Physical Examination and Evaluation Study Guide

**Physical Examination and Evaluation:**
Dynamic, Organized, Critical Judgement

**Medical Diagnosis versus PT**
Medical diagnosis more pathological, whereas PT diagnosis is more functional, involving tissue and movement impairments, and neuromuscular dysfunction.

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<th>Medical Diagnosis</th>
<th>versus</th>
<th>PT Diagnosis (18 Steps)</th>
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**According to the Guide to PT Practice Define:**
- Examination: Hx, Systems Review, 18 steps
- Evaluation: Clinical Judgements based on data. Identify problems requiring a referral.
- Diagnosis: Defined clusters, syndromes, including POC etc to determine the prognosis
- Prognosis: Determine level of optimal improvement that can be attained through intervention, P.O.C, time needed to reach improvement
- Intervention: determine changes in patient status, modify or redirect intervention, may be passed on new clinical findings or lack of progress, identify need for consultation with other providers.
- Outcome - End result. Result of pt. management, include patient interventions.

**Dysfunction**
- Abnormality or impairment of function
- State of altered mechanics, +/- from norms or presence of abnormal motion

**Functional Limitation**
- Impairments (anatomical, physiological, mental, emotional, etc.) that restrict movement
Disability
-Restricted ability to perform actions/ ADL's/ Tasks

Impairment
- Consequence of Pathology, Lesion, Psycho, Physio, or any other alterations in anatomy

10 Musculoskeletal Practice Patterns in Guide to PT Practice:
- Primary Prevention/ risk reduction for skeletal demineralization
- Impaired posture
- Impaired muscle performance
- Impaired joint mobility, motor function, muscle performance and ROM associated with:
  - connective tissue dysfunction
  - localized inflammation
  - spinal disorders
  - fractures
  - joint arthroplasty
  - bony or soft tissue surgery
  - amputation

Define:
- Symptom - subjective, what patient tells/ feels/ chief complaint
- Signs - What we see/ observe/ measure
- Etiology - cause of disease
- Pathogenesis - onset of disease
- Clinical Manifestations - How everything presents in the clinic, way disease presents itself.
- Exam findings - what we found through exam. Results of PT/MD exam.

13 Types of History (Step #3)
1. general demographics
2. social history
3. occupation/ employment
4. growth and development
5. living environment
6. history of current conditions
7. functional status and activity level
8. medications
9. past history of current condition
10. past medical/ surgical history
11. family history
12. health status
13. social habits
**Structural** - Fixed - Can’t change or move (bones)

**Functional** - Functional adaptation, altered positional relationship dt soft tissue impairment, compensatory type, acquired (positional). Patient is able to correct. (CORRECTABLE)

### 18 Steps - Patla - ON EVERY TEST!!!!!!!!!!

1. Pain Assessment
2. Initial Observation
3. History
4. Structural Inspection
5. Palpation for condition
   - looking for swelling, redness, heat, pain, effusion, edema, etc.
6. AROM
7. PROM - Classical - Osteokinematics; Accessory - joints
8. MSTT
   - MSTT can single out one muscle group at a time
   - Joints held in LOOSE Pack position
   - Can hold + No Pain = Normal Tissue; Confirm with MMT
   - Can hold + Pain = Tendinopathy (-osis, -itis, strain); Confirm with MLT + PFC/PFT
   - Can NOT hold + Pain = Partial Tear; Defer MLT/MMT; Confirm with PFC, PFT, Imaging, Special Tests
   - Can NOT hold + No Pain = Complete Tear; Confirm with MLT
9. MLT
   - Purpose is to determine/ detect if a muscle is normal, limited, or excessive in length.
   - Cannot assess muscle length if ROM is limited at joint
10. MMT
    - We test mobility before strength
    - Cannot assess full strength if ROM is limited
    - Apply resistance throughout ROM, muscles tested in groups, or singled out if possible
    - We treat joint restrictions before muscle stretching and strengthening. “Gain the ROM, Train the ROM”
11. Special Tests
    - Purpose is to conform or deny hypothesis and facilitate communication with the patient.
    - DO NOT replace 18 steps with a series of special tests
    - sensitivity, specificity, reliability, and validity
12. Movement Analysis - observe the patient performing a functional activity. Meaningful activity
13. PFT - provoke symptoms.
14. Neurological - Rule in or rule out neurovascular pathology - reflex testing, myotome testing, dermatome testing, neural tensioning, pulses.
15. Imaging - correlate image to clinical findings - multidisciplinary approach md/pt
16. Evaluation - dynamic process in which the therapist makes clinical judgements based on date gathered during the exam; draw together and list significant impairments/ findings.
17. Diagnosis/Prognosis - determination of the level of optimal improvement that tight be attained through intervention and the amount of time required to reach that level
   - factors - reactivity level of the patient, your experience, complete honesty as to evaluate and suspected outcomes of treatment, patients ability to understand, your evaluation to the patient’s goals,
18. Intervention

**Characteristics of Motion**
- AROM < PROM
- Body type - ecto, endo, mesomorphs
- quality of motion - classic vs accessory motion
- tone of muscles - tight/ weak
- muscle strength - grades 0 - 5
- Pain symptoms MM Guarding, decreased ROM, etc - FIND CAUSE

**Abnormal Motion**
- Pain at end range (moderate tissue reactivity)
- Pain during range (high tissue reactivity)
- Mid-range pain (high subject reactivity)

**Capsular Pattern of Restriction**
- active and passive (AROM and PROM) painful in *SAME* direction
- pain comes on at limit of ROM
- resisted movements don’t hurt
- patterns are characteristic to that joint (i.e shoulder ER > ABD > IR)

**Capsular Pattern Findings**
1. AROM → Restrictions
2. PROM Classical Quantity → Restricted ROM (Goniometry
3. PROM Classical Quality → End Feel
4. PROM Accessory Quantity → Hypo, Hyper, Normal
5. PROM Accessory Quality → End Feel

**6 normal end feels**
1. Normal Muscle
2. Normal Cartilage
3. Normal Capsule
4. Soft Tissue Approximation
5. Normal Ligament
6. Normal
9 Abnormal end feels (CLAAMPS TB cartilage, laxity, adhesion, muscle, meniscus, pannus, swelling, tightness, bony block)

1. Capsular tightness - harsh resistance with reduced or absent creep
2. Joint adhesions - sudden sharp arrest in one direction, intracapsular
3. Abnormal muscle
4. Bony block - sudden hard/ rigid stop, callus formation, myositis ossificans
5. Abnormal cartilage - rough grating, chondromalacia, osteoarthrosis
6. Displaced meniscus - springy rebound, bouncing back, sublimed meniscus, joint mice
7. Pannus - soft with crunchy, elbow extension
8. Ligamentous or capsular laxity - increased movement without firm arrest, capsule torn with hypermobility, grade 2 ligament laxity
9. Swelling - boggy, soft, effusion, edema

Tissue Specific Impairments - ON EVERY EXAM!!!

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Tissue Specific Impairment (TSI)</th>
<th>Best TSI Step</th>
<th>Tissue Reactivity Best Step</th>
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<tbody>
<tr>
<td>Muscle</td>
<td>Muscle Tightness (ex. Bicep tightness)</td>
<td>MLT</td>
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<td>Muscle Weakness (ex. Bicep weakness)</td>
<td>MMT</td>
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<td>Partial Tear (ex. Bicep partial tear)</td>
<td>MSTT</td>
<td>Defer (PROM classical)</td>
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<td>Complete Tear (ex. Bicep muscle complete tear)</td>
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<td>Strain (ex. Bicep strain)</td>
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<td>Tendon</td>
<td>Tendonitis/osis (ex. Long head bicipital tendonitis)</td>
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<tr>
<td>Capsule</td>
<td>Capsule Laxity (ex. Ant. GH jt capsule laxity)</td>
<td>PROM ACC</td>
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<td>Capsule tightness (ex. Ant &gt; Inf &gt; post capsule tightness)</td>
<td>PROM ACC</td>
<td>PROM ACC</td>
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<td></td>
<td>Adhesion (ex. Posterior GH jt capsule adhesion)</td>
<td>PROM ACC</td>
<td>PROM ACC</td>
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<td>Effusion (ex. MCP jt effusion)</td>
<td>PROM ACC</td>
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<tr>
<td>Ligament</td>
<td>Laxity (ex. ATF ligament laxity or Grade 1 sprain of ATF)</td>
<td>PROM ACC</td>
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<td>Adhesion</td>
<td>PROM ACC</td>
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Essentials of Medical Orthopedics

**Six Clinical Manifestations of Inflammation**
1. Rubor - redness
2. Calor - heat
3. Tumor - Swelling
4. Dolor - Pain
5. Loss of Function
6. Muscle Inhibition

**Inflammatory Disorders**
Specific Inflammation (Bacterial/ viral)
- Pyogenic Tenosynovitis
  - Contained within the tendon sheath usually in the hands.
  - Bacterial infection of synovium

**Acute and Chronic Hematogenous Osteomyelitis**
- Rapidly developing blood-bone bacterial infection in bone and bone marrow
- common mostly children
- early diagnosis extremely important
- acute becomes chronic if not treated early with antibiotics
- necrotic bone sequestrates from living bone - need surgical removal of sequestra
- Treat with antibiotics + IV antibiotics
- Redness, warmth, severe swelling, guarded, pain, gait deviation, apprehension, etc.
- Attempt to restore function and prevent spread of infection to treat

**Pott's Disease**
- Tuberculosis osteomyelitis of the spine
- Common from age 7-15
- Common from T10 to L3 Vertebrae (convex at both edges) **GIBBOUS formation**
- Convexity of spine and wedging of the vertebral bodies
Secondary to UTI
- Slow progression of bone degeneration of anterior vertebral body
- children reluctant to sit up, stand, or forward bend
- TB skin tests positive
- treat with antiTB drugs and rest; attempt to fix posture in pain free range
- surgical removal of sequestra and spinal fusion in bad cases

Rheumatoid Arthritis
- systemic non-specific inflammation of joints - most common in hands and feet
- Ulnar drift is hallmark sign of RA
- Treat by maintaining function and alleviating pain.
- Grade I/II manipulations, bracing, education, etc.
- leads to joint laxity

Ankylosing Spondylitis “bamboo spine”
- inflammation of joints between spinal bones, and joints between spine and pelvis
- Spine eventually fuses
- Believed to be found more commonly in males 20-30s of scandinavian descent
- Idiopathic
- treatment includes Postural Training before spine fuses

Reiter’s Syndrome
"Can’t See, Can’t Pee, Can’t Climb a Tree"
Pink eye, urethritis, asymmetric arthritis
Pathogenesis: bacterial infection in the body usually in the intestines, genitals, or UT. inflammation of eyes, UT, body attacks itself - antigen located in WBC

Metabolic Diseases
Osteoporosis
Scurvy-vitamin C deficiency - decreased healing and collagen production
Rickets-decreased Calcium, vitamin D, phosphorus

Gout
High levels of uric acid
Poor purine metabolism
mostly occurs in males over 40, overweight, Diabetes, eating shellfish
mostly in feet - 1st MTP joint

Paget’s Disease (Osteitis Deformans)
Slow progression of enlargement and deformity of long-bones
bones become Thick, Bowed, Weak
Acceleration of deposit and resorption of bone
**Enthesitis**
Decreased collagen at junction of tendon and bone
common in achilles tendon
associated with ankylosing spondylitis and reiter's syndrome

**Sequestra**
necrotic bone separating form living bone
sometimes needing surgical removal
common in hematogenous osteomyelitis or wherever there is necrotic bone

**Primary Degenerative Joint Disease**
- Premature accelerated aging process of articular cartilage
- common in middle aged females
- slow progression, No known preexisting abnormalities, *Idiopathic* in nature

**Secondary Degenerative Joint Disease**
- results from traumatic injury, deformity, disease
- Common in males
- develops at any age

**10 Conditions leading to Secondary DJD**
1. congenital joint abnormalities
2. joint infection
3. non-specific inflammatory disorders of joints
4. metabolic arthritis
5. repeated hemarthrosis
6. injury
7. acquired joint in congruencies
8. extra-articular deformities with mal-alignment
9. joint instability
10. iatrogenic damage to cartilage

**DJD**
- narrowing of joint spaces
- osteophytes and cysts where bone is rubbing together
- osteoarthritis (most common)
- osteoarthrosis (more accurate name) (chronic)
- degenerative arthritis
- senescent arthritis (geriatric)
- hypertrophic arthritis (joint breakdown)
**Imaging**
Diagnostic imaging helps at PT assess and confirm hypothesis and communicate with other healthcare professionals at a higher level.

**Radiograph (X-Ray)**
Sends X-rays through body. Picks up radio dens (white/gray) e, radiolucent (film black), and radiopaque (film white) structures
- heavy metal > cortical bone > cancellous bone > Muscle > H2O > Fat > Air
Know difference between metal vs fat vs air! (metal = white, fat = gray, air = black)

![Radiograph Diagram](image)

**CT Scan**
360 degree arc of radiographs computed to a 3-d image
Great for finding loose bodies and complex fractures
Not great for soft tissue

**MRI**
- Image using magnets
- No harsh radiation
- Great for viewing soft tissue
- Less likely to miss a Dx with an MRI
- T1 MRI $\rightarrow$ **DARK Fluids/Disks**
- T2 MRI $\rightarrow$ **BRIGHT Fluids/Disks**
- Metal in body can cause image distortion

**Ultrasonography**
- Uses reflected sound waves
- Dynamic - can be used during exam/eval
- No known hazards

**MRI VS CT!!!!**
CT: Bright Cortex / White Borders vs. MRI Dark Cortex / Dark Borders
MRI best for soft tissue, whereas CT best for bone.

**Diagnostic Imaging ABCs**

A. Alignment
   - general architecture, contour, joint alignment, articular space, fractures, dislocation, general shape

B. Bone Density
   - look at cortical bone vs. cancellous bone.
   - Cortical: more radiopaque
   - White outline for normal bone
   - Osteoporosis: when cortices are thin and cancellous bone is thin/inconsistent

C. Cartilage
   - note changes in joint space (should be well preserved), narrowing of growth plates
   - hard to see in radiographs

D. Soft Tissue
   - muscle, fat pad, joint capsule, periosteum

**GREENSPAN’S 7 Elements of Bone Fracture Descriptions**

*SCADFAT: site, complete, alignment, direction, features, abnormalities, types*

1. **Site and extent of fracture**
   - Open (through skin) vs closed (skin intact), location of fx in the bone (i.e. proximal 1/3)

2. **Complete or Incomplete Fracture**
   - Complete is a fx all the way through (all cortices broken)
   - Incomplete is a "hinge" or "greenstick" fx

3. **Alignment of Fracture**
   - position of one fragment relative to another
   - Described as distal part on proximal part
   - Displaced = loss of apposition

4. **Direction of Fracture line**
   - direction of fx line relative to long axis of bone
   - ex: transverse, spiral, oblique, oblique-transverse, comminuted

5. **Special features**
   - Impact vs Avulsion
   - Impaction: fragment is forcibly driven into another part of bone
   - Avulsion: when tendon pulls off bone fragment

6. **Associated abnormalities**
   - dislocations or subluxations
   - soft tissue abnormalities

7. **Special types of Fx's**
   - results from abnormal stresses or pathological issues
   - stress fractures, cancer, paget's, bone grafts etc.
Salter Harris Classification (Growth Plate Fractures)

Don’t Need To Memorize
1. Type I: through growth plate (physis)
2. Type II: through physics & metaphysis (MOST COMMON)
3. Type III: through joint surface through epiphysis and across physics - displacement
4. Type IV: from jt surface, through epiphysis, physics and metaphysis - one fx segment
5. Type V: crush injury (physis)

Peripheral Joint Manipulation I

Definition of mobilization/ manipulation according to Patla:
“Skilled passive movement to a joint with therapeutic intent.” KNOW THIS!

Classical vs Accessory Movements
- Classical - osteokinematic
- Accessory - component motion/ joint play

Component Motion (GLIDE)
- takes place within a joint complex
- can be used to detect dysfunction interfering w/ AROM
- Facilitate a particular active motion

Joint Play (DISTRACTION)
- passive ROM
- response to outside forces (EXTERNAL FORCE)
- detects joint ability to relieve and absorb forces

Traction
Application of force to unload a joint (no joint separation)

Distraction
Application of force WITH joint separation

Purpose of manipulation
- exam and treat accessory motion
* restore normal motion
* improve function and performance
* decrease pain
* improve tolerance to insult/painful stimuli
* aids nutrition and repair

**2 types of Manipulation (thrust vs non-thrust)**

- **Non-thrust:**
  - distraction, glide, tilt, rotation
  - oscillations within limits of accessory ROM
  - oscillations taken to end ROM then stretched
    - elongates connective tissue
    - fires cutaneous, muscular, and joint receptors

- **Thrust**
  - sudden high-velocity (SHORT AMPLITUDE) at the limit of Accessory ROM
  - Used to alter positional relationships, SNAP Adhesions, or produce neurophysiological effects
  - Grade V manipulation

**6 Variables of Manipulation Tx:**

1. **Type** - thrust vs non-thrust
2. **Velocity** - fast vs slow (speed)
3. **Amplitude** - oscillation, graded movement
4. **Force** - different amounts
5. **Duration** - Time
6. **Temperature** - COLD

**3 Effects of Manipulation**

1. Psychological - through examination, hands on, and dramatic motion, and perhaps a “pop”
2. Mechanical - stretches restrictions, SNAP Adhesions, alters positional relations
3. Neuropsychological - Fires mechanoreceptors, cutaneous and muscle receptors, abates nociceptors and resultant muscle states

**Indications for Manipulation**

1. restricted accessory motion
2. neurophysiological effects
3. disease, if present, is not a factor

**7 Possible Manipulation Precautions (no absolute contraindications):**

1. Disease states
2. hemearthropathy
3. hypermobility
4. muscle holding
5. acute inflammation
6. joint replacement
7. anti-coagulant therapy

Physical therapy joint manipulations are based on RESTORING FUNCTION

Transverse Friction Massage
Realigns collagen fibers
Speeds healing by increasing blood-flow to affected area/tendon

Muscle Selective Tissue Test (Step 8)

Peripheral Joint Manipulation II

Convex-Concave Rules
Convex on Concave - Roll and slide are in OPPOSITE directions
  - Roll always occur in same direction as limb.
Concave on Convex - Roll and slide are in SAME direction
  - Roll always occurs in same direction as limb

Criteria for Assessment and Treatment of Accessory Motion (8 Steps)
1. Patient Position
   - Relaxed
2. Therapist Position
   - Proper Body Mechanics
3. Loose Packed Position
   - Joint capsule and ligaments are on Slack
   - Joint is least congruent, angular position
4. Joint Alignment
   - Palpating area to check for malalignment of bones
   - Check joints above and below
5. Stabilizing Hand
   - One joint surface will need to be stabilized (fixed)
6. Manipulating Hand
   - Force isolated to one joint surface
   - needs to be as close to the joint line as possible
7. Direction of Force
   - Treatment Plane lies on the concave articulating surface perpendicular to a line from the center of the convex articulating surface
   - Parallel forces are Glides (component motion)
   - Perpendicular forces are Joint Plays (Distractions)
8. Amount of Force
Grades of Glides, Joint Plays

Grades of Oscillation Manipulations (GLIDES)

Grade I
- Beginning of range of accessory motion
- Small Amplitude
- 0 - 25%

Grade II
- Beginning of Range to Middle of Range
- Large Amplitude
- 0 - 50%

Grade III
- Middle of Range to End Range
- Large Amplitude
- 50 - 100%

Grade IV
- End of Range
- Small Amplitude
- 75 - 100 - 75

Grades of Distractions

Grade I
- Unweighting joint surface
- Bunching up the skin

Grade II
- Taking up the Capsule Slack

Grade III
- Stretching the Capsule

Before Manipulation
Adequate evaluation, identify direction of restriction, prepare soft tissues, protect any neighboring hyper mobility

Pain

"Paris - Treatment Philosophy of Pain"
We don't treat pain, we treat suffering/ the CAUSE of the pain.
Patient's suffer since they do not understand WHY they are in pain.
We treat suffering through patient education. Then we treat the dysfunction and impairment.
Don't award painful behavior, encourage good behavior.

Clinical Management - ON EVERY TEST!!!

Clinical Management
- The treatment of, and beyond, the specific pathological process involved
- Rare that pathological process is the contributing factor
- Must look at etiological factors and cause of disease
- Must recognize and address psychosocial implications of disablement
- Goal is to help patient regain function
- Clinical management is time effective and useful in its systemic approach
Salter's 6 Principles of Treatment
1. *Do no harm*
2. Base treatment on accurate *diagnosis and prognosis*
   1. ask pt what is functional, do not over do treatment, non weight bearing, surgery, need treatment, mental state
3. Use *specific treatment aims*
4. Follow *laws of nature*
5. Use *realistic* and practical treatment
6. Select Treatment for *patient as an individual*  
   - NO COOKIE CUTTER APPROACH

Four Categories of Intervention
1. Palliative - soothing to relax - ice, heat, rest - grade 1 + 2 manipulations
2. Preparatory - get the patient ready for corrective treatment, massage, low grade oscillations, TENS, acupressure
3. Corrective - how to fix - grade 3 + 4 manipulations, distraction, exercise, transverse friction massage, ultrasound, traction, etc.
4. Supportive - Home exercise programs, therapeutic exercise, posture training; tissue specific impairments should correlate with Rx.

Stage of Condition
1. Immediate - minutes immediately post injury, first aid by patients most effective –> PRICE
2. Acute - condition is worsening, goal is to limit worsening; 6 signs of inflammation; PROTECT
3. Subacute - inflammation is settling; starting to improvement; tissue is still fragile, may start light tx.
4. Settled - Injury has stabilized, no swelling/effusion; corrective treatments are well tolerated; goal is to fix problem.
5. Chronic - ~12 - 15 weeks post injury, *Primary healing is complete*, pain behaviors have probably developed; patient may be despondent

Rate of Healing
50% of healing in first 2 weeks  
80% of healing in first 6 weeks  
100% of healing by the 12th week  
Time frames vary and are dependent on the patient!

Tissue Reactivity (Can be assessed during PROM/AROM)
High - Pain BEFORE tissue restriction; *Cannot reach end ROM without pain*
Moderate - Pain WITH restriction; Pain at END of ROM
Low - No pain with restriction; No pain at end ROM

Determining Tissue Reactivity
Tendon - MLT
Bursae - palpation for tenderness (P4T)
Joint capsule = PROM Accessory
Subject Reactivity (found in Hx and "subjectives")

High - Patient cannot carry out functional activities due to complaints
Moderate - Patient can carry out functional activity but complains during activity. Patient will probably complain post-activity.
Low - Patient carries out activity with NO COMPLAINT. May or may not complain post-activity.