Head and Neck Course 2019
LAB HANDOUT

Neck Dysfunction Examination

Cervical mobility

- Quality of movement
- Amount of flexion, extension, lateral flexion, rotation
    - Smart Phone Application
        - G-pro app (version 2.7; download from Apple's App Store; https://itunes.apple.com/us/app/goniometer-pro/id646925503?mt=8)
            - Flexion/Extension ROM (Sitting): The iPhone was placed just beside the external auditory meatus and one axis of the app was aligned with the imaginary line between the base of the nostril and the external auditory meatus.
            - Lateral Flexion (Sitting): The center of the app was placed over the C7 spinous process, and one axis of the app was aligned with the occipital protuberance.
            - Rotation (Supine): The center of the app was positioned at the center of the head and one axis was aligned with the nose.

Reliability and Measurement Error of Cervical Range of Motion Measurement using Smart Phone Application

	ICC (CI)	SEM	MDC_{95}
Flexion	0.69 (0.42, 0.83)	3.11°	8.62°
Extension	0.71 (0.45, 0.84)	2.57°	7.12°
Lateral Flexion-L	0.69 (0.42, 0.84)	1.23°	3.40°
Lateral Flexion-R	0.69 (0.43, 0.84)	1.46°	4.04°
Rotation-L	0.62 (0.30, 0.79)	4.51°	12.50°
Rotation-R	0.70 (0.44, 0.84)	4.50°	12.47°

ICC: intraclass correlation coefficient; CI: confidence interval; SEM: standard error of measurement; MDC: minimal detectable change

- Pourahmadi MR et al. A new iPhone application for measuring active craniocervical range of motion in patients with non-specific neck pain: a reliability and validity study. The Spine Journal. 2018;18:447–457

Cervical Spine Range of Motion Normative Data (Inclinometer)

		<30	30-39	40-49	50-59	>60
Flexion	M	58.6± 10.7	55.9 ± 11.2	53.6 ± 9.7	52.4 ± 9.8	49.7 ± 10.9
	F	55.5 ± 10.3	58.5 ± 11.6	56.7 ± 8.4	54.9 ± 12.0	50.3 ± 15.4
Extension	M	70.7 ± 11.7	68.5 ± 14.9	64.1 ± 12.9	61.1 ± 12.6	64.3 ± 13.0
	F	73.5 ± 21.0	69.2 ± 10.5	68.1 ± 12.8	66.7 ± 13.0	60.7 ± 15.6
Lateral Flexion Left	M	50.5 ± 9.2	45.7 ± 9.7	43.1 ± 8.4	39.1 ± 8.6	39.2 ± 8.9
	F	46.6 ± 8.0	46.8 ± 7.6	45.4 ± 11.7	43.3 ± 9.5	40.5 ± 10.4
Lateral Flexion Right	M	49.4 ± 9.0	47.4 ± 8.8	43.3 ± 8.4	40.1 ± 8.3	39.9 ± 9.7
	F	45.0 ± 7.4	46.4 ± 8.3	44.8 ± 8.5	42.7 ± 8.8	39.7 ± 9.2
Rotation Left	M	68.9 ± 11.5	68.6 ± 10.0	64.0 ± 10.0	61.6 ± 11.8	61.8 ± 11.4
	F	66.6 ± 10.5	70.0 ± 11.7	66.6 ± 11.9	64.0 ± 12.0	59.6 ± 15.0
Rotation Right	M	67.4 ± 8.7	69.0 ± 9.1	64.5 ± 9.5	60.4 ± 11.2	61.5 ± 10.7
	F	65.5 ± 15.0	66.4 ± 10.4	66.0 ± 11.7	63.7 ± 12.0	61.1 ± 13.8

- Cote MP, Kenny A, Dussetschleger J, Farr D, Chaurasia A, Cherniack M. Reference values for physical performance measures in the aging working population. Hum Factors. 2014 Feb;56(1):228-42

Reliability of Cervical Range of Motion Using an Inclinometer

	ICC	SEM
Flexion	0.75-0.93	2.6-6.8
Extension	0.74-0.95	2.9-5.6
Lateral Flexion Left	0.69-0.90	2.4-7.0
Lateral Flexion Right	0.66-0.90	2.6-3.7
Rotation Left	0.77-0.95	2.5-5.5
Rotation Right	0.78-0.95	3.2-5.0

ICC: intraclass correlation coefficient; SEM: standard error of measurement

Minimal Detectable Change = $z\ score * SEM * \sqrt{2}$; z score for $MDC_{95\%}$ is 1.96

- Cleland JA, Childs JD, Fritz JM, Whitman JM. Interrater reliability of the history and physical examination in patients with mechanical neck pain. Arch Phys Med Rehabil. 2006 Oct;87(10):1388-95
- Piva SR, Erhard RE, Childs JD, Browder DA. Inter-tester reliability of passive intervertebral and active movements of the cervical spine. Man Ther. 2006 Nov;11(4):321-30.

- Schneider GM et al. Intrarater and interrater reliability of select clinical tests in patients referred for diagnostic facet joint blocks in the cervical spine. Archives of Physical Medicine and Rehabilitation. 2013;94:1628-34.

Palpation

- SCM
- Upper trapezius
- Levator Scapulae
- Rhomboids/Middle trapezius

Head and Cervicothoracic Spine Posture

- From a sagittal view, identify the presence of any of the following postural deviation:
    - forward head,
    - forward shoulder,
    - Increased or decreased kyphosis of the cervicothoracic junction (C7-T2),
    - Increased or decreased kyphosis of T3-5 and T6-10 segments

Head and Cervicothoracic Spine Postural Deviations

Deviation	
Forward head	Patient's external auditory meatus is anteriorly displaced (anterior to the lumbar spine);
Flexed head	Line connecting external auditory meatus to nose is NOT parallel to ground
Forward shoulder	acromion is anteriorly displaced
Increased CTJ kyphosis (C7-T2)	Increase in the convexity of the C7-T2 segments
Increased thoracic kyphosis (T3-T5 and T6-10)	Increase in the convexity of the thoracic spine
Decreased thoracic kyphosis (T3-T5 and T6-10)	Flattening of the convexity of the thoracic spine

CTJ: cervicothoracic junction

- Cleland JA, Childs JD, Fritz JM, Whitman JM. Interrater reliability of the history and physical examination in patients with mechanical neck pain. Arch Phys Med Rehabil. 2006 Oct;87(10):1388-95

Neck Dysfunction Intervention

Manual Therapy

- Pressure Release
- Stretching of taut bands

Therapeutic Exercise

- Deep Cervical Flexor Muscle Training
    - Coordination training for the deep & superficial cervical flexor muscles using a cranio-cervical flexion task, reducing activation of superficial SCM and scalenes

Stage 1	Training - In supine, patient concentrates on feeling back of head slide in cephalad – caudal direction (rotation movement) rather than retraction movement
Stage 2	Use air-filled pressure sensor, patient attempts to reach 5 sequential pressure targets in 2 mmHg increments from a baseline of 20 mmHg to the final level of 30 mmHg. The therapist identifies target level that the subject can hold steadily for 5 s without resorting to retraction, without dominant use of the superficial neck flexor muscles, and without a quick, jerky movement. Contribution from the superficial muscles is monitored by the therapist using palpation. The contraction duration is increased to 10 s, and the subject performs 10 repetitions with 3-5 second rest between repetitions.
Stage 3	Exercise is progressed to train at the next target level up to the final target of 30 mmHg.

- Jull GA et al. The effect of therapeutic exercise on activation of the deep cervical flexor muscles in people with chronic neck pain. Man Ther. 2009 Dec;14(6):696-701.
- [Jull GA et al. Clinical assessment of the deep cervical flexor muscles: the craniocervical flexion test. J Manipulative Physiol Ther. 2008 Sep;31(7):525-33.

- Cervical Extensor Muscle Training
    - Supine
    - Standing against wall
    - Prone and/or quadruped

- Resistance Exercise Prescription
    - FITT- VPP principle
        - Frequency: number of times per week
        - Intensity: how hard; load or resistance level
        - Type: isometric, concentric, eccentric
        - Time: duration of resistance exercise program
        - Volume: repetitions, sets
        - Pattern: rest intervals, selection and order of exercises
        - Progression: increasing resistance level, increasing repetitions per set, change type of contraction, increasing speed of movement, increasing range of movement, complexity of movement
    - Strength
        - 60-80% 1-RM, 1-4 sets, 6-12 repetitions, 2-3 minute rest intervals
    - Endurance
        - < 60% 1-RM, 1-4 sets, > 15 repetitions, 30 seconds-2 minute rest intervals
    - Rating of Perceived Exertion
        - Borg CR10 ratings of 3 to 6 fall between estimates of 40%-70% 1RM

- Borg's scales in strength training; from theory to practice in young and older adults. Buckley JP, Borg GA. Appl Physiol Nutr Metab. 2011 ;36(5):682-92.

Borg CR-10 Scale

0	Nothing at all (Rest)
1	Very, very easy
2	Easy (Light)
3	Moderate
4	Somewhat hard
5	Hard (Heavy)
6	
7	Very hard
8	
9	
10	Extremely hard (Maximal)

Temporomandibular Examination

- Ohrbach et al. 2014. Diagnostic Criteria for Temporomandibular Disorders Clinical Examination Protocol. Accessible at: www.rdc-tmdinternational.org

Jaw Mobility

- Amount of jaw opening, lateral deviation, protrusion
- Opening pattern
    - Straight
    - Corrected deviation ≥ 2 mm (right, left, both)
    - Uncorrected deviation > 2 mm (right or left)

Noises during open & close movements

- Examiner palpates skin overlying the lateral pole of TMJ condyle
    - Click: short duration, distinct noise with clear beginning and end; referred to as snap or pop
    - Crepitus: longer duration, comprised of multiple overlapping sounds; referred to as crunching, grinding

Palpation

- Duration: 2 - 5 seconds
- Amount of pressure: 0.5 – 1 kg
- Questions
    - Pain?
    - Familiar?
    - Referred?
    - Headache?
- Locations
    - Temporalis Anterior
        - Start posterior to bony crest lateral to eyebrow and superior to zygomatic process. Have patient clench teeth
    - Temporalis Middle
        - Start just anterior to the ear and superior to the zygomatic process; the area is superior
    - Temporalis Posterior
        - Start just above superior tip of the ear; area is superior
    - Masseter: Origin
        - Inferior and anterior to zygomatic process is anterior border; Anterior border of TMJ condyle is posterior border
    - Masseter: Insertion
        - Start at posterior border of muscle, just superior to inferior mandibular boarder; area is anterior
    - Masseter: Body
        - Midway between origin and insertion

- Lateral Pole
  - Place index finger just anterior to tragus of the ear. Ask patient to open mouth and examiner should feel lateral pole translate forward
- Posterior belly of digastric
  - Area between SCM attachment at mastoid process and posterior border of mandible
- Medial Pterygoid
  - Area 2 cm anterior to the angle of the mandible, and medial to mandible
- Lateral Pterygoid
  - Ask patient to move mandible to same side. Place finger on buccal side of alveolar ridge above the maxillary molars and move finger posteriorly, medially, and upward as far as possible
- Tendon of the Temporalis
  - Finger is placed against ascending ramus, and moved superiorly as far as possible to anterior ridge of the coronoid process. Palpate on the superior aspect

Temporomandibular Interventions

Manual Therapy

- Soft tissue mobilization
    - Kneading (circular motions) and sliding (longitudinal) techniques
    - Pressure release technique
        - Pressure is progressively increased until tissue resistance (barrier) is perceived by the therapist. Pressure is maintained until the therapist senses a relief of the taut band. At that time, the pressure is increased again until the therapist feels the next increase in tissue resistance. Repeated 3 times per session.
    - Stretching of taut bands technique
        - Both thumbs of the therapist are placed over the taut band of muscle above and below. The therapist applies moderate, slow pressure over taut band of muscle, sliding the thumbs in opposite directions.
    - Pin and stretch technique
        - Masseter: therapist braces distal attachment and instructs patient to slowly open mouth

- Joint mobilizations

Inferior mobilization	With gloved left thumb, apply an inferior force on the posterior mandibular molars Use some counter pressure on the anterior aspect of the mandible using your flexed fingers to limit mandibular opening
Inferior-lateral mobilization	Same as inferior mobilization AND apply lateral force on the posterior mandibular molars
Inferior-medial mobilization	Same as inferior mobilization AND apply medial force on the posterior mandibular molars
Inferior-anterior mobilization	Same as inferior mobilization AND apply anterior force on the posterior mandibular molars

Contraindications to manual therapy include and not limited to technique being detrimental to healing of tissue, erythema, desquamation, open wound, mouth sores (intraoral), infection, osteonecrosis/high fracture risk (joint mobilizations)

Shoulder Examination

Active and passive shoulder range of motion

- Forward elevation
- Abduction
- External rotation at 0 degrees of abduction
- External rotation at 90 degrees of abduction
- Hand behind back internal rotation

Visual assessment of scapular motion

Operational Definitions Scapular Dyskinesis Test	
Normal shoulder complex rhythm	The scapula is stable with minimal motion during the initial 30° to 60° of humerothoracic elevation, then smoothly and continuously rotates upward during elevation and smoothly and continuously rotates downward during humeral lowering. No evidence of winging is present.
Scapular dyskinesis	Either or both of the following motion abnormalities may be present.
	Dysrhythmia: The scapula demonstrates premature or excessive elevation or protraction, non-smooth or stuttering motion during arm elevation or lowering, or rapid downward rotation during arm lowering.
	Winging: The medial border and/or inferior angle of the scapula are posteriorly displaced away from the posterior thorax.
Rating Scale Each test movement (flexion and abduction) rated as: a) ***Normal motion****:* no evidence of abnormality b) ***Subtle abnormality****:* mild or questionable evidence of abnormality, not consistently present c) ***Obvious abnormality****:* striking, clearly apparent abnormality, evident on at least 3/5 trials (dysrhythmias or winging of 1 in (2.54 cm) or greater displacement of scapula from thorax)	

- McClure P, Tate AR, Kareha S, Irwin D, Zlupko E. A clinical method for identifying scapular dyskinesis, part 1: reliability. J Athl Train. 2009 Mar-Apr;44(2):160-4.

Visual assessment of resting alignment

Operational Definitions for Resting Scapular Alignment	
Normal	*Mal-alignment*
Scapula lies flat against upper back.	Scapula is winging, with either the medial border and/or inferior angle displaced off the thorax.
Vertebral borders are parallel to spinous processes.	Medial-lateral difference exists between root of the scapular spine and inferior angle of the scapula with respect to the thoracic spine midline (upward or downward rotation).
From a frontal view, the clavicle is either horizontal or elevated by 6-10 degrees at the acromial end.	From a frontal view, the clavicle is either depressed *or* elevated by more than 10 degrees at the acromial end.
From a lateral view, the midpoint of the acromion is centered with respect to the midline of the thorax.	From a lateral view, the midpoint of the acromion is anterior or posterior to the midline of thorax.
Subtle = mild or questionable mal-alignment **Obvious =** marked or clearly apparent mal-alignment	

Manual muscle tests

- Upper trapezius/levator scapulae
  - https://www.youtube.com/watch?v=NNK1H2aAzhM&t=0s&list=PLmrHlJS1tNJOS9P_rJnsxVTBtpkXxyVo5&index=10
- Middle trapezius
  - https://www.youtube.com/watch?v=6rJvL6Xyz6I&index=11&list=PLmrHlJS1tNJOS9P_rJnsxVTBtpkXxyVo5
- Lower trapezius
  - https://www.youtube.com/watch?v=k2o74lue_T8&list=PLmrHlJS1tNJOS9P_rJnsxVTBtpkXxyVo5&index=13
- Rhomboids
  - https://www.youtube.com/watch?v=RZ-wlxQU5wQ&list=PLmrHlJS1tNJOS9P_rJnsxVTBtpkXxyVo5&index=12
- Serratus anterior
  - https://www.youtube.com/watch?v=7QNiDXkINJk&index=10&list=PLmrHlJS1tNJOS9P_rJnsxVTBtpkXxyVo5

Special tests

Scapular flip sign:	With the arm at the subject's side and elbow flexed 90 degrees, examiner applies an internal rotation force at the wrist while the subject attempts to resist. A positive test is the presence of scapular winging during isometric external rotation.
Plus test:	With the arm flexed to 90 degrees, the patient is asked to protract the scapula. A positive test is the presence of scapular winging and/or unable to protract scapula.
Neer impingement sign:	Examiner stabilizes the scapula with a downward force while passively flexing the humerus overhead maximally with overpressure. A positive test is reproduction of pain at the superior or superolateral aspect of the shoulder.
Hawkins-Kennedy:	With the arm and elbow flexed to 90 degrees, examiner passively internally rotates humerus maximally with overpressure. A positive test is reproduction of pain at the superior or superolateral aspect of the shoulder.
Empty can test:	With the arm elevated 90 degrees in the plane of the scapular and internally rotated (thumb pointing towards ground), the examiner applies a downward directed force at the wrist while the subject attempts to resist. A positive test is weakness or reproduction of pain at the superior or superolateral aspect of the shoulder.
External rotation resistance test:	With the arm at the subject's side and elbow flexed 90 degrees, examiner applies an internal rotation force at the wrist while the subject attempts to resist. A positive test is weakness or reproduction of pain at the superior or superolateral aspect of the shoulder.
Painful arc sign:	The patient is asked to actively abduct his/her arm and report any pain during the motion. A positive test is superior or superolateral shoulder pain reported by the subject between 60 and 120 degrees of abduction.
External rotation lag signs:	Examiner supports the arm elevated 20 degrees in the plane of the scapula with the elbow flexed 90 degrees. Examiner maximally externally rotates arm. The patient is asked to maintain the arm in maximal external rotation. A positive test is an inability to maintain external rotation or a lag of more than 5 degrees into internal rotation. The test is repeated with the arm supported in 90 degrees of elevation in the scapular plane.
Lift Off Test	Patients hand is placed on the back at the position of the midlumbar spine. Patient is asked internally rotate the arm to lift the hand posteriorly off of the back. The test is considered positive if the patient was unable to lift the arm posteriorly off of the back or if he or she performs the lifting maneuver by extending the elbow or the shoulder.
Belly Press	With the hand flat on the abdomen and elbow close to the body, the patient is asked to keep her or his elbow forward and wrist straight as she or he presses palm into her or his abdomen. The amount of resisted active internal rotation against the patient's belly can be assessed. The test is considered positive (1) if the patient shows a weakness in comparison to the opposite shoulder or (2) if patient pushs the hand against the belly by means of elbow extension or shoulder extension.

Shoulder Interventions

Manual Therapy

- Manual resistance training
    - Application of manual resistance
    - Have patient perform warm-up activity
    - Ensure stabilization of appropriate segment
    - Apply resistance to appropriate segment
        - Typically distal end of motion segment
        - More proximal application may be warranted to achieve desired goals
    - Identify presence or severity of weakness
    - Determine dosage
        - Intensity – start low and gradually increase if indicated
        - Reps – typically 8 to 12 reps with submaximal intensity
        - Set – 2 to 3
        - Rest interval – typically 2 – 4 minutes
    - Patient preparation
    - Provide verbal/visual instructions
        - Encourage rhythmic breathing to prevent Valsalva
        - Monitor for substitutions
        - Monitor for signs of fatigue
        - Modify dosage as needed
    - Positioning for proper body mechanics is essential

- Proprioceptive Neuromuscular Facilitation (PNF)
    - An approach that combines diagonal movement patterns with manual techniques to facilitate motor responses and improve neuromuscular control
        - Enhances muscle strength and endurance
        - Helps stability and mobility
        - Develops coordination between body segments
    - Patterns
        - Upper Extremity
        - Lower Extremity
        - Scapula

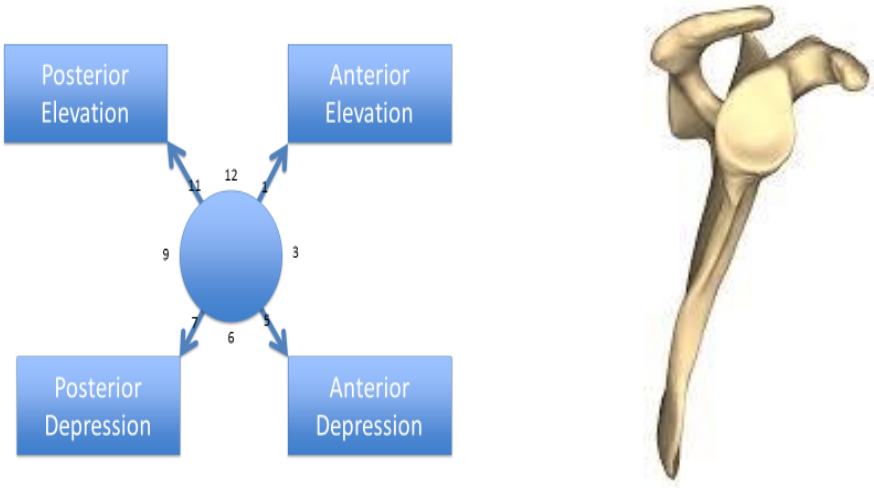

Figure represents right shoulder where 12 o'clock is superior and 6 o'clock is inferior 3 o'clock is anterior and 9 o'clock is posterior

Pattern	Procedures

Anterior Elevation	○ Therapist Position
	  ○ Behind patient, facing head
	○ Grip
	  ○ One hand on anterior aspect of GH joint and acromion. Other hand supports first hand.
	○ Start
	  ○ Pull scapula down and back
	○ Instruction
	  ○ Shrug your shoulder up toward your nose. Pull.

Posterior Depression	○ Therapist Position
	  ○ Behind patient, facing head
	○ Grip
	  ○ Heels of hands along vertebral border of scapula below spine of scapula.
	○ Start
	  ○ Push scapula up and forward
	○ Instruction
	  ○ Push shoulder blade down toward me. Push.

Anterior Depression	○ Therapist Position
	  ○ Behind patient's head, facing hip
	○ Grip
	  ○ One hand posteriorly with fingers holding lateral border of scapula. Other hand anteriorly on pectoralis major/coracoid process.
	○ Start
	  ○ Lift scapula up and backward toward middle of back of head
	○ Instruction
	  ○ Pull shoulder blade down toward your naval. Pull.

Posterior Elevation	○ Therapist Position
	  ○ Behind patient's head, facing hip
	○ Grip
	  ○ Place hands posterior on the upper trap superior to spine of scapula.
	○ Start
	  ○ Bring scapula down and forward to ilium
	○ Instruction
	  ○ Shrug your shoulder up. Push.

Lymphedema Examination

Soft tissue assessment

- Visual inspection
    - Color
    - Loss of anatomical architecture (i.e. mandible)
    - Deviation from normal anatomical contour (i.e. submental region)
- Temperature
- Tissue texture assessment
    - Normal
        - No abnormality of tissue texture
    - Spongy
        - Tissue feels squishy or boggy
    - Firm
        - Tissue feels solid; not soft
    - Hard
        - Tissue feels very solid or firm
- Pitting edema assessment
    - Pitting edema is defined by a visible indentation that remains in the skin after applying pressure.
        - No or Yes
        - No or Subtle or Obvious
        - No or 1+ to 4+

Tissue Texture/Pitting Edema Assessment		
Facial Composite	**Right**	**Left**
Cheek		
Chin		
Submandibular region		
Lateral neck		
Anterior neck		
Submental region		
Other:		

Tape measurements

MD Anderson Head and Neck Lymphedema Tape Measurement Protocol		
Facial Composite	**Right**	**Left**
Tragus to chin		
Tragus to corner of mouth		
Mandibular angle to nasal wing		
Mandibular angle to medial canthus		
Mandibular angle to lateral canthus		
Mandibular angle to nasal wing		
Chin to medial canthus		
Mandible angle to chin		
Neck Composite		
Superior neck		
Middle neck		
Inferior neck		
Additional Measurements		
Head diagonal		
Head vertical		
Tragus to tragus		
Mandibular angle to mandibular angle		

"ALOHA" Trial Protocol

- Lower neck circumference
  - Lowest possible neck circumference taken superior to the angle of the neck and shoulder
- Upper neck circumference
  - Highest neck circumference measured inferior to the mandible
- Length from ear to ear
  - Inferior junction of ear lobe and face on left to inferior junction of ear lobe and face on right intersecting a point 8cm inferior to the lower lip edge
- Length from lip to lower neck circumference
  - Inferior lower lip edge to lower neck circumference in midline

Lymphedema Intervention

MLD Principles

- Hand movements are used to stretch the skin in a specific direction
- Light pressure (< 30 mmHg)
- Varies according to underlying tissues
- Excessive pressure may increase capillary filtration, cause hyperemia, and damage lymphatics
- Movements are slow (approximately one stroke per second) and repetitive (at least 7 strokes per area)
- MLD sequence starts proximally or centrally, and work distally
- Each stroke has a “pressure” phase and “relaxation” phase

MLD Strokes

Stationary Circles

- Application: Lymph node groups, face, neck
- Circular (perpendicular) skin stretch using entire palmer surface of the hand
- Working phase: Perpendicular to alignment of lymphatic collectors
- Resting phase: Hand relaxed remaining in contact with skin
- Variations: Stationary/dynamic, use of both hands alternating

Rotary

- Application: Trunk
- Longitudinal skin stretch
- Working phase: Hand placed on surface of body in an elevated position and parallel to pathway of lymph collectors. Wrist is in flexion, fingers are neutral, and thumb is abducted 90 degrees. Palm is then placed on the skin at the same time the thumb slides into adduction.
- Resting phase: Hand moves back into wrist flexion until it is elevated while keeping the fingers in contact with the skin
- Variations: Use of both hands at same time or alternating

“Milking”

- Application: Front of neck
- Longitudinal skin stretch
- Working phase: Wrist flexion with ulnar deviation and thumb abduction/extension. Avoid gripping with fingers
- Resting phase: Hand relaxed while maintaining skin contact

MLD Sequence

Anterior Sequence

1. Supraclavicular nodes-Perform stationary circles with fingers in hollow just above collar bone (supraclavicular fossa)
2. Diaphragmatic breathing

3. Axillary nodes-Perform stationary circles stretching skin up and inward with fingers
4. Pectoral nodes-At side of chest beneath the axilla, perform stationary circles stretching skin towards axilla
5. Inferior chest (one finger above nipple)-Perform stationary circles with flat hand or rotary technique stretching skin towards axilla; Perform several strokes to cover the entire area
6. Mid chest (hand width above inferior chest)- Perform stationary circles with flat hand or rotary technique stretching skin towards axilla; Perform several strokes to cover the entire area
7. Upper chest (below collar bone)-Perform stationary circles with flat hand or rotary technique stretching skin towards axilla; Perform several strokes to cover the entire area
8. Supraclavicular fossa (Step 1)
9. Repeat the above steps on other side

10. Back of neck lateral to the SCM- Perform stationary circles stretching skin towards the front and down
11. Side of neck medial to the SCM- Perform stationary circles stretching skin towards the back and down
12. Front of neck- Perform stationary circles stretching skin towards the back and down
13. Front of neck (the center front)- Using “Milking” technique stretching the skin down
14. Parotid and posterior auricular nodes-With two fingers on either side of ear, perform stationary circles stretching the skin down and back
15. Face- Perform stationary circles stretching skin back and down towards ear
16. Now reverse the steps

Exercise Capacity Testing

2-Minute Step Test

- Take resting vital signs
    - Blood pressure, heart rate, respiratory rate, pulse oximetry
- With patient standing next to a wall, mark the height of the iliac crest and patella on the wall. Place a piece of tape on the wall half the distance between the two marks.
- Patient steps in place (not running), raising each knee to the mark on the wall, for as many times as possible in the 2 minute period.
- Instruct patient to begin on "go."
- Count the number of times the right knee reaches the required height.
- If the proper knee height cannot be maintained, ask the participant to slow down, or to stop until they can regain the proper form, but keep the stopwatch running.
- A person with impaired balance may use the back of a chair as a touch-hold for stability. Note this modification in your documentation
- Record peak heart rate and rating of perceived exertion
- Take post-test blood pressure, pulse oximetry, respiratory rate, and recovery heart rate at 1 to 5 minutes

2-Minute Step Scores for the 10%, 25%, 50%, 75% and 90% percentiles		
Age	**Number of steps – Women**	**Number of steps – Men**
60 - 64	60, 75, 91, 107, 122	74, 87, 101, 115, 128
65 - 79	57, 73, 90, 107, 123	72, 86, 101, 116, 130
70 - 74	53, 68, 84, 101, 116	66, 80, 95, 110, 125
75 - 79	52, 68, 84, 100, 115	56, 73, 91, 109, 125
80 - 84	46, 60, 75, 91, 104	56, 71, 87, 103, 118
85 - 90	42, 55, 70, 85, 98	44, 59, 75, 91, 106
90 - 94	31, 44, 58, 72, 85	36, 52, 69, 86, 102

Scores less than 65 were associated with lower levels of functional ability
Test-retest reliability: intraclass correlation coefficient = 0.90
Mean (SD) Women: 83 (25); Mean (SD) Men: 93 (25)

- Rikli RE , Jones CJ . Development and validation of a functional fitness test for community-residing older adults . J Aging Phys Activ. 1999;7:129-161 .

- Rikli RE , Jones CJ . Functional fitness normative scores for community residing older adults, ages 60-94 . J Aging Phys Activ. 1999;7:162-181.

- Bohannon RW, Crouch RH. Two-Minute Step Test of Exercise Capacity: Systematic Review of Procedures, Performance, and Clinimetric Properties. J Geriatr Phys Ther. 2017 Nov 28