
- Standing posture – poor, fair, good
- Lordosis – increased, decreased, normal
- Lateral shift – right, left, nil; Relevant yes / no

- Criteria for a relevant lateral shift
  - Upper body is visibly and unmistakably shifted to one side
  - Onset of shift occurred with back pain
  - Patient is unable to correct shift voluntarily
  - Or, if patient is able to correct shift they are unable to maintain correction
  - Correction affects intensity of symptoms
  - Correction causes centralisation or worsening of peripheral symptoms.

- Other Observations – e.g. structural scoliosis, kyphosis, leg length difference

Neurological

- Criteria for conducting a neurological examination
  - Paraesthesia in the leg
  - Weakness in the leg
  - Thigh or leg symptoms, especially in a radicular pattern
Components:
- Sensation
- Muscle power
- Reflexes
- Nerve tension tests

Movement loss
- Range of movement
- Pain or stiffness that stops the movement
- Movement pathway – deviation
- Confidence and willingness to move
- Curve reversal

Repeated movements
Movements that can be performed (not all need to be)
- Flexion in standing
- Extension in standing
- Flexion in lying
- Extension in lying
- Side gliding (as required)

Monitor symptom / Mechanical response
- Establish symptoms present prior to testing
- Ask about pain response during the movement
  - Is it - During the movement (Pain During Movement) PDM
  - Or - At end range (End Range Pain) ERP
- Establish symptoms after testing
- Observe and record the mechanical response – increased, decreased, no effect

Static tests
- Sitting slouched
- Long sitting
- Sitting erect
- Standing slouched
- Standing erect
- Lying prone in extension

Other Tests – performed if symptoms are not influenced by the testing above
- SIJ
- Hip
- Other peripheral structures

Provisional Classification

Derangements
Step 1: Circle word “Derangement”
Step 2: Circle “Appropriate symptom location”
Step 3: Indicate “Directional Preference”
**Dysfunction**
Step 1: Circle word “Dysfunction”
Step 2: Indicate direction

**Postural**
Step 1: Circle word “Postural”

**OTHER**
Step 1: Circle word “OTHER”
Step 2: Indicate sub-group
6. Define and demonstrate the appropriate use of terms involved in completing the McKenzie lumbar spine assessment form

**During Loading** - Either by repeated movements or sustained postures

- **Increase** (↑) Symptoms already present are increased in intensity.
- **Decrease** (↓) Symptoms already present are decreased in intensity.
- **Produce** (P) Movement or loading creates symptoms that were not present prior to the test.
- **Abolish** (A) Movement or loading abolishes symptoms that were present prior to the test.
- **Centralising** Movement or loading moves the most distal pain proximally.
- **Peripheralising** Movement or loading moves the pain more distally.
- **No Effect** (NE) Movement or loading has no effect on the symptoms during the testing.

**After Loading** - Either repeated movements or sustained postures

- **Worse** (W) Symptoms produced or increased with movement or loading remain aggravated following the test.
- **No Worse** (NW) Symptoms produced or increased with movement or loading return to baseline following the test.
- **Better** (B) Symptoms decreased or abolished with movement or loading remain improved after testing.
  - Or
  - Symptoms produced, decrease on repetition, remain better after testing.
- **No Better** (NB) Symptoms decreased or abolished with movement or loading return to baseline after testing.
- **Centralised** Distal pain abolished by movement or loading remain abolished after testing.
- **Peripheralised** Distal pain produced during movement or loading remain after testing.
- **No Effect** (NE) Movement or loading has no effect on symptoms after testing.
MODULE FIVE

ANATOMICAL CONSIDERATIONS RELATED TO MECHANICAL DIAGNOSIS AND THERAPY (MDT)

Objectives

By participating fully in this module, a participant will be able to:

1. Describe the structure, function and biomechanics of the intervertebral disc.
2. Describe the key biomechanical features of the lumbar spine.
3. Describe and explain the clinical significance of disc diurnal variations, disc nutrition and changes in the disc with aging.
4. Describe the clinical significance of creep.
5. Describe and differentiate the stages of disc degeneration.
6. Relate stages of degeneration to clinical presentations.
Any structure that is innervated is a potential source of back pain. Proven sources of back pain are the intervertebral discs (IVD), zygapophyseal joints and sacroiliac joints. The focus in this section will be the IVD, which has been shown to be the commonest cause of back pain and the most relevant to MDT.

1. Describe the structure, function and biomechanics of intervertebral disc
   - Concentric layers of annulus fibrosus
   - Surrounding incompressible nucleus pulposus
   - Nucleus acts to distribute pressure evenly
   - Behaves hydrostatically
   - Outer annulus is innervated, more deeply in degenerated discs.
   - Postero–lateral annulus is weakest, less radius, not as firmly attached to vertebral end plate, no cover of the posterior longitudinal ligament.
   - Anterior compression caused by flexion 'squeezes' the nucleus backwards, and conversely extension forces it forwards.
   - Postures of the spine which result in decentralization of the nucleus pulposus due to asymmetrical loading of the intervertebral segment play an important role in the pathogenesis and in the prophylaxis of intervertebral disc diseases.

2. Describe the key biomechanical features of the lumbar spine.
   - Flexion and extension involve two components – sagittal rotation and sagittal translation. For instance, in flexion there is a combination of anterior sagittal rotation and anterior translation of the lumbar vertebrae.
   - **Flexion**: the intervertebral disc is compressed anteriorly and the posterior annulus is stretched. Flexion causes a posterior displacement of the nucleus pulposus. The movement causes a lengthening of the vertebral canal, and places tension on the spinal cord and the peripheral nervous system. Intradiscal pressure, measured in the nucleus pulposus, increases by up to 80% in full flexion.
   - **Extension** the intervertebral disc is compressed posteriorly and the anterior annulus is stretched. The movement is associated with impacting of the spinous processes, or the inferior articular processes on the lamina below. Loading may be concentrated in the area of the pars interarticularis. Extension causes an anterior displacement of the nucleus pulposus. Extension reduces the size of the vertebral canal and intervertebral foramen. Nuclear pressure is reduced by up to 35% in extension.

See Objective 3.
3. Describe and explain the clinical significance of disc diurnal variations, disc nutrition, and changes in the disc with ageing.

Diurnal variations
- Osmotic pressure from proteoglycans causes water absorption when unloaded in the night
- Loading during the day forces water out of the disc
- Results in 10% loss in disc height
- 1-2% change in height during day
- 300% stiffer to flexion forces in early morning compared to later in the day
- Range of movement increases during the day

Disc nutrition
- Adult disc is avascular
- Metabolites are transferred via
  - Blood vessels surrounding the annulus, from periphery of disc
  - Blood supply beneath the hyaline cartilage, from vertebrae above and below.
- Mechanism of transferral of metabolites is via diffusion, by fluid flow
- Greater fluid loss in flexion than in extension
- Flexion facilitates loss by compression.
- Influx of fluid into disc when lying
- There is an outflow when standing, sitting, and carrying a load.
- Disc nutrition is increased by the fluid exchange that accompanies reciprocal movements in the sagittal plane.

Structural changes within the disc
- Transverse tears or rim lesions, with rupture of Sharpey’s fibres in the periphery of the annulus near the ring apophysis, or in the outer wall of the annulus
- Circumferential tears, between the lamellae of the annulus
- Radial fissures, occurring across the layers of the annulus
- Desiccation and break-up of nucleus

4. Describe the Clinical significance of Creep

Time factor and creep loading
- Sustained loading / time can be a factor in spinal pain
- Insidious onset is more common than trauma
- Experimentally shown that loading history / accumulative stress can have pathological consequences
- Biomechanical explanation is in collagen behaviour to sustained loading:
  - Creep – continued displacement of collagen fibres with sustained load
  - Hysteresis – restoration of ‘normal’ shape with unloading
  - Hysteresis occurs more slowly than creep
  - Set – difference between initial shape and effect of creep

‘The clinical importance of fatigue failure is that damage to tissues may occur without a history of major or obvious trauma.’ (Bogduk 1997)

Hence, this may explain why the onset of musculoskeletal problems in many cases appears to be for ‘no apparent reason’.
5. **Describe and differentiate the stages of disc degeneration**

- Internal disc disruption
- Radial fissures in annulus
- Desiccation of nucleus
- The intervertebral disc becomes vulnerable when tears and attritional changes cause the annulus fibrosus to lose its elasticity and allow the central gel-like tissue of the nucleus pulposus to be displaced beyond its physiological limits. (Kramer 1990)
- Internal Intra-discal mass displacement of disc material can occur with loading
- If the internal architecture of the disc is intact displacement is reversed on returning to a symmetrical posture.

The symptoms caused by a disc protrusion vary because the protruding disc tissue is still part of an intact osmotic system and participates in the pressure-dependent changes of volume and consistency of the disc. As long as the protruding tissue is covered by strong intact lamellae of the annulus fibrosus, the displaced fragment can relocate back into the centre of the disc. In some cases the protruded tissue can displace further and rupture the annulus fibrosus as a disc extrusion. If the outer annular wall is weakened or ruptured disc herniation may result.

6. **Relate stages of degeneration related to clinical presentations**

**Discogenic pain**

- Internal disc disruption, with intact outer annular walls without nerve root involvement, can be the cause of back and leg pain.
- Site of the referred pain depended on the site where the annulus is being stimulated.
- Correlation between fissures penetrating to outer annulus and pain is very high

**Disc herniation**

**Disc herniations: terms and pathology**

There has been a lack of standardisation of terminology used to describe disc herniations, and synonyms are many and varied. In this context the following definitions will be used:

<table>
<thead>
<tr>
<th>TERM</th>
<th>PATHOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement</td>
<td>Intra-discal mass displacement within annulus</td>
</tr>
<tr>
<td>Herniation</td>
<td>Non-specific term including any of below</td>
</tr>
<tr>
<td>Protrusion</td>
<td>Intact and competent annular wall</td>
</tr>
<tr>
<td>Protrusion</td>
<td>Intact annular wall, but so attenuated as to be incompetent</td>
</tr>
<tr>
<td>Extrusion</td>
<td>Annular wall breached by intra-discal mass that protrudes through, but remains in contact with disc</td>
</tr>
<tr>
<td>Sequestration</td>
<td>Annular wall breached by intra-discal mass that has separated from disc</td>
</tr>
</tbody>
</table>
Typical features of disc pathology (commonly extrusion or sequestration) resulting in nerve root involvement

- Unilateral leg pain in a typical root distribution below the knee
- Specific neurological symptoms incriminating a single nerve
- Limitation of straight leg raising by at least 50% of normal, with reproduction of leg pain
- Positive crossed straight leg raise
- Segmental motor deficit
- Segmental sensory change
- Hyporeflexia
- Kyphotic and/or scoliotic deformity
- Imaging evidence of a disc pathology at the relevant level.
REFERENCES FOR MODULE FIVE


NOTES FOR MODULE FIVE
THE McKenzie INSTITUTE
LUMBAR SPINE ASSESSMENT

Date ____________________________

Name ____________________________ Sex  M / F  Address ____________________________

Telephone ____________________________ Date of Birth ____________________________

Referral: GP / Orth / Self / Other ____________________________

Work: Mechanical stresses ____________________________

Leisure: Mechanical stresses ____________________________

Functional disability from present episode ____________________________

Functional disability score ____________________________ VAS Score (0-10) ____________________________

HISTORY

Present symptoms ____________________________

Present since ____________________________ improving / unchanging / worsening or no apparent reason

Commenced as a result of ____________________________

Symptoms at onset: back / thigh / leg ____________________________

Constant symptoms: back / thigh / leg ____________________________ Intermittent symptoms: back / thigh / leg ____________________________

Worse bending / sitting / rising / standing / walking / lying

am / as the day progresses / pm when still / on the move

other ____________________________

Better bending / sitting / standing / walking / lying

am / as the day progresses / pm when still / on the move

other ____________________________

Disturbed sleep yes / no Sleeping postures: prone / sup / side R / L Surface: firm / soft / sag

Previous episodes 0  1-5  6-10  11+ Year of first episode ____________________________

Previous history ____________________________

Previous treatments ____________________________

SPECIFIC QUESTIONS

Cough / sneeze / strain: +ve / -ve Bladder/Bowel: normal / abnormal Gait: normal / abnormal

Medications: Nil / NSAIDS / Analg / Steroids / Anticoag / Other ____________________________

General health: good / fair / poor ____________________________

Imaging: yes / no ____________________________

Recent or major surgery: yes / no ____________________________ Night pain: yes / no ____________________________

Accidents: yes / no ____________________________ Unexplained weight loss: yes / no ____________________________

Other: ____________________________

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## EXAMINATION

### POSTURAL OBSERVATION
- Sitting: good / fair / poor
- Standing: good / fair / poor
- Lordosis: red / acc / normal
- Lateral shift: right / left / nil

**Correction of posture:** better / worse / no effect
**Relevant:** yes / no

**Other observations:**

### NEUROLOGICAL
- Motor deficit
- Reflexes
- Sensory deficit
- Dural signs

### MOVEMENT LOSS
<table>
<thead>
<tr>
<th>Maj</th>
<th>Mod</th>
<th>Min</th>
<th>Nil</th>
<th>Pain</th>
</tr>
</thead>
</table>
- Flexion
- Extension
- Side gliding R
- Side gliding L

### TEST MOVEMENTS
- **Describe effect on present pain** — During: produces, abolishes, increases, decreases, no effect, centralising, peripheralising. 
- **After:** better, worse, no better, no worse, no effect, centralised, peripheralised.

<table>
<thead>
<tr>
<th>Symptoms during testing</th>
<th>Symptoms after testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest symptoms standing</td>
<td></td>
</tr>
<tr>
<td>FIS</td>
<td></td>
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<tr>
<td>Rep FIS</td>
<td></td>
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<tr>
<td>EIS</td>
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</tr>
<tr>
<td>Rep EIS</td>
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</table>

<table>
<thead>
<tr>
<th>Pretest symptoms lying</th>
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</thead>
<tbody>
<tr>
<td>FIL</td>
</tr>
<tr>
<td>Rep FIL</td>
</tr>
<tr>
<td>EIL</td>
</tr>
<tr>
<td>Rep EIL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If required pretest symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGIS - R</td>
</tr>
<tr>
<td>Rep SGIS - R</td>
</tr>
<tr>
<td>SGIS - L</td>
</tr>
</tbody>
</table>

### STATIC TESTS
- Sitting slouched
- Standing slouched
- Lying prone in extension
- Sitting erect
- Standing erect
- Long sitting

### OTHER TESTS

### PROVISIONAL CLASSIFICATION
- Derangement
- Dysfunction
- Postural
- **OTHER**
  - Central or Symmetrical
  - Unilateral or Asymmetrical above knee
  - Unilateral or Asymmetrical below knee

### PRINCIPLE OF MANAGEMENT
- Education
- Equipment provided
- Extension principle
- Lateral principle
- Flexion principle
- Other
- Barriers to recovery
- Treatment goal

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