BACK SUPPORT: KEYSTONE TO SEATED FUNCTION & PHYSIOLOGY

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A keystone is something on which associated things depend for support. In any seating system, the back support is the keystone on which posture, pressure physiology & function depend. Understanding the relationship between the pelvis and spine is the basis for comprehending the asymmetries and orthopedic changes which can occur in seated posture. For example, if the consumer sits kyphosed or oblique with a scoliosis, we determine if the orthopedic change is fixed or flexible. Based on that, the approach is accommodation of posture or correction. 2+2 = 4, or so it would seem.

From the initial wheeled mobility experience, consumers’ lives are impacted (positively or negatively). In many rehabilitation settings, close attention is paid to the wheelchair prescription. Several different mobility bases may be trialed and a variety of seat cushions may also be evaluated. Just as important, perhaps even more important in the assessment process is the back support.

In 1988, Shields and Cook examined the effects of both seat angle & lumbar support on the seated buttock pressure of 20 able-bodied individuals. They found that the use of lumbar support reduced the seated pressure at the ischial tuberosities. Since then, other studies with able bodied and non-able bodied subjects have supported those findings (Makhsous, et al, 2003, Sprigle, S, Wootten, M. et al). My own experience as a prescribing clinician and as a rehabilitation technology supplier further validated these published findings. In discussions with consumers and consumer-providers with the field, I continue to hear similar philosophies.

The pelvis is undisputedly the basis of seated support. Structurally it is the point of primary interface with the wheeled mobility device. But the pelvis is not alone; the lower extremities provide increased stability and weight distribution while the torso and upper body extend vertically from the pelvis with 360 degrees of possible deviation. Pelvic stability is not simply from a contoured seat surface. For the vast majority of consumers who utilize wheeled mobility devices, some type of posterior support is required.

Stabilizing the pelvis requires applying support at the level of the posterior superior illiac spine. In most instances, failure to apply contact at the PSIS would mean the back support was above the pelvis allowing room for the consumer’s pelvis to rotate anteriorly and possibly to slide posterily (beneath the back support). When the PSIS and lumbo-sacral spine is stabilized, additional parameters must be accessed and specified.

Back support angle influences trunk stability in the sagittal plane. The majority of ‘after-market’ rehab focused back supports have some amount of angle adjustment via the mounting hardware. The amount of back angle (open or closed from a ‘neutral’ 90 degree orientation) will have a direct bearing upon static & dynamic trunk stability and therefore many functional activities.

Back support height also affects stability in the sagittal plane. The shape of the top of the back, the contour through the vertical aspect of the back support and the orientation of the back support in relation to the vertebral levels and scapula all impact the spinal alignment orientation of the body in the sagittal plane. If the back height is too high, the consumer may be unable to sit with an upright posture. Their upper trunk may be forced anterior. A back height that is too low may not provide adequate thoracic support and the consumer’s upper body may fall over the back support with the head and shoulder girdle moving posterior of their pelvis.

Back support circumference determines trunk stability in the coronal or frontal plane. Back supports are available in planar and contoured variations. The consumers’ thoracic radius can be matched to a
similar back support radius with consideration for the amount of lateral thoracic support the individual requires.

Poor seated posture can lead to orthopedic issues, but keep in mind that there is much more going on than structural changes. Seated posture influences physiological systems; respiration, digestion, circulation, bowel and bladder function, skin integrity and active range of motion can all be effected. Research has identified the importance of seated posture to all of these bodily functions.

Posture also impacts the performance of functional activities such as propulsion and transfers. In addition, skin integrity is impacted by pressure distribution and is also dependent upon physiologic systems to maintain or regain that integrity.

All aspects of posture, support, pressure and function must be considered in the equipment selection process. Because these factors are interrelated and often influence each other, it would be shortsighted to think of seating & positioning as simply 2+2=4. Understanding the relationship between the pelvis and the spine is crucial to maximizing the benefit of the cushion as well as the mobility equipment.

References


