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Aquatic Interventions for the Upper Quadrant

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Learning Outcomes

As a result of this course, participants will be able to:

- write at least two medical justification statements supporting aquatic therapy interventions in the treatment of upper quadrant dysfunction.
- Identify at least five basic rehabilitation goals for upper quadrant impairments (decrease pain, reduce muscle tension, increase mobility, improve muscle balance, and restore postural awareness) with appropriate aquatic therapy interventions.
- Based on research, participants will be able to describe at least two important factors of thoracic spine mobility in relationship to shoulder, neck dysfunction, and pain.
- Progress a client through water exercises to improve posture, increase upper quadrant strength and decrease stress/ tension in the cervical muscles.

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Discussion Question

- How do you justify utilizing the aquatic environment to achieve rehabilitation goals for clients with upper quadrant impairments?

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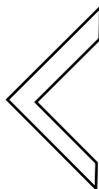
Clinical Decision: Aquatic Therapy Treatment of Choice?



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Shoulder Muscle Activation Aquatic and Dry Land Comparison (Kelly et al. 2000)



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Buoyancy

- Buoyancy provides an environment allowing active assistive shoulder elevation, reducing pain and compensation of upper trapezius.
- Buoyancy supports weight of the upper extremities allowing for activation and strengthening of scapular thoracic muscles (middle and lower trapezius) without reduced upper trapezius over activation.

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How does the water help the cervical spine?



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Especially when the head is out of the water?



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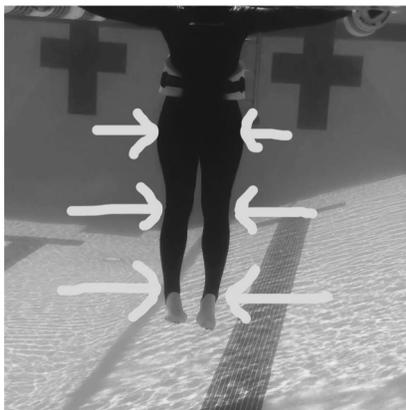
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Clinical Pearl

- 1st Observe cervical motion noting range, pain and quality of movement.
- 2nd Support the weight of the client's arms and observe motion a second time.
- If ROM increases and/or pain diminishes while arms are supported, the use of aquatic exercise in the rehabilitation plan is reinforced

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Hydrostatic Pressure



- Reduces edema
- Reduces lymphedema
- Provides input to help decrease tactile defensiveness

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Muscle Activation with Backward Walking: Drag force influence....

Backward walking in water resulted in significantly higher muscle activity of the **paraspinals** (increased 61%), **vastus medialis** (increase 83%) and **tibialis anterior** (increase 47%) compared to walking forward in the water.

Musumoto & Mercer 2008

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Drag force for strengthening

Remember surface area and speed
will influence level of resistance.

Often best to increase speed before
adding extra equipment

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Drag force: Added benefit....

- Trunk muscle co-contraction occurs with open-chain water-based exercise promoting balance and stability. Everybody needs core body strengthening.



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Effectiveness of Aquatic Therapy on Increasing ROM and Decreasing Pain in the Rehabilitation of Patient's with Shoulder Pathologies: A systematic Review (Leininger PM et al. 2018)

Conclusion: There is moderate to strong preliminary evidence suggesting use of AT as an adjunct to increase ROM and decrease pain in patients with Shoulder impingement syndrome and s/p R/C repair. In addition AT was found to improve sleep quality and overall function.

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Aquatic therapy and RCR Brady et al. 2008

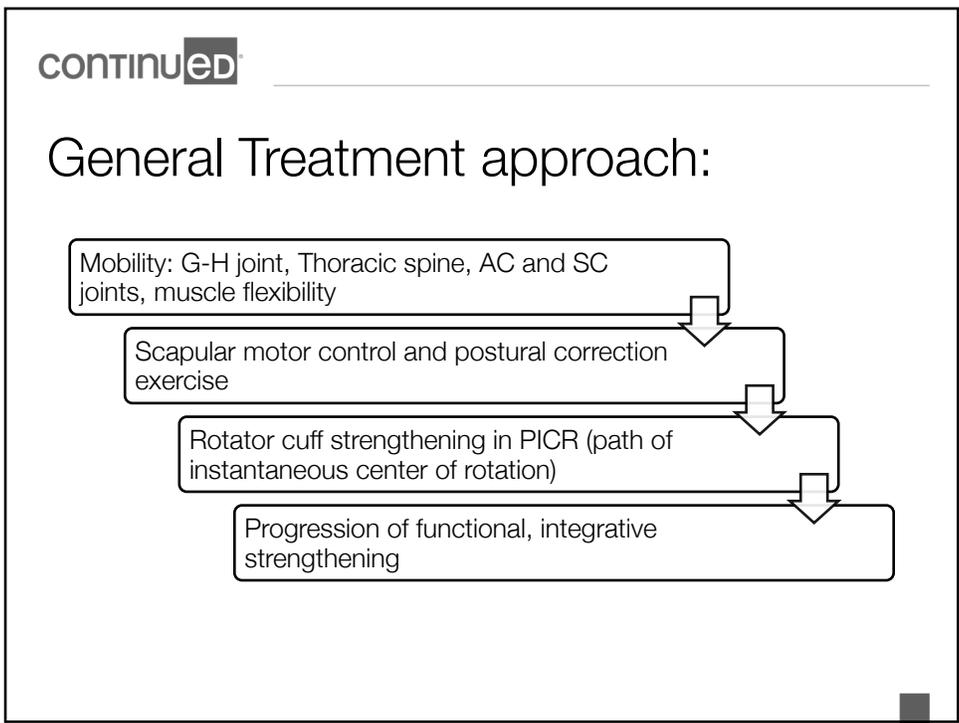
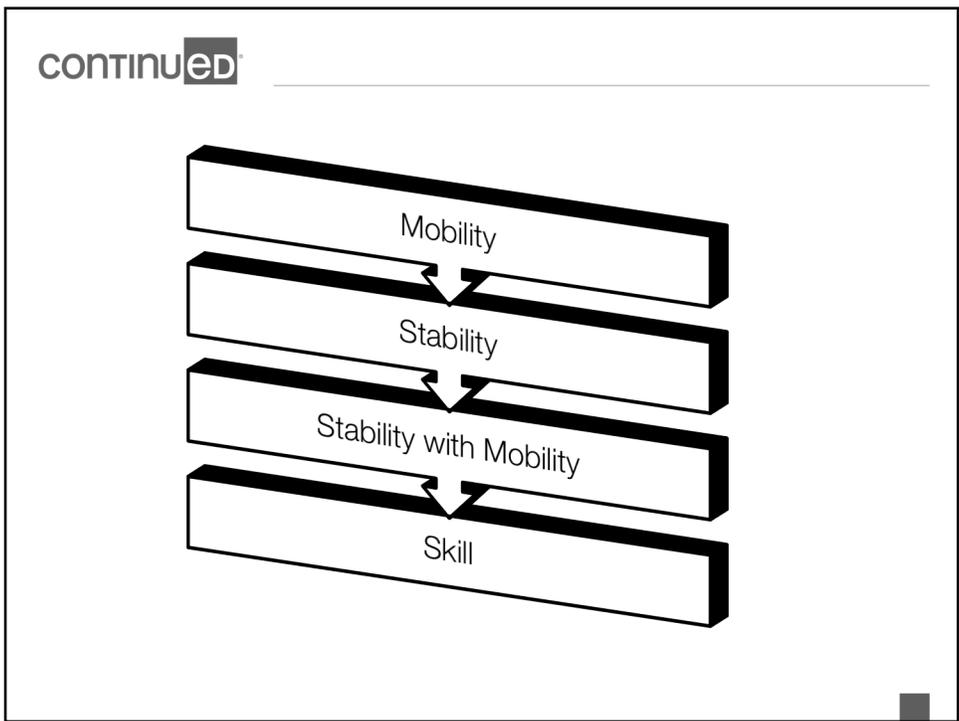
- N=18 (12 aquatic and land combined and 6 traditional land-based protocol)
- Significant improvement in ROM and Western Ontario Rotator cuff Index in all subjects, aquatic based group passive flexion range of motion measures at 3 weeks avg. 46 degrees and at 6 weeks was 30 degrees
- No difference in attendance rates or patient perceptions between the groups

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Rehabilitation Goals...

- Restore mobility
- Reduce/ eliminate pain
- Increase strength and endurance
- Reestablish postural awareness and position sense
- Return to highest level of function possible

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Stretch what is tight then
strengthen what is weak....

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Upper Quadrant Connections

- Cervical Spine
- Thoracic spine
- Shoulder girdle
- Upper extremity



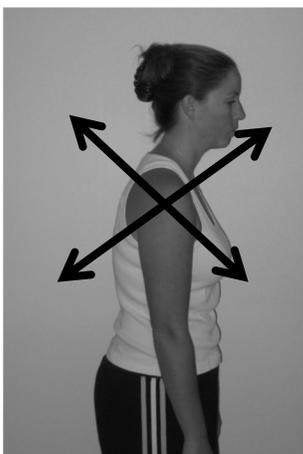
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How does Muscle Length relate to Posture and Mobility?

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Weak
Deep cervical flexors
Middle trapezius
Lower trapezius
Serratus anterior
Thoracic paraspinals



Tight
Pectorals
Levator scapulae
Upper trapezius
Suboccipitals
SCM
Scalenes

Upper Crossed Syndrome

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Mobility

- Joint mobilization
- Myofascial release techniques (AquaStretch™, IASTM, etc.)
- Muscle stretching



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Pectoralis Tightness = Evil Villain of the Upper Quadrant.

- Contributes to muscle/ joint imbalance seen in subacromial impingement syndrome
- Study concludes that implementation of pectoralis minor Gross Stretch in conjunction with conventional treatment in the treatment of Adhesive Capsulitis is beneficial. (Int J Pharm Bio Sci 2017 Apr; 8(2): (B) 193-199)
- Contributes to compression of cervical spine



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Pectoral stretches

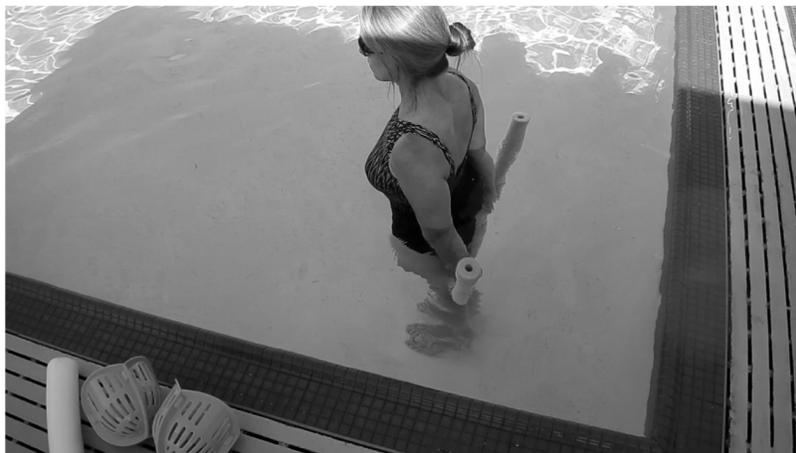


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Using the noodle



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Manual Therapy Techniques

- Buoyancy supported patient
- Must consider therapist position patient position and manual contacts
- Stabilization is different, use the water
- Caution when in pool with others as unexpected turbulence can change patient and therapist's positions.

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Collar Choice



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Challenges with Supine Activity

- Cervical spine issues/ decrease tolerance to neck collar
- Ear problems/ hearing aids
- Vertigo
- Sensitivity to light
- Fear
- Wet hair

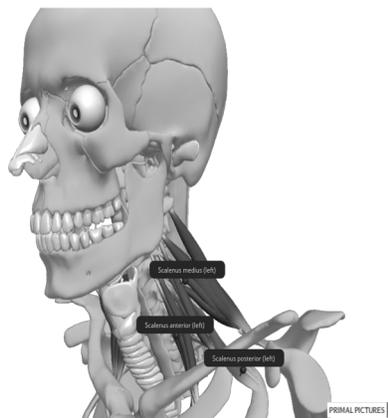
Can't touch this!



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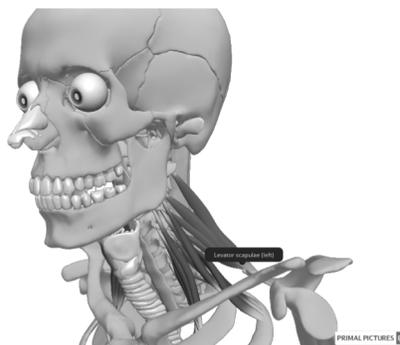
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Scalene Muscles



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Levator Scapulae



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Upper Trapezius



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Cervical Traction



Neck grip



Occipital grip



Mastoid grip



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Supine, PROM, Shld Abd/Add.



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Shoulder



Posterior Capsule



Latissimus Dorsi

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AquaStretch™



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Benefits of AquaStretch™



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Signed up and ready for MUA...



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Results in one session:
total procedure, cleared STJ,
20 minutes on shoulder....



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Thoracic Spine = Link



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Thoracic Spine Mobility and Shoulder Pain

- Strunce et al. (2009) found 51% reduction of shoulder pain and increase of shoulder ROM (30-38 degrees) immediately following HVLA manipulation of the thoracic spine or ribs.
- Mintken et al (2010) found that patients with shoulder pain who present with 3 or more of the following would benefit from manual therapy.
 - Pain free shoulder flexion is less than 127 degrees
 - Shoulder internal rotation less than 53 degrees
 - Neer's impingement test is negative
 - The patient is not taking medications
 - The symptoms have been present less than 90 days

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How does posture and alignment affect your mobility?

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Research has demonstrated thoracic spine position influences shoulder mobility

- Kebaetse et al.(1999) found that with a slouched posture the scapula was significantly more elevated in the interval 0-90 degrees of abduction and between 90 degrees and maximal abduction the slouched posture produced significantly less scapular posterior tilting. Subjects performing abduction in a slouched posture presented with **23.6 +/- 10.7** degrees less motion compared to ideal postural alignment.
- Thoracic posture affects shoulder function (Bullock 2005, Lewis 2005)
- Significant movement in the thoracic spine with arm elevation (Crosbie et al 2008)
- Increased thoracic kyphosis may influence shoulder function by abducting the scapula on the thoracic wall (Bowling et al 2006)



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Effects of Respiratory Muscle Exercise on Spinal Curvature (Obayashi, et al 2012)

- 26 healthy swimmers
- Exercise group performed respiratory muscle exercise 10min 3 x/ week for 4 weeks
- Results: reduced TS and LS angles, increased trunk flexion strength, improved pulmonary function forced vital capacity and forced expiration volume.

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Chest wall motion after thixotropy conditioning of inspiratory muscles in healthy humans (Izumizaki et al. 2006)

In this study, repetitive deep breathing resolved the stiffness of the rib cage and straightened thoracic kyphosis.

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Using Manual Feedback and Quick Stretch

1- Costal breathing -



2- Costal breathing -



Images and videos used courtesy of Physiotec

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Home program to facilitate posterior lateral chest expansion



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Keeping the mobility...



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Exercise for thoracic mobility...



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Stability



Involves postural stabilizers and co-contractions

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Muscles Involved in Stabilization



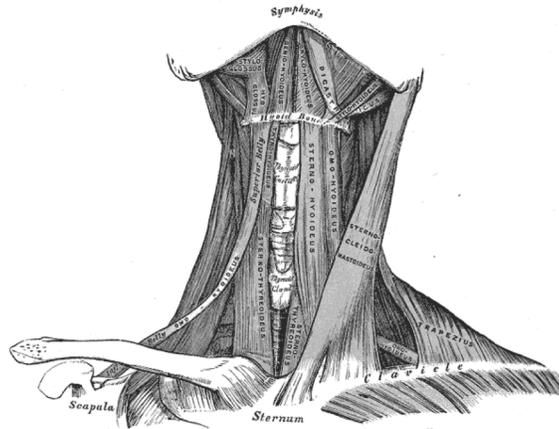
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Think Motor control vs. stillness

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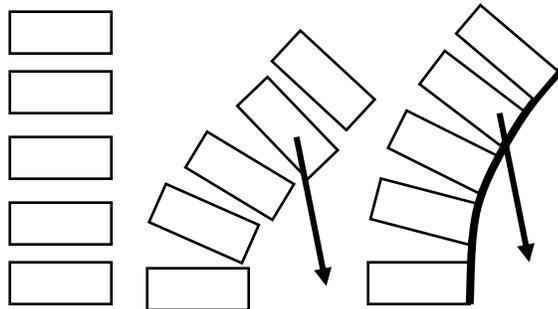
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Intrinsic/ deep neck flexors



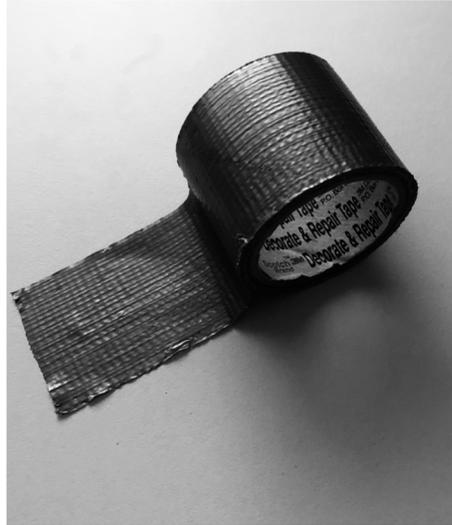
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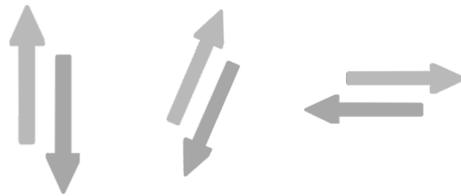
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Strengthening the deep neck flexors!

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The shoulder Blade Moves!

- Elevation/ depression
- Protraction / retraction
- Upward rotation/ downward rotation
- Internal rotation/ external rotation
- Tipping forward and backward



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How Many
Muscles Attach to
the Scapula?

17!

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Control the Shoulder Blade

- Setting the shoulder blade before starting a movement.
- Start with good posture
- Gently shrug shoulders up, then move back and finally relax down.

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Scapular
Dyskinesia

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Role of the Rotator Cuff...

- Rotates the humerus for throwing activities
- Stabilizes the humeral head in the glenoid. (keeps the ball in the center of the socket)

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Rhythmic Stabilization



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Closed Chain = Kinetic Chain Stability



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Stability with Mobility



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Head nods/ axial extension holds in various positions with various movements



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Get your hands on the shoulder/ feel that it is moving correctly and in alignment!



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Skill= Integration

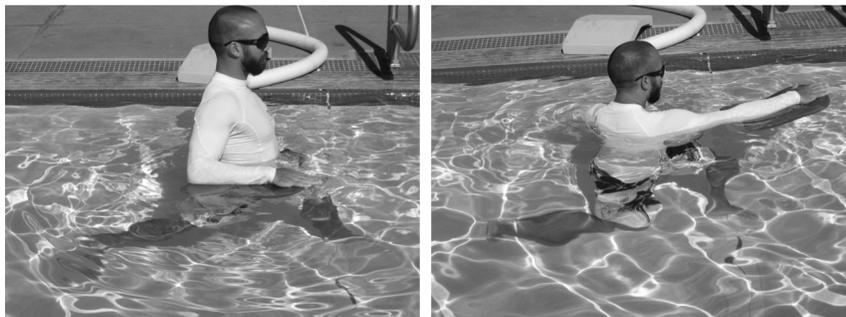


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Regional Interdependence



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Stir the pot



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Deep water ideas and considerations...



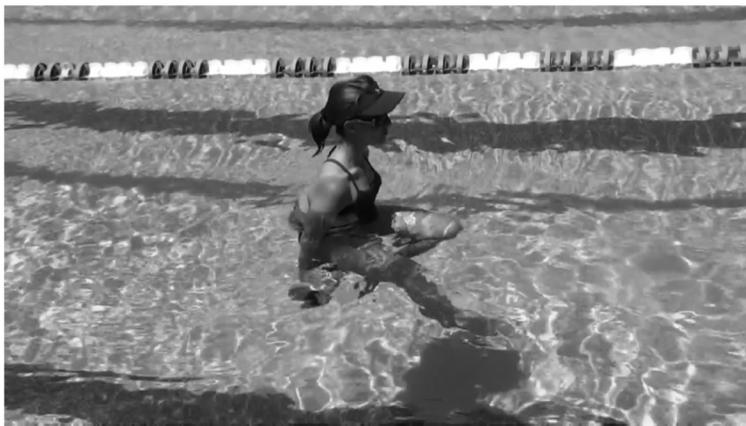
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Need to Train functional Push & Pull



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Integration



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Case Study Discussion

Secondary shoulder impingement....

- AROM with humeral head stability focus
- Lower and mid trap isometrics (rhythmic stabilization)
- Utilize buoyancy equipment when able to control upward movement, focus on scapular depression and eccentric control upward.
- Stretch tight muscles caution to avoid over stretching capsule

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