



# Amar Sava Sangam



## Assistive Technology Guidebook

A guide for clinicians



### DEVELOPED BY

**Karen Ogilvie**

MSc OT student, University of Toronto

**Zahra Karmali**

MSc OT student, University of Toronto

**Raina Coppicus**

MSc OT student, Western University

**Mikkayla Longland**

MSc OT student, Western University

### Content contributors

Marie Brien, PT, MSc

Navamani Venkatachalapathy, PT

Jeyanthi, D. Somasundaram PT

Maheswaran T,PT



## AMAR SEVA SANGAM



Amar Seva Sangam (ASSA) is a premier organisation in the field of disability management focusing on rural areas, located in Ayikudy Village in Tenkasi District of Tamil Nadu. Our approach is to establish a centralised resource center to act as a catalyst for change in the development of children and adults who are differently abled and intellectually challenged. We do this by involving the village community in the process. This mission of ASSA is to establish a Valley for the Disabled, whereby persons with physical / intellectual challenges live in a pro-active society where equality prevails irrespective of physical, intellectual or other challenges with the rest of the society. It is a futuristic vision whereby Amar Seva Sangam plays the role of an enabling agent to provide persons with physical / intellectual challenges "equality of status, equality in opportunities and equality in access".

Amar Seva Sangam (ASSA) was established by Mr. Ramakrishnan, in the International year of the Disabled to cater to disability management focusing on rural areas.

### S. Ramakrishnan, Founder President



**S. Ramakrishnan**, while in his 4th year engineering, injured his spine while attending the last round of Naval officers' selection test and became a quadriplegic. He established ASSA in 1981, the year for the Disabled and named it after his Doctor and mentor Air Marshal Dr. Amarjit Singh Chahal of Defence hospital. **Padma Shree awardee** S.Ramakrishnan is the President of ASSA.



### S. Sankara Raman, Secretary

**S. Sankara Raman**, a Chartered Accountant and a wheel chair user, affected by muscular dystrophy joined ASSA in 1992. He is the Secretary of ASSA. Along with Mr. Ramakrishnan, they have built a **Valley for the Differently Abled** in a 30 acre land

at Ayikudy, as a Rehabilitation and Development Centre and developing models for self-help initiatives by integrating individuals with disabilities within society for improved living conditions.

In 2020, he established Amar Seva Global, a social enterprise focused on spreading Amar Seva's Enabling Inclusion program globally.





## What is Development Delay ?

Skills such as taking a first step, smiling for the first time, and waving “bye-bye” are called developmental milestones. Children reach milestones in how they play, learn, speak, behave, and move (for example, crawling and walking). Children develop at their own pace. However, when developmental milestones are not met by a certain expected age, it is called “developmental delay”. Early stimulation and intervention can help children reach these milestones.

## What is Development Disability?

Developmental disabilities are a group of conditions due to an impairment in physical, learning, language, social or behavioral areas. These conditions begin during a child's developmental period, may impact day-to-day functioning, and can last throughout a person's lifetime. According to the WHO, “If children with developmental delays are not provided with appropriate early intervention, their difficulties can lead to lifetime consequences, increased poverty and profound exclusion”.

## What is Early Intervention?

Interventions promoting child development should address physical, social, emotional, language, and cognitive areas of development. Services targeting these domains of development are termed, “Early Intervention therapy” and can encompass physical therapy, occupational therapy, speech-language therapy and special education. Early Intervention has a significant impact for children who have delayed development in physical, cognitive, emotional, sensory, behavioural, social and communication domains of development. With quality early intervention services, children can reach their potential, live a meaningful life and integrate into their communities.



## Enabling Inclusion Programme

Amar Seva Sangam's Enabling Inclusion programme uses community rehabilitation workers to provide early intervention services to children in their own homes or in community centres by connecting these community workers with rehabilitation specialists (physiotherapists, occupational therapists, speech therapists/trainers and special educators) through the use of the award winning Enabling Inclusion (EI) app. The program has proven to improve outcomes for children with disabilities and their family members and has allowed many children to reach their potential.



# Assistive Technology Guidebook

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# Introduction

## Benefits of Assistive Technology

According to the World Health Organization, assistive technology (AT) is a broad term that encompasses products, equipment and services that aim to maintain or improve an individual's functioning, independence, and overall well-being. These devices can be essential for child development and health, as well as for participation across a variety of areas. According to Borg et al. (2015), these areas can include "communication, mobility, self-care, household tasks, family relationships, education, and for engagement in play". Assistive technology can help children with disabilities better engage in activities and tasks in their home, school, and community. AT promotes child development in all areas.

In this way, assistive technology can help to:

- Increase independence, mobility, participation, and social interaction
- Provide equal opportunity, enable the enjoyment of human rights, and live with dignity
- Provide access to and participation in educational, social, and recreational opportunities
- Empower greater physical and mental function
- Positively impact self-image, self-esteem, and sense of self-worth by providing autonomy
- Facilitate child development, reducing functional decline and preventing secondary conditions such as deformities, when provided at an early age
- Bridge disparities between children with and without disabilities
- Reduce need for caregiver support

Prescribing AT to children can be a complex process for clinicians and an emotional process for families and caregivers. In order to realize these benefits, assistive devices need to be high-quality and locally appropriate. As such, this handbook was designed for clinicians at ASSA to access pertinent information to help guide their clinical decision-making when it comes to the provision of AT.

## Who will find this guidebook most useful?

The following disciplines may find this handbook useful: physiotherapists, occupational therapists, speech therapists or speech trainers, special educators, and other clinicians who work with children with physical and developmental disabilities at ASSA or in the community.

## How to use this Guidebook

The assistive products/devices covered in this guidebook are divided into the following sections: mobility devices, postural aids, orthoses, AAC, and switches. The content provided for each AT in this guidebook have been further organized to guide clinicians through appropriate device selection and provision to help guide clinical reasoning and maximize family use of the device. These categories were adapted from the were adapted based on the Priority Assistive Products List (World Health Organization, 2016).

Specifically, information on mobility devices, postural aids and orthoses has been organized using the following headings:



Category Heading	Description of Category
<b>Description</b>	Details on the device purpose, how/ when to use, and a brief description of the different types/ variations.
<b>Referral</b>	Indications for prescription, including common conditions/ challenges/ issues associated with the need for the device.
<b>Assessment</b>	Common assessments to determine whether the device will be beneficial for the child (physical/cognitive assessments for example), including assessments for variations/ different types of devices.
<b>Prescription</b>	Information on what is needed for an effective prescription for the device. Includes specific indications for device variations/ types and measurements required to tailor to the individual.
<b>Device Preparation</b>	Provides general product assembly instructions required prior to use, if applicable. Outlines who is responsible for device preparation.
<b>Fitting and Adjustment</b>	Outlines the required adjustments/ considerations required to ensure the device is effectively fitted to the client for proper use, safety, and comfort.
<b>Training for Child and Family</b>	Provides instructions for specific training that needs to be provided to the client/ family for safe use of the product. It will also identify specifications for time and location of use.
<b>Follow-up</b>	Provides a systematic process for when to schedule follow-up to monitor use and fit of the device as per manufacturer recommendations and evidence-based clinical practice.
<b>Maintenance and Repairs</b>	Includes specific instructions for when and how to maintain the device and indications for when repair is required, including the steps needed to make the repair. Specific components that commonly require maintenance over time will be identified.
<b>Adapting, Modifying or Fitting the Product</b>	Includes specific instructions for device adaptations that may be required over time as the child develops and grows, as well as any specific considerations that may be specific to the ongoing use of the device over time.

These sections enable clinicians to quickly reference the information they need about any device. While it is beyond the scope of this guidebook to address each and every component of pediatric assistive devices, we hope that this guidebook serves as a valuable resource with key considerations for the provision of mobility devices, postural aids, orthoses, augmentative and alternative communication (AAC) and switches.



## References

- Borg, J., Berman-Bieler, R., Khasnabis, C., Mitra, G., Myhill, W., & Raja, D. S. (2015). Assistive Technology for Children with Disabilities: Creating Opportunities for Education, Inclusion and Participation (pp. 1-19, Publication). Geneva: WHO Library Cataloguing-in-Publication Data
- FutureLearn. (n.d.). How can technology assist children with developmental disabilities? *Integrated Healthcare for Children with Developmental Disabilities*. Retrieved from: <https://www.futurelearn.com/info/courses/children-with-developmental-disabilities/0/steps/60064>
- World Health Organization. (2016). Priority Assistive Products List [PDF].

# Mobility Devices

Assistive devices that maintain or improve a child's functioning and independence by facilitating activity participation and overall wellbeing

Assessment  
Interview

Wheelchairs

Walking frames

Rollators

Elbow crutches

Walking sticks

Mobility Devices  
GMFCS Prescription  
Chart





# Assessment Interview

The assessment interview guides the selection for the appropriate mobility device for a child and family. The information collected as part of the assessment process compliments special test findings to guide clinical reasoning

Purpose:

- To identify the family's needs and resources, environment, and daily activities that guide the selection of a specific device or variation

## Assessment Interview: Guiding questions

Information collected:	Questions to ask
<b>The child</b>	<ul style="list-style-type: none"> <li>● Does the child/ family understand the use of a mobility device? Are they open to discussing device use?</li> <li>● Does the child/ family want a mobility device?</li> <li>● Does the family have the funding to purchase?</li> <li>● How old is the child? Are they still growing?</li> <li>● How much independence does the child have?</li> <li>● What is the child's cognitive level? Are they able to make decisions for themselves or are they dependent on their caregivers?</li> <li>● Does the child require an assistive device for mobility indoors, outdoors, or both?</li> </ul>
<b>The child's physical abilities</b> <i>*May also require specific physical assessments to obtain</i>	<ul style="list-style-type: none"> <li>● Can the child walk? How far? How much support do they need to travel distances?</li> <li>● What is their upper arm ability? Do they have enough strength and range of motion for self mobility? (For manual wheelchair or walking aids)</li> <li>● How much strength and range of motion do they have in their legs? Can they provide self mobility with support? (For manual wheelchair or walking aids)</li> <li>● What is the range of motion available in the child's hips?</li> <li>● What is their grip strength and range of motion in their fingers?? Will they be able to grasp an assistive device?</li> <li>● Do they have postural instability? How much support do they need to sit in an upright position?</li> <li>● What is the child's capacity to weight bear on their feet, transfer themselves or change positions?</li> <li>● How is their muscle tone? Are there areas of low tone that require support? Do they have spasticity or contractures?</li> <li>● If the child has CP, what is their GMFCS level?</li> </ul>
<b>Lifestyle and the environment</b>	<ul style="list-style-type: none"> <li>● What is the child's home environment like? Are there stairs in their home? Is there room for a wheelchair?</li> <li>● What is the child's day like? Do they need to travel long distances or just move around their home?</li> <li>● What is the terrain they travel like? Are pathways paved? Are surfaces uneven and rocky?</li> <li>● Does the child have parents or aids available to assist them with mobility? Do they need to move on their own?</li> <li>● What does the child need mobility assistance to do?</li> </ul>
<b>Existing assistive device</b>	<ul style="list-style-type: none"> <li>● Do they currently use a mobility device?</li> <li>● What has it helped with?</li> <li>● What current problems are they experiencing with their current device? Is there discomfort? Have they developed any pressure sores?</li> <li>● Are they able to use it to do the activities they need it for?</li> <li>● What changes would they like to make from their existing device?</li> </ul>

# Wheelchairs

## Description

### Device overview

Provides wheeled mobility and seating support. Can enhance quality of life for children with walking and mobility difficulties.



### Wheelchair benefits



- Postural support to reduce common health problems such as pressure sores, deformity progression and improved respiration and digestion
- Reduces burden of care
- Promotes independence and social integration
- Improves level of participation
- Prevention of falls, injuries, and other impairments



### Wheelchair types

2 categories of wheelchairs: Manual and power chairs. 3 types of manual wheelchairs are covered within this manual.

Type	Description	Chair functions
<b>Manual wheelchairs:</b> Chairs which are self-propelled by user or pushed by another person		
<b>Upright wheelchair</b> 	<ul style="list-style-type: none"> <li>• Supports up- right, seated position</li> <li>• Propelled by the child (arm or foot propulsion) or by pushed by another person</li> </ul>	<ul style="list-style-type: none"> <li>• Maximizes field of vision for performing activities and interacting with others</li> <li>• Maximizes upper extremity range of motion and use</li> </ul>
<b>Tilt in space wheelchair</b> 	<ul style="list-style-type: none"> <li>• Seat frame tilts back in varying degrees to 50 degrees</li> <li>• Tilt action does not change the hip angle</li> <li>• For children who require comfort, stability, and postural control</li> </ul>	<ul style="list-style-type: none"> <li>• Pressure release required to reduce pressure areas, increase comfort and sitting tolerance</li> <li>• Promote/ assists with reducing fatigue associated with high muscle tone</li> <li>• Gravity assists with positioning after transfers</li> <li>• Gravity assists with repositioning during the day</li> </ul> <p style="text-align: right;"><i>Consideration</i></p>

<p><b>Recline wheelchair</b></p> 	<ul style="list-style-type: none"> <li>• Backrest reclines from vertical to 90 degrees</li> <li>• Recline allows the hip to open and transition from seated position to horizontal</li> </ul>	<ul style="list-style-type: none"> <li>• No self- propulsion. Requires someone else to push chair</li> <li>• Reduces posterior pressure by creating large surface area for pressure redistribution</li> <li>• Provides passive range of motion of hips and knees</li> <li>• Can decrease fatigue associated with high muscle tone</li> <li>• May increase sitting tolerance throughout the day</li> <li>• Can allow independent weight shifts</li> <li>• Can facilitate bladder emptying and easier access for toileting positionings</li> </ul> <p><i>Considerations</i></p> <ul style="list-style-type: none"> <li>• Requires adequate hip range of motions for both flexion and extension</li> <li>• Need to address occurrences of shearing</li> <li>• Sliding may occur if backrests and supports are not correctly positioned</li> <li>• Unable to self- propel. Requires someone else to push chair</li> </ul>
<p><b>Power wheelchairs: Propelled by a motor</b></p>		
<p><b>Power wheelchair</b></p> 	<ul style="list-style-type: none"> <li>• Operated by chair user</li> <li>• *Not covered in this manual</li> </ul>	

## Referral

### Referral indications for wheelchair prescription

#### Client characteristics indicating prescription:

- Mobility disability (example: difficulty walking)
- Musculoskeletal issues (Example: congenital deformities, fractures)
- Neurological conditions
  - Example: Paraplegia or quadriplegia
  - Muscular Dystrophy
  - Spina Bifida
  - Cerebral Palsy (CP)
    - GMFCS level III, IV, or V
- Balance or gait problems





- Inability to walk longer distances
- Immobile children

## Assessment

*\*Note: Manual only covers assessment and prescription for manual wheelchairs*

### Assessments for prescription

Collect information to determine wheelchair need using:

- Assessment interview (See page 5)
- Physical assessment

## Prescription

Considerations and measurements required to select the most appropriate wheelchair for a child

### Wheelchair prescription process

1. Determine wheelchair type required
  - a. Consider child factors and needs
  - b. GMFCS level
2. Determine wheelchair size required
  - a. Take body measurements
  - b. Convert measurements for wheelchair components
3. Select customizations required
  - a. Need for postural supports or adaptations. Based on child's needs

### Step 1: Wheelchair type selection process

Considerations when selecting the wheelchair type:

- Child factors
- GMFCS level

### Child factors

- Child characteristics to determine which wheelchair is required:
  - Pelvic stability
    - How much support is required?
    - How much control does the child have?
  - Risk for pressure sores
    - Where are there high-risk areas?
    - Does pressure need to be alleviated from certain areas with specific positioning?
  - Muscle strength
    - Does the child need support?
    - How and what daily activities will the child perform?
  - Osteoporosis
    - Does specific positioning need to be achieved?
  - Posture
    - How much support does the child need?
  - Other comorbidities
    - Example: Diabetes, hypertension, epilepsy/seizures, vestibular disorders
  - Child's weight
  - Backrest levels of the wheelchair
    - What level of upper extremity function does the child have?

- What activities will they perform?
- Hand function, cognition, and pelvic stability





**Gross Motor Function Classification System (GMFCS)**

- Children at GMFCS level III, IV, and V often benefit from manual wheelchair use
- Children at level IV may benefit from a power chair
- See page 45 or more information about mobility aids for children with cerebral palsy

Indications for wheelchair type selection

Chair variation	Indications for prescription
<b>Upright chair</b>	<ul style="list-style-type: none"> <li>● Adequate upper or lower extremity strength and range of motion to self-propel</li> <li>● Possess adequate postural stability with or without supports for upright activities</li> </ul>
<b>Tilt in space</b>	<ul style="list-style-type: none"> <li>● Presence of high pressure areas that require relief with positioning (example: buttock)</li> <li>● High muscle tone</li> </ul>
<b>Reclining chair</b>	<ul style="list-style-type: none"> <li>● Presence of high pressure areas that require relief with positioning</li> <li>● High muscle tone</li> </ul>

**Manual chair options available**

<p><b>Wheelchair: 708 D Child</b></p> <ul style="list-style-type: none"> <li>● Foldable Frame and armrest</li> <li>● Adjustable/ Removable footrest</li> <li>● Solid Tyres</li> <li>● Pressure relief Cushion &amp; Straps</li> </ul> 	<p><b>Wheelchair: FS 908 LA Child Size</b></p> <ul style="list-style-type: none"> <li>● Foldable Frame &amp; armrest</li> <li>● Adjustable footrest</li> <li>● Pneumatic Tyres</li> <li>● PRC Cushion, Calf Strap</li> </ul> 
<p><b>Freedom Junior</b></p> <ul style="list-style-type: none"> <li>● 24" rear wheel</li> <li>● Non recliner back</li> <li>● Seat belt</li> <li>● Flip-up footrest</li> <li>● PRF cushion</li> </ul> 	<p><b>Cerebral palsy wheelchair</b></p> <ul style="list-style-type: none"> <li>● Reclinable backrest</li> <li>● Head Rest</li> <li>● Lateral Trunk Supports</li> <li>● Tilt In space</li> <li>● Chest and Pelvic Straps</li> </ul> 

## Step 2: Process to determine wheelchair size required

### Basic wheelchair components:

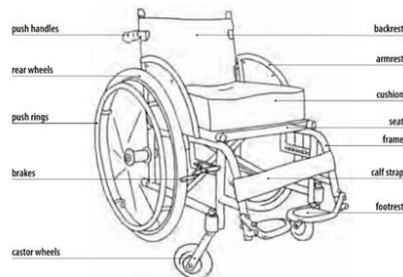


Image sourced from WHO, 2012

### Take body measurements

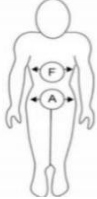

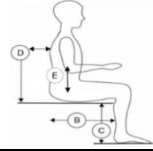
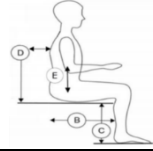
6 basic measurements taken for a manual wheelchair prescription:

<ul style="list-style-type: none"> <li>● Seat Width</li> <li>● Seat Depth</li> <li>● Floor to seat height</li> <li>● Seat back height</li> <li>● Armrest height</li> <li>● Seat back width</li> </ul>	
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Image sourced from WHO, 2008

### Measurement descriptions

Body measurements are taken to size for specific wheelchair components

Wheelchair component	Body measurement taken	Measurement description
<b>Seat width</b>	Hip width (A) 	<ul style="list-style-type: none"> <li>● In seated position, measure widest part of the body when seated</li> </ul>
<b>Seat depth</b>	Upper leg length (B) 	<ul style="list-style-type: none"> <li>● In seated position, measure back of bottom to popliteal fossa of both legs</li> </ul>
<b>Floor to seat height</b>	Lower leg length (C) 	<ul style="list-style-type: none"> <li>● In seated position, measure distance from popliteal fossa to bottom of heel</li> </ul>
<b>Seat back height</b>	Back height (D) 	<ul style="list-style-type: none"> <li>● In seated position, measure from buttocks to bottom of scapula</li> </ul>



<b>Armrest height</b>	Buttocks to elbow height (E) 	<ul style="list-style-type: none"> <li>With elbows bent at 90 degrees, measure from buttocks to tip of olecranon process of elbow to</li> </ul>
<b>Seat back width</b>	Width of chest (F) 	<ul style="list-style-type: none"> <li>While seated, measure width of chest at the top level of the backrest</li> </ul>

### Wheelchair size calculations

Convert body measurements to determine size required for each wheelchair component

*\*Remember:* Child will grow. Good wheelchair fit is important: Aim to maximize child's use of chair while they grow, but if too large, chair can cause issues for function and injury

Wheelchair component	Measurement for component size	Sizing description and considerations
<b>Seat width</b>	Hip width + 1 ¼ - 2 inches	<p>Add 1 ¼ - 2 inches to hip width measure to allow room for clothing between body and armrests</p> <p><i>Sizing considerations</i></p> <ul style="list-style-type: none"> <li>Too narrow can cause rubbing and skin irritation</li> <li>Too wide makes it difficult to propel, fit through doorways and doesn't provide adequate postural support</li> </ul>
<b>Seat depth</b>	Upper leg length - 1-2 inches	<p>Subtract 1-2 inches from upper leg length measurement to allow space between back of knee and wheelchair seat</p> <p><i>Sizing considerations</i></p> <ul style="list-style-type: none"> <li>If legs are not equal length, take measurement of short leg</li> <li>If seat depth is too long, poor posture and skin irritation and breakdown on back of knees can occur</li> <li>If seat depth is too short, less support under through increases pressure on buttocks</li> </ul>
<b>Floor to seat height</b>	<p>Lower leg length</p> <p>*If using footrest: Lower leg length + 2 inches</p>	<p>If using footrest, add 2 inches to allow for clearance</p> <p><i>Sizing considerations</i></p> <ul style="list-style-type: none"> <li>If floor to seat height is too high: <ul style="list-style-type: none"> <li>Wheelchair will be difficult to fit underneath desks, tables, etc...</li> <li>Feet will be unable to touch ground when removed</li> </ul> </li> </ul>



		<ul style="list-style-type: none"> <li>▪ Transfers and foot propulsion will be difficult</li> <li>▪ Increased risk of tipping</li> <li>● If seat is too low:             <ul style="list-style-type: none"> <li>▪ Footrests will hit the floor</li> <li>▪ Increased pressure on buttocks when feet on floor</li> </ul> </li> </ul>
<b>Seat back height</b>	Back height	<p>Add or subtract height from measurement depending on how much support is required</p> <p><i>Sizing considerations</i></p> <ul style="list-style-type: none"> <li>● Higher seat back will offer more trunk support</li> <li>● Seat back should not interfere with shoulder movements</li> <li>● If too high             <ul style="list-style-type: none"> <li>● Can cause poor upper trunk posture and not allow for full shoulder range of motion required to propel chair</li> </ul> </li> <li>● If too short, will promote poor posture and inadequate trunk support</li> </ul>
<b>Armrest height</b>	<p>Buttocks to elbow height</p> <p><i>*If using cushion</i></p> <p>Buttocks to elbow height + 1 inch</p>	<p>Add 1 inch plus height of cushion (if used)</p> <p><i>Sizing considerations</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Armrest height promotes upright posture with shoulders in neutral position</li> <li><input type="checkbox"/> Too low will promote poor, forward leaning posture</li> <li><input type="checkbox"/> Too high may put pressure on elbows and/ or cause shoulder impingement</li> </ul>
<b>Seat back width</b>	Width of chest + ¾ inch	<p>Add ¾ inch to chest width measurement</p> <p><i>Sizing considerations</i></p> <ul style="list-style-type: none"> <li>● Too wide may interfere with shoulder's ability to push the chair and will not offer adequate postural support</li> <li>● Too narrow may cause skin irritation or discomfort</li> </ul>

### Step 3: Determine wheelchair customizations required (as needed)

Wheelchair components are selected based on the physical, environmental, and functional needs

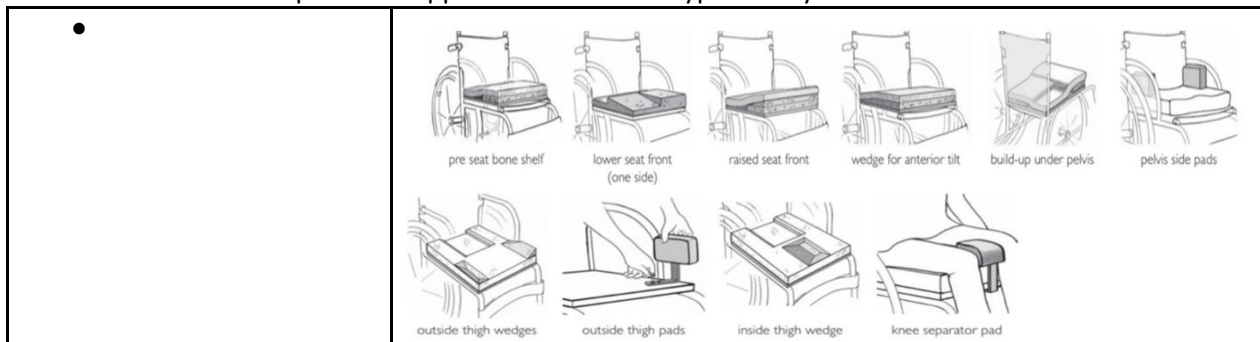
Select option for basic components:

- Wheelchair Frame:
  - Cross-folding
  - Rigid
- Backrest:
  - Fixed
  - Reclining
- Footrests:
  - Removable, swing-away
  - Fixed, flip-up
  - Height adjustable
- Armrests:

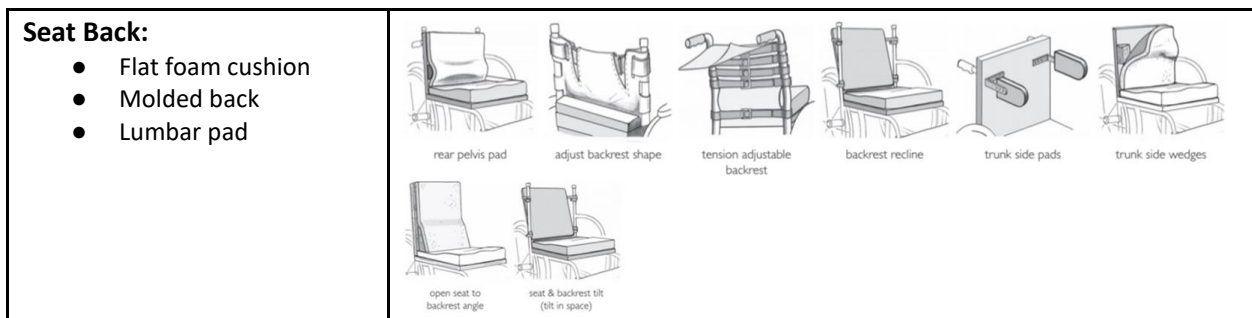
- Fixed
- Removable, height adjustable
- Type of Tyres:
  - Front castors:
    - Solid
    - Pneumatic
  - Rear wheels:
    - Solid
    - Pneumatic

Select postural supports (as needed)

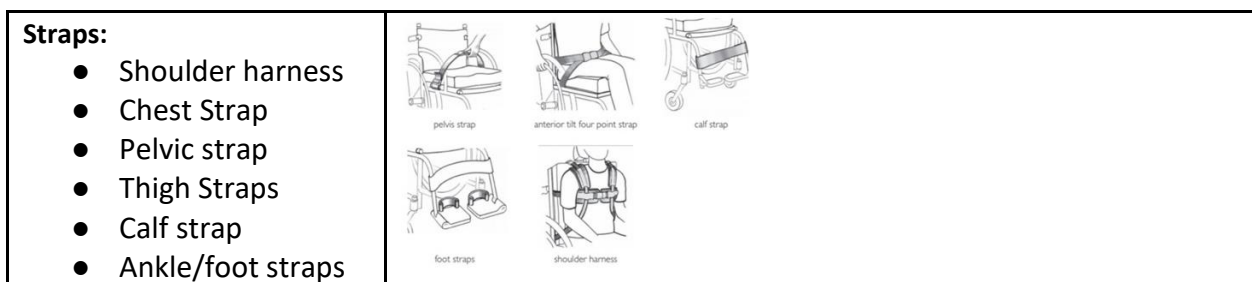
Consider what level of postural support is needed and typical daily activities



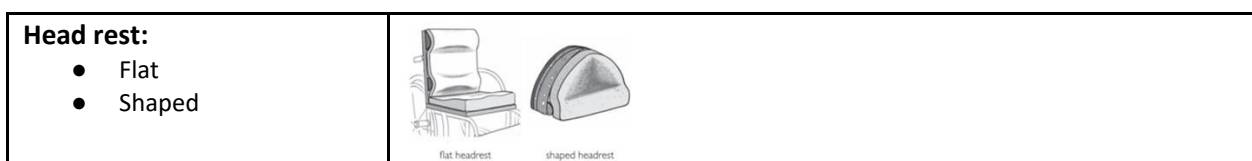
Images sourced from WHO, 2012



Images sourced from WHO, 2012



Images sourced from WHO, 2012



Images sourced from WHO, 2012



<p><b>Supports:</b></p> <ul style="list-style-type: none"> <li>● Lateral Trunk Supports</li> <li>● Abduction wedge</li> <li>● Lateral Pelvic Pads</li> <li>● Lateral Thigh Pads</li> <li>● Tray</li> </ul>	
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*Images sourced from WHO, 2012*

<p><b>Accessories:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Anti-tips</li> <li><input type="checkbox"/> Push handles</li> </ul>	
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## Device Preparation

### Wheelchair checklist

Check:

- Wheelchair seat width and depth measurements are correct for prescription
- If using a cushion, check fit and that the measurements include the space for the cushion
- Perform safety check:
  - Whole wheelchair
    - No sharp edges
    - No scratches or damages
    - Wheelchair moves in a straight line
    - Push wheelchair and ensure caster wheels are in “trail” position
  - Front castor wheels
    - Tip the wheelchair backwards onto rear wheels. Make sure castor wheels spin freely
    - Check that bolts are tight
      - Should feel firm. Do not over tighten
  - Rear Wheels
    - Tip chair sideways on one wheel and spin the other. Check it spins freely
      - Perform on both sides
    - Check if axle bolts are tight
      - Should feel firm. Do not over tighten.
    - Check tire pressure
      - Press with thumb. Should depress a little (Not more than 5 mm)
    - Check push rims are secure
  - Breaks
    - Apply breaks and check wheelchair does not move
  - Frame
    - Check that cross- folding wheelchair folds and unfolds easily
    - Check if fold- down backrest folds and unfolds easily
  - Cushion (is applicable)
    - Cushion cover is on properly
      - Should not stretch tightly over any contours of the cushion



- Positioned correctly on seat
  - If cushion is contoured, 'well' for seat bones is at the back of the seat
  - Cushion fully covers seat
    - No part of the seat should be visible from under the cushion

## Fitting and Adjustment

### Principles for positioning

- Aim for symmetry and proper body alignment when positioning child in the chair
  - Chair supports position and promote functional movements
- No pressure areas to prevent stiffness, contractures, and pressure sores
- Child can self move into different positions
- Stable postural base with pelvis in neutral, supported position
- Lateral support at head, trunk, pelvis, thighs, and feet (as needed)
- Shape pummels/ postural support for hip abduction and external rotation and to align foot position
- Hip position: hip abduction 15-30° (as tolerated), external rotation 5-10°

### Wheelchair fitting checklist

Check for fit	What to check	How to check
<b>Size and adjustments</b>	Seat width	Run hands between client's thighs and sides of wheelchair. Fingers should fit without being pinched
	Seat depth	2-finger gap between back of knee and seat cushion
	Footrest height	<ul style="list-style-type: none"> <li>● Thighs fully supported by cushion with no gaps</li> <li>● Feet are supported on footrests</li> <li>● Ankles, knees, and hips at 90° (or as close possible)</li> </ul>
	Backrest height	<ul style="list-style-type: none"> <li>● Client's trunk positioned over hips</li> <li>● Client has free movement in shoulders to push wheels (if applicable)</li> <li>● Bottom of the rib cage supported</li> <li>● If client has difficulty sitting upright, may need higher backrest to support spine</li> </ul>
	Rear wheel position (For hand propulsion)	<ul style="list-style-type: none"> <li>● Elbows at 90° angle when placed on wheel rims</li> </ul>
	Seat height (For foot propulsion)	<ul style="list-style-type: none"> <li>● Feet are flat on the floor</li> <li>● Ankles, knees, and hips are 90°</li> </ul>
<b>Posture</b>	Posture position	<ul style="list-style-type: none"> <li>● Check for good back and pelvis support</li> <li>● Look at client from the side and check:           <ul style="list-style-type: none"> <li>▪ Pelvis upright</li> <li>▪ Trunk is upright</li> <li>▪ Hips flexed near 90°</li> <li>▪ Knees and ankles flexed near 90°</li> <li>▪ Feet flat on floor or footrests</li> </ul> </li> <li>● Look at client from the front and check:           <ul style="list-style-type: none"> <li>▪ Pelvis is level</li> <li>▪ Shoulders level and arms free to move</li> </ul> </li> </ul>



		<ul style="list-style-type: none"> <li>▪ Legs slightly open</li> <li>▪ Head upright and positioned over body</li> </ul>
<b>Pressure points</b>	Areas of high pressure	<ul style="list-style-type: none"> <li>● Check under seat bones for high pressure</li> <li>● Adjust with cushion or reposition for any pressure points</li> </ul>
<b>Fit when wheelchair is moving</b>	Position during and after movement	<ul style="list-style-type: none"> <li>● Backrest supports client to move shoulders to push</li> <li>● Rear wheel position allows user to push</li> <li>● Seat height and depth allow client to propel with legs</li> <li>● Postural supports allow unrestricted and safe wheelchair mobility</li> <li>● User's feet stay on footrests (if not foot propelling)</li> <li>● Movement of wheelchair doesn't change posture; client should not feel uncomfortable or unstable</li> </ul>

*Images sourced from WHO, 2008*

### Adjusting wheelchair fit

Options for adjusting fit for a specific user (if required)

<b>Concern</b>	<b>How to adjust fit</b>
<b>Seat depth too short</b>	<ul style="list-style-type: none"> <li>● Extend seat rails and replace upholstery</li> <li>● Add and secure a rigid board and seat cushion               <ul style="list-style-type: none"> <li>▪ Ensure this is strong enough to carry weight of user</li> <li>▪ Check that it does not flex or crack beyond existing wheelchair seat</li> </ul> </li> </ul>
<b>Seat depth is too long</b>	<ul style="list-style-type: none"> <li>● Mark and remove upholstery to shorten</li> <li>● Remove seat and replace with shorter               <ul style="list-style-type: none"> <li>▪ Change cushion to match</li> </ul> </li> </ul>
<b>Footrests are too low</b>	<ul style="list-style-type: none"> <li>● Shorten footrest hangers</li> <li>● Use sturdy material to add height to footrests</li> </ul>
<b>Footrests are too high</b>	<ul style="list-style-type: none"> <li>● Lower footrests by lengthening inner extension tube</li> <li>● Increase cushion height               <ul style="list-style-type: none"> <li>○ Add something solid underneath</li> </ul> </li> </ul>
<b>Feet slide off footrests</b>	<ul style="list-style-type: none"> <li>● Check footrest height</li> <li>● Adjust footrest angle               <ul style="list-style-type: none"> <li>○ Increase angle to fold foot in place</li> <li>○ Check there is even pressure under foot</li> </ul> </li> <li>● Attach a strap               <ul style="list-style-type: none"> <li>▪ Attach at ankle level                   <ul style="list-style-type: none"> <li>▪ If feet slide backwards, attach behind legs</li> <li>▪ If feet slide forward, attach in front of legs</li> </ul> </li> </ul> </li> <li>● Calf straps can help to provide support and keep legs in place if sliding off the back</li> </ul>
<b>Wheelchair is too wide</b>	<ul style="list-style-type: none"> <li>● Add inserts on either side of pelvis child can't tip side to side               <ul style="list-style-type: none"> <li>▪ Inserts should only come as far forward as child's trunk</li> </ul> </li> <li>● Too wide may prevent child from reaching wheels to propel</li> </ul>



<b>Postural Support</b>	<ul style="list-style-type: none"> <li>● Child should be seated in a relaxed and upright position</li> <li>● Ideal position: 90° bend in ankle, knee, and hips, or as close to as is comfortable for the client</li> <li>● Posture can be supported with wedges, straps, and cushions</li> </ul>
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## Training for child and family

### Wheelchair training checklist

- Wheelchair handling
  - Folding and lifting the wheelchair
  - Taking off and putting back on any PSDs that need to come off for transport
  - Using quick- release wheels
  - Using the brakes
  - Tilting and anti- tips bars (if used)
  - Correct position of PSDs when user is in the wheelchair
  - Using the cushion including positioning correctly
- Pressure sore prevention
  - How to check high pressure areas
  - Pressure relief lifts
  - Proper nutrition and hydration
  - What to do if pressure sore develops
- Wheelchair transfers (in and out)
  - Independent transfer
  - Assisted transfer
- Wheelchair mobility
  - \*See chart below
- How to care for the wheelchair and cushion
  - Clean the wheelchair
  - Wash and dry cushion
  - Oil moving parts
  - Pump tyres
  - Tighten nuts and bolts
  - Tighten spokes
  - Check upholstery
  - Check for rust
- Checking the cushion

### Wheelchair and mobility skills

Clients and their families should be trained to perform the following skills safely

Skill	Description	
<b>Pushing (arm propelling)</b>	Push from "10 o'clock" position to "2 o'clock position" with long, smooth action	

<b>Turning</b>	Position one hand on one push rim towards the front, and the other hand on the other wheel towards the back. Pull the forward hand backwards and push backwards hand forward at same time	
<b>Going up hill</b>	<ul style="list-style-type: none"> <li>● Lean forward <ul style="list-style-type: none"> <li>▪ Stops wheelchair from tipping</li> </ul> </li> <li>● To stop or rest, park sideways on hill to prevent rolling backwards</li> </ul>	
<b>Going downhill</b>	<ul style="list-style-type: none"> <li>● Lean backwards</li> <li>● Keep hands on push rims and let rim slide through hand, applying pressure to control speed</li> </ul>	
<b>Going up stairs with assistance from aid</b>	<ul style="list-style-type: none"> <li>● Chair positioned backwards</li> <li>● Tilt wheelchair onto back wheels and position against step</li> <li>● Aid stands behind the chair and pulls back and upwards to roll chair up step</li> <li>● Second aid can help to support chair at the front <ul style="list-style-type: none"> <li>▪ Do not hold footrests</li> </ul> </li> </ul>	
<b>Going down steps with assistance from aid</b>	<ul style="list-style-type: none"> <li>● Chair positioned forward (client looking down the stairs)</li> <li>● Tilt chair onto back wheels</li> <li>● Aid holds chair, and lets back wheels roll down steps slowly, one a time</li> <li>● Second aid can help to support chair at the front <ul style="list-style-type: none"> <li>▪ Do not hold footrests</li> </ul> </li> </ul>	
<b>Partial wheelie</b>	<ul style="list-style-type: none"> <li>● Can be useful for clearing small curbs, strokes, and bumps</li> <li>● Roll chair backwards until hands are at 10 o'clock position, then push forward quickly</li> <li>● Castor wheels will come up</li> <li>● Lift castor wheels to clear small object</li> </ul> <p>** Requires practice and skill</p>	
<b>Getting in and out of chair</b>	<ul style="list-style-type: none"> <li>● Do not stand on footrests when getting in and out</li> <li>● Keep fingers away from wheel spokes and breaks</li> <li>● Have an aid to help when learning to go up and down hills</li> </ul>	

Images sourced from WHO, 2012.

### Activity and participation training checklist

Child/ family should be provided training for the following activities

Activity	Training required
<b>Indoor mobility</b>	<ul style="list-style-type: none"> <li>● Transfer techniques from bed/ floor/ chair to wheelchair <ul style="list-style-type: none"> <li>▪ Education and adaptations if child has difficulty with functional transfers</li> </ul> </li> </ul>





	<ul style="list-style-type: none"> <li>● Self-maneuvering techniques</li> <li>● Lifting, carrying and transfer techniques for caregiver</li> <li>● Training child on supported weight bearing while transferring</li> </ul>
<b>School mobility</b>	<ul style="list-style-type: none"> <li>● Transfer techniques from bed/ floor/ chair to wheelchair</li> <li>● Self-maneuvering techniques</li> </ul>
<b>Outdoor mobility</b>	<ul style="list-style-type: none"> <li>● Transfer techniques from bed/ floor/ chair to wheelchair</li> <li>● Self-maneuvering techniques</li> </ul>

## Follow- up

### Follow up Process

If the child is not being seen by a clinician on an ongoing basis:

- Follow up within 6 months after child receives chair
  - Additional follow up after as needed to assess changes in wheelchair fit or need

During the follow up session

Review with the child/ parent:

- How well wheelchair has worked
- Any problems client/ parent has experienced while using the chair
- The chair fit
  - Any pain or discomfort
  - Difficulty with activities
  - Postural support
- The child/ parent's skills for maneuvering the chair
  - Is more training is required?
- The client/ parent's ability to care for and maintain the wheelchair
  - Is more training is required?

Adjustments for fit, modifications or training should be made for any issues the family identifies

## Maintenance and Repairs

### At- home maintenance

To ensure wheelchair functioning:

- Clean the wheelchair
- Wash and dry cushion
- Oil moving parts
- Pump tyres
- Tighten nuts and bolts
- Tighten spokes
- Check upholstery
- Check for rusk
- Check the cushion

If maintenance is required:

- Wheelchair should be taken to ASSA or another orthotic centre for maintenance to be performed by trained personnel

## Adapting, Modifying or Fitting the Product

Wheelchair fit may change as the child grows or as their physical needs change.

- Clinician should be seen if the child's fit or comfort changes as they grow
  - Adjusted postural supports or assessment for new wheelchair.

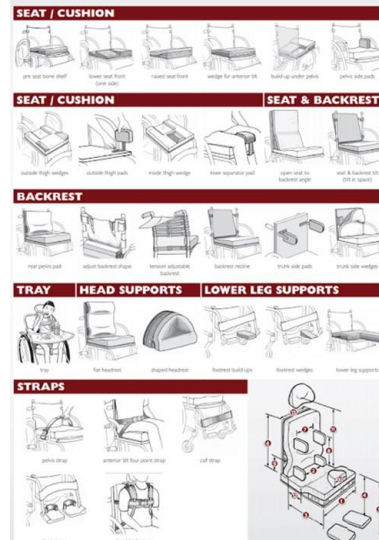


Image sourced from WHO, 2012

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# Walking Frames


## Description

### Device overview

- Consist of a frame with handles and legs that need to be lifted for movement
- Improves balance and relieves weight bearing either fully or partially on lower extremity
- Can be adjusted to accommodate various heights and may have 2-wheels with 2 rubber tips or 4 tips
- May have hand grips or forearm support
- Also known as walker



### Types of walking frames

Type	Description
<p data-bbox="188 1261 389 1330">Standard/Rigid Walker</p> 	<ul style="list-style-type: none"> <li>● Simple, lightweight device without wheels</li> <li>● Mostly used indoors</li> <li>● Improves base of support</li> <li>● Improves motor strength and locomotion performance</li> </ul>
<p data-bbox="188 1756 405 1785">Foldable Walker</p>	<ul style="list-style-type: none"> <li>● Can be folded for storage and transportation</li> <li>● Large base of support to facilitate balance and extra support while standing or walking</li> </ul>



## Referral

Walking Frame	Commonly Prescribed for children who have:
Standard/Rigid Walker	<ul style="list-style-type: none"> <li>● GMFCS Level III Spastic Diplegia</li> <li>● Paraplegia</li> <li>● Amputation</li> <li>● Muscular Dystrophy</li> <li>● Lower limb fracture</li> </ul>
Foldable Walker	<ul style="list-style-type: none"> <li>● GMFCS Level III</li> <li>● Problems with walking or with mild balance</li> <li>● Spastic diplegia</li> <li>● Paraplegia</li> <li>● Amputation</li> <li>● Muscular Dystrophy</li> <li>● Lower limb fracture</li> </ul>

### *Gross Motor Function Classification System (GMFCS)*

The GMFCS level for a child with cerebral palsy can indicate whether a walking frame would support the child's functional needs. Children at GMFCS level III often benefit from walking frames. See page 45 for more information about mobility aids for children with cerebral palsy

## Assessment

### Assessment interview

- Conduct an assessment interview to assess need for walking frame and which type would best support daily function (See page 5)

### *Assessment Considerations*

- If a child cannot bear weight on one or both legs, but is mobile enough not to require a wheelchair, a walker should be used

To determine whether a child would benefit most from a walking frame or a rollator:

- Compared to a rollator, walkers allow for extra support and stability. They allow for mobility at a slower pace. Walking frames are beneficial for a child with good upper limb function and balance
- Rollators would be better suited for children with flexor or extensor spasticity



### *Physical Assessment*

The following physical assessments may be used to determine whether a standard/rigid walker or foldable walker is needed for the child:

- Timed up and go test
- Balance test (static and dynamic)
  - Pediatric Balance Test: a score between 30 and 39 indicates the need for a walking frame or rollator
- Muscle power test
- Limb length discrepancy

### **Prescription**

To ensure an effective prescription is made, consider the following factors:

- Must ensure it is tailored to the child's height and ideally, height adjustable to accommodate for growth
- Consider width and overall weight of the walker

### *Measurement Process*

- Ask the child to stand up straight with shoes on
- Allow hands to rest naturally at the sides
- Measure from hip joint to the floor (this will be the handle height required)

### **Device Preparation**

The walking frame should be delivered fully assembled or assembled to such an extent that the remaining assembly can be carried out with the use of commonly available screwdrivers or wrenches by the rehabilitation specialist.

### **Fitting and Adjustment**

Tips to adjust the walking frame for the child and ensure proper fit:

- A. Adjust the height of the walker handles so that they are even with the child's hip joint
- B. When the child is standing and grips the handles, the elbows should be slightly bent (20-30 degrees)

### **Training for Child and Family**

Training should be provided prior to using the walking frame in the following areas:

- Gait training
- Balance training (static and dynamic)
- Should demonstrate how to use walker correctly
- Navigating various types of terrains and environments safely (ramps, indoors, outdoors, community, school, etc.). Consider the progression of the use of the walker in different types of environments or ground surfaces





- Ensure that the environment in which the child will be walking is safe
- If the child has AFOs, encourage them to wear them at all times while using the walking frame
- Ensure that no other child uses this device as it is designed specifically for the user

## Follow-up

Considerations for follow-up:

- Inspect the walker on a regular basis (at regular visits)
- In order to ensure safe use, a visual inspection and functional observation should be performed at least once every six months by a therapist
- Encourage regular and consistent use and inquire how they are using it in different environments
- Shorter time intervals may be needed depending on the frequency of use, place of use and the child's needs and growth/development

## Maintenance and Repairs

The walker can be cleaned with basic soap and water. Keep hair and lint away from any wheels and oil moving parts occasionally

The following components should be inspected for any damages, changes to function and wear and tear every six months:

- Frame
- Screws (if any)
- Shaft (height adjustable clip/push button)
- Hinges (if foldable)
- Rubber tips
- Wheels and swivel castors (if any)

Replace worn out, missing or damaged parts if functioning and safety is impacted

## Adapting, Modifying or Fitting the Product

The height of the walker may need to be adjusted as the child grows. If the height of the walker cannot be adjusted and is no longer appropriate for the child's change in function, a new walking frame will need to be prescribed.

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## Rollators


### Description

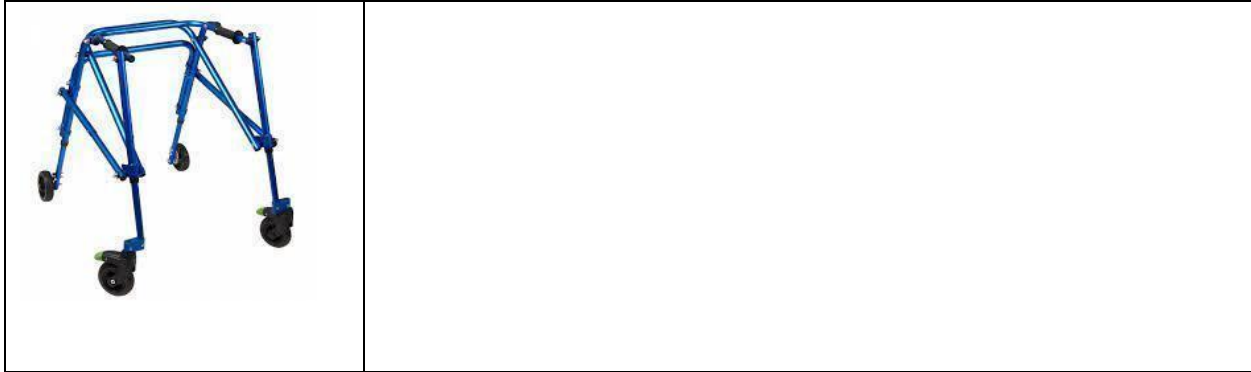


#### Device overview

- Walking devices that enable stability, balance and safety while walking indoors and/or outdoors
- Lowers the risk of falls
- Frame with built-in handles, brakes and 3-4 wheels (may have various sized wheels)
- May include a seat for resting or a basket
- Uses the person's own muscle power to operate

#### Types of rollators

Type	Description
<p>Anterior Rollator</p> 	<ul style="list-style-type: none"> <li>● Placed in front of the child</li> <li>● Child shifts weight forward onto rollator</li> <li>● Allows for freedom of movement</li> <li>● Improves posture and enables faster gait</li> </ul>
<p>Posterior/Reverse Rollator</p>	<ul style="list-style-type: none"> <li>● Placed behind the child</li> <li>● Weight bearing is down through the arms and hand placement is to the sides rather than forward</li> <li>● Child pulls the walker forward</li> <li>● Improves gait and posture</li> <li>● Advances stride and step length along with better cadence (steps/min) and spinal alignment</li> </ul>



## Referral

Rollators are typically prescribed when children have:

- Difficulty walking
- Problems with balance
- Pain while standing or walking and/or frailty
- Spastic diplegia-GMFCS Level II or III
- Amputation
- Muscular dystrophy
- Lower limb fracture

### *Gross Motor Function Classification System (GMFCS)*

The GMFCS level for a child with cerebral palsy can indicate whether a rollator would support the child's functional needs. Children at GMFCS level II or III often benefit from rollators. See page 45 for more information about mobility aids for children with cerebral palsy

## Assessment

Assessment interview

- Conduct an assessment interview to assess need for rollator and which type would best support daily function (See page 5)

### *Assessment Considerations*

Consider the following factors to determine whether a rollator will be useful:

- Gait analysis
- Muscle power test
- ROM
- Limb length discrepancy
- Balance test (static and dynamic)
  - **Pediatric Balance Test:** a score between 30 and 39 indicates the need for a walking frame or rollator



## Prescription

To ensure an effective prescription is made, consider the following when deciding between an anterior or posterior rollator:

Type	Description
Anterior Rollator	<ul style="list-style-type: none"><li>• For children with extensor spasticity and poor posterior balance</li><li>• Provides forward-leaning stability and facilitates stepping and moving forward</li><li>• Open-back facilitates easier transfers</li></ul>
Posterior/Reverse Rollator	<ul style="list-style-type: none"><li>• For children with flexor spasticity</li><li>• Promotes upright posture and prevents hip flexion</li><li>• Requires less energy exertion</li><li>• Typically preferred by children for comfort and open front accessibility it provides</li></ul>

- Must ensure the rollator is tailored to the child's height and ideally, height adjustable to accommodate for growth
- Consider width and overall weight of the rollator

### *Measurement Process*

- Ask child to stand up straight with shoes on
- Allow hands to rest naturally at the sides
- Measure from wrist crease to the floor (this will be the handle height required)

## Device Preparation

The rollator should be delivered fully assembled or assembled to such an extent that the remaining assembly can be carried out with the use of commonly available screwdrivers or wrenches by the rehabilitation specialist.

## Fitting and Adjustment

Tips to adjust the walking frame for the child and ensure proper fit:

- Adjust the height of the walker handles so that they are even with the child's wrist crease
- Ensure the hands rest comfortably and the user is able to use the brakes safely

## Training for Child and Family

Training should be provided prior to using the walking frame in the following areas:

- Gait training
- Weight bearing
- Balance training (static and dynamic)
- Should demonstrate how to use rollator correctly
- Navigating various types of terrains and environments safely (ramps, indoors, outdoors, community, school, etc.). Consider the progression of the use of the rollator in different types of environments or ground surfaces
- Ensure that the environment in which the child will be walking is safe



- If the child has AFOs, encourage them to wear them at all times while using the rollator
- Ensure that no other child uses this device as it is designed specifically for the user

## Follow-up

Considerations for follow-up:

- Inspect the rollator on a regular basis (at regular visits)
- In order to ensure safe use, a visual inspection and functional observation should be performed at least once every six months by a therapist
- Encourage regular and consistent use and inquire how they are using it in different environments
- Shorter time intervals may be needed depending on the frequency of use, place of use and the child's needs and growth/development

## Maintenance and Repairs

The rollator can be cleaned with basic soap and water. Keep hair and lint away from wheels and oil moving parts occasionally

The following components should be inspected for any damages, changes to function and wear and tear at least once a year.

- Rollator frame
- Swivel castors and screws
- Wheels
- Brakes, brake levers and cables
- Hand grips or handles
- Seat, cushion, and basket (if applicable)

Replace worn out, missing or damaged parts if functioning and safety is impacted

## Adapting, Modifying or Fitting the Product

The height of the rollator may need to be adjusted as the child grows. If the height of the rollator cannot be adjusted and is no longer appropriate for the child's change in function, a new rollator will need to be prescribed.

## References

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## Elbow Crutches

### Description

#### Device overview

- Elbow crutches provide support and balance when walking and help to transfer body weight from injured leg/ foot to upper body
- Appropriate for:
  - Long-term use
  - Non- weight bearing or partial weight bearing single lower limb with functional upper limbs
  - Mild cerebral palsy
- May be adjustable in height and cuff size
- Child will slip their arm into a cuff and then grasp the hand grip, reducing the pressure on the wrist and maintaining posture and mobility control when moving



### Referral

#### Indications for elbow crutches prescription

- Challenges with balance or impaired strength in lower limbs
  - Support is required for walking
- Need to limit how much weight it put onto a leg
- Pain relief required
- Support weak muscles
- Loss of sensation in leg(s)

#### Common conditions

- Musculoskeletal injuries (broken bones, tendon injuries)
- Cerebral palsy (CP)
  - If clients have some ability to ambulate
  - GMFCS level II or III
- Spina Bifida
- Muscular dystrophy

#### Contraindications



- Elbow crutches are not meant to take full body weight. Not appropriate if child's legs cannot support some of their body weight
- Hand injuries or limited hand strength/ range of motion that would prevent gripping crutch handles

## Assessment

### Assessments for elbow crutch prescription

Assessments to determine the child's need for elbow crutch prescription include:

- Assessment interview
- Physical assessments

### Assessment interview

- Conduct an assessment interview to assess need for elbow crutches or the most appropriate walking aid to best support daily function (See page 5)

### Physical Assessments

To determine elbow crutches would support the child's physical function, conduct the following assessments:

- Static balance
- Dynamic balance
- Muscle power test
- Gait Analysis

### Gait pattern

- Decide the amount of support required for walking.
- Hand function: Hand grip.

### Considerations

The following factors should be considered if a prescription is the most appropriate for a child:

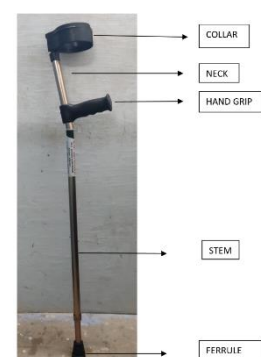
- Upper body strength
- Balance and coordination
  - Pediatric Balance Test: a score of 45 and above may benefit from elbow crutches for progression to independent mobility
- Gait pattern
- Overall physical strength and endurance
- Level of impairment
  - GMFCS Level II or III (See page 45 for GMFCS mobility aid chart)
- Cognitive function
- Vision

If a child only needs unilateral support for walking, then a walking stick may be a more appropriate device. If bilateral support is required, then a walking frame, rollator or elbow crutches may be more appropriate

## Prescription

### Indication for prescription

Indication that a child would benefit from prescription:



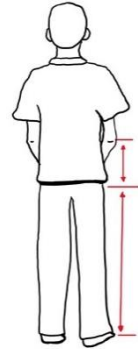


- Child's GMFCS level (for children with CP)
  - Level II or III
- Results of physical assessments
- Results from assessment interview

## Body measurements

Body measurements required for prescription:

- Procedure:
  - Child stands while wearing shoes they would normally wear for walking
  - Take and record measurement:
    - Height from floor to greater trochanter (Floor to hand grip)
    - Distance between hand grip and elbow (Grip to arm cuff)



## Elbow crutch selection

Using the leg height and arm measurement to choose elbow crutch size. Consider that the child will grow, and that the height can be adjusted for the child's need

- Sizing:
  - Floor to hand piece
    - Minimum: 30 inches
    - Maximum: 39 inches
  - Elbow to hand piece
    - Minimum: 9 inches
    - Maximum: 12 inches

## Device Preparation

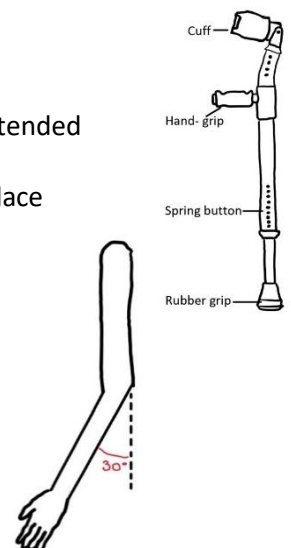
Check crutches prior to fitting for any scratches or damages to the cuffs or shaft

## Fitting and Adjustment

The crutches should enable the child to walk comfortably while supporting upright posture attainable by child

Adjusting elbow crutches for proper fit

- Height adjustment
  - Child stands upright, shoulders relaxed and at sides
  - Adjust height of crutch so grip height is at the hand when arm is extended
    - Elbows should have 30° bend when child holds the grips
  - Crutches should be equal height and spring buttons are locked in place
- Cuff adjustment
  - Cuff should be 1-2 inches below elbow
  - To adjust, press spring buttons to lengthen or shorten. Re-engage to lock in place before use
  - Widen or narrow the cuff to ensure secure fit around child's arms
- Check for fit





- Check skin under arm cuffs for redness or soreness

## Training for child and family

### Training checklist for family

Clinicians should provide families with the following:

- Instructions for donning and doffing elbow crutches
- Mobility skills
- Device hygiene
- Skin checks for irritation, redness, or blisters
- Process for maintenance

### Elbow crutches mobility skills

Clients and their families should be trained to perform the following skills safely

Skill	Overview
<b>Walking</b>	<ul style="list-style-type: none"> <li>● Walk as normal with whole foot touching the ground               <ul style="list-style-type: none"> <li>○ Clinicians advise how much weight to be put through foot</li> </ul> </li> <li>● Place both crutches one step in front of body</li> <li>● Place affected leg on ground, slightly behind crutches</li> <li>● Step through with unaffected leg while taking weight through hands and some through affected leg</li> </ul>
<b>Sitting to standing from Chair</b>	<ul style="list-style-type: none"> <li>● When standing up or lowering into a seat to sit down, do not put arms inside cuffs until fully standing. Hold the handgrip for stability when transitioning</li> <li>● Once standing, put arms into cuffs</li> </ul>
<b>Standing up from the floor</b>	<ul style="list-style-type: none"> <li>● The child is kneeling on the floor and picks up crutches and places them in front for stability.</li> <li>● Child moves to standing through 1/2 -kneeling by holding onto the handgrip of the crutches.</li> <li>● Once standing, places arms in cuffs.</li> <li>● May put arms in cuffs from a kneeling position if stable and comfortable</li> </ul>
<b>Stairs</b>	<ul style="list-style-type: none"> <li>● Stand close to handrail</li> <li>● Hold handrail in one hand and both crutches in the other hand               <ul style="list-style-type: none"> <li>○ Keep one arm in cuff of crutch</li> <li>○ Take off second crutch, and turn it horizontal and hold at both crutches at the handgrip in the same hand</li> </ul> </li> <li>● If no handrail, then keep crutches on either side of body</li> <li>● Step with unaffected leg first, supporting affected leg with handrail/crutches</li> <li>● Lift affected leg and crutches up onto step, followed by crutches</li> </ul>

### Elbow crutch hygiene

- Regular cleaning with a damp cloth, soap, and water
- Dry fully with towel prior to use



## Follow-up

Follow-up procedure

Children not seeing a clinician regularly should follow up within 6 months or when:

- Crutches are too short for the child and can no longer be lengthened
- The rubber tips become worn down or have tears, rips, or cracks
  - Clients should return to facility or orthotic centre for replacement

## Maintenance and Repairs

Maintenance process

- Maintenance is required when rubber tips rip, tear, crack, or the tread becomes worn down
- Have serviced at Amar Sava Sangam or an orthotic centre if rubber tips become worn down, ripped, or cracked to be replaced

## Adapting, Modifying or Fitting the Product

Child growth and adaptations

Crutches should be lengthened as child grows in height to maintain 30° elbow bend

- To increase elbow crutch length:
  - Push buttons in on crutches shaft or forearm piece and pull to add length
- If crutches become too short for the child, the clinician should be seen to assess and arrange prescription for a larger size

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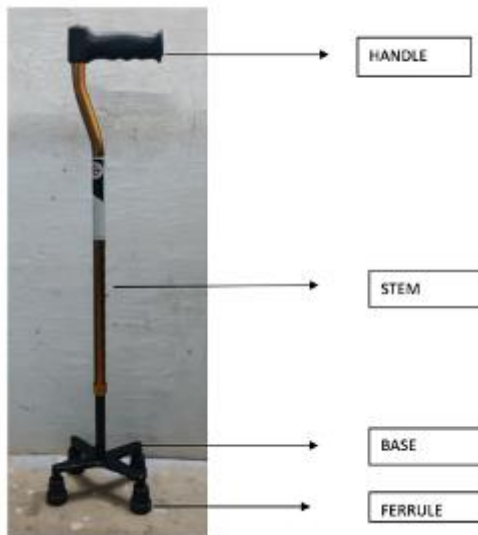


# Walking Sticks


## Description

### Device overview


- Handheld devices to provide support and balance when walking
- Enables a child to maintain stability and balance whilst walking in indoors and outdoors by increasing the child's base of support
- Provides tactile information about the ground, as well as enables weight redistribution off of a weak or painful lower leg
- Can be made of wood or light metal, such as aluminum
- Have a handle grip, shaft and tip(s) and are height adjustable
- Handles can be flat, swan neck or ergonomic in design
- Rubber tips prevent slipping and can be replaced as needed
- May be used unilaterally or bilaterally (a child may use one or two walking sticks)
- Also known as canes



### Types of walking sticks

Type	Description
 <p>Tripod</p>	<ul style="list-style-type: none"> <li>● Has 3 tips</li> </ul>



<p>Quadripod</p> 	<ul style="list-style-type: none"><li>● Has 4 tips</li></ul>
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## Referral

Walking sticks are typically prescribed when children have mild moderate levels of mobility impairment, when minimal-moderate stability is needed. It requires a slower walking pattern (gait).

### *Gross Motor Function Classification System (GMFCS)*

The GMFCS level for a child with cerebral palsy can indicate whether a walking stick would support the child's functional needs. Children at GMFCS level II often benefit from walking sticks. See page 45 for more information about mobility aids for children with cerebral palsy

## Assessment

### Assessment interview

- Conduct an assessment interview to assess need for walking stick and which type would best support daily function (See page 5)

### *Assessment Considerations*

Consider the following factors to determine whether a walking stick will be useful:

- Upper body strength
- Balance and coordination
  - Pediatric Balance Test: a score of 45 and above may benefit from a walking stick for progression to independent mobility
- Gait pattern
- Overall physical strength and endurance
- Level of impairment
  - GMFCS Level II
- Cognitive function
- Vision

## Prescription

To ensure an effective prescription is made, consider the following:

- If a child only needs unilateral support for walking, then a walking stick may be a more appropriate device. If bilateral support is required, then a walking frame, rollator or elbow crutches may be more appropriate
- Tripods and quadripods provide more stability than a single tip walking stick but without the cumbersome forearm cuff of an elbow crutch



### *Measurement Process*

- Ensure child is wearing appropriate and comfortable footwear during the measurement process
- The child should stand upright with their arms hanging loosely by the side
- Walking stick is placed approximately 6 inches from the lateral border of the toes
- The distance from the distal wrist crease to the floor is measured to provide the cane length and will allow the elbow to be flexed at 20-30 degrees
- Minimum height: 30 inches; Maximum height: 39 inches

### **Device Preparation**

Walking sticks should come delivered in a box, either fully assembled or assembled to such an extent that the remaining assembly be carried out using screwdrivers or wrenches (to be done by the clinician).

### **Fitting and Adjustment**

Tips to adjust the walking stick for the child and ensure proper fit:

- Confirm the size of the walking stick that has been delivered to ensure the device is properly fitted according to the child's height
- Ensure that the handles are comfortable for the child to use
- Make sure the child is using the cane to walk correctly and feels natural while walking
- If walking is difficult with the cane, it may be that the cane is not fitted properly
- If cane is too long, it will not provide the support the child needs while walking
- If the cane is too short, you may see the child with a forward-bent posture leading to imbalance and an increased falls risk

### **Training for Child and Family**

Training should be provided prior to using the walking stick in the following areas:

- How to walk with a cane (ambulating with a cane)
  - Sit to stand and stand to sit
  - Two/three-point gait
  - Stairs
  - Navigating various types of terrains and environments safely (indoors, outdoors, community, school, etc.). Consider the progression of the use of the walking stick in different types of environments or ground surfaces

### **Follow-up**

Considerations for follow-up:

- Inspect the cane on a regular basis (at regular visits)
- In order to ensure safe use, a visual inspection and functional observation should be performed at least once every six months



- Encourage regular and consistent use if needed and inquire how they are using it in different environments
- Shorter time intervals may be needed depending on the frequency of use, place of use and the child's needs and growth/development

## Maintenance and Repairs

The walking stick should be cleaned with soap and water on a regular basis. Keep hair and lint away from the tips to reduce risk of falls.

Inspect the cane on a regular basis (at regular visits). The following components should be inspected for any damages, changes to function and wear and tear every six months:

- Ensure the rubber tip(s) are well maintained for shock absorption and grip to prevent slipping
- Check the handle, the shaft, and the tips
- Ensure the walking stick is at the proper height to avoid imbalance, bad posture or falls

Replace worn out, missing or damaged parts as needed. Encourage regular and consistent use and inquire how they are using it in different environments

## Adapting, Modifying or Fitting the Product

The height of the walking stick will need to be adjusted as the child grows. If the height of the walking stick cannot be adjusted and is no longer appropriate for the child, a new walking stick will need to be prescribed.

## References

- Brien, M. (n.d.). Physiotherapy manual. Village-based early intervention rehabilitation programme. *Enabling Inclusion*. [PDF]. Retrieved from: [https://www.amarseva.org/uploads/default/files/EI%20manuals/EI-PHYSIOTHERAPY%20Manual\\_for%20Website.pdf](https://www.amarseva.org/uploads/default/files/EI%20manuals/EI-PHYSIOTHERAPY%20Manual_for%20Website.pdf)
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## Indications for Prescription of Mobility Devices based on GMFCS Level

GMFCS Level	Manual Wheelchairs	Power Wheelchairs	Walking Sticks	Walking Frames	Rollators	Elbow Crutches	Notes
Level I							Child typically does not require mobility devices
Level II			X		X	X	Walking stick, rollator or elbow crutches may be beneficial if child requires support for stability and balance with daily activities
Level III	X			X	X	X	<p>Child usually requires the stability of a hand-held walker or rollator, but may benefit from elbow crutches when walking</p> <p>If the child does not have enough leg strength or mobility to walk with a walker for longer distances, than a wheelchair is recommended</p> <p>A manual wheelchair can be used if the child has enough strength and mobility in their arms to self-propel the chair or if they have a parent and aid to push the chair</p> <p>If child is required to travel long distances without assistance and does not have a parent or aid to push them, a power wheelchair may be more appropriate</p>
Level IV	X	X					<p>A manual wheelchair may be used if the child has a parent or aid to push a manual wheelchair</p> <p>A power chair may be more appropriate to promote greater independence</p>
Level V	X						<p>A manual wheelchair should be used with a parent or aid available to push the chair</p> <p>Child does not have the ability to operate a power chair</p> <p>Tilt- in- space chair required as child does not have head or trunk control</p>



# Postural Aids

Assistive aids used to support a child in achieving proper body position, balance or alignment while promoting participation and function

CP Chairs

Corner Chairs

Standing  
Frames

Postural Aids

GMFCS

Prescription  
Chart





# CP Chairs

## Description

- Postural aid that enables the child to maintain a stable, symmetrical sitting posture.
- Enables a child to use their hands for play, feeding, communication and learning
- Encourages the child to develop as much independent sitting ability as possible



## Uses

- Maintains upright symmetrical sitting posture
- Facilitates postural control
- Normalizes tone
- Maintains skeletal alignment
- Promotes function

## Components

- **Chair Base**
  - Tilt-in Space
    - Chair may be designed with a slide backward or forward tilt to supports a child in keeping their head upright
- **Postural Adaptations (are provided separately)**

The following adaptations would be selected based on the child's individual needs:

- Tilt-in Space
- A head pad may help the child to look forward and may reduce spasticity
- Pommel or Cushions
  - Seat and back cushion can be added for child positioning and comfort as needed
  - Wedges can be used to adjust alignment
  - Cushions located at the front-edge of the seat between the distal femurs to ensure hip alignment
  - Can help to prevent a child from sliding out of the chair and keep the legs in abduction
  - Cushion types: flat foam, pressure relief, molded anterior wedged or posterior wedged
- Straps/Belts
  - If cushions do not offer enough support for the child, straps may be needed
  - Straps may be placed at the hips, chest, or thighs
  - Prevents the child from pushing or sliding out of the chair
- Trunk/Lateral Pad
  - Provides additional support if a child has the tendency for scoliosis or their head is flexed in one position
  - Support pads for the head, hip or shoulder blades are available
- Wedge between the knees



- If a child’s legs often cross, a wedge between the knees may be needed to keep them from crossing
- Foot Support
  - A strap or stool may be needed for to ensure the child’s feet are supported and comfortably resting

## Referral

CP chairs are typically prescribed for children with:

- Impaired trunk control in conditions like Cerebral Palsy and Muscular Dystrophy
- Difficulty maintaining a seated position while using hands functionally

## Assessment

Consider collecting the following information when assessing whether a CP chair will be useful:

- What is the child’s ability to maintain...
  - head control?
  - trunk control?
  - an upright position while seated?
  - sitting balance?
- Does the child have some upper extremity control or functional hand use?

## Prescription

To ensure an effective prescription is made, consider the following:

- Age
- GMFCS Level (See page 65 for GMFCS postural aid chart)
- Head and Trunk Control
- Upper extremity and hand function
- Intended use for CP chair (i.e., play, feeding, communication and learning)
- Intended location of use (home, school, etc.)
- Ability to transfer to and from CP chair

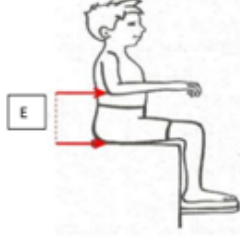
### Measurement Process

Ensure the child is in a seated position and is as upright as possible.

The following measurements should be taken while the child is seated in an upright position:

CP Chair Component	Body Measurements	Photos	Considerations for Sizing
Seat Width (hip width)	Measure widest part of the body when seated	Hip Width (A)	Add 2 inches for easy movement (i.e., if the widest part width is 15 inches than the seat width is: 15+2 = 17 inches)

<b>Footrest Height/Floor to Seat Height (lower leg length)</b>	Measure back of knee to floor (leg length)	<p>Lower Leg Length (B)</p>	Height should be adjusted if cushion is added
<b>Seat Depth (upper leg length)</b>	Measure back of pelvis to back of knee	<p>Upper Leg Length (C)</p>	<p>Subtract one inch to reduce pressure on back of the knee.</p> <p>From this measurement: If we are planning on using a back cushion, then cushion thickness should be added. For example, from back to popliteal fossa is 14 inches, then the depth is: <math>14 - 1 = 13</math> inches. Now if we add 2 inches for the thickness of the back cushion: <math>13 + 2 = 15</math> inches</p>
<b>Back Rest</b>	Measure base to top of head Also measure seat base to top of shoulder	<p>Back Rest (D)</p>	<p>Based on the child's capacity to maintain an upright position.</p> <p>If the child has good head control, then the back support can be until shoulder level</p> <p>If the child has good upper trunk stability, then the height can be up until the angle of the scapula.</p> <p>If a seat cushion will be added, then the height will need to be adjusted. (Suppose the height</p>

			measured from bottom of buttocks to armpit is 17 inch and we are adding 2 inch cushion, then the seat height is: $17+2 = 19$ inches
Arm Rest	With elbows bent at 90 degrees, measure from bottom of buttocks to tip of olecranon process of elbow	Buttocks to elbow height (E) 	Height should be adjusted if seat cushion is added

## Device Preparation

- All CP chairs are customized and built by a carpenter (no standard sizes available)
- Clinicians are to record measurements and decide on the adaptations required
- Adaptations must be given in writing or indicated on the carpenter prescription sheet
- *The carpenter can provide the following, if indicated by the therapist:*
  - Tilting
  - Strap (therapist must provide position of strap)
  - Pommel
  - Cut-out table
  - Any inbuilt laterals
- *Clinicians can then provide:*
  - Straps
  - Wedges
  - Cushions
  - Soft lateral supports

## Fitting and Adjustment

Tips to adjust the CP chair for the child and ensure proper fit:

- Keep in mind that it will take time for the child to adjust to the new device (there may be fear of sitting in the chair).
- Ensure the child is comfortable and do not add in straps right away
- Height of the cut-out table should enable function
- Adding toys onto the table/tray within reach will encourage hand function and independent play

### Seating Positioning

- Ensure that the position of the pelvis, trunk, upper limb, lower limb, and head is symmetrical and in midline



- Ensure the child is seated upright and the position encourages head control
- Lateral supports can be used to stabilize pelvis, head, and trunk
- Ensure correct placement and length of the straps and other adaptations, such as wedges
- Use supports to encourage hip abduction and external rotation and align foot position
- Ensure the hip strap prevents the child from slipping out of chair (particularly for children with spastic diplegia)
- Hip position: 15-30° abduction and external rotation 5-15° (as tolerated)
- Provide supports at thighs and feet as needed
- Anterior support might help to calm the child

## Training for Child and Family

Training should be provided prior to using the CP chair in the following areas:

- Child should gradually be introduced to using the CP chair (increasing period of time gradually)
- Hygiene education
- Positioning and changing position
- Length of time that is recommended to using the CP chair at one time (dependent on activities). Typically, 30-60 minutes at a time
- When it is recommended to use or for which activities
- Consider child's comfort level
- Alternate use with other positions/activities (like using standing frames, floor play)
- Transfers into and out of CP chair
- If the family will not be seeing a therapist regularly, they should be instructed to check the fit and comfort of the CP chair and any adaptations at least every 3 months
- Children should not be in a corner chair unattended

## Follow-up

Considerations for follow-up:

- Inspect the CP chair on a regular basis (during regular visits)
- If a CP chair is provided to non-regular service users, a visual inspection and functional observation should be performed by a clinician at least every 3 months to ensure safe use
- Shorter time intervals may be required depending on frequency of use, place of use and the child's needs and growth/development
- Instructions should be given to parents to check the size, cushion or wedge supports at least every 3 months
- If the child has outgrown postural adaptations, they can be removed
- Encourage parents to bring the CP chair to ASSA, rather than local carpenters, particularly if:
  - The child experiences pain or discomfort
  - There are difficulties safely positioning the child
  - Any part of the chair become wobbly, loose, or damaged
  - The child has grown and the frame needs to be adjusted

## Maintenance and Repairs



Adjustable tray should be cleaned with soap and water on a regular basis. Other surfaces can be wiped down.

Inspect the CP chair during regular visits or at least every 3 months. Check the following components:

- Chair base, pommel or cushions, straps, pads, wedges, and cut-out tray

Replace worn out or damaged parts as needed.

## Adapting, Modifying or Fitting the Product

As a child grows, a larger CP with the proper back height, hip width, and seat depth to support and promote function may be required. Adaptations may need to be added or removed as needed. For example, as a child grows, a back cushion may be needed to adjust for seat depth.

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## Corner Chairs

### Description

- Corner chair with a V-shaped backrest
- Most often used at floor level but can be elevated as a CP chair for table height



### Uses

- For children who cannot maintain a stable upright anti-gravity position
- For children who may need head, trunk, and pelvis support for attaining proper sitting alignment and posture





- Assists with some upper extremity and trunk control by promoting upper extremity midline positioning
- Provides support at the back and sides of the user (lateral supports for the upper trunk)
- Prevents shoulder and scapular retraction
- Provides support for the child in shoulder girdle protraction that tends to decrease extensor spasticity in users with tone problems, such as CP
- Normalizes tone
- Provides postural control and maintains skeletal alignment
- Promotes function as it allows children to use their arms and hands freely to play and explore at either table height or on the floor

### Components

- Chair Base
  - Wide, secure base for stability
  - Floor sitter allows children to relax and extend their legs and interact more easily with others during playtime
- Postural Adaptations (are provided separately)
  - Pommel
    - Rectangular cushions located at the front-edge of the seat between the distal femurs to ensure hip alignment
    - Prevent children from sliding out of the chair
  - Seatbelt or straps
    - Prevents the child from pushing or sliding out of the chair
  - Soft padding or seat cushions (flat or wedged)
  - Cut-out tray
    - Promotes shoulder protraction and symmetrical arm posture
    - Promotes the use of the hands while seated
    - Can be positioned to assist the child to bear weight through the elbows for hand movements

### Referral

Corner chairs are typically prescribed when children who:

- Cannot stabilize themselves against gravity
- Have tone problems and/or inadequate postural control of the head, neck, trunk, and pelvis (Cerebral Palsy, Muscular Dystrophy, and Spinal Abnormalities)

### Assessment

Consider collecting the following information when assessing whether a corner chair will be useful:

- What is the child's ability to maintain...
  - head control?
  - trunk control?
  - an upright position while seated?
- Does the child have some upper extremity control?

### Prescription

To ensure an effective prescription is made, consider the following:



- Age or approximate age range
- Weight
- Environmental factors (adaptability)
- May need corner seat tilted back using an anterior wedge for those with impaired head control

### Measurement Process

Ensure the child is in a seated position and is as upright as possible with their legs extended. The following measurements should be taken:

Corner Chair Component	Body Measurements	Considerations for Sizing
<b>Back Rest or Seat Height</b>	Measure from the base of the chair to the top of head Also measure seat base to top of shoulder	Based on the child's capacity to maintain an upright position. It will help to ensure that the child receives adequate head and neck support  If the child has good head control, then the back support can be until shoulder level. If the child has good upper trunk stability, then the height can be up until the angle of the scapula.  If a seat cushion will be added, then the height will need to be adjusted. (Suppose the height measured from bottom of buttocks to armpit is 17 inch and we are adding 2-inch cushion, then the seat height is: $17+2 = 19$ inches)
<b>Seat Depth</b>	Measure from the back of the heel to ensure that the corner chair is equal to the length of the child's legs in extension	Subtract one inch to reduce pressure on back of the knee.  From this measurement: If we are planning on using a back cushion, then cushion thickness should be added.  For example: if the back to the popliteal fossa measures 14 inches, then the depth is: $14-1= 13$ inches. Now add 2 inches for the thickness of the back cushion: $13+2 = 15$ inches
<b>Seat Width (hip width)</b>	Measure widest part of the body (hip) while seated	Add 2 inches for easy movement (i.e., if the widest part width is 15 inches then the seat width is: $15+2 = 17$ inches)  This measurement is not essential, but will help to adjust the fit for the child

### Device Preparation

- All corner chairs are customized and built by a carpenter (no standard sizes available)
- Clinicians are to record measurements and decide on the adaptations required
- Adaptations must be given in writing or indicated in the carpenter prescription sheet
- *The carpenter can provide the following, if indicated by the therapist:*
  - Tilting
  - Strap (therapist must provide position of strap)
  - Pommel
  - Cut-out table



- Any inbuilt laterals
- *Clinicians can then provide:*
  - Straps
  - Wedges
  - Cushions
  - Soft lateral supports

## Fitting and Adjustment

Tips to adjust the corner chair for the child and ensure proper fit:

- Position of pelvis should be neutral
- Trunk should be upright
- Child should not be leaning to the side or to the front
- Upper limbs should be symmetrical
- Hips should be at 90 degrees flexion (child's bottom should be right to the back of the corner chair and the hips should be maintained at 90 degrees)
- Head should be in midline position
- Strap position (chest and low pelvis). Straps should fasten properly
- Ensure cut-out tray is well placed in front of the child
- Check hip width and seat depth
- Wedge/seat cushion can be used if seat needs to be tilted further
- Child should be comfortable while playing and interacting with others

## Training for Child and Family

Training should be provided prior to using the corner chair in the following areas:

- Child should be gradually introduced to using the corner chair (increasing period of time gradually)
- Hygiene education
- Positioning and changing position
- Length of time that is recommended to using the CP chair at one time (dependent on activities). Typically, 30-60 minutes at a time
- When it is recommended to use or for which activities
- Consider child's comfort level
- Alternate use with other positions/activities (like using standing frame, CP chair)
- Transfers into and out of corner chair
- If the family will not be seeing a therapist regularly, they should be instructed to check the fit and comfort of the corner chair and any adaptations at least every 3 months
- Children should not be in a corner chair unattended

## Follow-up

Considerations for follow-up:

- Inspect the corner chair on a regular basis (during regular visits)
- If a corner chair is provided to non-regular service users, a visual inspection and functional observation should be performed by a clinician at least every 3 months to ensure safe use



- Shorter time intervals may be required depending on frequency of use, place of use and the child's needs and growth/development
- Instructions should be given to parents to check the size, cushion or wedge supports at least every 3 months
- If the child has outgrown postural adaptations, they can be removed
- Encourage parents to bring the corner chair to ASSA, rather than local carpenters, particularly if:
  - The child experiences pain or discomfort
  - There are difficulties safely positioning the child
  - Any part of the chair become wobbly, loose, or damaged
  - The child has grown, and the chair needs to be adjusted

## Maintenance and Repairs

Adjustable tray should be cleaned with soap and water on a regular basis. Other surfaces can be wiped down.

Inspect the corner chair during regular visits or at least every 3 months. Check the following components:

- Chair base, pommel or cushions, straps, pads, wedges, and cut-out tray

Replace worn out or damaged parts as needed.

## Adapting, Modifying or Fitting the Product

As a child grows, a larger corner chair with the proper back height, hip width, and seat depth to support and promote function may be required.

Adaptations may need to be added or removed as needed. Consider the following examples:

- As the child grows, a back cushion may be needed to adjust for seat depth
- If the child has adequate head control, then a CP chair may be prescribed
- If the child still needs lateral support and head support, then an appropriately sized corner chair may need to be prescribed

## References

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# Standing Frames

## Description

- Provides alternative positioning to sitting in a wheelchair by supporting a child in a standing position
- Also known as a stander



## Uses

- Enables safe and stable standing and facilitates postural control in upright and symmetrical position
- Facilitates exploration, play and development in other areas by supporting face-to-face social interaction with peers
- Improves weight bearing on the child's legs
- Breaks up the extensor patterns of tone and reduces spasticity of lower limbs
- Prevents contractures of the hips, knees, or lower limbs
- Prevents retraction of the muscles of the lower limb
- Develops hip stability and maintains hip alignment
- Encourages arm function

## Types of Standing Frames

Type	Description
Vertical Stander	<ul style="list-style-type: none"> <li>• Child is positioned upright</li> </ul>
Prone Stander	<ul style="list-style-type: none"> <li>• Support surface is in front of the child</li> <li>• The child is positioned upright or with a slight forward tilt</li> </ul>
Supine Stander	<ul style="list-style-type: none"> <li>• Support surface is behind the child</li> <li>• The client is positioned supine on the frame and then tilted as far upright as possible (within the child's tolerance level)</li> </ul>
Mobile/Wheeled Stander	<ul style="list-style-type: none"> <li>• Stander has wheels</li> </ul>

Vertical Stander	Prone Stander	Supine Stander



## Adaptational Components

There are a variety of adaptations that can be provided to optimize alignment and function:

- head rests
- shoulder protractors
- chest harness brackets
- trunk laterals
- straps at the chest or waist
- cut-out tray
- hip prompts/pads/straps
- pelvic support
- pommel
- knee supports
- footplates or footrests

## Referral

Standing frames are typically prescribed for children:

- who are trying to pull up to stand by themselves from a low chair
- who are able to sit but unable to stand
- with cerebral palsy
- GMFCS III, IV or V
  - (See page 65 for GMFCS postural aid chart)
- with spinal cord or head injuries, spina bifida, muscular dystrophy

## Assessment

Consider collecting the following information when assessing whether a standing frame will be useful:

- Mobility level
- Neck and trunk control
- Postural control
  - If the child does not have antigravity head control, a supine stander may be more appropriate
  - If the child does have head control, a prone or vertical standing frame would be appropriate
- Range of motion
  - If there are flexion contractures at the hips, knees, or ankles, it may not be possible to position the child in a vertical stander
- Consider space available in the child's home and environments in which the standing frame will be used
- Think about how the child will be able to transfer in and out of the standing frame
- Consider the amount and availability of supervision required
- Consider the child's comfort level and tolerance, as well as which activities the child will participate in while in the stander





### Other Assessment Considerations

- A stander with independent knee blocks and footplates is appropriate for children with asymmetrical contractures and/or leg length discrepancies
- AFOs are recommended for use in the stander to help improve foot contact and protect ankle and foot alignment
- Angle adjustable footplates for use in the stander may accommodate for ankle plantarflexion contractures

### Contraindications and Precautions

- Any condition that does not allow weight bearing (healing fractures for example) is a contraindication
- For individuals with compromised cardiovascular or respiratory systems, close monitoring of circulation and function is necessary to prevent complications (blood pressure, heart rate, orthostatic hypertension)

## Prescription

Considerations for selecting the appropriate stander:

Type	Typically Prescribed For:
<b>Vertical Stander</b>	<ul style="list-style-type: none"> <li>● People who have fairly good balance and trunk control</li> <li>● Providing less support than a prone or supine stander</li> <li>● Providing support at the knees, hips, and lower torso so suitable for children with postural insecurity or who are developing lateral weight-shifting skills</li> </ul>
<b>Prone Stander</b>	<ul style="list-style-type: none"> <li>● Upright social interaction</li> <li>● Improving head and trunk control</li> <li>● Minimizing extensor tone</li> <li>● Pressure relief</li> <li>● Gradual increase in weight-bearing</li> <li>● Better hip extension and alignment</li> <li>● Developing skills in standing and endurance</li> <li>● Children with mild or moderate neuromuscular limitations</li> <li>● Children to gradually adjust to weight bearing</li> </ul>
<b>Supine Stander</b>	<ul style="list-style-type: none"> <li>● Medically involved patients (with significant musculoskeletal weakness)</li> <li>● Children who cannot stand fully upright</li> <li>● When prone standing does not allow optimal positioning</li> <li>● Children who lack the strength or the ability to lift or control the head and shoulders</li> <li>● Gradual progression to an upright position</li> <li>● Upright interaction</li> <li>● Improving head control</li> <li>● Easier transfers</li> </ul>



<b>Mobile/Wheeled Stander</b>	<ul style="list-style-type: none"><li>● Providing maximum access to the environment while standing</li><li>● social interaction</li><li>● independent mobility</li><li>● Improving weight-bearing</li><li>● Improving weight-shifting and postural control</li><li>● Improving trunk control</li></ul>
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## Device Preparation

- All corner chairs are customized and built by a carpenter (no standard sizes available)
- Clinicians are to record measurements and decide on the adaptations required
- Adaptations must be given in writing or indicated in the carpenter prescription sheet
- Rehab specialist will set up the standing frame according to the child
- Rehab specialist will ensure that the child is comfortable and in proper alignment

## Fitting and Adjustment

Tips to adjust the corner chair for the child and ensure proper fit:

- Ensure the standing frame fits correctly, is comfortable and meets the needs of the child to be positioned in an upright standing position
- Ensure the child is standing straight, not leaning forward or slouching
- Ensure that any straps are pulled tightly and securely (across the child's chest and bottom)
- Ensure child's knees are in-line with the knee piece
- Check the material and ensure there is no damage to the device. Check all bolts, screws, and hardware to make sure they are not loose or coming apart
- Check for any friction damages when the child is taken out of the standing frame (high pressure contact areas can cause redness or injury)
- Use postural adaptations as needed
- If child requires AFOs, the child should be using them in the stander

## Training for Child and Family

Training should be provided prior to using the standing frame in the following areas:

- Demonstration is needed for the parents to safely transfer the child into and out of the standing frame (note: a hoist may be needed)
- Supervision depends upon the child's cognitive, motor impairment, age, and engagement level
- Never leave a child unattended while using a standing frame
- Should be used on a level floor and never used on a raised or uneven surface
- Always use all of the position straps if provided
- Allow 1 finger width between a belt and the child
- Hygiene education
- Ensure that the aid is dry before use
- Consider child's comfort level
- Gradually increase the amount of time a child is positioned in the frame when introducing it to the child



- Can increase the time that the child will tolerate it by building 5-minute increments every few days
- The child should be encouraged to stand for 30-45 minutes at a time. Can be repeated throughout the day for different activities
  - If this is not possible given daily routines and activities, break-up the time into shorter segments. This will also help to prevent fatigue
- After the child is taken out of the standing frame, check the child's skin and pay attention to areas of higher-pressure contact or friction (e.g., knee blocks)
- Encourage family to use the standing frame daily by building it into a routine and engage the child in an activity
- If child requires AFOs, encourage the child to use them in the stander
- As the stander is custom built for a specific child, no other child should use it
- If the family will not be seeing a therapist regularly, they should be instructed to check the fit and comfort of the standing frame at least every 3 months

## Follow-up

Considerations for follow-up:

- Inspect the standing frame on a regular basis (during regular visits)
- If a corner chair is provided to non-regular service users, a visual inspection and functional observation should be performed by a clinician at least every 3 months to ensure safe use
- Shorter time intervals may be required depending on frequency of use, place of use and the child's needs and growth/development
- Encourage parents to contact rehab specialists, particularly if:
  - The child experiences pain or discomfort
  - There are difficulties safely positioning the child within the frame
  - Any part of the frame becomes wobbly, loose, or damaged
  - The child has grown, and the frame needs to be adjusted

## Maintenance and Repairs

Tips for maintenance and repairs:

- The stander should be kept clean
- Check all moveable parts at every use and tighten screws if necessary (only do this when child is not in the standing frame)
- Ensure straps and other adaptations remain functional and they are not loose

Replace worn out or damaged parts as needed.

## Adapting, Modifying or Fitting the Product

As the child grows, a larger standing frame to safely support the child in an upright standing position may be required. Adaptations may need to be added or removed as needed.



## References

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## Indications for Prescription of Postural Aids based on GMFCS Level

GMFCS Level	CP Chair	Corner Chair	Standing Frames	Notes
Level I and II				Children at GMFCS I-II typically do not require postural aids
Level III	x	x	x	Standing frames, CP chairs and corner chairs are predominately used in non-ambulant children (GMFCS III-V), but younger children with some independent mobility (GMFCS III) may also benefit from them
Level IV	x	x	x	Children require adaptive seating and standing due



				to limited trunk and pelvic control
<b>Level V</b>	x	x	x	<p>Children are limited in their ability to maintain antigravity head and trunk postures and control arm and leg movements and require support</p> <p>Postural aids should have a tilt-in-space component</p> <p>A wedge may be placed in front of the corner chair to tilt it back</p> <p>A supine stander (reclined back) is recommended</p>

AFO

KAFO

HKAFO

Cock- up splints

Spinal orthoses

Orthoses

GMFCS

Prescription

Chart

# Orthoses

Assistive devices that apply force to support, align, prevent, or correct deformities of the body to enable function

# Ankle- foot orthoses (AFO)

## Description

### Device Overview



An AFO runs around the foot and ankle. This device is used to control and support motion and position of the lower extremity to enable proper positioning and mobility

### Purpose

- Prevention and correction of deformities, such as equinus, pes varus and varus, and Achilles' contractures
- Reduction of inappropriate weight bearing forces
- Assists dorsiflexion and provides stability and reduces deviations during gait
- Provide stable base for movement and reduces potential falls risk
- Reduce impact of spasticity in lower limbs
- Reduce excessive energy for movement and controls for muscular imbalance

### AFO types

There are two main types of AFO: solid AFOs and Hinged AFOs. Prescription depends on the amount of power of the muscles controlling the ankle.

Type	Description
<b>Solid AFO</b> 	<ul style="list-style-type: none"> <li>● Ankle is in a fixed position. Neither plantar flexion nor dorsiflexion is permitted</li> </ul> <p><i>Subtypes</i></p> <ul style="list-style-type: none"> <li>● Solid AFO Fixed at 90°</li> <li>● Solid AFO molded with 5° of dorsiflexion               <ul style="list-style-type: none"> <li>▪ For genu recurvatum</li> </ul> </li> <li>● Solid AFO molded with 5° of plantarflexion               <ul style="list-style-type: none"> <li>▪ For crouched gait</li> </ul> </li> </ul>
<b>Hinged AFO</b> 	<ul style="list-style-type: none"> <li>● Permits voluntary dorsiflexion. Limits plantar flexion beyond 90 degrees (natural)</li> <li>● Can also be free ankle- ankle movement (DF and PF permitted)</li> </ul>

## Referral

### Referral indications for AFO prescription

Characteristics where child may benefit from prescription:

- Excessive knee flexion, hyper pronation, and valgus stress at the knee
- Drop- foot/ dorsiflexor paralysis present
- Ankle and subtalar joint muscle weakness/ paralysis
- Equino/ pes valgus and varus deformities
- Loss of selective motor control in lower limbs
- Abnormal muscle tone/ spasticity present





- Imbalance between muscle agonists and antagonists across joints
- Moderate to high tone in gastrocnemius muscle
- Less than 10 degrees of ankle dorsiflexion with knee in maximum extension

### Common conditions

Conditions that affect the biomechanics or cause neurological impairments of the lower extremities may benefit from AFO for positioning or function:

- Cerebral Palsy
- Spina Bifida
- Muscular Dystrophy

### Contraindications

AFO prescription not beneficial for:

- Fixed deformities impacting the ankle
  - Required ankle joint range of motion not available
- Unstable triplanar alignment of the foot
- Dorsiflexion occurs in foot joints rather than at the ankle joint

Contraindications for hinged AFOs:

- No passive dorsiflexion of ankle
  - AFO could force midfoot joints into dorsiflexion, causing a midfoot break deformity
- Knee flexion contractures or quadriceps weakness
  - Could increase crouched gait
- Gastrocnemius weakness
  - Could increase crouched gait

## Assessment

### Physical assessments and special tests

Assessments to determine need for prescription:

- Ankle ROM
  - Test ankle dorsiflexion with knee extended and flexed
- Muscle strength
- Selective motor control of ankle dorsiflexion
- Gait analysis
- Limb length discrepancy
- Sensation testing
- GMFCS level
  - Level I, II, III, IV or V
  - Purpose of AFO will depend on functional need (See GMFCS chart on page 99)

\*All AFO variations are considered when prescribing the AFOs. Specific needs are addressed during AFO fabrication

## Prescription

### Indication for prescription

Indication for prescription determined by:

- Physical assessment results:



- Passive ROM
- Ankle joint stability
- Gait analysis
- Limb length variation
- Sensory problem
- Poor joint stability
- Any other foot deformity

### Special test findings

Special test results that indicate if child would benefit from a AFO prescription

Special test	Findings
<b>Muscle Power Test</b>	<ul style="list-style-type: none"> <li>● Muscle power is not strictly/ indicating factor for prescription</li> <li>● If muscle power is poor (less than 3), AFO is prescribed to stabilize the ankle joint</li> </ul>
<b>Ankle ROM</b>	<ul style="list-style-type: none"> <li>● TA tightness and limited passive dorsiflexion indicates prescription</li> </ul>
<b>Limb Length Discrepancy</b>	<ul style="list-style-type: none"> <li>● Can be corrected with router raise in AFO</li> </ul>
<b>Sensation Testing</b>	<ul style="list-style-type: none"> <li>● If child has poor tactile sensation, soft padding should be used, and skin procedure should be taught</li> </ul>

### AFO type selection

Assessment findings that indicate prescription of specific AFO type

Assessment findings	AFO selection
<ul style="list-style-type: none"> <li>● TA tightness (limited passive dorsiflexion of ankle)</li> <li>● Ankle can dorsiflex to 90° with knee extended</li> </ul>	Solid AFO
<ul style="list-style-type: none"> <li>● TA tightness (<i>minimum active dorsiflexion is possible but the child walks heel raised</i>)</li> </ul>	Hinged AFO
<ul style="list-style-type: none"> <li>● If the TA tightness is associated with genu recurvatum (<i>Assessed with Silverskiold test</i>)</li> </ul>	85-degree AFO
<ul style="list-style-type: none"> <li>● Instability of hip and knee joint and poor muscle power in lower motor neuron injuries (spina bifida and polio)</li> </ul>	AFO not recommended, KAFO preferred

### Prescription Process

- Referral to orthotist
  - Orthotist will determine the need for either a prefabricated or custom- made AFO

### Device Preparation

- AFOs are developed by an orthotist
- Attach Velcro straps in the appropriate positioning:
  - Forefoot (as needed)
  - Ankle joint
  - Calf- level
- Custom modifications, such as arch support, may be added to a prefabricated AFO as required



## Fitting and Adjustment

AFO supports proper positioning of the lower extremity, preventing discomfort and promoting function

Indicators of good fit

Clinician should check:

Check for:	Description of good fit	Notes about fit
<b>Heel fit</b>	Child's heel fits in AFO heel cup without excess space	<ul style="list-style-type: none"> <li>Space allowing foot movement up and down or side to side can cause blistering or lack of alignment control</li> </ul>
<b>Plantar surface contour</b>	During weight bearing, AFO plantar surface contours to foot	<ul style="list-style-type: none"> <li>Mismatched contour can be uncomfortable</li> </ul>
<b>Metatarsal head width</b>	Metatarsal head width fits comfortably within AFO during weight-bearing	<ul style="list-style-type: none"> <li>If too wide, foot will move into uncorrected position within the AFO (e.g., forefoot abduction)</li> <li>If too small, pinching and redness of medial and lateral metatarsal heads will occur</li> </ul>
<b>If wraparound design: Instep and dorsum</b>	Snug fit over instep and dorsum with "give" for comfort and growth	<ul style="list-style-type: none"> <li>Should have mildly compressive wrap with some give/ bounce when pressing downward on instep</li> <li>Too tight causes discomfort and redness</li> <li>Too loose causes diminished alignment and support</li> </ul>
<b>Toe- shelf length</b>	During weight bearing, toe- shelf length should have ¼- ½ inch space for comfort and growth allowance	<ul style="list-style-type: none"> <li>Space required for child to grow</li> <li>Too much space could contribute to problems with tripping</li> </ul>
<b>Contact points with bony prominences: navicular, base of fifth metatarsal and malleolar bones</b>	Extra space centered at apex of the bony prominence and supporting contour	<ul style="list-style-type: none"> <li>Poor fit causes rubbing and skin breakdown</li> </ul>
<b>Brace height</b>	When child crouches on floor or moves from sit to stand, proximal edge of brace does not dig into calf belly, back of knee or thigh	<ul style="list-style-type: none"> <li>AFO height between apex of calf belly and 1 inch below fibular head</li> <li>Height depends on child. Taller height needed for child with knee hyperextension or extreme pronation or supination. Lower height for child where primary issue is toe walking or excess plantarflexion</li> </ul>
<b>If designed to allow tibia to move freely into dorsiflexion: Width of leg portion</b>	Width allows for tibia to move freely during dorsiflexion	
<b>Leg width</b>	Width is wide enough to allow for comfort over long periods of time, but fits closely enough to help with alignment improvement	<ul style="list-style-type: none"> <li>Excess brace decreases alignment correction</li> <li>Too fit is uncomfortable to wear</li> </ul>

<b>Brace trimlines</b>	Comfortable fit and room for expected movements	<ul style="list-style-type: none"> <li>• There should be no pinching or digging. Check for redness at trim-edges</li> <li>• Edges should allow for movement during gait stages</li> </ul>
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### AFO fit checklist

Put AFO on child. In both seated and weight bearing positions, which:

- Indicators of good fit
- Positioning of straps
  - Forefoot
  - Ankle joint
  - Top of the AFO
- Pain or discomfort
  - Ask the child and note red marks or pinching of skin at edges or top of AFO. Extra padding or enlarging of the brace may be required.
- Adjustability
- Sensory issues

### Adjustments for poor fit

- Valgus of the foot
  - Arch support insert may be required at the in-step to prevent valgus
- Issues with fit
  - Trimming, heating, or remolding may be required

## Training for child and family

### Training checklist for family

Provide families with:

- Instructions for putting on and removing
- AFO hygiene
- Time and duration of use
  - When should the child be wearing the AFO
  - How long should the child wear the AFO for (Dependent on the AFO purpose)
- Skin checks for irritation, redness, or blisters
  - Note edges of the foot and on the heel
- Maintenance process

### Instructions for putting on the AFO

<p><b>Step 1: Position child</b></p> <ul style="list-style-type: none"> <li>• Child sits with hips and knees bent           <ul style="list-style-type: none"> <li>▪ Knee bent at 90 degrees</li> <li>▪ AFO should never put on with leg straight</li> </ul> </li> <li>• Stretch ankle muscles</li> <li>• Put on sock and smooth out wrinkles</li> </ul>	
<p><b>Step 2: Identify the left and right orthotic</b></p> <ul style="list-style-type: none"> <li>• Look at the bottom of the foot and note the shape           <ul style="list-style-type: none"> <li>▪ The arch edge is positioned towards body mid- line and</li> </ul> </li> </ul>	

<p>straight edge is the outer edge</p> <ul style="list-style-type: none"> <li>▪ Inner boarder can be identified as longer edge for the big toe</li> </ul> <ul style="list-style-type: none"> <li>● Strap directions             <ul style="list-style-type: none"> <li>▪ Straps pull towards the outside of the AFO</li> </ul> </li> </ul> <p><i>Tip:</i> Mark the left and right orthotic with a pen</p>	
<p><b>Step 3: Place foot in AFO</b></p> <ul style="list-style-type: none"> <li>● Undo all straps and pulled back from inner AFO</li> <li>● Position heel firmly on the toe place of the AFO, then slide down and back             <ul style="list-style-type: none"> <li>▪ Ensure foot is fully seated</li> </ul> </li> </ul>	
<p><b>Step 4: Fasten straps</b></p> <ul style="list-style-type: none"> <li>● Use thumb to keep heel firmly planted in place</li> <li>● First secure ankle strap</li> <li>● Secure remaining straps second</li> <li>● Pull sock up to remove wrinkles</li> </ul>	
<p><b>Step 5: AFO Check</b></p> <ul style="list-style-type: none"> <li>● Sock has no wrinkles</li> <li>● Straps are proper tightness</li> <li>● No space at the back of the heel</li> <li>● Tips of toes are just inside of the heel place</li> </ul>	
<p><b>Note:</b></p> <ul style="list-style-type: none"> <li>▪ Always wear a sock to protect the skin</li> <li>▪ AFO should always be worn with a sandal or shoe             <ul style="list-style-type: none"> <li>○ Child should never walk with AFO without footwear</li> <li>○ Footwear should be 1-2 sizes larger than regular shoe size for AFO to fit</li> </ul> </li> </ul>	

### Time and location of use

*\*Depends on their level of function and the purpose of the AFO*

- For children with ambulatory mobility (with or without walking aids)
  - Day time wear to support activities like walking, running, and jumping
- For children with high spasticity and tone
  - Night and daytime wear to maintain positioning to prevent contractures and deformities

### AFO Hygiene

- Regular cleaning with damp cloth, soap, and water
- AFO should be dried completely before wearing
- Do not wet straps to clean
- Do not leave AFO in water to soak or in high heat (example: Do not leave in direct sunlight)
  - High heat can cause the AFO to lose its shape



## Follow-up

Follow-up procedure

Children not seeing a clinician regularly should follow up:

- Within one month of initial fitting of AFO
  - Follow up every 6 months

Follow up sessions

During follow-up sessions, check:

- If AFO is too small
- Worn or broken straps or padding

## Maintenance and Repairs

Monitoring for signs of wear and tear

The following signs indicate that an AFO may require maintenance or replacement for safe use

Orthotic component	Monitor for:
Plastic components	<ul style="list-style-type: none"> <li>● Check for areas of stress. Stress marks appear white within the plastic. Common stress locations include areas of moveable joints and strap attachments</li> <li>● White marks alone are okay, but orthotic requires maintenance if cracks appear.</li> </ul>
Straps	<ul style="list-style-type: none"> <li>● Check for bends or tears</li> <li>● If worn out, straps will need to be replaced</li> </ul>
Joints and hinges	<ul style="list-style-type: none"> <li>● Should move freely without catching or making sounds</li> <li>● Locks should function normally and remain secure when weight is applied</li> </ul>

Maintenance process

Serviced by an orthotist at the orthotic centre

## Adapting, Modifying or Fitting the Product

Child growth and adaptation

Monitor for fit as the child grows

- Indications AFO is too small:
  - AFO becomes too tight
  - Toes exceed the toe-box
  - Appearance of red marks or blisters
  - Complains of pain or unwillingness to weight-bear (if applicable)
- If too small, refer to orthotic centre for adjustment or replacement

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# Knee Ankle Foot Orthosis (KAFO)



## Description

### Device Overview

A KAFO assists with lower limb instability due to muscle weakness, paralysis, or musculoskeletal problems. KAFO spans the entire leg, stabilizing the knee, ankle and foot joints and assisting the muscles of the leg

### Purpose

- Provides stability to the knee, ankle, and foot during weight bearing
- Prevents or corrects deformity
  - Prevents hamstring contracture by maintaining knee extension
  - Corrects knee deformities, such as genu varum, valgum and recurvatum
    - For genu valgum, a single, upright is recommended on the medial or lateral side of the leg, depending on if varus or valgus
    - For recurvatum, adjustment knee control- popliteal interface used
- Improves gait efficiency
- Increases base of support and facilitates training

### KAFO types:

KAFO type	Description
Hinged knee KAFO	Provides knee stability while allowing for knee flexion for dynamic activities like sitting
Rigid KAFO	Maintaining knee in extension. Only used for static positions requiring joint stability.

## Referral

### Referral indications for KAFO prescription

Characteristics suggesting benefit from prescription:

- Quadriceps and hip extensor weakness (where hip extension and joint stability is poor)
- Hamstring tightness (Flexed Knee)

### Common conditions

Conditions that affect the biomechanics or cause neurological impairments of the lower extremities may benefit from positioning for function:

- Muscular Dystrophy
- Poliomyelitis
- Spinal cord injury
- Cerebral palsy
- Peripheral nerve injuries of the lower limb
- Deformed knee

### For children with cerebral palsy:

- Prescribe AFOs rather than KAFOs to allow child to functionally develop active hip/knee extensor control (quadriceps) in standing



- Prescribe long leg splints and standers if support is required for prolonged standing.

## Assessment

### Physical assessments and special tests

Assessments used to determine need for prescription:

- Muscle power
- Knee and ankle joint range of motion
  - Gastrosoleus tightness: with knee extended and knee flexed at 90 degrees.
- Sensory test
- Hamstring tightness
  - Hamstring flexibility (SLR or popliteal angle)
- GMFCS level
  - Level I, II, III, IV or V
  - Purpose of KAFO will depend on functional need (See GMFCS chart on page 99)

## Prescription

### Child factors

Characteristics to consider for prescription:

- Stability of hip and pelvic joint muscles
  - Low stability indicates prescription required
- If KAFO is appropriate for weightbearing
- Mobility
  - Rigid KAFO is not appropriate for walking as knee flexion is limited
    - Leads to abnormal hip hiking
  - Children requiring knee and ankle support should use both an AFO and knee brace rather than a KAFO

### KAFO type selection

Indications for which KAFO type should be selected

KAFO type	Indication for selection
Hinged knee KAFO	<ul style="list-style-type: none"> <li>● Diagnosis of spina bifida or polio</li> <li>● Used when stability of the knee joint is a priority</li> </ul>
Rigid KAFO	<ul style="list-style-type: none"> <li>● Diagnosis of cerebral palsy where child is in a static sitting, standing, or lying position for long periods of time</li> <li>● Hamstring tightness with limited active knee extension           <ul style="list-style-type: none"> <li>▪ Posterior tube splint or knee gaiters can be used</li> </ul> </li> </ul>

### Prescription Process

- Refer to the orthotist
  - Orthotist will determine the need for either a prefabricated or custom- made KAFO



## Device Preparation

- KAFO's are developed by an orthotist
- Attach Velcro straps in the appropriate positioning:
  - Forefoot (as needed)
  - Ankle joint
  - Calf- level
- Custom modifications may be made to components of prefabricated KAFO, as required.

## Fitting and Adjustment

### Goal when fitting KAFO

Proper positioning of the lower extremity, preventing discomfort and promoting function

### KAFO fit checklist

Put KAFO on child. In both seated and weight bearing positions, check:

- Positioning of the straps
- Pain or discomfort
  - Ask the child and note any red marks or pinching of skin. Extra padding or enlarging of the brace may be required.
- Bearable (light weight)
- Unwanted pressure spots
- Weight bearing equally on both sides
- Height of the thigh piece
  - Should not come up too high into the groin area

## Training for child and family

### Training checklist for family

Provide families with the following:

- Instructions for putting on and removing
- KAFO hygiene
- Time and duration of use
  - When should the child wear the KAFO
  - How long should the child wear the KAFO for
- Skin checks for irritation, redness, or blisters
- Maintenance process

### Instructions for putting on the KAFO

- Identify left and right KAFOs
  - Shorter and more prominent boarder positioned towards the body midline. The straighter and longer edge aligned with the outside of the body



- Lie the KAFO on a flat surface
- Place child's leg into the orthosis
- Attach all fasteners and tighten
  - Apply straps while lying down and then tighten when standing

### KAFO Hygiene

- Regular cleaning with damp cloth, soap, and water
- KAFO should be dried completely before wearing
- Do not wet straps to clean
- Do not leave KAFO in water to soak or in high heat (example: Do not leave in direct sunlight)
  - High heat can cause the KAFO to lose its shape

### Follow-up

#### Follow-up procedure

Children not seeing a clinician regularly should follow up:

- Within one month
  - Additional follow up every 6 months

#### Follow up sessions

Check for:

- Signs KAFO is too small
- Worn or broken straps or padding
- Child may need to be prescribed a larger KAFO once they outgrow their current one

### Maintenance and Repairs

Monitoring for signs of wear and tear

The following signs indicate that an KAFO may require maintenance or replacement for safe use

Orthotic component	Monitor for:
<b>Plastic components</b>	<ul style="list-style-type: none"> <li>● Check for areas of stress. Stress marks appear white within the plastic. Common stress locations include areas of moveable joints and strap attachments</li> <li>● White marks alone are okay, but orthotic requires maintenance if cracks appear.</li> </ul>
<b>Straps</b>	<ul style="list-style-type: none"> <li>● Check for bends or tears</li> <li>● If worn out, straps will need to be replaced</li> </ul>
<b>Joints and hinges</b>	<ul style="list-style-type: none"> <li>● Should move freely without catching or making sounds</li> <li>● Locks should function normally and remain secure when weight is applied</li> </ul>



Maintenance process

Worn out or broken AFO needs to be serviced by an orthotist at the orthotic centre

## Adapting, Modifying or Fitting the Product

Child growth and adaptation

Monitored for fit as child grows

- Indications that an KAFO is too small:
  - Too tight at leg/thigh, or too short in length
  - Knee joint no longer at appropriate level
  - Toes exceed the end of the foot plate
  - Appearance of red marks or blisters
  - Complaints of pain or unwillingness to weight- bear (if applicable)
- If the KAFO is too small, refer to orthotic centre for adjustment or development of a new KAFO

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# Hip Knee Ankle Orthosis (HKAFO)

## Description

### Device Overview

An HKAFO has a pelvic band that provides support and correction to the hip, knee, ankle, and foot. Pelvic band is bracketed to at least one KAFO. Often built with the option to be locked or unlocked at the hip and knee joint, depending on standing and mobilization needs, especially when goal is prevention of contractures of the hips, knees, and ankles

### Purpose

- Allows for hip flexion and extension only. Controls rotational movement
  - Gait is possible with use of forearm crutches



- Improves posture, body alignment and balance when standing
- Controls during gait in hip muscles are weak
  - Prevents hip abduction, adduction, and rotation
- Increases lumbar spine movements
- Increases bone and muscle strength
- Promotes independence and self- esteem

#### HKAFO components

- Pelvic band
- Hip joint
- Extension of the KAFO

## Referral

#### Referral indications for HKAFO prescription

- Weakness and instability of the lower limbs

#### Common conditions

Conditions that affect the biomechanics or cause neurological impairments of the lower extremities may benefit from positioning for function:

- Spina Bifida
- Spinal cord injury
- Muscular Dystrophy

#### *For children with cerebral palsy:*

- Do not prescribe an HKAFO

## Assessment

#### Physical assessments and special tests

Assessments to determine prescription need:

- Muscle Power
  - Spinal, hip, knee, and ankle
- Lower limb joint ROM
- Balance test
- Endurance
- Vitals
- Sensory
- Type of gait
- Functional dependence (BADL/ IADL)

## Prescription



## Indications for prescription

Factors indicative of prescription need

Factors to consider	Assessment results:	Prescription indication:
<b>Hip rotation control</b>	Absent/poor hip rotation control and presence of hip instability in anterior-posterior and lateral planes.	Prescribe HKAFO in absence of hip rotation control (if joint is locked or unlocked)
<b>Deformity</b>	-Foot or ankle deformities (calcaneovalgus, drop foot, equinus, planovalgus) -Knee flexion deformity or genu recurvatum -Hips hyperextended or flexion deformity	Prescribe HKAFO if the feet can be passively placed in a plantigrade position and hips and knees attain full or near full extension.
<b>Sensory issues (touch and proprioception)</b>	If the child has spina bifida or a spinal injury, may have sensory deficits in the lower extremities or trunk. Check skin integrity.	Prescribe HKAFO if the child has skin integrity.
<b>Lumbosacral mobility</b>	-Assess lumbar flexion/ extension, lateral flexion, and rotation. -Check for lumbar kyphosis or scoliosis	Prescribe HKAFO if child can be fitted without incurring skin breakdown in low back
<b>Type of gait</b>	-Inability to stand or ambulate KAFOs only. -Poor ankle/hip/knee control -With ankles/knees/hips supported, is the child able to stand or take steps with circumduction or swing-through gait with a walker	Prescribe HKAFO if child can stand or take steps with circumduction or swing-through/ swing- to gait with walker or forearm crutches

## Prescription Process

- Refer to the orthotist
  - Orthotist will determine the need for either a prefabricated or custom- made HKAFO

## Device Preparation

- HKAFO's are developed by an orthotist
- Attach Velcro straps in the appropriate positioning:
  - Forefoot (as needed)
  - Ankle joint
  - Calf- level

## Fitting and Adjustment

### Goals when fitting an HKAFO

Proper positioning of the lower extremity, preventing discomfort and promoting function as determined

### HKAFO fit checklist

Put HKAFO on child. In both seated and weight bearing positions, check:





- Material accurately contoured to the body
- Proper distribution of forces
- Less weight
- Positioning of straps, suspension, and accessory attachments

#### Areas to check for proper fit and HKAFO sizing

- Foot length
- Medial and lateral heights of ankle, knee, and hip joints
- Comfort of pelvic band
- Antero- posterior depth of ankle at malleolar level
- Mid- calf circumference
- Medial and lateral heights of overall HKAFO
- Mid- thigh circumference

#### Process for poor fit

- Trimming, padding, heating, or remolding by the orthotist to adjust

## Training for child and family

#### Training checklist for family

Provide families with the following:

- Instructions for putting on and removing
- HKAFO hygiene
- Time and duration of use
  - When should the child wear the HKAFO
  - How long should the child wear the HKAFO for
- Skin checks for irritation, redness, or blisters
- Gait training (to be done by therapists)

#### Instructions for putting on the HKAFO

1. Open all straps
2. Place devices on flat, stable surface
3. Unlock all knee and hip joints of the HKAFO
4. Apply full length socks to child
5. Gently lay child into the orthosis
6. Check to ensure child's heels are completely seated within the orthosis
7. Secure all fasteners
  - a. Start at the feet first and work upwards
8. Lock hip and knee joints
9. Lift child and place in walker or assisted standing area

#### HKAFO hygiene

- Regular cleaning with damp cloth, soap, and water
- HKAFO should be dried completely before wearing
- Do not wet straps to clean
- Do not leave HKAFO in water to soak or in high heat (ie, do not leave in direct sunlight)



- High heat can cause the HKAFO to lose its shape

## Follow-up

Follow-up procedure

Children not seeing a clinician regularly should follow up:

- Within one month
  - Additional follow up is every 6 months

Follow up sessions

Check for:

- Signs HKAFO is too small:
- Worn or broken straps or padding

## Maintenance and Repairs

Monitoring for signs of wear and tear

The following signs indicate that an HKAFO may require maintenance or replacement for safe use

Orthotic component	Monitor for:
Plastic components	<ul style="list-style-type: none"><li>● Check for areas of stress. Stress marks appear white within the plastic. Common stress locations include areas of moveable joints and strap attachments</li><li>● White marks alone are okay, but orthotic requires maintenance if cracks appear.</li></ul>
Straps	<ul style="list-style-type: none"><li>● Check for bends or tears</li><li>● If worn out, straps will need to be replaced</li></ul>
Joints and hinges	<ul style="list-style-type: none"><li>● Should move freely without catching or making sounds</li><li>● Locks should function normally and remain secure when weight is applied</li></ul>

Maintenance process

Serviced by an orthotist at the orthotic centre

## Adapting, Modifying or Fitting the Product

Child growth and device adaptation

Monitor for fit as the child grows

- Indications that a HKAFO is too small:
  - HKAFO too tight at leg/thigh or hip/pelvic level
  - HKAFO too short in length
  - Hip or knee joint no longer at appropriate level
  - Pelvic band too tight
  - Toes exceed the foot plate
  - Appearance of red marks or blisters
  - Complaints of pain or unwillingness to weight- bear (if applicable)
- If too small, refer to the orthotic centre for adjustment or development of a new HKAFO



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# Cock up splint

## Description

### Device Overview

A cock-up splint immobilizes the hand in a position of function. Typically, the wrist in dorsal extension

### Purpose

- Stretches to maintain or increase range of motion in joints with contractures or high tone
- Maintain functional positioning with spastic or low tone muscles
- Immobilize and protect the wrist during healing of an injury to the bone or soft tissues in the wrist or hand.
- Decrease pain

### Cock up splint types

Type	Purpose
<b>Static cock- up splint</b>	<ul style="list-style-type: none"> <li>● Used as a resting splint</li> <li>● Supports functional use of the hand through supported positioning in wrist extension</li> <li>● Correction of deformity</li> <li>● Prevention of further deformity</li> <li>● Prevention of soft tissue contracture</li> <li>● Substitution of lost motor function</li> <li>● Aiding in fracture alignment and wound healing</li> </ul>
<b>Dynamic cock- up splint</b>	<ul style="list-style-type: none"> <li>● Supports functional use of the hand through supported positioning</li> <li>● Substitution of lost motor function</li> <li>● Correction of a deformity</li> <li>● Control of motion</li> <li>● Aiding in fracture alignment and wound healing</li> </ul>
<b>Full hand cock- up splint</b>	<ul style="list-style-type: none"> <li>● Used as a resting splint</li> <li>● Correction of deformity</li> <li>● Prevention of further deformity</li> <li>● Prevention of soft tissue contracture</li> <li>● Substitution of lost motor function</li> <li>● Aiding in fracture alignment and wound healing</li> </ul>

## Referral

### Referral indications for prescription

Upper extremity characteristics that may benefit from prescription:

- Spasticity or high tone (cerebral palsy)
- Contractures
- Tendonitis
- Wrist pain
- Wrist strain
- Fractures
  - Distal forearm and wrist fractures



- Soft tissue hand/wrist injuries- sprain carpal tunnel night splints etc.
- 2<sup>nd</sup>-5<sup>th</sup> metacarpal
- Radial nerve palsy
- Boxer’s fracture
- Distal radial fracture
- Distal ulnar fracture

**Common conditions**

For children with spastic hemipelagic or quadriplegic cerebral palsy:

- Cock up splints can support positioning of the hand in functional position for high spasticity and tone

**Contraindications**

Do not prescribe for conditions in upper extremity:

- Circulatory problems
- Edema
- Redness or blisters

**Assessment**

**Functional assessments**

To determine need for prescription:

- Muscle tone
  - Note if wrist/ hand is flaccid or spastic
- Passive range of motion wrist, thumb, and finger joints
  - Elbow flexion and extension
  - Forearm pronation and supination
  - MCP, PIP and DIP flexion and extension
  - Thumb opposition and abduction
- Motor control
- Active elbow flexion and extension, forearm pronation and supination
- Active MCP, PIP and DIP flexion and extension
- Active thumb opposition and abduction
- Ability to actively extend wrist while grasping
- Hand use for ADLs and writing ability (functional use of hand)
- Fine motor ability

**Prescription**

Indications for prescription

Factors and assessment results indicating prescription

Assessment finding	Prescription recommendation
Wrist and finger tightness where passive movement is limited or requires effort	Static cock up splint
Wrist and finger flexor tightness where finger flexion function is only limited by wrist flexion	Static cock up splint
Wrist drop where only wrist extensor muscles are affected	Dynamic splint



Inability to extend wrist (less than 20 degrees)	Cock- up splint required
Wrist and hand joint contracture	Static cock up splint

### Indications for type selection

Depends on the type of injury or impairment, or the functional goals

Type	Appropriate for:
<b>Static cock- up splint</b>	<ul style="list-style-type: none"> <li>• Wrist injuries/ fractures requiring immobilization or rest</li> <li>• Spasticity, contractures, or high tone in wrist</li> <li>• Low tone in wrist</li> </ul>
<b>Dynamic cock- up splint</b>	<ul style="list-style-type: none"> <li>• Extensor or flexor muscle group weakness, low tone or paralysis requiring assistive pulling in one direction for motion</li> </ul>
<b>Full hand cock- up splint</b>	<ul style="list-style-type: none"> <li>• Hand/ wrist injuries/ fractures requiring immobilization or rest</li> <li>• Spasticity, contractures or high tone in wrist and hand</li> <li>• Low tone in wrist and hand</li> </ul>

### Prescription Process

- Refer to the orthotist
  - Orthotist will determine the need for either a prefabricated or custom- made splint

### Device Preparation

None required

### Fitting and Adjustment

#### Goals when fitting a cock up splint

Proper positioning of the upper extremity, preventing discomfort and promoting function

#### Cock up splint fit checklist

- Sizing
- Contour
  - No gaps and the wrist and hand are held the correction position
- Extension of the splint  $\frac{2}{3}$  down forearm towards elbow
- Proper joint range of motion as allowed by the splint
  - Example: MCP flexion in static cock- up splint
- Good circulation and no pinch points or red marks

### Training for child and family

#### Training checklist for family



Provide families with:

- Instructions for putting on and removing
- Splint hygiene
- Time and duration of use
  - When should the child wear the splint
  - How long should the child wear it for
- Skin checks for irritation, redness, or blisters

Instructions for putting on a cock up splint

1. Correctly position the splint
  - The hand portion should face upwards with thumb oriented towards body midline



2. Place the hand in the splint
  - Palm placed downwards into the splint



3. Secure straps
  - Check for circulation and red markers

Cock up splint hygiene

- Fabric splint:
  - Remove straps and metal pieces (if applicable)
  - Wash material in soap and water
  - Dry
- Rigid splint
  - Regular cleaning with damp cloth, soap, and water
  - Splint should be dried completely before wearing
  - Do not wet straps to clean
  - Do not leave splint in water to soak or in high heat (ie, do not leave in direct sunlight)
    - High heat can cause the splint to lose its shape

## Follow-up

Follow- up procedure

Children not seeing a clinician regularly:

- Every 3-6 months
- When child splint is too small





## Follow up sessions

During follow- up sessions, check:

- If splint is too small:
  - Complaints of pain
  - Appearance of red marks
- Wear and tear
  - Worn or broken straps or padding
  - White marks or cracks in plastic
  - Tears in the fabric
- Functional use of the splint
  - Questions to ask:
    - Is the child wearing the splint?
      - If no, then why?
    - When is the child wearing the splint?
    - What activities is the child wearing the splint for?
    - Is the splint supporting hand performance?
  - *NOTE:* If the child is not wearing the splint as recommended, education, splint adjustments or alternative assistive devices may be required.

## Maintenance and Repairs

Monitoring for signs of wear and tear

The following signs indicate that a cock up splint may require maintenance or replacement for safe use

Orthotic component	Monitor for:
<b>Plastic components</b>	<ul style="list-style-type: none"> <li>● Check for areas of stress. Stress marks appear white within the plastic. Common stress locations include areas of moveable joints and strap attachments</li> <li>● White marks alone are okay, but orthotic requires maintenance if cracks appear.</li> </ul>
<b>Straps</b>	<ul style="list-style-type: none"> <li>● Check for bends or tears</li> <li>● If worn out, straps will need to be replaced</li> </ul>
<b>Joints and hinges</b>	<ul style="list-style-type: none"> <li>● Should move freely without catching or making sounds</li> <li>● Locks should function normally and remain secure when weight is applied</li> </ul>

Maintenance process

Serviced by the orthotic centre at ASSA or by an orthotist

## Adapting, Modifying or Fitting the Product

Child growth and adaptation

- Indications that a cock up splint is becoming too small:
  - Splint is too tight
  - Appearance of red marks on skin
  - Complaints of pain



- If too small, refer to orthotist for adjustment or development of a new splint

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# Spinal Orthoses


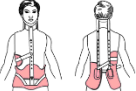




## Description

### Device Overview

A spinal orthosis restricts motion in a segment of the spine. This orthosis can unload forces to a specific spinal area, provide endpoint control or alleviate pressure, while also providing a psychological reminder to restrict or slow movement

### Spinal orthosis types

There are 3 types of spinal orthoses, with variations within each:

Type	Variations	Purpose	
<b>Lumbosacral orthosis</b>		<ul style="list-style-type: none"> <li>● Immobilizing and supporting lumbar and sacral spine</li> </ul>	
<b>Thoracolumbosacral orthosis</b>  4 variations: <ul style="list-style-type: none"> <li>● Milwaukee Brace (CTLSO)</li> <li>● Boston Brace</li> <li>● Wilmington Brace</li> <li>● Charleston bending Brace</li> </ul>	<b>Milwaukee Brace (CTLSO)</b> 	<ul style="list-style-type: none"> <li>● Immobilizing and supporting thoracic, lumbar, and sacral spine</li> <li>● To correct spinal deformities</li> <li>● Designed to stop the progression of scoliosis</li> </ul>	
	<b>Boston Brace</b>		
	<b>Wilmington Brace</b> 		
	<b>Charleston bending Brace</b> 		
<b>Cervical orthosis</b>  5 variations: <ul style="list-style-type: none"> <li>● Soft and hard collars</li> <li>● Philadelphia collar</li> <li>● Sterno- occipital mandibular immobilization device (SOMI)</li> <li>● Minerva brace</li> <li>● Halo</li> </ul>	<b>Soft and hard collars</b>	<ul style="list-style-type: none"> <li>● Immobilizing and supporting the cervical spine</li> </ul>	
	<b>Philadelphia</b> 		
	<b>Sterno- occipital mandibular immobilization device (SOMI)</b> 		
	<b>Halo</b>		



## Referral

### Referral indications

Presence of the following characteristics suggest that a child may require a spinal orthosis prescription:

- Lower back pain
- Spondylosis
- Spondylolisthesis
- Degenerative disc diseases
- SI joint pain
- Recent lumbar spinal surgery
- Scoliosis
- Kyphosis
- Osteoporosis
- Herniated disc
- Spinal fracture
- Cervical sprains and strains
- Stable fracture at cervical level
- Recent surgery at cervical level
- Herniated disc

### Referral process

If need for spinal orthosis is suspected, refer to a physician or orthopedic surgeon for assessment and prescription

## Assessment

Performed by orthopedic physician

## Prescription

### Indications for spinal orthosis type

Specific impairments or injuries indicates type of spinal orthosis required. Selection is determined by physician

Type	Indications for prescription
<b>Lumbosacral orthosis</b>	<ul style="list-style-type: none"> <li>● Lower back pain</li> <li>● Spondylosis</li> <li>● Spondylolisthesis</li> <li>● Degenerative disc diseases</li> <li>● SI joint pain</li> <li>● Recent lumbar spinal surgery</li> </ul>
<b>Thoracolumbosacral orthosis</b>	<ul style="list-style-type: none"> <li>● Scoliosis</li> <li>● Kyphosis</li> <li>● Osteoporosis</li> <li>● Herniated disc</li> <li>● Spinal fracture</li> </ul>
<b>Cervical orthosis</b>	<ul style="list-style-type: none"> <li>● Cervical sprains and strains</li> <li>● Stable fracture at cervical level</li> <li>● Recent surgery at cervical level</li> <li>● Herniated disc</li> </ul>



## Prescription Process

Prescription determined by physician or orthopedic surgeon

## Device Preparation

Not required

## Fitting and Adjustment

Goals when fitting a spinal orthosis

Protection and support of spine, preventing discomfort and promoting safe function

Spinal orthosis fit checklist

Put orthosis on child. In supine and upright positions, check for:

- Pain or discomfort
- Height and width of orthosis
  - Watch orthosis doesn't come up higher than axilla or sit too low on the hips
- Adjustability
- Sensory issues

## Training for child and family

Training checklist for family

Provide families with:

- Instructions for putting on and removing
- Orthosis hygiene
- Time and duration of use
  - When should the child wear the orthosis
  - How long should the child wear the orthosis for
- Skin checks for irritation, redness, or blisters
- When to follow up with physician

Instructions for putting on a spinal orthosis

Each type may come with instructions for how to properly put on. Follow manufacturer instructions as provided



<b>Lumbosacral Orthosis</b>	<p><i>NOTE:</i> Child should wear a shirt under orthosis to protect skin</p> <p>Steps:</p> <ul style="list-style-type: none"><li>● Loosen straps<ul style="list-style-type: none"><li>○ Loosen straps at front of orthosis</li></ul></li><li>● Position the orthosis on the child<ul style="list-style-type: none"><li>○ Back is centered with spine</li><li>○ Lumbar curve of insert matches curve of spine</li></ul></li><li>● Fasten straps</li><li>● Tighten the straps<ul style="list-style-type: none"><li>○ Bring the opposite straps together at the same time</li></ul></li><li>● Check positioning<ul style="list-style-type: none"><li>○ Ensure back is centered on spine</li><li>○ Front should be centered as well</li></ul></li></ul>
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<b>Thoracolumbar orthosis</b>	<p><i>NOTE:</i> Child should wear a shirt under orthoses to protect skin</p> <p>Steps:</p> <ul style="list-style-type: none"><li>● Wrap the orthosis around the child<ul style="list-style-type: none"><li>○ Spread open at the bottom of the front opening</li><li>○ Slide opening over one hip</li><li>○ Reach around and pull the orthosis around the child</li><li>○ Ensure all straps are outside of the plastic girdle</li></ul></li><li>● Check positioning<ul style="list-style-type: none"><li>○ Orthosis is not twisted and is facing straight forward</li><li>○ Opening is in the middle of the child's front. Cut out at the back is centered at crease of the buttocks</li><li>○ The waist roll sits at the waist, just above hip bones</li></ul></li><li>● Secure straps<ul style="list-style-type: none"><li>○ Attach the middle strap first, then the bottom strap and then the top strap</li></ul></li><li>● Tighten the orthosis<ul style="list-style-type: none"><li>○ May be easiest while child is lying down</li></ul></li><li>● Pull down under shirt<ul style="list-style-type: none"><li>○ Pull extra cloth at the bottom and top of orthosis to smooth</li></ul></li><li>● Ensure orthosis straps are snug<ul style="list-style-type: none"><li>○ Will shift and cause skin problems if loose</li></ul></li></ul>
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<b>Cervical Orthosis</b>	<p>Steps:</p> <ol style="list-style-type: none"><li>1. Keep head and neck in a straight line (neutral position)</li><li>2. Position the orthosis<ul style="list-style-type: none"><li>▫ "Dip" of the collar upwards and to the front; Velcro towards the back</li></ul></li><li>3. Position orthosis<ul style="list-style-type: none"><li>▫ Rest chin in the dip of the collar<ul style="list-style-type: none"><li>▪ Top edge sits where chin meets the neck</li></ul></li><li>▫ Slide each side of the collar around the back</li><li>▫ Attach Velcro</li></ul></li><li>4. Check fit<ul style="list-style-type: none"><li>▫ Collar should be snug</li></ul></li></ol>
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	<p>5. Collar adjustment</p> <ul style="list-style-type: none"> <li>▫ With child sitting up: <ul style="list-style-type: none"> <li>▪ Head and neck should be in neutral position</li> <li>▪ Collar has complete contact with neck all the way around</li> <li>▪ Top inside of collar sits where chin meets neck</li> <li>▪ Chin is outside top of collar</li> <li>▪ Fit should be “comfortable yet snug”</li> </ul> </li> <li>▫ If adjustment is needed, release and reattach straps while holding head and neck in straight line</li> </ul>
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### Spinal orthosis hygiene

- Regular cleaning with damp cloth, soap, and water
- Orthosis should be dried completely before wearing
- Do not wet straps to clean
- Do not leave orthosis in water to soak or in high heat (ie, do not leave in direct sunlight)
  - High heat can cause the orthosis to lose its shape

### Follow-up

Follow up should be with the prescribing orthopedic physician

### Maintenance and Repairs

Monitoring for signs of wear and tear

The following signs indicate that a spinal orthosis may require maintenance or replacement for safe use

Orthosis component	Monitor for:
<b>Plastic components</b>	<ol style="list-style-type: none"> <li>1. Check for areas of stress. Stress marks appear white within the plastic. Common stress locations include areas of moveable joints and strap attachments</li> <li>2. White marks alone are okay, but orthosis requires maintenance if cracks appear.</li> </ol>
<b>Straps</b>	<ol style="list-style-type: none"> <li>3. Check for bends or tears</li> <li>4. If worn out, straps will need to be replaced</li> </ol>
<b>Joints and hinges</b>	<ol style="list-style-type: none"> <li>5. Should move freely without catching or making sounds</li> <li>6. Locks should function normally and remain secure when weight is applied</li> </ol>

Maintenance process

Serviced by an orthotist at the orthotic centre





## Adapting, Modifying or Fitting the Product

### Child growth

- Adjust orthoses for fit as child grows or to reduce pressure points

\*If orthosis cannot be safely adjusted, refer to physician for follow up

## References

Agabegi, S. S., Asghar, F. A., & Herkowitz, H. N. (2010). Spinal Orthoses. *American Academy of Orthopaedic Surgeon*, 657-667.

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## Indications for Prescription of Orthoses based on GMFCS Level

AFOs and KAFOs prescription based on GMFCS level

GMFCS Level	AFO	KAFO
<b>Level I</b>	<p style="text-align: center;"><b>X</b></p> <p>AFO can support speed, balance, and coordination for walking, running, and jumping</p>	<p style="text-align: center;"><b>X</b></p> <p>KAFO can support speed, balance, and coordination for walking, running, and jumping</p>
<b>Level II</b>	<p style="text-align: center;"><b>X</b></p> <p>AFO can provide support, stability, and balance during daily activities and for independent ambulation as needed</p>	<p style="text-align: center;"><b>X</b></p> <p>KAFO can provide support, stability, and balance during daily activities and for independent ambulation as needed</p>



<b>Level III</b>	<p style="text-align: center;"><b>X</b></p> <p>AFO can provide support for mobility for a child who can walk short distances</p> <p>AFO can support proper positioning to prevent lower extremity contractures and deformities for a child with high tone or spasticity</p>	<p style="text-align: center;"><b>X</b></p> <p>KAFO can provide support for mobility for a child who can walk short distances</p> <p>KAFO can support proper positioning to prevent lower extremity contractures and deformities for a child with high tone or spasticity</p>
<b>Level IV</b>	<p style="text-align: center;"><b>X</b></p> <p>For a child with high tone or spasticity, an AFO can support proper positioning to prevent lower extremity contractures and deformities</p> <p>AFO can maintain proper positioning to enable weight bearing when in wheelchair or using a standing frame</p>	<p style="text-align: center;"><b>X</b></p> <p>For a child with high tone or spasticity, an KAFO can support proper positioning to prevent lower extremity contractures and deformities</p>
<b>Level V</b>	<p style="text-align: center;"><b>X</b></p> <p>For a child with high tone or spasticity, an AFO can support proper positioning to prevent lower extremity contractures and deformities</p> <p>AFO can maintain proper positioning to enable weight bearing when in wheelchair or using a standing frame</p>	<p style="text-align: center;"><b>X</b></p> <p>For a child with high tone or spasticity, an AFO can support proper positioning to prevent lower extremity contractures and deformities</p>



# Augmentative and Alternative Communication (AAC)

Devices that allow a child to communicate without the use of spoken language

Communication boards and books

Topic boards and Theme boards

Talking books

Software and Apps for voice output communication aids

iPad Apps and websites for access to books

# Communication Boards and Books

## Description

- Enables children to communicate using symbols, words, pictures, or objects
- The child looks to, points to, or selects items on the communication board or book
- Adds or replaces verbal communication

## General Features

- Printed boards with a grid of communication responses (can be symbols, paintings, icons, real-life pictures, letters, words, or objects to represent ideas when communicating with others)
- Made from durable materials or laminated paper
- Can be fixed to a wall, shelf, tray or table for accessibility and convenience
- Can be designed and printed using software for a customized board or book

## Types

Type	Typical user	Characteristics	Requirements for Configuration
<p><b>Universal communication board</b></p>	<p>Child with limited or no spoken communication</p> <p>Has complex communication needs</p>	<p>Symbols and board layout is produced in accordance with common standards or user's needs</p>	<p>Vocabulary can be varied to reflect user's needs and culture</p>
<p><b>Customized (personalized) communication board</b></p>	<p>Child with limited or no spoken communication who wants to build on and extend the vocabulary of the universal communication board</p>	<p>Symbols and board layout reflects user's needs</p>	<p>Specific symbols or usage methods can be set according to user's needs</p>
<p><b>Eye-pointing communication frame</b></p>	<p>Child with limited or no spoken communication</p>	<p>Symbols and words are attached around</p>	<p>Frame is typically rectangular with a gap</p>

	<p>and with severely limited limb movement</p> <p>Child relies on their eyes to look at the symbols to communicate</p>	<p>a frame, which is held in position vertically during communication</p>	<p>in the middle so communication partners can see one another</p> <p>Symbols and words are arranged around the frame in constant format so they can be easily found and pointed at using the eyes</p>
<p><b>Communication book</b></p>	<p>Child with limited or no spoken communication and who uses a wider vocabulary</p>	<p>Collection of symbols related to common theme or setting is displayed using categories</p>	<p>Pages are produced in different categories and bound into a book to reflect user's needs</p>

### General Design Requirements

- Board or book should be easy to carry and suitable for use
- Materials should be durable to protect from damage and safe (non-toxic laminate)
- The print should be easy to read with good contrast
- Permanent ink should be used
- Layout should be adjustable using software

## Topic Boards and Theme Boards

### Description

- Symbols and words are categorized according to theme
- Can help the child express their choices and feelings

Play-based theme board examples:

- Building a toy train track
- Building a puzzle or playing with building blocks
- Playing with playdough, artificial clay, or Mr. Potato Head
- Playing with a doll, car, or truck
- Doing craft activities, bubbles

*Location/environment-based theme board examples:*

- Kitchen
- ASSA Clinic
- Party
- Temple, Mosque, or any Religious Gathering



### *Self-care activities:*

- Eating
- Dressing
- Brushing and Grooming
- Toileting

## Talking Books

### **Description**

- Talking books allow children to listen to books for enjoyment, learn and participate in reading activities with others
- Using talking books, children can:
  - Turn pages
  - Read and re-read as many times as they like
  - Read independently with speech support
  - Make decisions about their book
  - Write their own version of the book

### *Types of talking books*

- Re-created picture books
- Custom books (social stories, personal photo books, curriculum support books, etc.)

### *Creating custom books*

- Books can reinforce specific text
- Can support curriculum when there are no pre-made resources for child's literacy level
- Can increase engagement (photos)

## **Programs to Develop Talking Books**

The following table outlines programs that can be used to develop talking books, with links to helpful resources for each program:

### **Microsoft PowerPoint**

- Can use an interface and a switch to move to the next slide if children are unable to physically turn pages
- Can create a variety of projects

### *Resource Links*

- [www.unm.edu/~jbrink/365/Documents/CreatingTalkingBooks\\_2010.doc](http://www.unm.edu/~jbrink/365/Documents/CreatingTalkingBooks_2010.doc)
- [https://www.setbc.org/download/LearningCentre/Access/making\\_accessible\\_books\\_powerpoint\\_2007.pdf](https://www.setbc.org/download/LearningCentre/Access/making_accessible_books_powerpoint_2007.pdf)
- Video Instructions:
  - <https://www.youtube.com/watch?v=tYQCwowU8sk>
  - <https://www.youtube.com/watch?v=3r1JD1RJ7Hc>



## SwitchIt!

- Easy to use
- Lots of access control options
- Sound is either on or off, not optional
- Can only move forward
- Cannot make any decisions about the book
- Very few pre-made resources
- Cannot make books with authoring options

### Resource Links

- <https://www.spectronics.com.au/product/switchit-maker-2>

## Clicker 5

- Can do a lot more than just talking books
- Lots of access control options
- Large number of pre-made resources
- Children can choose when they want speech support and when they don't
- Making resources is complex

### Resource Links

- <https://www.cricksoft.com/uk/training/clicker-training/tutorials/clicker-8>
- <https://www.spectronics.com.au/article/clicker-5-review-part-1>

## Tar Heel Reader

- Collection of free, easy-to-read, and accessible books on a wide range of topics
- Books can be speech enabled and accessed using multiple interfaces (switches, alternative keyboards, touch screens and dedicated AAC devices)
- May be downloaded as slideshows in PowerPoint, Impress, or Flash Format
- Can record your own sounds, add music, songs, or sound effects
- Can write your own books
- Books you create are public and will be shared with other users

### Resource Links

- Frequently asked questions:
  - <https://tarheelreader.org/frequently-asked-questions/>
- How to write stores:
  - [http://www.esc1.net/cms/lib/TX21000366/Centricity/Domain/35/Tarheel\\_writing%20LOLHO.pdf](http://www.esc1.net/cms/lib/TX21000366/Centricity/Domain/35/Tarheel_writing%20LOLHO.pdf)
- Video Instructions:
  - <https://www.youtube.com/watch?v=MF3yGOW3KQs>
  - [https://www.youtube.com/watch?v=l7Hk\\_00tOcs](https://www.youtube.com/watch?v=l7Hk_00tOcs)

## Windows Photo Story 3

- Quick to use
- Talking photo album with text and sound
- Search "Photostory" on YouTube to access step by step videos

### Resource Links

- <https://education.fcps.org/trt/photostory>



### **Boardmaker Plus**

- Lots of access control options
- Adapted learning
- Can go forward, backward, and repeat audio
- Can create own stories
- Manual creation of links
- Embedding sound files and movie files makes sharing difficult

#### *Resource Links*

- <https://www.spectronics.com.au/catalogue/boardmaker-plus>

### **Boardmaker Speaker Dynamically Pro & Boardmaker Studio**

- AAC software for voice output communication
- Comes with natural sounding voices
- Word prediction and abbreviation expansion
- Boardmaker Studio has quick and easy templates for a range of activities

#### *Resource Links*

- <https://kgorhamblog.wordpress.com/2015/04/30/boardmaker-with-speaking-dynamically-pro-resource-package-2/>
- [https://goboardmaker.com/blogs/knowledge-base/software-boardmaker\\_studio](https://goboardmaker.com/blogs/knowledge-base/software-boardmaker_studio)

### **Flickr**

- Download pictures to use in your books from here: <https://www.flickr.com>

## Software and Apps for Voice Output Communication Aids

The following table outlines software and apps that can be used for voice output, with links to helpful resources. The information is listed by the company or organization that has developed them.

### **Jellow (Indian App)**

#### *Communication App/Software:*

- Jellow APP
- Available in Tamil Language
- Basic version free to use

#### *Resource Links:*

- <https://www.jellow.org/jellow-basic.php>





## AVAZ (Indian App)

### Communication App/Software:

- AVAZ AAC app has a one-month free trial available
- After the one-month trial, there is a one-time lifetime fee

### Resource Links:

- <https://www.jellow.org/jellow-basic.php>

## Tobii Dynavox

### Communication App/Software:

- Compass

### Resource Links:

- <https://us.tobiidynavox.com/?redirect=true>
- Support Page: <https://www.tobiidynavox.com/en-US/support-training/>

## Assistiveware

### Communication App/Software:

- Proloquo2Go
- Proloquo4text

### Resource Links:

- <https://www.assistiveware.com>
- Support Page: <https://www.assistiveware.com/support>

## Silverkite

### Communication App/Software:

- Touch Chat

### Resource Links:

- <https://store.prc-salttillo.com>
- Support Page: <http://touchchatapp.com/support>

## Smartbox Assistive Technology

### Communication App/Software:

- Grid 3
- Look to Learn

### Resource Links:

- <https://thinksmartbox.com>
- Support Page: <https://thinksmartbox.com/smart-support/>



## PRC – Prentke Romich Company

### Communication App/Software:

- Accent Series Devices

### Resource Links:

- <https://www.prentrom.com>
- Support Page: <https://www.prentrom.com/support>

## iPad Apps and Websites for Access to Books

The table below provides information on Apps and websites that can be used to create digital or audiobooks:

### I Like Books

- Low cost
- Simple picture books
- Swipe to turn pages

### Resource Links

- <https://apps.apple.com/ca/app/i-like-books-37-picture-books-for-kids-in-1-app/id460795092>

### Audible

- Can purchase audiobooks

### Resource Links

- <https://apps.apple.com/ca/app/audible-audio-books-original-series-podcasts/id379693831>

### Voice Dream Reader

- Text-to-speech reader that turns any document or ebook into audio
- Can purchase digital books
- Many features to change font type, voice style, speed of reading and visuals

### Resource Links

- <https://apps.apple.com/ca/app/voice-dream-reader/id496177674>

### EasyReader from Dolphin

- Can purchase digital books, similar to Voice Dream Reader

### Resource Links

- <https://yourdolphin.com/en-gb/products/individuals/easyreader-app>



### **LibriVox**

- Free access to audiobooks

#### *Resource Links*

- <https://itunes.apple.com/ca/app/librivox-audio-books/id596159212?mt=8>

### **Book Creator**

- Book creating App with many features

#### *Resource Links*

- <https://bookcreator.com>

### **YouTube Website**

- Many videos of people reading picture books aloud

#### *Resource Links*

- <https://www.youtube.com>

## **References**

- Amy Speech Language Therapy, Inc. (n.d.). Augmentative & alternative communication devices (AAC). Retrieved from: <https://www.amyspeechlanguagetherapy.com/communication-boards.html>
- Cullen, C. (n.d.). Making talking books. *Spectronics*. [PDF].
- Moore, K. (n.d.). Tar Heel reader. [PDF].
- Moore, K. (n.d.). Educational software “talking books & more...” [PDF].
- Ottawa Children’s Treatment Centre. (n.d.). iPad apps and websites for access to books.



# Switches

Assistive devices that allow a child with limited movements to use technology and operate electronic devices

Purposes

Characteristics

Basic Types

Positioning



# Purposes

- Teaches children to understand cause-and-effect
- Allows children to actively initiate play and engagement
- Provides opportunities to interact and control their environment
- Using switches with toys will help to develop play skills such as turning them on/off, moving them for social and communicative purposes, making choices to indicate preferences and learning to have fun
- Early AAC training will allow successful interactions early in the child’s life, so that existing abilities of the child are extended into more complex behaviours and situations

# Characteristics



- There are several ways to examine whether a switch is applicable for a child
- Knowing the child’s abilities and preferences will help to find a suitable switch




Consider the following characteristics when selecting switches for a child:

Switch Characteristics	Considerations
Size of the surface “target” that child must activate	<ul style="list-style-type: none"> <li>• How large does the surface have to be?</li> <li>• How small might it be?</li> <li>• Which areas actually activate the switch (center, corners or edges?)</li> </ul>
Amount of force (pressure) required to activate the switch	<ul style="list-style-type: none"> <li>• How sensitive is the switch?</li> <li>• Gravity can add to the force exerted if the switch is positioned in such a way</li> <li>• Switch closure depends on the amount of consistent exertion to the user</li> </ul>
Amount of travel that a switch has (distance that a switch must be moved before it activates)	<ul style="list-style-type: none"> <li>• Some switches are designed with more “play” than others; the material may be more flexible</li> </ul>
Feedback	<ul style="list-style-type: none"> <li>• Can be tactile and/or auditory</li> <li>• Many switches make an auditory “click” sound when activated. This may be necessary for children with visual impairments</li> <li>• Other types of switch feedback include vibration or musical sound</li> </ul>
Durability	<ul style="list-style-type: none"> <li>• Some children may not be able to control the amount of pressure they use to activate a switch</li> </ul>
Feel and Texture	<ul style="list-style-type: none"> <li>• Does the child prefer or avoid a certain texture?</li> <li>• If a child prefers a particular texture, can it be added to the surface later?</li> </ul>

# Basic Types

The table below describes the basic types of switches used for play:

Types of Switches	Description
<p><b>Push/Touch Switch</b></p> 	<ul style="list-style-type: none"> <li>● The most common type</li> <li>● Child activates the switch by pushing against the surface of the switch</li> <li>● Available in a wide range of sizes and shapes, in the type of feedback and in the amount of force a child must use</li> </ul>
<p><b>Lever/Wobble Switch</b></p> 	<ul style="list-style-type: none"> <li>● Lever switches can be activated by pushing in more than one direction</li> <li>● Pushing against or bending the flexible tip in any direction operates these switches</li> <li>● Often mounted near the hands or head of a child</li> <li>● Can be easily mounted and less rigid than other switches</li> </ul>
<p><b>Switches for different motoric movements: pull switch, the grasp or grip switch, the pinch switch, and the tongue switch</b></p>	<ul style="list-style-type: none"> <li>? Used when a child is unable to produce a reliable pushing movement</li> <li>? Designed for users with focused motoric abilities</li> </ul>
<p><b>Chain Switch</b></p>	<ul style="list-style-type: none"> <li>● Is an example of a motoric switch</li> <li>● The child makes any movement that causes the chains to move against the metal bar</li> </ul>

	
<p><b>String Switch</b></p> 	<ul style="list-style-type: none"> <li>• Is an example of a motoric switch</li> <li>• Pulled to turn a toy on</li> <li>• Can be modified with a ball to make it easier to see and grab</li> </ul>
<p><b>Activity Switch</b></p> 	<ul style="list-style-type: none"> <li>• Switch closure can be the result of a separate activity with the target responding when a separate task is completed</li> <li>• For example, when the puzzle is completed, switch closure occurs and the toy that it is connected to turns on</li> </ul>



# Positioning

The table below describes considerations for optimizing the child's switch play:

Positioning Considerations	Description
The child should be comfortable wherever they are positioned	<ul style="list-style-type: none"><li>• The child should be secure so that they focus on expending energy on participation</li><li>• The child should not be putting effort or energy into balancing or maintaining a particular position</li></ul>
The switch should be placed near the child's easiest, most reliable access site	<ul style="list-style-type: none"><li>• Reflexive or abnormal movement patterns should not be considered</li><li>• Switch placement should not interfere with stable body positioning</li></ul>
The toy/device that the child is activating should be placed in close proximity to the switch	<ul style="list-style-type: none"><li>▪ Should be placed within a visual field if possible</li></ul>
The switch should be secured in a stable position so that it does not move out of place when it is activated	<ul style="list-style-type: none"><li>▪ Special switch holders are available or items such as suction cups, Dycem (a non-slip material) or a combination of Velcro will stabilize the switch</li></ul>
Mounting Sites	<ul style="list-style-type: none"><li>▪ There are several mounting sites available (clamps, mounts, mounting plates, rods, and flexible arms). Pieces are sold separately or as systems or kits</li></ul>
Switches may need to be further customized in order to make them more appealing or functional	<ul style="list-style-type: none"><li>▪ Can add colours, stickers, or textures</li></ul>
Can be more than one switch access site, mounting system and/or switch	<ul style="list-style-type: none"><li>▪ Consider various activities, positions, the stamina of the child and different environments</li></ul>

## References

University at Buffalo / Center for Assistive Technology. (n.d.). Playing with switches. *Let's Play! Project*. World Health Organization. (2021). Assistive product specifications and how to use them. [PDF]. Retrieved from: <https://apps.who.int/iris/bitstream/handle/10665/339851/9789240020283-eng.pdf>



# Hand Propelled Tricycle



## Description

- A hand-propelled tricycle is a modified tricycle that allows the person to use their hands to propel rather than their feet.
- These tricycles allow them to experience an enhanced sense of freedom and mobility.
- These tricycles are typically ordered from an outside vendor but can also be made at ASSA out of recycled bicycle parts.

## Referral

Usually referred by a physiotherapist to orthotic clinic or if already assessed can be ordered commercially by self.

### Common Conditions

- Have difficulty in standing and walking for longer distances ie outdoor mobility due to the following conditions:
  - Paraplegia
  - Spinal cord injuries
  - Spina bifida
  - Polio

## Assessment

Assessment includes the following components:

- Arm strength
- Upper extremity ROM
- Core strength
- Lower extremity ROM (to determine if they can place their feet on the platform inside the tricycle)
- The purpose and the environment to be used

These would need to be assessed to determine if a hand-propelled tricycle is a good fit to address mobility concerns for the service user.

## Prescription

- Typically prescribed by a physiotherapist.
- To prescribe a hand-propelled tricycle, the following measurements to be taken.
  - ✓ Back height- Seat to angle of scapula or till shoulder
  - ✓ Seat depth – Back rest to popliteal fossa minus 1 inch.
  - ✓ Seat height – upper portion of seat till foot (ankle kept in 90 degree)



- ✓ Seat depth – while seating- distance between outer side of the widest portion of the hip.
- ✓ For handle bar – shoulder to wrist with elbow extension.

### **Device Preparation**

- Hand propelled tricycles are available in different sizes. Once the body measurement is sent to the vendor, appropriate tricycle will be supplied by the vendor. Assembling needs to be done at orthotic Centre or a bicycle shop. Minor adjustment of measurements like seat height, width, handle bar distance can be done while assembling.

### **Fitting and Adjustment**

- Once the device is made for the service user, the physiotherapist can check for proper fitting by ensuring the following:
  - They can reach the handles for propelling
  - The seat is an appropriate size
  - Their feet are resting on the platform

### **Training for the Service User**

- The service user will need to be instructed on how to propel their new device.
- This can be done by the physiotherapist during a session, or through instructional videos provided by the physio.
- They can also be provided with written instructions on how to use their device so they have something to refer to later.

### **Follow-Up**

- A follow-up appointment should be scheduled shortly after the service user receives the device (within a week) to check in and see how they are doing with the device.
- The physiotherapist can either schedule regular follow-up appointments or have the service user contact them if any issues arise.

### **Additional Follow-Up Sessions**

- Further follow-up questions can be asked to see how the service user is using their device:
  - Are they using their hand-propelled tricycle?
    - If not, then why?
  - When is the service user using the hand-propelled tricycle?
  - Is the hand-propelled tricycle providing benefit to the service user?
  - What activities are they using the hand-propelled tricycle for?
  - Do they have concerns about using their hand-propelled tricycle?

### **Maintenance and Repairs**

- If the device needs maintenance or repairs, the service user can make their physiotherapist aware of this and will be able to bring their device back to ASSA for repairs.
- Potential maintenance procedures/repairs may include:
  - Maintaining the chain mechanism
  - Oiling the chain mechanism
  - Look for any material breakdown or wearing on seating/handles
  - Tightening screws

### **Adapting, Modifying, or Fitting the Product**

- The seat needs to be comfortable to the user to ensure there are no pressure injuries.
- If the user experiences lower limb external rotation, straps may be provided for leg alignment inside the tricycle.



- If the service user is not finished growing, it is possible they may outgrow their device and either require modifications to their current device or may require a new one altogether.
- If they have concerns about the fit of their device, they should contact their physiotherapist for advice on how to proceed with adaptations or replacement.

## Scooter Board



### Description

- A scooter board is a device made of either plastic or wood that has four casters (wheels) on the bottom.
- Scooter boards are often used to help develop lower extremity and core muscle strengthening.
- Some may use them for community mobility, but it is mostly used as a means of mobility at home.

### Referral

- A scooter board is often recommended by a physiotherapist.

### Common Conditions

It is generally prescribed for people who have limited mobility and have a small living space that may not be appropriate for wheelchair use.

Common conditions that a scooter board may be recommended for include:

- Cerebral palsy
- Spina bifida
- Spinal cord injuries



- Lower limb amputees
- Any conditions that result in the person having mobility difficulties.

## Assessments

- The service user will require upper and lower limb range of motion and strength assessments to determine if they can propel a scooter board.
- They will also require range of motion assessments of lower limbs as they will require good ROM in hips and knees if they are to sit on the scooter board.
- Good sitting balance

## Prescription

- Measurements will depend on the position of use - Prone lying or Sitting.
- Usually hip width or body width with 4 inches additionally.

## Device Preparation

- Generic scooter boards (usually with a plastic topper for seating) are available for purchase online and through various device companies.
- Scooter boards can also be made on site as needed for service users once they are recommended by a physiotherapist. These are typically made from a wood platform with four wheels on the bottom.

## Fitting and Adjustment

- Once the device is made, the physiotherapist who recommended it should have a session with the service user to ensure they know how to use it for the intended purpose, whether that is mobility or strengthening muscles.
- They should observe them using it to ensure they notice any issues with the fit and dimensions of the scooter board and should recommend any adjustments as necessary
- It should not be too long or wide and should allow free movement of limbs for propelling.

## Training for Service User

- The physiotherapist can instruct the service user on how to use the scooter board by teaching them how to properly sit/lay on it, and how to propel it.
- It is important that the device is gradually introduced, with increasing its use over time.
- The physiotherapist can also instruct the family on how to help their child learn to use the scooter board if necessary.

## Follow-Up

- Follow-up appointment should be scheduled to touch base with the service user to see how they are using the scooter board.
- This appointment should be relatively soon after they receive the device, but with enough time for them to try it and identify any issues they may have.
- They can bring these issues to the physiotherapist to have them addressed at the follow-up appointment.

## Additional Follow-Up Sessions

- Further follow-up assessments can address how the service user is using the device by asking the following questions:
  - Are they using their scooter board?
    - If not, then why?
  - When is the service user using the scooter board?
  - Is the scooter board providing benefit to the service user?
  - What activities are they using the scooter board for?
  - Do they have concerns about using their scooter board?



## Maintenance and Repairs

- The service user and their family should inspect their device regularly to look for any breakdown of the materials or defects in the construction of the scooter board.
- The casters are freely moving and the platform is sturdy and properly padded.
- Repairs are done locally where it was made or ordered.

## Adapting, Modifying, or Fitting the Product

- Service users can be given new scooter boards to use if they outgrow the one they have. The physiotherapist will need to provide updated measurements.
- Additional mobility assessments may be required to determine if other mobility devices are needed in the community (wheelchair, walker, etc.) as scooter boards are not an ideal device for community mobility.
- If it is used in prone position a strap may be added to stabilize the trunk
- Regular check-up of skin integrity at buttock, lower limb, hands and axilla would be required.

### References

<https://www.especialneeds.com/shop/mobility/special-needs-tricycles-bicycles.html>

<https://www.especialneeds.com/shop/mobility/special-needs-tricycles-bicycles/adaptive-tricycles.html>

<http://www.freedomconcepts.com/product-lines/adaptive-bikes/>

<https://www.performancehealth.ca/scooter-board>

<https://yourkidstable.com/scooter-board/>

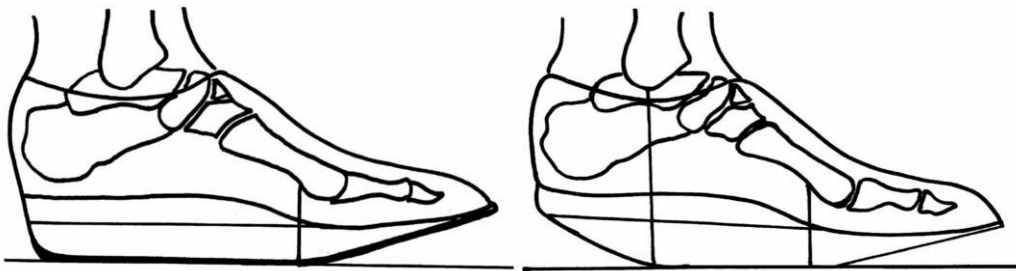
## Rocker Bottom Shoes



### Description

- Rocker bottom shoes are a type of footwear with a rounded sole on the bottom of the shoe.

- Rocker bottom shoes can work similarly to foot orthotics to help reduce pain when walking, prevent unwanted compensation for immobile joints, and helping the harmony of movement through the floor in a gait cycle.
- These types of shoes can be used in people experiencing pain while walking and who may be in need of more support in their shoes.
- There are two types of rocker soles:
  - Forefoot rocker sole: a rocker is placed just behind the heads of the metatarsal heads and works to reduce pressure under the ball of the foot and acts to reduce excess motion in the toe joints.
  - Heel to toe rocker sole: limits ankle and mid-foot motion which would be beneficial for someone experiencing arthritis in these areas



1. Forefoot rocker sole 2. Heel to toe rocker sole

## Referral

- Rocker bottom shoes are often suggested for people with diabetes who are at risk of pressure wounds on their feet due to the lack of circulation in their lower extremities. These shoes help to redistribute their weight so there is not immense pressure on any one area of the foot.
- Rocker bottom shoes are also often used for people with arthritis affecting the joints of the foot.
- They can help children with their gait cycle; foot rolling over from heel strike to toe off
- Can be used in people experiencing a deformity of the leg/foot; or those with contractures.

## Common Conditions

- Diabetes
- Juvenile arthritis
- Gait cycle issues
- Leg/foot deformity
- Contractures

## Assessment

- No specific assessment of the service user would be needed to recommend this product. Assessment of their abilities to put on/take off shoes independently and their ability to fasten/unfasten them independently would give an idea of whether they are a good option for them.

## Prescription

- Rocker bottom shoes do not require a prescription and can be purchased at most shoe stores but are also made on site at ASSA in the orthotic center.

## Device Preparation

- N/A





## Fitting and Adjustment

- Like any shoe, it is recommended that the person try on the shoe before purchasing to ensure they buy the right size.
- Size recommendations would be based on comfort; the shoe shouldn't be tight enough to cause pain anywhere but should not be loose enough to have movement in the heel of the shoe.

## Training for Service User

- Depending on the service user's current ability to put on and fasten shoes, these skills may need to be taught for them to wear rocker bottom shoes. Family will require the skills to put on and fasten shoes so they can either do it for them or teach them how.

## Follow-Up

- Follow up with service user to inquire if they seem to receive more support in their feet/more comfort walking since the introduction of the rocker bottom shoes.

### Additional Follow-Up Sessions

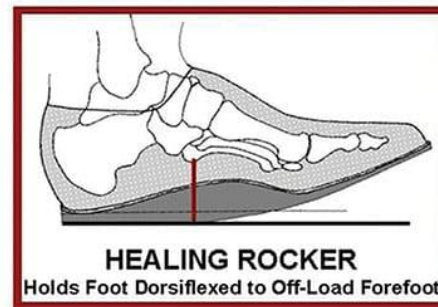
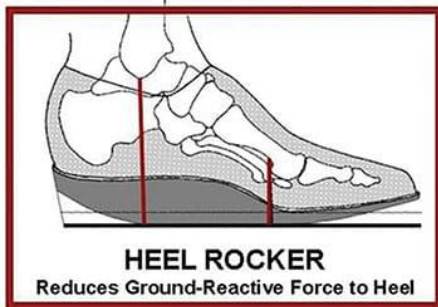
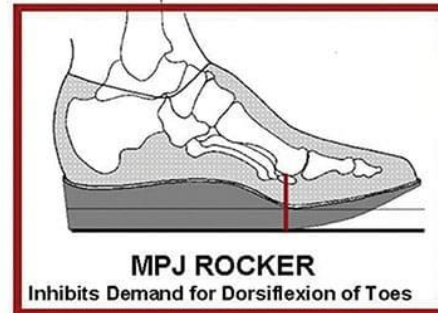
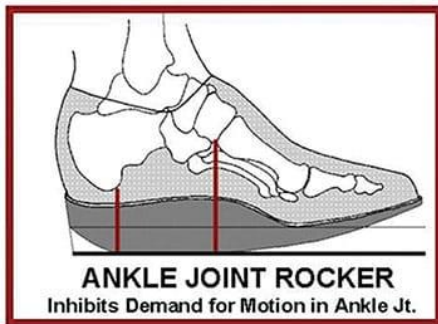
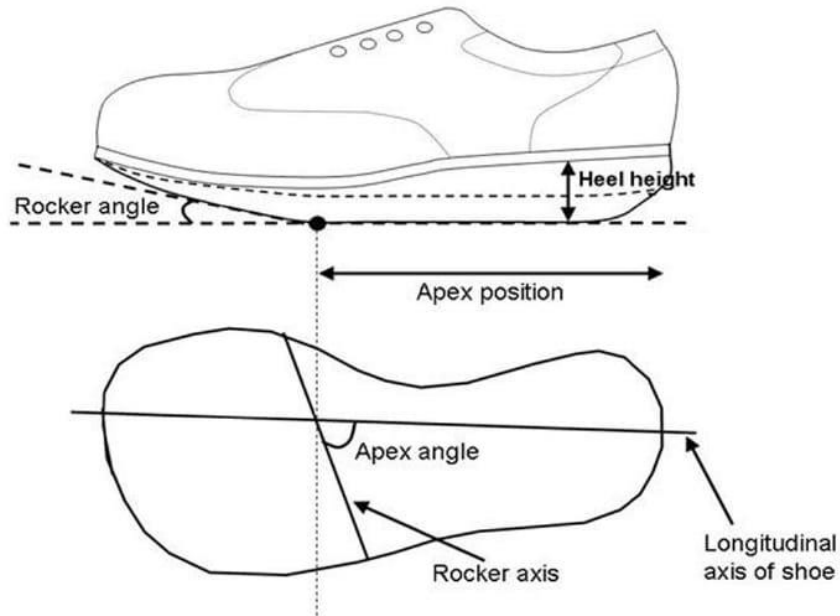
- Further follow-up assessments can address how the service user is using the device by asking the following questions:
  - Are they using their rocker bottom shoes?
    - If not, then why?
  - When is the service user wearing their rocker bottom shoes?
  - Are the rocker bottom shoes providing benefit to the service user?
  - What activities are they wearing the rocker bottom shoes for?
  - Do they have concerns about using their rocker bottom shoes?

## Maintenance and Repairs

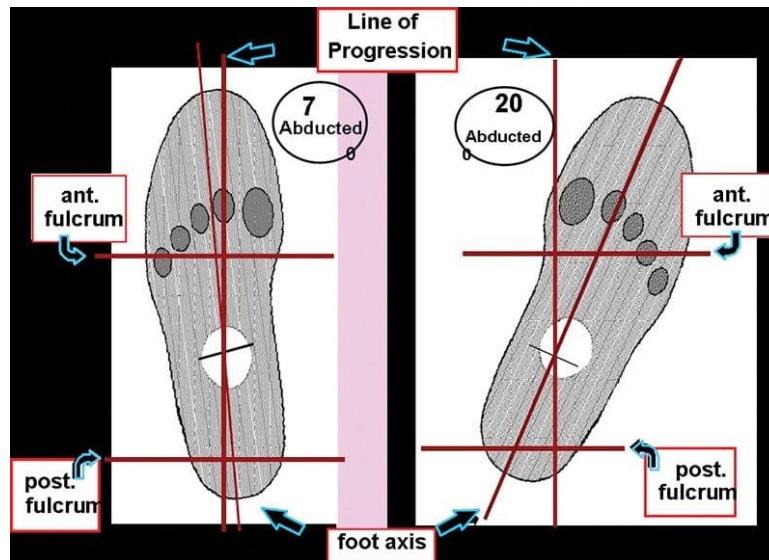
- Monitor the condition of the shoes regularly to determine if they need replacing. Like all shoes, rocker bottom shoes will eventually wear out after extended use and a new pair may be required if this happens.
- Areas that should be monitored regularly include the soles of the shoe (i.e. the bottoms of the shoes, look for signs of wear) and the laces of the shoe (make sure the laces are not falling apart and can still be tied to secure the shoe).

## Adapting, Modifying, or Fitting the Product

- As the service user grows, he or she may outgrow a pair of rocker bottom shoes. If this is the case, the shoes will need to be replaced with ones of a larger size as they cannot be purchased with "growing room" if they are to be used properly.
- Depending on the reason for prescribing the shoe, the therapist may want to increase or reduce the degree of rocking in the shoe. This should be assessed regularly by the therapist.







Rocker bottom soles must consider the angle and base of gait  
To be effective Fulcrums must be perpendicular to line progression

## CTEV Brace and Shoe

### Description

- CTEV braces (Figure 1) are used to help correct and reduce the deformity that occurs in children born with talipes equinovarus, also known as clubfoot.
- Clubfoot is a common birth defect in which the foot points downward and inward.
- Clubfoot is usually treated using the Ponseti method involving casting of the legs and feet to reform the bones into the correct alignment.
- Once this is done, the child must continue to wear a brace, or a CTEV shoe, to ensure the feet and legs to not revert to their initial deformed positioning.
- The braces are usually made of plastic and are lined with a foam cushion for comfort.
- They are often worn for many years after the initial casting portion of the Ponseti method.
- They consist of two boot braces attached to a bar in the middle and the feet are placed in a turned-out position to keep the feet and legs in the correct position.
- Once correction has been done, or if the child's feet are resistant to correction, they will need supportive footwear called a "CTEV shoe" which is a supportive shoe that is not attached by a bar at the bottom. (Figure 2)
- These shoes provide support that a regular shoe will not provide them since they may require a specific fit inside of their shoe to contour to their foot properly.

Figure 1: CTEV Brace



Figure 2: CTEV Shoe



## Referral

- The CTEV shoe or brace is specifically designed for each child and are designed for children who were born with clubfoot.

## Assessment

- Physical assessment to determine the severity of the clubfoot will be necessary to start the process of the Ponseti method and subsequently the CTEV shoes/braces that are worn afterwards.

## Prescription

- They would be prescribed by a physician after a clubfoot diagnosis.



- In order for these shoes/braces to be prescribed, the person will need to have undergone the casting process of the Ponseti method beforehand.

### **Device Preparation**

- The shoes/braces will need to be formed and made to custom fit the child's feet before they can be used. The physician will arrange with the manufacturer for these to be made while also providing the correct measurements to ensure a custom fit.
- CTEV shoes are ordered to ASSA from an outside vendor.

### **Fitting and Adjustment**

- Before the child is sent home with their CTEV shoes/braces, the physician will need to assess the child while wearing the braces and confirm the fit is appropriate to continue treating the clubfoot.
- A physiotherapist may also be present to help determine if the fit is appropriate.

### **Training for the Child and Family**

- The family will be required to learn how often the child is to wear the braces (i.e., 23h a day), and when it is appropriate to take them off (i.e. for bathing).
- They will also be provided with education on how to clean the braces.
- Additionally, the parents will be required to learn how to maneuver the buckles used to fasten the CTEV shoes/braces to the child's feet.

### **Follow Up**

- The service user will require frequent follow-up appointments to monitor the clubfoot and ensure it is not reverting to the original deformed position.
- They will also need to be fit again for these braces and shoes as they grow, and their growth will need to be monitored regularly to ensure they will have a new set when they need them and won't be left without treatment for any length of time.
- They will require new CTEV shoes as they will outgrow them as well.
- Non-adherence to casting/bracing can result in reverting to the previous foot position.

### **Additional Follow-Up Sessions**

- Further follow-up assessments can address how the service user is using the device by asking the following questions:
  - Are they using their CTEV braces or shoes?
    - If not, then why?
  - Are they using their CTEV braces and shoes for the recommended time per day (i.e.23h)?
  - Are the CTEV braces/shoes improving their clubfoot?
  - Do they have concerns about wearing their CTEV braces and/or shoes?

### **Maintenance and Repairs**

- During follow up appointments, the size of the CTEV shoes/braces, as well as the buckles and closures, will need to be checked to ensure they still work.
- Repairs to the shoes and braces are done onsite at ASSA.

### **Adapting, Modifying, and Fitting the Product**

- Modification and adapting the shoes/braces can be done at ASSA, with collaboration with a physician for any issues with bracing.

#### **References**

- <https://lomagazine.com/article/rocker-bottom-footwear-effects-on-balance-gait>
- <https://www.footankle.com/shoe-therapy/rocker-bottom-sole-shoes/>
- <https://www.medicalnewstoday.com/articles/183991#diagnosis>
- <https://kidshealth.org/en/parents/ponseti-bracing.html>

<https://globalclubfoot.com/cure-international-india-national-program-update/#:~:text=The%20vision%20of%20CURE%20is,free%2C%20successful%20and%20complete%20treatment.>

<https://www.nationwidechildrens.org/conditions/clubfoot-talipes-equinovarus>

## Crutches



### Description

- Provide support and balance when walking and help to transfer body weight from injured leg/ foot to upper body
- Appropriate for:
  - Non- weight bearing or partial weight bearing single lower limb with functional upper limbs

### Axillary Crutches

- Short-term use
  - Short-term disability or condition i.e.. Musculoskeletal injury
- Long-term use :  
Lower limb paralysis with good upper limb strength (Ex: Residual Polio)  
Underarm lightly rests on chest wall approximately 5cm below the axilla, with force for walking being pushed onto grip handles.

### Referral

Indications for crutches prescription



- Challenges with balance or impaired strength in lower limbs, support is required for walking
- Need to limit how much weight is put onto a leg/ partial weight-bearing
- Pain relief required
- Support weak muscles
- Loss of sensation in leg(s)

#### Common conditions

- Musculoskeletal injuries (broken bones, tendon injuries)
- Cerebral palsy (CP)
  - If clients have some ability to ambulate
  - GMFCS level II or III
- Spina Bifida
- Muscular dystrophy
- Arthritis
- Polio and poliomyelitis

#### Contraindications

- Crutches are not meant to take the full body weight. Not appropriate if the child's legs or one leg cannot support some of their body weight. Require significant upper body strength, range of motion, grip strength, and coordination.

#### Axillary Crutches

- Typically for short-term use as there is a risk of nerve damage to the brachial plexus under the armpit. Avoid pressure in the armpit and push through hand grips to walk.
- Long-term use at ASSA for clients with Polio.

#### Gutter Crutches

- Less lateral support versus axillary crutch. Can be more difficult to learn to use and take cuffs off.

## Assessment

#### Crutch prescription

Assessments to determine the child's need for crutch prescription include:

- Assessment interview
- Physical assessments

#### Assessment interview

- Conduct an assessment interview to assess need for elbow crutches or the most appropriate walking aid to best support daily function (See page 5)

#### Physical Assessments

To determine if crutches would support the child's physical function, conduct the following assessments:

- Static balance
- Dynamic balance
- Muscle power test

- Gait Analysis and endurance
- Upper body range of motion
- Hand function/ Grip strength

### Considerations

The following factors should be considered if a prescription is the most appropriate for a child:

- Upper body and grip strength
- Balance and coordination
  - Pediatric Balance Test: a score of 45 and above may benefit from elbow crutches for progression to independent mobility
- Gait pattern
- Overall physical strength and endurance
- Level of impairment
  - GMFCS Level II or III (See page 45 for GMFCS mobility aid chart)
- Cognitive function
- Vision

If a child only needs unilateral support for walking, then a walking stick may be a more appropriate device. If bilateral support is required, then a walking frame, rollator or long-term use crutches may be more appropriate.



### Prescription

Indication for prescription

Indication that a child would benefit from prescription:

- Child's GMFCS level (for children with CP)
  - Level II or III
- Results of physical assessments
- Results from assessment interview

Body measurements

- Always consider the future growth of the child.

Crutch Height: \_\_\_\_\_ inches (Axilla) (Pediatric) (Forearm)

Hand grip Height: \_\_\_\_\_ inches

Gutter Attachment: Gutter-Floor Height: \_\_\_\_\_ inches (Left) (Right) (Both)

Axillary Crutches



- Crutch height: Measure 3-6 inches lateral to foot on floor, to 1-½ inches below Axilla with shoes on, measure from the apex of the axilla.
- Hand grip height: Measure 1-½ inches below Axilla to hand grip at 20-30-degree elbow bend in standing, and in lying 15 degrees.

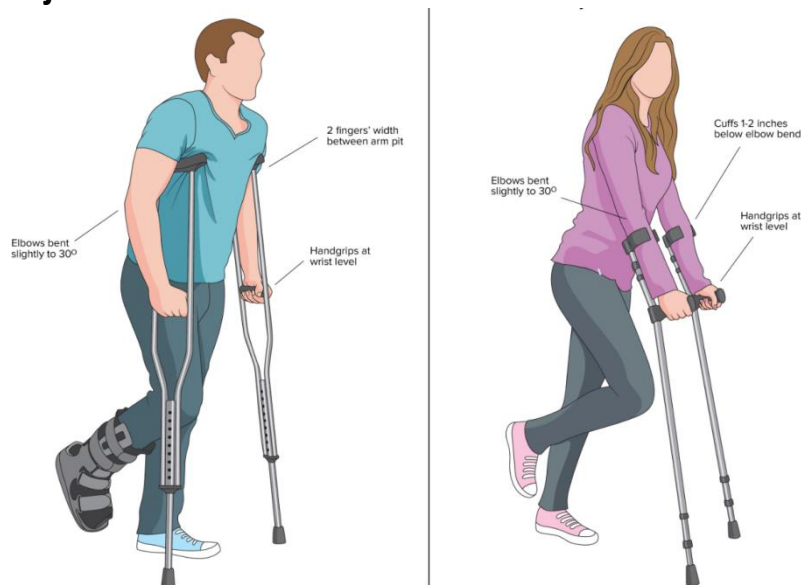
Gutter Crutches

- Crutch height: Measure 3-6 inches lateral from foot on floor, to forearm with elbow bent to 90 degrees.
- Hand grip height: Measure from elbow to hand grip.
- Crutch height: Measure 3-6 inches lateral to foot on floor, to 1-2 inches below the bend of the elbow.
- Hand grip height: Measure from the elbow to the hand grip.

## Device Preparation

For safety purposes check crutches prior to fitting for any scratches or damages to the cuffs or shaft, and ensure any joints or screws are not loose.

## Fitting and Adjustment



- (See above body measurements section for fitting information)

The crutches should enable the child to walk comfortably while supporting upright posture attainable by child, ensure the client is not stooped too low, has hunched or elevated





shoulders. Ensure there is no redness or pressure sores developing around weight bearing areas. Crutches should be of equal height.

### Axillary Crutches

- To adjust height, press spring buttons to lengthen or shorten. Re-engage to the proper hole of height and lock in place before use.
- Wooden crutches may be adjusted using screws to adjust overall height and grip height.
- Have the client wear their proper shoes and have their shoulders and arms relaxed. Measure from the floor approximately 3-6 inches lateral to the foot, vertically to 1 inch – 1 ½ inches below the armpit, this is the height of the crutch from floor to armpit padding.
- With arms relaxed, have the patient bend elbows to about 30 degrees flexion, this should be the level of the hand grips. They should be at a comfortable level where the patient is pushing through the grips to walk and not their armpits.

### Gutter Crutches

- To adjust height, press spring buttons to lengthen or shorten. Re-engage to the proper hole of height and lock in place before use.
- Widen or narrow the cuffs to ensure secure fit around child’s arms.
- Have the client relax their shoulders and arms, then bend the elbows to 90 degrees. Measure from the elbow/ ulna to the floor, approximately 3-6 inches lateral from the foot. The client should be able to lay their forearm on the platform comfortably with elbow bent to 90 degrees, and the shoulder should not be elevated or down. Measure from the elbow to the hand grip to determine where the hand grip should be. This should be comfortable, and the wrist should be in a neutral position.

## Training for child and family

### Training Checklist for Family

Clinicians should provide families with the following:

- Instructions for donning and doffing elbow crutches
- Mobility skills
- Device hygiene
- Skin checks for irritation, redness, or blisters
- Process for maintenance

### Mobility Skills

Clients and their families should be trained to perform the following skills safely

Skill	Overview
<b>Walking</b>	<ul style="list-style-type: none"> <li>○ May be full or partial weight bearing</li> <li>○ Place both crutches one step in front of body</li> <li>○ Place affected leg forewards, slightly behind crutches</li> <li>○ Step through with unaffected leg while taking weight through hands/ forearms</li> </ul>



<p><b>Sitting to standing from Chair</b></p>	<ul style="list-style-type: none"> <li>○ When standing up or lowering into a seat to sit down, do not put arms inside cuffs or grips, have the crutches to the side and hold the handgrip for stability when transitioning. Use chair arms or the seat to lower or stand, pushing through the good leg with the affected leg forewards.</li> <li>○ Once standing, put arms into cuffs/ grips.</li> </ul>
<p><b>Standing up from the floor</b></p>	<ul style="list-style-type: none"> <li>○ The child is kneeling on the floor and picks up crutches and places them in front for stability.</li> <li>○ Child moves to standing through 1/2 -kneeling by holding onto the handgrip of the crutches. Push through the good leg to stand.</li> <li>○ Once standing, places arms in cuffs/ grips.</li> <li>○ May put arms in cuffs from a kneeling position if stable and comfortable.</li> </ul>
<p><b>Stairs</b></p>	<ul style="list-style-type: none"> <li>○ Stand close to handrail</li> <li>○ Hold handrail in one hand and both crutches in the other hand</li> <li>○ If there is no handrail, then keep crutches on either side of body</li> <li>○ Upstairs: Step with unaffected leg first, supporting affected leg with handrail/ crutches. Keep the crutch on the same level as the affected leg. Then follow through with the affected leg and crutch, one step at a time.</li> <li>○ Downstairs: Step with the affected leg first. Lower the crutches onto the step the affected leg will be on. Then follow through with the unaffected leg.</li> </ul>

### Crutch Hygiene

- Regular cleaning with a damp cloth, soap, and water
- Dry fully with towel prior to use

### Follow-up

#### Follow-Up Procedure

Children not seeing a clinician regularly should follow up within 6 months or when:

- Crutches are too short for the child and can no longer be lengthened.
- The rubber tips become worn down or have tears, rips, or cracks. Or cushions are ripped or creating redness or pressure sores.

### Maintenance and Repairs

#### Maintenance Process

- Maintenance is required when the above occurs.



- Have serviced at Amar Sava Sangam or an orthotic centre.

## Adapting, Modifying or Fitting the Product

### Child Growth and Adaptations

Crutches should be lengthened as child grows in height to maintain 30° elbow bend for elbow crutches, and 90-degree bend for gutter crutches, at a comfortable and natural height.

- To increase elbow crutch length:
  - Push buttons in on crutches shaft or forearm piece and pull to add length
- If crutches become too short for the child, the clinician should be seen to assess and arrange prescription for a larger size.

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## Toe Splints



Bunion Splint



Toe Spreader

### Description

**Bunion Splint:** Splint which wraps around the inner side of the Hallux toe to pull it laterally and realign, relieving discomfort associated with Hallux Valgus, and often used after surgery to prevent bunions from reforming. Often used for nighttime use only.

**Toe Spreader:** Typically, gel, foam, silicone, or rubber product placed between the Hallux and the second toe to realign toes and relieve discomfort associated with Hallux Valgus. Can be used underneath socks or shoes for daytime use.

### Referral

Referral indications for prescription

- Hallux valgus or misalignment of the big toe, causing it to crowd the smaller toes. The metatarsophalangeal joint becomes inflamed and painful and can swell, otherwise known as a bunion.
- Pain or discomfort in shoes or while walking.



### Common conditions

- Juvenile hallux valgus
- There is an increased risk of Hallux Valgus and bunions if a person has flat feet.
- Arthritis
- Can be hereditary or risk with daily overuse/ standing occupations

### Contraindications

- Not recommended for those with diabetes or poor circulation.
- Splints or spreaders will not fix bunions; however, they may relieve pain or discomfort or prevent bunions from getting worse.
- Watch for redness or pressure sores.

### Assessment

- See a foot specialist or physiotherapist for assessment, untreated bunions may lead to hammertoe, abnormal curling, bursitis, or inflammation of the sacks that cushion the tendons, bones, and muscles.
- May assess pain during sitting/ standing/ walking. May take measurements for custom fit.
- If needed, a referral is sent to orthopedics for imaging.

### Prescription

- Bunion splints and toe spreaders are generally prescribed by physiotherapist.
- Typically for mild to moderate bunions. Severe often requires further treatment/ surgery.
- Generic Splints and toe spreaders available online, or custom splints by orthotic center.

### Device Preparation

- Ensure the correct size is selected for splint or toe spreader. Adjust or tighten straps on splints to firmly but comfortably fit.

### Fitting and Adjustment

- Slide foot into device with mid arch at the metatarsal strap and the toe positioned to fit into the toe strap. Slip straps into loops and tighten around the mid foot and toe. The big toe should be aligned and fastened onto the splint. Ensure that it fits comfortably, check for red marks which may lead to pressure sores frequently.



- Toe Spreaders typically just slip onto or between the toes, no adjustment required. However, generic toe spreaders may prove difficult to find an exact fit.



## Training for child and family

### Training checklist for family

Provide families with:

- Instructions for putting on and removing
- Splint hygiene
- Time and duration of use
  - When should the child wear the splint
  - How long should the child wear it for
- Skin checks for irritation, redness, or blisters

### Splint hygiene

- Make sure to keep the devices and your feet clean and dry to prevent fungus growth. You may want to buy more than one to alternate.
- If using a custom splint, make sure to keep it out of hot temperatures, and do not use hot water to wash as the temperature may melt the material and change its form. Do not leave on while bathing.
- Splint:
  - Remove or avoid getting wet any soft Velcro straps, you may leave on rough Velcro as it will dry.
  - Wash material in cool soap and water
  - Let dry completely
- Toe spreader
  - Wash with cool soap and water.
  - Let dry completely.

### Time and Duration of Use

- Splint: For daytime use begin implementing gradually, starting with 20 minutes per day, up to 3 hours plus per day. The splint is bulky and may be uncomfortable to wear during the day. For nightly use you may also try implementing it gradually if uncomfortable, or wear for the duration of sleep.
- Toe spreader: May be used through the daytime, should also be trialled gradually. Typically used within a slipper or shoe so that it remains in place.

## Follow-up

### Follow- up procedure

- As the child grows may need updated sizing for the splint or toe spreader.



- Make an appointment if there are any uncomfortable areas on custom splints, the therapist can then mold and adapt it.
- Contact therapist if there are any other issues (redness, pressure sores, worn or broken pieces).

#### Follow up sessions

- If splint is fitted improperly may notice:
  - Complaints of pain
  - Appearance of red marks
- Wear and tear
  - Worn or broken straps or padding
  - White marks or cracks in plastic
  - Tears in the fabric
- Functional use of the splint
  - Questions to ask:
    - Is the child wearing the splint?
      - If no, then why?
    - When is the child wearing the splint?
    - Is the splint providing benefit to the child?
    - What activities is the child wearing the splint for?
  - *NOTE:* If the child is not wearing the splint as recommended, education, splint adjustments or alternative assistive devices may be required.

### Maintenance and Repairs

#### Maintenance process

Have splints serviced by the orthotic centre at ASSA or by the therapist that completed the fitting.

### Adapting, Modifying or Fitting the Product

- Custom splints can be molded and adjusted in size to relieve discomfort.
- Generic splints can be adjusted using the Velcro straps for tightness, or they may have elastic straps.
- Toe spreaders must be ordered in the correct size, typically not adjustable.

### References

<https://www.luriechildrens.org/en/specialties-conditions/bunion-deformity-juvenile-hallux-valgus/>

[https://www.joint-surgeon.com/orthopedic-services/foot-and-ankle/hallux-valgus-hallux-rigidus-bunion-surgery.html#what\\_is](https://www.joint-surgeon.com/orthopedic-services/foot-and-ankle/hallux-valgus-hallux-rigidus-bunion-surgery.html#what_is)

Page Break <http://www.lbhandtherapy.com/care-cleaning-of-custom-splints/>

## Posterior Knee Splint

### Description

Typically, custom molded and made of plaster or fiberglass, on the posterior or back side of the leg behind the knee. Buckled or Velcro straps are used to hold the splint tight, typically one above the



knee, a broad strap on the knee, and one below the knee.

## Referral

Referral indications for prescription

- For daily use if the knee joint requires stabilization. For example, if the knee is locking or giving out during standing or walking.
- May be used while child is sitting or in standing on his own or while using a floor level corner seat or standing frame.
- May be used as a night splint to give sustained stretching for knee flexors (elongation of hamstring tightness and last 10 degree of knee extension)

## Common conditions

- Cerebral palsy
- Musculoskeletal issues. Acute soft tissue injuries (ie. Quadriceps or patellar tendon rupture, ACL rupture, patellar dislocation, etc.)
- Spinal cord injury
- Spina Bifida

Contraindications

- Watch for redness, or pressure sores, especially if the client has poor sensation in the lower limbs.
- Do not use if the client has complicated or multiple fractures, open fractures, or injuries associated with nerves and blood vessels. Refer to physician or consultation by orthopedic surgeon in these instances.

## Assessment

To determine need for prescription

- Muscle tone
- ROM in the knee joint
- Pain assessment
- Functional assessment, specifically in standing
- Physician (X-ray/ imaging referral if required)

## Prescription

Indications for prescription

- Physiotherapist assessment will determine the need for splinting.

## Device Preparation

- It is custom fit to the client's leg at the orthotic center.
- Often made with plaster, plastic, or fiberglass and secured with buckle or Velcro straps.

## Fitting and Adjustment

- The splint should fit just below the gluteal crease and extend just proximal to the malleoli, with the knee placed in slight flexion to about 10-15 degrees.
- Ensure the splint is not too tight, no sharp edges and edges and contact areas are padded appropriately
- Check for a pulse in the foot to ensure proper circulation.

## Training for child and family

Training checklist for family

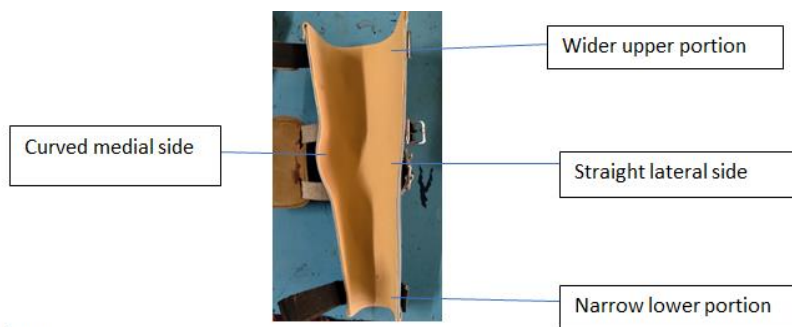


- Instructions for putting on and removing
- Splint hygiene
- Time and duration of use
  - When should the child wear the splint
  - How long should the child wear it for
- Skin checks for irritation, redness, or blisters

### Instructions for putting on a splint

- Side determination: upper portion of the splint is wide and at the knee portion – medial side is curved and lateral side is straight.
- Therapist can mark R and L on the splints
- Slip the splint onto the back of the leg so that the top is just below the buttock and the bottom just above the malleoli / ankle joint.
- Secure the straps so that they are tight enough to support the leg, but not cutting off circulation. You can check the color of feet and toes frequently to assess circulation. Ensure there is no pain and the child is comfortable.

### Posterior Knee Splint:



### Splint hygiene

- If using a custom splint, make sure to keep it out of hot temperatures, and do not use hot water to wash as the temperature may melt the material and change its form. Do not leave on while bathing.
- Remove or avoid getting wet any soft Velcro straps, you may leave on rough Velcro as it will dry.
- Can wash leather straps with a damp cloth.
- Wash splint material in cool soap and water
- Let dry completely

### Time and Duration of Use

- For nightly use if the child is comfortable with and accepts the use of the splint, otherwise for a few hours, gradually implementing.
- To be used throughout the day to assist with standing or long sitting on floor.

### Follow-up

#### Follow- up procedure

- As the child grows may need updated sizing if using splint for long-term use.
- Make an appointment if there are any uncomfortable areas on custom splints, the orthotic technician can then mold and adapt it.





- Contact orthotic technician if there are any other issues (redness, pressure sores, worn or broken pieces).

#### Follow up sessions

- If splint is fitting improperly you may notice:
  - Complaints of pain
  - Appearance of red marks
- Wear and tear
  - Worn or broken straps or padding
  - White marks or cracks in plastic
  - Tears in the fabric
- Functional use of the splint
  - Questions to ask:
    - Is the child wearing the splint?
      - If no, then why?
    - When is the child wearing the splint?
    - What activities is the child wearing the splint for?
    - Is the splint supporting walking or standing performance? Does it appear to be helping with contractures during the nightly wearing routine?
  - *NOTE:* If the child is not wearing the splint as recommended, education, splint adjustments or alternative assistive devices may be required.

#### Maintenance and Repairs

- Refer to the orthotic technician that custom fit the splint to maintain, modify or repair the splint and/or straps, or at the ASSA orthotic center.

#### Adapting, Modifying or Fitting the Product

- Growth of the child or changes in limb size due to inflammation or swelling may impact splint fitting:
  - Appearance of red marks on skin
  - Complaints of pain

#### References

Boyd AS, Benjamin HJ, Asplund C. Splints and casts: indications and methods. Am Fam Physician. 2009 Sep 1;80(5):491-9. PMID: 19725490.

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Page Break

# Feeding/ Eating Devices

Assistive devices that maintain or improve a child's functioning and independence in eating and/or feeding are grouped under this category.

The further classification is

- Grip Devices
- Cups/Mugs
- Plates
- Non-Slip Mat

## Grip Devices

- Universal Grip
- EaZy Hold
- Thick Grip
- Weighted handle



## Description

Universal Grip:  
Description



- Small band that wraps around the hand, with a compartment to hold items

Purpose

- Helps to hold items when grip strength is poor or lacking

Alternative forms

- May be prepared at ASSA by sewing fabric together with a compartment to hold items

### EaZy Hold

Description

- Flexible silicone device with two holes on either end. Comes in various sizes to fit many objects

Purpose

- Helps to hold items when grip strength is poor or lacking

Alternative Forms

- May create the same effect with pipe cleaner, a thick band of material or tape wrapped around items or molded aqua plast.

### Thick Grip

Description

- Attachable or bought thick handles for items

Purpose

- Helps to hold items when grip strength is poor

Alternative Forms

- May create by taping on layers of tape, or wrapping cardboard or cloth and taping onto items, or by molding aqua plast.



### Weighted handle

Description

- Items which have a heavy weighted handle

Purpose

- Heavier handle can reduce movements while eating (muscle spasms, tremor)

Alternative Forms

- Can attach or tape on a small pouch of sand or rice wrapped around the handle to create this. Or try using a coupling nut to provide weight with washers or tape to hold in place.



## Referral

- Conduct an interview to determine if a grip device is needed or best for the client.
- Ask yourself some of the following questions:

TABLE I. Taken from Smith (1995, p. 44).

### **Questions related to the assessment:**

- What is the nature of the disability?
- Is the client able to cognitively use equipment?
- Is the client motivated to use the equipment?
- What is the client's level of psychological acceptance?
- What is the client's lifestyle?
- What are the expressed needs and goals?
- What feelings, attitudes, and judgements have been expressed?
- What is the expected personal, cultural, and physical environment?

### **Questions related to treatment:**

- Can this device improve function?
- Can adapted techniques replace this device?
- Is independence possible?
- What are the client's goals?
- Is the equipment consistent with those goals?
- Is the device needed to learn to function without a device?

### **Questions related to the equipment:**

- Is the equipment economical and cost effective?
- Is it safe and appropriate for this individual?
- Does it display excellent workmanship?
- Is it easy to set up or down?
- If a short-term need for equipment is identified, are less expensive models or alternative solutions available?
- What are the characteristics and limitations of the equipment?

### **Questions related to reimbursement:**

- Have I clearly documented that the equipment is reasonable and necessary?
- Do I have a plan for follow-up to determine long-term use and satisfaction?



## Common Conditions

- Cerebral palsy (CP) specifically ataxic and athetoid types
- Stroke or traumatic brain injury
- Multiple disabilities

## Assessment

### Additional Considerations

- Upper limb coordination
- Am I taking a remediation or compensatory approach?
- Does this device fit within the client's cultural context and/ or needs?

## Prescription

- Trial the items, if possible, prior to prescription.
- Try to be resourceful, if the family has materials where these devices may be made at home, they may save on the expense.

## Device Preparation

- See fitting and adjustment section. Devices are often bought ready for use or may be DIY made at home.

## Fitting and Adjustment

- Grip Devices should be comfortably fitted to the child's hand, or securely onto items of use.
- EaZy hold comes in various sizes. Order the appropriate size for the child's hand size and the object to be used. Or create with own materials at home.
- Options to buy different grip sizes or weights. Or adjust with materials at home, increase the weight or decrease depending on the child's strength and needs for reduced movement, and the thickness of items dependent upon the child's hand size.

## Training for Child and Family

- Model the use of the grip devices for the family. Do this for various objects that would be used in the child's daily routine. Ensure they understand how it may be properly and safely used.
- Explain to the child in simple language what the device is for, and model it's use.
- Gradually introduce the grip devices to the child. Ensure the child is comfortable. Start by trialling the device for short periods of time.

## Follow-up

- Device hygiene: Keep devices clean and dry with soap and water.

## Maintenance and Repairs

- Demonstrate to the family how to fix or create new devices if they were custom made with materials at ASSA.

## Adapting, Modifying or Fitting the Product

- See Fitting and Adjustment section. Devices may be modified according to the child's hand size or grip and arm strength.

## References

<https://www.rehabmart.com/post/help-elderly-or-disabled-loved-ones-eat-independently-with-adaptive-eating-utensils>

<https://www.especialneeds.com/shop/daily-living-aids/dining-aids.html>

<https://www.caregiverproducts.com/weighted-utensils.html>

Smith, R. (1995). A Client-Centered Model for Equipment Prescription (Client's Values and Roles, Effective Use of Adaptive Equipment). *Occupational Therapy in Health Care*, 9(4), 39–52. [https://doi.org/10.1080/J003v09n04\\_04](https://doi.org/10.1080/J003v09n04_04)



## cups/ Mugs

- Nosey Cup
- Thumbs-Up Arthritis Cup
- SafeStraw
- Sure Grip Non-Slip Cup
- Regulating Drinking Cup
- Handled Sippy Cup with Straw



## Description

### Nosey Cup

- Nosey cups have a U-shaped cut out of the side of the cup allowing space for the nose and allowing for safe swallowing
- This allows for drinking without excessive bending of the neck or tilting of the head



### **Thumbs-Up Arthritis Cup**

- Thumbs-up arthritis cups have horizontal handles on both sides of the cup so the person can lift the cup to the lips with less movement required in the wrists
- It is lightweight and functional and ideal for people who have decreased range of motion in their wrists, those who experience wrist pain, hand deformities, etc.

### **SafeStraw**

- This is typically used in patients who experience oral motor dysfunction.
- It limits the amount of liquid that can be sipped at one time, making a smaller bolus to swallow.
- This will decrease the risk of aspiration because the volume of liquid that can be sipped at one time is limited.

### **Sure Grip Non-Slip Cup**

- This allows a person to drink without the need to raise their head.
- It is spill resistant, even when tipped over. It can be used with hot or cold liquids. It promotes independent drinking and reduces need for caregiver assistance.
- A lid can be added for use in those who are laying down.
- A removable handle can be added into the grooves of the cup.

### **Regulating Drinking Cup**

- Similar to the Safe Straw, this cup controls the amount of liquid a person can put in their mouth at one time, which decreases the risk for aspiration.
- It is commonly used in people who have difficulty swallowing and who are at an increased risk for aspiration when drinking liquids.
- This can only be used for thin liquids. The design of the cup also minimizes need for head tilt.

### **Handled Sippy Cup with Straw**

- Promotes independent drinking in young children.
- Features an ergonomic design that easier to grip because the handles are large.
- This is ideal for those with fine motor challenges because it engages bilateral use of hands, and the large handles are easier to hold.

### **Common Conditions**

- Common conditions that lead to the use of assistive feeding devices include:
  - Cerebral palsy
  - Spinal cord injuries
  - Stroke
  - Traumatic brain injury (TBI)
  - Spina bifida
  - Muscular dystrophy

### **Referral**

- An occupational therapist can determine whether feeding devices would be appropriate for the patient to use.
- If they think they would help the patient, they can suggest the appropriate device from the descriptions above.

### **Assessment**

- An occupational therapist can administer assessments that determine ADL functioning and make recommendations on adaptive equipment/assistive devices.
- Examples of ADL assessments include the FIM, WeeFIM, REAL, etc.

### **Prescription**

- If possible, these devices should be trialed with the service user prior to recommendation to see if it works for them.
- Adaptive eating equipment does not require a prescription from a physician.



- They can be recommended to patients by any health care professional, but occupational therapists specialize in this area.

### **Device Preparation**

- In some cases, feeding equipment can be adapted inexpensively, such as in the grip devices section.
- However, for the cups and mugs section, devices and equipment would have to be purchased either by the family or provided to the family by ASSA.
- Since it is equipment that needs to be purchased, there is little to no device preparation needed.
- Before use, all equipment should be washed.

### **Fitting and Adjustment**

- There is little fitting and adjustment to be done to cups and mugs that ease drinking.
- Each of the items listed above are a “use as is” product, so they should not need to be adjusted, unless there are alternative sizes available that would better fit the service user's needs.

### **Training for Child and Family**

- For each device listed above, the family will need to be shown how to prepare (i.e. how to fill) the device for their child and how to disassemble it for cleaning purposes.
- The child will need to be shown how to hold the device and how they should bring it to their mouth and drink from it.

### **Follow-up**

- Once the child has been using the device for a period of time (i.e. two weeks, a month) a follow-up appointment should be scheduled to discuss how satisfied the family and the child is with the device.
- If they are not satisfied, discussions can be had regarding switching to a different device.

### **Maintenance and Repairs**

- While these devices are well made and are designed to last, general wear and tear may occur and may require replacement.
- Unless it's a mechanical issue that could be fixed with a new piece or glue, such as the handles coming off of the cup, replacement is the most likely solution.

### **Adapting, Modifying or Fitting the Product**

- Some of the devices, such as the SafeStraw and the Regulating Drinking Cup, come in different sizes to allow for more liquid to be in the mouth at one time.
- These devices can be changed for the different amounts.
- Otherwise, there is little adapting to be done to the devices themselves, as the preferred option would be to switch to a different device if the family was not satisfied with the way their child is using the device.

### **References**

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