Biomechanical Principles Checklist

You are looking for the What? Why? and How? of the Biomechanical Principles. What is the principle? Why do we promote it? What is it's purpose? And how do you promote it with the appropriate exercises?

1. Breathing

- In through the nose, out through the mouth with pursed lips
- Emphasis is on 3-D breath especially into the posterior and lateral aspects of the rib cage, because these tend to be under-utilized areas
- Exhaling deeply can also help activate the deep support muscles by engaging the transversus abdominis
- Explanation of the action of the transversus and how it stabilizes the lumbo-pelvic region, especially in neutral position
- The gentle contraction of the deep pelvic floor muscles also aids in firing the transversus abdominis
- This breath pattern helps avoid unnecessary tension in the neck and shoulders
- This breath pattern helps relaxation
- The rib cage opens out and up during an inhale, promoting spinal extension and closes in and down during exhale, promoting spinal flexion

2. Pelvic Placement

- In neutral pelvic placement, the natural lordotic curve of lumbar spine is present
- ASIS and Pubic Symphysis lie approximately in a horizontal plane drawn parallel to the floor when lying supine
- Neutral promotes good shock absorption and efficient movement patterns throughout body
- Neutral is usually used during closed kinetic chain activities
- Imprinted position is a slight posterior pelvic tilt with slight lumbar flexion and is used to gain stability if neutral cannot be maintained and often used during open kinetic chain activities
- Imprint involves shortening of obliques without activation of glutes

3. Rib Cage Placement

- Emphasis is put on breathing into the posterior and lateral aspects of the rib cage
- Abdominal wall attaches to the lower ribs. Be aware of maintaining abdominal engagement and not popping the ribs
- Abdominals stabilize rib cage and therefore spine during movement of the arms

- Used to keep the spine neutral and stable

4. Scapular Movement & Stabilization

- Scapula lacks bony attachment to the ribs and spine (only attaching to clavicle), thereby providing mobility to the upper limb, which must be counterbalanced with stability
- It is important to balance the surrounding muscles and to control the movement of the scapulae
- The scapulae should lie flat on the rib cage and glide across it without winging
- Protraction, retraction, elevation, depression, upward rotation and downward rotation are available movements
- Stabilizing the scapulae is necessary during the initiation of every exercise

5. Head & Cervical Placement

- Cervical spine should hold its natural curve (anterior convex) and the skull should be balanced directly above the shoulders in sitting or standing
- Pads or pillows may be needed in supine or prone to prevent hyperextension of the cervical spine
- Cervical spine should continue the line of the thoracic spine in neutral, during flexion, extension, lateral flexion and rotation
- Cranio-vertebral flexion, flexing the cranium on the first two vertebrae of the cervical spine, not jamming the chin into the chest, occurs initially when flexing the upper torso from a supine position
- Use these methods to (dynamically) stabilize the cervical area and avoid strain