

# Clinician Tip Sheet: Maximizing Use of a Standard Power Wheelchair Joystick

While a standard joystick is the most commonly used way to operate a power wheelchair, successful use of a joystick to drive may be impacted by multiple factors. So how might clinicians support clients with limited or declining function to maintain use of a standard joystick? Possible suggestions outlined below are presented in a base up approach to support clinicians to strategically investigate and resolve a variety of issues. These suggestions may be a starting point, however, clinicians are encouraged to reach out to other resources such as local vendors and seating teams for support and expertise as needed.

Power Wheelchair Base	
<p><b>Goal</b> Ensure the power wheelchair base is working efficiently.</p>	<p><b>Questions to Ask</b></p> <ul style="list-style-type: none"> <li>On a smooth, flat surface, does the wheelchair travel on a straight path without requiring many extra joystick corrections? Or does the wheelchair drift or pull to one side?</li> </ul> <p><b>Possible Interventions</b></p> <ul style="list-style-type: none"> <li>Ensure both wheelchair motors are in good repair and working in unison, not pulling the wheelchair off course.</li> <li>Ensure wheelchair tires and bearings are in good repair, not pulling the wheelchair off course.</li> <li>If the power wheelchair has tracking technology/steer correction, ensure it is activated. See appendix for information on tracking technology.</li> </ul>

Positioning	
<p><b>Goal #1:</b> Ensure the client is positioned with a strong base of support to ensure consistent joystick access.</p>	<p><b>Questions to Ask</b></p> <ul style="list-style-type: none"> <li>Does the client feel secure when driving? (i.e., not leaning/sliding onto or away from joystick, not getting jostled on uneven terrain)</li> <li>Is the client's visual field maximized for driving? (i.e., able to see ahead, scan, and shoulder check)</li> <li>Are the client's hands free for accessing the joystick? (i.e., not trying to maintain balance by arm or elbow "propping" or "airplane" grip on armrests)</li> <li>Does the client feel supported in both upright and tilted positions? Or does tilting the client shift him onto or away from the joystick?</li> <li>Is the client's tone controlled or does tone activate with the exertion of driving, negatively impacting access to the joystick?</li> </ul> <p><b>Possible Interventions</b></p> <ul style="list-style-type: none"> <li>Ensure the client's pelvis is stable (via frame set up, cushion, pelvic belts).</li> <li>Ensure the client's trunk is stable (via backrest with laterals, chest harnesses).</li> <li>Ensure the client's tone is managed (via frame set up and/or seating, positioning joystick and display where tone is not activated).</li> </ul>

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Positioning	
<p><b>Goal #2:</b> Ensure the client's arm, wrist, and hand are positioned to ensure consistent joystick access.</p>	<p><b>Questions to Ask</b></p> <ul style="list-style-type: none"> <li>• Are the client's arm, wrist, or hand position causing them to push into the joystick or reach for it?</li> <li>• Does increased tone with exertion, uneven terrain, or repositioning in tilt push the client's arm, wrist, or hand into or away from the joystick?</li> </ul> <p><b>Possible Interventions</b></p> <ul style="list-style-type: none"> <li>• Ensure the joystick is placed where the client's arm, wrist, and hand are in a supported and relaxed position for driving (not too far, close, high, low).</li> <li>• Consider adjustment of armrest height, a full or half tray, or medial or lateral blocks to support the arm, wrist, or hand in a neutral position.</li> <li>• Consider a midline (centre) or offset (left or right) joystick position to improve access.</li> </ul>
<p><b>Goal #3:</b> Maximize the client's hand and finger function for joystick use.</p>	<p><b>Questions to Ask</b></p> <ul style="list-style-type: none"> <li>• Is the client able to maintain hold on the joystick gimbal without slipping off when accessing all directions? Has this also been tried in tilt?</li> <li>• Is the client able to release hold on the joystick gimbal at will? Or do they get "stuck?"</li> </ul> <p><b>Possible Interventions</b></p> <ul style="list-style-type: none"> <li>• Ensure the client's hand and finger range of motion and strength are matched to the appropriate joystick gimbal end.</li> <li>• Consider a ball, knob or goal post end, rather than a standard gimbal end to improve access. See appendix for information on gimbal ends.</li> </ul>

Programming (See appendix for information on programming)	
<p><b>Goal:</b> Ensure power wheelchair programming set up is matched to client's abilities and environments.</p>	<p><b>Questions to Ask</b></p> <ul style="list-style-type: none"> <li>• Does the wheelchair move forward smoothly or "jerky"?</li> <li>• Does the wheelchair turn with control or "whip" the client around?</li> <li>• Does the wheelchair stop in a timely manner or "pitch" the client forward?</li> <li>• Does the client feel in control or that the wheelchair is "getting away from them?"</li> <li>• Is the client able to effectively access 360 degrees of movement?</li> <li>• Is force and distance required to active the joystick matched to the client's strength and range of motion?</li> </ul> <p><b>Possible Interventions</b></p> <ul style="list-style-type: none"> <li>• Ensure programming parameters have been reviewed to match the client's abilities.</li> <li>• Review all basic parameters are set to the client (min and max speeds as well as accelerations and deceleration in forward, turns, reverse; power).</li> <li>• Review joystick sensitivity (turn sensitivity, tremor dampening, centre deadband, joystick throw, axis direction). See appendix for information on these programming parameters.</li> </ul>

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Environmental and Occupational Fit	
<p><b>Goal:</b> Ensure a good “fit” or match between the client, environment, and occupation to maximize drive access</p>	<p><b>Questions to Ask</b></p> <ul style="list-style-type: none"> <li>• Are other areas of health, vision, perception, cognition or behavior the actual issues impacting the client’s ability to drive?</li> <li>• Does the client’s physical environment make driving a power wheelchair challenging?</li> <li>• Has the client had adequate training on the use of a power wheelchair?</li> <li>• Have the client’s caregivers had adequate training on how to set up the power wheelchair?</li> </ul> <p><b>Possible Interventions</b></p> <ul style="list-style-type: none"> <li>• Ensure assessment and intervention of other client related factors to decrease impact on driving (i.e., vision testing and getting new glasses).</li> <li>• Consider environmental adaption and modification, if needed.</li> <li>• Provide client and caregiver further training, if needed.</li> </ul>

Appendix	
<p><b>Tracking technology/steer correction</b></p>	<ul style="list-style-type: none"> <li>• Tracking technology uses either gyroscopes or voltage meters to assist correcting the client’s direction of travel without requiring them to make compensatory adjustments themselves.</li> <li>• It may help over difficult terrain or on different inclines where the chair would normally stray from its intended path.</li> <li>• It may reduce the number of joystick movements as well as overall time for the client to get from point A to point B; this may have benefits related to decreasing motor effort, fatigue, and user frustration.</li> <li>• It does not come standard on all power wheelchairs and requires clinical justification for funding through AADL, so how can a clinician tell if a power wheelchair has this feature?               <ul style="list-style-type: none"> <li>○ Sometimes the technology name will be marked on the wheelchair motors.</li> <li>○ If the vendor or manufacturer rep(s) are provided with the wheelchair serial number, they should be able to see if the feature was included in the original order.</li> </ul> </li> </ul>
<p><b>Joystick gimbal ends</b></p>	<ul style="list-style-type: none"> <li>• Joystick gimbal ends come in all sorts of shapes, sizes, and textures to support functional control of a joystick. Gimbal ends allow adaptation based on the client’s hand/finger range of motion, strength, and tactile preferences.</li> <li>• If the weight of a gimbal end is too heavy, it can pull the joystick off axis causing the chair to “error” or “fault” particularly when the wheelchair is in a tilted position.</li> <li>• The opening in the gimbal end is often specific to the wheelchair brand, so gimbal ends may not always be transferable between wheelchair brands.</li> <li>• Joystick gimbal ends can be obtained from local vendors or manufacturer websites.</li> </ul>
<p><b>Power wheelchair programming</b></p>	<ul style="list-style-type: none"> <li>• Programming involves adjusting parameters in a power wheelchair’s electronics (software) to improve how the chair drives and responds to the client’s input commands in light of the client’s abilities and their environments of use.</li> </ul>

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Appendix	
	<ul style="list-style-type: none"> <li>• Power wheelchairs come from the factory with pre-set programming or trial chairs may have been programmed differently for other clients, so it is important that programming is reviewed for the current client at the outset.</li> <li>• Programming requires access to manufacturer specific hand held programmers or computer programs. Although some sites choose to purchase their own, programming takes knowledge and practice, so contacting a vendor or manufacturer representative for support is recommended.</li> <li>• To ensure safety, it is recommended that the client and/or caregivers try the chair with clinician supervision after programming changes have been made to check that the chair performs as expected.</li> </ul>
<b>Adjusting programming parameters specific to joysticks</b>	<ul style="list-style-type: none"> <li>• A standard joystick provides the client with proportional drive access. This means the client has 360 degree directional control and graduated or variable speed control of the wheelchair. Like a gas pedal, the further (deflection) and harder (force) the joystick is pushed the faster the wheelchair will go and vice versa.</li> <li>• Reviewing basic programming parameters is always recommended.</li> <li>• For clients with high tone, tremors, decreased hand/finger strength or range of motion, other parameters involved in proportional control such as tremor dampening, centre deadband, joystick throw, and axis direction may also be reviewed.</li> <li>• What do these terms mean?  <i>Sensitivity/tremor dampening:</i> defines the amount of movement necessary to activate the drive control.  <i>Centre deadband:</i> defines how far the joystick must be moved from centre for a command to be recognized; the value corresponds to the diameter of a circle around the joystick centre.  <i>Joystick throw:</i> defines how far the joystick must be moved in each direction to generate a full speed command.  <i>Axis direction/assign direction:</i> alters the directional commands of the joystick (i.e., pulling backward on the joystick makes the chair go forward).</li> </ul>

**This resource is not meant to be prescriptive. Rather, it is meant as a general resource for clinicians to use with clinical reasoning skills to determine optimal solutions for clients.**

References:

- Canadian Seating and Mobility Conference-Power Wheelchair Function and Performance, Amy Bjornson, 2006
- Clinical Corner Sunrise Medical-Specialty Controls for Power Wheelchairs, Sheilagh Sherman, 2013
- Mobility Management-Drive Controls and Programming a Power Chair, Jay Doherty, 2012
- Quantum Technical Institute 2013