DYNAMIC SEATING FOR DYNAMIC PEOPLE

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dy•nam•ic: dī namik/
1. (adjective) (of a process or system) characterized by constant change, activity, or progress.
2. (noun) a force that stimulates change or progress within a system or process.

Humans are dynamic by nature. We are not “designed” to be static; we are “designed” to be dynamic with constant movement, some observable, some not. When it comes to sitting, humans are almost incapable of being static. When challenged with motionless sitting, it becomes even more difficult.
Consider individuals who always sit: What drives them to move? Sometimes it is to facilitate a functional ability or outcome. Sometimes movement can be driven to gain increased sensory stimulation. This can result in heightened awareness of where a body is in space or it can meet a basic primitive need for sensory input. Other times it can be a result of an abnormal tone pattern. Regardless of the reason, options need to be provided to allow movement for individuals in wheelchairs. If this need is not met, potentially harmful results can occur. These results can include an inability to function in required or desired daily tasks as well as potential safety r isks due to equipment breakage. Whatever the outcome, there are now many options for wheelchairs and seating to allow controlled movement.

So what is dynamic seating? Dynamic components can be defined as parts of a mobility system that respond to movement by the client, allowing for changes in position, absorption of energy or movement that occurs within the seat and/or wheelchair frame in response to force from the client. Adjustability is not included in the definition for dynamic seating. The movement has to be activated by the client.
Therefore, dependent tilt and recline and changing angles or dimensions through hardware adjustments are not considered dynamic in this use. Once the dynamic component absorbs a force created by the user’s movement, the component then assists the user back to the starting position.

Movement is important for many reasons. From a developmental perspective, movement drives brain development. As infants begin to move, their nervous systems begin to understand how their bodies work. In order to understand and interact with the world, movement and a sense of movement is vital. This drive is innate in humans however it can be limited by neurological “interferences” including diagnoses such as cerebral palsy. For other individuals, the ability to move can be limited through other diagnoses such as stroke, traumatic brain injury, and other neurological disorders. Movement must be sustained in order to maintain the ability to interact and learn.

The vestibular system along with the motor system develop hand in hand and provide the basis for all learning. The vestibular system provides an awareness of where one’s body is in space; proprioception adds additional feedback through muscle-based receptors. These two systems rely on movement to generate stimulation. Without movement, sensory feedback is limited and learning can be limited.

Types of Movement
Typical movement patterns that are observed in wheelchair seating can be broken down into three groups: movement for function, movement to accommodate or lessen abnormal muscle tone and movement for sensory stimulation. All three reasons can lead to loss of function, potential injury to the individual and potential damage to the mobility system. All reasons can lead to discomfort that also impacts function.

Dynamic movement can facilitate function. For example, an individual with shoulder weakness may need to activate trunk musculature to help raise their arm over their head to participate in a functional task. If the ability to move is not “built” into the seating system, the functional outcome may be limited.

Imbalanced muscle tone can also benefit from dynamic movement. As an extensor pattern is elicited and met with resistance, the pattern tends to continue to "fire" as long as the resistance is encountered. Through the use of dynamic components strategically located by the joints where the tone pattern is elicited, the controlled dynamic movement will dissipate the tone pattern and help return the individual to the desired posture/body alignment.

The drive for sensory stimulation through seated movement has two possible outcomes. It can either meet one's desire for specific sensory stimulation that can be alerting, organizing, or calming, or it can result in the need for heightened stimulation. This is sometimes observed in individuals with intellectual disabilities who seek out rocking or bouncing type movements. As one's nervous system becomes acclimated to one level of input, increased sensory stimulation may be need to impact the nervous system. As this occurs, the repetitive movements may increase in intensity, force or duration; resulting in increased potential for injury or breakage.

Determining Need and Location

To insure proper use of dynamic components, use needs to be considered throughout the evaluation process. Systems need to be designed in conjunction with the rest of the system and not used as an after thought or "band-aid". Movement and tone patterns as well as self-stimulatory behaviors have to be addressed during the interview process as well as through observation and the mat evaluation. Often times, these tendencies are easily observable which can lead to further information gathering by the seating team. Wear and tear on existing equipment can demonstrate the need for dynamic components. For example, a young woman had several small cracks in the connection between her side frames and her rear canes. Once noticed, questioning led to reveal that her extensor pattern is elicited when she was excited to see her parents. This pattern was not observed during the evaluation session.

Locations for use also need to be discussed throughout the evaluation process. Typically, dynamic components are used at locations corresponding to body joints (the axis point for movement). Common locations for dynamic components include neck, hips, knees and ankles. When using dynamic components, care needs to be taken to insure that appropriate movement is incorporated in the system without excess. More is not better. Too many dynamic components can lead to instability for the individual. For example, if an extensor pattern is elicited at one's hip, graded movement should be provided there however there might not need to be movement at the knees or ankles. The dynamic component has to offer the necessary "give" to the movement with enough resistance to return the component back to it's desired position. If the return movement is not easily achieved, the benefit may be lost.

In addition to the use of dynamic components, the amount of resistance the component needs to provide has to be considered. If the component is never released because of active movement, it cannot assist in repositioning. If the excursion of the movement is always at its fullest, the component is no longer dynamic and returns the device to a static state.

All reasons for the use of dynamic components can lead to equipment breakage if not provided. Common areas of breakage include headrest hardware, rear canes and side frames, and legrests. Once breakage occurs, injury can occur to the individual. For example, if headrest hardware breaks due to repetitive hitting of the headrest from a rocking pattern, the client is at risk of injury as a result of contact with the broken parts or the lack of a relied upon headrest pad. Injury to the client can also occur from the repetitive movement; think of the impact of repeated head hitting on a fairly rigid headrest pad.

Conclusion

Static seating is not a feasible or realistic expectation for individuals. For those with mobility limitations, static seating can lead to the loss of function, exaggeration of imbalanced muscle tone and the potential for equipment breakage in addition to the risk of injury to the individual. Careful consideration for the use of dynamic components needs to occur throughout the evaluation process. Benefits of dynamic seating can include improved functional movement for greater participation in

activities of daily living, improved control of muscle tone and the provision of appropriate sensory stimulation. With all benefits, the risk of injury to the individual is reduced as well as the risk of equipment breakage. There are many dynamic options available through a variety of manufacturers. Care needs to be taken to insure proper use at proper locations for proper benefit.

References:

1. Eason, S. (2009). Enhancing Development with Dynamic Components. NRRTS Directions, volume 5, p 50-52.

2. Freney, D., Schwartz, K. (2015). Dynamic Seating. NRRTS Directions, volume 4, p 45-48.

3. Lange, M. et al. (2017). Dynamic Seating-Providing Movement and Why. In Proceedings of the 33rd International Seating Symposium, Nashville, TN: University of Pittsburgh.

4. Lange, M. (2015, Aug). Dynamic Seating. [Webinar]. www.numotion.com/assets/uploads/Dynamic%20Seating%202_16.pdf.

5. Peek, G., et al. (2017). High Tone Extension Patterns. A handout from Dynamic Seating – Providing Movement and Why. 33rd International Seating Symposium, Nashville, TN; University of Pittsburgh.

Speaker Bio:

Jill Sparacio is an occupational therapist is private practice in Chicago, Illinois. Her practice includes the provision of seating and wheeled mobility services as well as traditional OT services to individuals with intellectual disabilities, multiple impairments and medical fragility. Jill has presented throughout North America and internationally. She is actively involved with funding issues on both the state and national levels.