



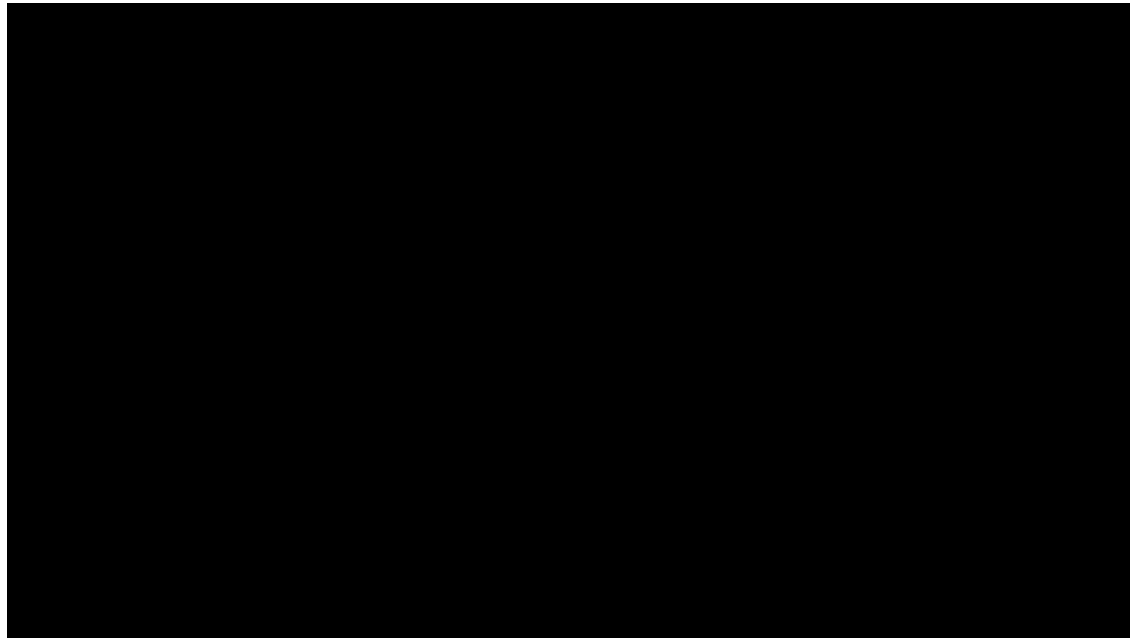
Rehabilitation
Engineering &
Applied
Research

YOU GOT TO MOVE IT, MOVE IT! **Pressure Reliefs, Weight Shifts, and Wheelchair Mobility in Individuals with SCI**

Sharon Sonenblum, PhD & Stephen Sprigle, PhD, PT

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“I Like to Move It, Move It!”

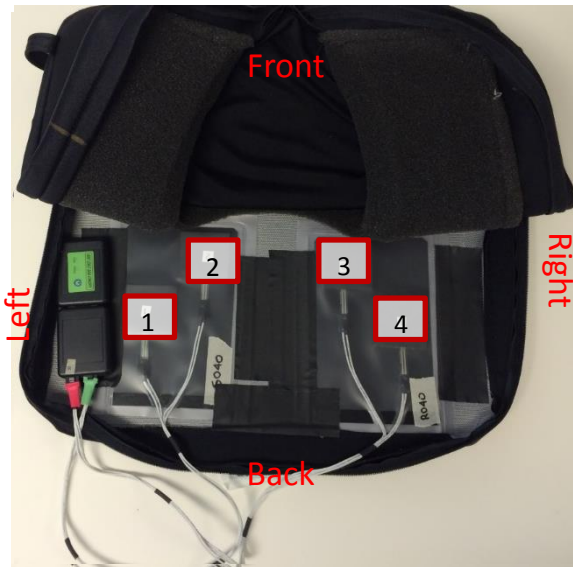


I like to move it move it, Madagascar HD
All rights reserved to Dreamworks

Research Questions

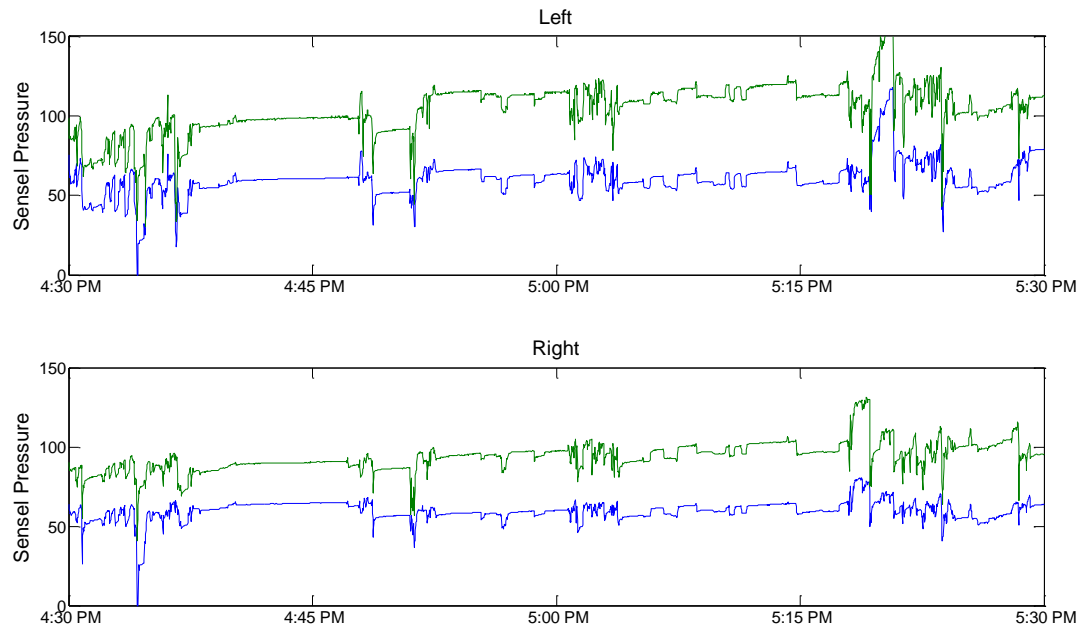
- How do wheelchair users use their wheelchairs during every day life?
- How do wheelchair users move in their wheelchairs during everyday life?
 - New SCI vs. Longer-Term SCI
 - Recurrent pressure injuries (ulcers) versus no history of pressure injuries

Seat monitor and data logger



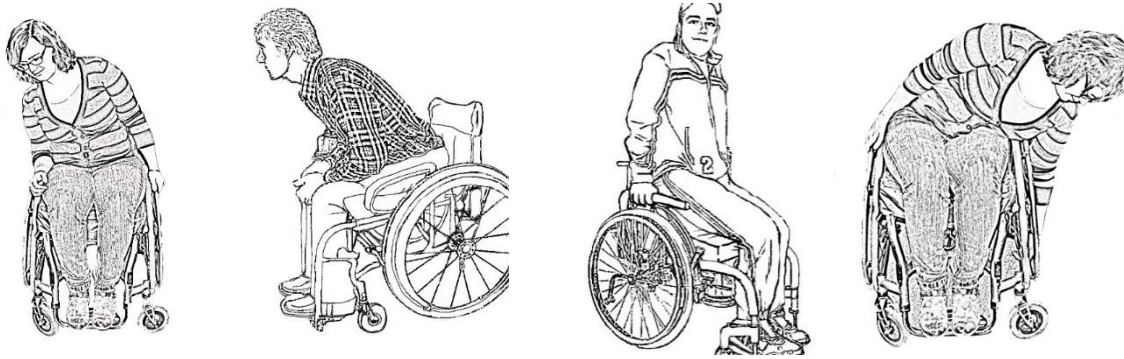
- 4 force-sensing resistors located under wheelchair cushion
- Data-logger captures forces at 1 Hz

Raw data is a continuous signal of forces that are run through a classifier



Definitions

- Out of Chair – fully unloaded for > 2 minutes
- Full Pressure Relief (PR) – left and right sides fully unloaded for > 15 seconds and < 2 minutes
- Weight Shift (WS) – either side or both sides are partially unloaded (>30% pressure reduction) for > 15 seconds



Subject Characteristics

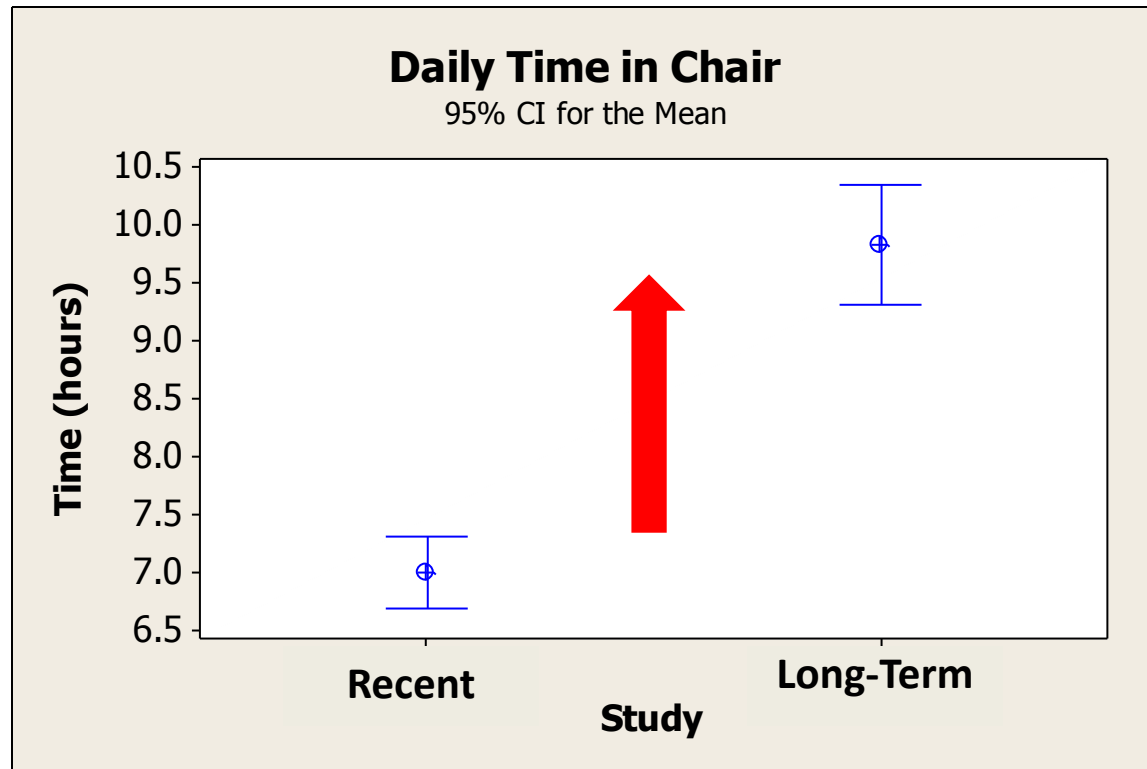
Recent SCI

- 31 manual wheelchair users
- 359 complete days of data
- Recruited through Shepherd Center and Kessler Foundation
- Characteristics
 - Ages 19-63 (Average 32 yo)
 - 25-215 days post injury (Average 97 days) at start of study
 - 22 men, 9 women
 - LOI split: 8 cervical, 10 upper thoracic, 13 lower thoracic or lumbar

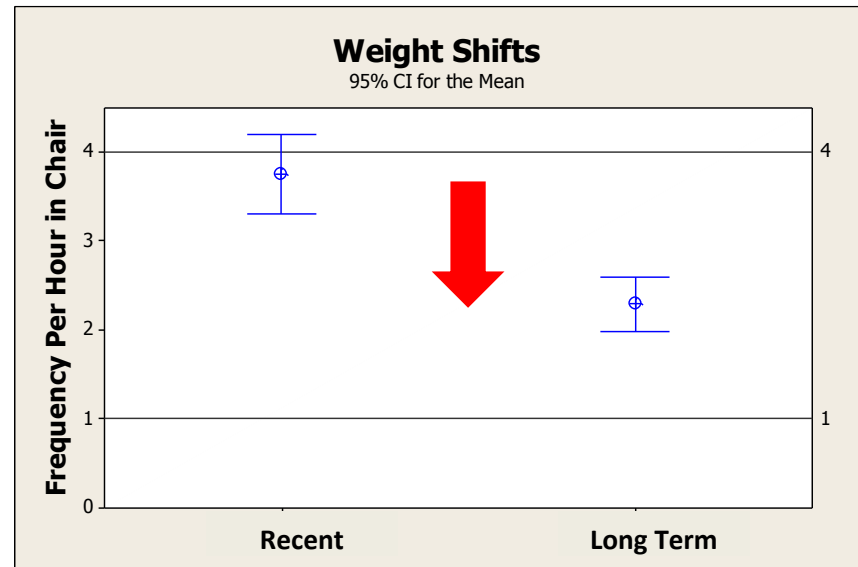
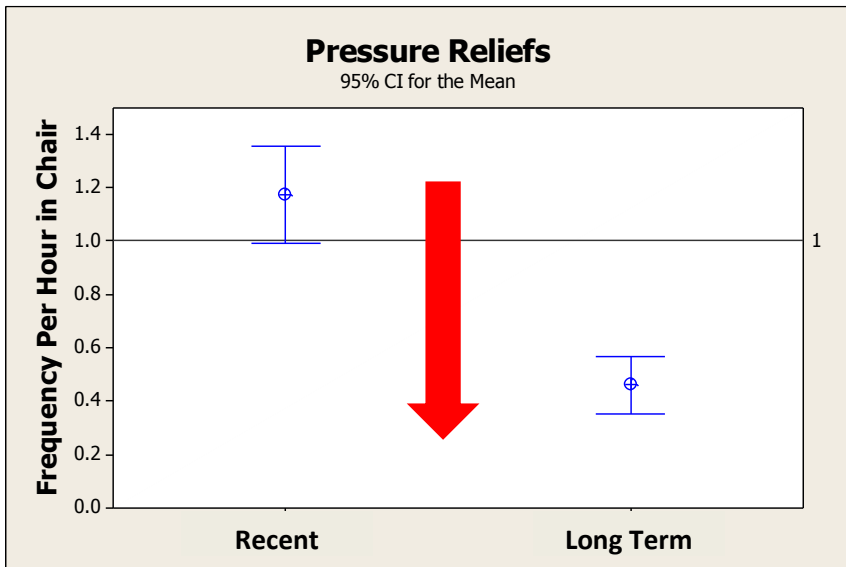
Long-Term SCI

- 29 manual wheelchair users
- 225 complete days of data
- Recruited through Shepherd Center and Duke University / Durham VA
- Characteristics
 - Ages 21-66 (Average 41 yo)
 - 2-33 years post injury (Average 15 years)
 - 23 men, 6 women
 - LOI: mostly lower thoracic or lumbar (18), 7 upper thoracic and 3 cervical
 - 12 had a history of recurrent pressure ulcers

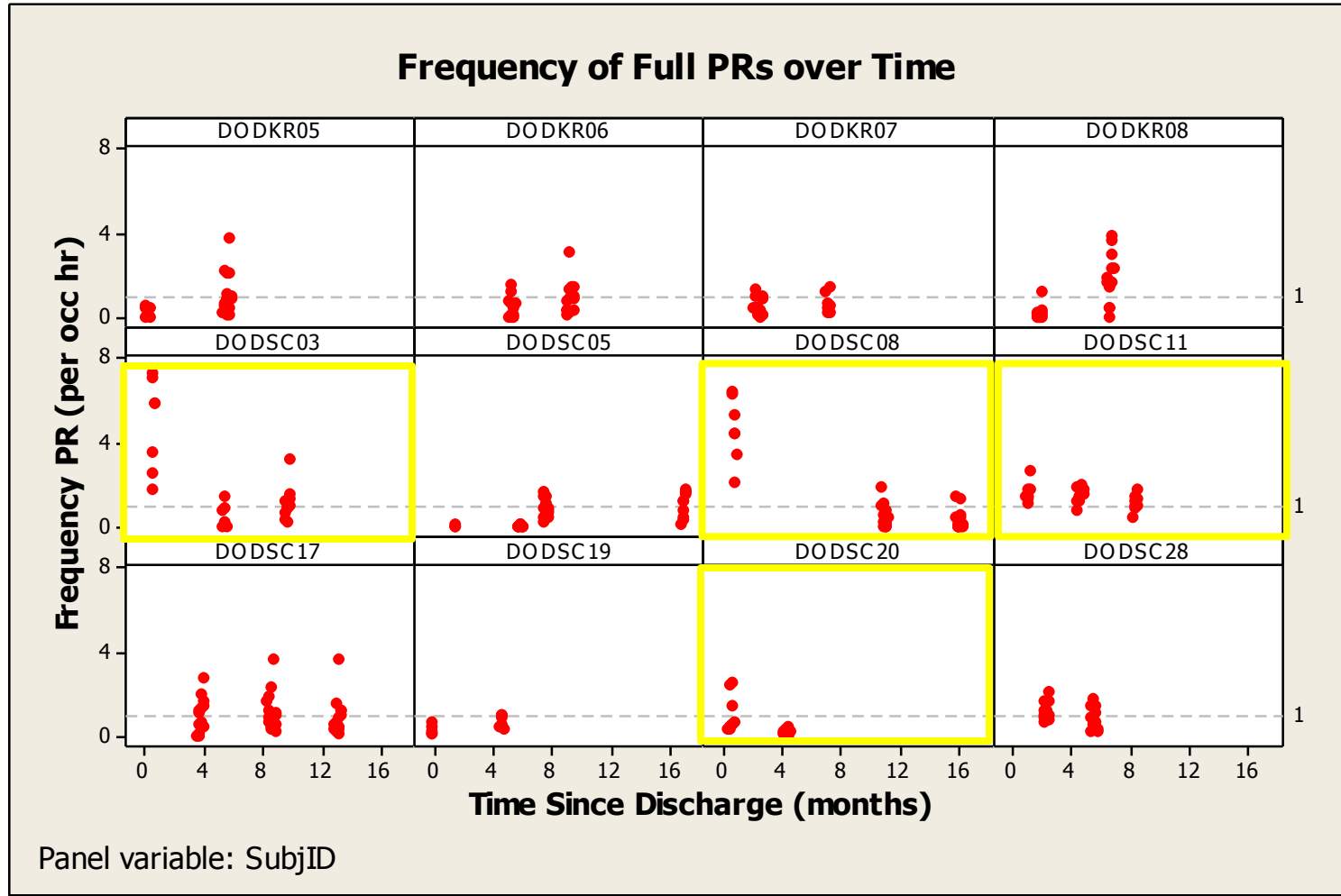
Time in Chair



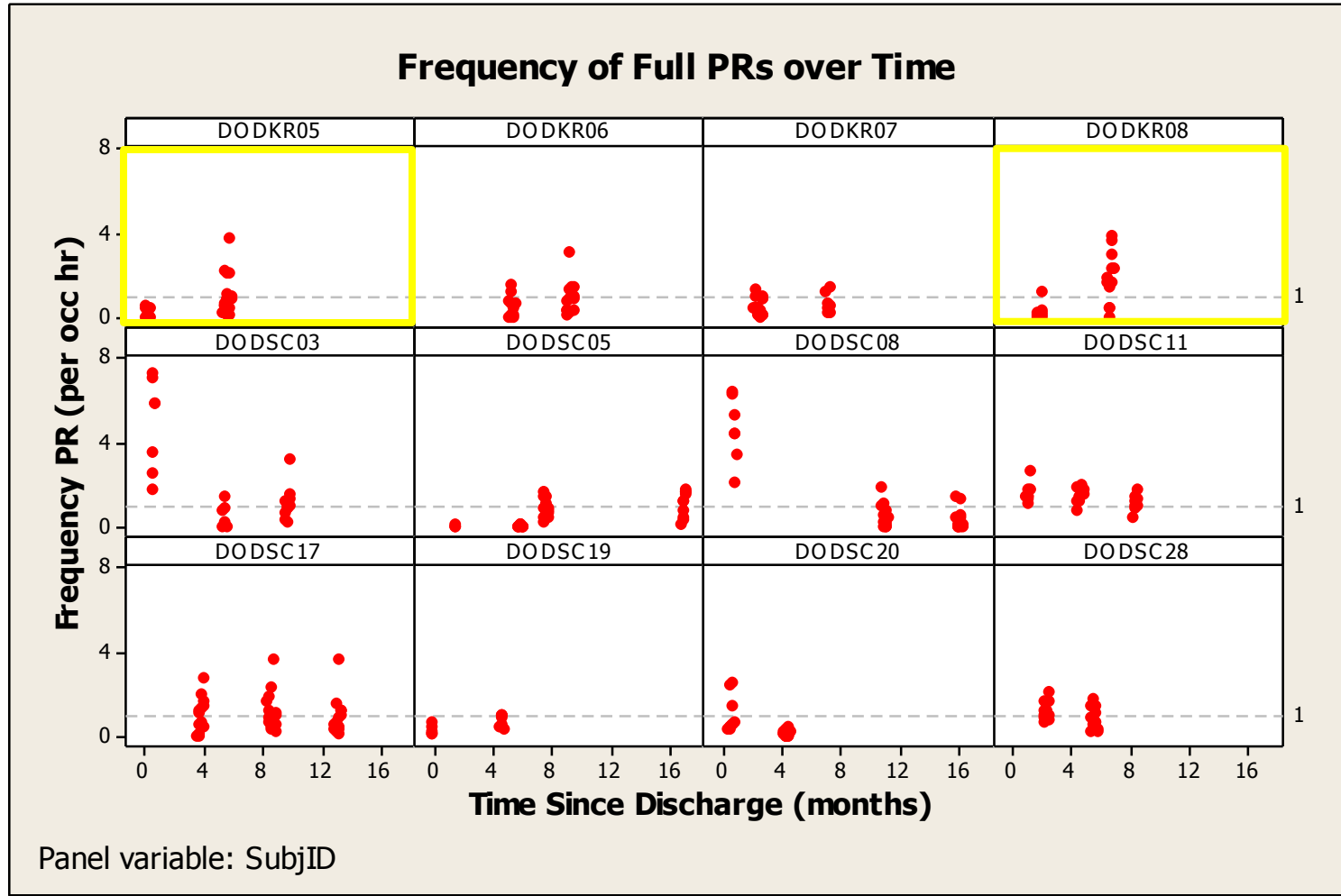
Pressure Relief and Weight Shift Behavior



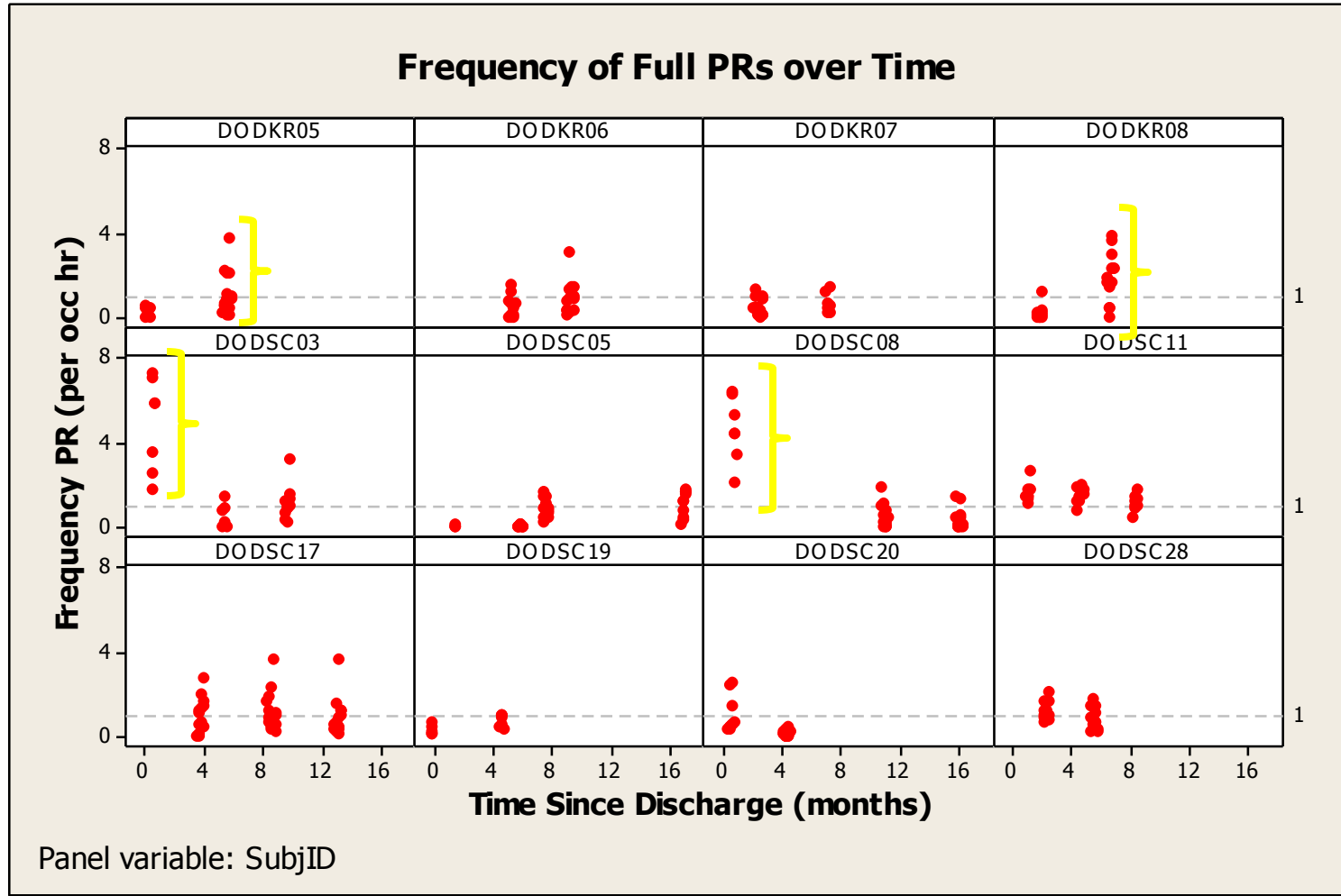
What is the timeline for change?



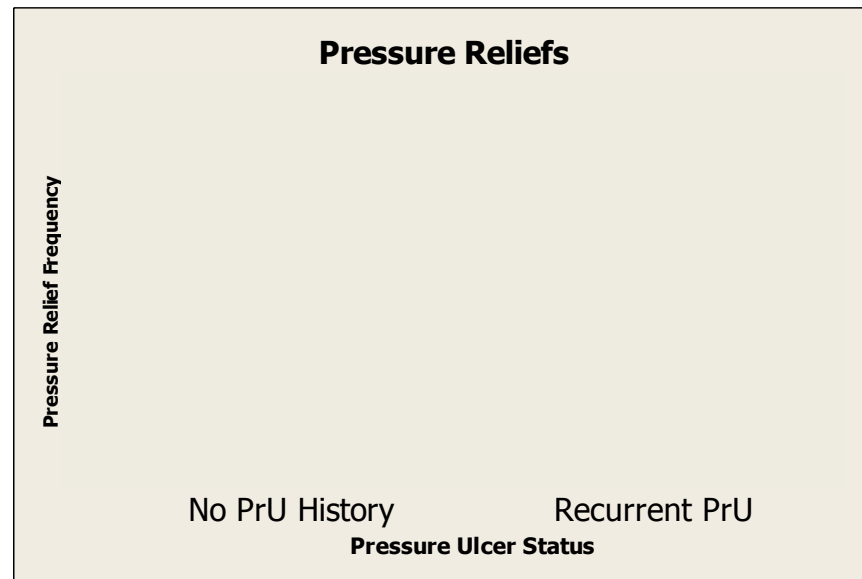
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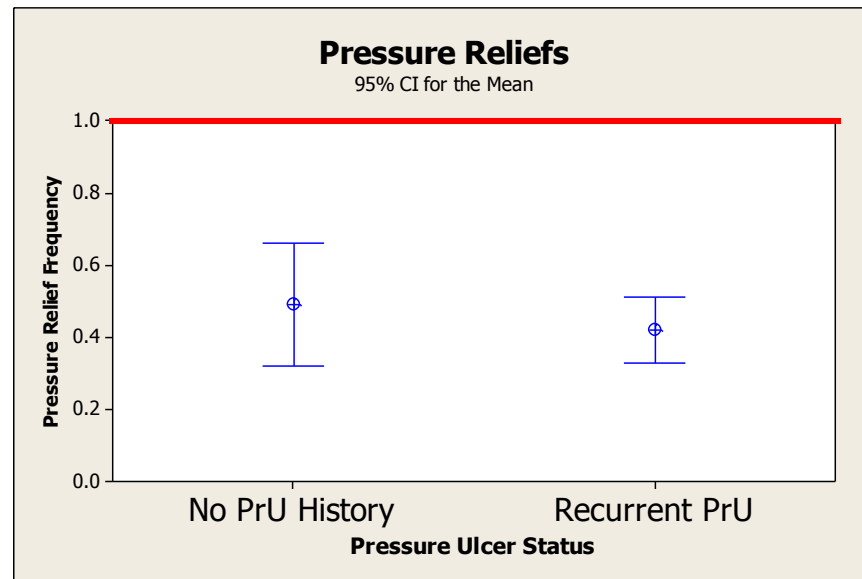
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What about Pressure Injuries?

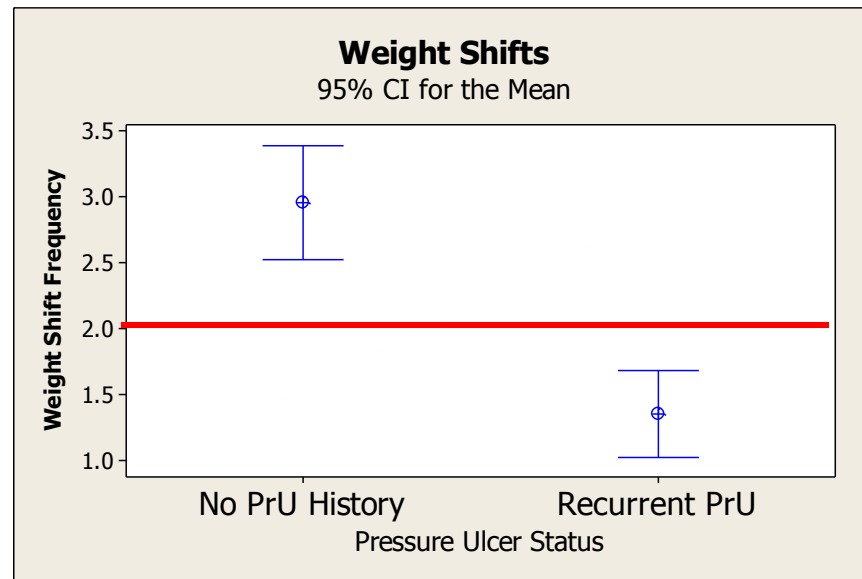


What about Pressure Injuries?



Nobody does them regularly!

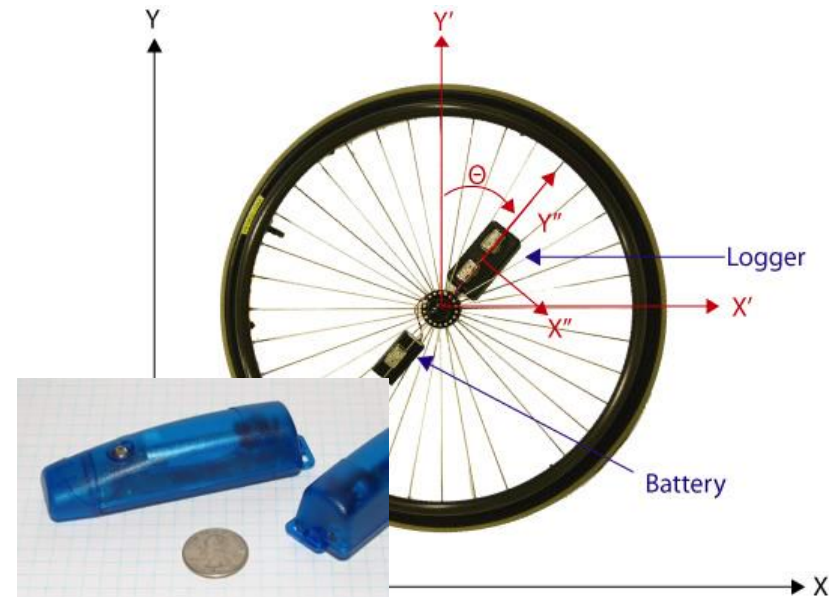
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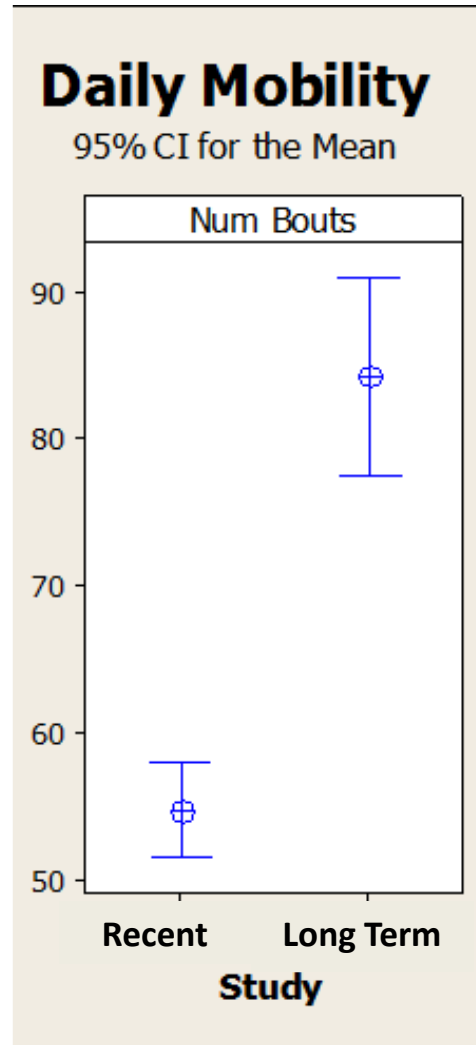
Weight shifting behavior IS different!

Wheelchair Propulsion

- Bouts of Mobility – A transition between stationary activities. Minimum speed of 0.12 m/s and duration of 5 seconds.



Manual Wheelchair Use



Clinical Implications & Summary

- Behavior changes with time
 - After discharge, time in chair increases and propulsion increases, but protective behaviors decrease.
 - What does this mean about the AT prescribed to them while in inpatient? Does it still fit their needs?
- Wheelchair users do not demonstrate routine
 - All were trained in PRs and to target a frequency
 - We cannot assume dedicated PRs are routine
- Weight shifts are much more common
 - Intermediate forward and side leans qualify
 - In-seat movement can have an impact so
 - Education should address these activities
 - IPM as an education tool, especially because amount of pressure relief for a weight shift might differ by cushion
 - Position people so they can move
- Activity is good
 - put people in a position that they can do stuff
 - Seating systems and training to facilitate transfers
 - encourage activity-
 - leaning and reaching has positive tissue benefits

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QUESTIONS?