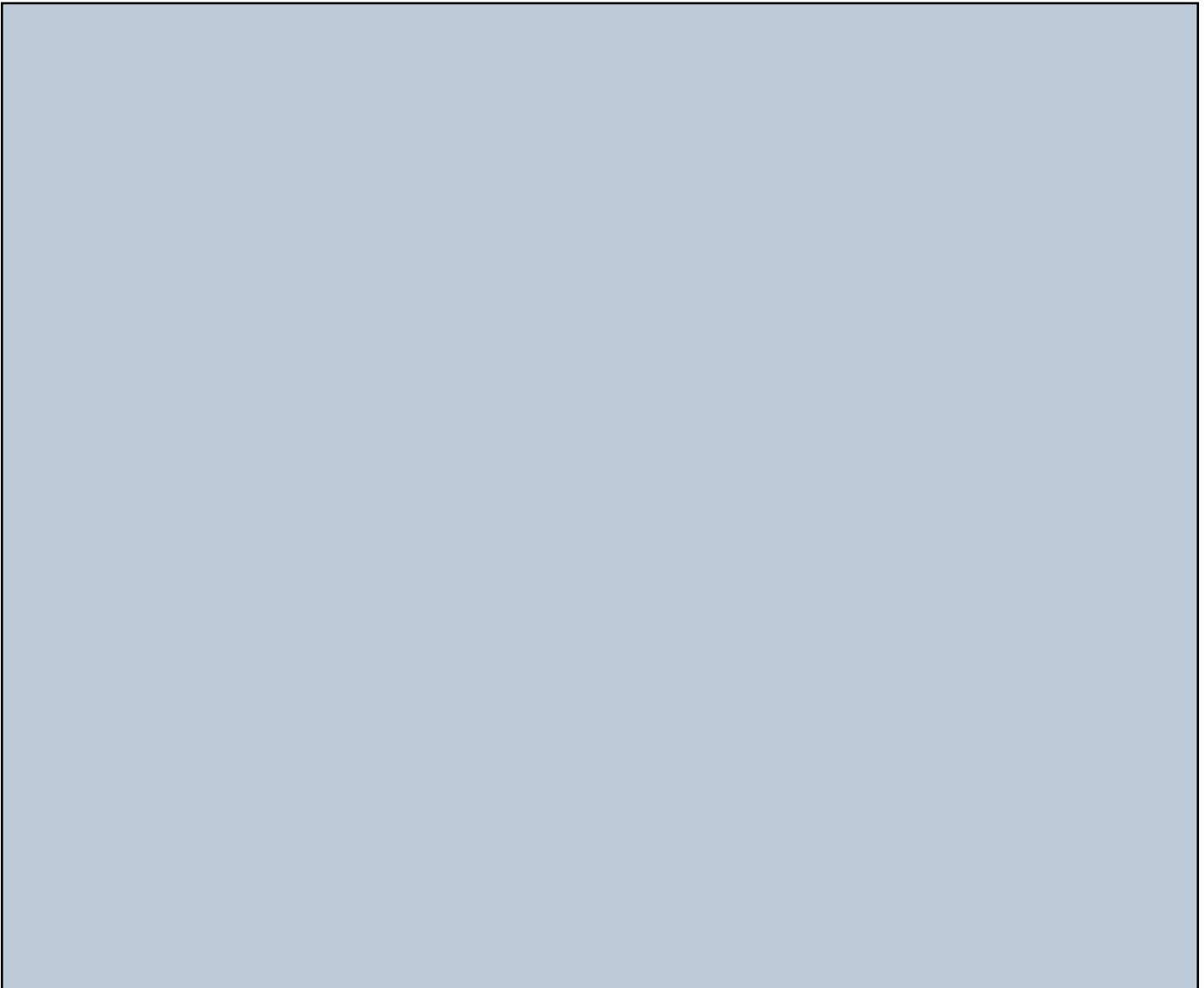




**Upper and Lower Quarter Screening:  
Assessment Tools for  
Maximizing the Benefits of Your Treatment Plan  
by Lisa M. Satalino, PT**



## **Upper and Lower Quarter Screening: Assessment Tools for Maximizing the Benefits of Your Treatment Plan**

Upper and Lower Quarter Screening – What are they and why do we do them? Pages 1-2

Patient Data Collection for Upper/Lower Quarter Screening: Pages 3-4

Pain Index Survey: Pages 5-7

Shoulder Evaluation: Pages 8-10

Elbow, Wrist, and Hand Evaluation: Pages 11-14

Hip Evaluation: Pages 15-17

Knee Evaluation: Page 18

Ankle/Foot Evaluation: Pages 19-21

Quick Reference Guide: Page 22

Dermatome Chart: Page 23

End Feel Chart: Page 24

Sample Body Chart: Page 25

Bibliography and Recommended Reading List: Page 26

Muscle Charts by Joint – At End of Manual

## Upper and Lower Quarter Screening

**Upper and Lower Quarter Screening:** What are they and why do we do them?

A screening exam is a quick overview of several body regions and/or systems which are meant to provide the therapist with enough evidence to direct attention to a specific region or system for a more thorough evaluation. It provides the therapist with a road map to a final destination.

In general if a screening exam is negative it should be repeated to ensure nothing was originally missed. If no abnormalities are found after a repeat of the screening and the client's symptoms persist or worsen the therapist should refer the client to their physician for additional medical testing and diagnosis.

An **Upper Quarter Screen** consists of a series of mobility and neurological tests to identify problem areas in the cervical spine, shoulder, elbow, wrist, and hand.

A **Lower Quarter Screen** consists of a series of mobility and neurological tests to identify problem areas in the lumbar spines, sacroiliac region, hip, knee, ankle, and foot.

**Below are charts summarizing the Upper and Lower Quarter Screening Tests:**

Upper Quarter Screen	
Postural Assessment – Standing- Observation and Palpation	
Active ROM Cervical Spine - Sitting	
Passive over pressure if symptom free	
Resisted muscle tests for cervical spine: Cervical Rotation	C-1
Resisted Shoulder Elevation	C-2,3,4
Resisted Shoulder Abduction	C-5
Active Shoulder, Elbow, Wrist ROM	
Resisted Elbow Flexion	C-6
Resisted Elbow Extension	C-7
Resisted Thumb Extension	C-8
Resisted Finger Abduction	T-1
Babinski's Reflex Test	UMN

### Lower Quarter Screening

Postural Assessment - Standing Active Forward, Backward, and Lateral Bending of Lumbar Spine – Standing	
Squat Test to clear all LE joints in weight bearing	
Toe Raises	S-1
Heel Walking	L-4,5
Active Rotation of Spine - Sitting Over-Pressure if symptom-free	
Straight Leg Raise – Supine – Add Cervical flexion For Dural Tube test	L-4,5,S-1
Sacroiliac Spring Test - Supine	
Resisted Hip Flexion - Supine	L-1,2
Passive Range of Motion Hip Movements - Supine	
Resisted Knee Extension - Sitting	L 3-4
Active Knee Rom - Sitting	
Femoral Nerve Stretch - Prone	
Babinski's Reflex Test	UMN

**Prior to either the Upper or Lower Quarter Screen** being completed a thorough intake and interview should be conducted with the client.

On pages 3 through 7 you will find forms for Upper and Lower Quarter Data Collection and a Pain Index Interview.

The Upper and Lower Quarter Data Collection Form may be used during your Initial Evaluation while the Pain Index Form can be issued to the client and returned on the next scheduled visit or prior to the Initial Evaluation.

**Following the Upper or Lower Quarter Screening** process, evaluations to the particular region of the body affected should be completed.

You will find the following Guidelines to assist you in additional evaluation:

Shoulder Evaluation – pages 8-10

Elbow, Wrist, and Hand Evaluation – pages 11-14.

Hip Evaluation

Knee Evaluation

Ankle/Foot Evaluation

## Patient Data Collection for Upper and Lower Quarter Screening

**Date:**

**Name:**

**DOB:**

**Diagnosis:**

**PMH:**

**PSH:**

**Subjective:**

Primary Complaint:

Nature: Sharp, dull, tingling, constant intermittent, etc.?

Location: Where is it?

Onset: When did it start? Can you relate it to any trauma, injury, etc.?

Course and Duration: How long does it last and have the symptoms changed over time? Is it acute or chronic?

Behavior: What increases or decreases pain? Is pain positional or situational? Does it get better or worse as day progresses, etc.?

Effect of Previous Treatments:

**Objective:**

Structural Assessment: Postural evaluation in sitting, standing, prone, and supine.

Mobility: ROM of structures involved.

Neurological: Myotomes and Dermatomes

Palpation: Soft tissue and fascial mobility

Special Tests: Done per joint

Additional tests available: Reports from physician, x-rays, etc.

**Assessment:**

Short Term Goals:

Long Term Goals:

Client Goal:

**Plan:**

Treatment plan and sequence

## Pain Index Survey

Name:

Date of Birth:

Diagnosis:

Dominant Side:

Date:

1. Please describe the location of your pain and rate the pain from 1-10 with 10 being the most severe pain and 1 being minimal pain.

2. How long have you been experiencing this pain?

3. Name 4 activities in the order of significance/importance which presently create difficulty and/or pain. Describe the difficulty you are having with each activity.

4. Please describe the effect each of the following has on your pain/function:

a. Prolonged positioning/activity:

b. Specific positions (i.e. standing, sitting, lying down) that increase or decrease your pain.

c. Direct Pressure:

d. Weight bearing (i.e. Upright activities versus resting.):

5. Are you on any medications? How do they effect your symptoms?





## Shoulder Evaluation

1. Upper Quarter Screening
2. Observation and Inspection Specific to Shoulder
  - Posture
  - Functional Movement
  - Symmetry
  - Signs of Trauma
  - Deformities or Dislocations
  - Scapular Position (winged?)
3. Active ROM
  - Adduction (45 degrees)
  - Abduction – Distinguish scapular and humeral articulation (0-180 degrees)
  - Extension (0-45 degrees)
  - Internal Rotation (0-55 degrees)
  - External Rotation (0-45 degrees)
  - ? Painful Arc during Abduction or Flexion
  - Apley's Scratch Test (Most people with a frozen shoulder can't do this.  
Adduction/IR – Touch hand to opposite shoulder anterior surface  
Abduction/ER – Touch hand to opposite shoulder posterior surface
  - Note Acromioclavicular and Sternoclavicular articulations.
4. Passive ROM
  - Same as above but note pain and end feels.
5. Resisted ROM
  - Flexion: Anterior Deltoid  
Coracobrachialis  
Pectoralis Major  
Biceps
  - Extension: Latissimus Dorsi  
Teres Major  
Posterior Deltoid  
Teres Minor  
Triceps (long head)
  - Abduction: Middle Deltoid  
Supraspinatus  
Serratus Anterior
  - External Rotation: Infraspinatus  
Teres Minor

### Posterior Deltoid

- Internal Rotation: Subscapularis  
Pectoralis Major  
Latissimus Dorsi  
Teres major
- Scapular Elevation: Trapezius  
Levator Scapulae  
Rhomboid major/minor
- Scapular Protraction: Serratus Anterior
- Scapular Retraction: Rhomboid Major/minor  
Trapezius
- Note Pain: If pain with contraction this is contractile tissue pain vs. pain from inert tissue.
- Note weakness: Is this from disuse or neurological involvement?

### 6. Neurological Evaluation:

- Sensation: Tactile or with hot/cold:  
Check Dermatome charts.  
Axillary nerve is most often involved. This would result in sensation change over the deltoid (C-5.)  
If loss of sensation in axillary fold (C4.)  
If loss of sensation over nipple area (T4.)
- Reflex Testing: Biceps – C6  
Triceps – C7
- Proprioception - Place one upper extremity and a position and note clients reproduction of this position with opposite side – eyes closed.

### 7. Palpation: Swelling

Tender Spots  
Bursae  
Brachial Pulse – elbow  
Joint Capsule  
Fascial Integrity  
Muscle Spasm/Trigger Points

### 8. Special Tests:

- Yergason Test: Tests stability of biceps tendon in bicipital groove.  
Place shoulder in neutral and elbow at 90 degrees flexion against body. Apply traction and ER to humerus.  
Tendon will pop out of bicipital groove if T-ligament isn't stable.
- Drop Arm Test: Indicates tear of rotator cuff muscles. (Differentiate via resisted muscle testing.)  
Place UE at 90 degrees of shoulder abduction. Tap UE. If complete rupture arm will drop. If incomplete tear there will be weakness.

- Apprehension Test: ? recurrent shoulder dislocation.  
In supine. Shoulder in abduction. Place hand over anterior humeral head. ER humerus. If previous dislocation patient will be apprehensive with ER.
- Tests for Thoracic Outlet Syndrome. (Subclavian artery and Brachial Plexus compression.)  
Adson's (Tests Sclaneus-anticus and cervical rib syndromes): Patient takes a breath and holds it while extending and rotating head to toward side tested. Examiner assesses radial pulse on side tested. This is positive if pulse diminishes or symptoms are reproduced.  
Wright's Test (Tests Costoclavicular Syndrome): patient takes a deep breath and holds while retracting and depressing shoulders. Examiner assesses radial pulse on tested side. This is positive if pulse diminishes or symptoms are reproduced.  
Hyperabduction Syndrome (Entrapment under pec minor /coracoid process): Therapist brings UE into Hyper horizontal abduction with ER while palpating radial pulse. This is positive if pulse diminishes or symptoms are reproduced.

## Elbow, Wrist, and Hand Evaluation:

1. Upper Quarter Screening.
2. Observation and Inspection:
  - Observe functional use of forearm.
  - Observe obvious deformities.
    - a. Carrying angle of elbow. -5 degrees in males. 10-15 degrees in females.
    - b. Cubitus valgus – greater than normal carrying angle.  
Cubitus varus – less than normal carrying angle.
    - c. “Dinner fork” deformity – Colles fracture malunion. (radius sticks up anterior.)
    - d. Ganglia – cysts.
    - e. Heberden nodes (due to OA – bony nodules.)
    - f. Observe nails:
      - Color – whitish pale could indicate anemia or circulation problems.
      - Contour – Spoon nails (concave) could indicate fungal infection. Clubbed nails (domed) could indicate respiratory or congenital heart problems.
  - Contour of palmar surface of hands:
    - Transverse arches
    - Asymmetry
    - Muscular Atrophy
    - Intrinsic muscles
3. Active ROM
  - Elbow
    - Flexion
    - Extension
    - Supination
    - Pronation
  - Wrist
    - Flexion
    - Extension
    - Ulnar Deviation
    - Radial Deviation
    - Supination
    - Pronation
  - Hand
    - MCPJ Flexion and Extension
    - IPJ Flexion and Extension
    - Finger Abduction and Adduction
    - Thumb Adduction, Abduction, Opposition
4. Passive ROM
  - Same as above but note pain and end feels.

## 5. Resisted ROM

- **Elbow Flexors**  
Briachialis – C5, C6  
Biceps – C5, C6  
Brachioradialis – C6, T1  
Supinator
- Extensors:  
Triceps – C7  
Anconeus
- Supinators:  
Biceps – C5, C6  
Supinator – C6  
Brachioradialis – C6, T1
- Pronators:  
Pronator Teres – C6  
Pronator Quad – C8, T1
- **Wrist Flexors/Pronators:**  
Pronator Teres – C6  
Flexor Carpi Radialis – C7  
Palmaris Longus –  
Flexor Carpi Ulnaris – C8, T1  
Brachioradialis – C6, T1
- Extensors:  
Extensor Carpi Radialis Longus – C8, T1  
Extensor Carpi Radialis Brevis – C6, C7  
Extensor Carpi Ulnaris – C7
- **Hand Flexors:**  
Distal IPJ – Flexor Digitorum Profundis  
Proximal IPJ – Flexor Digitorum Superficialis – C7, C8, T1  
MCP – Lumbricals – C7, C8  
Extensors:  
Extensor Digitorum Communis – C7  
Extensor Indicis – C7  
Extensor Digitorum Mini – C7  
Abduction:  
Dorsal Interrosi – C8, T1  
Abductor Digit Mini – C8, T1  
Adduction:  
Palmar Interrosi – C7, C8, Ulnar nerve

- **Thumb:**
    - MCP Flexion
    - Flexor Pollicus Brevis – medial – C8, Ulnar nerve. Lateral – C6, C7, Median Nerve
    - IPJ Flexion
    - Pollicus Longus – C8, T1
    - MCP Extension
    - Pollicus Brevis – C7
    - IPJ Extension
    - Pollicus Longus – C7
    - Abduction
    - Pollicus Longus – C7
    - Pollicus Brevis – C6, C7
    - Adduction
    - Adductor Pollicus – C8, Ulnar Nerve
6. Neurological Evaluation:
- Sensation: Tactile or with hot/cold.  
Check Dermatome Charts.
  - Reflex Testing: Biceps- C6  
Triceps – C7  
Brachioradialis – C6
  - Proprioception – reproduction of arm positioning with eyes closed.
  - Stereognosis – rapid supination/pronation
7. Palpation: Swelling
- Tender Spots
  - Temperature
  - Pulse – Brachial (Elbow,) Radial and Ulnar (Wrist.)
  - Joint Capsule
  - Fascial Integrity
  - Muscle Spasm/Trigger Points
8. Special Tests:
- Elbow:
    - Valgus/Varus Torsional Tress – to test ligament stability.
    - Tinel Sign – Ulnar groove – tap for Ulnar nerve sensitivity.
    - Tennis Elbow Test – Flex elbow to 90 degrees with forearm pronated. Resist wrist extension. Positive if reproduction of pain at common extensor origin.
    - Golfer’s Elbow: Flex elbow to 90 degrees with forearm in supination. Resist wrist flexion. Positive if reproduction of pain at common flexor origin.
  - Wrist/Hand:
    - Tinel Sign - ? Carpal Tunnel Syndrome – Tap over volar carpal ligaments. If Median nerve is sensitive this will be painful.

Phalens Test – ? Carpal Tunnel Syndrome – Patient places dorsum of hands together with fingers pointing down. Push hands together. This will irritate the Median nerve if positive.

Allen Test – Patency of digital arteries. – Patient “pumps” hand. Therapist gently constricts radial and Ulnar pulses. Patient opens hand and therapist releases arteries. Hand should turn pink.

Finkelstien Test – patient tucks thumb into fist and squeezes. If there is stenosis of the abductor Pollicus Longus/extensor Pollicus Brevis due to tenosynovitis this will be positive.



## Hip Evaluation:

1. Lower Quarter Screening
2. Questions Specific to Hip Pain
  - Can patient sleep on involved side?
  - Does the pain occur at any particular point in the gait cycle?
  - What is the pain like with activities such as sustained flexion?
  - Recent weight gain/loss?
3. Observation and Inspection Specific to Hip
  - Gait analysis – Trendelenburg gait?
  - Static postural exam
  - Femoral Torsion
  - Tibial Torsion
  - Symmetry
  - Signs of Trauma
  - Signs of Deformity
  - Unequal weight bearing
4. Active ROM
  - Hip Flexion (0-115 degrees)
  - Hip Extension (0-30 degrees)
  - Hip Abduction (0-50 degrees)
  - Hip Adduction (0-30 degrees)
  - Hip Internal Rotation (0-45 degrees)
  - Hip External Rotation (0-45 degrees)
5. Passive ROM
  - Same as above but note pain and end feels.
6. Resisted ROM
  - Flexion: Psoas major  
Iliacus  
Sartorius  
Rectus Femoris  
Pectineus
  - Extension: Gluteus Maximus  
Semitendinosus  
Semimembranosus  
Biceps Femoris (long head)
  - Abduction: Gluteus Medius  
Tensor Fasciae Latae  
Gluteus Minimus

- Adduction: Gracilis  
Adductor Brevis  
Adductor Magnus  
Adductor Longus
  - Internal Rotation: (Secondary Function)  
Semitendinosus  
Semimembranosus  
Adductor Magnus (posterior portion)  
Gracilis  
Gluteus Minimus  
Gluteus medius
  - External Rotation: Piroformis  
Quadratus Femoris  
Obturator Internus  
Obturator Externus  
Gemellus Superior  
Gemellus Inferior
7. Neurological Evaluation: (Previously cleared in Lower Quarter Screen)
- Sensation: Tactile or with hot/cold  
Check Dermatome charts.
  - Myotomes – refer to Lower Quarter Screen
  - Reflex Testing: Infrapatellar – L 3-4  
Achilles Tendon – S 1-2
  - Proprioception
  - It should be noted that the three nerves most commonly involved in hip disorders are the Sciatic nerve (resulting in posterior hip and thigh pain,) the Femoral nerve (decreased sensitivity to the anterior or medial aspects of thigh,) and the Obturator nerve (referring pain from hip to medial thigh or knee.)
8. Palpation: Swelling or hot spots
- Tender Spots
  - Bursae
  - Femoral Pulse – Groin
  - Joint Capsule
  - Fascial Integrity
  - Muscle Spasm/Trigger Points
  - Muscle Tone and symmetry of buttocks
9. Special Tests:
- Leg Length – Supine
  - Thomas Test – Iliopsoas and Rectus Femoris Length – Can also indicate Iliopectineal Bursitis.

- Ober Test – ITB tightness – Sidelying. Short fibers of TFL can be evaluated by flexing knee.
- Fabere’s Test for Arthritis – Supine with hip in flexion and ER. Support opposite iliac crest.
- Provocation Tests:
  - Posterolateral Capsule – Compression through hip with flexion, adduction, IR. Do Not Do This if patient has had a hip replacement!!!
  - Oscillations through straight leg – heel. Supine
- Pirofomis – Sidelying
- Bilateral Internal/External Rotation in Prone
- Adductor flexibility –knee extended and knee bent to eliminate influence of Gracilus m.

## Knee Evaluation

1. Lower Quarter Screening.
2. Observation and Inspection
  - Posture
  - Functional Movement
  - Gait
  - Effusion – Take anthropometric measurements if swelling present
  - Deformities
  - Signs of Trauma
  - Q angle
3. Active ROM
  - Flexion: (0-135 degrees)
  - Extension: (0-180 degrees)
4. Passive ROM
  - Same as above but note pain and end feels.
  - If there is a torn or displaced meniscus there is often an abrupt block in flexion or extension.
5. Resisted ROM:
  - Flexion – Hamstring Group  
Gastrocnemius  
Popliteal Muscles
  - Extension: Rectis Femoris  
Vastus Lateralis  
Vastus Medialis  
Vastus Intermedius  
Vastus Medialis Obliquus
  - Note Pain or weakness.
  - Note that if there is pain prior to resistance it is most likely acute. Pain during resistance is most likely subacute. Pain after resistance is generally more chronic.
6. Special Tests
  - Medial Collateral Ligament Test – Knee in 30 degrees flexion and full extension. Assess at medial joint line – exert valgus force.
  - Lateral Collateral Ligament Test - Knee in 30 degrees flexion and full extension. Assess at lateral joint line – exert varus force.
  - Anterior Drawer Test – Assesses Anterior Cruciate ligament.
  - Posterior Drawer Test – Assesses Posterior Cruciate ligament.
  - Apley's Distraction Test – Tests collateral ligaments and Meniscus – with ER and IR.
  - Apley's Distraction Test – Tests collateral ligaments and Meniscus – with ER and IR.
  - Patella Femoral Grinding Test
  - Tinel Sign for Saphenous Nerve Neuroma – medial border of patella.

## Ankle/Foot Evaluation

1. Upper Quarter Screening
2. Observation and Inspection
  - Gait
  - Static Exam of Relaxed Calcaneal Stance vs. Subtalar Neutral
  - Shoe Exam
  - Edema – unilateral or bilateral. Bilateral could indicate cardiac or lymphatic problems
  - Deformities
    - Pes Planus/Pes Cavus
    - Hallux Valgus/Hallux Rigidus
    - Claw Toes - Flexor Digitorum Brevis usually is the cause of this
    - Hammer Toes
    - Corns – areas of tenderness
  - Calluses
  - Signs of Trauma
3. Active ROM
  - Ankle joint: Dorsiflexion (0-20) 10 degrees of Dorsiflexion necessary for normal walking.  
Plantarflexion (0-50)
  - Subtalar Joint: Inversion (0-5)  
Eversion (0-5)
  - Toes: First Toe Flexion (0-40)  
First Toe Extension (0-70) 45 degrees flexion is necessary in big toe for normal gait.
4. Passive ROM
  - Same as above but note pain and end feels
5. Resisted ROM
  - Plantarflexion:
    - Peroneus Longus
    - Peroneus Brevis
    - Triceps Surae (Gastrocnemius and Soleus)?>
    - Flexor Hallicus Longus
    - Tibialis Posterior
    - Flexor Digitorum Longus
  - Dorsiflexion
    - Tibialis Anterior
    - Extensor Hallicus Longus
    - Extensor Digitorum Longus
    - Peroneus Tertius
  - Inversion/Adduction
    - Extensor Hallicus Longus
    - Tibialis Anterior

Tibialis Posterior  
Flexor Digitorum Longus  
Flexor Hallicus Longus  
Triceps Surae

- Eversion/Abduction:  
Peroneus Longus  
Peroneus Brevis  
Peroneus Tertius  
Extensor Digitorum Longus
- Toe Extension  
Extensor Digitorum Brevis
- Toe Flexion  
Interossei  
Flexor Digitorum Brevis  
Lumbricals
- First Toe Flexion  
Flexor Hallicus Brevis  
Flexor Hallicus Longus
- First Toe Extension  
Extensor Hallicus Longus

6. Neurological Evaluation

- Sensation: Tactile or with hot/cold  
Check Dermatome charts.
- Reflex Testing: Achilles Tendon (S1)
- Proprioception

7. Palpation:

- Swelling
- Tenderness
- Temperature

8. Special Tests:

- Ligament Injuries:  
Anterior Draw Test – Anterior Talofibular ligament  
Valgus Stress Test – Medial Collateral Ligament  
Varus Stress Test – Lateral Collateral Ligament  
Test for Rigid/Supple Pes Planus – Spring ligament
- Muscular Injuries:  
Thompson (Simmonds) Test – AT rupture  
Ankle Plantarflexion Test – Differential for Soleus and Gastrocnemius
- Circulation:  
Posterior Tibial Artery – Groove medial malleolus – primary blood supply to foot

Dorsalis Pedis – secondary blood supply to foot – Between EHL/EDL tendons (absent in 15% population)

Homan's Sign – (Deep Vein Thrombophlebitis) – Don't do this until you know if patient is prone to blood clot.

Long Saphenous Vein (Medial Malleolus) This will be prominent with varicose veins and is prone to blood clot

- Anthropometric Measurements:

Mid-Tarsal

3 cm above medial malleolus

Mid shaft of tibia

Compare with other leg

Pronation – Triplane motion at subtalar joint – Calcaneal eversion, abduction, and dorsiflexion.

Supination – Triplane motion at Subtalar joint - Calcaneal inversion, adduction, and plantarflexion.

## Quick Reference Guide

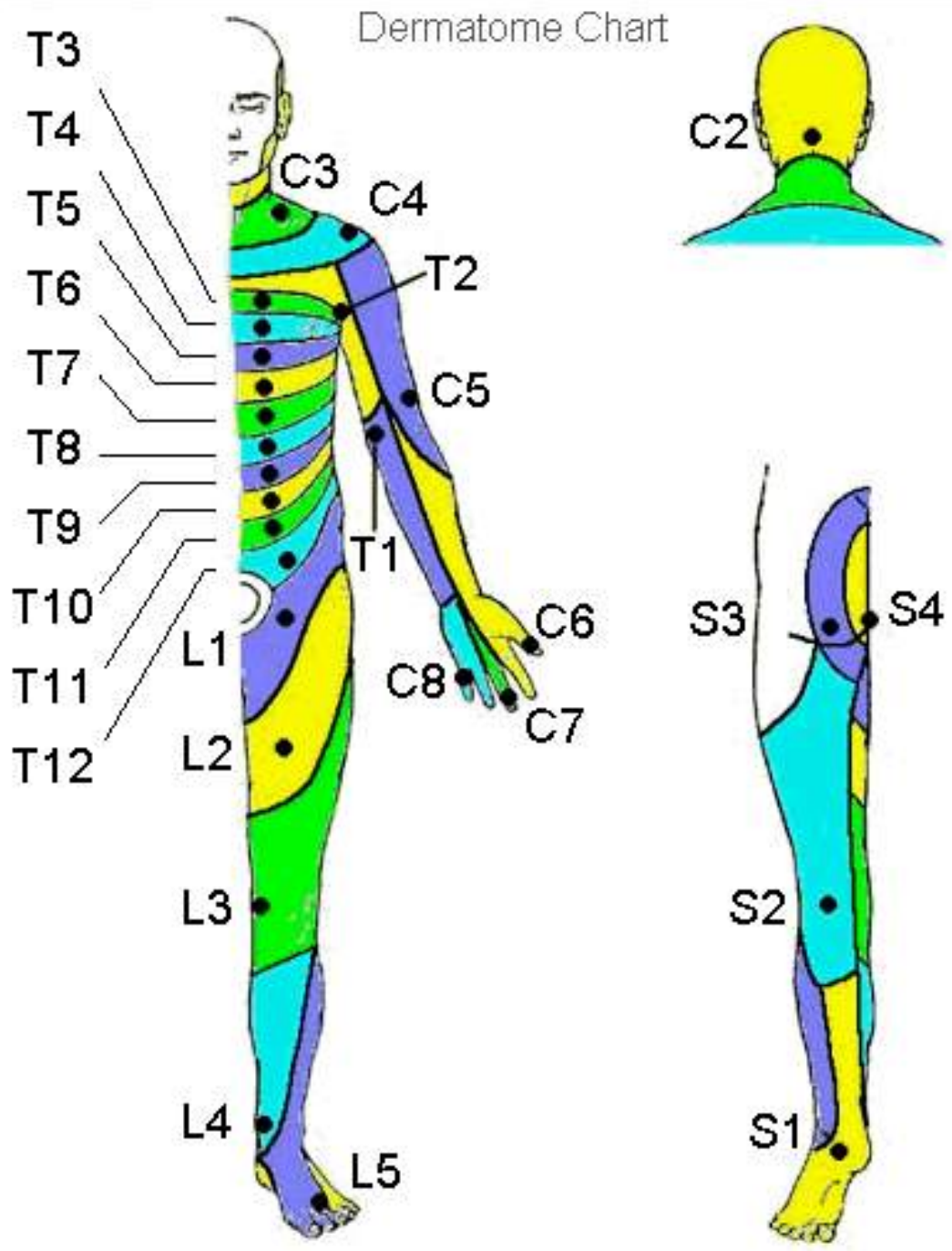
### Upper Quarter Screen

Postural Assessment – Standing- Observation and Palpation	
Active ROM Cervical Spine - Sitting	
Passive over pressure if symptom free	
Resisted muscle tests for cervical spine: Cervical Rotation	C-1
Resisted Shoulder Elevation	C-2,3,4
Resisted Shoulder Abduction	C-5
Active Shoulder, Elbow, Wrist ROM	
Resisted Elbow Flexion	C-6
Resisted Elbow Extension	C-7
Resisted Thumb Extension	C-8
Resisted Finger Abduction	T-1
Babinski’s Reflex Test	UMN

### Lower Quarter Screening

Postural Assessment - Standing	
Active Forward, Backward, and Lateral Bending of Lumbar Spine – Standing	
Squat Test to clear all LE joints in weight bearing	
Toe Raises	S-1
Heel Walking	L-4,5
Active Rotation of Spine - Sitting	
Over-Pressure if symptom-free	
Straight Leg Raise – Supine – Add Cervical flexion	L-4,5,S-1
For Dural Tube test	
Sacroiliac Spring Test - Supine	
Resisted Hip Flexion - Supine	L-1,2
Passive Range of Motion Hip Movements - Supine	
Resisted Knee Extension - Sitting	L 3-4
Active Knee Rom - Sitting	
Femoral Nerve Stretch - Prone	
Babinski’s Reflex Test	UMN

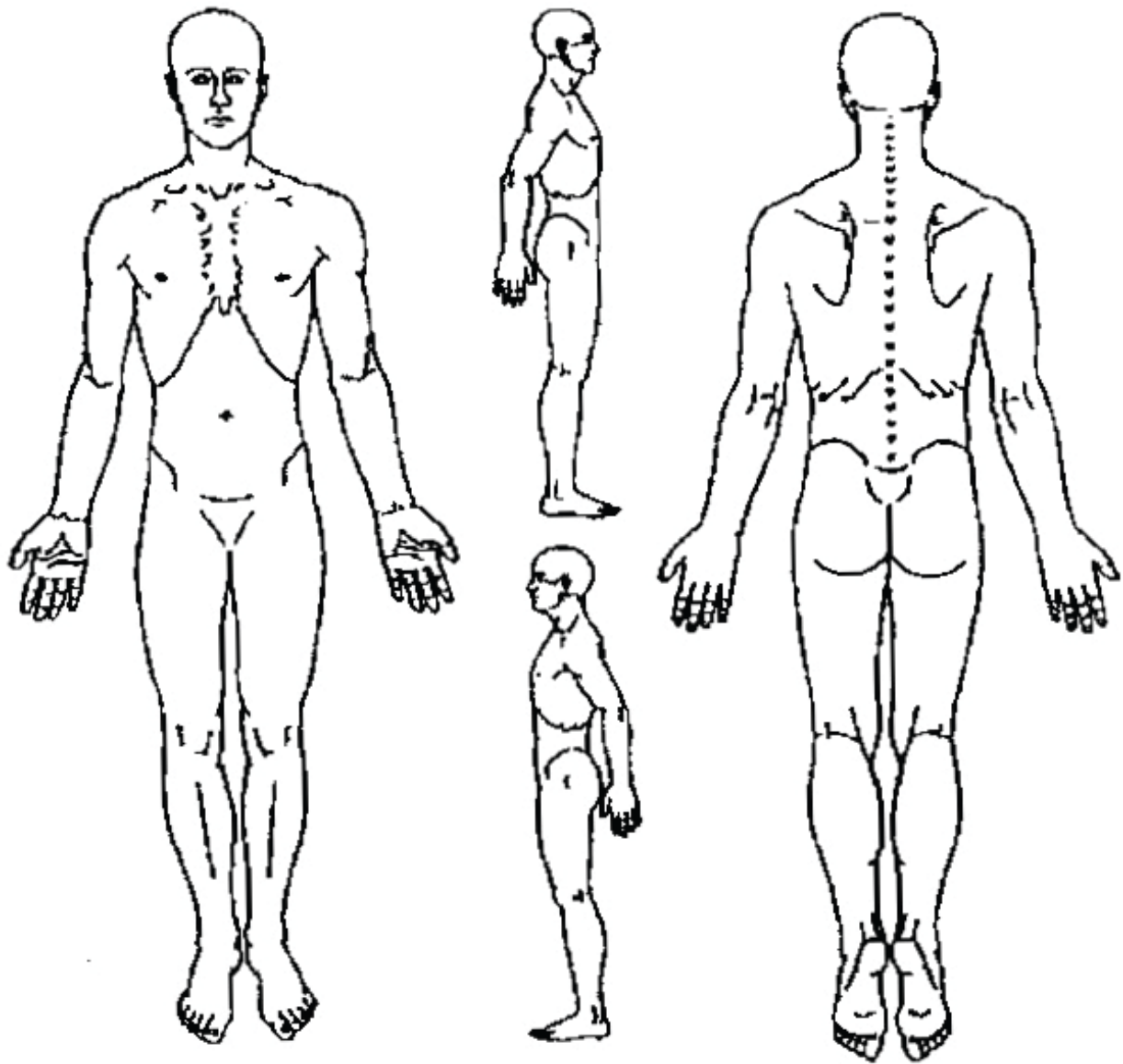




## End Feel Chart

Name of End Feel	Description of End Feel
Capsular	Leathery Example: Normal Glenohumeral ER
Spasm	Firm, contracting muscle Example: Cramping Muscle
Springy	Bounces Back Example: Internal joint derangement, "loose" bodies, "bucket handle" meniscus tear
Bone-on-bone or "hard" end feel	Hard, solid, unmovable Example: Normal elbow extension
Tissue approximation	Further range of motion is prevented or impeded by opposition of two tissues Example: Maximum knee flexion (posterior leg touches posterior thigh)
Empty	Feels like more movement is there but is unobtainable Example: referred pain or metastasis

Sample Body Chart



## **Bibliography and Recommended Reading List**

1. Anatomy of Movement  
Calais-Germain, Blandine. Eastland Press, 1993
2. Orthopedic and Sports Physical Therapy  
Gould and Davies. Mosby Company, 1985.
3. Evaluation, Treatment and Prevention of Musculoskeletal Disorders  
Saunders. Viking Press, 1989.