

FUNDAMENTALS of POSTURE CARE MANAGEMENT in the 3 HUMAN POSTURAL ORIENTATIONS of LYING, SITTING, & STANDING

Who Benefits from Posture Care Management (PCM)?

Individuals with: ^{1, 2, 7, 8}

- Limited movement who are unable to change positions easily, independently, or with variety
- Postural deviations, asymmetries, and contractures
- Tone, spasticity, or sensory impairments that drive a specific posture

3 Human Postural Orientations

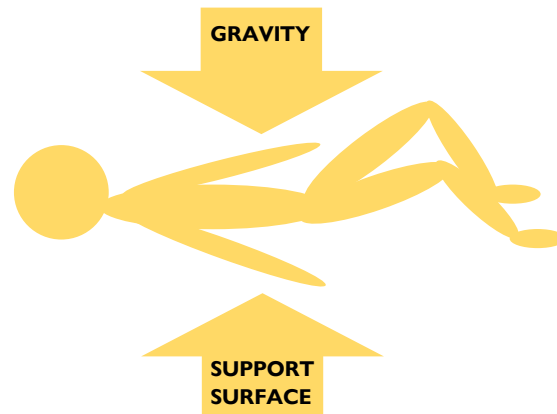
1. Lying
 - a. Supine (on back)
 - b. Prone (on stomach)
 - c. Side-lying
2. Sitting
3. Standing

Examples of Conditions

Cerebral Palsy (CP)
 Traumatic Brain Injury (TBI)
 Scoliosis
 Spinal Cord Injury (SCI)
 Spina Bifida
 Spinal Muscular Atrophy (SMA)
 Osteogenesis Imperfecta (OI)
 Amputation
 Muscular Dystrophy
 Angelman's Syndrome
 Chromosomal Abnormalities
 Rett Syndrome
 Amyotrophic Lateral Sclerosis (ALS)
 Ehlers-Danlos Syndrome (EDS)
 Schizencephaly
 Arnold Chiari Malformation
 Dementia
 Lennox-Gasteaux

Human Sandwich Effect ^{6, 7}

- Force of gravity pushing down
- Force of surface pushing up
- The body is "sandwiched" between these forces



Rather than allowing gravity to worsen body rotations, deviations, asymmetries, harness the force of gravity to gently promote aligned body positions over time. ^{6, 7, 10}

Dangers of Postural Deviations & Asymmetries ^{1, 3, 4, 5}

- Respiratory/digestive function
- Hip dislocation risk
- Increased pressure injury risk
- Compromised circulation
- Chronic pain
- Reduces ability to engage & function in everyday life
- Impaired mobility
- Impact on transfer ease
- Negative impact on mental health

Biomechanical Principles

PCM Begins at the Pelvis

- Stabilizing the pelvis securely provides a solid foundation for sitting, allowing a person to interact with the world and function to their best ability. ¹⁰
- Once the pelvis is stabilized, the focus can move up the spine and down the four limbs. ¹⁰
- A user's trunk control, balance, oral motor function, visual field, and engagement in their surroundings are all improved when the pelvis is stabilized. ¹⁰

“What happens at the lips and fingertips begins at the hips.” – Sammie Wakefield ¹⁰

The Impact of Multi-Joint Muscles on the Pelvis ¹⁰

Hamstrings

- Motion: extend (straighten) the hip and flex (bend) the knee
- Hamstrings shorten in people who sit much of the time, impeding full hip & knee range of motion ¹⁰

Hip Flexors

Quadriceps

- Motion: flexes hip & extends knee
- When seated, the quads are shortened, more anterior pelvic tilt is common ¹⁰
- Quads shorten in people who sit much of the time, impeding full hip & knee range of motion ¹⁰

Psoas Major

- Motion: flexes and externally rotates hip, and stabilizes low spine
- When shortened, increased anterior pelvic tilt and lumbar lordosis are seen, and full hip range of motion is limited ¹⁰

The Impact of the Pelvis on the Spine

- Tight hamstrings often cause posterior pelvic tilt, causing a kyphotic spine (rounded back) ¹⁰
- Tight hip flexors often cause anterior pelvic tilt, causing lordosis (swayback) ¹⁰
- When lordosis or kyphosis of the spine occur, the person must significantly flex/extend their neck to be able to see. Long-term neck flexion/extension limits functional neck mobility, effects breathing/swallowing, and can cause headaches. ¹⁰
- There is a correlation between developing pelvic obliquity/rotation, scoliosis, and trunk asymmetry, when a person's hips cannot flex equally ¹⁴
 - When one hip is higher (obliquity) or more forward (rotated) than the other, the spine will bend and/or rotate to compensate for the asymmetry of the pelvis. ¹⁴
 - When this happens, head-righting will often occur in order to preserve the visual field and orient the head symmetrically. The neck will rotate or flex to the side to compensate. ¹⁰
 - The ribcage rotates with the spine. Gravity will flatten the ribcage, pelvis, and spinal curvature in the rotated position, impacting internal capacity. ⁵

The Malleability of the Ribcage

- Made of many bones, cartilage, and muscle, the ribcage is easily distorted by gravity and body position ⁵
 - Ribs directly connect to the spine in the back of the ribcage
 - Ribs connect to the sternum (center bone) via cartilage, at the front of the ribcage, except for the 12th rib, which is “floating”
- The shape of the ribcage is easily distorted through body position and gravity, due to the many flexible junctions between bone and cartilage involved ⁵
- As the ribcage rotates and distorts over time, lung, heart, and digestive function can become seriously impacted as internal capacity reduces ⁵

PCM in Seated vs. Lying

Seated (working *against* gravity)

- Accommodate posture ¹⁰
- Maintain balanced pelvis ¹⁰
- Promote function and participation ¹⁰

Lying (*utilizing* gravity)

- Promote body symmetry and alignment ¹⁰
- Muscles naturally relax during sleep ¹⁰
- Correct/prevent postural deviations ¹⁰

Time Spent in Lying

- Children with a neurological impairment can spend about 10+ hours lying on average. ⁹
 - One study found that during a year, a girl spent 42% of her year lying at home in bed, and 45% at home seated/lying on couch, and 13% in school. ⁹
- PCM in lying should begin as soon as possible, as time spent in unsupported positions will increase the likelihood of postural deviations and asymmetries. ^{10, 11}
 - For children with cerebral palsy, or other young children who could benefit, 24/7 PCM should begin at the following ages: ¹¹
 - Lying: as soon as appropriate ¹¹
 - Sitting: from 6 months on ¹¹
 - Standing: from 12 months on ¹¹
- While PCM is important and commonly addressed for sitting and standing, the lying position is often overlooked.
 - The benefits of positioning in sitting and standing are counteracted while lying in an unsupported, asymmetrical position for many hours of the day/night. ¹⁰

Why is Supine the Best Lying Position?

Prone

- The heavy weight of the spinal column presses down on the ribcage, compressing the chest and internal organs, and worsening lumbar lordosis. ^{5, 7, 10}
- The head must turn to the side in order to breathe, rotating the neck and trunk. This promotes risk of neck contractures and pain. ¹

Side-Lying

- Difficult to avoid body rotation (spine, ribcage, pelvis, shoulder girdle) ⁷
- Increased risk for windswept posture, scoliosis, kyphosis, pelvic obliquity, etc. ¹⁵
- Likelihood of hip dislocation increases, as the top leg adducts, falling toward the surface ^{5, 10}
- More difficult to manage pressure distribution
 - Even if a person is turned side to side, pressure mapping studies show more even distribution of pressure if lying supine with postural supports ^{7, 12, 13}

Supine

- Provides a broad and symmetrical base of support, improving pressure management ^{1, 7, 12, 13}
- Allows for a body position that can be more easily aligned, controlling and limiting rotation ^{7, 10}
- Strategic use of postural supports can reduce and limit contractures and asymmetries, protecting the integrity of pelvis, spine, and ribcage posture ^{5, 10, 13}

Functional Outcomes of Posture Care Management (PCM)

Possible Improvements with PCM:

Improved postural alignment^{5, 18, 19}
Increased body symmetry^{18, 19, 20}
Decreased joint contractures¹³



Possible Outcomes:

Lessens pain, tone, spasms^{5, 18, 19, 21}
Improves respiratory, digestive, circulatory function^{4, 5}
Eases personal care/hygiene^{18, 21}
Increases sitting tolerance
Improves transfer ability
Delay/prevents surgical intervention¹
Increases participation in life^{1, 18}

Better sleep quality^{2, 19}



Increases focus, memory, concentration, alertness¹⁷
Improves emotional regulation¹⁷

Improved pressure distribution^{12, 13, 18}



Decreases tissue breakdown risk and associated complications^{12, 13, 18}

Decreased repositioning needs through the night^{2, 18}



Prevents disruption of sleep for both user and caregiver

Many Professionals May Promote PCM – Why Occupational Therapy?²²

What are Occupations?

- All the activities that a person does throughout the day or night to “occupy” their time¹⁶
- These include activities of daily living, rest/sleep, work, education, play, leisure, health management, social participation, etc.¹⁶

Why are Occupational Therapists (OTs) well equipped to address sleep and PCM?

- OTs view clients holistically, including their environment, mental and physical wellbeing, and motivations¹⁶
- OTs address seating and wheeled mobility, including positioning and stabilizing the body to promote alignment and function^{16, 22}

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