

## MEDICAL REVIEW OF THE BENEFITS OF TILT

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Manual tilt in space wheelchairs were designed originally to tilt to 45 degrees for pressure relief. Experience shows there are medical benefits associated with smaller amounts of tilt. Some of these benefits include:

- improved posture,
- passive correction of kyphosis and scoliosis,
- improved ability to swallow and eat,
- improved ability to breathe and or increase oxygen content,
- increase sitting tolerance,
- increased independence
- pressure relief with less than 45<sup>0</sup> of tilt

Is there literature to support these benefits? Yes and no. The literature is limited particularly when dealing with anything except pressure relief and when dealing with less than 45 degrees of tilt.

Here are a few quotes and statements from some of the studies to be discussed:

### **The Effects of Tilting the Seating Position of a Wheelchair on Respiration, Posture, Fatigue, Voice Volume and Exertion Outcomes in Individuals with Advanced Multiple Sclerosis**

Angela Chan studied the effect of tilting the seated position for people with MS with respect to respiration, posture, fatigue, voice volume and exertion. In her study she tilted people both 25 and 45 degrees. The study demonstrated there are measurable benefits to tilting the wheelchair, including improved posture, improved line of sight, improved voice volume and reduced fatigue.

Conclusion from the study: " The results of the current study have shown that tilting the seat position of a wheelchair produced statistically significant improvements in respiration and in trunk and head posture. Many subjects also experienced improvement in voice volume and in reduction of perceived effort for breathing and speaking. In individuals who have MS and are categorized at Kurtzke's EDSS of 7.0 or higher who exhibit symptoms of fatigue, poor sitting posture and voice projection difficulty, the tilt mechanism should be considered in conjunction with the wheelchair prescription as one symptom management strategy. Changing the angle of tilt alters the weight bearing areas, provides correction and support to the head and trunk, thereby correcting postural alignment. It reduces the work of breathing and speaking as well as promotes relaxation in a supportive sitting position."<sup>1</sup>

### **Biomechanics of Manual Wheelchair Propulsion in Elderly: System Tilt and Back Recline Angles**

This study tested tilt and recline and it's effect on propulsion. The study found tilt more than recline affects the biomechanical efficiency of wheelchair propulsion.

Results: "On average, the fraction of the mechanical effective force was found to be low when compared with other studies. Tiltting the system by 10 degrees and reclining the back by 10 degrees increase significantly the biomechanical efficiency of the subject by 10%. The biomechanical efficiency variable was more sensitive to the system tilt than to the back recline adjustment."

Conclusions: “The results of this study confirm the hypothesis that system tilt angle but not back recline significantly affects biomechanical efficiency. The findings of this study will help in designing and adjusting a wheelchair intended for self-propelled, older people.”<sup>2</sup>

### **A Qualitative Study Comparing the Experiences of Tilt-In-Space Wheelchair Use and Conventional Wheelchair Use by Clients Severely Disabled with Multiple Sclerosis**

The following article compares experience of tilt wheelchairs vs conventional wheelchairs when used for people with MS. Although comfort is not a medical necessity, improved postural support and stability, relief of pressure and being able to be up longer improves comfort.

Results: “The majority of tilt-in-space wheelchair users (6 out of 7) reported that their chairs were comfortable compared with only half of those in conventional wheelchairs (8 out of 16). The positive aspects of tilt-in-space wheelchair provision included comfort, improved postural support, enhanced seating stability, relief of pressure and being able to rest sitting out of bed for prolonged periods, often for more than 6 hours a day.”<sup>3</sup>

### **Chair Configuration and Balance Control in Persons with Spinal Cord Injury**

Posture and balance are affected by tilt. This study focused on people with spinal cord injuries. The researchers were studying the effect of tilting a wheelchair chair 7 or 12 degrees and how that influences balance and reach.

Results: “Although no significant difference in actively controllable reach was found in controls or in subjects with low SCI, sitting balance improved in all chairs relative to the standard chair. Ability to control displacement of arms and trunk during reaching improved. No apparent need for additional postural muscle activity was found.”

Conclusions: “The tested chairs had an overall positive effect.”<sup>4</sup>

These are just a few of the articles and studies that will be presented during the discussion as well as some case studies confirming some of the findings.

1. Chan A, Heck CS, The Effects of Tilting the Seating Position of a Wheelchair on Respiration, Posture, Fatigue, Voice Volume and Exertion Outcomes in Individuals With Advanced Multiple Sclerosis. J Rehab Outcomes Meas. 1999;3(4):1-14.
2. Aissaoui, Rachid PhD; Arabi, Hossein PhD; Lacoste, Michele OT; Zalzal, Vincent BSc; Dansereau, Jean PhD, Biomechanics of Manual Wheelchair Propulsion in Elderly: System Tilt and Back Recline Angles, American Journal of Physical Medicine and Rehabilitation. 81(2):94-100, February 2002
3. Dewey A.; Rice-Oxley M.; Dean T. , A Qualitative Study Comparing the Experiences of Tilt-In-Space Wheelchair Use and Conventional Wheelchair Use by Clients Severely Disabled with Multiple Sclerosis. The British Journal of Occupational Therapy, Vol 67, Number 2, 1 February 2004, pp.65-74(10)
4. Yvonne J.M. Janssen-Potten MSc, Henk A. M. Seelen PhD, Jan Drukker PhD and Jos P.H. Reulen Phd, Chair Configuration and Balance Control in Persons with Spinal Cord Injury. Archives of Physical Medicine and Rehabilitation, Vol 81, Issue 4. April 2000, Pages 401-408

**Speaker Bio**

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