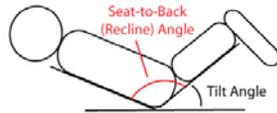


Introduction

Full-time power wheelchair users are considered to be at high risk of developing pressure ulcers. Powered tilt-in-space and tilt-and-recline systems are prescribed to fulltime wheelchair users who are unable to independently reposition or perform pressure reliefs for the prevention of pressure ulcers. However, little is known about how tilt-and-recline systems are used, particularly as compared with wheelchairs that only have tilt-in-space.

This poster presents pilot data describing the use of powered tilt-and-recline wheelchairs, and compares that data with published results on the use of powered tilt-in-space wheelchairs.



Tilt-and-recline wheelchairs allow users to change the seat Tilt Angle and the Seat-to-Back Angle.

Methods

- Convenience sample of 7 fulltime power tilt-and-recline wheelchair users
- 1 week of monitoring
- Instrumented with:
 - accelerometer / data logger mounted to the seat bottom and seat back (MSR 145, MSR Electronics GmbH)
 - Occupancy switch



Analysis

- **Occupancy Time** –Hours per day that participants occupied their wheelchairs.
- **Typical Position** - The position at which the subjects spent the most time
- **Frequency of Feature Use** –Tilt and/or recline use was defined by seat or back angle change of 5° and held for more than 20 seconds. Tilt and recline were used “together” if changes to tilt and recline occurred within 60 seconds of one another.
- **Percent Time Spent in Small Tilt and Recline** – Amount of time spent at a small tilt (<15°), and small recline (90°-110°).

Results

Participants

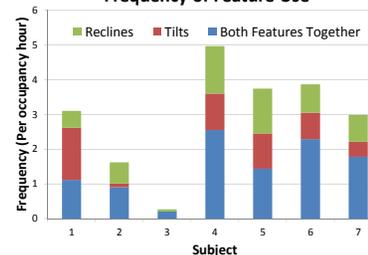
Subject	Age	Diagnosis	Level of Injury
1	63	SCI	C4-5
2	77	SCI	C6-7
3	23	SCI	C5-6
4	56	SCI	C4-5
5	54	SCI	C5
6	59	MS	n/a
7	27	SCI	C4-6-7

Participants occupied their wheelchairs for 10.7 hours per day (ranging from 1.7 – 20.8 hours across all days). Their median typical position was 3° of tilt and 95° of seat-to-back angle. Below are illustrations of the typical positions for all 7 participants:



On the median day, participants engaged a feature on their chair (either tilt, recline, or both) every 20 minutes (range: 0.1-6.2 / hour).

Frequency of Feature Use



84% of the time participants spent in their wheelchairs was spent at a small tilt and recline (<15° tilt, seat-to-back angle 90°-110°). Besides this most common position, the next most frequent positions included positions with either a small tilt and larger recline, or a small recline and larger tilt. In other words, medium (15°-29°), large (30°-44°) and extreme (≥45°) changes were only made to either tilt OR recline at any given time. Little time was spent at large and extreme tilts (≥30°) and reclines (≥130°). In fact, large and extreme tilts were used on fewer than half of the days studied.

Comparison with Tilt-in-Space

Our study of the use of tilt-in-space wheelchairs included 45 participants, with an average (SD) age of 45 (14) years old [1]. 30 of the participants had SCI, and other diagnoses varied.

Behavior of participants using tilt-in-space wheelchairs was similar to that of participants using tilt-and-recline wheelchairs. In both studies, participants did not sit with their chair perfectly upright, although tilt subjects typically sat with slightly more tilt (8° vs. 3°), and a fixed seat-to-back angle of 100°. In both studies, participants spent similar amounts of time (80-85%) in a small tilt and recline. Finally, the tilt-in-space participants tilted once every 27 minutes. This was slightly less often than participants engaged a feature on their tilt-and-recline wheelchair. However, if you neglect the use of recline, participants would have tilted at the same frequency as participants in the tilt-in-space study.

Discussion

- The use of powered tilt-and-recline is highly varied across days and users.
- 16% of time (> 1.5 hours per day) was spent outside of small tilt and recline positions (≥15° tilt or ≥110° recline).
- Tilt-and-recline features are engaged frequently (every 20 minutes).
- The addition of recline may provide greater opportunities for feature use than tilt-in-space alone.
- Users often use both tilt and recline to change position. However, a medium or large tilt or recline is typically paired with an small recline or tilt.

Reference

[1] Sonenblum, S.E. and S. Sprigle, *Distinct tilting behaviours with power tilt-in-space systems. Disabil Rehabil Assist Technol*, 2011. 6: p. 526-535.

Acknowledgements

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