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Assess & interpret 9: Musculoskeletal Assessment

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Learning Points:

- How to carry out a musculoskeletal subjective assessment
- How to screen for red flag subjective indicators in a musculoskeletal assessment
- How to carry out a musculoskeletal objective assessment

Key Points:

- A detailed musculoskeletal subjective assessment involves gathering information on the presenting complaint, history of the presenting complaint, past medical history, drug history, previous or current investigations and social history
- The objective examination is composed of active range of movement, passive range of movement, resisted testing, palpation, special tests and a neurological examination

Abstract

The ability to perform a basic musculoskeletal (MSK) assessment is vital to screening, assessing and managing MSK conditions. Understanding the key components that are necessary for the completion of a basic competent MSK assessment is therefore imperative for those who are the first point of contact for patients presenting in primary care.

The aim of this article is to provide a basic overview of the components that are utilised collectively to screen and assess MSK conditions.

The Musculoskeletal System

The musculoskeletal (MSK) system is a collective term which encompasses all of the components of the muscular and skeletal systems of the human body including bone, ligament, muscle / tendon and various connective tissues (Walker, 2020). The MSK system is a framework which functions to support, protect and allow voluntary motion of the human

body (Walker, 2020). The MSK system is intimately connected to the nervous system which is responsible for controlling the MSK system.

Musculoskeletal (MSK) conditions account for 30% of GP consultations (NHS England, 2023) with an estimated 17.8 million people living with long term MSK conditions (Versus Arthritis, 2021). With the introduction of first contact / advanced care practitioners, some of the burden of MSK management within primary care has shifted from General practitioners to nurse practitioners and allied health professionals.

Musculoskeletal conditions / diseases

The musculoskeletal system like any other system, is not immune to the effects of disease, injury or ageing. Musculoskeletal presentations within primary care encompass over 150 conditions including impairments in the functioning of the osteogenic, arthrogenic, myogenic, and neurogenic systems (WHO, 2022). These impairments can be short term or long-lasting and can have quite dramatic effects upon the lives of those affected including their activities of daily living, work and leisure. Dysfunctions in the musculoskeletal system are split into 3 general groups:

1. Inflammatory arthropathies
2. MSK pain conditions
3. Osteoporosis and osteoporotic fragility fractures

(Gov.uk, 2022)

Inflammatory arthropathies are a group of systemic inflammatory conditions such as rheumatoid arthritis (RA), psoriatic arthritis, & axial spondyloarthropathies which characteristically show joint pain and tenderness, inflammation, increased temperature and significant early morning stiffness (Poudel et al., 2022) of greater than 30 minutes (van Nies et al., 2015). Rheumatoid arthritis affects over 430000 people within the UK, with axial spondyloarthropathies affecting 220000 and psoriatic arthritis affecting approximately 100000 people in the UK (Versus Arthritis, 2021).

MSK pain conditions are a group of disorders such as lower back pain, osteoarthritis and tendinopathies. Lower back pain affects approximately 10 million people in the UK with approximately 8.5 million people being affected by osteoarthritis (Versus Arthritis, 2021) and tendinopathies affect millions of people every year.

Osteoporosis is a condition that affects the skeletal system and is seen through as a reduction in bone mineral density which leads to deterioration in the microstructure of the bone increasing the susceptibility of the bone to fracture (Sözen, Özışık & Başaran, 2017).

Osteoporosis affects approximately 3 million people in the UK each year with half a million fractures occurring as a result of osteoporosis (Versus Arthritis, 2021).

What is a Musculoskeletal Assessment?

A musculoskeletal assessment is systematic approach used to screen a patient presenting in clinical practice with symptoms believed to originate from an MSK source. This type of clinical examination is fundamentally based within the medical model of care.

A basic MSK screening process is utilised to identify any underlying MSK source that may be responsible for the patient's symptoms, by examining and testing various components of the MSK system and specific aspects of the nervous system. The key aspects to the MSK assessment are:

1. Gaining consent
2. The subjective interview
3. The objective examination
4. The clinical reasoning process

Gaining consent

Obtaining consent within healthcare is a legal and ethical requirement and involves explaining the various components of the assessment to the patient so that they are fully aware of what you are intending to do and why you are doing them (Dowie, 2021). Finally, it is imperative that patients are fully aware that they can stop the assessment or aspects of it at any point throughout the assessment (Dowie, 2021).

The subjective interview

The subjective interview should from the outset be patient centred and actively involve the patient in decision making along their journey. Identification of patient expectations, goals and preferences are all essential aspects to MSK assessment and management as this allows clinicians to ensure that the patients personal preferences and values are respected and taken into consideration (Health Education England, 2023) throughout the assessment and management process. This collaborative approach has been shown to provide better patient outcomes whilst also being more cost effective (Health Education England, 2023).

The subjective interview is the key to any MSK assessment as it provides the clinician with an opportunity to obtain vital information that will help them, alongside the objective examination findings to:

1. Screen for any red flags (such as cancer, cauda equina, tumour, myelopathy) and any other non-MSK pathologies (such as rheumatological conditions)
2. Ensure that the patient is safe and appropriate for MSK intervention following a thorough screening process
3. Formulate a clinical diagnosis via a clinical reasoning process
4. Direct treatment / management of the presenting MSK condition

Subjective Assessment

The first component of the subjective assessment is to screen for red flags. Red flags are a collection of subjective and objective indicators that may potentially indicate serious underlying pathology (Ramanayake & Basnayake, 2018). Identification of potential signs of serious underlying pathology is imperative to patient safety as delays in diagnosing serious pathologies can have dramatic effects on the duration and quality of life of patients. These indicators can be of value to all clinicians as they can aid with the decision-making process when managing potentially serious pathology (Ramanayake & Basnayake, 2018). Red flags indicators can be general (table 1) and these are often considered for all patients presenting in clinical practice or they can be more specific to certain body parts or joints in the body (tables 2-4) and are then predominantly considered when the symptoms involve the parts of the body they relate to.

Table 1. General red flag indicators

Adapted from Refshauge Latimer & Maher (Chapter 5 in Refshauge & Gass, 2004, p.145)

General red flag indicators
<ul style="list-style-type: none">• Unexplained weight loss (more than 5% body weight within months / weeks)• Previous cancer diagnosis• Age under 20 and over 50• Night sweats / fevers• Unremitting pain• Night pain• Severe / progressive neurological weakness (i.e. foot drop)• Significant trauma (i.e. Road traffic incident, rolled car over)• Structural deformity• Severe headaches (particularly around the temple with jaw pain, bilateral shoulder and /or pelvic girdle pain and pain chewing (consider giant cell arteritis, GCA)

Table 2. Cervical spine specific red flags

Adapted from Myers et al. (2021, p.34) & Davies et al. (2018, p.2)

Cervical Spine specific red flags	
(Vertebrobasilar artery insufficiency, VBI & Cervical artery dissection / dysfunction, CAD)	Cervical Myelopathy
<ul style="list-style-type: none"> • 5 D's & 3 N's • Dizziness, Diplopia (Double Vision), Drop attacks (sudden weakness in face/arm/leg), Dysarthria (speech disorder), Dysphagia (swallowing difficulties) • Nausea, Numbness (one side of body numbness), Nystagmus (dancing eyes) 	<ul style="list-style-type: none"> • Bilateral upper limb and / or lower limb pins and needles • Gait disturbance / unsteadiness on feet • Loss of grip strength and dexterity issues (i.e. dropping things, cannot do buttons on shirt or pick up coins)

Table 3. Lumbar spine specific red flags

Adapted from National Institute of Clinical Excellence (2022)

Lumbar spine specific red flags
<p>Cauda Equina Syndrome</p> <ul style="list-style-type: none"> • Bilateral radicular leg pain (sciatica) • Worsening neurological deficit in the leg/s • Saddle anesthesia (altered sensation in the saddle area) • Bladder and / or bowel issues (incontinence, retention) • Inability to recognise the passing of stools or urine • Inability to fully empty the bladder or initiate urination • Water leakage or abnormal sensation during sexual intercourse (female) • Inability to gain an erection or to ejaculate (male)

Table 4. Peripheral joint specific red flags

Adapted from Goodman & Snyder (2013, p.121)

Peripheral joint specific red flags
<ul style="list-style-type: none">• Swelling, redness and increased temperature (infection signs, inflammatory arthropathies etc.)• Significant early morning stiffness (greater than 30 minutes)• Questioning regarding skin (psoriasis), eye (iritis, uveitis) or bowel issues (chrons, colitis) as linked to inflammatory arthropathies

Once we have screened for red flags and are happy that the patient is safe and appropriate for MSK management, we must then ensure that we are able to adequately direct treatment and management by compiling sufficient information from the patient to be able to provide a reasoned diagnosis. This is achieved by questioning the patient on the following:

1. Presenting complaint / condition
2. History of presenting complaint / condition
3. Past medical history
4. Drug history
5. Previous or current investigations
6. Social history

The initial aspect to this process is to highlight the presenting complaint or condition by considering the various component listed in table 5. We must then consider the history of this presenting complaint to ascertain the timeframes, onset of symptoms etc. (listed in table 5). Following this we must obtain the past medical history, drug history, previous or current investigations and a social history (listed in table 5).

Table 5: Components of a subjective interview:

Adapted from Ryder & Van Griensven, Chapter 2 Subjective assessment in Petty & Ryder (2018).

Presenting complaint (PC)	<ul style="list-style-type: none"> • Area or location of symptoms? • Symptom description / behavior / relationship of symptoms <p>SIN factor</p> <ul style="list-style-type: none"> • Severity (Pain severity score on a visual analogue scale (VAS)) • Irritability (how irritable are the symptoms) • Nature (nociceptive, inflammatory, neuropathic etc.) • Aggravating factors • Easing factors • Diurnal Pattern (24- hour symptom behavior pattern: Morning & evening symptom behavior)
History of presenting complaint (HPC)	<ul style="list-style-type: none"> • Traumatic or atraumatic (insidious onset or specific mechanism of injury) • Timeframe of onset of symptoms • Previous injury to current body part • Has the patient received appropriate physiotherapy / chiropractic / osteopathy treatment previously?
Past medical history (PMH)	<ul style="list-style-type: none"> • Endocrine problems (Thyroid, diabetes) • Cardiovascular problems (Blood pressure, Cholesterol, previous stroke, angina, MI) • Rheumatological complaints (Rheumatoid arthritis, ankylosing spondylitis etc. and family history of these)

	<ul style="list-style-type: none"> • Epilepsy / seizures • Breathing problems (Asthma, COPD etc.) • Steroid use • Osteoporosis • Cancer (current or previous and family history of cancer) • Previous / current IV drug use • Record all aspects of past medical history
Drug history (DH)	<ul style="list-style-type: none"> • Steroids • Immunosuppressant medication • Anticoagulants • Antibiotics • Pain relief • GTN sprays
Previous or current investigations	<ul style="list-style-type: none"> • Has the patient had any investigations for this complaint currently or previously? i.e. x-ray, MRI, CT scans, blood tests, nerve conduction studies (NCS), ECG etc. • What were the results of any of these investigations? Were they normal, abnormal, normal for age etc.? • Are they still under investigation?
Social history (SH)	<ul style="list-style-type: none"> • Work • Family / home circumstances • Hobbies • Lifestyle

Following the completion of the subjective interview the next step is to carry out an objective examination of the patient which is tailored to the information gained within the subjective interview.

Objective Assessment

The objective assessment is an essential component to the MSK assessment as this allows the clinician to examine the patient physically in order to identify any reproduction of pain or symptoms with movement, resistance or palpation. The objective examination is composed of the following:

1. Observation
2. Active range of movement
3. Passive range of movement
4. Resisted testing
5. Palpation
6. Neurological examination including dermatomes, myotomes, reflexes, UMN testing (clonus, Hoffman's and Babinski signs) (Beyond the scope of this article)
7. Special tests (Beyond the scope of this article)

Observation

The objective examination starts with observation, and this takes two forms:

1. Observing the patient from the waiting area including observation of their sit to stand and their gait pattern
2. Observation of the joint or body part that is indicated as the main issue and any surrounding structures

The functional observation of assessing sit to stand and gait can help to provide some clues as to the presenting problem as well as giving an indication of the performance of some functional tasks. Assessment of a person's gait can provide clues of antalgic behaviours as well as identifying issues such as foot drop or an underlying neurological condition (i.e. high stepping gait, Trendelenburg gait).

Observation of the affected body part and any surrounding structures is an important aspect of MSK assessment as it can provide clues regarding a person's posture but also whether there are any red flag indicators apparent (redness, deformity etc.). Table 6 highlights the various aspects to observation that should be viewed during this process.

Table 6: Observation

Observation: Look for the following:	<ul style="list-style-type: none">• Posture• Swelling• Lumps / bumps• Colour changes (i.e. redness, pallor)• Bruising• Deformity (bony or muscular)• Muscle bulk symmetry• Muscle atrophy• Temperature changes• Sweating or lack of• Gait• Antalgic gait or postures
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Active range of movement

Active range of movement is the assessment of the movement available within a joint or body part that the patient themselves actively produces themselves (Petty & Ryder, 2018). It is an essential tool during the assessment process as it allows the clinician to:

1. Assess for any pain reproduction
2. Highlight any abnormalities in the movement patterns of the joints being assessed
3. Determine the available range of those joints
4. Observe any resistance encountered during the movement

(Petty & Ryder, 2018)

To assess active range of movement we need to instruct the patient to perform the movements that are available within the joint or location that the symptoms are being reported. We must record any pain response and the quality and degrees of movement that are available. Table 8 highlights the movements that are available at all of the joints / body parts.

Table 7: Summary of available active range of movement at each joint

Adapted from Magee & Manske (2021). (see page numbers below)

<i>Body part</i>	<i>Active range of movements available</i>
Cervical spine	Flexion, extension, rotation, side flexion, retraction, protraction p.254
Thoracic spine	Flexion, extension, rotation, side flexion p.623
Lumbar spine	Flexion, extension, rotation, side flexion, pelvic side glide p.646
Shoulder	Flexion, extension, abduction, adduction, medial rotation, lateral rotation, p.300
Elbow	Flexion, extension, pronation, supination p.477
Wrist / hand	Wrist flexion, extension, radial deviation, ulnar deviation, pronation, supination, Finger flexion, extension, adduction, abduction Thumb flexion, extension, opposition, adduction, abduction

	p.505
Hip	Flexion, extension, abduction, adduction, medial rotation, lateral rotation p.857
Knee	Flexion, extension p.888
Foot / ankle	Ankle dorsiflexion, plantarflexion, inversion, eversion Toe flexion, extension. adduction, abduction p. 1019

Passive range of movement

Passive range of movement is the movement available at a joint or body part that requires an external force to assess the movement rather than being performed by the patient (Magee & Manske, 2021). Passive range of movement is predominantly assessed by a clinician physically taking the joint or body part through the range of movement without any active involvement of the patient. Passive range of movement is an essential tool to MSK assessment as this allows:

1. Determination of the range available at a joint or body part (both restricted or excessive)
2. The reproduction or reduction in any symptoms
3. Assessment of the end feel of the joint (i.e. hard, soft tissue approximation)

(Magee & Manske, 2021)

To assess passive range of movement we need to assess the same movements as those performed actively in table 8. The clinician must instruct the patient to fully relax the area that is being assessed, whilst physically moving the joint or body part through the full available range of movement. The clinician must record of any pain response, spasm, degree of movement available and end feel that is apparent.

Resisted testing

Resisted testing is applying a force during an active movement of a joint or body part (Magee & Manske, 2021). It requires an external resistance being applied during an active range of movement and this can be either through the available range or statically (isometrically).

Isometric resisted testing is one during which a force is applied to elicit a contraction however no movement occurs (Baffour-Awuah et al., 2023). Resisted testing is an essential tool to MSK assessment as this allows:

1. Determination of the strength of contraction that is available (using the oxford grading scale, see table 9) at a joint or body part
2. Identifies any strength deficits statically or at particular ranges
3. Identifies possible significant pathology to contractile structures (i.e. tear / ruptures to muscle / tendon)
4. The reproduction of any symptoms

(Magee & Manske, 2021)

To carry out resisted testing the same movements as those performed actively in table 8 are assessed either by resisting the movement throughout the joint range or by resisting the movement statically by isolating the movement in the area tested. The clinician must instruct the patient to attempt to carry out the active movement of the muscle, joint or body part that is being assessed, whilst physically providing a resistance to that particular movement. The clinician must record of any pain response, spasm, degree of movement available and end feel that is apparent.

The Oxford grading scale

When assessing muscle strength, the oxford grading scale is used (see table 8) as this provides the clinician with a scale that allows them to determine which grade of muscle contraction strength the patient is able to achieve. With a grade 0 the patient demonstrates a complete lack of any muscle contraction when trying to perform the movement. With a grade 1 the patient demonstrates evidence of a flicker or contraction of the muscle when attempting the movement. With a grade 2 the patient demonstrates that they are able to perform the full range of the movement but with gravity eliminated, usually by supporting the limb in the

same plane that the movement occurs. With a grade 3 the patient is able to perform full range of movement purely against gravity without any passive resistance. With a grade 4 the patient is able to perform full range of movement but this time against gravity and with a low level of resistance applied. With a grade 5 the patient is able to perform full range of movement against gravity with full resistance applied.

Table 8. Oxford grading scale

Adapted from Carranza et al., (2014, p. 11)

Grade	Description
0	No signs of muscle contraction
1	Contraction or flicker apparent
2	Full range movement with gravity eliminated
3	Full range of movement against gravity but without resistance
4	Full range of movement against gravity and with low resistance
5	Full range of movement against gravity and with full resistance

Palpation

Palpation is the act of examining various parts of the body during an assessment using touch and feel to identify any abnormalities or elicit a pain response. Table 10 highlights the potential areas that should be commonly palpated during an MSK assessment.

Table 9. Palpation

Palpation: Palpate the following:	<ul style="list-style-type: none"> • Relevant bony landmarks • Relevant ligament locations • Relevant myofascial locations • Pulses (if indicated)
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The Neurological examination and special tests

A comprehensive neurological examination should form part of the objective assessment as well as various special tests for differing pathologies however these are beyond the scope of this article.

The clinical reasoning process

Throughout the MSK assessment the clinician is required to use a logical clinical reasoning process to piece together the information gathered in the subjective interview with that of the objective assessment, to determine the underlying diagnosis for the patient. This process involves consideration of the signs and symptoms that have been reported, the onset of the symptoms, the location and description of the symptoms and any associated risk factors for any differential diagnoses for the area of the body affected and using that information with any objective signs to identify a diagnosis for the presenting complaint to allow treatment and management decisions to be made based upon this.

Conclusion

A musculoskeletal assessment involves a very detailed evaluation of the patient's subjective history alongside a thorough objective examination of the patient. Throughout this a logical clinical reasoning process is required in order to piece together the different components of the assessment to determine an accurate diagnosis and to direct future treatment and management.

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