Ergonomics 101

The interaction between a product and its user is elemental in its design. As the primary function of a rollator is as a tool for disabled or elderly people who need additional support to maintain balance or stability while walking, the functional design of the rollator is key in ensuring this is realized.

There are many different studies discussing both walking patterns and gait disorders. It is essential to understand the importance of proper walking ergonomics and how the right rollator can help achieve this.

“The goals of assistive device use are to improve independent mobility, reduce disability, delay functional decline and decrease the burden of care.”

Ergonomics is a science focused on the study of human fit and decreased fatigue through product design. The ergonomics of walking focuses on gait patterns and the human body’s functions during such an activity.

The importance of proper walking

Walking involves several body parts all interacting together - your head carriage, shoulder girdle, arm swing, hip movement, knee action and foot placement all work together while walking. Any disconnect in this interaction, whether a result of disability or age, will require some type of assistance to ensure proper walking is maintained.

Studies have shown that in elderly people not only does the gait velocity slow down, but the step length gets shortened and the step width increased. Studies have also shown that elderly people walk with their legs rotated laterally [toes out] at about 5˚ in an effort to increase their lateral stability as well as with a greater anterior pelvic rotation and increased lumbar lordosis. Loss of function as a result of disease in young or old impairs sensorimotor functions, thus compromising overall mobility. Changes may be subtle at first, initially with a reduction in speed and stride of walking, progressing as the disease progresses.

“During the gait cycle, the upper body continues to oscillate forward and backward because of the changes in hip acceleration. To overcome this upper-body instability, a counterbalancing torque has to be generated around the hip and trunk.”
What does this mean in the long run? A compensatory walking pattern can result in strain on the back and shoulders, an additional encumbrance on multiple muscle groups as well as overall poor blood circulation. Walking is a proven method as the best single activity to maintain mobility and overall health, therefore proper walking ergonomics must be considered when designing a rollator.

The challenge of finding a rollator that supports a correct walking pattern

A rollator should allow its user the ability to move and provide good lateral stability. It should reduce the force and pain at arthritic joints, especially in the hands that will support most of the user’s body weight. The right height is crucial in ensuring that the handgrips are in the best position for weight bearing - at the wrist bone when the user’s elbow is bent at approximately 15˚.

“A disadvantage of human locomotion has to do with the human body structure - two thirds of the total body weight is centered in the upper body (head-arm-trunk) segment.”

A rollator should allow ample walking space so that the compensatory gait pattern can be accommodated appropriately. It should give the user support and relief during walking, and seating for any required short rests. It should cushion the impact of surface variances to maintain equilibrium during locomotion and minimize lateral instability.

The effects of finding a rollator that supports a correct walking pattern

There are significant differences between using a rollator that enables a correct walking pattern and one that does not.

With ample space a user can “step into” a rollator, ensuring the rollator is not too far away from them while taking steps. The seat cushion does not obstruct the gait pattern and accommodates the wider and shorter step lengths. It ultimately allows for a faster and more normal gait pattern, which ensures increased activity, better blood circulation, and overall better general health.

Ergonomically shaped handles will increase user comfort and spare arm and back muscles from undue strain. With weak or painful wrists, especially in the case of arthritics, anatomically shaped handles spread the weight over a wider area of the palm thus reducing stress and making brake usage much easier. The ability to push the rollator with better ease will ultimately increase walking ability, speed, endurance and dynamic balance.

“Obstacle avoidance is not an easy task for older adults because a large amount of attention has to be allocated not only to normal gait pattern but also to its modification.”

With a flexible construction, the rollator will absorb any bounces or fluctuations from ground impact, thus decreasing the strain on joints and muscles. Older or disabled people generally have less pliable muscle mass, so the less strain on the muscles, the better. Since increased mobility is imperative in strengthening muscles, a rollator that enables this is essential.

Unfortunately, with aging or disease, stamina decreases and the need to stop and rest while in motion becomes necessary. A solid seat provides the appropriate place to stop and recharge the system.

The more independent the user, the better their outlook and the more confident they are in walking, thus improving not only their mobility but overall health and quality of life.

1 Bradley, Sara M., MD and Cameron R. Herndandez, MD, Mount Sinai School of Medicine, New York, New York, “Geriatric Assistive Devices”, American Family Physician, August 15, 2011, Volume 84, Number 4
2 Woollacott, Marjorie H. and Pei-Fang Tang, “Balance Control During Walking in the Older Adult: Research and Its Implications”, Physical Therapy, June 1997, Volume 77, Number 6
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