Introduction to Goniometry and Muscle Length Testing Lab  [Reese & Bandy Chapter 1]

I. General Definitions:

Goniometry is a testing procedure by which we measure the available ROM at a joint (done in a position to minimize muscle stretch).

Muscle Length Testing (MLT) is a procedure by which we measure joint movement with muscle(s) in a stretched position.

II. Perform Goniometry and MLT in order to:
1. Examine function & movement; describe impairment
2. Develop treatment goals and measure progress over time

III. Instruments to Measure ROM and Muscle Length (in no particular order):
1. Radiography is the gold standard
2. Goniometer
3. Inclinometer
4. Flexible Ruler, Tape Measure
5. Still Photography, Video Recording

IV. Methods to Measure Muscle Length (aka: Flexibility measurement):
1. Composite Tests - flexibility measurement involving flexion & extension of the entire length of the body or entire extremity (gross approximation at best). Can use as a screening tool.
   a. Sit and reach test
   b. Apley’s Scratch Test
   c. Shoulder lift test
   d. Fingertip-to-floor test
2. Direct Measurement – flexibility measurement specific to the one joint and muscle(s) in question.

V. Passive vs. Active ROM when performing Goniometry and MLT:
1. Passive-ROM (PROM)  Active Assistive ROM (AAROM)  Active-ROM (AROM)

VI. Measuring Systems:
1. 0-180° system: mostly widely used; this is the system we will use
2. 180-0° system: movement toward flexion approaches 0°; extension approaches 180°
3. 360° system: shoulder flexion is 0°; extension is 180°; hyperextension is >180°

VII. End-feel: the description of the resistance at the end of the ROM (p. 19-20 in text)
1. Soft tissue  (example – knee flexion in supine)
2. Muscular  (example – knee flexion in prone; ankle DF with knee extended)
3. Capsular  (example – possibly hip rotation or shoulder rotation)
4. Bony  (example – elbow extension)
   NOTE: Any of the above can be normal OR abnormal, it depends on the joint in question
5. Others covered in clinical courses: Tissue Stretch, Boggy/Mushy, Empty, Springy-Block

VIII. Standards/Norms for ROM: Chapter 2 and Appendix B in Reese and Bandy text
1. Problems with standards: age, sex, etc.
2. Problems with studies: instrumentation, procedures, reliability

IX. What you need to know in order to correctly perform Goniometry and MLT
Recommended test positions, place joint at 0 degrees to start, alternative positions, stabilization required, joint structure and function, normal end feels, anatomic bony landmarks, instrument alignment,
X. **Goniometers**

Do exercise in Box 1-1, p. 13 in Reese & Bandy text with each goniometer available to you in lab.

XI. **Procedures for GONIOMETRY** (p. 16, Box 1-4 in Reese and Bandy text for more detail).

1. Get consent from the patient.
2. Place the patient in the recommended position & place the joint in the “zero / neutral” position.
3. Explain to the patient the motion to perform and you passively move the joint thru the ROM to the end-feel or point of pain. As you do this, observe & estimate the PROM & anticipate the outcome (normal, hypermobile, hypomobile). Then return the joint to the starting position.
4. Expose and palpate anatomic landmarks and align the goniometer.
5. Read the starting position & adjust position as desired to start at 0°. (be sure they can achieve 0° if you do not start at 0°) - - DON'T WASTE TIME ACHIEVING 0° IF YOU KNOW THAT HAVE IT.
6. Stabilize the proximal articulating bone as needed and have the patient perform the motion as far as possible (AROM). If needed or desired, you can help the patient (AAROM or PROM).
7. Read & record the ROM: (AROM, or AAROM, or PROM)

XII. **Practice some sample measurements** (elbow flexion, shoulder ER, wrist ext)

XIII. **Recording Goniometric and Muscle Length Measurements**

1. Goniometry: Indicate which side, which joint, which movement, what type of motion (AROM-AAROM-PROM) and the range of motion:
   a. Example: R knee flexion AROM 0 – 130°
2. Muscle Length: Indicate which side, which muscle, what type of motion (AROM-AAROM-PROM) and the measurement:
   a. Example for hamstrings after doing 90-90 flexibility test:
      i. R hamstrings flexibility AROM 25° knee flexion.

**ACTIVITY TO EXPLORE RELIABILITY OF AROM MEASUREMENTS USING GONIOMETRY**

Break up into groups as assigned by your instructor. Within each group, designate one person to be the patient and one person to be the recorder. The remaining two or three people in the group will be the examiners.

**Patient:** The examiners will, one at a time, measure your AROM. Your role is to cooperate as fully as possible with each examiner, attempting to perform the same motion in the same manner each time it is requested of you.

**Recorder:** Your role will be to read the scale of the goniometer and record the reading for each measurement taken by each examiner. Each examiner will take two measurements of the AROM. While reading and recording the measurements, don't discuss the results with anyone else in the group.

**Examiners:** Measure the following joint motion 2X on the patient: ______________________________
Let the recorder read and record each measurement.