RUHANI COLLEGE
OF HEALTH BUSINESS AND TECHNOLOGY

RU RMT 19 · REMEDIAL EXERCISE & KINESIOLOGY

Cervical & Thoracic Exercises I

Regional Anatomy, Resistance Principles & Deep Cervical Retraining

Registered Massage Therapy Diploma Program
Ruhani College
Lecture 9 of the RU RMT 19 series
Primary text: Kisner & Colby, Therapeutic Exercise ('K&C')

01

Introduction & Learning Objectives

Where this lecture sits in the program, and what you should be able to do by the end of it.

Learning Objectives

By the end of Lecture 9, the learner will be able to:

- Identify and describe the principal muscles of the cervical and thoracic region and their primary actions
- Explain the purpose of resistance (weight-training) exercise and distinguish isometric, isotonic, concentric and eccentric contraction
- Differentiate muscle power, muscle strength and muscle endurance as measures of muscular performance
- Instruct and cue deep cervical flexor (longus colli) retraining in two progressive parts
- Instruct cervical extensor and cervical lateral flexor strengthening with appropriate isometric dosage
- Select equipment and design a progressive, pain-free home-care program within the RMT scope of practice
- Document exercise prescription and obtain informed consent consistent with CMTCA competency expectations

How Remedial Exercise Fits Massage Therapy Practice

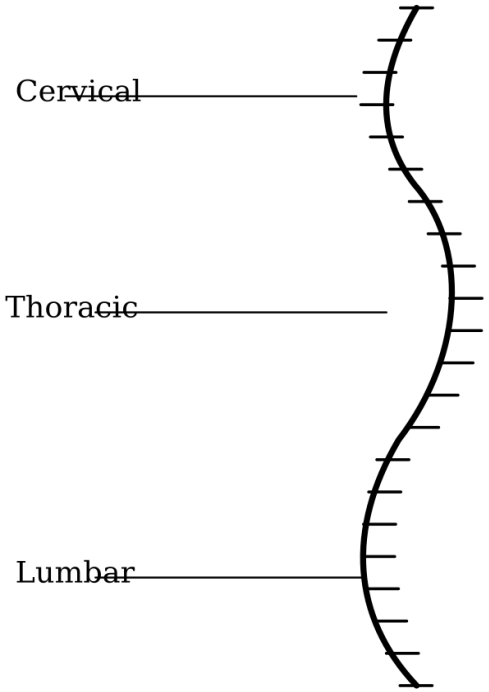
- Remedial exercise is a self-care and rehabilitative adjunct to hands-on treatment, not a replacement for it
- The RMT prescribes, teaches, cues and progresses exercise; the client performs it independently between visits
- Goals across this unit: restore length-tension balance, improve postural endurance, and reduce symptom recurrence
- Every prescription must be:
  - Individualized to the client's presentation, goals and tolerance
  - Kept within pain-free active range of motion (AROM)
  - Supported by clear instruction, demonstration and written home-care
  - Documented, consented and reassessed at each visit
- Refer out when signs fall outside scope (e.g., progressive neurological deficit, red-flag pathology)

02

Regional Anatomy: Structures Involved

The muscles that generate, guide and stabilize cervical and thoracic movement.

Structures Involved



Cervical, thoracic and lumbar curves of the vertebral column

The exercises in this unit target and coordinate the following structures:

- Cervical extensors — splenius capitis, splenius cervicis
- Longus colli — deep cervical flexor
- Trapezius — upper, middle and lower fibres
- Scalenes — anterior, middle and posterior
- Levator scapula
- Erector spinae — cervical and thoracic portions
- Rhomboids — major and minor
- Pectoralis — major and minor

Video resource: youtu.be/Nc9wUD70HoU

Cervical Extensors — Splenius Capitis & Cervicis

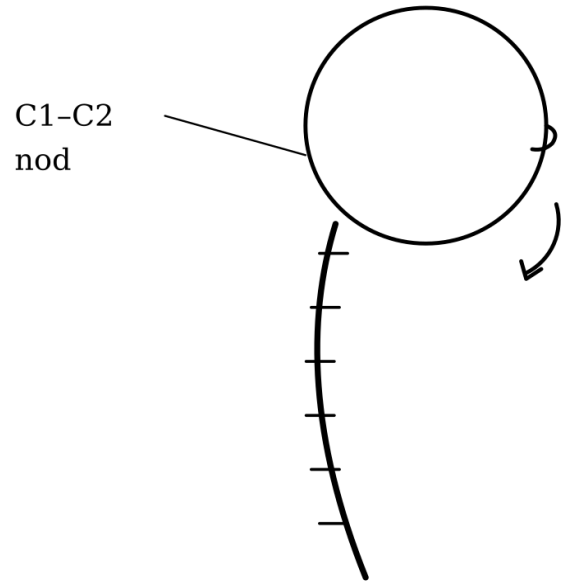
K&C p. 454

- Location: superficial posterior neck, running from the spinous processes and nuchal ligament up to the mastoid/occiput (capitis) and upper cervical transverse processes (cervicis)
- Primary actions:
  - Bilateral contraction → cervical extension
  - Unilateral contraction → ipsilateral lateral flexion and rotation of the head/neck
- Function: postural control of the head, decelerating cervical flexion and guiding return to neutral
- Clinical note: often chronically loaded in forward-head postures; can be simultaneously overworked and lengthened
- Grouped with the cervical erectors, upper-fibre trapezius and levator scapula when we retrain the extensor system

Longus Colli — Deep Cervical Flexor

K&C p. 391, 399, 452–453

- Deep anterior neck muscle running along the front of the cervical vertebral bodies (C1–T3)
- Provides dynamic segmental support to the cervical spine and head
- Key role in axial extension (cervical retraction) and works with the SCM for cervical flexion
- Commonly injured in rear-end collisions producing whiplash
- Frequently weak and inhibited in forward-head posture and upper crossed syndrome
- This is the primary retraining target of the deep cervical flexor exercises later in this lecture



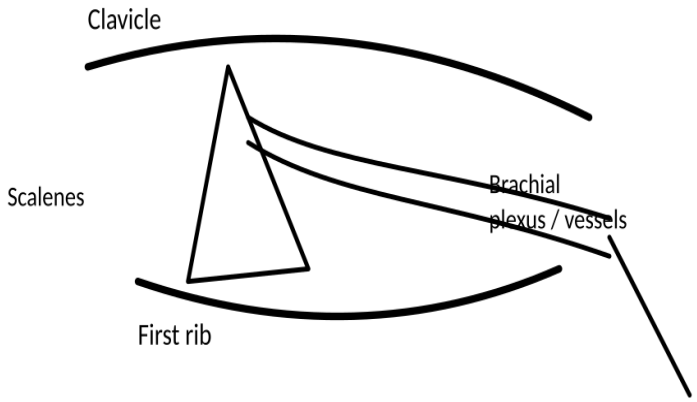
Craniocervical 'yes' nod — subtle C1–C2 motion

Trapezius — Upper, Middle & Lower Fibres

- Large superficial muscle spanning occiput and cervicothoracic spine to the scapula and clavicle; three functional divisions:
  - Upper fibres — elevate the scapula, assist cervical extension/lateral flexion; commonly tight in postural dysfunction
  - Middle fibres — retract (adduct) the scapula; commonly weak and lengthened
  - Lower fibres — depress and upwardly rotate the scapula; commonly weak
- Together the three divisions upwardly rotate the scapula for overhead reach and stabilize it against the thorax
- Balance matters more than raw strength: upper-fibre dominance with weak mid/lower fibres is a classic postural pattern

Scalenes — Anterior, Middle & Posterior

- Three paired muscles from the cervical transverse processes to the first two ribs
- Actions:
  - Bilateral — assist cervical flexion and elevate the upper ribs (accessory inspiration)
  - Unilateral — ipsilateral lateral flexion and rotation of the neck
- Border the thoracic outlet: the brachial plexus and subclavian vessels pass between/near them
- Tightness can contribute to thoracic outlet syndrome and to referred arm symptoms
- Involved in torticollis and are a target for both stretching and, when weak, strengthening



Scalenes bordering the thoracic outlet (schematic)

Levator Scapula

- Runs from the transverse processes of C1–C4 to the superior medial border of the scapula
- Primary actions:
  - Elevates the scapula
  - Downwardly rotates the scapula (glenoid tips down)
  - Assists ipsilateral cervical lateral flexion and rotation
- A very common site of neck/shoulder tension and trigger points, especially with sustained desk posture
- Grouped with upper trapezius as a chronically tight elevator in postural syndromes
- Its downward-rotation action opposes the trapezius's upward rotation — imbalance affects scapular mechanics

Erector Spinae — Cervical & Thoracic Portions

- The erector spinae group (iliocostalis, longissimus, spinalis) runs vertically along the spine in three columns
- Cervical and thoracic portions extend the spine and control (decelerate) forward flexion
- Unilateral contraction produces ipsilateral lateral flexion
- Principal postural extensors: they hold the trunk and head upright against gravity throughout the day
- In hyperkyphosis the thoracic extensors are lengthened and endurance-poor — a strengthening target
- Endurance, not maximal strength, is usually the priority for these postural muscles

Rhomboids — Major & Minor

- Deep to trapezius, running from the spinous processes (C7–T5 region) down and out to the medial border of the scapula
- Primary actions:
  - Retract (adduct) the scapula
  - Elevate and downwardly rotate the scapula
  - Stabilize the scapula against the thorax during arm movement
- Commonly weak and lengthened in protracted-shoulder / rounded-back postures
- A key strengthening target in hyperkyphosis and upper crossed syndrome (scapular retraction work)

Pectoralis — Major & Minor

- Pectoralis major: broad chest muscle; flexes, adducts and medially rotates the humerus
- Pectoralis minor: deep to major, from ribs 3–5 to the coracoid process; protracts and downwardly rotates the scapula and depresses it
- Pec minor tightness tilts the scapula anteriorly, rounding the shoulders and contributing to forward-head posture
- Chronically shortened/tight in the classic desk-posture pattern
- A primary stretching target in hyperkyphosis and upper crossed syndrome
- Pec minor also borders the neurovascular bundle and can contribute to thoracic outlet symptoms

Functional Relationships: Facilitated vs Inhibited

Commonly Tight / Facilitated

- Upper-fibre trapezius
- Levator scapula
- Scalenes
- Suboccipitals
- Pectoralis major & minor
- Cervical extensors (can be short & overworked)

Commonly Weak / Inhibited

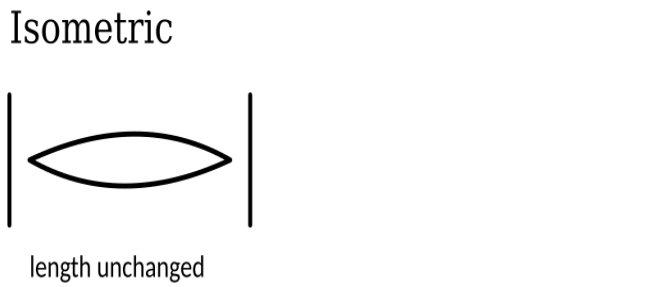
- Deep cervical flexors (longus colli)
- Middle & lower trapezius
- Rhomboids major & minor
- Thoracic erector spinae (endurance)
- Serratus anterior
- Deep neck / postural stabilizers

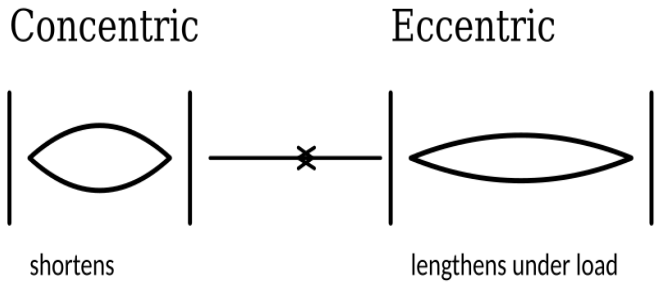
03

Principles of Resistance Exercise

How muscular contraction builds strength, endurance and size — and how we measure it.

Resistance Exercise — Purpose





Contraction types by change in muscle length

Resistance exercise (weight training) induces muscular contraction to build strength, anaerobic endurance and the size of skeletal muscle.

- Isometric — joint angle and muscle length do not change during the contraction
- Isotonic — tension is held constant while the muscle's length changes and velocity varies:
  - Concentric — tension overcomes the load and the muscle shortens as it contracts
  - Eccentric — tension is insufficient to overcome the load, so the muscle lengthens as it contracts; this decelerates the joint at the end of a movement

Isometric Contraction in Cervical Retraining

- Definition: muscle generates tension with no change in length and no visible joint movement
- Why it is the entry point for the neck:
  - Low mechanical stress on irritable or recently injured tissue
  - Allows motor re-education of deep stabilizers before adding movement
  - Easy to control within a pain-free range
- Standard dosage in this unit: hold 1–5 seconds, then slowly release; build to longer holds and more repetitions for endurance
- Used for deep cervical flexors, cervical extensors and cervical lateral flexors before progressing to dynamic/resisted work

Isotonic Work: Concentric & Eccentric

Concentric

- Muscle shortens under load
- Overcomes the resistance
- The 'lifting' phase of a movement
- Example: raising the head against gravity
- Generally less muscle soreness than eccentric

Eccentric

- Muscle lengthens under load
- Cannot overcome the resistance
- The 'lowering' / controlling phase
- Decelerates the joint at end-range
- Strong stimulus, but more delayed-onset soreness — progress carefully

Measuring Muscular Performance

Quality	What it is	Trained by / clinical use
Muscle strength	Maximal force a muscle can produce in a single effort	Higher load, lower repetitions; restore baseline capacity
Muscle power	Force produced quickly — strength × speed	Explosive or faster efforts; later-stage, function/sport goals
Muscle endurance	Ability to sustain or repeat contractions over time	Lower load, higher repetitions; the priority for postural muscles

Equipment for Resistance Exercise

Contraction can be loaded with body weight, gravity, manual resistance or simple equipment:

- Resistance bands — graded, portable, ideal for home programs
- Tubing — similar to bands; useful for pulling/retraction patterns
- Free weights — dumbbells for controlled strengthening
- Barbells — for larger, later-stage loading (used with caution near the neck)
- Stability ball — adds a balance/core-stability demand
- Wobble boards — challenge balance and postural reflexes
- Also: gravity, the treatment table as a resistance surface, and the client's own hand for manual isometrics

Exercise Prescription — Dosage Framework

Variable	Typical starting guidance in this unit
Type	ROM, stretch, isometric, or strengthening — matched to the finding
Intensity	Pain-free; light load or body weight first; progress gradually
Hold / tempo	Isometric holds 1–5 s (build to 5–10 s); slow, controlled release
Repetitions	≈ 10 reps to start; adjust to fatigue and tolerance
Sets & frequency	1–3 sets; often daily / several times daily for postural drills
Progression	Add range, load, reps, holds or an instability challenge — one at a time

04

Deep Cervical Flexors (Longus Colli)

Retraining the deep stabilizer of the cervical spine in two progressive parts.

Longus Colli — Clinical Relevance

K&C p. 391, 399, 452–453

- Provides dynamic, segment-by-segment support to the cervical spine and head
- Central to axial extension (cervical retraction) and, with the SCM, to cervical flexion
- Commonly injured in rear-end accidents that produce whiplash
- Weak and inhibited in forward-head posture and upper crossed syndrome, allowing the head to drift forward
- Retraining strategy — break the motion into two parts:
  - Part 1: a slow, controlled craniocervical nod ('yes' motion)
  - Part 2: axial extension (cervical retraction) held isometrically
- Begin supine with knees bent so the head is supported and gravity is neutral

Video resource: youtu.be/y4YTIhSBtxc

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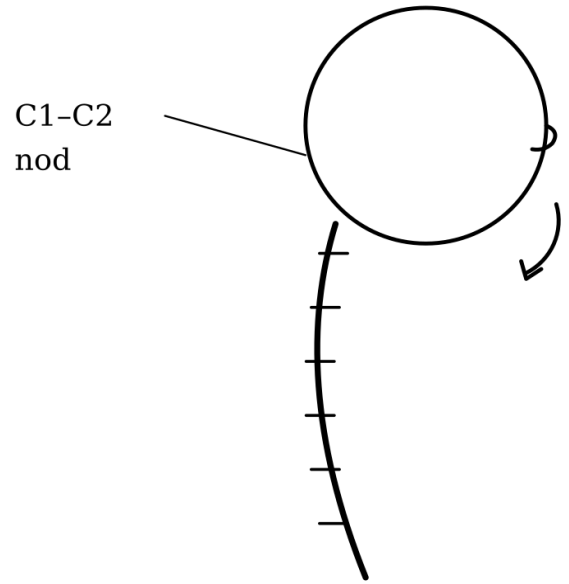
Longus Colli — Part 1: The 'Yes' Nod

- Position: supine with knees bent, head resting and supported
- Action: perform a slow, controlled nodding motion of the head — the 'yes' motion
- Cue the motion to occur only at C1–C2 — this is craniocervical flexion
- The chin glides gently toward the throat; the back of the head stays down
- Avoid lifting the head or jutting the chin — that recruits SCM/scalenes instead of the deep flexors
- Hold 1–5 seconds, then slowly release



Focus the motion at C1–C2 (craniocervical flexion)

Longus Colli — Refining Craniocervical Flexion

- The quality of the nod matters more than the size — small, precise, isolated motion
- Reinforce that only the upper cervical segments (C1–C2) should move
- Common substitutions to correct:
  - Head lift (using SCM as a prime mover)
  - Chin poke / jut (extension of the upper cervical spine)
  - Breath-holding or jaw clenching
- Progress only once the isolated nod is performed cleanly and comfortably
- Build endurance by increasing hold time and repetitions before adding resistance
- A pressure biofeedback cuff (behind the neck) can help confirm correct, low-level activation

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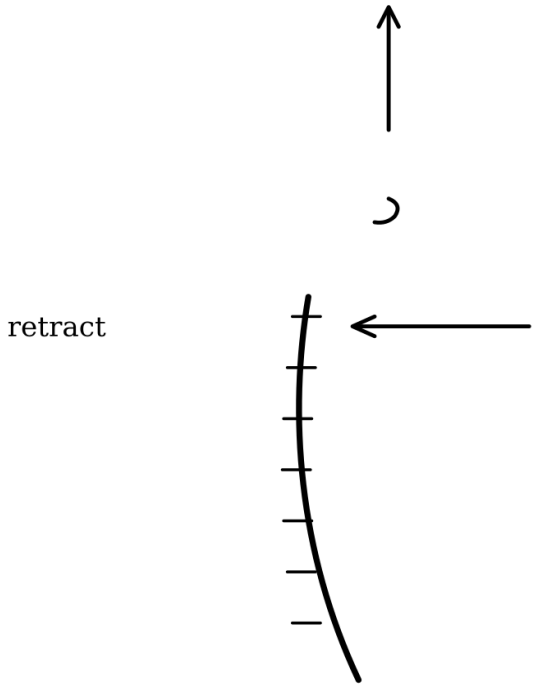
Longus Colli — Part 2: Axial Extension

Once Part 1 is performed safely, add axial extension (cervical retraction):

- Slight flattening of the cervical lordosis — feel as though lifting the top/crown of the head
- Flattening of the upper thoracic kyphosis — try to keep the back of the neck toward the ground
- Hold this position isometrically to build resistance and endurance
- Hold 1–5 seconds and slowly release
- Typically taught seated for carry-over to daily posture, but can also be done supine



Lengthen the crown upward; gently flatten the curves

Longus Colli — Progression & Integration

- Progression sequence:
  - Supine nod (Part 1) → supine axial extension (Part 2)
  - → Seated axial extension for postural carry-over
  - → Add gentle manual or gravitational resistance and longer holds
  - → Integrate with scapular setting and upright sitting posture
- Pair with pectoral and upper-trapezius lengthening for a balanced program
- Prescribe as a frequent 'micro-drill' — brief, several times daily — rather than one long session
- This deep-flexor endurance is the foundation for correcting forward-head posture in Lecture 10

05

Extensors, Lateral Flexors & Program Design

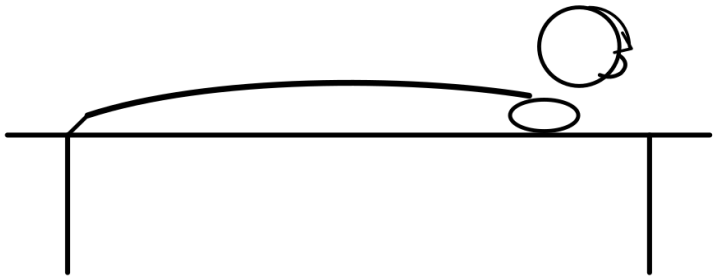
Strengthening the posterior and lateral cervical systems, then assembling a safe program.

Cervical Extensors — Prone Strengthening

K&C p. 454

Targets the cervical erectors, upper-fibre trapezius and levator scapula (bilaterally).

- Position: prone with a towel roll under the forehead, arms at the sides
- Lift the forehead slightly off the table while keeping the chin tucked
- Eyes focus on the table; maintain a neutral spinal position
- Cue to lift the head toward the ceiling without looking up (no upper-cervical extension)
- The lift is a small motion — quality over height
- This reinforces the craniocervical flexion learned supine, now against gravity



Prone, towel roll under forehead, small head lift

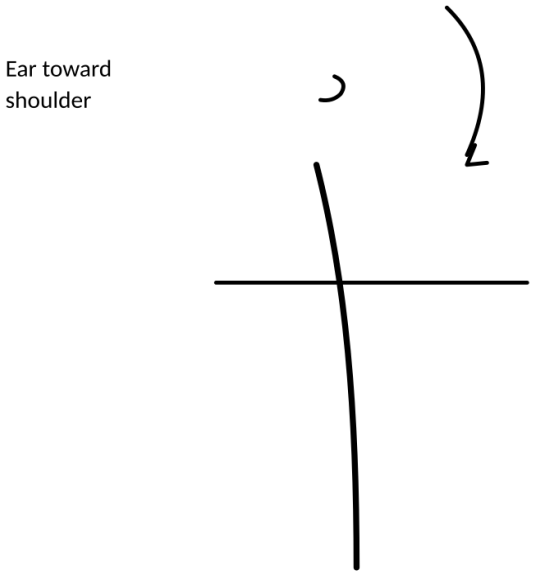
Cervical Extensors — Dosage & Progression

- Hold the contraction isometrically for 1–5 seconds, then slowly release and lower the head back down
- Before progressing, confirm the client can:
  - Properly activate the core musculature
  - Assume and maintain a neutral cervical posture
- To progress this action:
  - Move to supine and use the table as resistance
  - Add motions of the extremities to strengthen stabilizers and increase muscular endurance
- Keep loads light and ranges pain-free; increase reps/holds before adding resistance

Cervical Lateral Flexors

Targets the scalenes, upper-fibre trapezius and levator scapula (ipsilateral).

- Action: bring the ear toward the shoulder (lateral flexion) without rotating or flexing the neck
- Hold the contraction isometrically for 1–5 seconds, then slowly release
- Can be performed either seated or supine
- Keep the motion pure — shoulder stays down, no shrugging or head turn



Ear toward shoulder — ipsilateral lateral flexion

Cervical Lateral Flexors — Progression

- Begin with unresisted, pain-free active lateral flexion and short isometric holds
- To progress this action, add resistance using:
  - Gravity (position dependent — e.g., side-lying for a gravity challenge)
  - The client's own hand for a manual isometric
  - A resistance band for graded, controlled load
- Increase hold time and repetitions before increasing resistance
- Train both sides; note and address asymmetries in strength or comfort
- Especially relevant to torticollis and post-whiplash lateral imbalances (Lecture 10)

Isometric Dosage — Quick Reference

- Standard neck isometric: hold 1–5 seconds → slow, controlled release
- Build endurance by increasing hold duration (toward 5–10 s) and repetitions (≈ 10) before adding load
- Keep effort submaximal and pain-free throughout
- Cue continuous, relaxed breathing — no breath-holding or jaw clenching
- Frequency: short, frequent bouts suit postural muscles better than one long session
- Reassess response before progressing; regress if symptoms increase or form degrades

Contraindications, Precautions & Safety

- Stay within pain-free active range of motion at all times — pain is a stop signal, not something to push through
- Screen for red flags before prescribing cervical exercise:
  - Progressive or severe neurological signs (weakness, numbness, bilateral symptoms)
  - Dizziness, visual disturbance or symptoms suggesting vascular involvement
  - Signs of instability, acute fracture history or unexplained persistent symptoms
- Avoid aggressive end-range loading and ballistic movements in the irritable cervical spine
- Introduce load gradually; watch for delayed-onset soreness with new eccentric work
- When findings fall outside the RMT scope, refer to the appropriate health professional

Client Education, Cueing & Breathing

- Demonstrate first, then have the client perform while you observe and correct
- Use plain-language cues and imagery (e.g., 'tiny yes,' 'grow tall through the crown,' 'long neck')
- Emphasize relaxed diaphragmatic breathing — no breath-holding, jaw clenching or gripping
- Teach clients to self-monitor for the correct sensation and to stop with pain
- Provide clear written or illustrated home-care with sets, reps, holds and frequency
- Confirm understanding with teach-back; check technique again at the next visit

Documentation, Consent & CMTCA Competencies

- Obtain and record informed consent for exercise prescription as part of the treatment plan
- Document, at minimum:
  - Assessment findings that justify the exercises chosen
  - Each exercise: type, dosage (reps/sets/holds/frequency/duration) and instructions given
  - Education provided, client response and any modifications
  - Reassessment and progression/regression at each visit
- Align records with CMTCA performance expectations: assess, plan, treat/educate, evaluate, document
- Clear records support continuity of care, communication and professional accountability

Scope of Practice & When to Refer

- Within scope: assessment of movement/posture, exercise prescription, instruction, education and progression
- Not within scope: medical diagnosis, prescribing medication, or managing pathology requiring other providers
- Refer or co-manage when you observe:
  - Red-flag or progressive neurological findings
  - Symptoms not responding as expected, or worsening with care
  - Conditions needing medical, physiotherapy or specialist input
- Communicate and document referrals clearly and follow up on outcomes

Designing the Home-Care Program

Build It

- Start with 2–4 key exercises, not a long list
- Sequence: mobility → activation → strengthening
- Balance: lengthen the tight, strengthen the weak
- Set clear dosage: reps, sets, holds, frequency
- Prefer brief, frequent postural micro-drills

Keep It Working

- Written/illustrated instructions to take home
- Modifications to increase or decrease difficulty
- Tie exercises to daily cues (e.g., every desk break)
- Review technique and adherence each visit
- Progress one variable at a time; regress with pain

Summary & References

- **The cervicothoracic region works as balanced pairs of facilitated and inhibited muscles**
- Resistance exercise builds strength, endurance and size via isometric, concentric and eccentric contraction
- Deep cervical flexor (longus colli) retraining is the two-part foundation: the 'yes' nod, then axial extension
- Cervical extensors and lateral flexors are strengthened with light, pain-free isometrics and progressive loading
- Prescribe with a clear dosage framework, educate thoroughly, document, consent and reassess
- **Next — Lecture 10: applying these tools to hyperkyphosis, forward-head posture, UCS, headaches, torticollis and whiplash, with case studies**
- *References: Kisner & Colby, Therapeutic Exercise ('K&C', pp. 391, 399, 452–454); CMTCA competency standards; CMTO Standards of Practice. Verify all page references against the current edition before delivery.*