OBJECTIVES

Be able to perform a lower quarter screening examination
Recognize importance and be able to accurately take detailed history
Efficiently perform neurological examination
Link static and dynamic examination to effective treatment strategy
Understand the concept of regional interdependence
Be able to perform manual reset technique for the hip, knee, and ankle
TAKING A DETAILED HISTORY

Initial Observation

- Note the unusual (things you can see from across the room)

History and Interview

- Goals of Subjective Interview
- Interview Format
HISTORY — INITIAL OBSERVATION

Deformity
Gait
Assistive Devices
Patient’s Behavior / Attitude
Quality of Movement Patterns
Handshake
General Appearance
Red Flags
HISTORY — SUBJECTIVE INTERVIEW

Goals of Subjective Interview

- To determine “kind” of disorder present
- Detailed symptom description and behavior
- Chronological history
- Make assessments of several key areas
- Determine contraindications to further exam and/or treatment techniques
- Form a baseline to which progress can be measured
HISTORY — INTERVIEW FORMAT

Patient description of problem

Onset

Pain description

Aggravates / Alleviates

Interceding episodes

Medical history

Special considerations
NEUROLOGICAL EXAMINATION

Can help determine what part of nervous system involved

Consists of the following:

- Myotomes
- Dermatomes
- DTR’s
- Neural Tissue Tension
- Neurovasular testing when indicated
NEUROLOGICAL TESTING - MYOTOMES

Lower Extremity

- L2: Hip Flexion – Key Muscle: Iliopsoas
- L3: Knee Extension – Key Muscle: Quadriceps
- L4: Ankle Dorsiflexion – Key Muscle: Tibialis Anterior
- L5: Great Toe Extension – Key Muscle: EHL
- L5-S1: Ankle Eversion – Key Muscle: Peroneals
- S1: Ankle Plantar Flexion – Key Muscle: Gastrocnemius
- S2: Knee Flexion – Key Muscle: Hamstrings
NEUROLOGICAL TESTING - DERMATOMES

These are the “most represented” cutaneous innervated areas of individual nerve roots:

- L1: Inguinal Region
- L2: Middle Anterior Thigh
- L3: Medial Aspect of Knee
- L4: Medial Lower Leg and Ankle
- L5: Web Space between First and Second Toes
- S1: Lateral Border of Foot
- S2: Popliteal Space
- S3-4: Saddle / Perianal Region
DTR’s and Lumbar Reflexes

- Patellar Tendon Reflex: L3-4
- Medial Hamstring (L5-S1); Lateral Hamstring (S1-S2)
- Achilles Tendon Reflex: S1
- Babinski Reflex:
  - Normal Response?
- Clonus:
  - What is acceptable?
LUMBAR ROOT SYNDROMES

L3:
- Pain Distribution:
- Cutaneous Innervation:
- Reflex:
- Myotome:

L4
- Pain Distribution:
- Cutaneous Innervation:
- Reflex:
- Myotome:

S1:
- Pain Distribution:
- Cutaneous Innervation:
- Reflex:
- Myotome:

S2-3-4:
- Pain Distribution:
- Cutaneous Innervation:
- Reflex:
- Myotome:

L5
- Pain Distribution:
- Cutaneous Innervation:
- Reflex:
- Myotome:
NEURAL TISSUE TENSION / NEURODYNAMIC TESTING

Slump Test or variant

Straight Leg Raise or variant

Well Leg Raise

Cram’s Test

Femoral Nerve Tension Test
CLEARING LUMBAR SPINE

Movement Testing

- AROM
- Overpressure
- Sustained / Combined / Repeated Movements (when indicated in subjective)
- Quadrant Testing
STATIC EXAMINATION: POSTURE — LATERAL VIEW

Plumb line

- bony landmarks:
  - sl. behind the coronal suture
  - thru external auditory meatus
  - thru the dens of the axis
  - thru cervical vertebral bodies
  - thru lumbar vertebral bodies
  - thru sacral promontory
  - sl. behind the hip joint
  - sl. ant. to the knee joint
  - sl. ant. to the ankle joint
  - thru the calcaneocuboid joint

- line of gravity

- surface landmarks:
  - thru the ear lobe
  - thru the shoulder joint
  - midway of the trunk
  - thru the greater trochanter
  - sl. ant. to the knee joint
  - sl. ant. to the ankle joint

Plumb Line Test (Side View)
STATIC EXAMINATION: POSTURE — FRONT/BACK

Symmetry
Trunk — rotation, creases
Pelvis — PSIS/ASIS/Iliac crest
Hips — neutral
Knees — neutral, varus, valgus
Feet — parallel, pointed in, pointed out
Achilles — are they straight?
Equal weight bearing?
Why do we need a movement assessment?
REGIONAL INTERDEPENDENCE

Clinically relevant relationships exist between separate regions of the body

Impairments in one region of the body are often associated with impairments in other regions of the body

Wainer, Whitman, Cleland, Flynn 2007
PAIN

Pain changes motor control and the way we move
Dysfunctional movement as a result of the changes to motor control
Need a movement assessment in order to detect movement variation
Practical and high-level performance is possible using compensatory patterns, but you are more likely to be injured secondary to...

- Altered mobility
- Altered stability
- Asymmetry

Cook, Burton, Hoogenboom
SFMA OVERVIEW

Looks at movement patterns and compares them to a baseline
Systematically breaks down movement to locate the problem
Top Tier Tests
Breakout tests with each top tier
SCORING THE SFMA

Dysfunctional
Functional
Painful
Non-Painful
SCORING

Functional = any movement that is not limited or restricted and meets the baseline criteria

Dysfunctional = movements that are limited or restricted and do not meet the baseline criteria

Painful = reproduction of symptoms, increase of symptoms, secondary symptom reproduction
TOP TIER MOVEMENTS

Cervical Flexion
Cervical Extension
Cervical Rotation
Upper Extremity Pattern 1
Upper Extremity Pattern 2
Multisegmental Flexion
Multisegmental Extension
Multisegmental Rotation
Single Leg Stance
Overhead Deep Squat
THE SELECTIVE FUNCTIONAL MOVEMENT ASSESSMENT

SFMA SCORING

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<thead>
<tr>
<th>Active Cervical Flexion</th>
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<tr>
<td>Active Cervical Extension</td>
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<td>Cervical Rotation</td>
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<td>Upper Extremity Pattern 1 (MRE)</td>
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<td>Upper Extremity Pattern 2 (LRP)</td>
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<td>Overhead Deep Squat</td>
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THE SELECTIVE FUNCTIONAL MOVEMENT ASSESSMENT

Name:           Date:           Total Score:
Cervical Flexion  ☐ Painful
☐ Can't touch Sternum to Chin
☐ Excessive effort and/or lack of motor control
Cervical Extension  ☐ Painful
☐ Not within 10 degrees of parallel
☐ Excessive effort and/or lack of motor control
Cervical Rotation  ☐ Painful Right  ☐ Painful Left
☐ Right  ☐ Left  Nose not in line with mid-clavicle
☐ Right  ☐ Left  Excessive effort and/or appreciable asymmetry or lack of motor control
Pattern #1 – MRE  ☐ Painful Right  ☐ Painful Left
☐ Right  ☐ Left  Does not reach inferior angle of scapula
☐ Right  ☐ Left  Excessive effort and/or appreciable asymmetry or lack of motor control
Pattern #2 – LRF  ☐ Painful Right  ☐ Painful Left
☐ Right  ☐ Left  Does not reach spine of scapula
☐ Right  ☐ Left  Excessive effort and/or appreciable asymmetry or lack of motor control
Multi-Segmental Flexion  ☐ Painful
☐ Cannot touch toes
☐ Sacral angle <70 degrees
☐ Non-uniform spinal curve
☐ Lack of posterior weight shift
☐ Excessive effort and/or appreciable asymmetry or lack of motor control
Multi-Segmental Extension  ☐ Painful
☐ UE does not achieve or maintain >70
☐ ASIS does not clear toes
☐ Spine of scapula does not clear heels
☐ Non-Uniform spinal curve
☐ Excessive effort and/or lack motor control
Multi-Segmental Rotation  ☐ Painful Right  ☐ Painful Left
☐ Right  ☐ Left  Pelvis rotation <30 degrees
☐ Right  ☐ Left  Shoulders rotation <30 degrees
☐ Right  ☐ Left  Spine/pelvis deviation
☐ Right  ☐ Left  Excessive knee flexion
☐ Right  ☐ Left  Excessive effort and/or lack of symmetry or motor control
Single Leg Stance  ☐ Painful Right  ☐ Painful Left
☐ Right  ☐ Left  Eyes open <10 seconds
☐ Right  ☐ Left  Eyes closed < 10 seconds
☐ Right  ☐ Left  Loss of Height
☐ Right  ☐ Left  Excessive effort or lack of symmetry or motor control
Overhead Deep Squat  ☐ Painful
☐ Loss of UE start position
☐ Tibia and Torso are not parallel or better
☐ Thighs do not break parallel
☐ Loss of sagittal plane alignment:  ☐ Right  ☐ Left
☐ Excessive effort, weight shift, or motor control
MOVEMENT DIAGNOSIS

Mobility
- Tissue (TED)
- Joint (JMD)

Stability and Motor Control Problem (SMCD)

Breakouts
Local Biomechanical Examination
BREAKOUT LOGIC

Unilateral vs Bilateral – remove a body part

Loaded vs Unloaded – move to a gravity lessened position
• Equally limited with unloaded and loaded = mobility dysfunction
• More movement with unloaded = stability and motor control dysfunction

Active vs Passive
• If passive movement is within 10 deg of active = mobility dysfunction
• If passive movement is much greater = stability and motor control dysfunction

Consistent vs Inconsistent
• Consistent = mobility dysfunction
• Inconsistent = stability and motor control dysfunction
JOINT SPECIFIC EVALUATION

Hip / Knee / Ankle

- Anatomy Review
- Relationship to Movement Diagnosis
- Patho-Anatomy Quick Assessment Logic
  - Bone
  - Joint / Cartilage
  - Ligament
  - Muscle / Tendon
  - Peripheral Nerve
  - Spinal Nerve
JOINT SPECIFIC EVALUATION - HIP

Anatomy

Clinical Implications

Patho-Anatomy Quick Assessment

Relationship to Movement Diagnosis
JOINT SPECIFIC EVALUATION - KNEE

Anatomy

Clinical

Patho-Anatomy Quick Assessment

Relationship to Movement Diagnosis
JOINT SPECIFIC EVALUATION - ANKLE

Anatomy

Clinical

Patho-Anatomy Quick Assessment

Relationship to Movement Diagnosis
TREATMENT

Reset — typically manual intervention to reset dysfunction

Reinforce — reinforce what has been reset with therapeutic activity, stretching, taping, etc.

Reload — new movement patterns with therapeutic exercise and neuromuscular re-education
Manual intervention
  - Joint mobilizations
  - HVLA
  - Soft Tissue Mobilization
  - Myofascial Release
  - Instrumented assisted soft tissue mobilization
  - Active soft tissue release
  - Dry Needling
HIP
RESET — HIP

Hip distraction
Hip mobilizations with belt
PA in Fig 4
Prone IR
REINFORCE - HIP

Stretching
Positional/postural advise
Taping
RELOAD - HIP

Therapeutic exercise and neuromuscular re-education

- ½ kneeling
- Tall kneeling
- Patterns (squat, inline lunge, single leg stance)
KNEE
RESET — KNEE

Flexion Mobs
Extension Mobs
Patellar Glides
Proximal Tib/Fib Mobs
Dry needling
REINFORCE — KNEE

Stretching
Therapeutic Activities
Taping
ANKLE
RESET - ANKLE

DF Mob
PF Mob
Inversion/Eversion at TC and STJ
TC PA/AP Prone and supine
Distal Tib/Fib
Rearfoot distraction thrust manipulation
Cuboid
Lateral/Medial Glides
Standing MWM – DF
1st MTJ
Discussion / Education
Taping
RELOAD — ANKLE

Once mobility is established, treat the joint as if it were a stability — motor control issue

Functional Strengthening

Return to Sport
NEURAL TENSION
Techniques

- Adverse Neural Tissue Tension
- STM to Sciatic, Tibial, Peroneal Nerve
- SLR in and out of tension positions
- Modified Slump mobilizations
REINFORCE — NEURAL TENSION

Taping

Stretches

Self Mobilizations
  • Sliders and Tensioners
RELOAD — NEURAL TENSION

Therapeutic Exercise
Neuromuscular Re-education
CONCLUSION
QUESTIONS?