

Interactive Posture

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Gravity, it eventually gets us all. The challenge for our bodies is to maintain stability and move efficiently against the forces of gravity. Disease, injury, environment, emotions, body type, kinesthetic sense and repetitive activities can lead to adverse movement patterns and further dysfunction. Identifying abnormal movement patterns and understanding the interplay between gravity, buoyancy and our bodies is essential for the aquatic therapist.

Ideal alignment especially the curves of the spine are important in withstanding the forces of gravity. For a weight bearing joint to be stable the gravity line must fall through the joint's axis of rotation. For example: in standing the gravity line should fall just anterior to the knee and posterior to the patella this allows the knee to remain straight and the person upright without excessive forces at the joint or excessive effort from the quadriceps. If the gravity line falls anterior to the patella the forces of gravity tend to push the knee into hyperextension causing increased stress to the soft tissue of the posterior knee. This position causes the ACL to be on slack and over time leads to weakness of the ligament and possibly increasing risk of ACL injury in young women who tend to have this alignment. The first step in postural assessment is evaluation of where the gravity line falls at each joint.

Posture is often described based on static position, forward head, military style, sway back, kyphosis-lordosis and flat back are common postural syndromes described by Kendal. These syndromes, their associated impairments and pool exercises to address the problems are summarized in table 1 and 2. However people rarely remain still in space; in fact our bodies were designed to move. Dynamic Posture or more specifically how a person moves can provide a great deal more information about strength, flexibility and possible dysfunction compared to static positions. Sahrman describes movement pattern dysfunction. In both cases posture and movement are related to balance of muscle strength, flexibility and timing.

When assessing a person's movement first you must have a strong understanding of normal. Second look at the four S's of dynamic alignment. **Symmetry** of the movement involves comparing sides and quality throughout the range of movement. For example a person may be performing a squat and shift their weight away from the involved side weight bearing more on the uninvolved limb. Level of **Stability** of the body as whole and at each joint can indicate problematic areas. If during a single leg squat the therapist notices significant wobbling at the knee more so than the hip or ankle the knee may be the joint requiring the focus during exercise even if the person came in with an ankle problem. Muscle firing **Sequence** and appropriate **Synergist** muscle activity should follow normal patterns. Be vigilant for substitutions or awkward patterns in movements particularly in areas of pain or chronic dysfunction. Many patients with shoulder pain and impingement will use their upper trapezius to lift the arm leading to shoulder elevation and lack of scapular-humeral rhythm.

In addition to injury or weakness deviations from normal can be caused by repetitive movements and sustained postures in our every day lives. For example the person who sits at the computer for work and bike rides for exercise might present with stiffness in the hip flexor muscles limiting hip extension ROM during walking. Instead of shortening the steps the person's pelvis may anteriorly rotate and their spine extend excessively to compensate for the limited mobility at the hip. Further evaluation of the patient might reveal weakness in the oblique abdominal and gluteus maximus muscles. Correcting this dysfunction would involve strengthening the muscles that prevent or control anterior pelvic rotation (oblique abdominals and gluteus maximus) in addition to lengthening the hip flexors. There is no cookbook answer for movement dysfunction everyone is different, to keep it simple strengthen the muscles that are weak and lazy and improve flexibility of the stiff and tight muscles.

Prescribing exercise to correct the impairments is not enough, correct performance of the exercise is essential. This goes for correcting static and dynamic postures. People have their preferred movement patterns essentially the body's path of least resistance. Many people do not even have a sense of where their bodies lie in space. This lack of proprioception perpetuates faulty postures and movement patterns requiring constant feedback and education from the therapist along with concentration of task while exercising. Remember that practice does not make perfect, perfect practice makes perfect.

Table 1: Common Static Postural Syndromes

Syndrome	Common Alignment	Associated Impairments	
		Lengthened Weak	Strong Increased tension Shortened
Forward Head	Upper cervical spine extended Lower cervical spine flexed Chin anterior to chest	hyoid, lower cervical and thoracic erector spinae, middle and low trapezius, rhomboids	levator scapulae, SCM, scalenes, suboccipital, upper trap., pectoralis major and minor
Military- Type	Chest elevated Increased lumbar lordosis Pelvis anterior tilted Knees slightly hyperextended Ankles slightly plantar flexed	Hamstrings Abdominals	iliopsoas lower back extensors/ fascia
Sway-Back	Forward head Cervical spine slightly extended Increased thoracic flexion Flattening of lumbar spine Posterior tilt of pelvis Hip and knee joints hyperextended	One-joint hip flexors, external obliques, upper back extensors	Hamstrings Fibers of internal obliques
Flat-Back	Forward head Cervical spine slightly extended Upper T-spine increased flexion Lower T-spine straight Lumbar spine straight (flexed)	Iliopsoas Lumbar spine extensors	Hamstrings Stiff lower back
Kyphosis-Lordosis	Forward head Hyperextended cervical spine Abducted scapulae T-spine increased flexion Lumbar spine increased lordosis	Upper back extensors, middle and lower trapezius, rhomboids and lower abdominals, external obliques, hamstrings	Intercostals, pec major, serratus anterior, iliopsoas and possibly lower back

Table 2: Pool exercise for correction of static postures.

Interactive Posture: Exercises for **Flat Back Posture**

Therapeutic Goal	Exercise to address therapeutic goal	Focus of exercise/ key verbal cues
Increase flexibility of Hamstring muscles	Hamstring stretch with noodle or buoyant cuff at ankle	Stand against pool wall to start, focus on keeping neutral pelvis, can progress to mid pool as long as neutral is maintained.
	V-sit and reach (noodle or barbell under ankles)	Keep back straight and pelvis in neutral as you hinge at hips and reach towards ankles (hips will sink)
Strengthen iliopsoas	Standing knee and hip flexion progress to ankle weight or hip flexion with knee extended for greater lever arm and resistance	Keep pelvis in neutral, be sure pelvis does not tuck under or posteriorly rotate. Cue: abdominals into spine
Strengthen lumbar spine extensors	Vertical to prone in deep water with short bars (dumbbells) keeping trunk straight.	Watch cervical alignment
	Sit on Barbell or noodle (hips and knees at 90 degrees) row forward and backward	Keep trunk straight with neutral pelvis, watch cervical/ head alignment, with back ward row avoid slouching
Increase articulation/ mobility of the spine	Sit on noodle or barbell pelvic clock and circles	Keep shoulders still, movement is at waist/ pelvis
	Shoot through front to back and side to side (deep water)	Keep shoulders down, avoid excessive lumbar and hip extension

Interactive Posture: Exercises for **Sway Back Posture**

Therapeutic Goal	Exercise to address therapeutic goal	Focus of exercise/ key verbal cues
Correct forward head posture	Draw shoulder blades down and back, gently lift sternum	Cue to correct head and neck, do not allow chin to jut forward to control trunk, keep shoulders away from ears, keep back of neck long
Strengthen external obliques (focus on rib cage alignment)	Noodle overhead lift	Keep rib cage from moving forward or “popping” ribs
	Noodle press down (straight, to the left then to the right)	Keep spine aligned, do not allow ribs to pop do not flex spine to achieve motion (isometric contraction of abdominals)
Strengthen upper back extensors	Sit on noodle and row forward	Keep spine in neutral, do not let pelvis tuck under, do not let chin jut forward
Strengthen one joint hip flexors	Double knee to chest	Keep upper back straight
Stretch hamstrings	Noodle or buoyant cuff at ankle	Keep low back in neutral and upper back alignment

Interactive Posture: Exercises for **Kyphosis-Lordosis**

Therapeutic Goal	Exercise to address therapeutic goal	Focus of exercise/ key verbal cues
Correct forward head posture	Scapular depressions with short bars	Cue to correct head and neck, do not allow chin to jut forward to control trunk, keep shoulders away from ears
Strengthen mid and lower trapezius and rhomboid muscles	Shoulder horizontal abduction/ adduction emphasis on abduction (pressing back)	Keep drawing shoulders down, keep upper trapezius relaxed
Strengthen external obliques and lower abdominals	Opposite hand to knee Pelvic tilt against wall	Focus on keeping back straight and gaining abdominal/ oblique strength Gentle lengthening of low back tilting the pelvis posteriorly, keep upper back from flexing further
Strengthen upper back extensors	Sitting on noodle row forward, vary amount of shoulder abduction	Keep stomach muscles tight, avoid over arching low back or rounding shoulders forward
Stretch iliopsoas	Hip flexor stretch in lunge position Walking backwards	Keep abdominals in and gluts tight, do not let lordosis increase in low back Focus on hip extension without increasing lumbar lordosis (keep stomach muscles tight)
Stretch intercostals, pectoralis major	Noodle or barbell held behind body for stretch, can progress with pumping arms	Cue: lift sternum, keep rib cage aligned, keep back of neck long

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