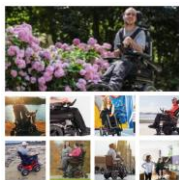




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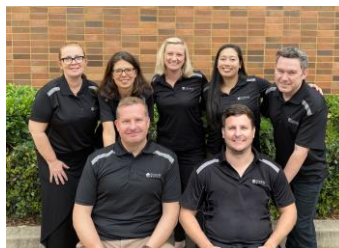
Evidence and considerations when prescribing powered mobility.



Lisa Bidgood
Occupational Therapist,
Sunrise Medical
October 2021

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CLINICAL HUB – AUSTRALIA WIDE TEAM



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A LITTLE BIT OF HISTORY



Motorised mobility devices were first thought to be used in the early 1900's.

Canadian inventor, George Klein, is widely credited with initiating the design of the first electric motor powered wheelchair.



"The Klein Chair."

Mass production began in 1956 with all configurations of bases being rear-wheel drive systems.

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What's most important most of the time?

What are the deal breakers for client?

What are the deal breakers as a therapist?

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Is the identified need included in the current plan?

What are the risks to the client?

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W/C SERVICE PROVISION PROCESS



The successful wheelchair provision process is not simply assessment followed by prescription.

Rather, it's a multi-stepped process which requires many considerations²¹. To achieve optimal seating and mobility for the individual, these steps include:

1. Referral;
2. Assessment²⁴;
3. Equipment Recommendation and Selection;
4. Funding procurement;
5. Product Preparation;
6. Fitting, Training and Delivery;
7. Maintenance and Repair; and
8. Outcome Measurement¹.

One-hundred and ten (110) distinct skills and abilities were identified and mapped to the ICF: 80 in the Body Structures and Functions domain, and 30 in the Activities and Participation domain. Approximately 50% of skills and abilities were mental functions²⁴.

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THE "FINE PRINT" – WHY ARE WE PRESCRIBING POWER?



Independent mobility can have a tremendous impact on ¹⁷	Power mobility has allowed individuals to resume personally valued
Learning	Responsibilities
Communication	Values
Mobility	Roles
Socialisation	
Recreation	
Self care	
Decreasing carer burden	



Work and life related tasks can be restored, thus increasing self-esteem and feelings of competence ¹⁷ to manage life's obstacles and socialisation¹⁷

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POWER MOBILITY: DEFINED



- are intended to provide both **mobility and function**.
- are **complete systems** which include:

1. **Primary components:** base, seating, drive control, motors, and batteries
2. **Secondary components:** positioning equipment
3. **Additional components:** electronics / accessories / driving control.



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POWER MOBILITY: ENVIRONMENTAL CATEGORIES



Indoor

- Smaller drive wheel (10 to 12 inches)
- Slower driving speeds
- Exceptional maneuverability



Indoor/Outdoor

- Larger drive wheel (12 to 14 inches)
- Faster speeds
- Suspension



Outdoor

- Primarily intended for outdoor use.
- Obstacle climbing
- Suspension.
- Adventure / Off road

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IT'S ALL ABOUT THAT BASE



Front wheel ^{15,16,18, 25}

- Stable base
- Performs well when driving over soft terrain, grass, uneven gravel or climbing curbs
- Legs can be "tucked back"
 - due to front caster position
 - improved proximity to work surfaces for functional / daily tasks and helpful in environments with reduced space
 - beneficial for individuals with tight hamstrings



Center of Rotation
Center of Gravity

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IT'S ALL ABOUT THAT BASE



Mid wheel ^{15,16,18,25}

- Drive wheel placement allows for the tightest turning radius when completing a 360° turn
- Front and rear casters position help provide a stable base
- Intuitive to drive since the user's centre of gravity is directly over the drive wheel



Center of Rotation
Center of Gravity

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IT'S ALL ABOUT THAT BASE



Rear wheel ^{15,16,18,25}

- Very stable base anteriorly
- Good performance in rural settings / rougher terrain
- More intuitive / easier to drive for attendant carers due to the position of the drive wheels in relation to the position of the controls



Center of Rotation
Center of Gravity

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IT'S ALL ABOUT THAT BASE



Hybrid

- Driving performance of rear wheel with smaller turning radius
- Longer turning radius because of the base length - intuitive to drive



Hybrid Wheel Drive (HWD)

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4 x 4	<ul style="list-style-type: none"> • off-road recreation and vocation • Regular use on rural properties and country roads • Designed to withstand certain environmental barriers – reducing injury /accident³ reduced damage & repairs to PWC
Kerb climber	<p>Function Accessibility</p> <ul style="list-style-type: none"> • potential reduced injury /accident when "driving through environmental barriers"³ • Improved independence through reduction of physical barriers
Suspension	<p>Medical^{13, 14, 18, 20}</p> <ul style="list-style-type: none"> • Decreased vibration reduces <ul style="list-style-type: none"> ◦ spasms / pain symptoms ◦ risk of secondary physical injuries¹⁰ and psychological symptoms⁴ • increased sitting tolerance <p>Function Accessibility</p> <ul style="list-style-type: none"> • assist with control of driving input in clients with weakness or motor control issues.

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Steering lock	<p>Safety Accessibility</p> <ul style="list-style-type: none"> • keeps the chair on track on rough terrain, kerb climbing and steep inclines • assists when reversing from vehicles via ramp
Wheelchair lock	<p>Safety</p> <ul style="list-style-type: none"> • disables the chair
Scooter stopper	<p>Safety</p> <ul style="list-style-type: none"> • Remote stopping to disable chair
Stability wheels / roller	<p>Safety Accessibility</p> <ul style="list-style-type: none"> • Prevents mobilisation if PWC at an unsafe angle
Stability roller	<p>Safety Accessibility</p> <ul style="list-style-type: none"> • Improves PWC stability on inclines – reduced risk of tipping • Independent & safe management of variable

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TYRES



Puncture protection kit	<p>Safety Support reduction Accessibility</p> <ul style="list-style-type: none"> • protects against damage from sharp objects • reduced maintenance and replacement tyre costs
Solid	<p>Safety Support reduction Accessibility</p> <ul style="list-style-type: none"> • no punctures but a "rougher" ride • reduced maintenance / replacement tyre costs
Pneumatic	<p>Accessibility Medical</p> <ul style="list-style-type: none"> • smooth ride with good traction • shock / vibration absorption
Hybrid	<p>Support reduction Accessibility</p> <ul style="list-style-type: none"> • mobility across varied environments • Reduced need to change tyre types
Off road	<p>Accessibility</p> <ul style="list-style-type: none"> • 14" knobby tyres for traction and comfort • Easily adjustable pressure when required

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DOCKING



Docking station	<p>Support reduction Accessibility</p> <ul style="list-style-type: none"> • Assists safe securement of PWC when in vehicle. • Reduces number of transfers • Increases access to the community
Retractable docking pin	<p>Accessibility</p> <ul style="list-style-type: none"> • Operated via chair joystick to secure themselves independently in motor vehicle • Dock retracts inside the wheelchair frame reducing ground clearance (ie. travelling over uneven terrains or catching on curbs). • Crash tested

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ELEVATE / LIFT



<p>Function Participation Capacity Building Support reduction</p> <ul style="list-style-type: none"> • Biomechanics of reach – reduction of overuse injuries • Biomechanics of transfers • Visual orientation and line-of-sight • Promotes communication, social engagement, self-esteem and integration with peers • Reduced OH&S reports from carers 2, 18
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TILT



Posture Medical Support Reduction Safety^{10,18}

- Provides a change in position for individuals to reduce risks of:
 - pressure injury;
 - extensor spasticity;
 - respiratory, digestive, postural hypertension, complications and autonomic dysreflexia complications
 - pain and increased seated tolerance
- improved access within the community
- best results of pressure reduction when tilt and recline used together (25-45° of tilt with 110-150° of recline)²
- critical when combined with recline & elevating leg rests - MND⁵
- Tilt restraint considerations⁶



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ANTERIOR TILT



Function Safety Capacity Building Support reduction

- minimises risk of falls during a standing transfer
- increased functional independence through functional reach⁷
- management of tone and abnormal reflexes
- lowers front to seat floor height
- aids in digestion and speech production
- increased safety in meal preparation⁷



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RECLINE



Posture Medical^{11, 18}

- changes seat to back angle
- best results of pressure reduction when tilt and recline used together (25-45° of tilt with 110-150° of recline)²
- critical when combined with recline and elevating leg rests – MND⁵
- potential reduction in discomfort / pain from vibration when in a reclined position than in an upright sitting position⁸
- when combined with elevating leg rests allows for personal care
- management of spasticity/tone
- shear reduction recline should be used when recline angle is greater than 120 degrees.
- Tilt restraint considerations⁶
- Pain reduction¹²

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POWER ELEVATING LEG RESTS



Power elevating leg rest swing away

Posture Medical Support reduction¹⁸

- Oedema management²
- Critical when combined with recline & elevating leg rests for MND⁷
- Flex or extend the knee with little or no support

Manual elevating leg rest swing away

Posture Medical Support reduction

- flex or extend the knee with little or no support from carer
- Effective in managing oedema²
- Critical when combined with recline & elevating leg rests for MND⁵
- Safe transfers

Centre mount power leg rest

Accessibility

- Flex or extend the knee with little or no support
- Support functional tasks such as standing transfers or repositioning
- Oedema management²
- Critical when combined with recline & elevating leg rests for MND⁵

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POSTURAL SUPPORTS



Arm rests	Accessibility Posture Safety <ul style="list-style-type: none"> • Assist in transfers / Heavy reliance of armrest to transfer • Removable to assist with hoist application • Used for postural changes
Arm pad	Posture <ul style="list-style-type: none"> • Justification required for pad size and material type
Lap belt	Posture <ul style="list-style-type: none"> • Positional support • Restraint consideration¹⁷
Secondary trunk and pelvic supports	Posture <ul style="list-style-type: none"> • Justification required for any positioning supports to optimise function, posture and skin protection
Forward fold backrest	Accessibility <ul style="list-style-type: none"> • Reduced chair height – ease of access to unmodified vehicles
Tray table	Posture Accessibility Capacity Building Participation <ul style="list-style-type: none"> • assistive device to carry out daily tasks • postural support for individuals with reduced trunk facilitate upright posture / eye contact and participation • used to transport / carry objects

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LIFESTYLE – RAM MOUNTS



Tablet / phone holder

Accessibility Function Capacity Building

- Essential for individuals with reduced hand function

Camera mount

Accessibility Function Capacity Building

- Independently carry their own equipment in order to participate⁹

Cupholder

Accessibility Function

stabilises drink whilst driving to avoid spillage – helpful for individuals with reduced hand function



○ For individuals with demonstrated interest in this lifestyle activity

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LIFESTYLE



Accessory charger	Accessibility Function Participation Safety <ul style="list-style-type: none"> readily available power source for communication (telephone, tablet etc) Safety for emergency situations
Fishing rod holder	Capacity Building Participation <ul style="list-style-type: none"> Independently carry their own equipment in order to participate
Luggage rack	Function Participation Capacity Building Support reduction <ul style="list-style-type: none"> carry their own belongings (groceries, laundry) with little to no support
Accessory bag	Accessibility Safety <ul style="list-style-type: none"> Independently carry and have access to personal items and/or consumables
Sunshade	Medical Accessibility <ul style="list-style-type: none"> Sun protection - essential for individuals who are prescribed medication which is deemed harmful / reactive to sunlight essential for individuals who have a diagnosis of skin cancers

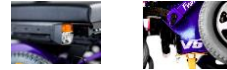


For individuals with demonstrated interest in this lifestyle activity **IMPROVING PEOPLE'S LIVES**

SAFETY & ABILITY IN LIFESTYLE



Ventilator Tray and/or Oxygen Tank Holder	Medical <ul style="list-style-type: none"> Necessary to hold essential equipment for individuals who require mechanical assistance to breathe
Transit Tie Down points	Safety <ul style="list-style-type: none"> Essential to reduce the risk of serious injuries to wheelchair-seated occupants (ISO 7176-19 or WC19 / 20)
Lights	Safety <ul style="list-style-type: none"> important for wheelchair users to see their surroundings Improves visibility of chair user in low light / night time ¹⁹
Jack	Safety Accessibility <ul style="list-style-type: none"> independent and efficient tyre changes in the community



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DRIVING CONTROL – SCREEN & JOYSTICK



Accessibility Function Participation Safety

- Size of screen (LED, LCD, C.JSM2)
- Vision
- Access – Swing back, height adjustable
- Stem option height adjustable – individual requires joystick to be at a particular height for access and safe control
- Stem option quick release – individual requires joystick to be quickly removed from driving position during transport for safety and accessibility
- Additional justification will be required to justify individual's ability to best access control power seat functions
- Additional justification for different joystick knobs are required due to reduced finger control, grasp etc.

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Thankyou

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TOP EVIDENCE RESOURCES



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