karma A Better Wheelchair, A Better Fit

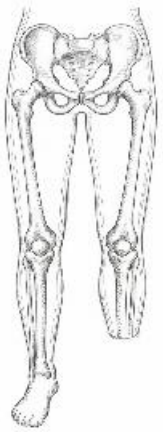
Flexx Clinical Justification

Lower Extremity Amputation

Loss of lower limb mass causes a significant posterior and superior shift in the center of gravity (COG), increasing the risk of backward tipping during wheelchair propulsion.Prolonged improper positioning in transtibial amputees predisposes to knee flexion contracture. Furthermore, Since the rear axle position has great impact on wheelchair stability and maneuverability, adjusting the rear axle position to compensate for the altered COG is a critical factor in preventing backward tipping. Furthermore, prolonged improper positioning in transtibial amputees predisposes to knee flexion contracture.

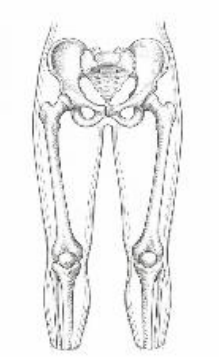
The Flexx offers the following targeted solutions through its modular adjustment capabilities:

Unilateral Below-knee Amputation



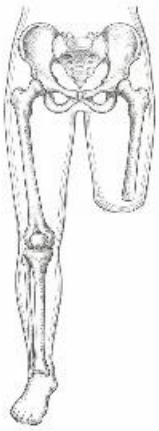
The most common complication of transtibial amputation is knee flexion contracture. An **amputee Legrest** must be fitted to prevent prolonged residual limb knee flexion in a seated position. This leads to hamstring tightness and joint stiffness, thereby increase the difficulty of prosthetic fitting. Unilateral amputation also causes uneven pressure distribution; a **pressure-relief cushion** is recommended to redistribute pressure evenly.
For safe transfers, the wheelchair should be equipped with **flip-back armrests** and **quick-release swing-away footrests** to assist pivot transfers on the intact limb and provide a clear transfer path.

Bilateral Below-knee Amputation



The posterior COG shift is more significant than in unilateral amputees, **rear wheel axle** repositioning for COG compensation and the addition of **anti-tippers** to prevent backward tipping is crucial. **Amputee Legrests** should be used bilaterally to maintain knee extension, facilitating future prosthetic fitting.

Unilateral Above-knee Amputation

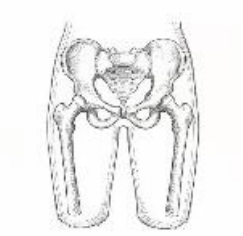


Loss of one thigh reduces the seated support surface area, causing the amputee to compensate through lateral trunk flexion and rotation to maintain balance.

This asymmetric movement pattern predisposes to pelvic obliquity and compensatory scoliosis. **Height-adjustable armrests** are recommended to provide appropriate upper extremity support for postural realignment. **A pressure-relief and positioning cushion** should also be used to provide support and redistribute pressure evenly.

For safe transfers, the wheelchair should be equipped with **flip-back armrests** and **quick-release swing-away footrests** to assist pivot transfers on the intact limb and provide a clear transfer path.

Bilateral Above-knee Amputation



Bilateral lower limb loss causes great posterior COG shift, requiring rear wheel axle repositioning to prevent backward tipping.
The posterior COG shift also predisposes to posterior pelvic tilt, pelvic obliquity, and sacral sitting, which may lead to scoliosis, pressure injuries, and pain. A pressure-relief cushion or a positioning cushion can provide sitting stability and redistribute pressure under the hip. Height-adjustable armrests provide symmetrical support, while flip-back or fully removable armrests clear the transfer path to place transfer board for seated lateral transfers.

Accessory / Feature	Clinical Application for Amputation
Selectable Seat Width	Provides precise seat width to ensure pelvic support, maintaining seating stability. 14"-20" range ensures approximately 1-2 finger-widths of clearance between each thigh and the side guard after seating, reducing shear and pressure. Selecting the seat width according to the user's hip width allows the arms to hang naturally and propel the wheelchair with the most energy-efficient position, improving propulsion efficiency.
Adjustable Seat Depth	Proper seat depth helps the user sit securely and comfortably by minimizing movement on the seat, which reduces pressure and shear forces. Fine-tuning using extension tubes can be performed to maintain approximately 2-3 finger-widths of clearance behind the popliteal fossa. This ensures the user's back remains in full contact with the backrest, avoids compression of the sensitive neurovascular structures in the popliteal region, keeps neutral pelvic alignment, and reduces the risk of the pelvis sliding forward.
Adjustable Seat Angle (Seat Dump)	Lowering the rear axle position (reducing the rear seat height) creates a posterior seat inclination (seat dump). This allows the pelvis to settle deeper into the seat, using gravity to anchor the pelvis to prevent sliding forward.
Adjustable Backrest Height	Lowering the backrest height provides adequate scapular clearance, enabling smoother wheelchair propulsion. Suitable for active users with strong independence in activities of daily living.

Adjustable Backrest Angle	Reclining the backrest compensates for cervical spine deformity through hip joint angle adjustment, helping the user restore a horizontal line of sight. As trunk control in amputees improves with rehabilitation, the Flexx offers 4-degree increment adjustments, enabling therapists or caregivers to precisely identify the optimal balance between stability and mobility. This ensures adequate spinal support (stability) while preserving the range of motion needed for upper extremity wheelchair propulsion (mobility) - particularly critical for users who rely on their upper limbs for activities of daily living (ADLs).
Tension-Adjustable Backrest	The tension-adjustable backrest allows loosening of straps corresponding to thoracic kyphosis, increasing the contact surface area and thereby distributing pressure. Tightening the straps at the lumbar region creates a built-in lumbar support, helping maintain the physiological spinal curvature and delaying fatigue. The tension-adjustable backrest can be re-tightened at any time as the fabric stretches, ensuring the backrest consistently provides effective support rigidity and maintains correct seated posture.
Adjustable Rear Wheel Axle	Repositioning the rear wheel axle posteriorly increases the wheelchair's base of support, significantly enhancing stability. This adjustment is critical for compensating for changes in the center of gravity (COG) in amputees and for providing a sense of security for new wheelchair users.
Height-Adjustable Armrest	200-280 mm adjustable range ensures the elbows are comfortably supported at 90 degrees of flexion. This not only stabilizes the trunk but also provides a stable platform for users to perform pressure relief through push-ups.

Flip-Back Armrest	Ideal for lateral transfers when the lower extremities are non-weight-bearing or when caregiver assistance is required. With the armrests flipped back, the wheelchair seat surface aligns seamlessly with the bed surface or transfer board. This eliminates barriers to lateral transfer, significantly reducing energy expenditure and fall risk during transfers.
Amputee Legrest	The amputee Legrest elevates and supports the residual limb, maintaining the knee joint in full extension to prevent joint contracture, laying the foundation for future prosthetic training. Supports the residual limb, helping the user realign the body's midline and maintain sitting balance.
24” Solid Tire Spoked Rim with Ergo Handrim	24" rear wheels: Suitable for users with upper extremity self-propel capability. Larger wheel diameter provides a longer lever at the handrim contact point, reducing propulsion effort and increasing propulsion efficiency. Solid tires: Ensure the wheelchair is always in a ready to use; particularly suitable for long-term care facilities or users / caregivers with limited maintenance capability. Ergo handrims: Increase grip contact surface area, reduce pressure points, and lower the risk of repetitive strain injuries (RSI) from frequent propulsion.
Anti-Tipper	Center of gravity (COG) shifting rearwards in amputees increases the risk of backward tipping. Anti-tipper provide the protection during sudden center-of-gravity shifts, preventing the wheelchair from tipping over.

The clinical recommendations provided in this document are for professional therapists' reference only and should not replace individualized clinical assessment. The actual prescription should be determined by healthcare professionals based on the user's physical functions, home environment, and individual needs. Karma Medical reserves the right to change product specifications.

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