

Why Full-time Power Wheelchair Users Tilt

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RESNA

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Background

- Pressure ulcers (PUs) are a problem
- PUs are caused by loading
- Managed clinically via:
 - cushions and support surfaces (magnitude)
 - pressure reliefs (duration)
- When independent pressure reliefs are not an option, powered tilt or recline may be employed.

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Other purposes for tilting?

- increased comfort and sitting tolerance secondary to the decreased pressure
- increased function
 - Secondary to increased sitting tolerance and more time out of bed
 - variable positions available for access and reach in different situations
 - improved head and neck control
 - easier transfers
- Improved sleep and rest
- increased blood flow
- easier feeding
- improved respiratory function

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Lacoste et al: A Survey about Tilt and Recline

- 40 people
- how and why they used their systems
 - comfort/discomfort/pain
 - rest/relaxation
 - posture
 - functional independence
 - physiological functions (including pressure reliefs)
- 97.5% reported using their tilt or recline system daily
- > 70% used their tilt and recline systems for comfort, rest, relaxation, and pain
- few participants reported using the chairs for prevention of pressure sores or other physiological functions.

Lacoste M, Weiss-Lambrou R, Allard M, Dansereau J. Powered tilt/recline systems: why and how are they used? Assist Technol 2003;15(1):58-68.

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Purpose of the Current Studies

- Monitoring Study: To explore how fulltime power wheelchair users utilized their tilt systems.
 - *Did participants utilize their tilt feature?*
 - *Did participants perform regular weight shifts?*
 - Why do people use their tilt?
 - Why don't people perform regular pressure reliefs using their tilt system?
- Tilt Angle Pilot Study: To determine if people know how far to tilt for pressure reliefs

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Monitoring Study

Methods: Subjects and Protocol

- Convenience sample: N=16 (11 men, 5 women),
- Fulltime power wheelchair users
- Varying diagnoses
- 2 weeks of monitoring
- WhAMI (Wheelchair Activity Monitoring Instrument)
 - Occupancy switches
 - Accelerometer for tilt angle
 - Record every 2 seconds
- Asked (n=15) why or when they use tilt (open ended)

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Monitoring Study

Review of Tilt Results

All Tilts (Position changes of 5°)

- Nearly half of subjects tilted regularly (1x / 15 minutes)

Pressure Relieving Tilts (>30° for > 1 minute)

- Median subject = 1 pressure relieving tilt every 7 hours
- Only 3 subjects performed pressure relieving tilts at least once per hour
- Only 6 subjects tilted to 45°
- Some subjects never reached 30°

Typical Position

- Some subjects spent most of their time between 15° and 30°

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Monitoring Study

Purpose of Tilt Use

Subject	Comfort / Discomfort / Pain	Rest / Relaxation	Posture	Functional Independence	Physiological Functions
1	X				X
2	X		X		X
3	X			X	
4	X				X
5	X		X	X	
6	X			X	
7	X	X			X
8	X	X			
9		X	X	X	X
10		X			X
11		X			X
12		X	X		X
13		X		X	X
14		X			X
15					X

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Monitoring Study

Median Tilt Use By Purpose

	Comfort/Discomfort/Pain		
	No (6)	Yes (9)	p-val
Typical Position ()	7	15	0.290
Tilt Frequency / hour of wheelchair occupancy	4.9	2.8	0.178
PRT Frequency / hour of wheelchair occupancy	0.6	0.1	0.194
% Time > 30	12%	3%	0.194
	Rest/Relaxation		
	No (7)	Yes (8)	p-val
Typical Position ()	15	6	0.102
Tilt Frequency / hour of wheelchair occupancy	4.2	1.6	0.248
PRT Frequency / hour of wheelchair occupancy	0.2	0.1	0.211
% Time > 30	5%	3%	0.441

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Tilt use when used for physiological purposes including pressure reliefs

	Physiological		
	No (4)	Yes (11)	p-val
Typical Position ()	15	8	0.461
Tilt Frequency / hour of wheelchair occupancy	2.8	3.2	0.292
Pressure Relieving Tilt Frequency / hour of wheelchair occupancy	0.1	0.3	0.598
% Time > 30	3%	4%	0.673

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Comparison with Lacoste et al.'s Survey Results

SIMILARITIES

- 14/15 subjects reported comfort, pain, or rest as a purpose of use

DIFFERENCES

- Many participants reported physiological purposes
- Many participants had at least one day in which they did not use their tilt feature to change position more than 5°.

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Tilt Angle Pilot Study

- Do people know how far to tilt for pressure relief?
- Are people aware of how far they are tilted?
- Does training help?

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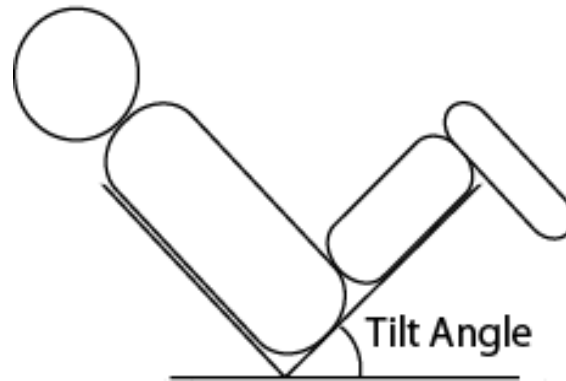
Tilt Angle Study

Able-bodied Students

- N = 11 able bodied students
- Adjusted footrests on a tilt-in-space power wheelchair for optimal fit
- Asked to tilt “as far as needed for pressure relief”, measure actual angle (x3)
- Asked to tilt to 45°, measure actual angle (x3)
- Shown 45° of tilt and asked to replicate the position, measure actual angle
- 1 week later – ask subjects to tilt to 45°

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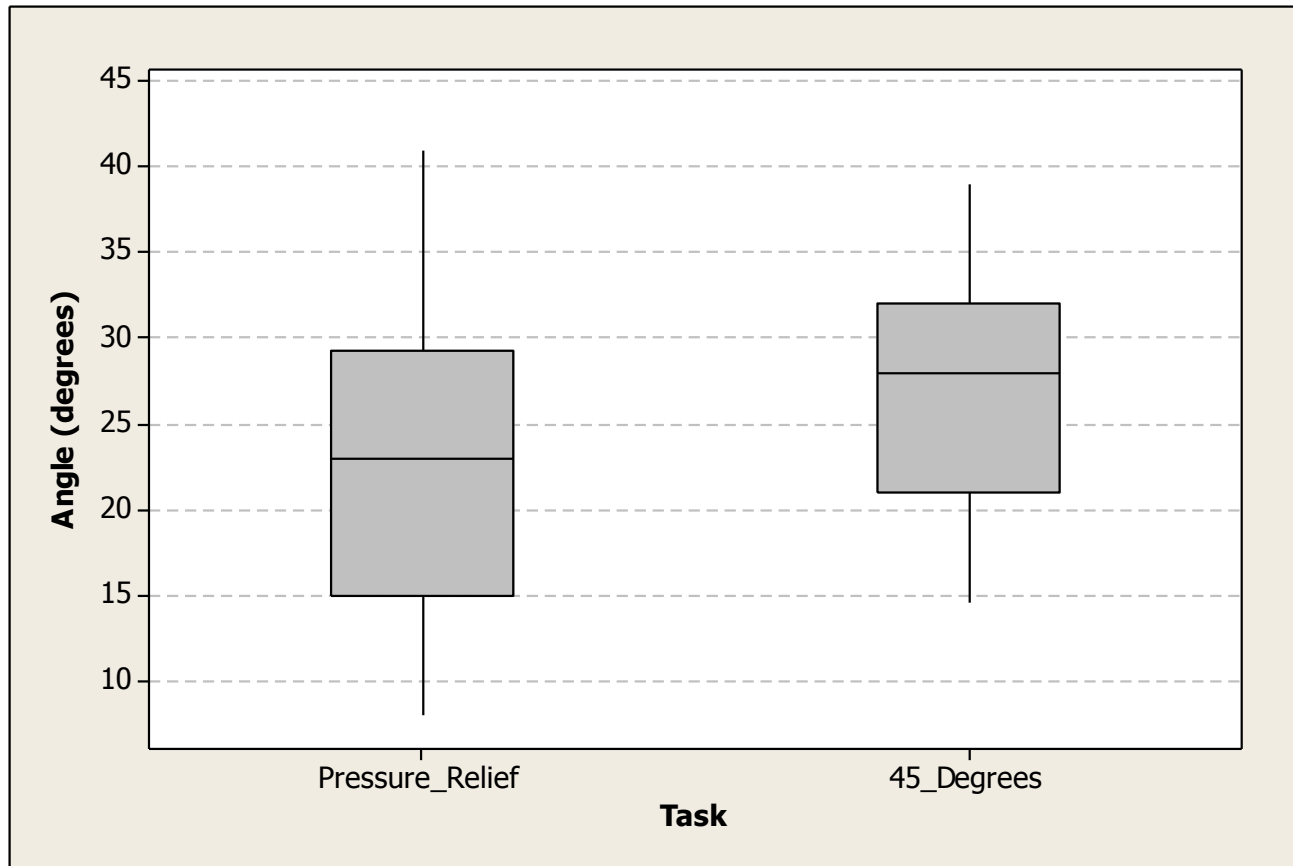
Tilt Angle Study



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Tilt Angle Study

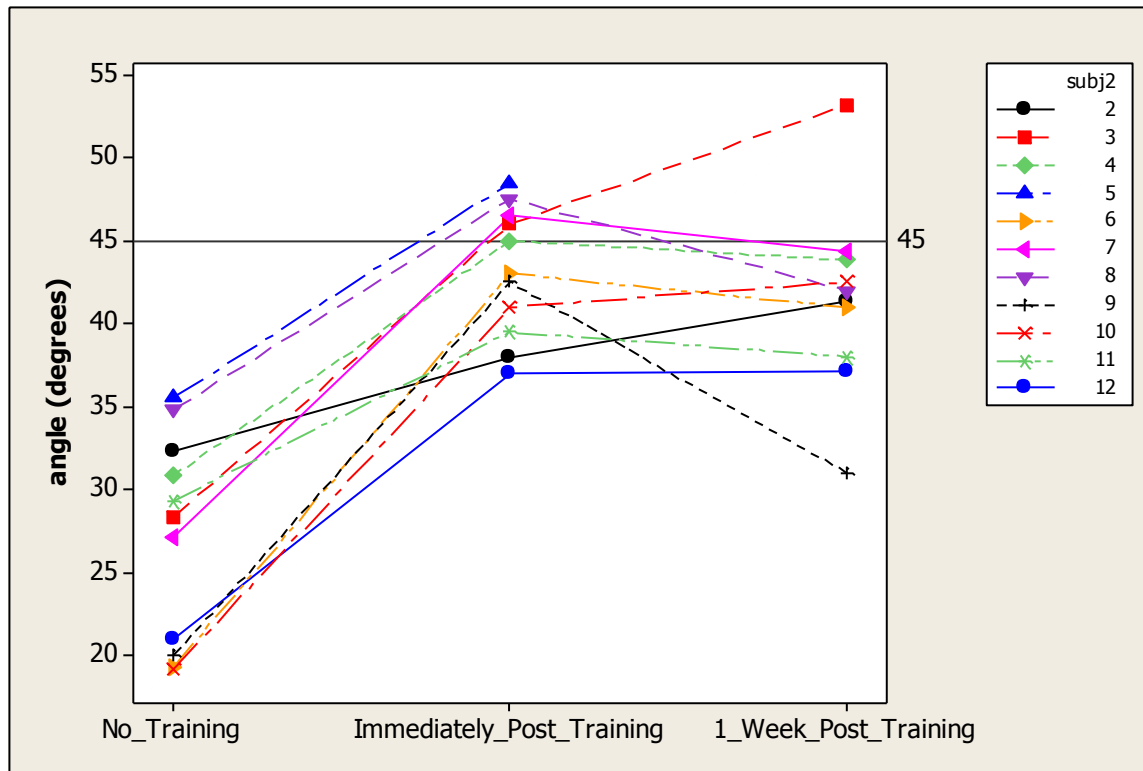
Able-bodied Students: Before Training



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Tilt Angle Study

Able-bodied Students: Training Effects

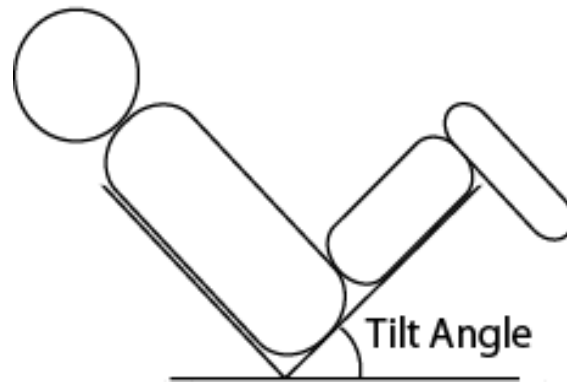


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Tilt Angle Study

Current Tilt Users

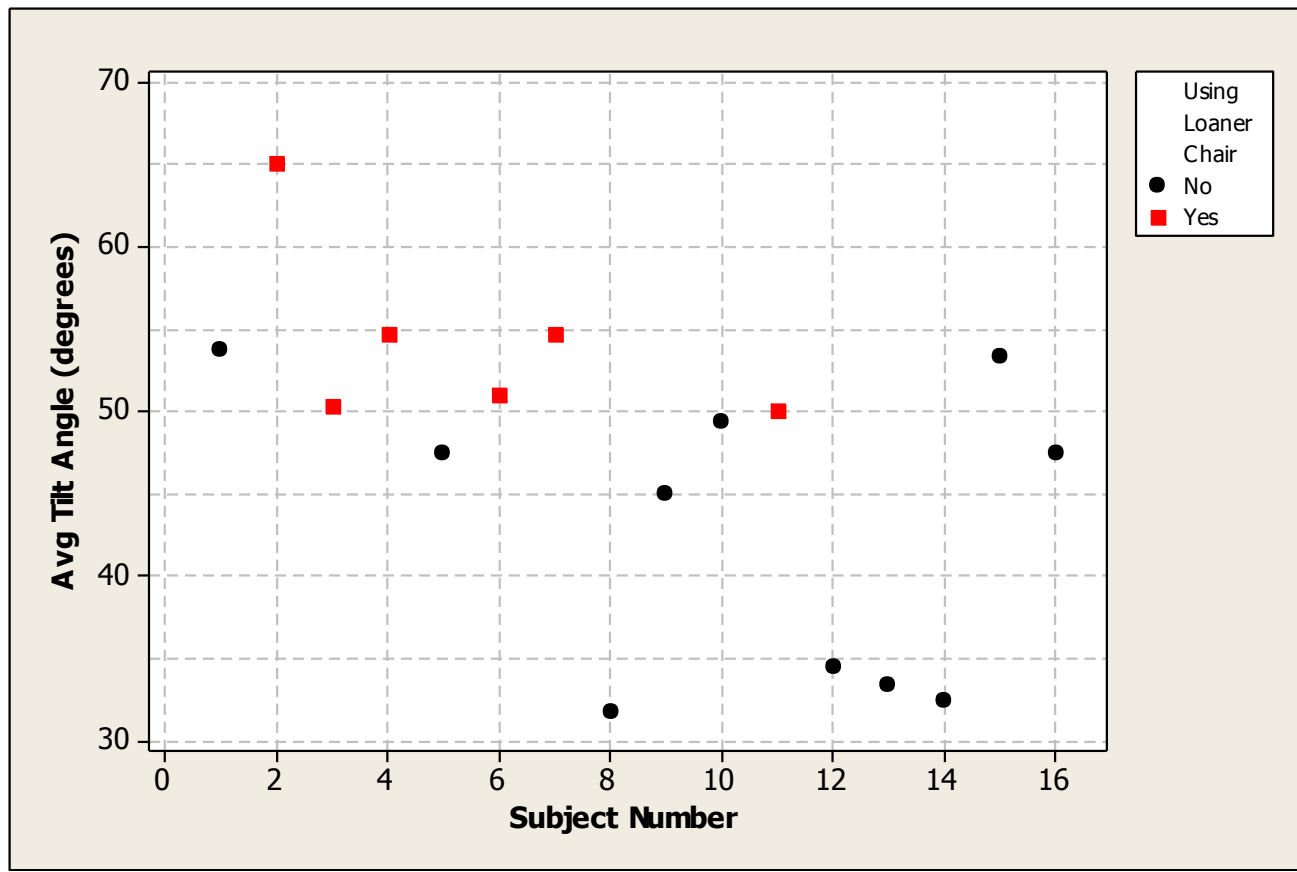
- Randomly selected people who use powered tilt wheelchairs were asked to “demonstrate a pressure relief” 3 times
- Angle with horizon was measured



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Tilt Angle Study

Current Tilt Users



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Discussion

Monitoring Study

- Do frequent, small position changes offer restorative benefits to wheelchair users?
- How can we predict who will take advantage of their tilt system?

Tilt Angle Study

- How can we improve training to make sure everyone knows how far to tilt?
- What sort of follow-up can we provide to improve retention of knowledge about tilts and pressure reliefs?
- If training successfully teaches people how far to tilt, why are some people still not tilting?

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Questions?

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Future Work

- Future work should identify the benefits of small position changes in terms of comfort, pain reduction, and pressure ulcer prevention.
- Additionally, it should aim to demonstrate for which subjects the tilt feature will be most beneficial.

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