

**The Guide to
Efficient
Physical Therapy
Examination**

1st Edition

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Introduction

In the changing healthcare environment, physical therapists and other allied health professionals are expected to see high volumes of patients in a short amount of time. To complicate the situation, patients are arriving with more complex clinical presentations. They are often presenting over-medicated, over-stimulated, and under examined. Many have multiple comorbidities, including a diagnosis of chronic pain. The expectation for healthcare professionals is to provide high quality, evidenced guided care with the minimal amount of patient care time. To accommodate this ever-changing paradigm, healthcare professionals must be efficient and effective in their examination process.

In physical therapy school, therapists are taught a broad spectrum of knowledge. Orthopedic examination, treatment, and prognosis is covered in-depth. For example, we learn more than 50 special tests to diagnose shoulder impingement, rotator cuff dysfunction, biceps pathology, and labral tears. Despite all this knowledge, therapists lack the ability to prioritize these tests. Many therapists gather information without considering 'why' we perform each measure. We soon realize that the special tests are not very special! Upon finishing their clinical examination, they are drowning in information that only minimally changes their patient's prognosis or intervention selection. The therapist has found several secondary and tertiary impairments without identifying the primary cause of the problem. This evaluation style is problematic because the examiner is no longer guiding the exam by evidence-based measures. Physical Therapists need an examination process that is thorough, reproducible, and efficient.

Pathoanatomy versus Pathokinesiology

Movement is at the heart of the physical therapy profession. To appreciate the content presented in this book, readers must shift their thinking from anatomical dysfunction to movement dysfunction. Readers must adopt the concept of pathokinesiology in order to fully benefit from the text below.

Pathoanatomy: the study of abnormal anatomy resulting in pathology

Pathokinesiology: the study of abnormal movement resulting in pathology

Many special tests and examination measures assess the pathoanatomy (a.k.a. the injured anatomical tissue). Fortunately, the work of movement impairment specialists and pain science researchers has shown that the injured tissue is typically not the *cause* of the patient's problem. For example, a 2011 study by Yamamoto et al found a 65.4% prevalence of rotator cuff tears in asymptomatic persons.ⁱ Additionally, a 2014 study by Brinjikji et al found that >50% of individuals from 30-39 years old without low back pain had degenerative changes and bulging discs.ⁱⁱ Understanding these statistics sheds light on the shortcomings of the pathoanatomical model. If a physical examination is guided by the same faulty principles, the outcomes are inadequate. Physical therapists need to adopt a standardized musculoskeletal examination and treatment method that is guided by movement based impairments.

How to Read this Book

The following pages will guide you through the necessary steps to perform an efficient physical therapy evaluation for each region of the body. The reader will notice, for each evaluation, the tests are performed in a systematic, reproducible manner. This is done for consistency and repeatability. For example, in the lumbar evaluation the examiner assesses the function of the core muscles in supine; yet this should only be completed after a thorough examination of the functional testing of the core in standing. It would not be an efficient use of time to take an acute low back pain patient from standing, to supine, back to standing. Additionally, the goal of any physical therapy session is to maximize function so we must assess function first.

When reading through the book, it will be evident that many special tests have been left out. For example, in the shoulder evaluation, only a few special tests with high diagnostic accuracy are performed. Remember, we need to assess movement dysfunction - not anatomical tissue dysfunction! Furthermore, testing revolves around common impairments seen across the population.

Disclaimer

The examinations are guided by evidence, but they are not inclusive to certain Red or Yellow Flags that may present during an evaluation. The book is intended to assist your physical examination. As a medical practitioner, this book should not replace your clinical judgment.

Symbols

Clinical pearls relating to the examination measure can be found in the blue text boxes.

Remember: Reminders can be found in the orange shaded text box at the beginning of each evaluation.

Key Examination Points

- 1) **Minimal positional changes for the patient.** It is inefficient to have the patient constantly rolling over, standing, and sitting. A patient in high levels of pain will not be able to tolerate multiple positional changes.
- 2) **Perform pain provocation testing last in each position.** For example, if a patient states that bending forward increases their symptoms, perform lumbar flexion active range of motion last. Pain will cloud the results of your physical exam.
- 3) **Examiner must assess regional joints, muscles, and nervous system tissue.** The body is a single kinetic chain. Movement at one joint increases the demands on local tissue. For example, when someone performs shoulder flexion, movement occurs in the thoracic spine, rib cage, acromioclavicular joint and more. If one of those areas is dysfunctional, it can be the source of pain. Each examination needs to evaluate each source of a patient's symptoms.

Efficient Lumbar Spine Clinical Examination

Remember: When performing a lumbar evaluation, the patient likely has preconceived thoughts regarding their medical diagnosis (i.e. bulging discs, degenerative disc disease). These pathoanatomic terms are often not the cause of one's pain. It is imperative that the examiner appropriately educate the patient regarding their pathokinesiologic (movement) diagnosis.

Key points:

- Must assess the thoracic spine and hips
- A thorough neurological examination may be warranted
 - Acute low back pain may limit testing
- High fear avoidance will alter the examination findings



Efficient Lumbar Spine Clinical Examination

Seated Tests and Measures

- Seated posture
- Neurological examination (Slump test, dermatomes, myotomes, reflex testing)

Standing Tests and Measures

- Gait
- Heel walk and toe walk
- Squat
- Single leg squat
- Single leg balance
- Cardinal plane testing
- Functional stability tests

Supine Tests and Measures

- Gross lower extremity AROM and PROM screening
- Active straight leg assessment (neural tension, disc involvement, hamstring length, lumbar stability)
- Supine stability tests (bent knee fall out, bent knee marches, straight leg raise)
- Palpation
- Sacroiliac joint tests (distraction, thigh thrust)

Sidelying Tests and Measures

- Strength testing (gluteus medius)
- Sacroiliac joint tests (compression)

Prone Tests and Measures

- Thoracic and lumbar PA mobility assessment
- Strength testing (gluteus maximus)
- Prone stability tests (prone knee bend, sacral rocking)
- Palpation (iliac crests, PSIS, sacral inferior lateral angle, ischial tuberosities)

Seated Tests and Measures

Seated postural assessment is an important baseline measure to evaluate the patient's physical and psychological status. The patient's demeanor and response to the examiner's questions all provide cues regarding the outcome of the evaluation and subsequent treatment sessions. For example, consider a typical patient with chronic low back pain. They will likely present with a slouched spine, forward head, and rounded shoulders posture. From an anatomical standpoint, the examiner will be cued to test thoracic mobility as well as core stability. From a psychological standpoint, this posture can cue the examiner to ask about recent depressive symptoms, history of anxiety, and the effect of low back pain on the patient's life.

Seated posture considerations

- Slouched posture during the subjective may indicate thoracic spine stiffness and prolonged lumbar flexion posture
- Quick, fidgety movements may indicate high pain levels
- Legs crossed may indicate a repetitive posture muscle imbalance at the hips and/or need for stability



Neurological examination should be performed on any patient with spinal problems. The full neurological exam includes dermatome and myotome testing, deep tendon reflexes, upper motor neuron testing, and neural tension testing. Not all of these components need to be performed on every low back evaluation. The examiner should use clinical judgment to determine which tests are appropriate.

**For the purposes of the efficient examination, the upper motor neuron testing has been left out of this text. This choice does not diminish the importance of upper motor neuron examination when clinically appropriate.*

SLUMP Test. assesses for neural tension or altered neuro-dynamics. The findings should be clustered with the straight leg raise range, nerve palpation, and the overall clinical presentation. In asymptomatic people, tension testing causes some discomfort. Be sure the patient meets the criteria for a positive neural tension test (see below).

Performing the SLUMP Test:

Patient seated with popliteal creases against edge of table and arms resting on their knees or behind their back. Patient slouches by moving into thoracolumbar flexion. Systematically perform cervical flexion, knee extension, and ankle dorsiflexion. When symptoms are present, move a distant body part to take tension off the nervous system. Reassess symptoms at each stage of the test.

Start Position:



End Position:



A positive neural tension test includes:

1. Reproduction of symptoms (familiar, concordant pain)
2. When the test response can be altered by movement of distant body parts (passive neck flexion, ankle extension, hip rotation/abduction/adduction).
3. Difference between testing side-to-side

Dermatome and Myotome testing should be performed on any patient with signs and symptoms consistent with upper motor neuron problems, radiculopathy, or peripheral nerve dysfunction. Additionally, they should be assessed in individuals who report bowel and bladder changes, saddle paresthesia, numbness and tingling, and/or other symptoms atypical of mechanical low back pain.

Dermatomes	Myotomes
L1: Inguinal region	L2: Hip flexion (iliopsoas)
L2: Middle, anterior thigh	L3: Knee extension (quadriceps)
L3: Medial knee	L4: Ankle DF (tibialis anterior)
L4: Medial lower leg	L5: Great toe extension (EHL)
L5: Between toes 1-2	S1: Ankle PF (gastrocnemius)
S1: Lateral foot	S2: Knee flexion (HS)
S2: Popliteal space	
S3-4: Perianal region	<i>Short-cut: Heel walking for L4 myotome; Toe walking for S1 myotome (see below)</i>



Deep Tendon Reflex Testing is indicated for patients with signs and symptoms of upper motor neuron or lower motor neuron problems. For the efficient lumbar examination, it is important to test the Patellar and Achilles reflexes. The Patellar reflex tests the integrity of the L4 nerve root and the Achilles reflex assesses the S1 nerve root. Individuals with lower motor neuron symptoms will have decreased reflexes. Those with upper motor neuron symptoms will have increased reflexes.

Reflex Grading Scale

0: No response

1+: Low Normal, Diminished

2+: Normal

3+: Brisker than average, High Normal, Not pathologic

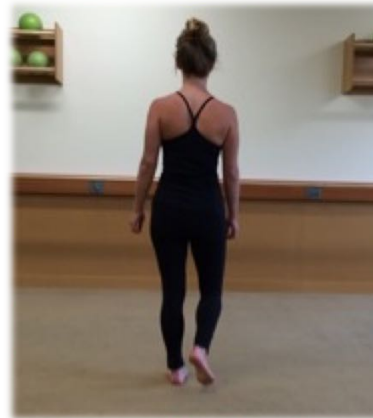
4+: Very Brisk, Hyperreflexia

Standing Tests and Measures

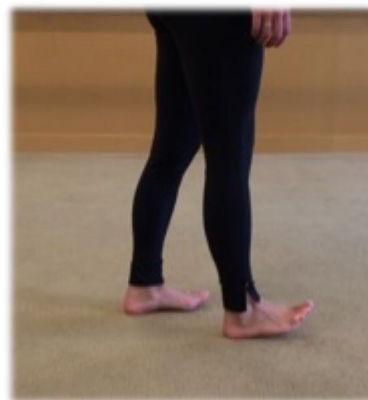
Gait assessment should be systematic and reproducible on every patient. Either observe from head-to-toe or vice versa, but be consistent. Numerous considerations should be taken while watching someone walk.

Gait assessment considerations

- Weight bearing equally through both legs
- Equal and adequate hip extension bilaterally
- Trunk control during single limb loading
- Lacking ankle, knee, hip motion
- Trendelenburg or compensated Trendelenburg
- Knee valgus during single limb stance
- Excessive pronation or supination
- Normal heel to toe progression
- Good toe off at terminal stance



Heel walk and toe walk is a simple method to assess distal myotomes. Heel walking assesses the L4 nerve root and toe walking assesses the S1 nerve root. Additionally, this test will provide a general look at the patient's balance.



Squat/Overhead Squat evaluates the patient's general willingness to move, coordination, and ability to achieve basic functional movement. The squat can be used as a quick myotome screening and a gross screening of lower extremity joints. If someone cannot squat, then assess their deadlift technique. If they cannot perform either maneuver, it can be assumed they use their back more than their legs when performing lifting movements.

Squat Considerations

- Starting foot position
- Depth of squat
- Knees over toes
- Dynamic knee valgus
- Weight shift during descent
- Hip hinge
- Quality of motion on ascent (no lumbar hyperextension)
- Mobility vs. stability



*For many clients, the standard squat is a sufficient test. If a patient exhibits good mobility and stability, assess the overhead squat as seen above.



Single leg step down is a great assessment for higher level patients. In particular, it assesses quadriceps muscle function, lumbopelvic disassociation, and single leg balance.

If the patient can squat with relatively good form, it is important to assess single leg squat or single leg step down (as seen in the picture).

Single leg balance provides a general assessment of coordination, single limb strength, and spatial awareness. Using a dowel across the shoulders allows the examiner to visualize shoulder level while removing the arms from assisting with balance.

Single leg balance considerations

- Trendelenburg or compensated Trendelenburg
- Extension of the lumbar spine
- Dynamic knee valgus/femoral adduction
- Shoulder level
- Head position



Cardinal plane testing (active range of motion) will establish a pattern of pain and limitation. The testing will demonstrate a baseline range of motion for improvement. If no pain is elicited during the active motion testing, add overpressure to assess end-range of motion. Additionally, if distal symptoms are noted, assess repeated motions to find a directional preference.

Cardinal plane testing considerations

- Total range of motion
- Symmetry of movement
- Quality of movement
- Deviations from plane of motion
- Pain (onset, distribution, painful arc)
- Paresthesia
- Age, sex, and body type



Arthrokinematics of the Lumbar Spine

Flexion: Both superior articular surfaces glide up and forward on the inferior articular surfaces

Extension: Both superior articular surfaces glide down and backwards on the inferior articular surfaces

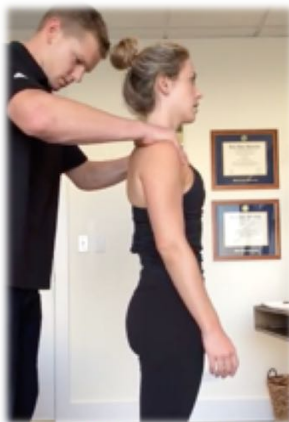
Rotation: The superior articular surface glides down and back on the side to which rotation occurs, and up and forward on the opposite side

Sidebending: The superior articular surface glides down and back on the side to which sidebending occurs, and up and forward on the opposite side

Functional stability testing assesses how the core responds to perturbations from various directions. Each test attempts to identify segmental translation, motor recruitment timing deficits, and activation of the deep core stabilizers.

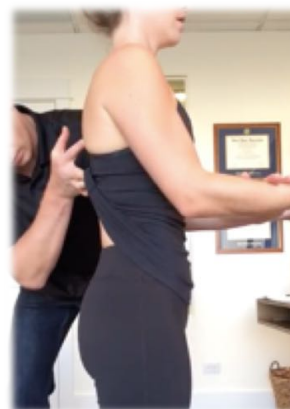
Vertical compression test

- Provide a quick downward compression through spine and assess for buckling/hinging



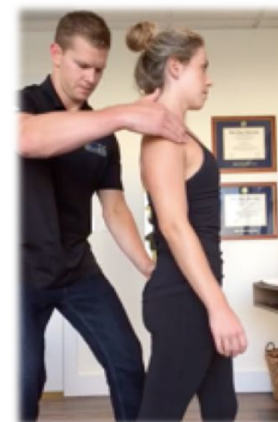
Elbow flexion test

- Patient flexes elbow to 90 degrees and holds isometrically
- Therapist watches for faulty movements in the spine



Lumbar protective mechanism

- Patient stands normally or stagger stance
- Therapist provides random perturbations
- Assess for use of hip strategy, inability to maintain spinal stiffness, or reproduction of symptoms



Supine Tests and Measures

Gross lower extremity screening includes a quick assessment of the hips, knees, and ankles. The screen focuses on AROM with PROM overpressure and joint mobility assessment. The examiner should be looking for a reproduction of pain, abnormal end-feel, and general willingness to move. If impairments are found to be contributory, further examination is warranted.



The gross lower extremity screening is a quick strength, range of motion and joint assessment of the hips, knees, and ankles. The screening should provide the examiner with information needed to determine if the tested joint is contributing to the patient's current symptoms.

Example: A patient with low back pain has 0 degrees of dorsiflexion with a hypomobile talocrural joint and coinciding gait abnormalities. In this example, the ankle impairments should be addressed to normalize gait mechanics. After improving ankle dorsiflexion range of motion, reassess gait mechanics to see if lumbar pain has changed and/or movement improved.

Active straight leg raise assessment (aSLR) has the potential to assess multiple structures. When performing an aSLR, the examiner should consider neural tension, disc involvement, hamstring length, and lumbar stability.

Active Straight Leg Raise

When interpreting the results of the aSLR, respect the wide variety of structures being tested.

- If the examiner is assessing for disc involvement or neural tension, use the three components for a positive neural tension test (as described in the Slump test above)
- If the examiner is assessing hamstring length, the patient should be able to actively raise the leg to the height of the opposite ASIS without pelvic substitution
- If the examiner is assessing lumbar stability, the patient should be able to raise the leg to 45 degrees without an ipsilateral pelvic drop



Supine stability tests assess the motor control of the core. Each of these tests identify the ability to disassociate the trunk from the lower extremities. If increased pelvic movement is noted during the maneuvers, the core is not stabilizing during lower extremity movement.

Bent Knee Fall Out

A positive test is an increase in symptoms or opposite side pelvic rotation during the first 50% of motion. Symptoms should diminish with passive stabilization.



Bent Knee March

A positive test is the reproduction of symptoms or pelvic rotation to the side of hip flexion. Symptoms should diminish with passive stabilization.



Straight Leg Raise

A positive test is the reproduction of symptoms or ipsilateral pelvic drop as the leg raises. Symptoms should diminish with passive stabilization.



Palpation during the supine lumbar examination should include iliac crest heights, symmetry of the ASISs, and position of the medial malleoli. This information can help identify if an anterior or posterior innominate is present or if a true or apparent leg length discrepancy exists. The information obtained during supine palpation should be clustered with the SI joint pain provocation and mobility testing.

Sacroiliac joint pain provocation tests can rule-out SIJ pathology. During the examination, Laslett's clusterⁱⁱⁱ should be utilized since it has high diagnostic accuracy. Both the distraction and thigh thrust tests can be performed in supine.

Distraction Test

- Patient positioned in supine
- Place hands on each of the ASIS with arms extended and crossed
- Press down in posterolateral direction
- Pressure is maintained until symptoms are reproduced
- If symptoms have not been provoked, overpressure may be performed
- Positive test is a reproduction of unilateral posterior pain. Pain in midline is not considered positive



Thigh Thrust

- Patient positioned in supine
- Place hand under the sacrum
- Force transfer through the femur into posterior acetabulum in varying degrees of abduction and adduction
- Positive test is a reproduction of ipsilateral sacroiliac joint pain



Laslett's Cluster for Sacroiliac Joint Dysfunction

Compression

Distraction

Thigh thrust

Sacral thrust

Gaenslen's Test (later research has shown this test can be omitted from the diagnostic process)

Sidelying Tests and Measures

Gluteus Medius strength testing is a necessary component of the lumbar examination. Many individuals with low back pain lack frontal plane stability in the hips. The test shown assesses the posterior fibers of the gluteus medius, which are important hip external rotators and abductors.

Posterior Gluteus Medius (PGM) Strength Test

- Patient in sidelying
- Abduct the leg, flex the hip, externally rotate the foot
- To achieve the strength grade 3/5, the patient must maintain the external rotation. If they can hold the starting position, the examiner then pushes the leg down and forward, while the patient resists. Do not allow the pelvic girdle to roll backwards



Controversy exists regarding the test position of the gluteus medius. The author of this text chose to demonstrate the test position for the posterior fibers. This test assesses the external rotation component of the gluteus medius and minimizes the action of the tensor fascia latae muscle.

Sacroiliac joint provocation testing in sidelying includes the SI joint compression test.

Compression Test

- Patient in sidelying
- Therapist stands behind patient
- Place hand over hand on top innominate and roll patient's pelvis slightly forward. Keep arms extended and push down
- The test is performed twice, once on each side
- Positive test is a reproduction of unilateral SIJ pain



Prone Tests and Measures

Thoracic and lumbar PA joint mobility assessment must be performed on all lumbar patients. The PA assessment is a reliable measure to assess hypomobility and pain response. When performing joint PAs, the examiner should be analyzing the expected mobility of segment, comparison to segments above and below, left to right comparison, and consider age/sex/body type.

Central PAs

- Patient in prone
- Position hypothenar eminence on the spinous processes with hand over hand
- Provide anteriorly directed force assessing range/quality of movement and symptom behavior



Unilateral PAs

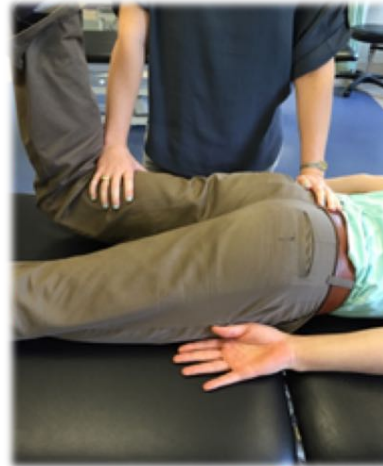
- Patient in prone
- Position hypothenar eminence over transverse processes
- Provide anteriorly directed force assessing range/quality of movement and symptom behavior



Gluteus maximus strength testing should be performed during every lumbar and lower quarter evaluation. The test needs to be given extra attention due to the natural compensations that typically occur. Individuals with a weak gluteus maximus will compensate by over-activating the hamstrings or lumbar paraspinals.

Gluteus Maximus Strength Test

- Patient in prone with the knee passively flexed
- Therapist passively brings the hip into extension and pushes down through the posterior thigh while the patient resists



Gluteus Maximus strength testing can be difficult to interpret due to the subtle compensations that can occur above and below the hips. The examiner should assess for over-activation or dominance of the lumbar paraspinals as well as the hamstring muscles. If the examiner notes immediate activation of the surrounding musculature with poor timing and control of the gluteus maximus, the test is graded 3-/5.

*The gluteus maximus strength test is an example of the need to assess for movement dysfunction. The gluteus maximus functions as a proximal stabilizer. The gluteus maximus will appear stronger than it actually is unless the examiner monitors for compensatory strategies.

Prone segmental stability tests assess for lumbar hypomobility and relative flexibility of the spine. In both exam measures, the examiner is assessing for segmental stability of the spine. Segmental rocking will identify areas of hypomobility and areas of relative muscle stiffness. Segmental rocking should be clustered with the results of the lumbar PA joint assessment. The prone knee bend, which assesses relative flexibility of the hip flexors, will determine if tension in the hip flexors can be contributing to a patient's symptoms.

Sacral Rocking

Patient in prone

- Palpate in interspinous space with superior hand
- With other hand rock pelvis back and forth and feel for the willingness of the vertebrae to move
- This test is good at assessing hypomobility, but is not good for determining hypermobility



Prone Knee Bend

-Patient in prone

- Passive knee flexion that causes the pelvis to tilt anteriorly with associated lumbar extension indicates a positive test
- The extension moment in the lumbar spine can also cause an increase in symptoms

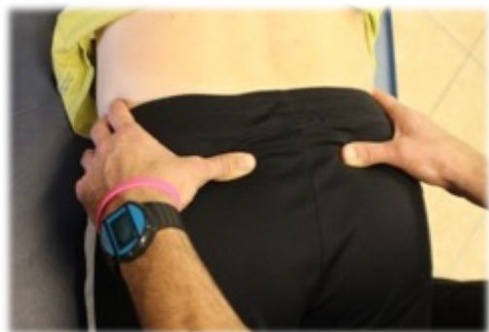


Many patients who prefer lumbar extension will have a positive prone knee bend test. When performing the test, the examiner must assess the lumbar spine for increased motion (i.e. hinging or increased rotation).

Palpation of the sacrum will help identify any sacral or ilial abnormalities. The examiner should be assessing for side to side differences. While sacral palpation is inherently flawed with poor inter-rater reliability, it can be beneficial in defining the type of SIJ dysfunction. This will allow for improved treatment decisions such as use of muscle energy techniques or manipulations as required.

Sacral Sulci

- Located just medial and slightly inferior to the PSISs to evaluate sacral base position
- Deep sacral sulci on both sides indicates sacral flexion
- Shallow sacral sulci indicate sacral extension
- A deep sulcus on one side and a shallow sulcus on the other side indicates a sacral rotation



Sacral Inferior Lateral Angle (ILA)

- Approximately 1-inch lateral and slightly superior to the sacrococcygeal junction
- Palpate the ILAs on both sides to determine relative superior/inferior position
- A difference of 1/4 inch or more may suggest that the sacrum is sidebent



Ischial Tuberosities

- Palpate for height (superior/inferior) and for depth (anterior/posterior)
- An iliac anterior rotation moves the ischial tuberosity posterior and vice versa
- An upslip moves the ischial tuberosity superior and vice versa



Efficient Shoulder Examination

During a shoulder examination, it is important to assess the cervical and thoracic spine, rib cage, and static and dynamic postures of the upper quarter. Each one of these regions can lead to pain and dysfunction of the glenohumeral joint. For example, during shoulder flexion, the thoracic spine extends, side bends, and rotates; ribs one and two depress, while ribs three through five elevate. In addition, the cervical spine needs to remain stabilized throughout the full range of motion. A lack of mobility or stability in any local region can contribute to the problem.

Remember: The key with examination is efficiency. For this reason, glenohumeral joint mobility or rhomboid strength testing is typically not indicated. The glenohumeral joint is built for mobility, unless the individual has clear mobility deficits (i.e. adhesive capsulitis), joint mobility is usually not an issue. Additionally, many people rest in scapular downward rotation and demonstrate strong and dominant rhomboids muscles. Testing these muscles is a poor utilization of time.

Key points:

- Must assess the cervical spine, CT junction, and thoracic spine
- Many patients with shoulder dysfunction have scapular muscle strength or motor control deficits
- A neurological examination may be warranted



Efficient Shoulder Clinical Examination

Sitting Tests and Measures

- Static postural assessment of the GHJ and scapula
- Gross cervical, elbow, and wrist AROM screening
- Shoulder AROM assessment
- Gross shoulder strength testing
- Serratus anterior strength testing
- Special tests (Hawkins-Kennedy, Neers, Drop Arm, IRRT/ERRT, IR lag)
- 1st and 2nd rib assessment
- Movement analysis (stand behind the patient and assess scapular movement)

Supine Tests and Measures

- Shoulder IR/ER AROM
- Upper limb tension testing per location of pain (median, ulnar, radial)
- Special testing (apprehension test, relocation test)
- Muscle length test (pec minor and latissimus dorsi)
- Cervical segmental joint mobility

Prone Tests and Measures

- Middle and lower trapezius strength testing
- Joint mobility of CT junction and thoracic spine

Seated Tests and Measures

Static postural assessment of the GHJ and scapula will provide a starting point for the shoulder examination. The examiner should be looking for side to side symmetry, scapular elevation or depression, inferior angle positioning, and thoracic spine posture. This exam measure can also guide the examiner to test specific muscles later in the shoulder examination (see box below).



In this picture, the patient rests in scapular downward rotation. This posture is commonly seen across the orthopedic population. With this static posture, it is important to assess the function of the serratus anterior and lower trapezius as these muscles facilitate scapular upward rotation.

Gross cervical, elbow, and wrist screening will clear the regional joints that can lead to dysfunction. The assessment investigates AROM with PROM overpressure. The examiner should be looking for a reproduction of pain, abnormal end-feel, and the patient's general willingness to move. If range of motion impairments are found to be contributory, further joint examination is warranted.



Shoulder active range of motion includes assessment of total range, pain, substitution patterns, and the willingness to move. All cardinal planes of movement should be tested starting with scaption. Observe both scapular and glenohumeral movement. Common impairments include the shrug sign, scapular winging, decreased scapular upward rotation, and scapular tilt. Further AROM of shoulder internal and external rotation should be performed in supine.



Shrug Sign (not pictured here): Excessive overuse of upper traps due to rotator cuff weakness or tear. The patient may have tight capsular structures and will often lean towards the opposite side with shoulder flexion or abduction.

Special testing for glenohumeral dysfunction is relatively unreliable. However, there are a few tests with good diagnostic accuracy that will help rule-in or rule-out certain tissue pathology. For the efficient evaluation, it is important to assess for a full rotator cuff tear, shoulder instability, and general tissue irritability. A full rotator cuff tear or shoulder instability may warrant an orthopedic referral, but variable amounts of success have been seen with conservative management. The impingement test cluster is great at assessing tissue irritability and can be used as an asterisk sign throughout treatment. Otherwise, the biceps tendon, partial thickness rotator cuff, and labral tear tests will all present as a form of shoulder impingement. These tests generally have poor diagnostic accuracy. Furthermore, the outcome of these tests will only minimally change the anticipated plan of care.

Hawkins-Kennedy -Abduct and horizontally adduct the shoulder to 90 degrees
-Supporting the elbow, allow the arm to drop with gravity, then apply gentle overpressure if tolerated
-Reproduction of symptoms defines a positive test for rotator cuff pathology



Neer's Test -Apply overpressure in full abduction/flexion
-Reproduction of symptoms defines a positive test for rotator cuff pathology



IRRT/ERRT -Abduct the shoulder and flex the elbow to 90 degrees
-If symptoms are reproduced with resisted internal rotation, the test is positive for a secondary RTC tear (bursal surface)
-If the symptoms are reproduced with resisted external rotation, the test is positive for primary RTC tear (acromial surface)



Drop Arm Test

- Place the shoulder in 90 degrees of abduction
- Instruct the patient to hold the position and slowly return to neutral
- Inability to slowly lower the arm is a positive test
- Examiner should watch for scapular elevation with deltoid and upper trapezius over-activity



IR lag

- Place hand behind back in internal rotation
- Weakness or pain reproduction when trying to maintain the back of the hand off the lumbar spine, with or without resistance, defines a positive test for subscapularis pathology

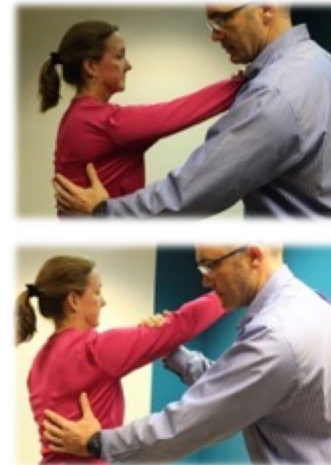


Gross shoulder strength testing in sitting should include testing the shoulder flexors, abductors, internal and external rotators (IR/ER). This test gives the examiner a side to side strength comparison, muscle group irritability, and general strength. In the efficient examination, specific muscles are not tested since it does not directly change the plan of care. Following the pain provocation testing rules, test shoulder IR/ER prior to flexion and abduction. Additionally, using the special tests above, the examiner will have already determined if the patient has a full thickness rotator cuff tear or other serious muscular pathology.

Serratus anterior strength testing. The serratus anterior is an important scapular upward rotator and abductor. Suspected weakness of the serratus can be seen in individuals with ‘winging’ or internal rotation of the scapula. The serratus is often weak or displays poor motor control in patients with shoulder dysfunction.

Serratus Anterior Strength Test

- Supporting the arm on the examiner’s shoulder, passively flex the arm to 110° and protract the scapula
- Monitor inferior scapular angle
- Ask the patient to maintain this position as the examiner releases the arm
- If the scapula “jogs,” the test is over (3-/5 max). If not, apply a downward force proximal to the elbow



First and second rib mobility assessment. The ribs have a vital function in shoulder mobility and stability. Elevation of the first or second rib can be a significant source of pain. Rib assessment should be graded similar to other joint mobility as hypomobile, hypermobile, or normal mobility. When assessing the ribs, look for side to side symmetry and pain response.

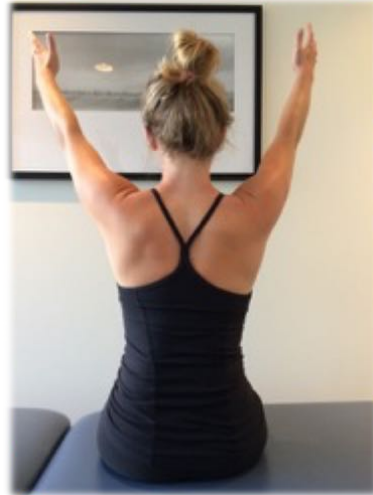
1st and 2nd Rib Assessment

- The examiner curls their fingers around the upper trapezius and sinks down until they feel a firm, bony surface
- Confirm the 1st by having the person take a deep breath (1st rib should elevate)
- Provide a caudal direct force to assess rib mobility
- Test the second rib in the same manner



The anterior and middle scalene attach on the first rib. The posterior scalene attaches on the second rib. If the scalene muscles are hypertonic, a patient may present with shoulder pain, but consequently have cervical and rib dysfunction as well.

Scapular movement analysis test assesses side to side symmetry and the presence of scapular dyskinesia. When performing the test, stand behind the patient and watch the scapulae move through the full range of motion. Repeat three to five times. Monitor for excessive scapular elevation, adequate scapular upward rotation, normal posterior tilt during flexion, and cervical stability. If the test does not provide the necessary information, consider having the patient hold a light weight (3-5 lbs.) to make compensations more apparent.



If symptoms are reproduced during the scapular movement analysis test, consider providing manual assistance to the scapula in the direction that is lacking mobility. If the patient's symptoms improve, the examiner should use the information to assist with treatment.

For example: If a patient is lacking scapular upward rotation during the test, provide passive assistance to the shoulder girdle into upward rotation. Reassess symptoms.

Supine Tests and Measures

Shoulder IR/ER AROM of the glenohumeral joint should be performed in supine to help block scapular movement. With internal rotation, palpate the acromion to feel for scapular movement and use one hand or elbow to stabilize the scapula (not pictured here). Shoulder IR AROM stops when scapular movement is noted.



Upper Limb Tension testing (median, ulnar, radial) is important for individuals with numbness and tingling, unusual neurological symptoms, or individuals with symptoms in multiple locations. Compression or tensile stresses on the nerve can occur throughout the cervical spine, thoracic outlet and upper extremity. Not all tests need to be performed on each evaluation; instead, choose the appropriate tension test based off location of symptoms and muscle weakness reported. Research demonstrates several methods to performing these tests. The key aspect is that the examiner needs to be consistent with their initial patient positioning and steps in the examination.

Upper Limb Tension Test	Description
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Median Nerve	<ul style="list-style-type: none">-Depress the shoulder and punch into table to keep shoulder in depressed position-Therapist uses their other hand on patient's hand to laterally rotate and abduct the shoulder (about 90 degrees or more)-Extend the elbow while the forearm is supinated, wrist and fingers extended-Stop when the patient reports symptoms-A decrease in symptoms by removing tension off a distant component is a positive test
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Ulnar Nerve

- Depress the shoulder and punch into table to keep shoulder in depressed position
- Use other hand on patient's hand to flex elbow to about 115 degrees, with the forearm pronated
- Keep patient's wrist and fingers extended. Laterally rotate the patient's shoulder to end range and abduct the patient's shoulder
- Stop when patient reports neural symptoms
- A decrease in symptoms by removing tension off a distant component is a positive test



Radial Nerve

- Patient is lying in diagonal position on the table with shoulder off edge of table
- Clinician uses thigh closer to patient to depress shoulder
- Use other hand to grasp patient's hand and place arm in 10 degrees of abduction and *fully extended elbow*
- Medially rotate the shoulder, pronate the forearm, and flex the wrist and fingers/thumb. Abduct the shoulder until neural symptoms are reproduced
- A decrease in symptoms by removing tension off a distant component is a positive test



OPTIM PT Youtube link for all 3 upper limb tension tests: <https://www.youtube.com/watch?v=SNX3V4esiu0>

Supine special testing can help identify glenohumeral instability. This testing should be performed on patients with a reported history of shoulder dislocation or subluxation. The supine tests include the apprehension and relocation tests.

Apprehension Test

-Apprehension with external rotation of the shoulder at 90 degree of abduction defines a positive test for instability



Relocation Test

-Relief of apprehension with external rotation of the shoulder at 90 degrees of abduction corroborates a positive apprehension test for instability



Muscle length testing of the Pectoralis Minor and Latissimus Dorsi. Inadequate length of the Pec Minor and Latissimus can predispose patients to an anterior scapular tilt and internal rotation of the glenohumeral joint. Adequate length of these muscles is important for normal shoulder mechanics. Inadequate clearance of the greater tuberosity under the acromion can lead to shoulder impingement during overhead activities.

Pec Minor Length Test

- Patient lies supine with arms by side
- Measure the distance between the posterior aspect of the acromion and the table
- Normal distance should be 3 finger widths



Latissimus Dorsi Length Test

- Patient lies supine with the knees flexed and lumbar spine in neutral
- Internally rotate and flex the arms fully
- Arms should rest parallel to the table without lumbar extension or other compensation



Tight pectoralis minor muscles will create excessive anterior scapular tilt. During shoulder flexion or abduction, the scapula needs to posteriorly tilt for normal range of motion. A tight pectoralis minor should cue the examiner to further test the strength and/or motor control of the serratus anterior muscle.

Cervical segmental joint mobility will determine if the cervical spine is contributing to the patient's symptoms. Reproduction of symptoms, side to side asymmetry, and hypomobility are all important findings.



**Further description of these tests can be found in the cervical examination section.*

Prone Tests and Measures

Middle and lower trapezius strength testing. The middle and lower trapezius are important stabilizers of the scapula. The middle trap assists with scapular retraction. The lower trap functions in end-range scapular upward rotation. These muscles are commonly deficient in individuals with shoulder pain.

- Middle Trapezius**
- Abduct the arm until it is in line with the fibers of the middle traps
 - Stabilize the contralateral scapula
 - Resist distally



- Lower Trapezius**
- Abduct the arm until it is in line with the fibers of the lower traps
 - Stabilize the contralateral side
 - Resist distally



Joint Mobility testing of cervicothoracic junction and thoracic spine will help determine if these regions are affecting shoulder mechanics. When performing segmental assessment with PA mobilizations, the examiner should be analyzing the expected mobility of segment, comparison to segments above and below, and left to right comparison. The examiner will find that the majority of patients are restricted in this region. This region needs to be addressed in patients with shoulder and neck dysfunction.

Prone Segmental PA assessment

- The therapist will place the hypothenar eminence over the spinous process and glide the vertebra anteriorly
- This should provide the therapist with the tissue irritability level as well as give a gross estimate of mobility of the vertebra compared to those around it



Efficient Cervical Examination

The cervical examination should be approached with more caution than other evaluations. The cervical spine is a sensitive region. It is important to assess for vertebral artery dysfunction, upper cervical instability, and other non-musculoskeletal pathology. Similar to the shoulder examination, be sure to assess regional joints and tissues that can impact the cervical spine.

Remember: Several studies have investigated the association between chronic neck pain and biopsychosocial effects. If a patient presents with multiple yellow flags, ensure they are appropriate for physical therapy, and then get them moving gently right away. Therapeutic neuroscience education will be an important component of the treatment sessions.

Key points:

- Always assess for transverse and alar ligament stability
- Do not perform excessive testing on the initial evaluation if symptoms are acute
- Must assess the thoracic spine and scapular strength and mobility



Efficient Cervical Clinical Examination

Safety Tests and Measures

- Craniovertebral scan (VBI, ligament stress testing, Jefferson fracture test)

Sitting Tests and Measures

- Neurological tests (dermatomes, myotomes, reflexes)
- Shoulder static and dynamic postural assessment
- Cervical cardinal plane testing
- Cervical special tests (compression, distraction, Spurling's test)
- First and second rib assessment

Supine Tests and Measures

- Cervical PROM testing
- Supine special testing (deep neck flexor endurance test)
- Segmental mobility testing
- Muscle length testing (pectoralis major and minor)
- Upper limb tension testing (median, radial, ulnar)

Prone Tests and Measures

- Middle and lower trapezius strength testing
- Joint mobility of CT junction and thoracic spine

Safety Tests and Measures

Every safety test and measure is not necessary for each patient with cervical pain. These tests should be performed based on mechanism of injury, subjective history, and gut feeling. However, it is the author's recommendation to perform upper cervical ligamentous testing prior to performing any high velocity, low amplitude manipulation technique to the cervical spine.

Craniovertebral Scan assesses the integrity of the vertebral artery and stability of the upper cervical spine. If there are any red flag signs or symptoms noted during the subjective history, it is prudent to assess these before any other examination measures. If there is no suspicion of VBI or upper cervical instability, test these components in supine. Regardless of trauma, it is important to test upper cervical ligamentous stability prior to performing any high velocity techniques.

Vertebrobasilar Insufficiency Test

5 Ds: Diplopia, dizziness, dysphagia, dysarthria, drop attacks

3 Ns: Nystagmus, nausea, numbness

- Rotate patient's head to 90 degrees
- Patient focuses on therapist's nose and counts backwards from 10 to 0
- Therapist assesses patient's eyes and asks about 5 Ds and 3 Ns



Atlanto-Axial Stability Test (Transverse Ligament)

Always assess the Transverse ligament before the Alar ligament. Transverse ligament insufficiency is much worse.

- Head supported with cranial hand and stabilized in deltopectoral groove
- Caudal hand monitors C2 spinous process as cranial hand translates C1 and head upward
- C2 spinous process should immediately follow (amplitude is very small 3-5 mm)



Alar Ligament Test

- Palpate the spinous process of C2, side bend at OA (axis through the nose)
- The spinous process should deflect opposite the direction of side bend
- Side bend is very small amplitude (5 degrees)



Jefferson Fracture Test (C1 fracture)

- Grasp both C1 transverse processes with a thumb/forefinger "pincer" grip
- Stabilize one transverse process while trying to translate the other medially
- Movement, acute pain, crepitus, or increased neuro signs suggest a positive test

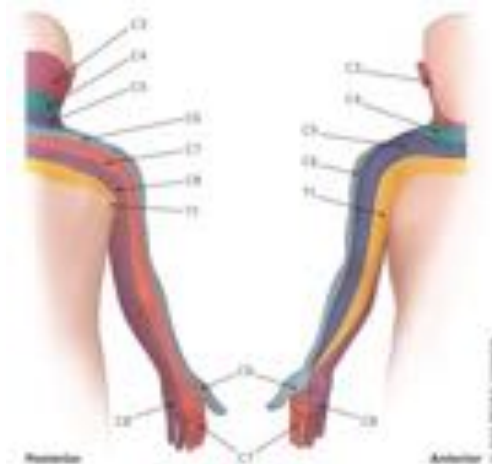


Seated Tests and Measures

Neurological examination is warranted on individuals with signs and symptoms of an upper motor neuron or lower motor neuron lesion, peripheral nerve entrapment, or atypical symptoms not consistent with mechanical neck pain. The examination should consist of dermatomes, myotomes, reflexes, cranial nerve testing, and upper motor neuron special tests. For a quick neurological screening, observe for changes in muscle tone, coordination deficits, muscle wasting, and gait ataxia.

**For the purposes of the efficient examination, the cranial nerve testing has been left out of this text.
This choice does not diminish the importance of assessing cranial nerves when clinically appropriate.*

Dermatomes	Myotomes
C1: Top of head	C3-4: Shoulder elevation and cervical rotation
C2: Side of head	C5: Shoulder abduction and external rotation
C3-4: Lateral neck and top of shoulder	C6: Elbow flexion and wrist extension
C5: Deltoid	C7: Elbow extension and wrist flexion
C6: Lateral forearm and thumb	C8: Thumb and finger extrinsics
C7: Middle and ring fingers	T1: Hand intrinsics
C8: Ring and 5 th fingers	<i>Short cut: Gross myotome check- patient in sitting, holding the examiners hands. Have them actively push away & pull towards.</i>
T1-2: Medial forearm and arm	



Reflex Testing is indicated in patients with signs and symptoms of upper motor neuron or lower motor neuron problems.



The biceps reflex has been shown to be the single best neurological screening to test for cervical radiculopathy. If the biceps reflex is decreased, the chance of having cervical radiculopathy increases from 23% to 59%.^{iv}

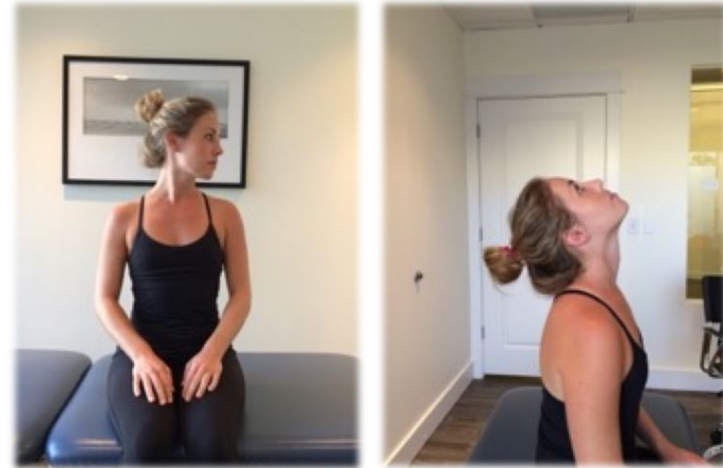
Static and dynamic postural assessment of the shoulder girdle will help determine if the shoulder complex is influencing the patient's cervical pain. Often with mechanical neck pain, altering the position of the scapula can significantly decrease cervical pain and improve range of motion. For example, if the patient has depressed scapula, the upper trapezius will be placed on a chronic stretch, which increases the force on the cervical spine. Correcting the postural position, can immediately decrease symptoms.

**Further description of the shoulder postural assessment can be found in the shoulder examination section.*

Cervical Cardinal Plane testing will help establish a pattern of pain and limitation. The testing will demonstrate a baseline range of motion for improvement.

Considerations for cervical cardinal plane testing

- Willingness to move
- Quality of movement & substitution patterns at surrounding joints
- Onset of pain (when & where)
- Quality of pain
- Reaction of patient to pain (fear, anxiety, etc.)
- Increase or decrease of pain with movement



Shoulder Girdle assistance test (not pictured). After observing the patient's static shoulder posture and assessing cervical cardinal plane motions, perform the shoulder girdle assistance test. First, stand behind the patient and provide an upward assistance to the shoulder girdle by lifting through the elbows. Next, reassess cervical active range of motion and symptom response. If unloading the shoulder complex minimizes cervical pain and/or improves range of motion, it is considered a positive assistance test.

Cervical special testing in sitting is not always necessary unless the patient has complaints of neck pain with radiating pain. The tests include the compression test, distraction test, and Spurling's test to assess symptom reproduction and tissue irritability.

Compression Test

- Gradually load cervical spine with pressure through top of skull in neutral, flexion, and extension
- Test is positive if it recreates the patient's symptoms



Distraction Test

- Gradually unload cervical spine by lifting up under occipital condyles
- Test in neutral, flexion, and extension
- Test is positive if it reduces the patient's neurological symptoms



Spurling's Test

- Place the patient's head in side bending towards the side being tested
- Provide an inferior directed compression (not side bending)
- Test is positive if it recreates the patient's peripheral symptoms



First and second rib mobility assessment. The ribs have an important function in cervical mobility and stability. Elevation of the first or second rib can be a significant source of cervical pain. Rib assessment should be graded similar to other joint mobility as hypomobile, hypermobile, or normal mobility. When assessing the ribs, look for side to side symmetry and pain response.

**Further description of the 1st and 2nd rib mobility assessment can be found in the shoulder examination section.*

Supine Tests and Measures

Cervical Passive Range of Motion attempts to eliminate muscular effort and focus on testing of inert structures. The assessment is best performed in supine to minimize guarding and allow the patient to fully relax. Note: contractile structures may be tensioned at end ranges due to stretching of muscles/tendons.



The deep neck flexor endurance test assesses the strength of the deep anterior neck muscles. Normative values for test duration do exist, but for the quick examination, simply assess if the patient can hold the chin tucked test position for >5 seconds without activating the sternocleidomastoid or scalene muscles. Additional compensations include increased effort and/or extension of the upper cervical spine. Cluster the endurance test findings with the patient's posture, segmental mobility assessment, and ability to stabilize the cervical spine during shoulder AROM testing.

Deep Neck Flexor Endurance

- The test is performed with the subject in hook lying on a plinth
- The subject's head is positioned in slight upper neck flexion by the examiner who places their hand on the table just below the subject's occiput
- The subject is asked to gently flex upper neck and lift head off the examiner's hand while retaining the upper neck flexion (chin tuck)
- Verbal feedback ("tuck your chin in" or "hold your head up") is given to the subject when their head touches the examiner's hand during the test
- The test is terminated if the subject is unable to maintain the position of head off the examiner's hand





Segmental mobility assessment of the cervical spine will assist the practitioner in determining which segment(s) of the cervical spine may be contributing to the patient's symptoms. Segmental assessment of the upper cervical spine (C0-2) is performed differently than the lower cervical spine (C3-7).

C0-C1 Segmental Assessment

- Flexion/extension axis is through the patient's ears
- Palpate TPs and mastoid process to appreciate asymmetries
- Small amplitude 'OA nod'



C1-C2 Segmental Assessment	<ul style="list-style-type: none"> -Fully sidebend to stabilize lower segments -Without losing the side bend, rotate the head in the opposite direction -50 degrees of rotation is normal 	
C3-C7 Segmental Assessment	<ul style="list-style-type: none"> - Provide a 'sideglide' through the segment -Fairly large amplitude -Recheck in flexion and extension to determine direction of restriction 	

Muscle length testing of the Pectoralis Major and Minor. As discussed in the shoulder examination, shortness of the pectoralis muscles can limit scapular mobility and cause scapular dyskinesias. It is important to examine the scapulohumeral musculature to determine its impact on the cervical spine.

Clinically, it is more beneficial to strengthen the lengthened structures versus stretching the shortened structures. For example, when a patient has tightness of the pectoralis minor, it is more beneficial to strengthen the antagonists, the serratus anterior and lower trapezius, than stretching the agonist, pectoralis minor.

Pec Minor Length Test

- Patient in supine with arms by the side
- Measure the distance between the posterior aspect of the acromion and the table
- Normal distance should be 3 finger widths



Pec Major Length Test (Lower fibers)

- Patient in supine
- Examiner guides both arms into a flexed/abducted position in line with the fibers of the lower pecs
- Arms should be able to rest parallel to the table



Upper limb tension testing (ULTT) is an important component of the cervical examination if the patient presents with any radiating symptoms. If the examiner is suspecting cervical radiculopathy or a peripheral nerve entrapment, be sure to test the appropriate upper limb tension test.

**Further explanation of the ULTT can be found in the supine shoulder examination section.*

Prone Tests and Measures

Scapular strength testing of the middle and lower trapezius. The middle and lower trapezius are important force couples for the upper trapezius and serratus anterior. While the middle and lower trapezius fibers are often weak, the levator scapulae and rhomboids are typically strong and dominant. Since it attaches onto the cervical spine, a dominant levator can cause significant shoulder or cervical dysfunction.

**Further information on the middle and lower trapezius strength test can be found in the prone shoulder examination section.*

Joint Mobility of cervicothoracic junction and thoracic spine. Adequate spinal mobility of the CT junction and thoracic spine is essential for proper neck mechanics. Stiffness in the CT junction will often create hinge points in the lower cervical spine. Clinically, treating the CT junction and thoracic spine can significantly decrease pain and improve range of motion in the cervical spine.

**Further demonstration for joint mobility of the CT junction and thoracic spine can be found in the prone shoulder examination section.*

*For the efficient examination, it is not necessary to include cervical PA joint mobility assessment as these segmental mobility restrictions should be observed in the supine segmental assessment. If time permits, perform cervical PA assessment directly before the CT junction and thoracic spine PA joint mobility assessment.

Efficient Knee Clinical Examination

Key points:

- Must assess the lumbar spine, hips, and ankles
- Acute knee pain can significantly alter special test results
- Use mechanism of injury, acuity of symptoms, and location of pain to assist with guiding examination and diagnosis

Remember: The knee is a modified hinge joint. Assessing local joints including the foot and ankle, hip, and lumbar spine is especially important during the knee examination. When a patient has regional impairments, forces are unequally distributed across the tibiofemoral joint predisposing the knee to repetitive micro-traumas or increased risk of macro-trauma.



Efficient Knee Clinical Examination

Standing Tests and Measures

- Standing posture
- Gait
- Squat/overhead squat/single leg step down
- Single leg balance
- Lumbar spine cardinal plane testing

Supine Tests and Measures

- Lower extremity resting posture
- Observation/palpation
- Hip and ankle A/PROM
- Knee A/PROM with overpressure
- Special tests
- Joint mobility
- Neural tension testing (if warranted)

Standing Tests and Measures

Standing posture evaluates weight bearing status, lower extremity positioning, and any swelling or deformity present. Postural assessment should include acknowledgement of genu varum or genu valgum deformity, genu recurvatum, resting position of the foot and ankle, and lumbar spine position.

Changing the position of the lumbar spine and pelvis will immediately alter the position of the knees. For example, when the lumbar spine is extended, the knees can more readily move into hyperextension. If the pelvis is slightly posteriorly rotated, the knees will 'unlock' and rest in a small amount of knee flexion.

Gait assessment should be systematic and reproducible on every patient. Numerous considerations should be taken while watching someone walk.

Gait assessment considerations

- Weight bearing equally through both legs
- Equal and adequate hip extension bilaterally
- Trunk control during single limb loading
- Lacking ankle, knee, hip motion
- Trendelenburg or compensated Trendelenburg
- Knee valgus during single limb stance
- Excessive pronation or supination
- Normal heel to toe progression
- Good toe off at terminal stance



Squat/overhead squat evaluates the patient's general willingness to move, coordination, and ability to conduct a basic functional movement. The squat can be used as a quick myotome screening and a gross screening of the lower extremity joints. When assessing the knee, it is important to watch for dynamic genu valgus, excessive tibial external rotation, and a proper hip hinge technique.

Squat considerations

- Starting foot position
- Depth
- Knees in line with the toes
- Dynamic knee valgus
- Weight shift during descent
- Hip hinge
- Quality of motion on ascent
- Mobility vs. stability



Single leg step down is a great assessment for higher level patients. In particular, it assesses lower extremity strength, lumbopelvic disassociation, and single leg balance. This specific test is very beneficial for patients with anterior knee pain as it directly assesses function of the quadriceps muscle.

**Further information on the single limb squat can be found in the lumbar examination section.*

Single leg balance provides a general assessment of weight acceptance, coordination, single limb strength, and spatial awareness.

Single limb balance considerations

- Excessive pronation or supination
- Trendelenburg or compensated Trendelenburg
- Extension of the lumbar spine
- Dynamic knee valgus/ femoral adduction
- Shoulders level



Lumbar spine cardinal plane testing will help establish a pattern of pain and limitation. Many individuals with knee dysfunction will exhibit decreased loading through the ipsilateral lumbar spine. Additionally, cardinal plane testing will reveal any regions of stiffness or excessive mobility through the thoracolumbar region.

**Further demonstration of the lumbar cardinal plane testing is located in the lumbar standing examination section.*

Lumbar cardinal plane testing considerations

- Symmetry of movement
- Quality of movement
- Deviations
- Pain (onset, distribution, painful arc)
- Paresthesia
- Sex, age, and body type

Improper loading through the lumbar spine is often missed by the novice clinician. When performing lumbar cardinal plane testing, be sure to monitor quality of movement as well as quantity of movement.

Supine Tests and Measures

Lower extremity resting posture in supine will give the examiner a baseline assessment of muscle guarding, knee extension mobility, and hip position. Additionally, the examiner should observe for swelling and a loss of patellar grooves.

Excessive tibial external rotation and/or poor tibial internal rotation is a common impairment observed clinically. If the lower extremity resting posture indicates excessive tibial external rotation, further assessment of the proximal tibiofibular joint may be warranted.

Palpation of the knee should include assessment of joint line tenderness, patellar tenderness, and tenderness over the fibular head. Joint line tenderness may indicate meniscal or ligamentous pathology. Isolated bony tenderness at the patella or fibular head may be indicative of a fracture.

Ottawa Knee Rules for Fracture Screening

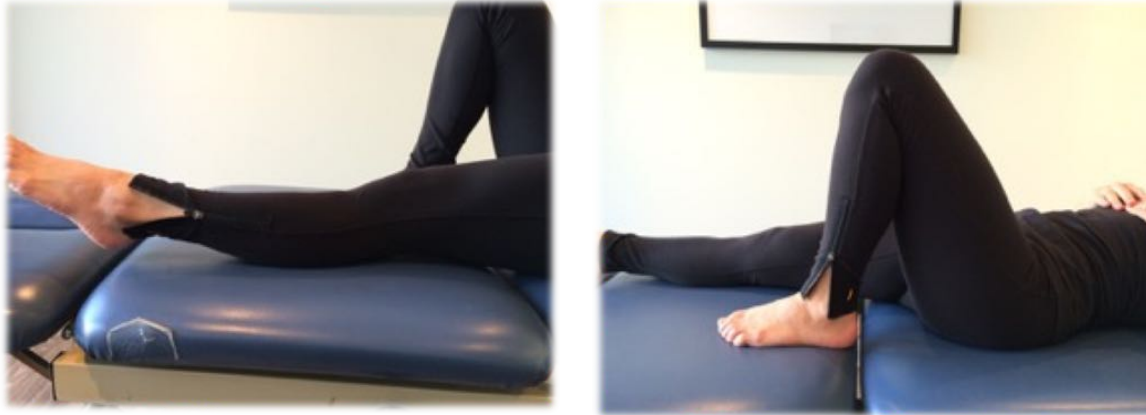
- Age 55 or older
- Isolated tenderness over the patella
- Tenderness over the fibular head
- Knee flexion less than 90 degrees
- Inability to bear weight both immediately and in the emergency department for 4 steps^v

An X-ray is required in patients with an acute knee injury and 1/5 positive criteria

Gross lower extremity screening includes hip and ankle active and passive range of motion as well as joint mobility. In the presence of tibiofemoral joint dysfunction, the examiner must assess the joints above and below for mobility. Commonly seen impairments in the outpatient orthopedic clinic include decreased ankle dorsiflexion motion, decreased gastrocnemius strength, limited hip internal and external rotation motion, and decreased hip extension strength.

To quickly assess active and passive range of motion, the examiner has the patient actively move into the position, then provide passive overpressure at end-range. Assess for pain and side to side asymmetries. The screening should inform the examiner if the joint being tested is contributing to the patient's current symptoms.

Knee active/passive range of motion with overpressure. After assessing the ankle and hip, evaluate knee range of motion. Active range of motion demonstrates the patient's general willingness to move. Passive range of motion assesses tissue irritability as well as the quality of end-feel. Pain with flexion and extension overpressure directly stresses the menisci and can help guide the examiner to further assess this tissue as the source of symptoms. From this position, the option exists to incorporate tibial IR/ER motion to specifically stress different portions of the menisci and ligaments.



Normal full knee extension is noted by the heel rising from the table. In this picture, the individual has nearly five degrees of knee hyperextension

Ligamentous testing at the knee assesses the integrity of the ACL, PCL, MCL, and LCL. These four ligaments provide passive stability to the tibiofemoral joint. A loss of ligamentous integrity will lead to a sense of instability, swelling, decreased strength, and limited range of motion at the knee. Special testing should include Lachman's Test, Posterior Drawer test, and Valgus/Varus stress testing.

Lachman's Test

- Patient is supine with the knee flexed to 15 degrees
- Examiner stabilizes the distal femur with one hand and grasps behind the proximal tibia with the other hand
- Examiner applies anterior force to the proximal tibia
- A positive test is sensitive for a torn ACL and indicated by greater displacement on the affected side when compared to the unaffected

Posterior Drawer Test

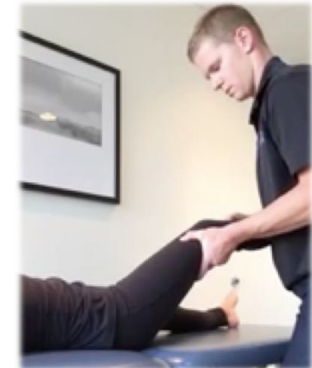
- Position the knee in 90 degrees of flexion
- Provide posterior translation to the tibia
- Assess for increased motion and quality of end-feel

*Option: Repeat the test in tibial external rotation.
Increased laxity in the externally rotated position could implicate the posterolateral corner*



Valgus Stress Test

- Stress test the knee at 30 degrees to isolate the MCL
- Palpate medial joint line
- Provide valgus stress
- If >10 mm opening is noted at 30 degrees, the ACL is likely involved too
- Valgus stress can be done in full extension to test the MCL and other secondary restraints to valgus



Varus Stress Test

- Stress test the knee at 25-30 degrees to isolate the LCL
- Palpate lateral joint line
- Provide varus stress
- Varus stress can be done in full extension. If gapping is found in extension, suggest multiple ligament disruption



Joint mobility assessment at the knee examines the joint end-feel, tissue irritability, and pain response to over-pressure. It is important to assess the tibiofemoral, tibiofibular, and patellofemoral joints for mobility. Mobility is graded as hypomobile, normal, or hypermobile.



Neural tension testing (if warranted) includes assessing the sciatic and saphenous nerves. First, patients who report atypical posterior leg symptoms may be experiencing sciatic nerve entrapment. Sciatic nerve entrapment near the knee often presents as proximal calf pain with occasional pain referral up or down the limb. Patients who report medial joint line pain may be experiencing irritation of the infrapatellar branches of the saphenous nerve. Saphenous nerve irritation is common post arthroscopic knee surgery. It is often described as a burning, poorly localized pain around the medial knee.

The Treatment Paradigm

Structuring a physical therapy treatment session in a systematic, reproducible manner can maximize a patient's performance and improve long term outcomes. This book is not intended to discuss treatment strategies but to ensure that the practitioner efficiently and consistently arrives at the proper physical therapy diagnosis. After diagnosing the movement impairments, the therapist then can determine which interventions are appropriate.

To better understand the paradigm, read the two treatment questions below:

Question 1: Should you prioritize therapeutic exercise or manual therapy first in your treatment session?

Answer: Manual therapy.

If you are currently squeezing manual therapy into the end of a treatment session, STOP! The manual therapy needs to be performed early in the treatment so that changes in mobility or tissue extensibility can be sustained with motor control exercises afterward.

Question 2: After your manual techniques do you choose to perform motor control exercises, power based movements, or strength training?

Answer: Motor control exercises.

After a manual therapy technique has corrected a mobility deficit, the therapist needs to sustain those changes with motor control and movement retraining exercises. Once the motor control is achieved, then the patient can progress to power and strength based training.

Manual Therapy Rule

Manual therapy needs to be performed early in the treatment session. Therefore, changes in mobility or soft tissue extensibility can be sustained with motor control and corrective exercises during the session.

Treatment Paradigm

- 1) Exam, Eval, Dx, POC, Intervention
 - o Re-assessment of asterisks sign &/or function movements
 - o Done within and between treatments
- 2) Manual therapy
 - o Immediately re-assess asterisks sign &/or functional movements
- 3) Motor control exercises
 - o Correcting movements patterns
- 4) Outcome Assessment
 - o Re-assess asterisks sign &/or functional movements
- 5) Functional warm-up
 - o Jog, burpees, bear crawls, walking lunges, etc.
 - “Activation” exercises that prime the nervous system & increase core temperature
- 6) Speed, agility, power
- 7) Strength
- 8) Metabolic conditioning
 - o High intensity training relative to patient tolerance
- 9) Motor control
 - o Challenging the kinetic chain in fatigued state
 - o Must be intentional/purposeful
 - o May include speed, agility, power for the athlete returning to sport
- 10) Cool down
 - o Easy aerobic movements followed by static stretching
 - o Often skipped, but useful in reducing soreness & maintaining mobility
- 11) Outcome Assessment
 - o Re-assess asterisks sign &/or functional movements

*Some patients may not be appropriate for certain aspects of the paradigm. For example, a patient with high pain levels will likely not tolerate agility and power based movement. In these cases, simply move onto the next step in the paradigm.

Efficient Examination Printable Templates

Efficient Lumbar Spine Clinical Examination

Seated Tests and Measures

- Seated posture
- Neurological examination (SLUMP test, dermatomes, myotomes, reflex testing)

Standing Tests and Measures

- Gait
- Heel walk and toe walk
- Squat
- Single leg squat
- Single leg balance
- Cardinal plane testing
- Functional stability tests

Supine Tests and Measures

- Gross lower extremity AROM and PROM screening
- Active straight leg assessment (neural tension, disc involvement, hamstring length, lumbar stability)
- Supine stability tests (bent knee fall out, bent knee marches, heel slides)
- Palpation
- Sacroiliac joint tests (distraction, thigh thrust)

Sidelying Tests and Measures

- Strength testing (gluteus medius)
- Sacroiliac joint tests (compression)

Prone Tests and Measures

- Thoracic and lumbar PA mobility assessment
- Strength testing (gluteus maximus)
- Prone stability tests (prone instability test, prone knee bend, sacral rocking)
- Palpation (iliac crests, PSIS, sacral ILA, ischial tuberosities)

Efficient Shoulder Clinical Examination

Sitting Tests and Measures

- Static postural assessment of the GHJ and scapula
- Gross cervical, elbow, and wrist AROM screening
- Shoulder AROM assessment
- Shoulder strength testing
- Serratus anterior strength testing
- Special tests (Hawkins-Kennedy, Neers, Drop Arm, IRRT/ERRT, IR lag)
- 1st and 2nd rib assessment
- Movement analysis (stand behind the patient and assess scapular movement).

Supine Tests and Measures

- Shoulder IR/ER AROM
- Upper limb tension testing per location of pain (median, ulnar, radial)
- Special testing (apprehension test, relocation test)
- Muscle length test (pec minor and latissimus dorsi)
- Cervical segmental joint mobility

Prone Tests and Measures

- Middle and lower trapezius strength testing
- Joint mobility of CT junction and thoracic spine

Efficient Cervical Clinical Examination

Safety Tests and Measures

-Craniovertebral scan (VBI, ligament stress testing, Jefferson fracture test)

Sitting Tests and Measures

- Neurological tests (dermatomes, myotomes, reflexes)
- Shoulder static and dynamic postural assessment
- Cervical cardinal plane testing
- Cervical special tests (compression, distraction, Spurling's test)
- First and second rib assessment

Supine Tests and Measures

- Cervical PROM testing
- Supine special testing (deep neck flexor endurance test)
- Segmental mobility testing
- Muscle length testing (pectoralis major and minor)
- Upper limb tension testing (median, radial, ulnar)

Prone Tests and Measures

- Middle and lower trapezius strength testing
- Joint mobility of CT junction and thoracic spine

Efficient Knee Clinical Examination

Standing Tests and Measures

- Standing posture
- Gait
- Squat/overhead squat/single leg step down
- Single leg balance
- Lumbar spine cardinal plane testing

Supine Tests and Measures

- Lower extremity resting posture
- Observation/palpation
- Hip and ankle A/PROM
- Knee A/PROM with overpressure
- Special tests
- Joint mobility
- Neural tension testing (if warranted)

References

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