The Power of Prevention

Using power seat functions to improve client outcomes

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Core message: a power seat function is just a button until it becomes a prevention behaviour.

Agenda:

- Assessment Process
- Power Seat Bases - Drive Wheel Configuration
- Morning tea
- The Power of Prevention – Power Seat Functions
- Lunch
- Give it a Go!

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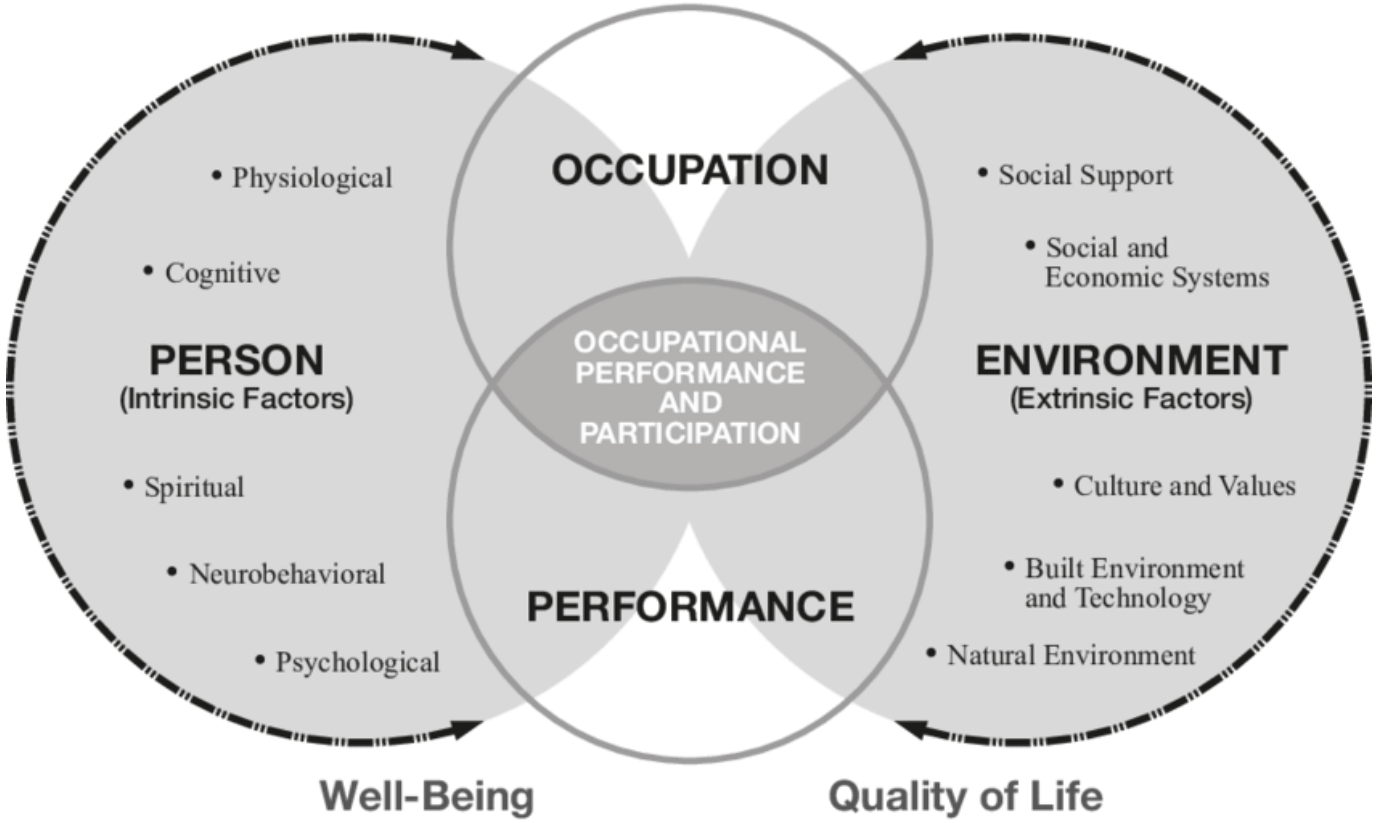
PEOP Model



Baum, C. M., Christiansen, C. H., & Bass, J. D. (2015). The Person-Environment-Occupation- Performance (PEOP) model. In C. H. Christiansen, C. M. Baum, & J. D. Bass (Eds.), *Occupational therapy: Performance, participation, and well-being* (4th ed., pp. 49-56). Thorofare, NJ: SLACK Incorporated.

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Assessment Process

Assessment Process

- Initial Assessment / Information Gathering
- Development of Goals
- Physical Assessment / MAT Evaluation
- Environmental Assessment
- Equipment Trial Process
- Clinical Reasoning
- Equipment Considerations and Report Writing
- Delivery and On-Going Training

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Initial Assessment

Information Gathering
SCI Assessment form

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Medical History:

- **Primary Diagnosis**
- **Prognosis**
- **Medical History/Surgical History**
- Other Treatments or Rehab Measures trialed in the past
- Medications and allergies

Current Mobility Skills:

- **Safe, Timely, Independent**
- **Gait (Balance and Safety)**
- Manual Propulsion
- Power Mobility Control
- **Cardiopulmonary Tolerance (Vital Signs/Subjective Scales)**
- **Vision, Hearing, Cognition, Motor Control**

Neuromuscular:

- **Strength**
- Motor Control
- **Coordination**
- Tone/Spasticity
- Balance (sitting and standing)
- Vision and Hearing

Range of Motion and Flexibility

- **All body segments (including spine and pelvis)**
- Skeletal Deformity Assessment (Reducible vs Non-Reducible
- **Linear Measurements**

Skin and Pain Assessment:

- **Current and Past Skin Integrity issues**
- **Risk Factors for Pressure Injuries**
- **Pressure Relief Ability**
- **Pain - when and where?**

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Goal Setting

If the need for a wheelchair is identified ask:

- Why?
- What is the purpose of the wheelchair?
- Where will it be used?
- How will this Mobility Device enable the participant to complete their task independently?
- SMART Goals

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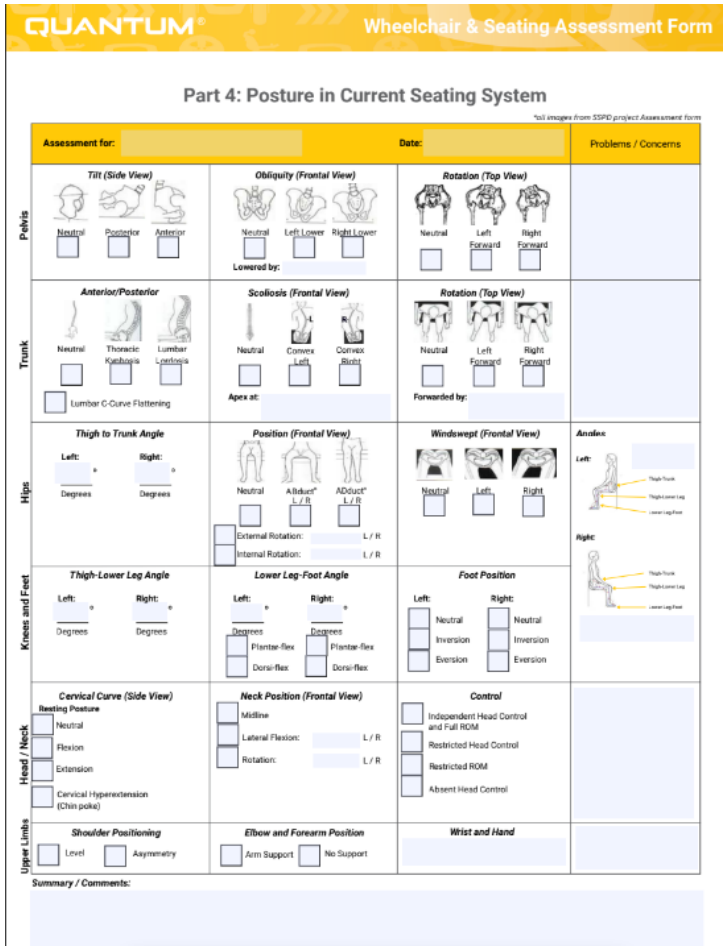
Body Range of Motion (ROM)


QUANTUM® Wheelchair & Seating Assessment Form

Part 4: Posture in Current Seating System

*all images from SSPD project Assessment form

Assessment for: Date: Problems / Concerns

Pelvis
- Tilt (Side View): Neutral, Posterior, Anterior
- Obliquity (Frontal View): Neutral, Left Lower, Right Lower; Lowered by:
- Rotation (Top View): Neutral, Left Forward, Right Forward

Trunk
- Anterior/Posterior: Neutral, Thoracic Kyphosis, Lumbar Lordosis; Lumbar C-Curve Flattening
- Scoliosis (Frontal View): Neutral, Convex Left, Convex Right; Apex at:
- Rotation (Top View): Neutral, Left Forward, Right Forward; Forwarded by:

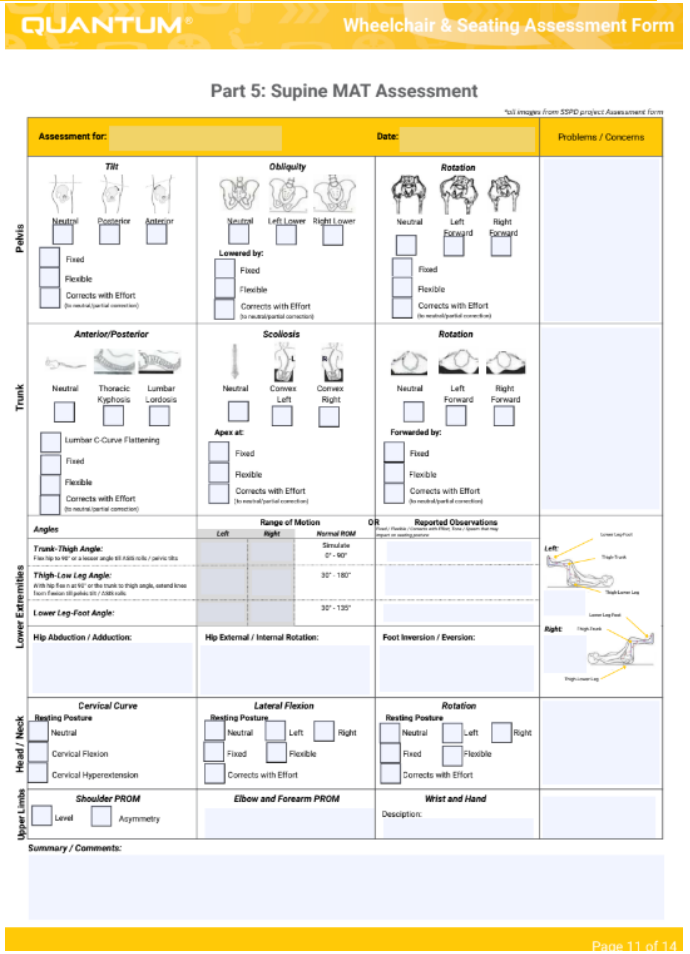
Hips
- Thigh to Trunk Angle: Left: Degrees, Right: Degrees
- Position (Frontal View): Neutral, ABduct° L / R, ADduct° L / R; External Rotation: L / R; Internal Rotation: L / R
- Windswept (Frontal View): Neutral, Left, Right
- Angles: Left:, Right:

Knees and Feet
- Thigh-Lower Leg Angle: Left: Degrees, Right: Degrees
- Lower Leg-Foot Angle: Left: Degrees, Right: Degrees; Plantar-flex, Dorsi-flex
- Foot Position: Left: Neutral, Inversion, Eversion; Right: Neutral, Inversion, Eversion

Head / Neck
- Cervical Curve (Side View): Resting Posture: Neutral, Flexion, Extension, Cervical Hyperextension (Chin poke)
- Neck Position (Frontal View): Midline, Lateral Flexion: L / R, Rotation: L / R
- Control: Independent Head Control and Full ROM, Restricted Head Control, Restricted ROM, Absent Head Control

Upper Limbs
- Shoulder Positioning: Level, Asymmetry
- Elbow and Forearm Position: Arm Support, No Support
- Wrist and Hand

Summary / Comments:


QUANTUM® Wheelchair & Seating Assessment Form

Part 5: Supine MAT Assessment

*all images from SSPD project Assessment form

Assessment for: Date: Problems / Concerns

Pelvis
- Tilt: Neutral, Posterior, Anterior; Fixed, Flexible, Corrects with Effort
- Obliquity: Neutral, Left Lower, Right Lower; Lowered by: Fixed, Flexible, Corrects with Effort
- Rotation: Neutral, Left Forward, Right Forward; Fixed, Flexible, Corrects with Effort

Trunk
- Anterior/Posterior: Neutral, Thoracic Kyphosis, Lumbar Lordosis; Lumbar C-Curve Flattening, Fixed, Flexible, Corrects with Effort
- Scoliosis: Neutral, Convex Left, Convex Right; Apex at: Fixed, Flexible, Corrects with Effort
- Rotation: Neutral, Left Forward, Right Forward; Forwarded by: Fixed, Flexible, Corrects with Effort

Lower Extremities
- Angles; Range of Motion (Left, Right, Normal ROM) OR Reported Observations
- Trunk-Thigh Angle: Simulate, 0° - 90°
- Thigh-Low Leg Angle: 30° - 180°
- Lower Leg-Foot Angle: 30° - 135°
- Hip Abduction / Adduction:
- Hip External / Internal Rotation:
- Foot Inversion / Eversion:

Head / Neck
- Cervical Curve: Resting Posture: Neutral; Cervical Flexion, Cervical Hyperextension
- Lateral Flexion: Resting Posture: Neutral, Left, Right; Fixed, Flexible; Corrects with Effort
- Rotation: Resting Posture: Neutral, Left, Right; Fixed, Flexible; Corrects with Effort

Upper Limbs
- Shoulder PROM: Level, Asymmetry
- Elbow and Forearm PROM
- Wrist and Hand: Description:

Summary / Comments:

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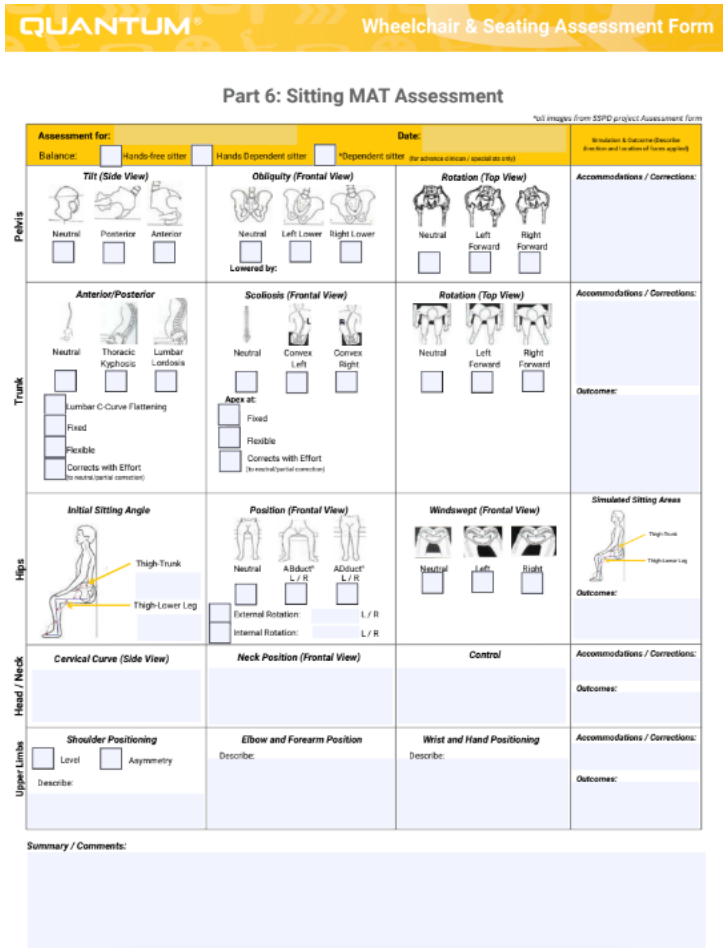
QUANTUM® Wheelchair & Seating Assessment Form

Part 6: Sitting MAT Assessment

*all images from SSPD project Assessment form

Assessment for: Date: Simulation & Outcome (Describe direction and Location all forces applied)

Balance: Hands-free sitter, Hands Dependent sitter, *Dependent sitter (for advance clinician / specialist use only)

Pelvis
- Tilt (Side View): Neutral, Posterior, Anterior
- Obliquity (Frontal View): Neutral, Left Lower, Right Lower; Lowered by:
- Rotation (Top View): Neutral, Left Forward, Right Forward
- Accommodations / Corrections:

Trunk
- Anterior/Posterior: Neutral, Thoracic Kyphosis, Lumbar Lordosis; Lumbar C-Curve Flattening, Fixed, Flexible, Corrects with Effort
- Scoliosis (Frontal View): Neutral, Convex Left, Convex Right; Apex at: Fixed, Flexible, Corrects with Effort
- Rotation (Top View): Neutral, Left Forward, Right Forward
- Accommodations / Corrections:
- Outcomes:

Hips
- Initial Sitting Angle: Thigh-Trunk, Thigh-Lower Leg
- Position (Frontal View): Neutral, ABduct° L / R, ADduct° L / R; External Rotation: L / R; Internal Rotation: L / R
- Windswept (Frontal View): Neutral, Left, Right
- Simulated Sitting Areas
- Outcomes:

Head / Neck
- Cervical Curve (Side View)
- Neck Position (Frontal View)
- Control
- Accommodations / Corrections:
- Outcomes:

Upper Limbs
- Shoulder Positioning: Level, Asymmetry; Describe:
- Elbow and Forearm Position: Describe:
- Wrist and Hand Positioning: Describe:
- Accommodations / Corrections:
- Outcomes:

Summary / Comments:

https://aci.health.nsw.gov.au/__data/assets/pdf_file/0018/156060/m03_mat_basic.pdf

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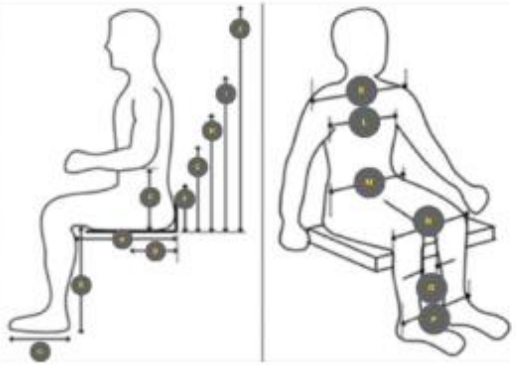
Linear Measurements

QUANTUM® Wheelchair & Seating Assessment Form

Part 7: Body Measurements

Client Measurements in Proposed Position

	Left	Right
A Buttock / Thigh Depth		
B Lower Leg Length		
C Foot Length		
D Ischial Well Length		
E Seat to Elbow		
F PSIS		
G Inferior Scapula		
H Axilla		
I Top of Shoulder		
J Top of Head		
K Shoulder Width		
L Chest Width		
M Hip Width		
N External Knee Width		
O Internal Knee Width		
P External Ankle / Foot (at widest point)		



Overall Width (Asymmetrical width for windswept legs or scoliotic posture)

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Translating the MAT Evaluation and Linear Measurements

Is the posture fixed?
Goal is to accommodate to slow deformity progression

Is the posture flexible?
Goal is to move towards neutral position. Never correct posture beyond the range established during the MAT.

Take into consideration secondary postures
Example: Pelvic Obliquity with scoliosis, Posterior pelvic tilt with thoracic kyphosis

Recognise Key Relationships Between Client and Wheelchair

Seating Components
Work with your dealer to select appropriate components such as backrests, cushion, leg rests, armrests and headrests.

FUNCTIONAL FREEDOM

Do your best not to over script

How can we use gravity to achieve better posture?
Power seat functions in PWC
Seat dump in MWC

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- **Environmental Assessment**
- Equipment Trial Process
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Environmental Considerations

- Access in and around home
- Obstacles
- Type of terrain
- Inclines
- **Transportation**
- Access and manoeuvrability

Assessment Process

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Wheelchair Trial Process
&
Clinical Reasoning

Mobility Assistive Equipment (MAE) - **Algorithmic Process**

What MAE device allows the individual to go from Point A to Point B in an:

- *Independently*
- *Safely*
- *AND timely*

manner in order to accomplish MRADL's?

Gait Device

Manual Wheelchair

Scooter

Basic Power Wheelchair

Complex Power Wheelchair

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Power Seat Bases

Drive Wheel Configuration

Drive Wheel Configurations

Rear Wheel Drive

Mid Wheel Drive

Front Wheel Drive

4 Wheel Drive

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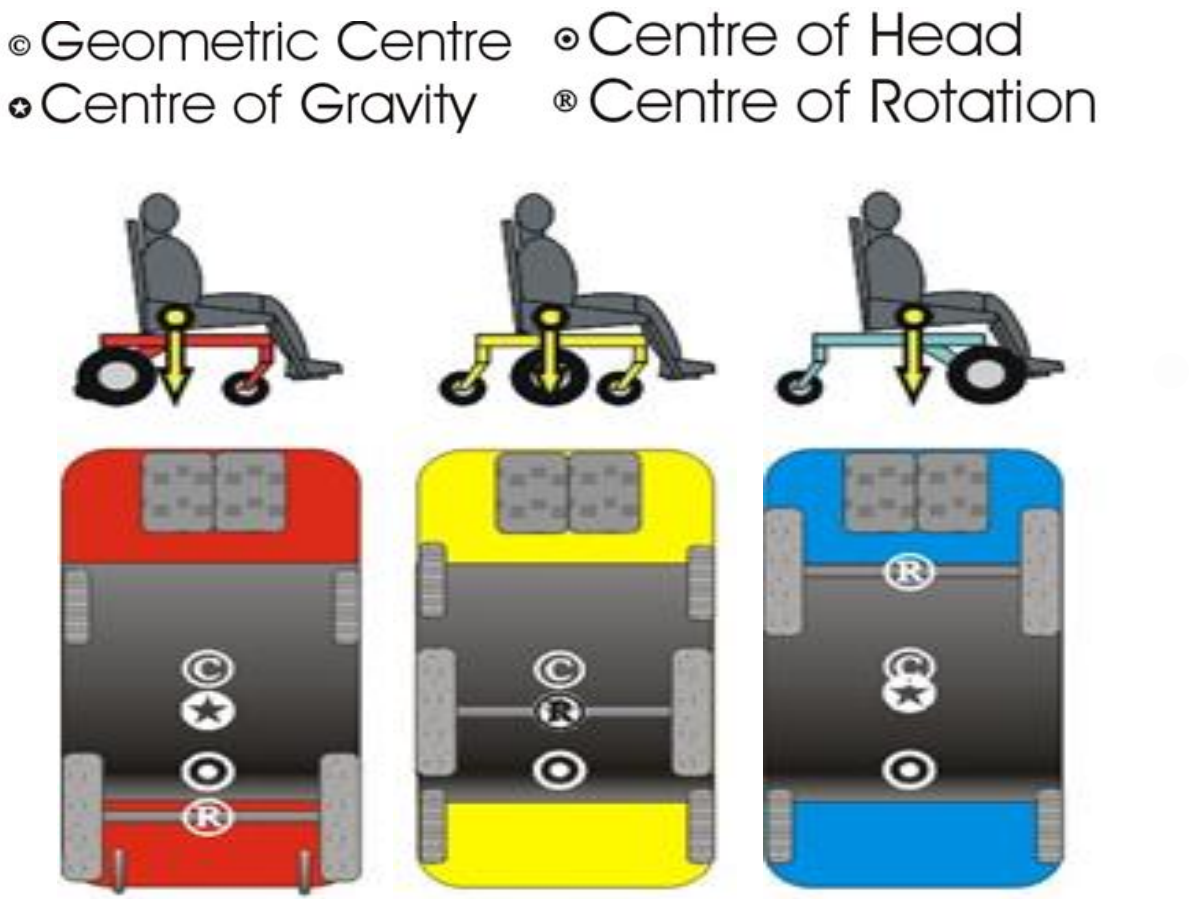
Drive Wheel Location



A chair turns on the "**Center Point**" of the drive wheel axis

The closer the user's head is to the w/c center of rotation, the less rotational displacement

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	EDGE 3 STRETTO®	EDGE® 3	Q6 EDGE® 2.0	4 FRONT® 2	4 FRONT® 2 HD	Q6 EDGE® Z	Q6 EDGE® HD		QUANTUM® 1450	J623 2.0	R-TRAK
	Available with 12" iLevel 	Available with 12" iLevel 	Available with 12" iLevel 	Available with 10" Elevation 	Available with 10" Elevation 	Available with 10" iLevel 	Available with 10" Elevation  *Colour shown not available		No Elevation 	Available with 10" Elevation 	Available with 10" Elevation 
DRIVE CONFIGURATION	Mid-Wheel Drive	Mid-Wheel Drive	Mid-Wheel Drive	Front-Wheel Drive	Front-Wheel Drive	Mid-Wheel Drive	Mid-Wheel Drive		Front-Wheel Drive	Mid-Wheel Drive	Rear-Wheel Drive
DRIVE WHEELS	35.5 cm (14") or 31.7 cm (12.5") Pneumatic or Flat Free Tyres	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]		35.5 x 10 cm (14x4" wide) Flat Free Tyres	35.5 cm (14") Pneumatic or Flat Free Tyres 14x4" wide Flate Free Tyres[2]	35.6 cm (14") Pneumatic or Solid Tyres 14x4" wide Flate Free Tyres[2]
CASTOR WHEELS	**Front:** 12.7 cm (5") or 15.2 cm (6") Solid **Rear:** 15.2 cm (6") Solid	**Front:** 15.2 cm (6") Solid **Rear:** 15.2 cm (6") Solid	**Front:** 15.2 cm (6") Solid[1] 20.3 cm (8") Solid[2] **Rear:** 15.2 cm (6") Solid[1] 20.3 cm (8") Solid[2]	**Rear:** 22.8 cm (9") Solid	**Rear:** 22.8 cm (9") Solid	**Front:** 15.2 cm (6") Solid **Rear:** 15.2 cm (6") Solid	**Front:** 15.2 cm (6") Solid **Rear:** 15.2 cm (6") Solid		22.8 cm (9") Solid	**Front:** 15.2 cm (6") Solid[1] 20.3 cm (8") Solid[2] **Rear:** 15.2 cm (6") Solid[1] 20.3 cm (8") Solid[2]	**Front:** 22.9 cm (9") Solid or Pneumatic
ANTI-TIP WHEELS	N/A	N/A	N/A	**Front:** 10 cm (4") Solid	**Front:** 10.1 cm (4") S	N/A	N/A		**Front:** 7.5 cm (3") Solid	N/A	**Rear:** 10 cm (4") Solid
MAXIMUM SPEED[3]	Up to 10 km/h (5.6 km/h w/ iLevel)[10]	Up to 10 km/h (7.2 km/h with iLevel	Up to 10 km/h (5.6 km/h w/ iLevel)[10]	Up to 10 km/h (5.6 km/h w/ elevation)	Up to 8 km/h (4.3 km/h w/ elevation)	Up to 10 km/h (5.6 km/h w/ iLevel)	Up to 7.6 km/h (5.6 km/h w/ iLevel)		Up to 7.2 km/h	Up to 10 km/h (2.5 km/h w/ elevation)	Up to 10 km/h (5.6 km/h w/ elevation)
GROUND CLEARANCE	7.3 cm (2.9")	6.8 cm (2.7") (battery tray)	6.8 cm (2.7") (battery tray)	7.6 cm (3") (battery tray)	7.6 cm (3") (battery tray)	7.6 cm (3") (frame base)	7.6 cm (3") (frame centre)		5 cm (2") (anti-tips)	6.9 cm (2.7") (battery tray)	10 cm (3.97") (battery tray)
TURNING RADIUS[4]	53.3 cm (21")	52 cm (20.5")	52 cm (20.5") w/ 15.2 cm (6") castors 59 cm (23.2") w/ 20.3 cm (8") castors	65.7 cm (25.9")	65.7 cm (25.9")	50 cm (19.7")	50 cm (19.7")		67.3 cm (26.5")	52 cm (20.5")	65.3 cm (25.7")
OVERALL LENGTH[8]	82.5 cm (32.5")	90 cm (35.5") without foot riggings	90 cm (35.5") w/ 15.2 cm (6") castors 102.6 cm (40.4") w/ 20.3 cm (8") castors	101 cm (39.9")	101 cm (39.9")	90.4 cm (35.6")	90.4 cm (35.6")		97 cm (38.2")	90 cm (35.5") without foot riggings	88.3 cm (34.8")
BASE WIDTH	54.6 cm (21.5") (35.5 cm (14") drive wheels) 51.9 cm (20.47") (31.5 cm (12.5") drive wheels)	61.9 cm (24.4")	61.9 cm (24.4")	60.9 cm (24")	60.9 cm (24")	66.5 cm (26.2")	66.5 cm (26.2")		74 cm (29.2")	61.9 cm (24.4")	61.4 cm (24.2")
SEAT SIZES	TRU-Balance® 3 and 4	TRU-Balance® 3 and 4	TRU-Balance® 3	TRU-Balance®3 and 4	TRU-Balance®3	TRU-Balance® 3	TB2 HD	TB3 HD	TRU-Balance® 2 HD Tilt	TRU-Balance® 3	TRU-Balance® 3
TRU-BALANCE® 4	W: 16-22" D: 14-22"	W: 16-22" D: 14-22"	N/A	W: 16-22" D: 14-22"	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRU-BALANCE 3® STATIC	W: 12-20" D: 12-20"	W: 12-22" D: 10-22"	W: 12-22" D: 12-22"	W: 12-22" D: 12-22"	HD W: 20-24" D: 20-24"	W: 12-24" D: 12-24"	W: 16-28" D: 20-28"	W: 16-32" D: 20-28"	W: 20-32" D: 20-28"	W: 12- 22" D: 12-22"	W: 12- 22" D: 12-22"
TRU-BALANCE® 3 POWER TILT	W: 12-20" D: 12-20"	W: 12-22" D: 12-22"	W: 12-22" D: 12-22"	W: 12-22" D: 12-22"	HD W: 20-24" D: 20-24"	W: 12-24" D: 14-24"	W: 16-28" D: 20-28"	W: 16-28" D: 20-25"	W: 20-32" D: 20-28"	W: 12- 22" D: 12-22"	W: 12- 22" D: 12-22"
TRU-BALANCE® 3 LIFT & TILT	W: 12-20" D: 12-20"	W: 12-22" D: 12-22"	W: 12-22" D: 12-22"	W: 12-22" D: 12-22"	HD W: 20-24" D: 20-24"	W: 12-24" D: 10-24"	N/A	W: 16-24" D: 20-25"	N/A	N/A	W: 12- 22" D: 12-22"
SEAT-TO-FLOOR HEIGHTS[13,14]	TRU-Balance® 3 and 4	TRU-Balance® 3 and 4	TRU-Balance® 3	TRU-Balance® 3 and 4	TRU-Balance®3	TRU-Balance® 3	TB2 HD	TB3 HD	TRU-Balance® 2 HD Tilt	TRU-Balance® 3	TRU-Balance® 3
TRU-BALANCE® 4	17.5-19.5"	17.5-19.5"	17.5-19.5"	17.75-19.75"	N/A	18-20"	N/A	17.7-19.7"	N/A	17.5-19.5"	17.2-19.2"
SYNERGY / STATIC	16-18"	16.5-18.5"	16.5-18.5"	15.2 -17.2"	15-17"	16.5-18.5"	16.5-18.5"	17.5-19.5"	16.5-18.5"	16.5-18.5"	16-18"
TRU-BALANCE® 3 POWER TILT[7]	17.5-19.5"	17.5-19.5"	17.5-19.5"	17.75-19.75"	17.75-19.75"	17.5-19.5"	18.2-20.9"	18.5-20.5"	18-20"	17.5-19.5"	17.2-19.2"
TRU-BALANCE® 3 LIFT & TILT[7]	17.5-19.5"	17.5-19.5"	17.5-19.5"	17.75-19.75"	17.75-19.75"	18-20"	N/A	17.7-19.7"	N/A	17.5-19.5"	17.2-19.2"
BATTERY SIZE[5]	MK 48Ah(2)	MK 50Ah(2)	MK 50Ah(2)	MK 70Ah(2)	MK 70Ah(2)	MK 70Ah(2)	MK 70Ah(2)		MK 70Ah(2)	MK 50Ah(2)	MK 70Ah(2)
BATTERY WEIGHT[11]	17 kg each	17.2 kg each	17.2 kg each	23.3 kg each	23.3 kg each	23.5 kg each	23.5 kg each		23.5 kg each	17.2 kg each	23.3 kg each
AVAILABLE ELECTRONICS[9]	120A Q-Logic 3	120A Q-Logic 3	120A Q-Logic 3	120A Q-Logic 3	120A Q-Logic 3	120A Q-Logic 3	120A Q-Logic 3		90A VR2 6-Key 120A Q-Logic 3	90A VR2 6-Key	120A Q-Logic 3
BATTERY CHARGER	8A Off-Board	8A Off-Board	8A Off-Board	8A Off-Board	8A Off-Board	8A Off-Board	8A Off-Board		8A Off-Board	8A Off-Board	8A Off-Board
MOTOR PACKAGES	2-Pole	2-Pole or 4-Pole	2-Pole	4-Pole	4-Pole	4-Pole	4-Pole[1]		4-Pole	2-Pole	4-Pole
WEIGHT CAPACITY[6]	136 kg	136 kg	136 kg	136 kg	204 kg	160 kg	204.1 kg[12]		272 kg	136 kg	136 kg
BASE WEIGHT	57.3 kg	62.8 kg	62.8 kg w/ 15.2 cm (6") castors 67.1 kg w/ 20.3 cm (8") castors	58.9 kg	58.9 kg	65 kg	65 kg		88.4 kg	62.8 kg	58 kg
APPROX. TOTAL WEIGHT[15]	185 kg	193 kg	192 kg	201 kg	210 kg	200 kg	216 kg		203 kg	185 kg	201 kg

1 Standard. **2** Optional. **3** Speed varies with user weight, terrain type, battery charge, battery condition and tyre pressure. **4** Without front riggings. **5** Battery capacity may change when adding power positioning systems. **6** Weight capacity is dictated by the selection of seating. **7** All measurements +/- 1/8" with 18" x18" seat, fixed towers, 136 kg weight capacity and solid tyres (add 3/8" with pneumatic tyres). Depths may increase seat-to-floor height. Contact Customer Service for details. Listed measurements are in their lowest position; does not include elevating system unless specified. **8** Without foot riggings. **9** All Quantum units can be ordered with specialty controls. **10** 10 km/h speed availability only with Q-Logic 3. **11** Battery weight may vary +/- 1.3 kg based on manufacturer. **12** Weight capacity is reduced to 181 kg with iLevel® power adjustable seat height. **13** Seat-to-floor heights are measured with the unit unloaded. Due to the 4Front's suspension system, seat-to-floor heights are approximately 0.6 cm lower when the unit is loaded. **14** 41.9 cm seat-to-floor height is not available with power tilt or iLevel®. 49.5 cm seat-to-floor height is not available with static seat or power recline. **15** these values are with batteries installed, TB3 Tilt, Lift, Recline and Centre Mount Power Elevating Leg Rests. Overall maximum weight will change depending on Seating scripted. **NOTE:** The information contained herein is correct at the time of publication.

4FRONT 2

Maximum speed – 10km/h
5.6km/h

Overall base size – 101.3cm Length
61.4cm Width

Seating - 12”-22” Wide
12”-22” Deep

Weight Capacity – 136kg

4FRONT 2 HD

Maximum speed – 10km/h
5.6km/h

Overall base size – 101.8cm Length
61.4cm Width

Seating - 20”-24” Wide
20”-24” Deep

Weight Capacity – 204kg

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Front Wheel Drive – Advantages

- More force distributed to each of the **four tires**, because there are two fewer tires in contact with the ground
- Better with **weight distribution** and **overall stability**
- Performs well when driving over a **range of terrains** – grass or uneven gravel.
- **Climbs well over obstacles.** The larger tires at the front "grab" an obstacle like a curb or a step and go over it, pulling the rest of the chair with it
- Accommodates for **tight hamstrings or compromised leg rest** positioning easily because there are no front caster wheels to interfere
- Easily navigate **tight corners** within the home
- **Front Access** to work surfaces

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Front Wheel Drive – Disadvantages

- Anti-tip casters can interfere with foot placement for stand pivot transfers
- Turning in tight spaces can be tricky for new users because more of the chair is behind them
- Turning quickly can cause dizziness because the inner ear is further from the drive axle
- Harder to drive straight at higher speeds -Directional Stability decreases as the speed of chair increases (Fishtailing)
- May have less control with non-proportional drive input device
- Not a great base for attendant only use

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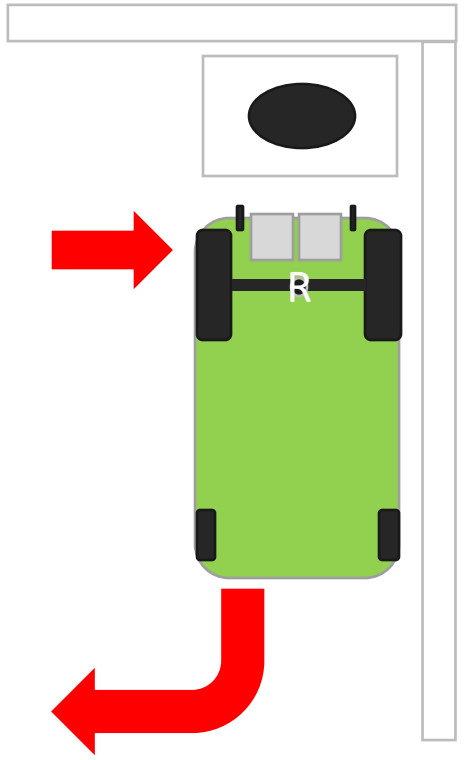
Optimizing Driving: FWD

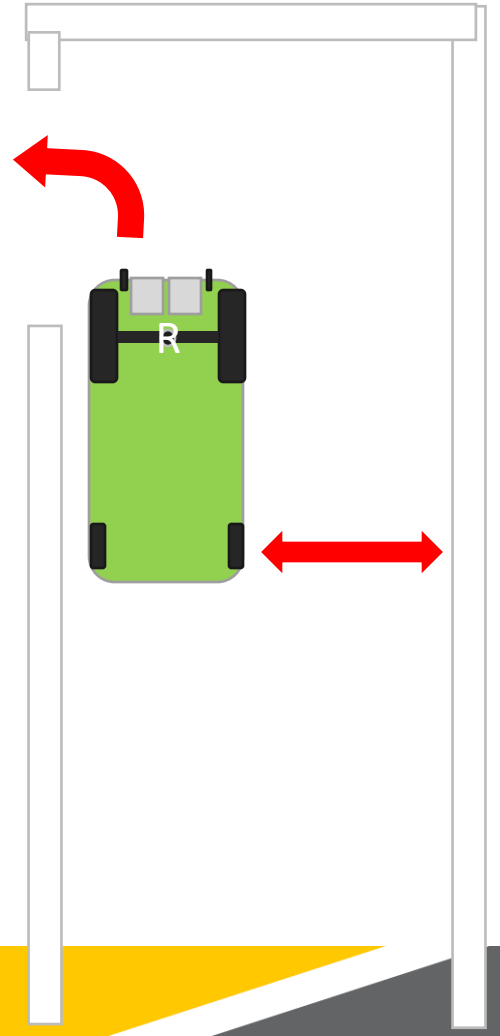
- When positioned next to a wall, turn toward the wall while reversing



QUANTUM®

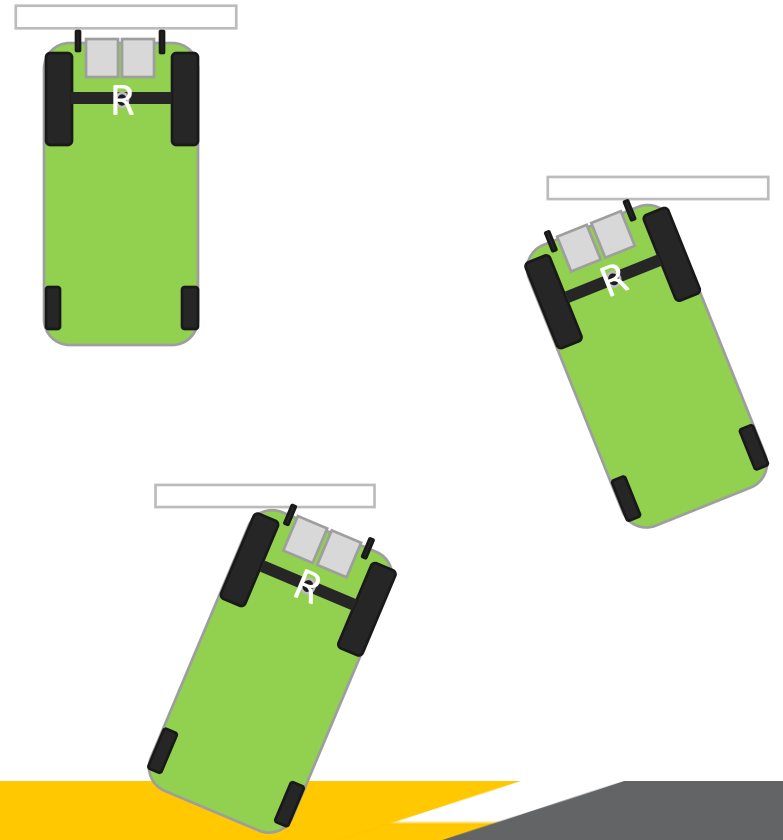
Optimizing Driving: FWD

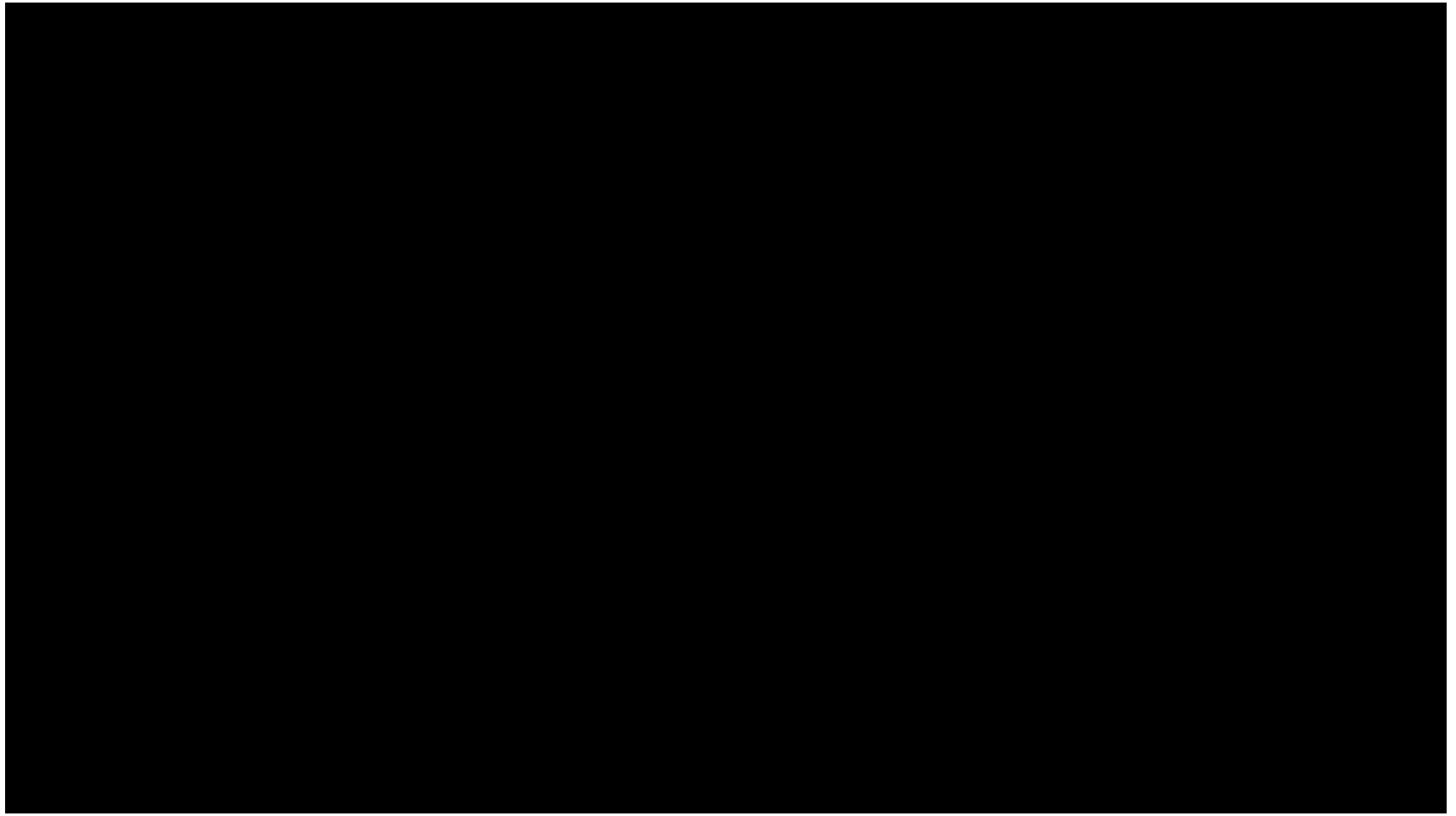
- When positioned next to a wall, turn toward the wall while reversing
- Approach the turn near the wall or direction that the person is turning



Optimizing Driving: FWD

- When positioned next to a wall, turn toward the wall while reversing
- Approach the turn near the wall or direction that the person is turning
- Approach obstacle from any direction, be sure to maintain the directional command





Optimizing Driving: FWD

- When positioned next to a wall, turn toward the wall while reversing
- Approach the turn near the wall or direction that the person is turning
- Approach obstacle from any direction, be sure to maintain the command
- Navigate declines slowly without stopping abruptly

QUANTUM® EDGE® 4

Maximum speed –	10km/h
	7.1km/h with iLevel
Turning radius –	57.9cm
Overall base size –	82cm Length
	62.2cm Width
Seating -	12”-22” Wide
	12”-22” Deep
Battery Size –	70amp
Cator Size -	7”
Weight Capacity –	150kg

EDGE 3 Stretto

Maximum speed –	10km/h
	5.6km/h with iLevel
Turning radius –	53.3cm
Overall base size –	82.5cm Length
	52cm Width
Seating -	12”-20” Wide
	12”-20” Deep
Range Per Charge –	Up to 25km
Weight Capacity –	136kg

QUANTUM®

Q6 edge® HD

Maximum speed –	7.6km/h
Turning radius –	54cm
Overall base size –	90.4cm Length
	66.68cm Width
Seating -	20”-28” Wide
	20”-25” Deep
Range Per Charge –	Up to 25km
Weight Capacity –	204kg

QUANTUM®

Mid Wheel Drive – Advantages

- Tightest turning radius for a 360° turn
- Most **intuitive** to drive as the COG is closest to the chair's center point
- **Climbs obstacles fairly well** - can be limited by how high caster wheels lift
- Having 6 wheels on the ground provides **stability** to the base
- **Good traction** on most surfaces, inclines and side slopes
- **Versatile** – Great for indoors and outdoors

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Mid Wheel Drive – Disadvantages

- Can high center on very uneven terrains – challenge for gutters
- Have limitations in the height of obstacle they can climb with smaller front castors
- Front caster wheels can interfere with stand pivot transfers
- Front caster wheels can be problematic for individuals with tight hamstrings or longer lower leg lengths
- Can give a sense of “pitching forward”
- Reliant on good suspension as user is sitting on top of drive wheel
- Can be difficult for some attendants to use

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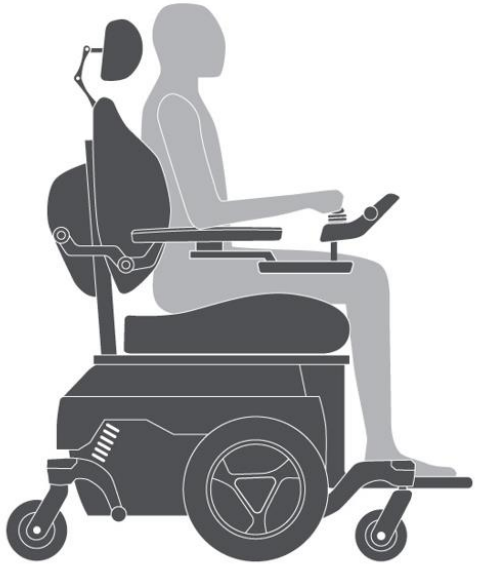
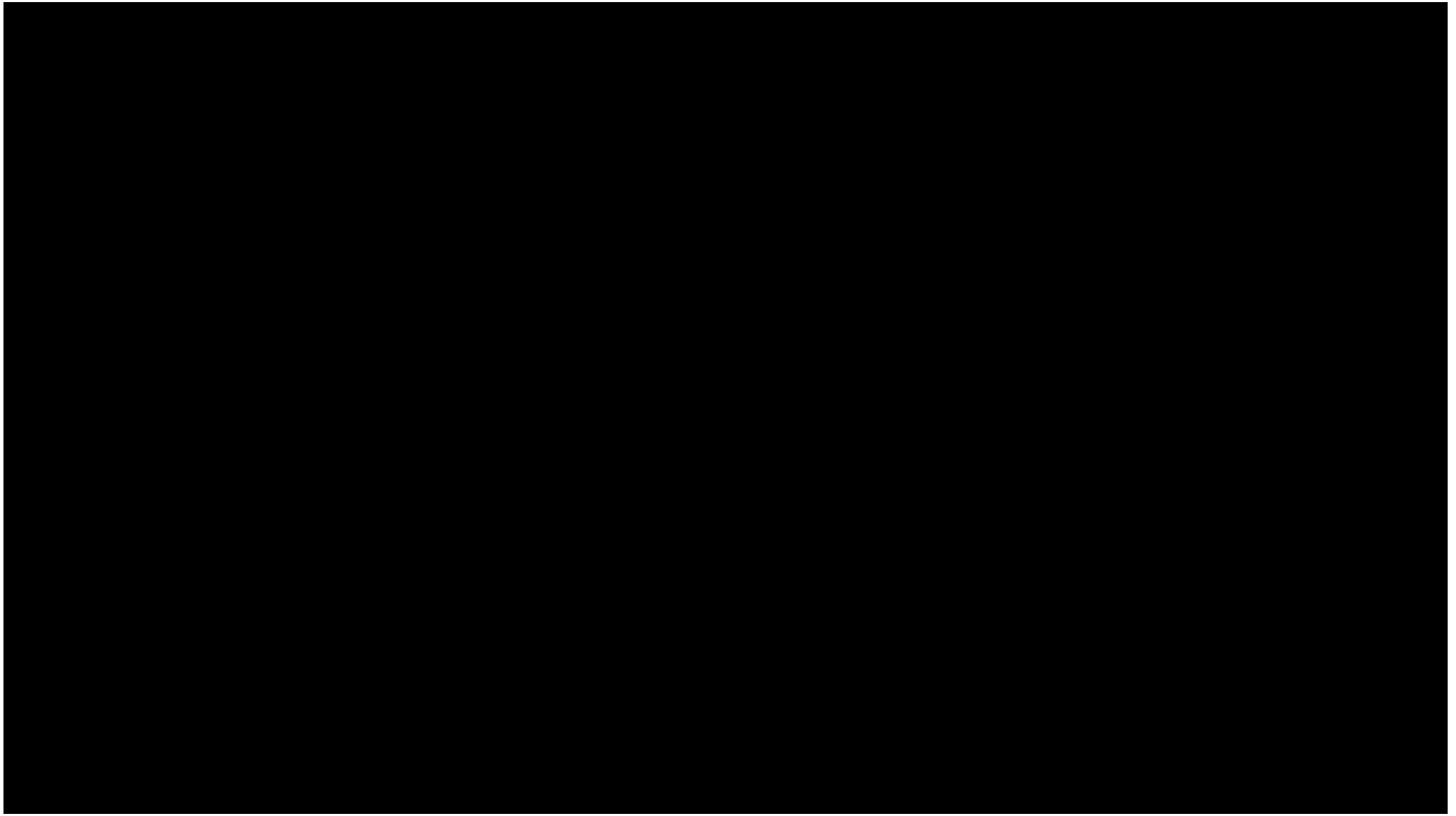
Optimizing Driving: MWD

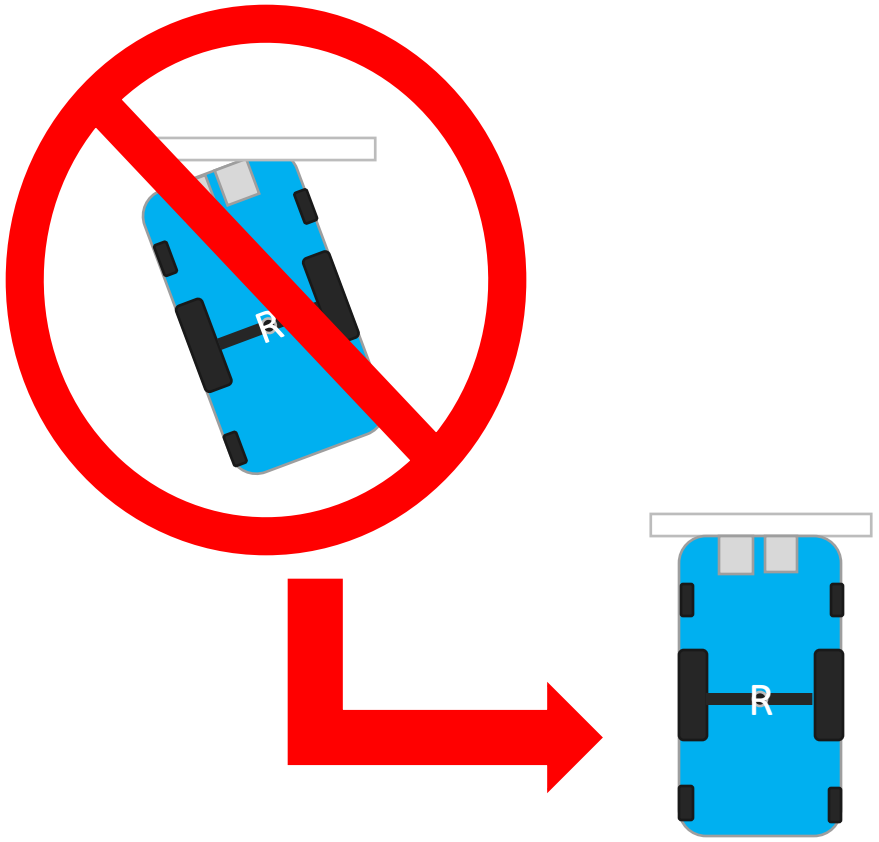
- Keep feet in as close as possible while avoiding the caster interference

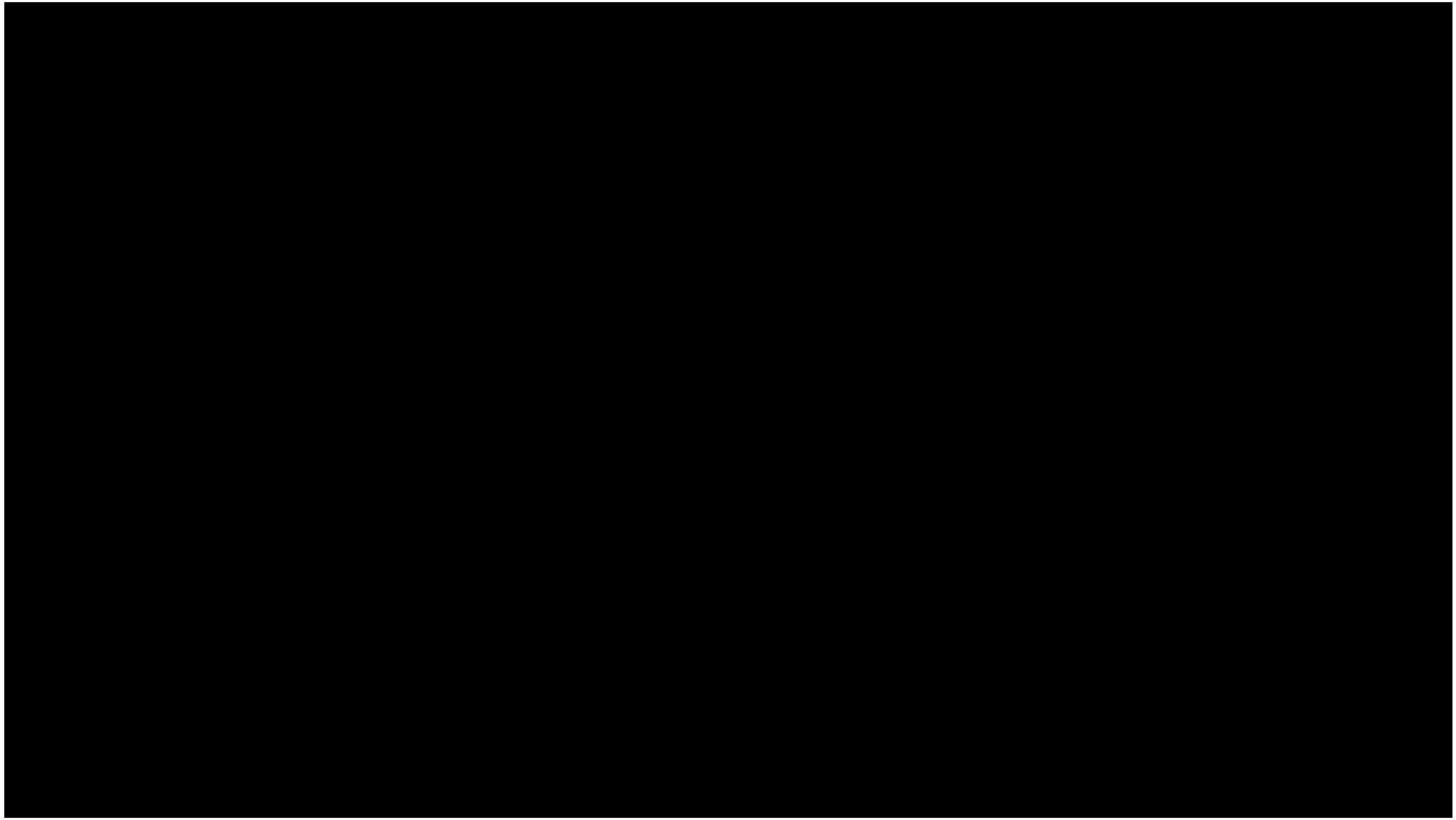




Optimizing Driving: MWD

- Keep feet in as close as possible while avoiding the caster interference
- Pull forward and line up drive wheels with door frame before initiating turn
- Approach turns from the middle of the path
- Approach obstacles with casters straight





Optimizing Driving: MWD

- Keep feet in as close as possible while avoiding the caster interference
- Pull forward and line up drive wheels with door frame before initiating turn
- Approach turns from the middle of the path
- Approach obstacles with casters straight
- Avoid terrains that could possibly cause high centering - approach obstacles from the side

R-TRAK

Maximum speed –	10km/h
	5.6km/h
Turning radius –	65.8cm
Overall base size –	88.3cm Length
	60cm Width
Seating -	12”-22” Wide
	12”-22” Deep
Range Per Charge –	Up to 25km
Weight Capacity –	136kg

QUANTUM®

Rear Wheel Drive – Advantages

- Provides **good control at higher speeds**
- **Handles aggressive terrain** very well
- Largest base = **Most stable**
- Large Front Castors **= Smoother Ride Outdoors**
- Will **transition grade changes easily**
- May be familiar for some users
- Most intuitive for attendants to use

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Rear Wheel Drive – Disadvantages

- Access issues due to large turning radius
- May require some speed to get over obstacles that must be climbed
- Must drive straight on, to climb higher obstacles
- Front caster wheels can interfere with footplate placement
- Front caster wheels can be problematic for individuals with tight hamstrings
- Increase length of the chair due to above
- Least intuitive to drive for new users who were previously ambulatory
- More likely to tip backwards when going up hill, as batteries and motor are at the rear of the chair

Optimizing Driving: RWD

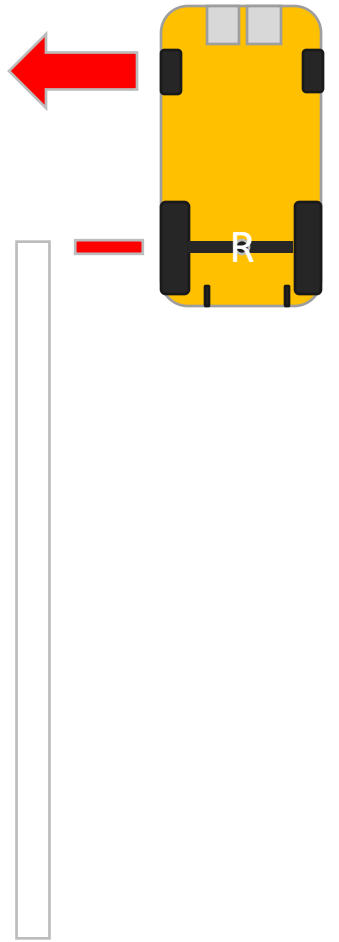
- Keep feet in as close as possible to decrease overall turning radius

Optimizing Driving: RWD

- Keep feet in as close as possible to decrease overall turning radius
- Be aware of COG placement for decreasing load on front casters and more weight distribution over drive tires

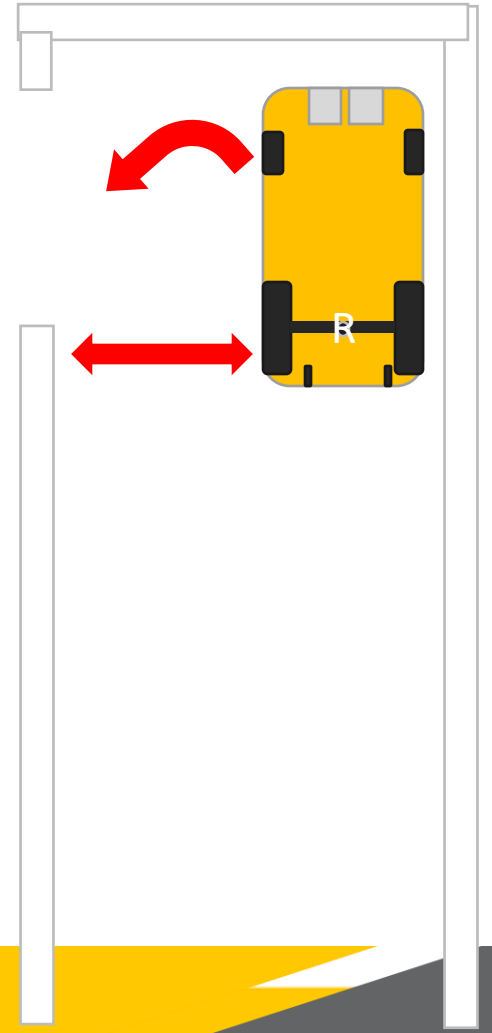
Optimizing Driving: RWD

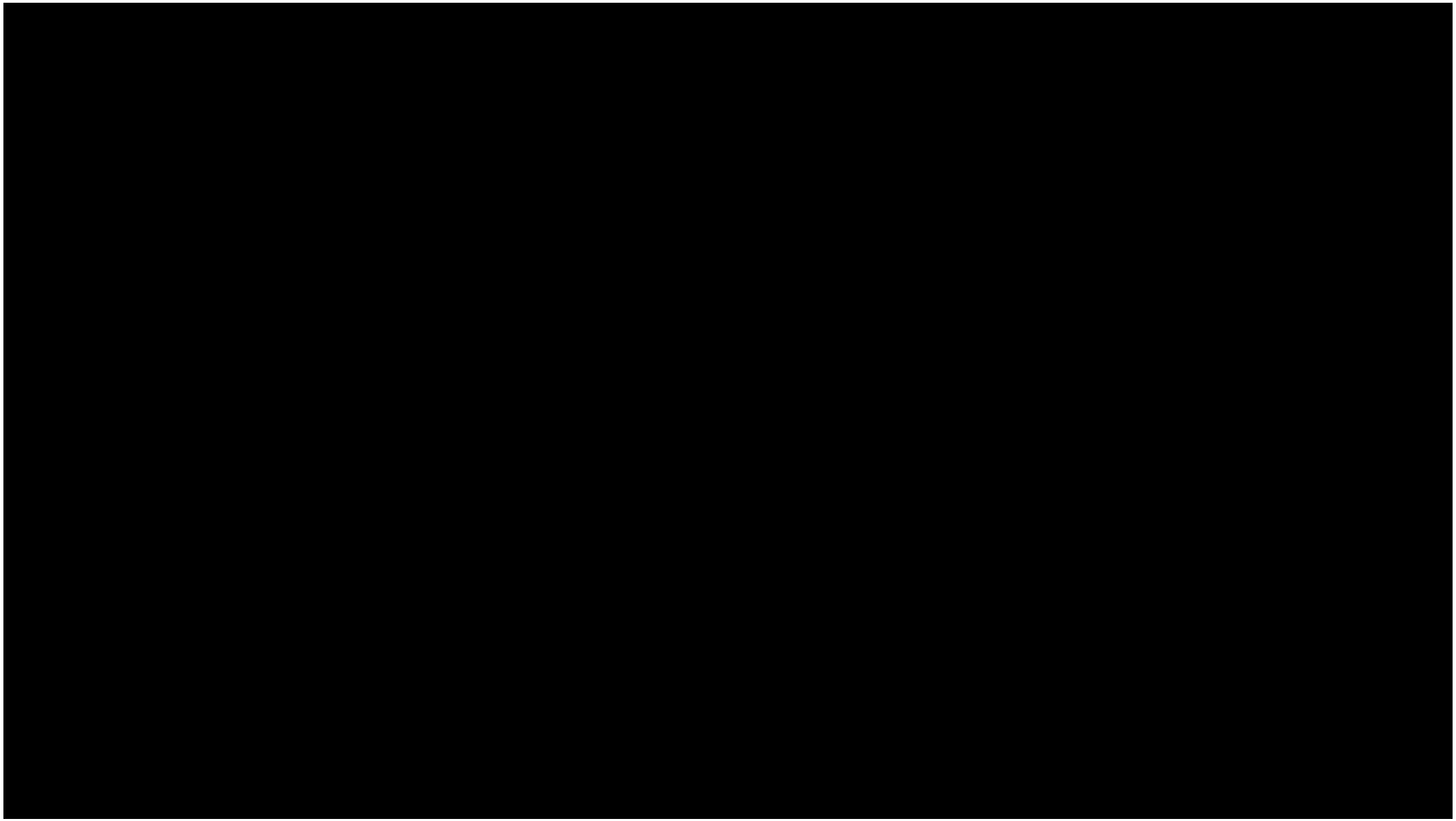
- Keep feet in as close as possible to decrease overall turning radius
- Be aware of COG placement for decreasing load on front casters and more weight distribution over drive tires
- Teach end user the need for wider turns around corners (Drive wheel to the corner)



Optimizing Driving: RWD

- Keep feet in as close as possible to decrease overall turning radius
- Be aware of COG placement for decreasing load on front casters and more weight distribution over drive tires
- Teach end user the need for wider turns around corners
- Approach turns from opposite side





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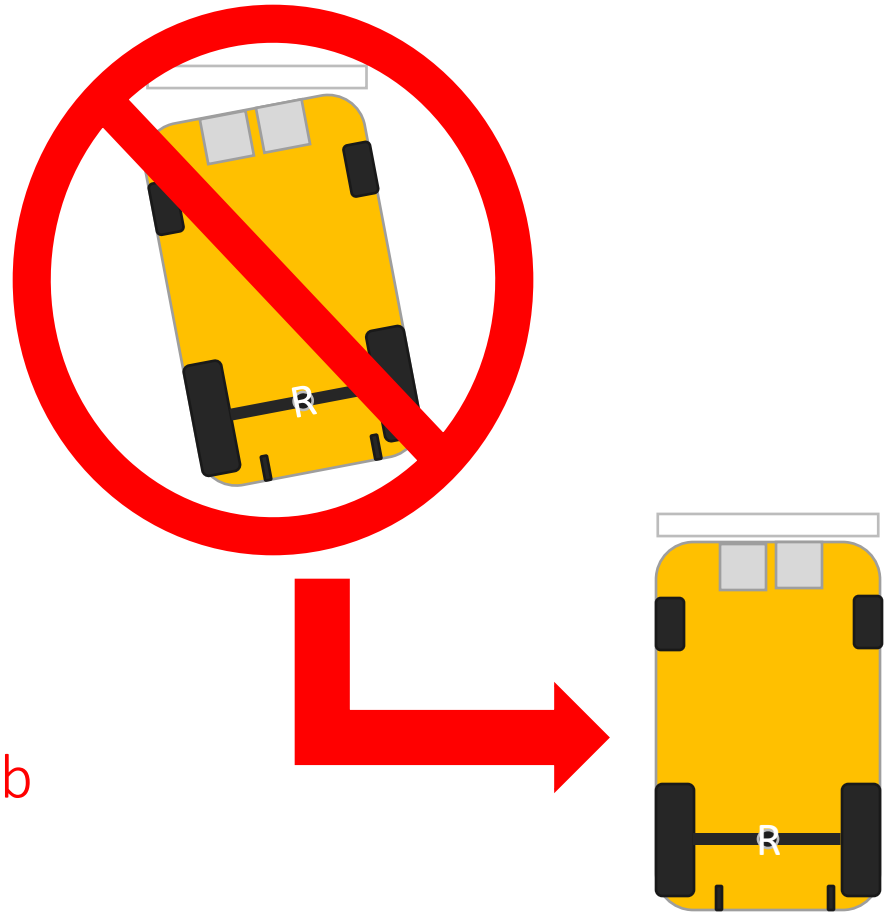
Optimizing Driving: RWD

- Keep feet in as close as possible to decrease overall turning radius
- Be aware of COG placement for decreasing load on front casters and more weight distribution over drive tires
- Teach end user the need for wider turns around corners
- Approach turns from opposite side
- Approach obstacles straight on for obstacle climb



Turning Shape of Space

4Front2

Edge 4

R-Trak

QUANTUM® OUTBACK® 4X4

Drive wheels –
14”pneumatic tires

Ground Clearance –
10.7cm

Drivetrain –
4 motor, independent drive

Battery Size –
(2) 95AH

Weight Capacity –
160kg

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Benefits of an Off-Road Mobility Device

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Environmental Considerations

- Access in and around home
- Obstacles
- Type of terrain
- Inclines
- Transportation and storage

Ryan, D. P., Kennedy, P., et al. (2017). The impact of the built environment on physical activity in individuals with spinal cord injury. Archives of Physical Medicine and Rehabilitation, 98(1), 79–88.

Case Study – Cam

- C7 incomplete quad
- **Everyday chair** – Push chair manual indoor chair, Quantum Edge 3 PWC
- **Barrier** – Cam's current wheelchairs cannot access rough or loose surface terrains.
- **Goals** – Cam would like to access the beach and local hiking trails with his friends.

Case Study – Cam

Activity

- Split into groups & focus on tight turning and using the attendant controls -
  - Mid Wheel Drive
  - Front Wheel Drive
  - Rear Wheel Drive
  - Off Road
- Which one felt the most natural?
- Which one was the hardest to control?

QUANTUM®

Power Seat Functions

The Power of Prevention

Power Seat Functions

Posterior Tilt

Anterior Tilt

Elevate / Lift

Elevating Legs

Recline

Stand

Picture obtained from Sunrise Medical Q700M-UP

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Posterior Tilt

Seat tilts posteriorly in relation to the ground, while maintaining the seat-to-back, and lower leg angle.

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Benefits of Posterior Tilt

Pressure Relief

- The more Tilt that is available, the better
- Tilting 10° - 15° reduce the effects of gravity to accommodate poor trunk balance/poor head control
- >30° Defines a pressure relieving tilt
- Up to 65° Significant ischial pressure relief (www.resna.org)
  - Recommendation is to maintain an offloaded position from the seating surface for at least 1 to 2 minutes every 30 minutes. (Pressure Ulcer Prevention and Treatment Following Spinal Cord Injury: A Clinical Practice Guideline for Health-Care Professionals SECOND EDITION S P I N a L c O R D M E D I c I N E, n.d.-a)

Positioning

- Support users to maintain an optimal seated posture by minimizing effects of gravity.
- Can use with custom molded seating
- Fixed Kyphosis-line of sight correction
- Reduces sliding due to;
- Gravity Assisted Independent repositioning

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Benefits of Posterior Tilt

Community Access and Stability

- Utilizing tilt while accessing slopes or uneven terrain can support postural stability.
- Reduce risk of sliding forward when travelling down hills.
- Increase clearance under footplates when travelling up-hills or slopes.

Feeding

- Gravity assisted swallowing and/or aide in digestion

Fatigue Management

- Increased sitting tolerance
- Energy conservation

Considerations:

- Risk of hypotension
- Cognition in independently managing tilt

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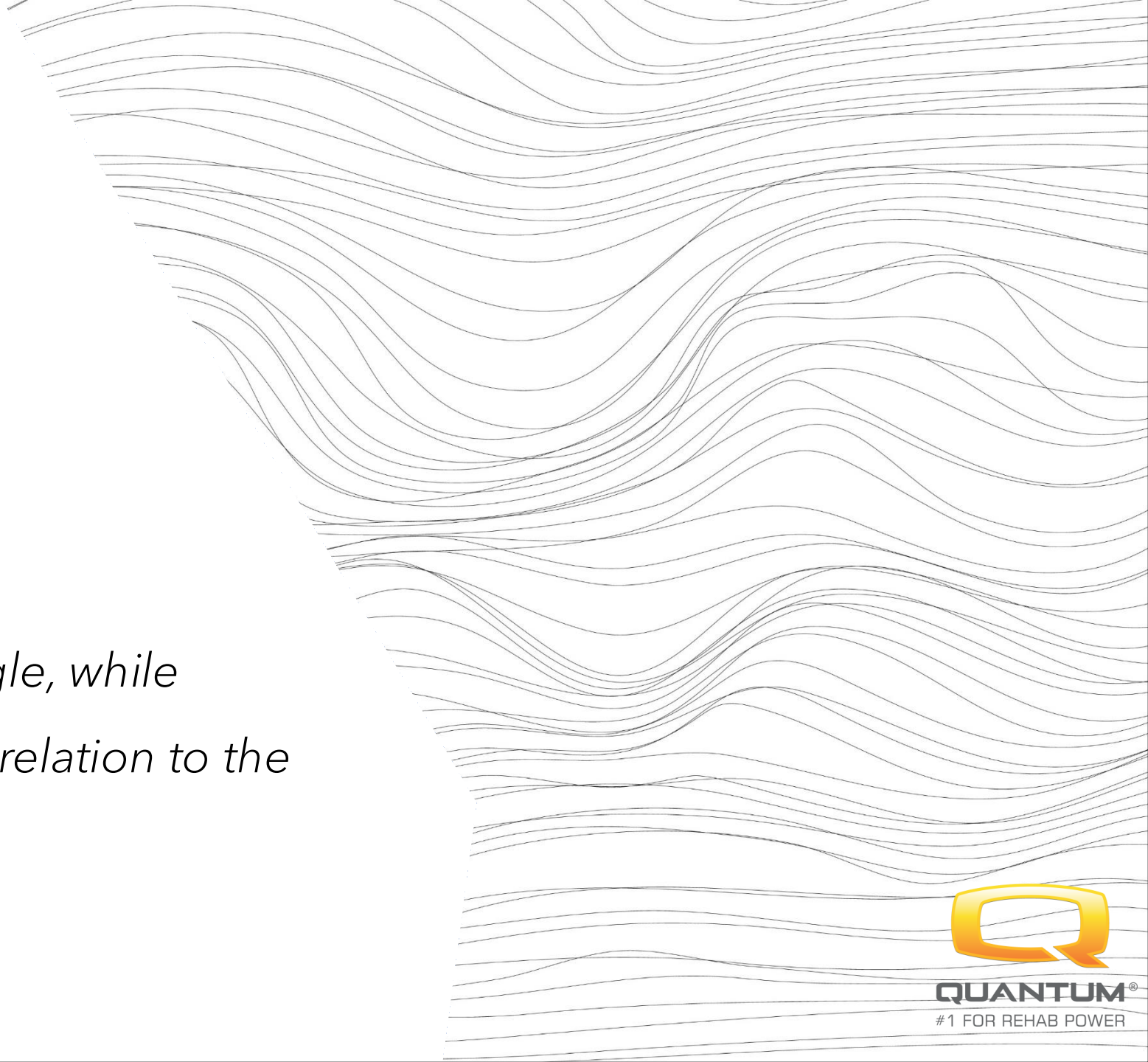
Recline

Increases the seat to back angle, while maintaining the seat angle in relation to the ground.



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#1 FOR REHAB POWER

Benefits of Recline

Pressure Relief

- “The greatest reduction in pressures were seen when combinations of tilt and recline were used together, with studies using 25-45° of tilt with 110-150° of recline.” (RESNA Position on the Application of tilt, Recline, and Elevating Legrests for Wheelchairs: 2015 Current state of the Literatures)

Independent Repositioning

- Comfort - Increases sitting tolerance
- PROM at hips and knees
- May help to achieve a supine position

Balance and Stability

- Improve trunk stability
- Improves postural readiness

Benefits of Recline

RESNA
Rehabilitation Engineering and Assistive Technology Society of North America

Reduces Manual Handling

- Reduction of transfers required throughout the day
- Reduces the need for transfers

Bowel and Bladder Care

- Catheterization
- Bladder and/or bowel care

Considerations:

- Increased risk of shear
  - ➢ Tilt before recline decreases risk
- Increased risk of Posterior Tilt/Sliding
- Increased Risk of shifting access to drive controls and postural supports
- May increase spasticity and/or reflex activity

QUANTUM®

Assistive Technology, 21:13–22, 2009

ISSN: 1040-0435 print
DOI: 10.1080/10400430902945769

Taylor & Francis
Taylor & Francis Group

RESNA Position on the Application of Tilt, Recline, and Elevating Legrests for Wheelchairs

Assistive Technology™

Brad E. Dicianno, MD,[1,2,3,4] Juliana Arva, MS, ATP,[5] Jenny M. Lieberman, MS, OTR/L, ATP,[6] Mark R. Schmeler, PhD, OTR/L, ATP,[2,3,4] Ana Souza, MS, PT,[2,3,4] Kevin Phillips, CRTS,[7] Michelle Lange, OTR, ABDA, ATP,[8] Rosemarie Cooper, MPT, ATP,[2,3,4]

ABSTRACT This document, approved by the Rehabilitation Engineering & Assistive Technology Society of North America (RESNA) Board of Directors on April 23, 2008, describes typical clinical applications and provides evidence from the literature supporting the application of tilt, recline, and elevating legrests for wheelchairs.

RESNA
Rehabilitation Engineering and Assistive Technology Society of North America

Published in the AT Journal on June 12, 2009

www.resna.org

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Power Tilt and Recline

Clinical Benefits:

- 25°- 45° Tilt with 110°- 150° Recline provides the **greatest pressure relief** when used in combination
- 45° of tilt with 120° of recline provides a **40% load reduction**
- Tilt before recline **decreases shear**
- Multiple angles provide ease of independent, or caregiver assisted repositioning
- 30° of tilt with full recline improves lower limb hemodynamic states (**oedema**)
- Dynamic seating allows a variety of postures throughout the day to participate in or perform **ADLs**

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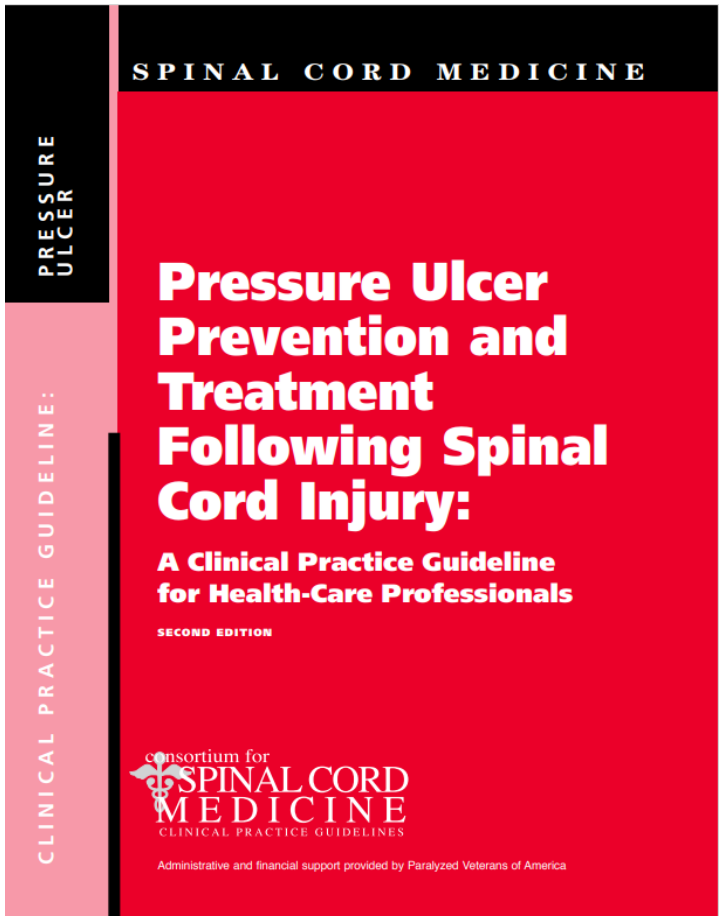
What do other resources say?

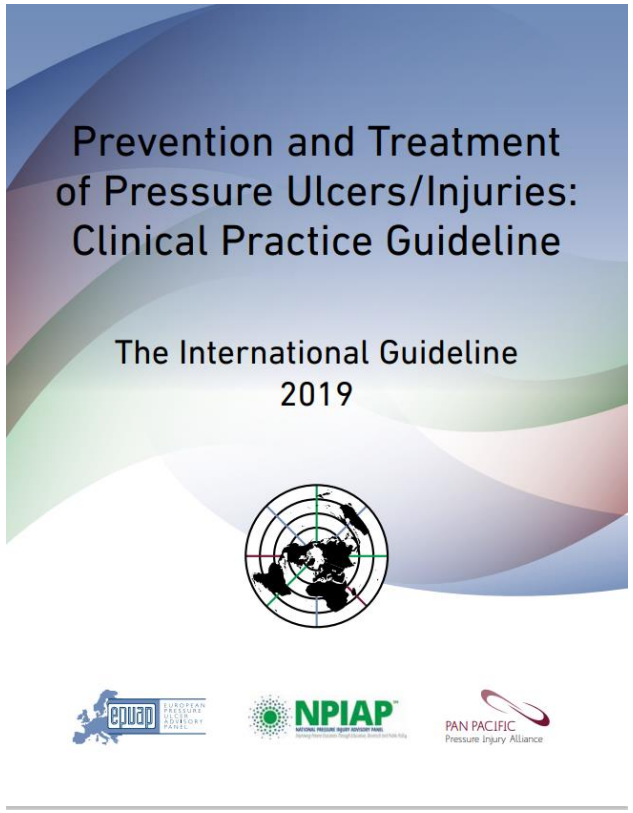


- Employ a power weight-shift system when manual pressure redistribution is not possible.
- Individualized attention must be given to determine the method of weight shifting that allows the person to consistently perform the maneuver and sustain the off-loaded pressure for the duration of time recommended.
- Tilt of power wheelchairs creates pressure redistribution and increased blood flow during maximum tilts at 45 to 60 degrees
- Tilt, recline, and standing systems should be considered as a means of achieving adequate pressure redistribution for all wheelchair users
- Maintain an offloaded position from the seating surface for at least 1 to 2 minutes every 30 minutes.

QUANTUM

What do other resources say?

- Skin perfusion increases when there is a seat tilt of 15°, 25° or 35° combined with a 120° recline, or when a 35° seat tilt is combined with 100° recline



QUANTUM

Tilt, Recline and Elevating Leg Rests

Power seat functions are often medically necessary, as they enable certain individuals to:

- Re-alignment posture and enhance function
- Improve physiological processes such as
  - Orthostatic Hypotension
  - Respiration
  - Bowel and bladder function
- Enhance visual orientation, speech, alertness and arousal
- Improve transfer biomechanics
- Regulate spasticity
- Accommodate and prevent contractures and orthopedic deformities
- Manage edema
- Redistribute and relieve pressure
- Increase seating tolerance and comfort
- Independently change position to allow dynamic movement

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Seat Elevation

Allows the entire seating system to raise while maintaining angles.

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What is Power Seat Elevation / Lift?

- Raises and lowers the end user while remaining in a seated position
- Utilizes of an electromechanical lift system to provide varying amounts of vertical seat to floor height
- Does not change the seated angles or the seat's angle relative to the ground.

QUANTUM®

Assistive Technology®, 21:69–72, 2009

ISSN: 1040-0435 print / 1949-3614 online
DOI: 10.1080/10400430902945587

Taylor & Francis
Taylor & Francis Group

RESNA Position on the Application of Seat-Elevating Devices for Wheelchair Users

Julianna Arva, MS,[1] Mark R. Schmeler, PhD, OTR/L, ATP,[2] Michelle L. Lange, OTR, ABDA, ATP,[3] Daniel D. Lipka, MEd, ATP, OTL,[4] and Lauren E. Rosen, PT, MPT, ATP[5]
[1]TiLITE Corp., Kemmerich,

ABSTRACT This document, approved by the Rehabilitation Engineering & Assistive Technology Society of North America (RESNA) Board of Directors in September 2005, shares typical clinical applications and provides evidence from the literature supporting the use of seat-elevating devices for wheelchair users.

Assistive Technology™

RESNA
Rehabilitation Engineering and Assistive Technology Society of North America

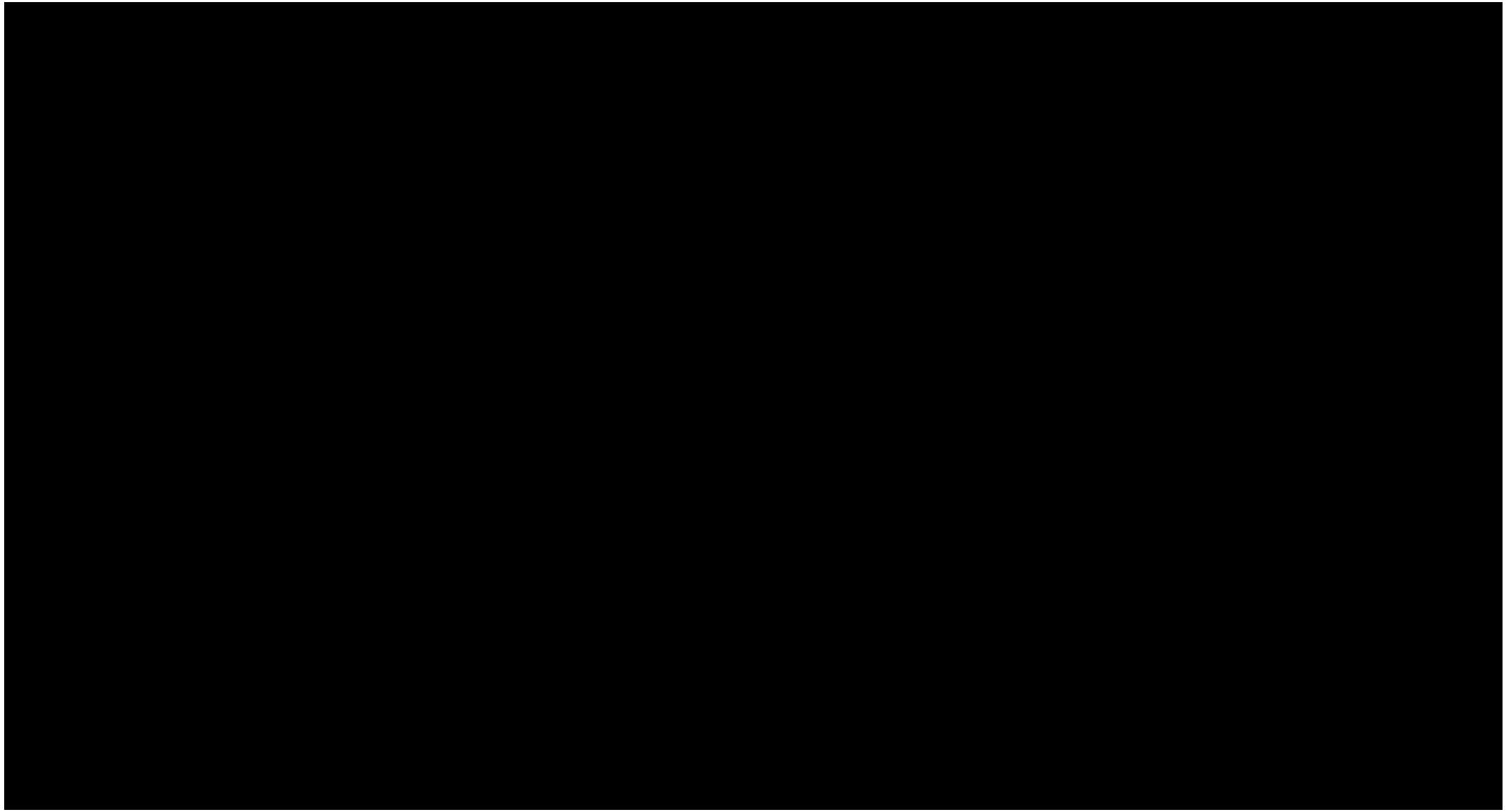
Published in the AT Journal on July 22, 2009

RESNA Position on the Application of Seat Elevation Devices for Power Wheelchair Users Literature Update 2019

Power Seat Elevation

It is RESNA's position that power seat elevation devices are medically necessary, as this technology enables certain individuals to:

- Facilitate reach biomechanics, safety and range
- Improve transfer biomechanics, safety and independence
- Enhance visual orientation and line-of-sight
- Support physiological health, safety and well-being
  - Decrease hyperlordotic position of the neck
  - Promote stable seated positioning
  - Reduce symmetric tonic neck reflex (STNR) activity
  - Improve safety with performance/participation in ADLs
- Promote communication, social engagement, self-esteem and integration
- Improve wheelchair pedestrian safety



Research Study – FMA & Seat Elevation

- **How to Utilize the Functional Mobility Assessment (FMA) to Track Function and Justify Medical Necessity**

- Hickey, Corey, (2016). Seat Elevators: How to Utilize the Functional Mobility Assessment (FMA) to Track Function and Justify Medical Necessity, 32nd International Seating Symposium Paper Presentation March 3, 2016

Research Study – FMA & Seat Elevation

- **Objective**: To determine trends in the procurement of Seat Elevation and their association with function
- **Design:** A retrospective analysis of client data-base and medical chart review
- **Inclusion:** Individuals recommended to have Seat Elevation from 01/26/2012 to 05/08/2014 (**N = 61**)
- **Measures:** Demographics, procurement, functionality of the Seat Elevation, and FMA scores at baseline and follow-up (**N = 22**)

FMA – Outcome Measure

Subject Code: _____

Functional Mobility Assessment (FMA) Beta Version 1.0

DIRECTIONS:

Step 1. Please answer the following 10 questions by **placing an 'X' in the box under the response** (completely agree, mostly agree, slightly agree, etc.) that best matches your ability to function while using your current means of mobility (i.e., walking, cane, crutch, walker, manual wheelchair, power wheelchair or scooter). All examples may not apply to you, and there may be tasks you perform that are not listed. **Mark each question only one time.** If you answer, ***slightly, *mostly, or *completely disagree for any question,** please **write and specify the reason for your disagreement in the C*omments* section.**

Step 2. Please determine your priorities, by rating **the importance of the content in each of the 10 questions** in the shaded box to the right of each question. Rate your highest priority as 10, and your lowest priority as 1.

What is your current means of mobility device? *(Check all that apply)*	Walking_____ Walker_____ Cane_____ Crutch_____ Manual Wheelchair_____ Power Wheelchair_____ Scooter_____

	Completely Agree	Mostly Agree	Slightly Agree	*Slightly Disagree	*Mostly Disagree	*Completely Disagree	Does not apply	Rating priority
1. My current means of mobility allows me <u>to carry out</u> my daily routine as independently, safely and efficiently as possible: *(e.g., tasks I want to do, need to do, am required to do- when and where needed)*								
Comments:								
2. My current means of mobility meets my <u>comfort needs</u>: *(e.g., heat/moisture, sitting tolerance, pain, stability)*								
Comments:								
3. My current means of mobility meets my <u>health needs</u>: *(e.g., pressure sores, breathing, edema control, medical equipment)*								
Comments:								
4. My current means of mobility allows me <u>to be as independent, safe and efficient as possible</u>: *(e.g., do what I want it to do when and where I want to do it)*								
Comments:								

Adapted from the FEW(2003) and FAW (2004)

Subject Code: _____

	Completely Agree	Mostly Agree	Slightly Agree	*Slightly Disagree	*Mostly Disagree	*Completely Disagree	Does not apply	
5. My current means of mobility allows me <u>to reach and carry out tasks at different surface heights</u> as independently, safely and efficiently as possible: *(e.g., table, counters, floors, shelves)*								
Comments:								
6. My current means of mobility allows me <u>to transfer</u> from one surface to another: *(e.g., bed, toilet, chair)*								
Comments:								
7. My current means of mobility allows me <u>to carry out personal care tasks</u>: *(e.g., dressing, bowel/bladder care, eating, hygiene)*								
Comments:								
8. My current means of mobility allows me <u>to get around indoors</u>: *(e.g., home, work, mall, restaurants, ramps, obstacles)*								
Comments:								
9. My current means of mobility allows me <u>to get around outdoors</u>: *(e.g., uneven surfaces, dirt, grass, gravel, ramps, obstacles)*								
Comments:								
10. My current means of mobility allows me <u>to use personal or public transportation</u> as independently, safely and efficiently as possible: *(e.g., secure, stow, ride)*								
Comments:								

Research Study – Outcomes:

Conclusion

- PWC with SE are associated with improved mobility
  - For those receiving one for the first time
  - Continued improvements for those who retain a SE
- Once the SE is removed, there is a decrease in transfer ability

Anterior Tilt

Anterior tilt shifts the entire seating system forward by raising the rear seat to floor height while maintaining front seat to floor height.

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#1 FOR REHAB POWER

What is Anterior Tilt?

- A power seating function that much like traditional posterior tilt changes the angle of the wheelchair seat in the sagittal plane.
- This function raises the posterior aspect of the seat higher than the front which places the person in a partial standing position.

Quantum TB4 – Anterior Tilt Packages

0° - 10° Package

0° - 30° Package

What is Required for TB4 Anterior Tilt?

- All Power Actuators
  - Power Tilt
  - Power Seat Elevation
  - Power Recline
  - Power LE Elevation
  - Foot Platform Articulation

Clinical Benefits of Anterior Tilt

- Position Change
- Increase Functional Reach
- Transfer Assistance
- Facilitation of Physiological Functioning
- Visual Field Improvements

QUANTUM®

› Disabil Rehabil Assist Technol. 2019 Jul 26;1-8. doi: 10.1080/17483107.2019.1644676.
Online ahead of print.

A pilot investigation of anterior tilt use among power wheelchair users

Laura A Rice [1], Rebecca Yarnot [1], Sarah Mills [2], Jacob Sonsoff [1 3]

- Significant improvements with anterior tilt seen for:
  - Safety of meal preparation
  - Functional reach in a vertical direction
    - Grocery retrieval adequacy and safety
  - Improved visual field “over” items ex. (fax machine, stove)

- Subjective feedback:
  - Most helpful in reaching tasks
  - The “safety” components involved were restrictive

1) Position Change

- Pain management
- Tone/spasticity management
  - Joint angle changes
- Pressure re-distribution
  - Additional functional movement options (dynamic seating) could increase the frequency in which weight shifts are completed
- Increased activity tolerance
  - Due to changes in joint angles and increased comfort/tolerance

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Position Change For Functional Seating:

- Establishes a sound base of support
  - Easier balance finding/maintaining
- Establishes a relationship with gravity
  - Facilitate stable core
- Enable supported pelvic movement
  - Allows extension of UE range of motion
- Position individual for best view
  - To see actions of their upper extremities
  - Improves hand eye coordination and precision

Costigan, F. A., & Light, J. (2010).

Retrieved from Rifton

2) Increase Functional Reach

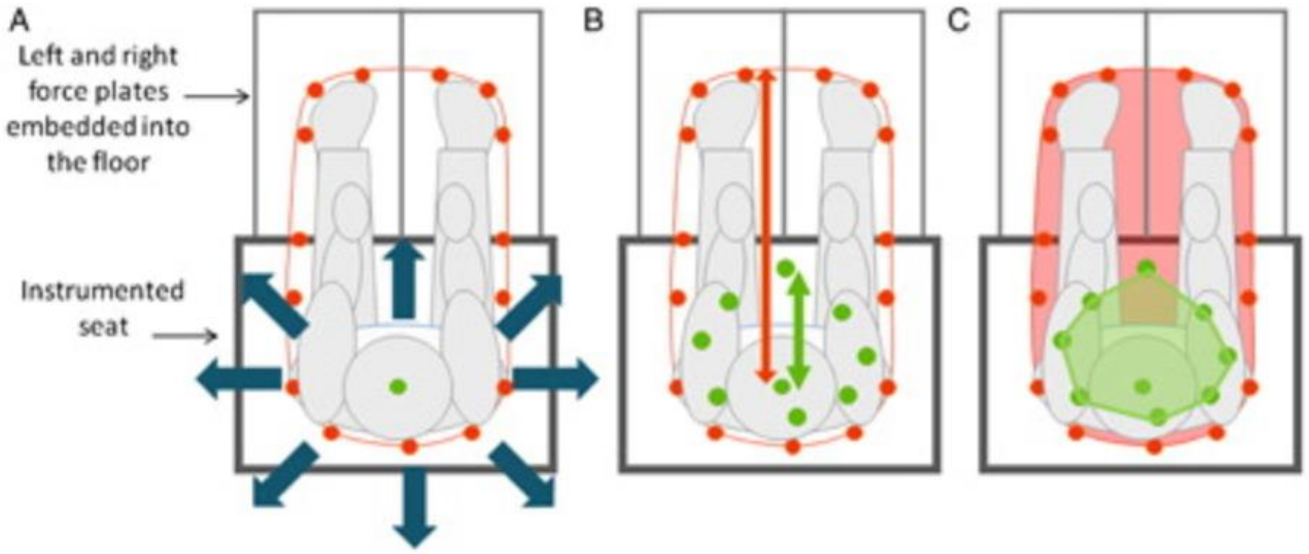
- Increasing horizontal and vertical reach
  - Improved upper extremity function even at anterior slopes of 0-15 degrees (Stavness, 2006).
- Completing downhill transfers whenever possible
- Improved biomechanics for reaching
- Limit positions that cause impingement
  - Limits internal rotation with abduction
- Improve energy conservation
  - “Wheelchair users perform overhead arm activities 5 times more often than ambulatory control subjects

Sharon E. Sonenblum , Chris L. Maurer , Christopher D. Hanes , Julie Piriano & Stephen H. Sprigle (2021)

QUANTUM®

Position Change For Balance and Reach:

- In many individuals reaching outside one's base of support may be limited
  - Extensive research on this for those with SCI, MS, post stroke, and CP



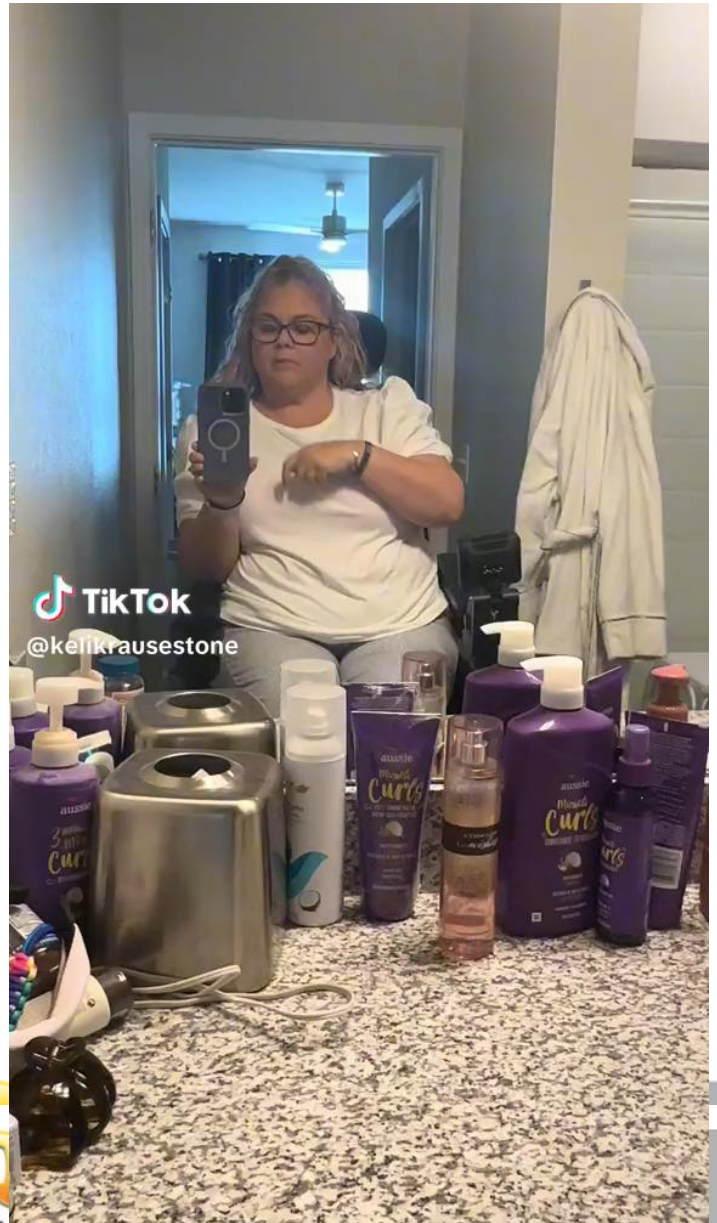
B. Red line is the maximal potential for center of pressure shift
-Green is the actual center of pressure achieved

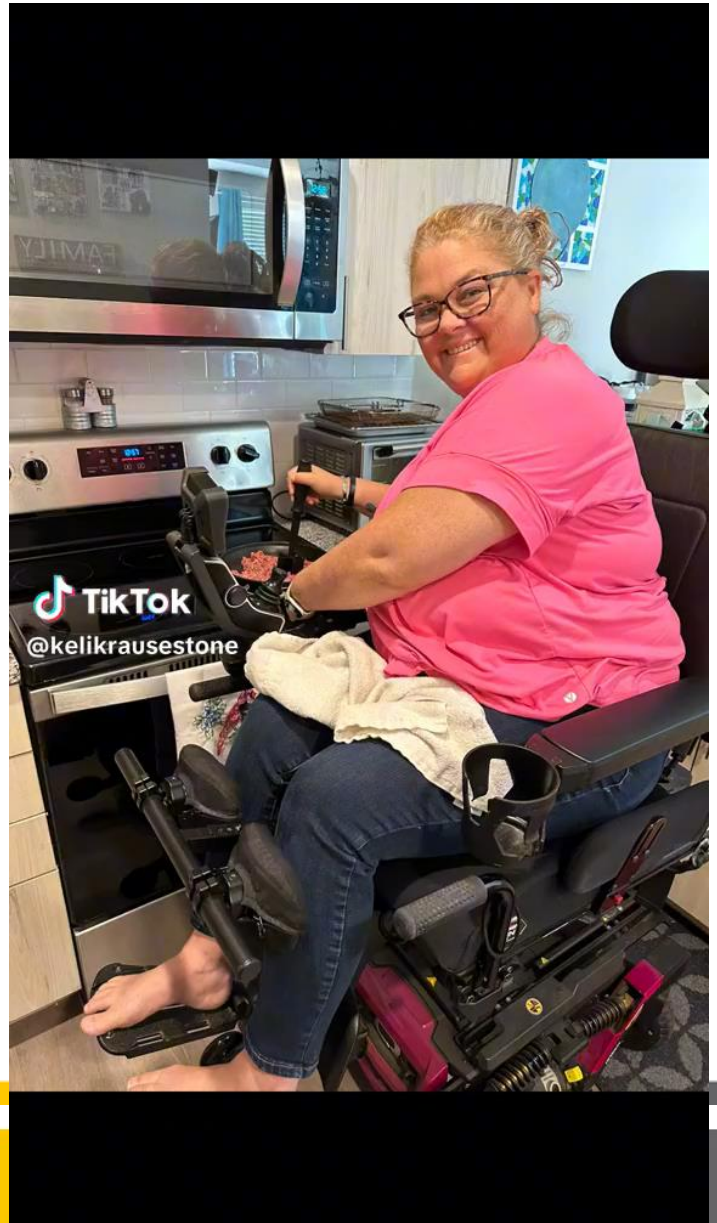
C. green = average area of excursion possible

So, let's bring the person closer to their desired object to maximize this when it comes to reach and balance!

Cindy Gauthier, Dany Gagnon, Géraldine Jacquemin, Cyril Duclos, Kei Masani & Milos R. Popovic (2012)

Case Study – Keli





Activities of Daily Living – Functional Tasks:

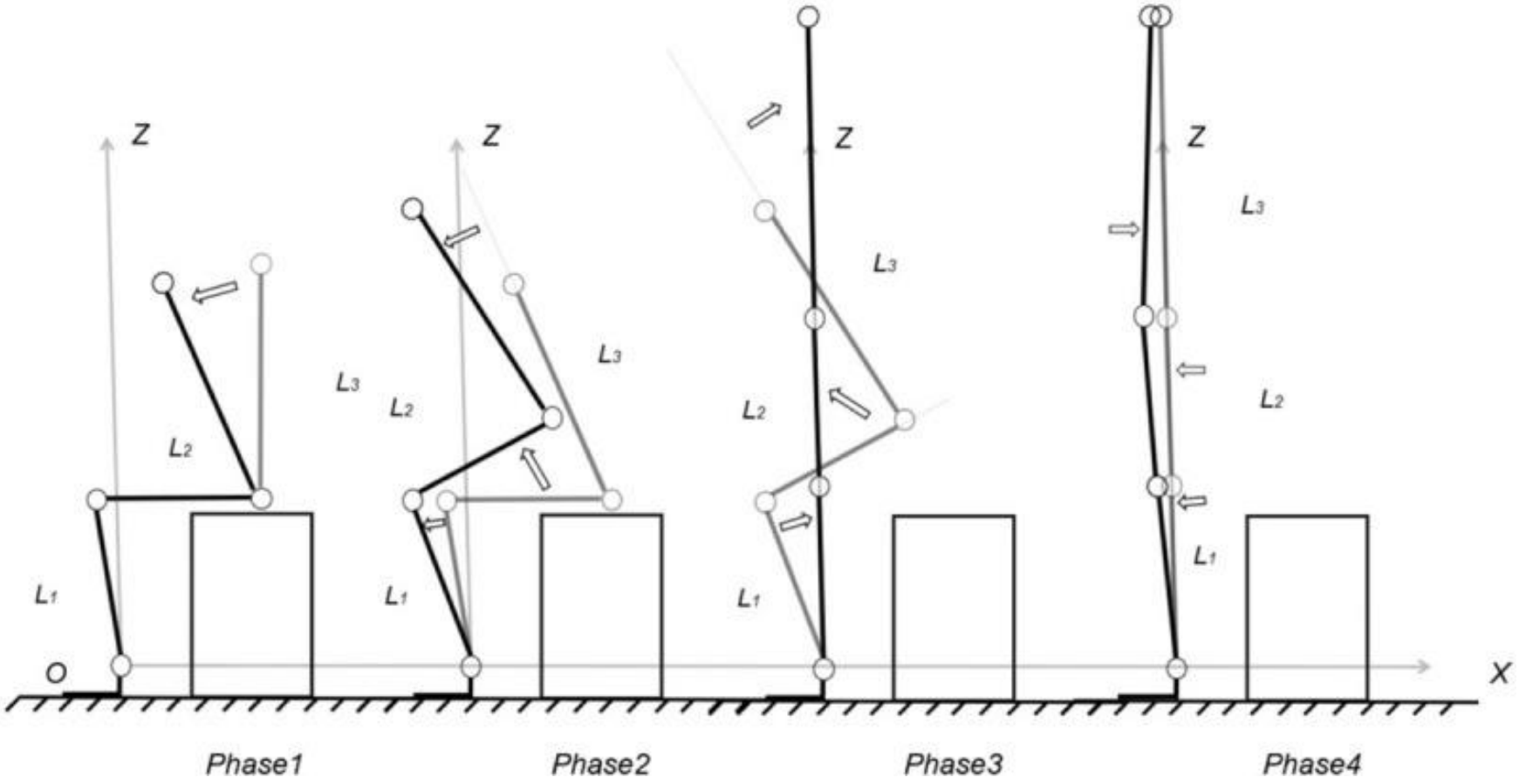
- Access to sinks
- Grooming
- Meal prep
- Reaching items in cupboards
- Accessing cooktop
- Doing laundry

Seat Elevation with Anterior Tilt is what allows the most OPTIMAL functional reach

3) Transfer Assistance

- Improving independence during transfers
- Decreased caregiver burden for transfers
- Less strain on upper extremities
- Energy conservation
    - Preservation of lower extremity available strength and endurance if appropriate

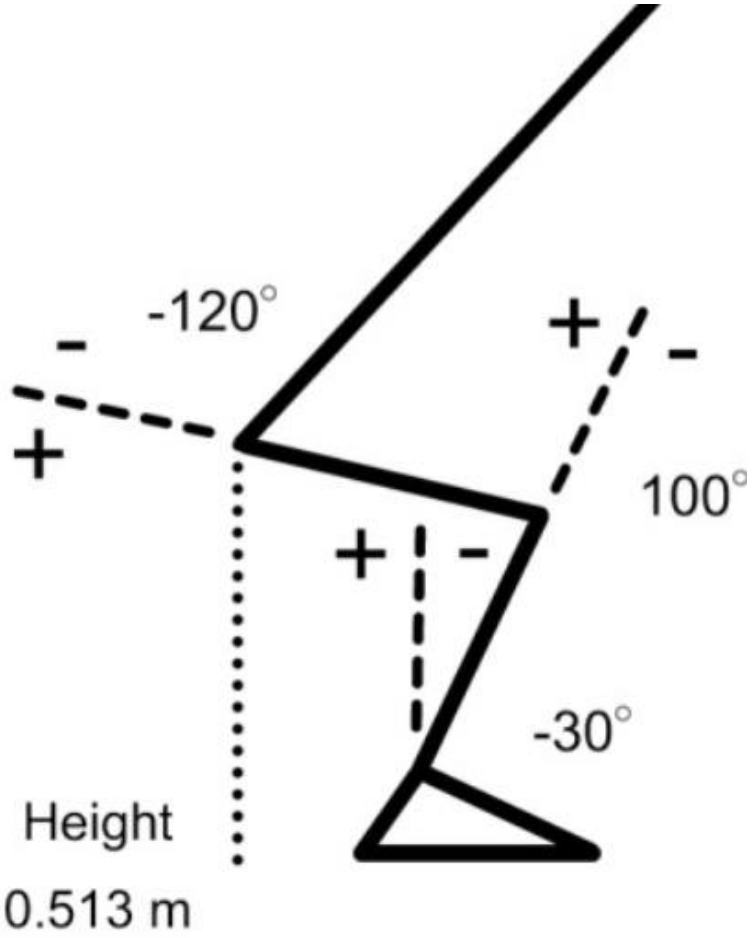
Analysis of Movement: Sit to Stand



Li J, Xue Q, Yang S, Han X, Zhang S, Li M, Guo J. Kinematic analysis of the human body during sit-to-stand in healthy young adults. Medicine (Baltimore). 2021

Typical Sit to Stand Joint Angle Considerations:

- Standard seat off ranges:
  - Hip flexion range: 85-145 degrees
  - Knee flexion range: 95-120 degrees
  - Ankle joint dorsiflexion: 15-45 degrees
- Known that peak hip joint movement significantly increases as seat height decreases



Inai, T., Takabayashi, T., Edama, M., & Kubo, M. (2018). Effect of hip joint angle at seat-off on hip joint contact force during sit-to-stand movement: a computer simulation study. *Biomedical engineering online*, *17*(1), 177. https://doi.org/10.1186/s12938-018-0610-5

Ways to help facilitate this:

- Increased seat to floor height
  - Taller cushion
  - Seat elevation
- Assist to scoot forward:
  - Use of transfer handles
  - Material selection of cushion & cover
    - Avoid shear when possible
  - Anterior tilt to assist with scooting
    - Gravity assist
- Assist with stand:
  - Anterior tilt to position feet under knees
  - Anterior tilt for pelvis to facilitate into anterior tilt
  - Allow for reduced lower extremity strength and endurance required during initial momentum of stand
    - By increased height and optimal angle

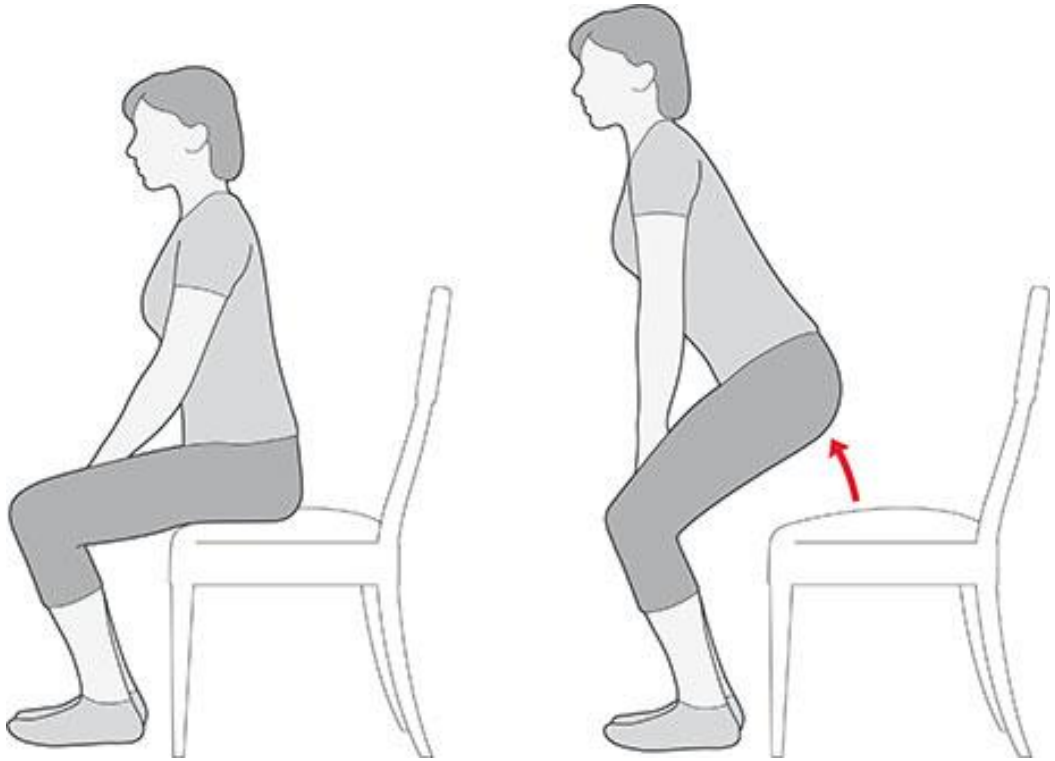
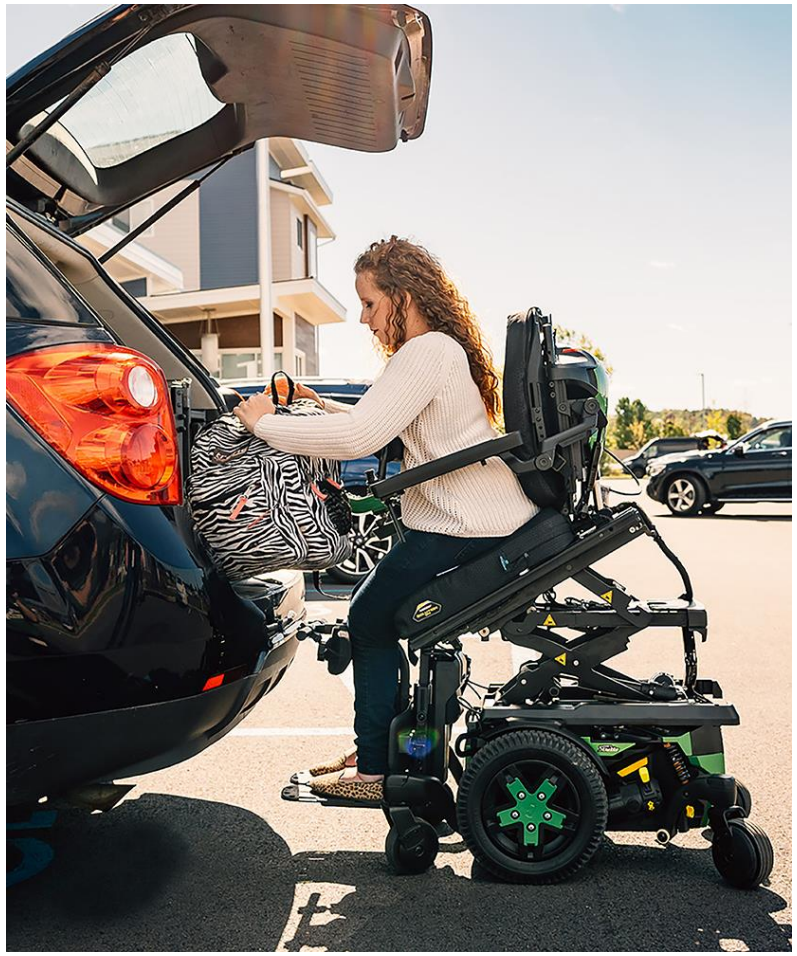


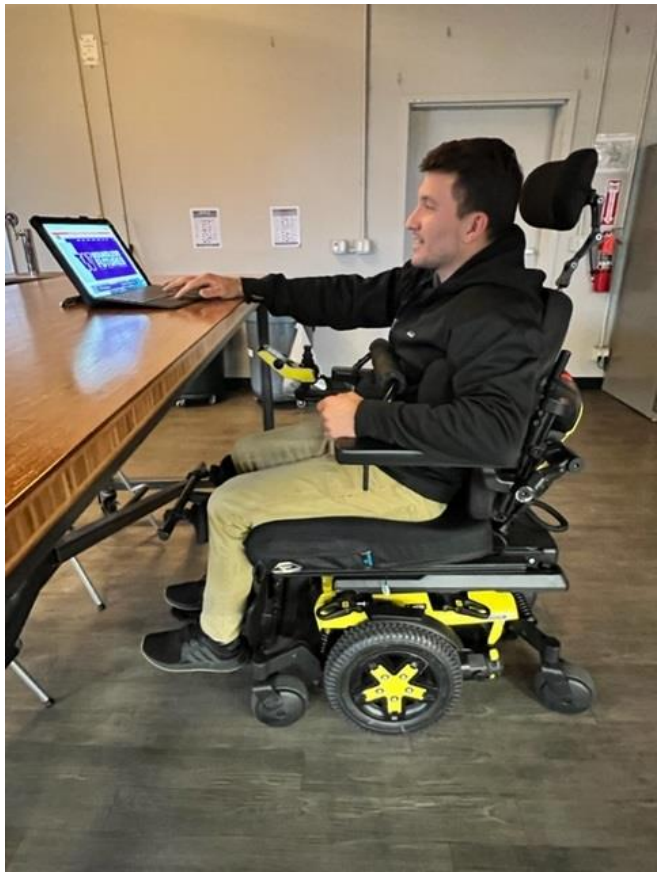
Photo: Versus Arthritis. (n.d.). *Osteoarthritis (OA) of the knee* [Photograph].

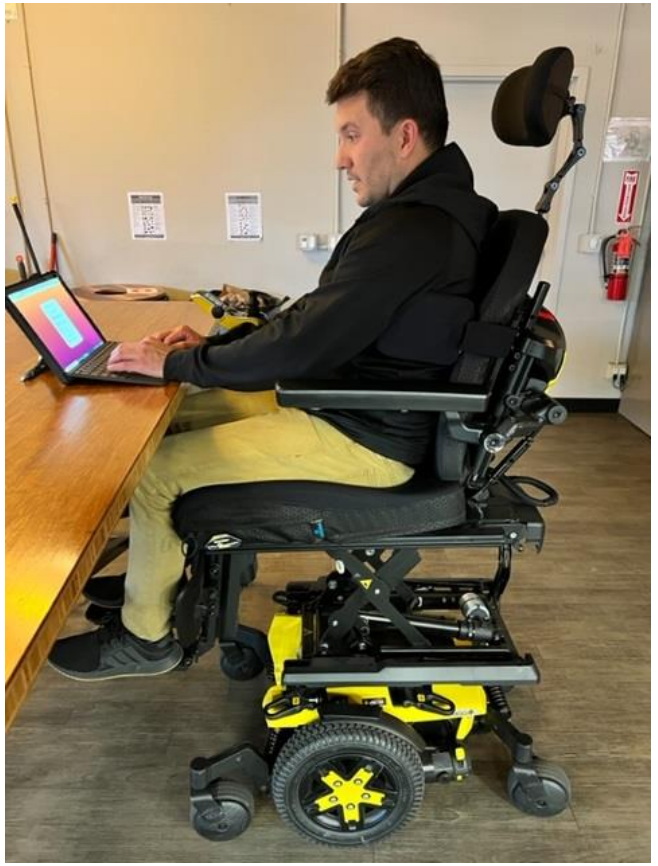
4) Facilitation of Physiological Functioning

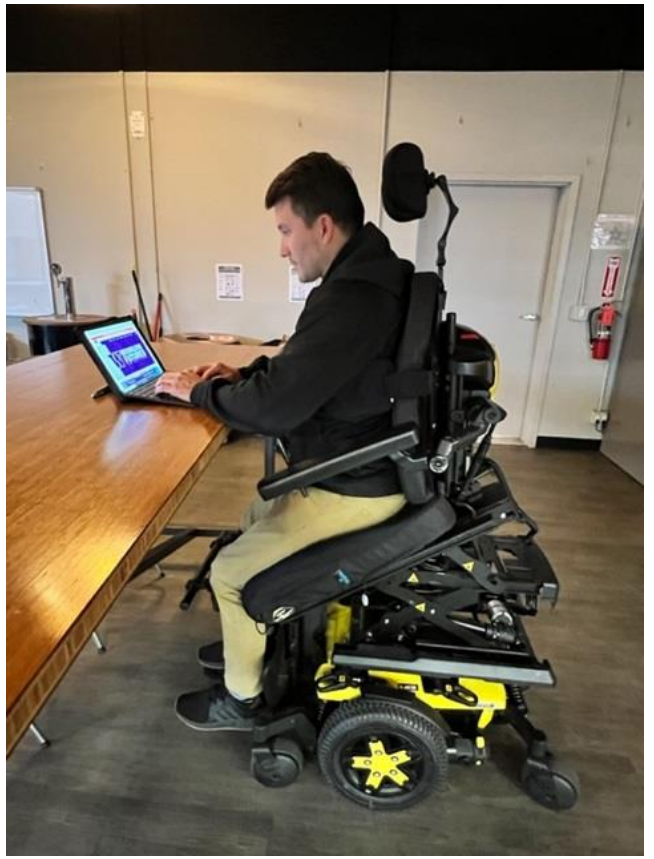
- We know gravity and being upright has potential for improvements in:
  - Bowel movements
  - Respiration
  - Bladder management
  - Muscle activation



Visual Field Improvement







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Assessments & Outcome Measures of Balance, Reach, & Function

- Assessments measure vs. reality
  - Maximal reach one time vs. functional reach throughout a daily routine
  - Objective clinical measures-intervention/potential for improvement-objective daily activity observation/measures

- Some Clinical Measures:
  - Modified functional reach
  - Function in sitting test
  - Timed up and go
  - Berg Balance
  - FIM
  - Diagnoses specific scales

Potential Candidates for Anterior Tilt

- A client who would benefit from assistance due to impaired trunk control who needs assistance obtaining a higher level of functional reach to complete activities of daily living (ADLs).
- The client can tolerate a more upright body posture the anterior tilt seat function places them into.
- The client can tolerate the partial weight bearing position that the anterior tilt seat function places them into.
- The client has the appropriate range of motion in their lower extremities to tolerate the anterior tilt position

Considerations

Balance and Stability

Trunk Control and Strength

Cognitive Capacity

Bone Density

Body ROM

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Access to Consistent Positioning

Clinical Benefits for Memory Seating

QUANTUM®
#1 FOR REHAB POWER

What is Memory Seating?

- Allows the end user to access a pre-programmed positions with the activation of a single command.
- Each pre-programmed position can be a combination of all available actuators in the system.
- The TruBalance 4 Seating System and Qlogic 3 electronics allows for 2 options for getting to the desired position
  - **Synced** - The actuators will all move at the same time. The actuators use a timing mechanism that allows all of the actuators to stop at the end position simultaneously
  - **Sequential** - The actuators will move one at a time and in a specific order. Used for pressure relief position to limit the amount of shear on the end user.

Clinical Benefits of Memory Seating

- Synced Memory Seating
  - Consistently access the “optimal” transfer position
  - Efficiently obtain consistent position for ADL and other reaching tasks
- Sequential Memory Seating
  - Efficiently and consistently obtain “optimal” pressure relief position
  - Decrease risk of shearing injuries by automatically using the multiple actuator functions in the proper order
- Smart Seating System
  - Allows for simple programming of the desired position
  - Simply placing the system in the desired and saving the position within the programming station

Synced Memory Seating Function

The actuators will all move at the same time. The actuators use a timing mechanism that allows all of the actuators to stop at the end position simultaneously

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Sequential Memory Seating

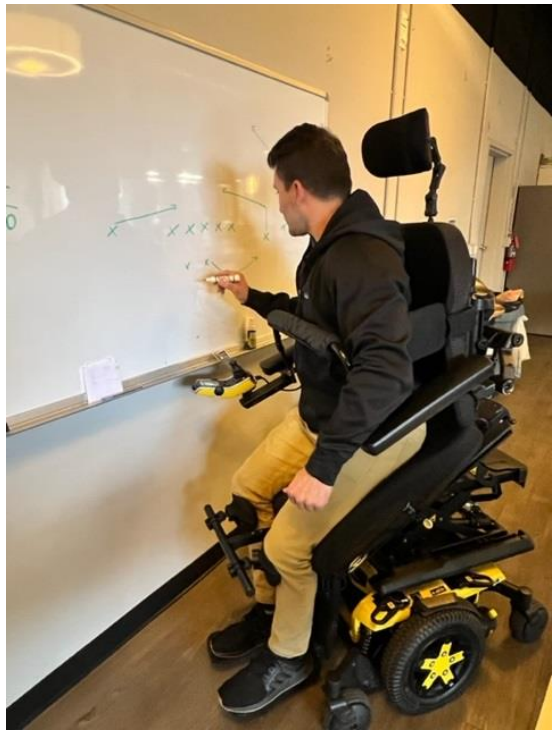
The actuators will move one at a time and in a specific order. Used for pressure relief position to limit the amount of shear on the end user. When going in posterior direction, the sequence is:

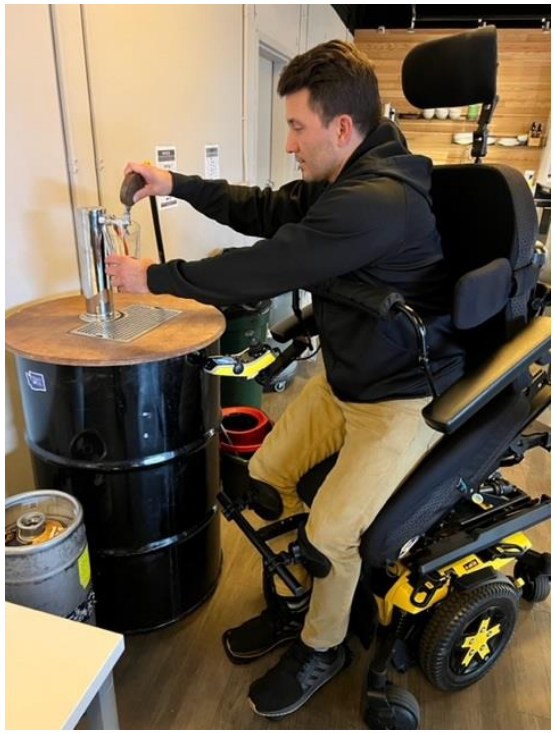
Tilt > AFP > Recline.

User Adjustable

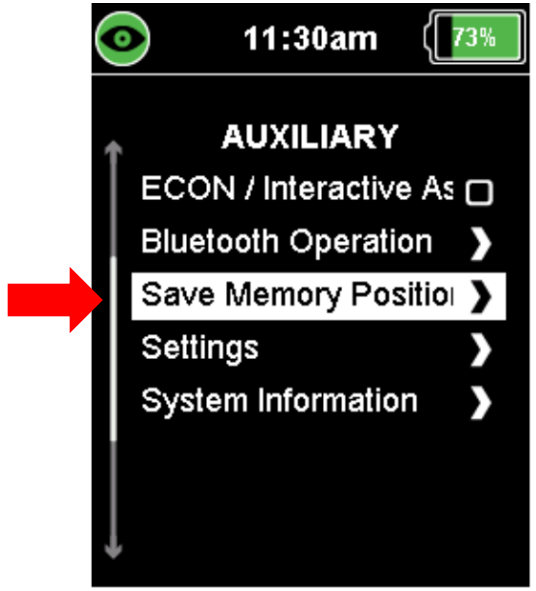
User Adjustable:

- Allows the consumer to make changes to the memory positions within that memory slot.
- User Adjustable can be enabled or disabled separately in each memory profile
- Examples could include vehicle access, positions of function for ADL, or positions of comfort for recreation/work activities

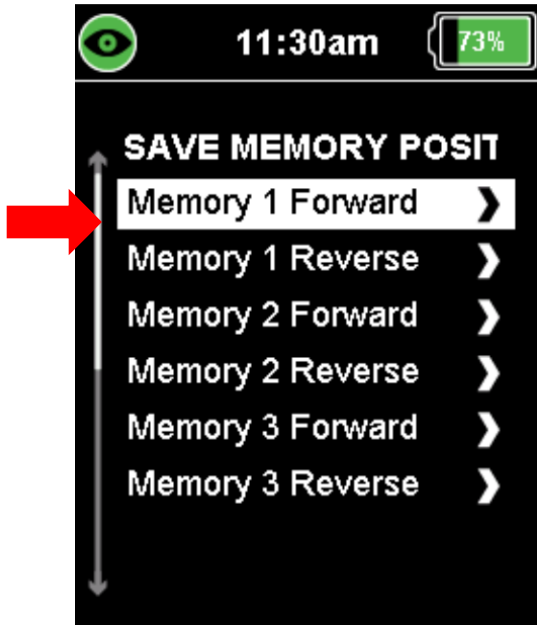




User Memory Seat Adjustments



From the **Auxiliary Menu**, give a **right command** on Save Memory Position



Highlight the Desired Memory Position and Direction and select with **right command**

Complete a forward command on input device to save position

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The most dangerous position can be the one that never changes.

Question for the room

What happens between appointments?

That is where prevention either lives or disappears.

Our Goal as Clinicians: Make Prevention Doable.

1

Educate without overwhelming

Turn risk into simple routines.

2

Empower advocacy and independence

Help clients know what to ask for and why.

3

Match technology to goals

Current function plus future protection.

4

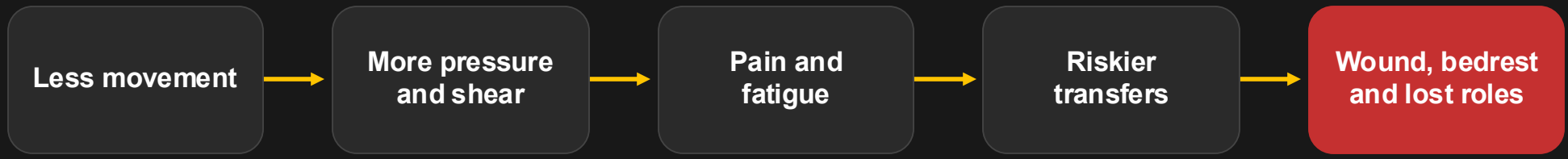
Document medical necessity

Connect features to outcomes, not just convenience.

Clinicians - the bridge between clinical risk, equipment capability, and the everyday life our clients are trying to protect

When Prevention is Missed, the Body Keeps Score.

This is the **prevention cascade** clinicians are trying to interrupt.



And then the secondary complications arrive.

- Pressure Injuries
- Respiratory Decline / Pneumonia
- Oedema
- Higher Blood Clot Risk
- Reduced bowel / bladder performance
- Contracture risk
- Muscle atrophy / disuse
- Skeletal or muscular deformity
- Pain
- Falls during transfers

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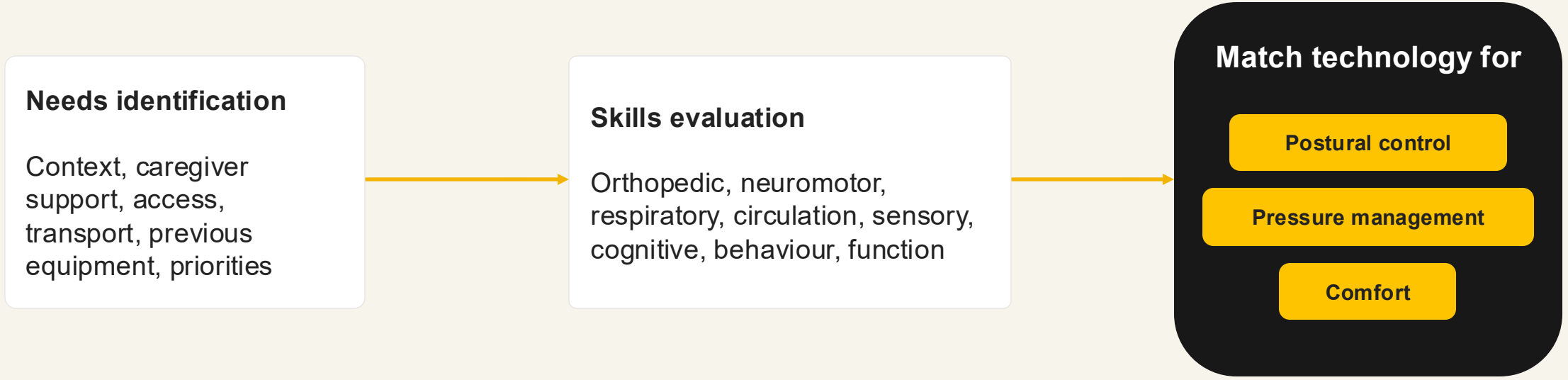
Prevention Begins Before the Chair is Chosen.

A practical assessment lens: Context + Skills + Technology match.



The chair is not the start of the clinical reasoning. It is the result of it.

Tilt: Gravity as a Clinical Assistant.

Pressure and perfusion	larger tilt angles may be needed for meaningful offload
Postural control	gravity-assisted support for head and trunk
Line of sight and access	visual orientation, switch access, communication
Physiology	orthostatic hypotension support, respiration, swallowing/digestion
Joint position	maintains seat/back/leg angles while changing orientation

Clinical caution: small tilt may improve posture or comfort, but may not equal pressure relief.

Recline:

Benefits

- Redistribute pressure when paired with leg elevation
- Rest, comfort and activity tolerance
- Bowel, bladder and catheter-care access
- Supine or sliding-transfer setup
- Change hip angle and trunk posture

Cautions

- Can increase shear if used poorly
- May increase spasticity or reflex activity for some clients
- Requires set-up, sequencing and education

The combination is often the magic.

Tilt + recline + elevating legs can change pressure, shear and circulation together.

Benefits

- 25°- 45° Tilt with 110°- 150° Recline provides the greatest pressure relief when used in combination
- 45° of tilt with 120° of recline provides a 40% load reduction
- Tilt before recline decreases shear
- Multiple angles provide ease of independent, or caregiver assisted repositioning
- 30° of tilt with full recline improves lower limb hemodynamic states (oedema)
- Dynamic seating allows a variety of postures throughout the day to participate in or perform ADLs

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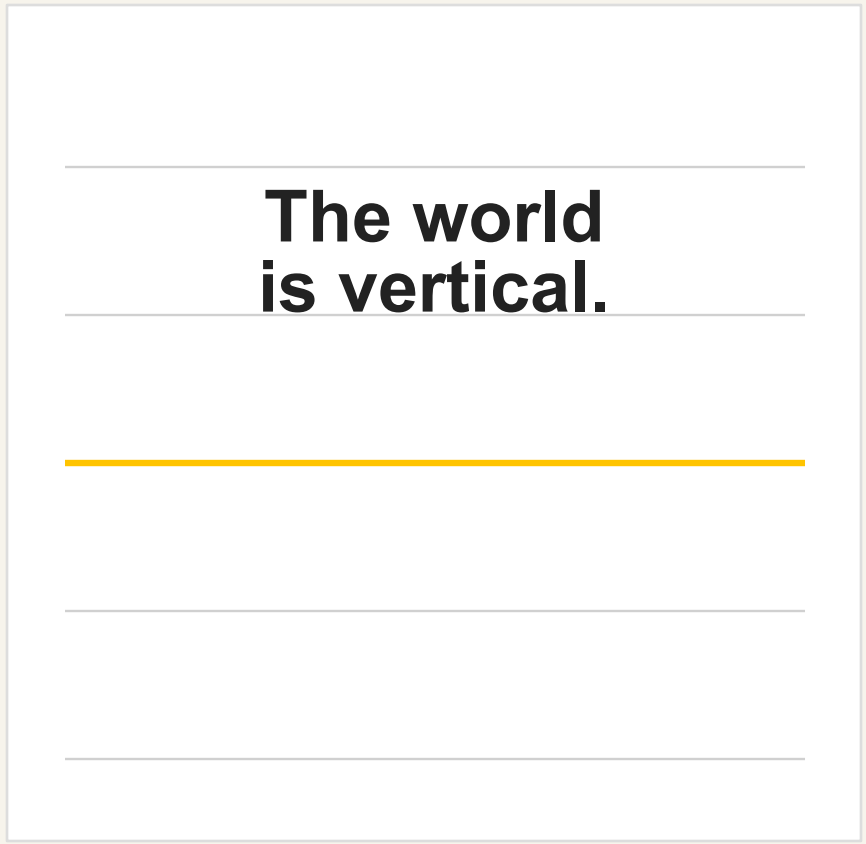
Seat elevation is not just about reaching a shelf.

It changes the vertical relationship between the client and the world.



Transfers — safer set-up and fewer awkward height gaps

Reach — ADLs without unsafe leaning or shoulder overuse

Line of sight — eye-level communication and social inclusion

Mobility tasks — navigate counters, switches, doors and environments designed for ambulatory people

Stage 1 is the Warning Light.

It may look minor. It may be the visible tip of a deeper problem.

Pressure Injury Review

- Pigmented or non-blanching area
- May vary by skin tone
- Does not resolve when pressure is relieved
- Often linked to contact, shear or transfer pattern
- Goal: Remove the source before tissue loss progresses

The iceberg effect: the worst part can be underneath what we can see.

The Progression We are Trying to Prevent.

From skin discoloration to open tissue loss, the clinical goal is to stop the story early.

Stage 2

Blistering or shallow open sore

Stage 3

Full-thickness skin loss; crater may show fat

Stage 4

Deep tissue damage; may involve muscle, bone or tendon

Unstageable

Depth hidden by dead tissue until debrided

Prevention is the difference between a position change today and a wound-care pathway tomorrow.

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A pressure injury is not just a wound.

It is often a life interruption, a care pathway and a systems cost.

$9.11B AUD

Estimated annual cost of pressure injuries in Australian public hospitals in 2020

1 in 3

people with SCI had pressure injuries in a 2020 global systematic review

58.7%

overall complication rate after flap reconstruction in a 2017 outcomes analysis

The cheapest wound is the one that never happens.

Use the Braden Scale as a prevention map.

Every risk factor asks a seating question.

Sensory perception	Can they feel risk?
Moisture	What keeps skin vulnerable?
Activity	How much time seated?
Mobility	Can they reposition independently?
Nutrition	Is healing capacity compromised?
Friction and shear	What happens during transfers and sliding?

ATP translation

1. Identify the risk factor
2. Match the seating feature
3. Teach the daily routine
4. Document the protected outcome

Risk factor -> seating feature -> daily routine -> measurable outcome.

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The Two-Minute Question.

Can the client perform an effective weight shift consistently?

Clinical reasoning screen

- History of pressure injury?
- Impaired sensation?
- Sits in wheelchair >2 hours/day?
- Can they offload effectively and reliably?
- Is 24/7 caregiver support realistic?

If the answer is no...

Consider a system that allows independent repositioning for tissue perfusion, comfort and participation.

The goal is not a perfect clinic demonstration.
The goal is reliable use at home.

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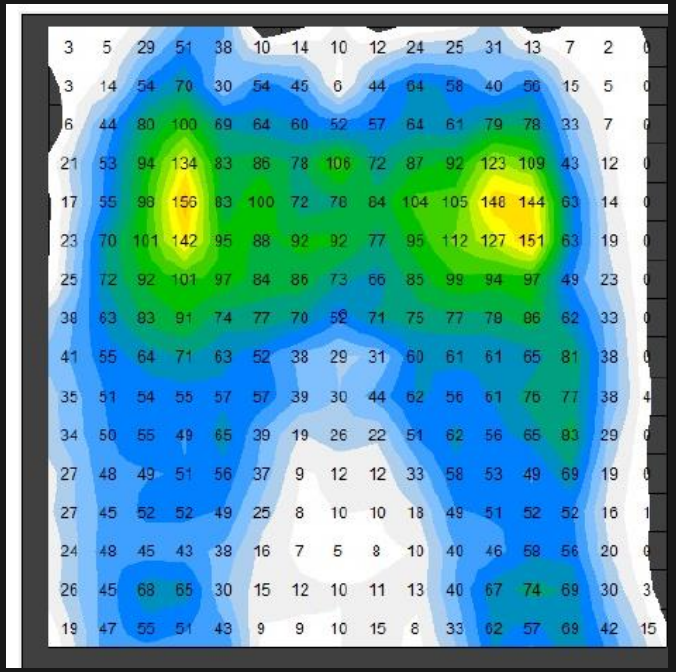
Angles are Medicine - But Only When Used with Intention.

Pressure, shear and blood flow respond differently to positioning.

- **Small changes** — can improve comfort and posture awareness.
- **Larger angles** — are often needed for meaningful pressure relief or blood-flow effects.
- **Combination use** — tilt + recline can reduce pressure more than either function alone.
- **Sequence matters** — tilt before recline helps reduce shear risk.

Pressure Mapping



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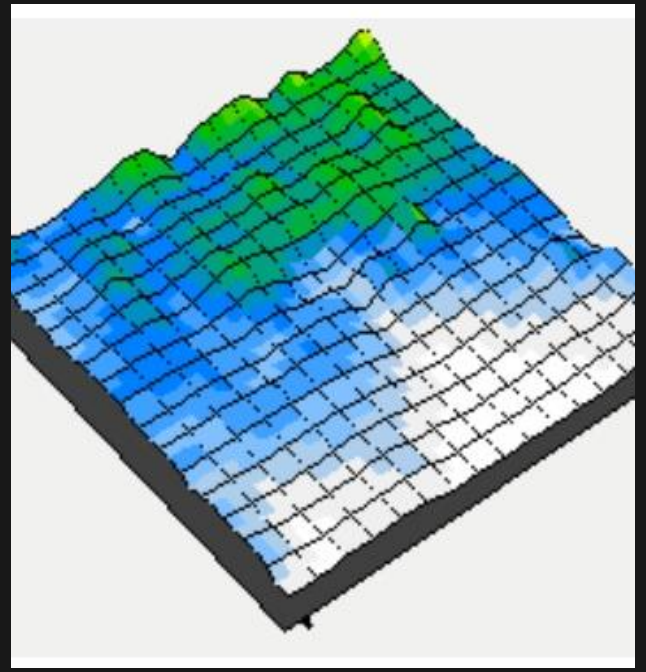

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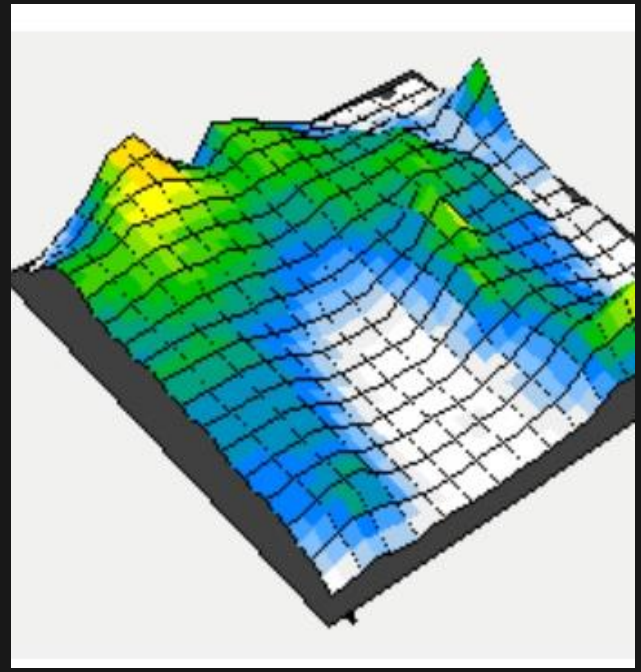

C

Make invisible load visible.

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Power Seating Can Support More than Skin.

The same position change can influence multiple body systems.

Skin and tissue loading
pressure injuries, shear, sitting tolerance

Circulation
oedema, blood pooling, venous return

Autonomic regulation
orthostatic hypotension, autonomic dysreflexia response

Respiration and swallowing
line of sight, breathing mechanics, aspiration risk

Bowel and bladder routines
access, catheterisation, care positioning

Musculoskeletal health
tone, spasticity, contracture risk, deformity

Function and safety
transfers, falls, caregiver injury, shoulder preservation

Participation
energy, comfort, communication, eye-level engagement

The feature is mechanical. The outcome is biological, functional and social.

Orthostatic Hypotension

Orthostatic hypotension can turn sitting up into light-headedness, fatigue or fainting.

- **What happens:** Blood pools in the legs and pelvic region when autonomic blood pressure control is altered.
- **Power seating role:** Tilt, recline and elevating legs can help create recovery positions and gradual postural change.
- **Prevention goal:** Extend upright tolerance without forcing the client to abandon the day.

Autonomic Dysreflexia

Autonomic dysreflexia can be a sudden blood pressure rise in people with SCI at or above T6.

- **Trigger hunt:** The body may react to bladder, bowel, skin, clothing pressure or other noxious stimuli the client cannot feel.
- **Immediate logic:** Sitting upright and assessing the trigger is part of the clinical response pathway.
- **Power seating role:** Independent access to upright positioning can reduce reliance on someone else noticing the problem first.

The client may not feel the problem, but the body still reacts.

Bowel and Bladder Function

Positioning can influence blood pressure, urine output and the practicality of personal care routines.

- **Why it matters:** A routine that requires multiple difficult transfers can increase shear, fatigue, falls risk and dependence.
- **Clinical lens:** Recline may change pressure and urine output timing; plan around the client, not just the equipment.
- **Prevention goal:** Protect skin, dignity and continence management while reducing unnecessary handling.

Adapted from uploaded source deck, page 22.

Bowel and Bladder Care

Recline and accessory integration can turn personal care from a transfer-heavy task into an in-chair routine.

- **Independence:** Recline may allow some clients to perform care with less caregiver assistance.
- **Safety:** For assisted care, completing part of the routine in the chair may reduce risky transfers.
- **Integration:** Power mobility can pair with options such as an electric bag emptier where appropriate.

Sometimes the safest transfer is the one we do not need.

Visual, Speech, Alertness, Respiration And Mealtimes

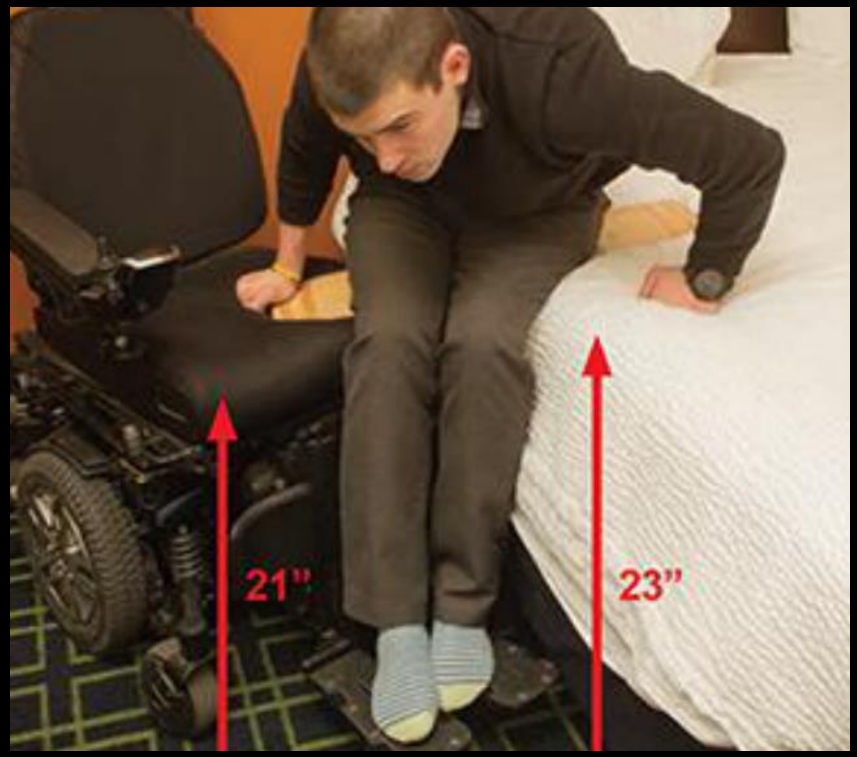
Head and trunk orientation can influence communication, alertness, respiration and eating.

- **See and be seen:** Tilt and recline can improve line of sight and allow more effective communication.
- **Arousal and attention:** Position change can help orient the body and stimulate the vestibular system.
- **Body systems:** Positioning may support breathing mechanics and safer swallowing when clinically appropriate.

Injury, Falls and Transfer Safety

A few centimeters of height mismatch can change effort, risk and confidence.

- **Set up first:** Tilt and recline can stabilise the trunk before the client moves.
- **Match the task:** Recline with elevating legrests may support sliding or supine-style transfers in selected cases.
- **Protect people:** Seat elevation can reduce height mismatch, upper limb overuse and caregiver strain.



Two inches can change the transfer story.

Contractures

Reduced voluntary range prolonged static positioning and muscle imbalance can all contribute to contracture risk.

- **Risk pattern:** Weakness through full range and static seating can gradually reduce available movement.
- **Clinical focus:** Lower-limb contractures are common concerns when wheelchair mobility replaces dynamic gait.
- **Prevention goal:** Use positioning, PROM, bracing and standing or weight-bearing where clinically appropriate.

Contractures

Seating should respect the body's current range while watching for patterns that could become fixed.

- **Do not force it:** Set seat-to-back and legrest angles to match available range and avoid undue tension.
- **Use movement options:** Elevating legrests with recline may help open hip and knee angles when tolerated.
- **Reassess early:** Small postural changes can become long-term biomechanical barriers.

Good seating is clinical negotiation with the body.

Power Seat Functions are Clinical Levers.

Tools for making prevention possible.

Tilt	Provide pressure relief or support blood pressure changes while maintaining joint angles
Recline	Opens seat-to-back angle; can shift weight to sacrum and provide access care
Elevating legs	Supports oedema and lower-limb positioning
Seat elevation	Changes vertical access and transfer setup to reduce risk of falls
Anterior Tilt	Case-by-case access to functional posture and participation

Have you considered Memory Seat Functions?

A feature does not prevent anything.

A behaviour does.

Our job is to design the chair, teach the why, rehearse the routine and protect the outcome before the complication starts.

Thank you for joining us!

The Power of Prevention - Using power seat functions to improve client outcomes

Joshua Chiswell
Clinical Educator and Product Specialist
Quantum Rehab QLD/WA/NT

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