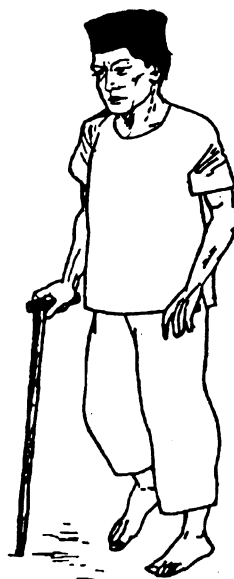
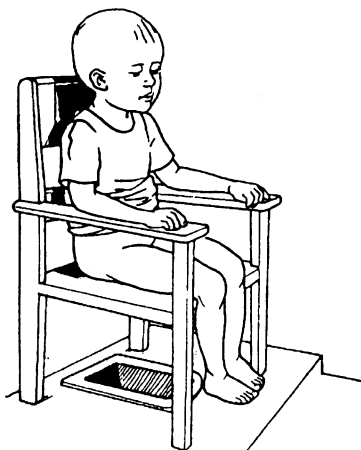


SIMPLE EQUIPMENT TO HELP PEOPLE WITH DISABILITIES

TRAINING MATERIALS FOR COMMUNITY BASED
REHABILITATION WORKERS



PROF. DR. SOEHARSO COMMUNITY BASED REHABILITATION
DEVELOPMENT & TRAINING CENTER
SOLO, INDONESIA

SIMPLE EQUIPMENT IN DISABILITY

TRAINING MATERIALS FOR COMMUNITY BASED REHABILITATION WORKERS

P r e f a c e

This module was developed by the Training Department at the CBR Development and Training Centre in Solo Indonesia under the direction of Laura Krefting, PhD and with assistance from staff: Tavip Riyadi and Dwi Atmo. Special consultants were : Roelie Wolting PT, Franny Dethmers PT, and Helen Madill, PhD.

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December, 1995

ABOUT THIS MANUAL

This is one of a series of manuals written for and by Community Based Rehabilitation workers in Central Java, Indonesia. They are being used to train fieldworkers for projects in different parts of Indonesia and Bangladesh.

The manuals can be used by anyone interested in the problems of disability: people with disability and their families, CBR workers, therapists, doctors or nurses. They can be used by members of CBR teams set up by the government, CBR workers in small projects run by NGOs, and people working in organizations that want to add CBR to their existing projects such as community development organizations and health outreach programs.

These manuals have no copyright so please copy them and pass them on to others interested in disability issues. You may want to translate them into your local language and change them to make them more suitable for your project and country. For example, change the pictures, names and stories to better fit your local area.

These manuals are new and there are weaknesses and things that could be improved. We hope that anyone reading or using them will send criticism and suggestions to us. We especially want your comments about :

- Content - Is it relevant? Is there a better way of doing things ?
- Teaching method - Did you learn from reading the manual and doing the learning activities ?
- Layout - Do you like how the pages look ? Is it easy to read and are the pictures helpful and relevant ?

INFO

CBR

Many of the ideas and illustrations in this manual are not new and have been borrowed. Key sources of material and illustrations are:

Disabled Village Children and Where There is No Doctor by David Werner. Available from the Hesperian Foundation, PO Box 1692, Palo Alto, CA, 94302 USA.

Helping Health Workers Learn by David Werner & Bill Bower. Available from the Hesperian Foundation, PO Box 1692, Palo Alto, CA, 94302 USA.

Training Disabled People in Community by E. Helander, P. Mendis, G. Nelson, and A. Goerd. Available from World Health Organization CH-1211 Geneva 27-Switzerland.

Training for Integration and Participation Manuals Available from International Labor Organization, Harare, Zimbabwe.

Prejudice and Dignity by E. Helander. Available from Interregional Programme for Disabled People of the United Nations Development Programme.

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INTRODUCTION

Many people with disabilities can be more independent with the help of simple equipment. Most of this equipment can be made by a local person in the community. For example a carpenter or someone who works with metal. Sometimes equipment is made in small automobile repair shops or by people who build houses. These people usually need four kinds of information:

- 1) the problem that the person has and the reason for using this equipment;
- 2) what the disabled person wants to be able to do with the equipment;
- 3) a picture of what you want;
- 4) how to take measurements so the equipment "fits" the person who will use it.

This manual gives some ideas about important simple equipment. There are other excellent resource books that give more detail. Some of them are:

- * **Disabled Village Children**, by David Werner. Available from the Hesperian Foundation, PO Box 1692, Palo Alto, CA, 94302 USA
- * **We Can Play and Move**, a manual to help disabled children learn to move by playing with others. Available from AHRTAG, 1 London Bridge Street, London SE1 9SG, UNITED KINGDOM
- * **Promoting the Development of Young Children with Cerebral Palsy**. Available from the World Health Organization, Geneva, SWITZERLAND

PRINCIPLES

There are as many kinds of special equipment as there are disabled people. Do not look for every answer in a book. Be creative and try different ideas.

Always talk to the disabled person and their family first to understand what their needs are. It is important to know what they see as the biggest need. Sometimes some special equipment will help, but not always. **DO NOT** give people equipment because **YOU THINK** it is needed. Make sure that the person wants to use it.

Sometimes people need equipment only for a short time. For example: after an operation or a small stroke a person may need a special seat in the bathroom and pillows when they are lying down. As they recover, they may need other equipment or none at all. Other people will need equipment for their whole lives. For example: someone who is paralyzed by a broken back.

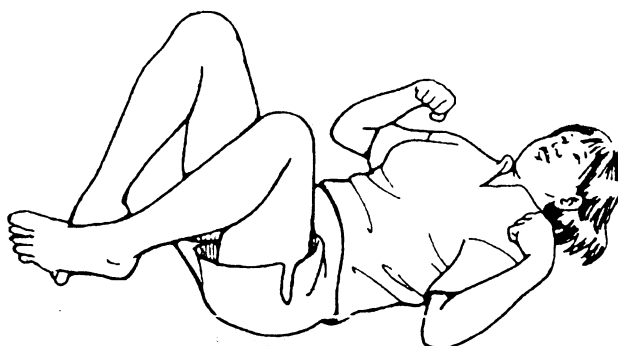
For children who will need special equipment, remember that as they grow, the equipment needs to grow with them. You can make it adjustable or you may have to make a new piece.

1. EQUIPMENT FOR LYING

If someone has to lie down a lot then use lying equipment: boards, pillows, wedges.

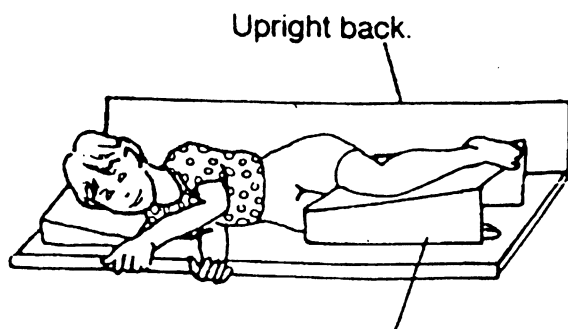
1. BOARDS

- A board behind the back, if people can not keep the side lying position by themselves.



Flexor pattern

This is a spastic child, who cannot do anything with her hands while lying on her back. Her legs are continuously bent. She also cannot change to another position by herself.



Upright back.

Padded leg shelf.

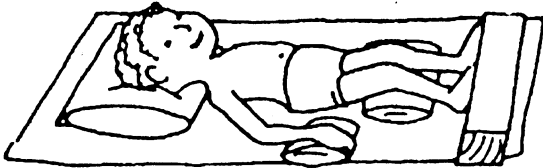
The board keeps the child in a side lying position. A pillow under his head will keep his head more relaxed. His arms should be kept forward, and may now be able to do something with his hands, he is maybe able to learn to eat by himself in this position. The wedge keeps his legs apart and in a relaxed position.

In this position he is able to see much more of what is happening in and around the house.

- A board to keep the feet straight.

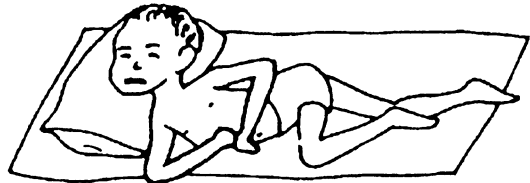
If an adult or child stays in bed for a long time, or a lot of time, it is important to prevent their feet from developing a tip-toe position as in the next picture.

GOOD POSITION



Arm, hip, and legs as straight as possible.
Feet supported.

BAD POSITION

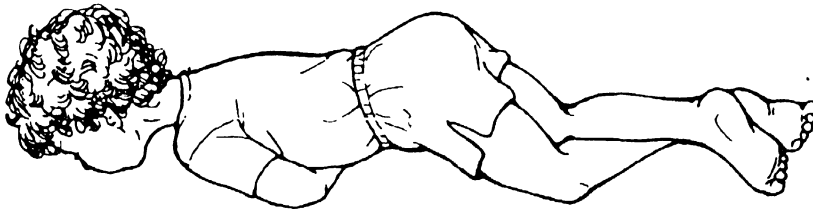


Bent arms, hips, and legs.
Feet in tip-toe position.

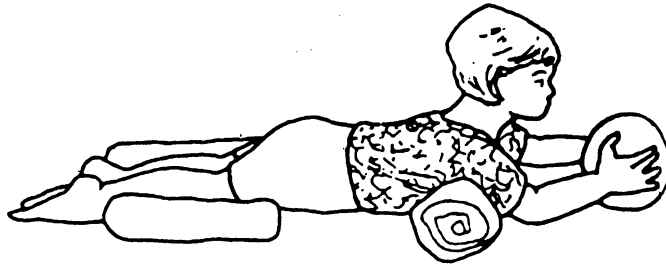
The feet should be flat against the board.

2. PILLOWS

- Pillows can also be used to correct some positions or to make them more comfortable.

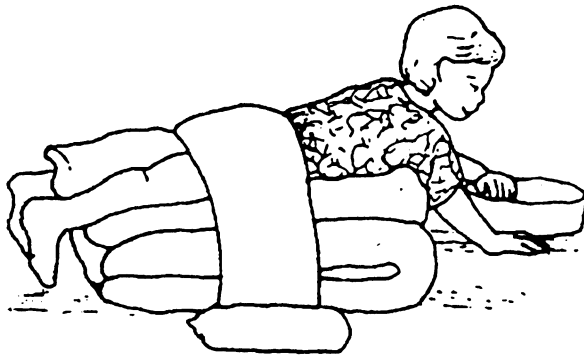


This child is unable to raise the head when lying on his stomach.



Place him on a roll, wedge or cushion. This keeps his arms forward and helps him to lift his head.

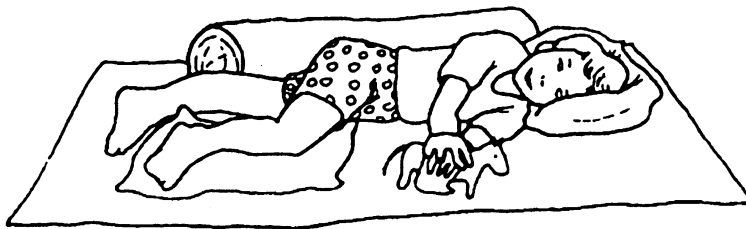
Hold floppy legs together with cushions or sandbags.



Place him on a roll, wedge or cushion. This keeps his arms forward and helps him to lift his head.

Hold stiff legs apart with a roll.

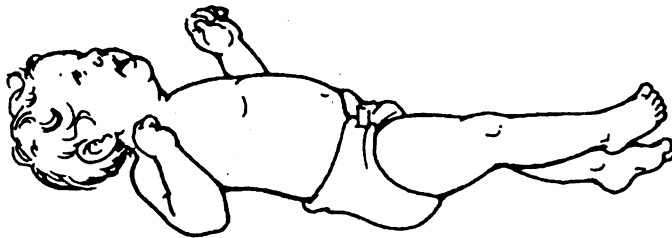
Straighten bent hips with two sandbags joined with a strip of material.



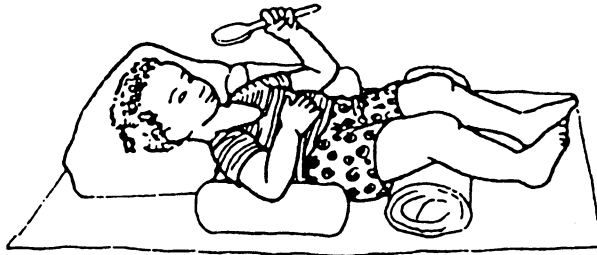
Place a pillow behind him to prevent him from rolling onto his back.

Keep both arms forward to bring his hands together.

Bend one hip and knee. This stops his legs from pressing together and relaxes his body.



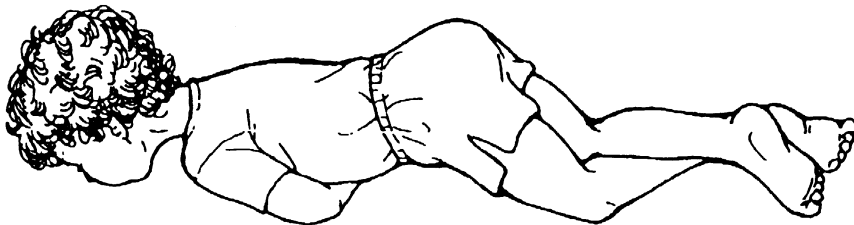
Flexor pattern of the upper body
with extensor pattern of the lower body.



Bring his head and shoulders forward with pillows.
Bend his hips and knees. This prevents his body from becoming stiff and straight.

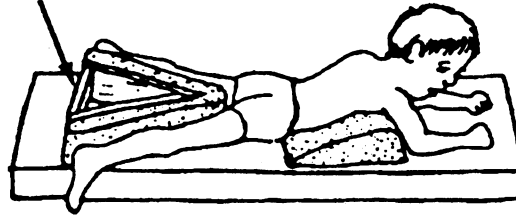
3. WEDGE

- Children who have problems controlling their head, their shoulders, their arms and their hands should be laid on their stomach regularly. Instead of pillows a wedge can help to make it easier for the child to gain better control in that position.

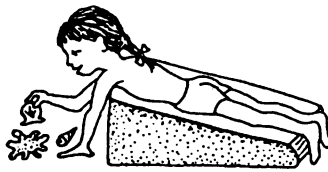


This child is unable to raise his head while lying on his stomach.

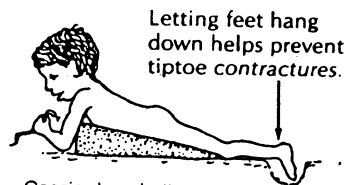
leg separator
if needed



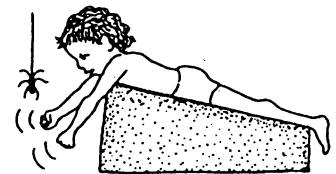
Place him on a wedge. This keeps his arms forward and helps him to lift his head. If his legs are pressing together use a leg separator or a pillow.



Diana manages best on a wedge high enough so that she can lift herself up a little at arms length. (Height is the length from wrist to armpit.)



Cassio does better on a lower wedge, so he can lift up on his elbows. (Height is slightly less than length from elbow to armpit.)



Carmen and others with little or no arm or hand control do best when their arms can dangle. She can see them moving when she moves her shoulders.

4. PRINCIPLES

Positions should be changed regularly, especially if the person cannot do it by himself! Staying in the same position for a long time will make the person stiff and can cause pressure sores. Change positions if the person is not comfortable anymore, otherwise always change every two hours.

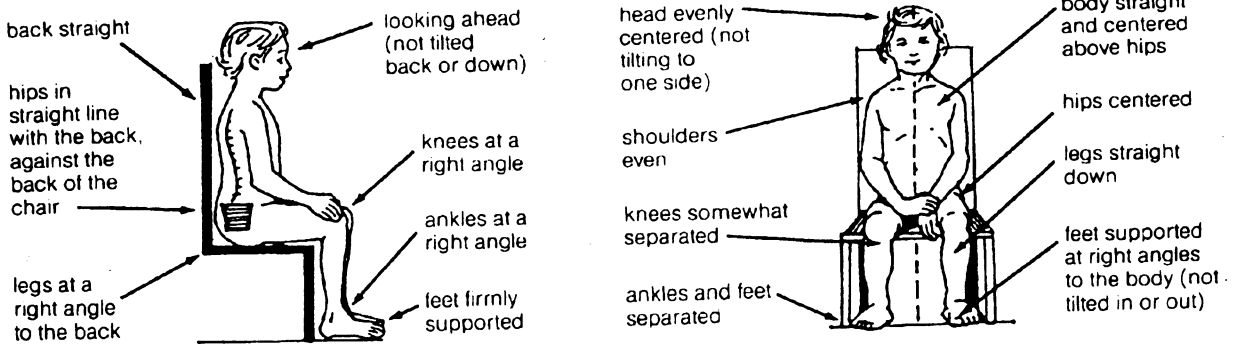
A person who needs help to control his position in lying, may also need special equipment for sitting or standing.

Do not give more support than is needed.

2. EQUIPMENT FOR SITTING

If someone cannot sit or sit well then use sitting equipment.

1. WHAT IS A GOOD SITTING POSITION ?

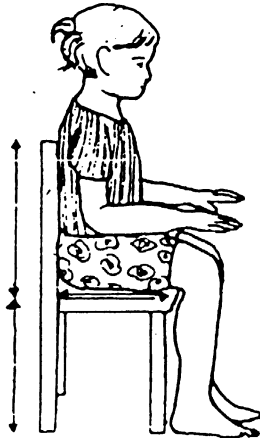


CAUTION : The seat should be wide enough to allow some free movement and narrow enough to give needed support.

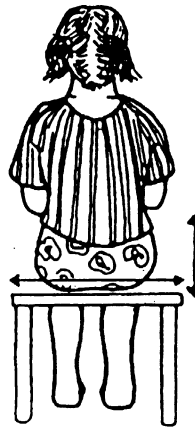
How to measure the person :

Seat back height - armpit to bottom.

Seat height - back of knee to heel.



Chair arm height - seat to elbow.

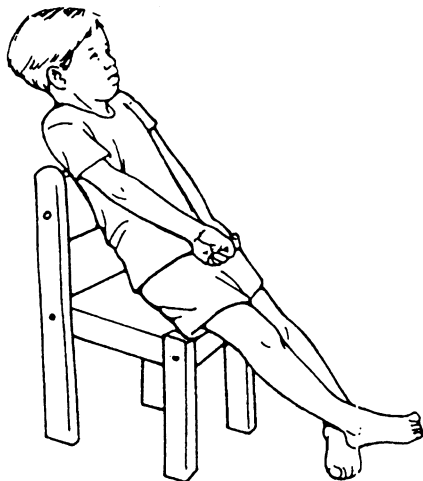


Seat depth - back of bottom to back of knee, less width of two fingers.

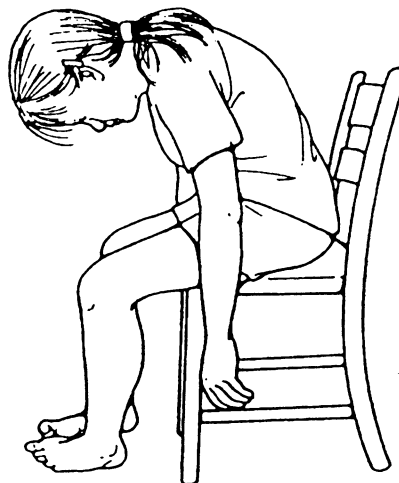
Seat width - width of bottom plus width of two fingers.

2. WHEN TO USE WHICH ADAPTATION

The adaptations can be made in a normal chair, in a wheelchair or maybe a special chair has to be made.



The whole body is too straight in this position, the legs press together.



This child is too floppy, too weak, to hold her upper body and head up.

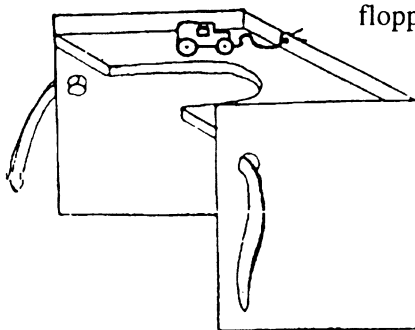
If he slides out of the chair, use a lap strap which pulls down and back.



If his hips are too straight, use a seat wedge under his thighs.

If his legs straighten so that his feet are not flat, use a foot box.

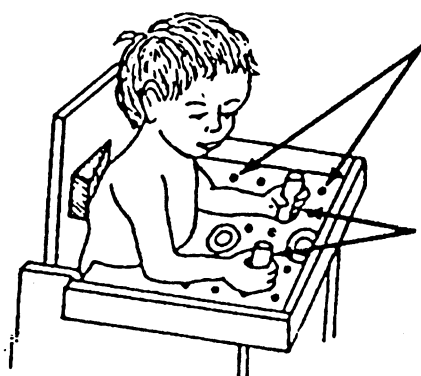
If he falls forward, use a table which fits around his body.



Raise the table height to support a floppy child.

If he knocks things off the table, raise the edges. Keep toys on a string.

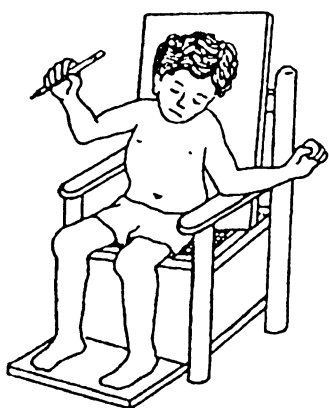
If his movements push the table away, tie it to the chair.



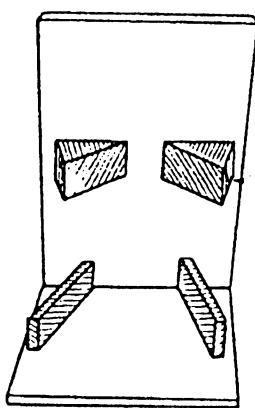
Extra holes for changing peg position

Two pegs to hold onto may help him sit, or move into a better position. They also help him develop hand control.

Height of the lapboard is usually the same as for armrests.
Experiment to find out what works best.



A



B

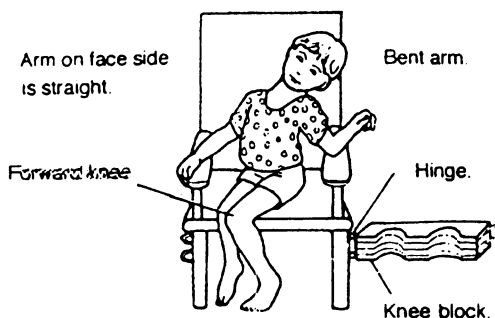
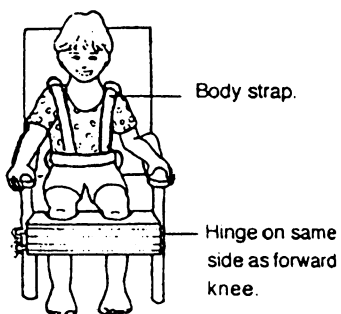


C

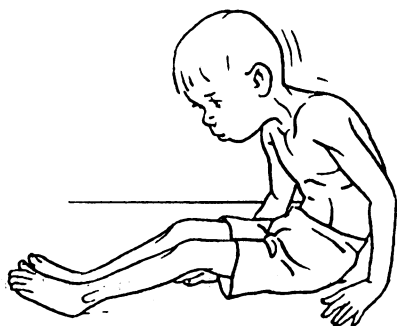
- A:** The spastic shoulder muscles pull the child's shoulders back and make it hard for him to bring his hands together in front of him.
- B+C:** Make wings behind the shoulder blades like this to help keep his shoulders forward. The child can hold his hands together and play more. The hip guides prevent his legs from falling aside.



Instead of shoulder wings, you can also use a corner chair, like in picture...
Or have the child seated in the corner of the room, to try out how it works.



The child can not sit straight without help.

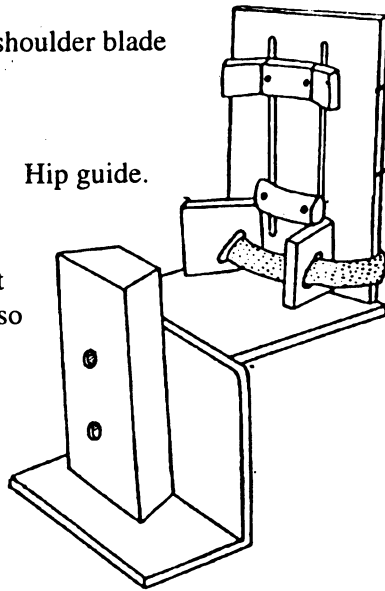


To prevent contractures, sit the child with straight knees. This is especially important for small children. Older children or adults with Cerebral Palsy probably already have contractures and are not able to sit with straight legs, even if you help them. If his legs are pressing together add a knee separator. Add groin straps if the child slides forward.

Adjustable shoulder blade wings.

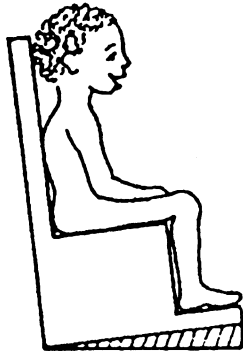
Hip guide.

Removable knee and foot separator (wider at front so that child's knees do not slip forward).

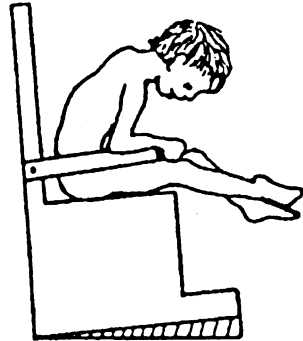


ANGLE OF BODY AND HEAD

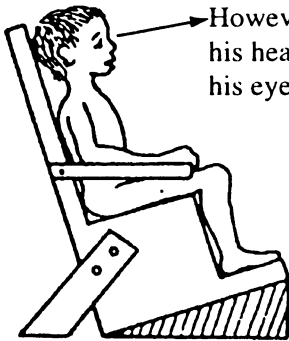
A slight backward tilt helps most children sit in a better, more relaxed position.



If the child still falls or stiffens forward.

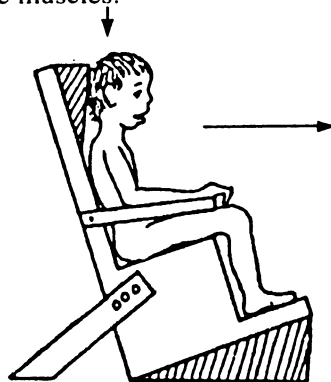


It may help to tip the chair back even more.

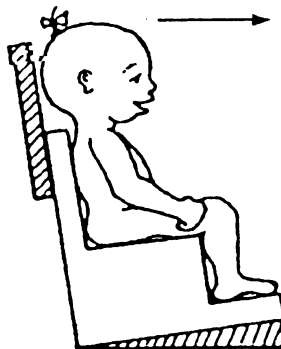


However, this may cause his head to lean back so his eyes look upward.

A head pad may help position him to look forward, and may decrease some spasticity in the eye muscles.

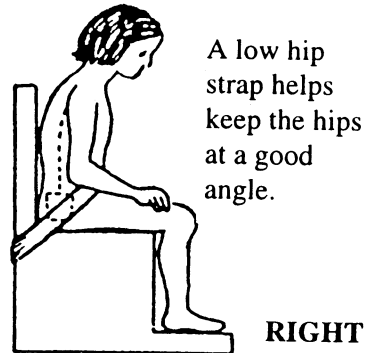
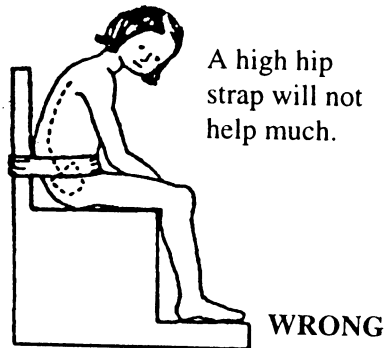


Putting the headrest behind the level of the backboard lets the child hold her head in a better position.

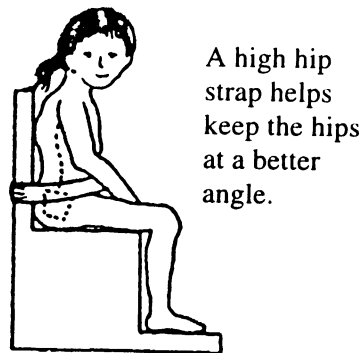
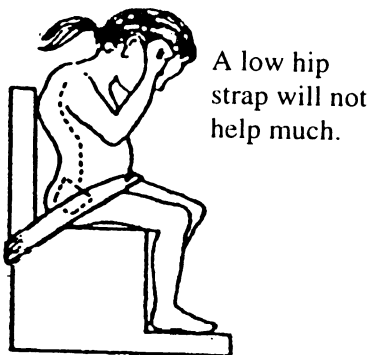


If the child has a big head, use a padded headrest like the one in this picture.

If the hips tilt back like this:

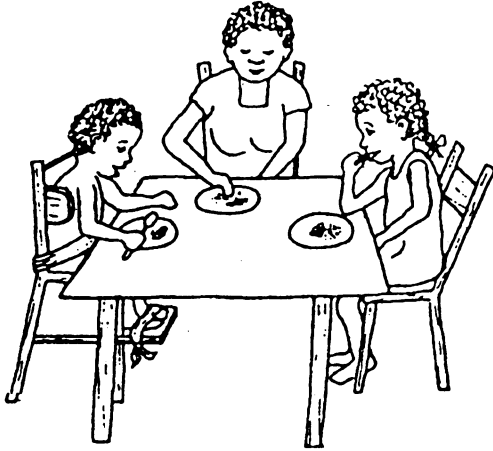


But if the hips tilt forward like this:

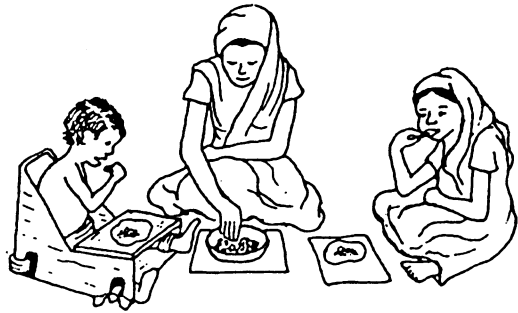


Always check if the equipment produces the result you expect.

A 'high chair' lets the child join the family that eats at a table.



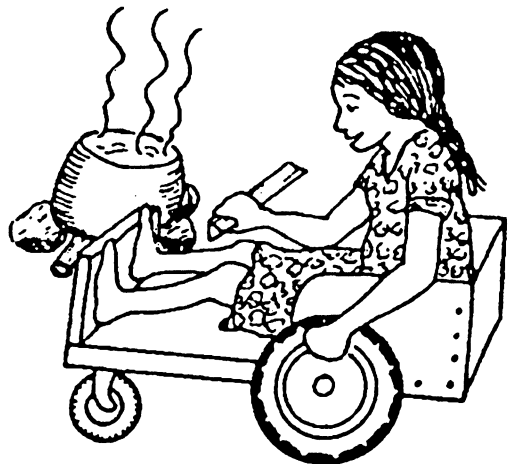
A 'low chair' lets the child fit in where the family eats at ground level.



Also, a 'high' wheelchair may be helpful where cooking and other activities are done high up.



But a low 'wheelboard' or 'trolley' may be better where cooking and other activities are done at ground level.



MAKING TROLLEYS

WHAT YOU NEED TO MAKE A TROLLEY

- You will need pieces of wood which, when joined, will be large enough to make a seat. The wood must be strong enough to hold the person's weight. Each piece of wood must be as wide as your hand.

- You will need three pieces of wood to put across the seat to hold it together. The pieces should be three fingers wide and three fingers thick. One of the pieces of wood should be as long as the width of the seat. Two of these pieces of wood will be the axles. Each piece should be as long as the width of the seat, with the width of your hand added on.
- You will need a strip of wood the thickness of two fingers, the width of your hand, and a length eight times of your hand. From this you will cut out eight pieces of wood. Each piece of wood will make a wheel. Each piece will be as wide as your hand in both length and breadth.
- You will need four pieces of tyre rubber long enough to cover the rim of each wheel. The piece of rubber should be four fingers wide.
- You will need four pieces of wood to make four pins. Each pin should be as long as the width of your hand. Each should be two fingers thick at one end and one finger thick at the other end.
- You will also need nails and glue.

HOW TO MAKE THE TROLLEY

- Make the different parts of the trolley separately. Make the seat, axles and wheels separately. Then put the parts together.

HOW TO MAKE THE SEAT

- Join the pieces of wood together with glue.

HOW TO MAKE THE AXLES

- Take the two pieces of wood for the axles. At each end of the pieces measure the width of your hand. These parts will be the ends of the axles.
- To make the ends of the axles round, first draw a circle on the ends.
- Then cut away the edges and make the ends of the axles round.

HOW TO MAKE WHEELS

- Take each piece of wood for the wheels.
- On each piece draw two lines between the opposite corners, as shown in the picture. In this way you will find the middle of the wheel.
- Now put a nail in the middle of the piece of wood. Tie a piece of string to the nail. The string should be as long as half the width of your hand. Tie a pencil or sharp stick to the other end

of the string. With this mark a circle.

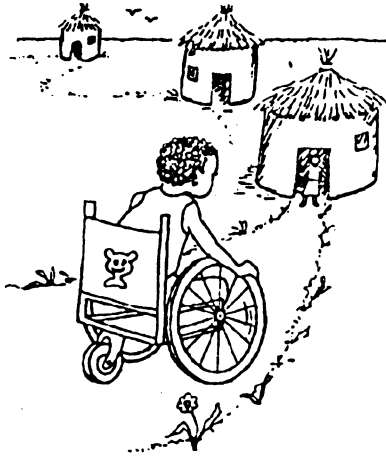
- In the middle of the large circle, mark a small circle, three fingers wide.
- Cut out the smaller circle to make a hole. This hole is for the axle.
- One way to cut the hole is by burning it through the wood. To do this you need an iron rod. Heat the rod. Then, using a pair of tongs, put the iron rod in the middle of the piece of wood. The hot iron rod will burn the wood and make a hole through it.
- Put the pieces of wood on the ground or on something hard. Cut away the corners of each piece of wood to make 8 circles.
- Two circles glued together make one wheel. Before you glue them, look at the lines in the wood. The lines in one piece of wood should go in the opposite direction. Putting them together this way makes the wheel strong. Make 4 wheels in this way.
- Cover the rim of each wheel with a strip of tyre rubber.

HOW TO PUT THE SEAT , AXLES, AND WHEELS TOGETHER

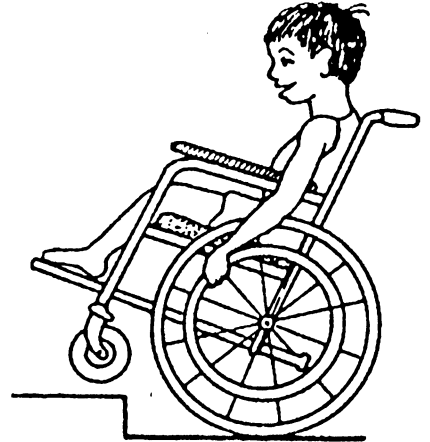
- Use nails to fix the two axles to each end of the seat.
- Fix the other piece of wood across the middle of the seat.
- Now put the wheels on the axles.
- Put a coin on the axles, standing up next to the wheel. Mark a point on the axle next to the coin. This point is where you will make holes for the pins.
- Now make the holes for the pins. Each hole should be one finger thick.
- You can make these holes in the same way that you made the holes in the wheels, by burning the wood.
- Now put the pins in the holes to hold the four wheels in place.

It is important to consider the type of ground surface on which a wheelchair will be used.

Where land is flat and fairly smooth, and entrance into houses is level, a chair with a small wheel at the rear may work well and be less costly to make.



But where there are curbs, steps, rocks, or other obstacles, a chair with small wheels at the front works better.



To jump over obstacles, the child can learn to do a 'wheelie' (tilt the chair back with the front wheels in the air).

On rough, sandy surfaces wide back tires and relatively large, wide front casters make moving about much easier.

Narrow back tires and small front wheels allow for faster travel on hard smooth roads but are useless on rough, sandy roads.



Wide tires, like the wide feet of a camel, help in sandy places.

3. PRINCIPLES

Be sure to add cushions or adequate padding to all seating designs. Children whose bodies push in uncontrolled ways can very easily develop pressure sores. Do not give more support than is needed.

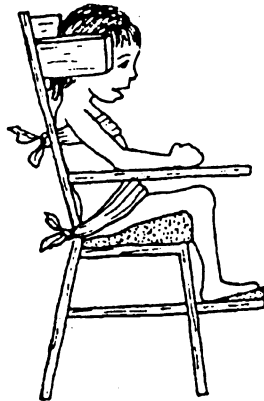
Adapt special features to the needs of the particular person, and test them before making them permanent.

Seating needs to be changed and supports reduced as the child develops.

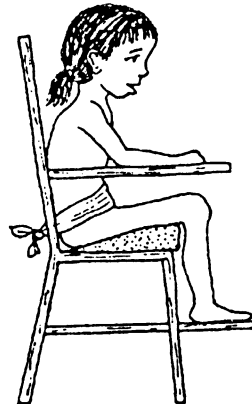
1. A child who is “floppy” and slow to develop ability to sit.



2. May at first need a seat with straps and supports to hold her up.



3. As she develop better head control and then body control, the supports can be removed little by little.



4. Until finally she is able to sit anywhere, with little or no special supports. Now low back support is all she needs.



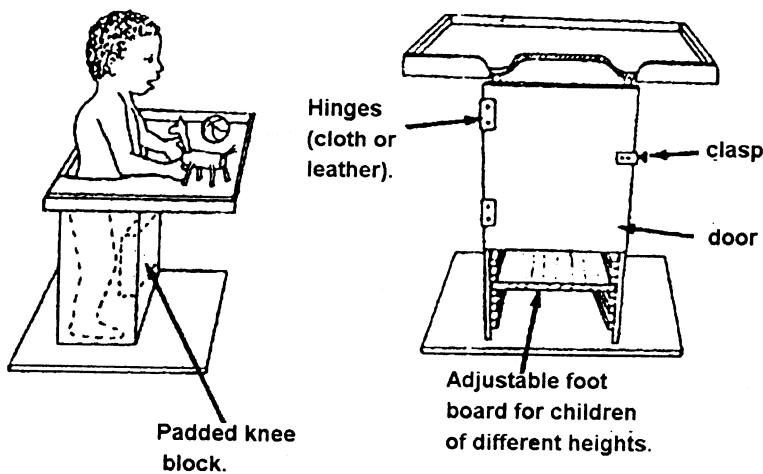
3. EQUIPMENT FOR STANDING

If someone can not stand then use standing equipment.

Standing is important, even when someone will never learn to stand and walk on his own. It is important to prevent contractures, stimulate the blood circulation, keep the bones strong, and to stimulate balance.

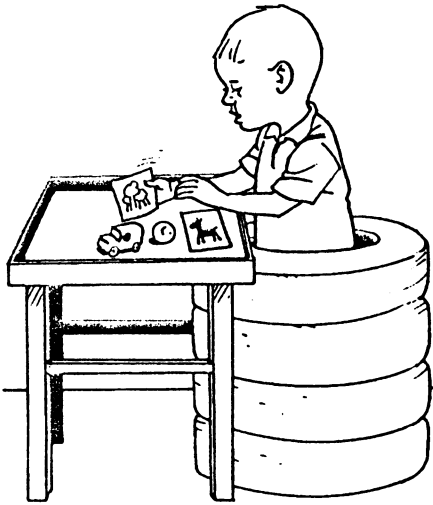
1. STAND-IN TABLES

- For people who can correct their position quite well when standing with support for a short time, but still lose their balance regularly.



How to measure the person :

- height: the adult/child should be able to lean on the table with his elbows when standing straight.
- width: the width should be smaller at the bottom than at the top.



Child standing inside car tires in front of a table.

Car tires can also be used as a stand-in table, especially for older children. For younger children this is too wide and they will not get enough support.



Small child standing in a few car tires, which are too wide, the child cannot stand straight.

How to adapt the stand-in table to the needs of each person:

- for a child, who will need the stand-in table for a few years, make an adjustable foot board so the table can be adjusted as they grow.
- for someone who has trouble keeping his knees straight, make a padded knee block.
- for someone who has good upper body control, the height of the stand-in table could be only up to the pelvis.
- or someone who has poor upper body control, the height of the stand-in table should be up to the chest.

2. STANDING FRAME

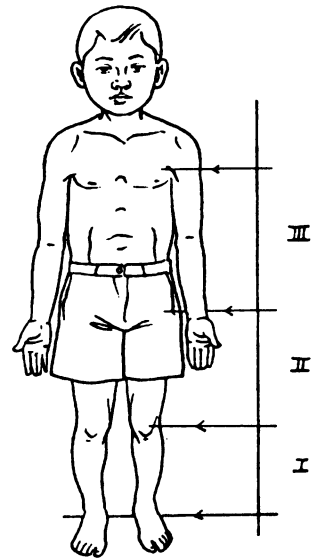
- For people who need more assistance to be able to stay standing in the right position.



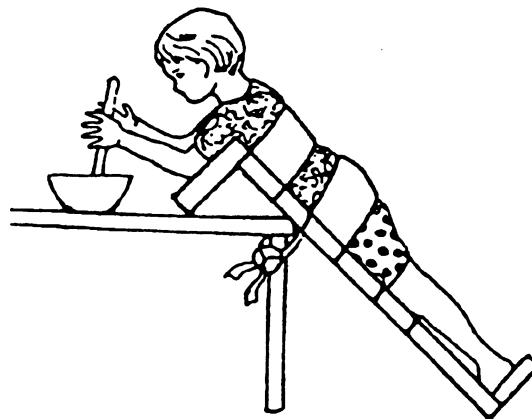
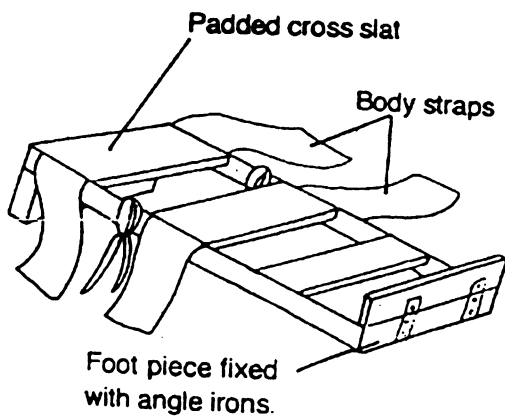
Floppy child who stands, but child does not take full weight on the legs, too floppy, whole body still bent.

Child standing (or lying), with measurements feet till knee, knee till buttock, buttock till chest.

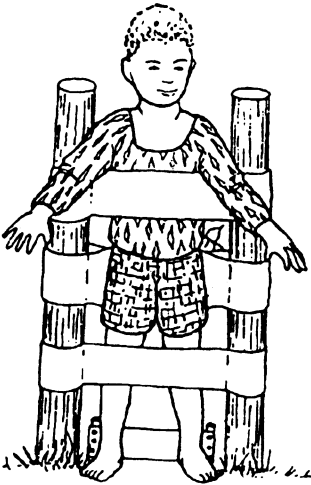
Measure the height of the knees, the buttocks and the chest, because those are the places where straps will be needed.



If he needs support to stand and his body is bent, or he cannot keep his heels on the ground, use a forward lean stander.



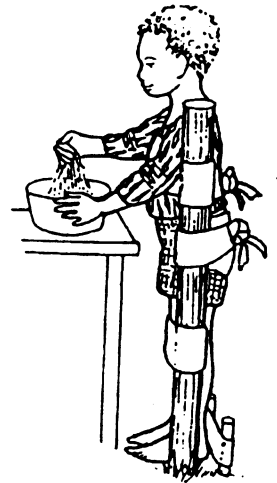
If he needs less body support use an upright stander. make sure the upright poles are pushed well into the ground or fix them to a large square base for use indoors.



Heel board

For children who lean back, bring the chest strap right around the body. Tie at the back.

Pull the ends of the bottom strap firmly to strenghten the hips. Tie the ends securely over the bottom.

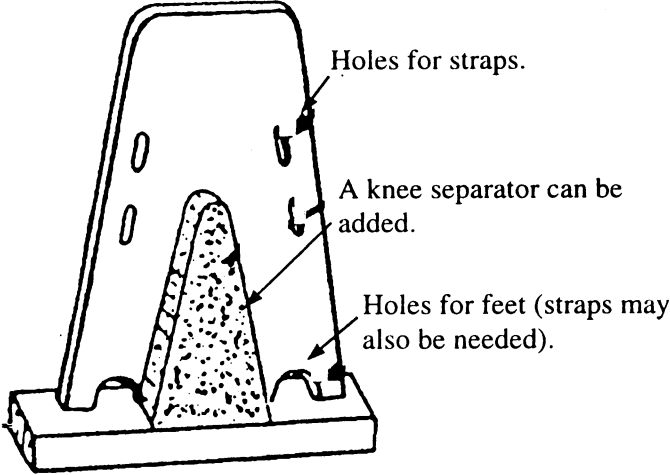
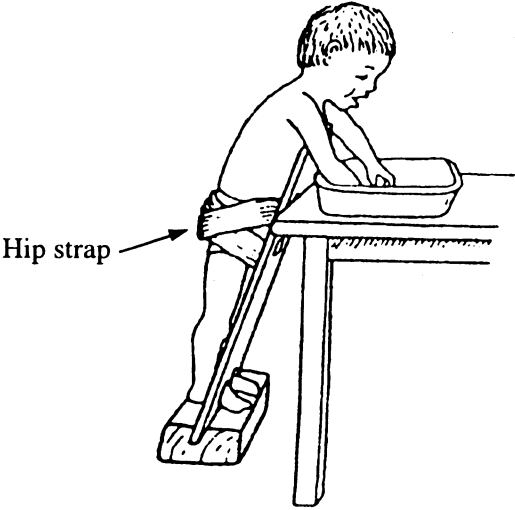


Child who stands, with upper body in good position, hips are bent, knees are a little bent and press together.

If the child is standing like this, you can use a simple standing board.



A simple standing board can help hold the child in a stable position. This one leans against a table.

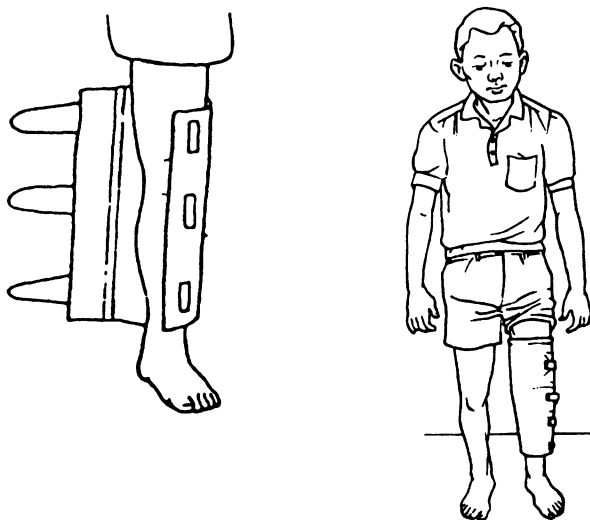


3. KNEE SPLINT

Good for - a person who cannot stand or walk alone because his knees bend too far back or too far forward.

Bad for - a person who can walk on his own

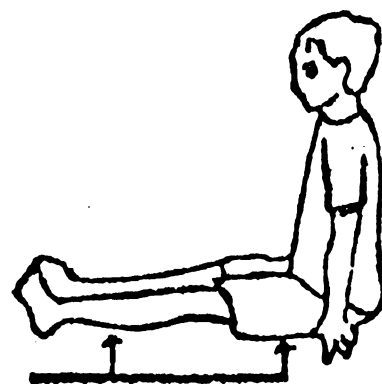
Things to remember - If the leg muscles are working but are very weak make sure that the person takes off the splint and does exercises for stiffness and weakness for the leg 3 times a day. He should try and stand without the splint. If the leg is paralysed and the muscles do not work do exercises for stiffness twice a day to prevent stiffness.



- The person's knee may bend forward when he or she stands. Or the knee may bend too far backward when the person stands. Then the knee is not in a good position for walking. If the person's knee is not in a good position when he or she walks, make a splint to support the knee.
- Make splints for a person's knees if the person sits or crawls during the day and cannot keep the knees straight at night. The person can wear the splints at night to prevent the knees becoming stiff in the bent position.

HOW TO MEASURE FOR THE SPLINT

- The person first sits with the knees straight.
- Then you hold a long, thin stick next to the person's leg to measure for the length of the splint.
- Place one end of the stick at the point which is halfway between the knee and the person's buttock.



- Then mark the stick at the point which is halfway between the person's knee and heel.
- The splint must be as long as the distance between these two points. If the splint is shorter than this it will not support the knee.

WHAT YOU NEED TO MAKE THE SPLINT FROM BAMBOO

- You will need a piece of strong bamboo which is as long as the splint will be.
- You will need a piece of cloth to cover the bamboo.
- You will need bandages or cloth to hold the splint on the leg.

HOW TO MAKE THE SPLINT

- Split the bamboo into two pieces along its length.
- Smooth the bamboo on the inside. Cover the inside with the cloth.
- You can make the splint from wood instead of bamboo.
- If the person is a child, you can use very thick layers of paper, such as newspapers instead of bamboo or wood to make the splint

HOW TO PUT ON THE SPLINT

- Put on the splint so that the middle of the splint is behind the middle of the person's knee.
- Wrap the bandages or cloth around the knee and the splint to hold the splint well against the leg, without being too tight.
- Make splints for both knees if necessary.
- Teach the person to put the splint on and to take it off without help.
- Teach the person to walk using the splint.

4. PRINCIPLES

Be sure to add adequate padding to all equipment. People whose bodies push in uncontrolled ways can very easily develop pressure sores.

Standing equipment needs to be changed and supports reduced as the child develops more control.

Do not give more support than is needed.

4. EQUIPMENT FOR WALKING

If someone cannot walk alone then use walking equipment.

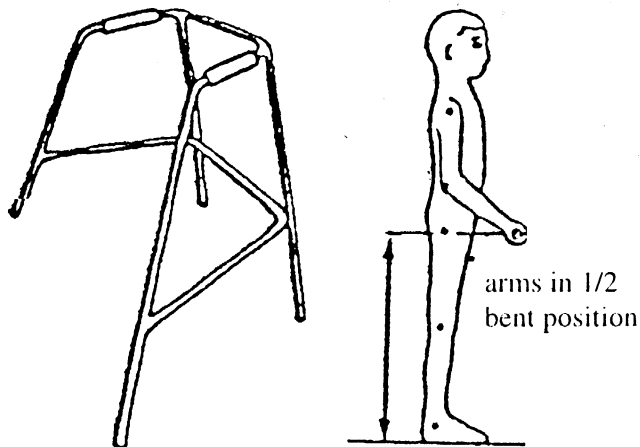
Some people need walking equipment for only a short period of time e.g. because they have injured their leg and are not allowed to put full weight on it until the leg is healed.

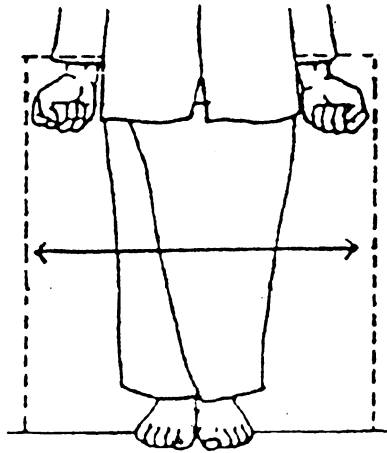
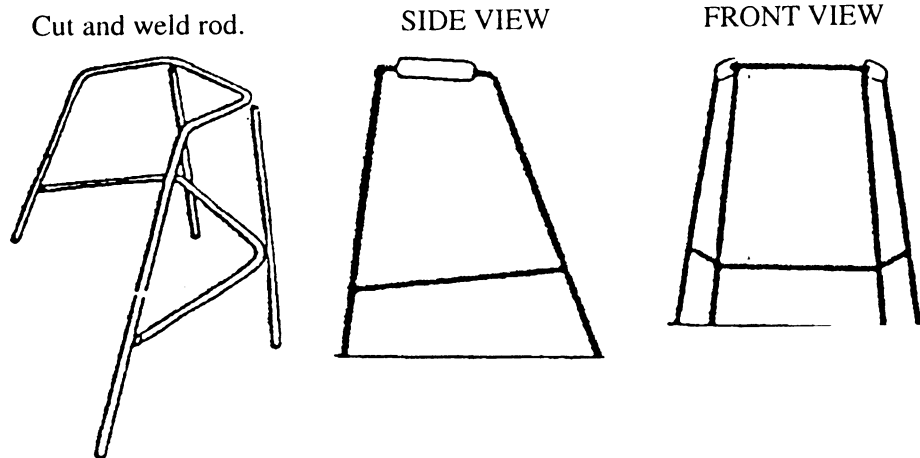
Some people need walking equipment forever e.g. because they have one or two weak legs or because they do not have the coordination to walk properly without support.

1. WALKER

- For children who can walk a little already , but still need to hold on to something stable with both hands and don't have the balance and coordination to use crutches or a stick.
- People who start walking after injuring their leg, but don't have the balance and coordination to use crutches or
- People who's balance and walking movements are poor.

How to measure the person:





There are many ways to make walkers. Choose the design and height according to the person's needs and size.

MEASURING AND MAKING WALKERS

Walkers can be different heights according to how much support the person needs. If the person needs support for the upper part of her body, then the frame must be tall enough for the person to rest her forearms on top of the frame while holding it. If the person does not need support for the upper part of the body, make the frame shorter. Then the person can lean on the top of the frame with her hands.

HOW TO MEASURE THE WALKER

- First the person stands up holding on to a tree or a wall with one hand. The other arm is by the side.
- Then you hold a long, thin stick at the person's side.

- If you are making a tall frame, mark the stick at a point about halfway between the person's armpit and waist.
- If you are making a short frame, mark the stick at the level of the person's wrist.
- This point marks the height that the frame will be.
- Now measure the distance between the person's shoulders with the stick.
- The inside of the frame should be as wide and as deep as this distance; it will be a square with one side missing.

WHAT YOU NEED TO MAKE A WOODEN WALKER

- You will need four pieces of wood as high as the frame will be.
- You will need six pieces of wood as long as the width of the frame. The wood should be three fingers thick and very strong.
- You will need screws and glue.
- You will need cloth to make padding.
- You will need four small pieces of rubber for the ends of the legs of the frame.

HOW TO MAKE A WOODEN FRAME

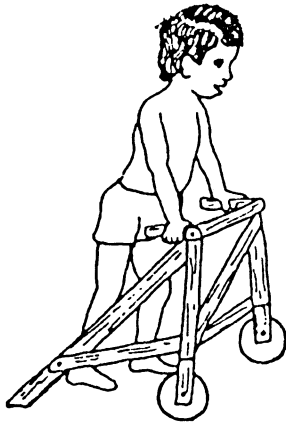
- Take the four long pieces of wood. Cut each piece out at one end to make a square shaped peg. The peg should be the thickness of one finger.
- Take four short pieces. Cut a piece of wood away at one end. The piece you cut off should be two fingers in width. Cut each out at both ends to make square-shaped pegs as you did for the long pieces.
- At the lower end of each of the long pieces mark a point the width of your hand from the ground.

Make holes at these points. Make the holes so that the pegs of the short pieces will fit into them.

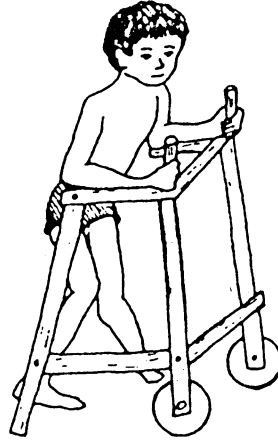
- On two long pieces mark a point three fingers above the level of the holes you made. Mark these points on one side of the long piece only. Mark each point on a side next to the one in which you made the first holes. Look at the picture to see how this is done. Make holes at these two points into which the pegs will fit. Take the two short pieces of wood that you have not yet used. In each of them make 2 holes. The pegs of the long pieces will fit into these holes. Make the holes three fingers from the edge of the wood.

- Take the two short pieces in which you made holes. Make two more holes as in the picture. Make each hole two fingers from the edge of the wood. Make the holes so that the pegs of the short pieces will fit into them.
- Make one side of the frame by joining two long pieces with two short pieces. Put one short piece with pegs into the lower holes of two long pieces. Put one short piece with holes across the top.
- Join the other two long pieces in the same way using two short pieces. This makes the other side of the frame.
- You now have two short pieces with pegs left over. Fit these into the two sides of the frame as shown in the picture. Fix together using glue.
- Put in screws to keep the pegs in place.
- Make the top part of the frame smooth so that it will not hurt the person's hands. Or you can wrap a piece of cloth around this part of the frame so that it will be easier for the person to hold.
- Fix pieces of rubber to the bottom of the legs of the frame so that it will not slip.

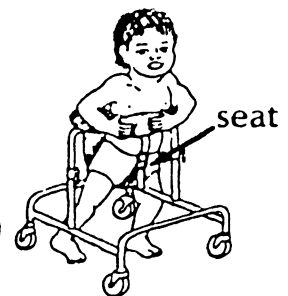
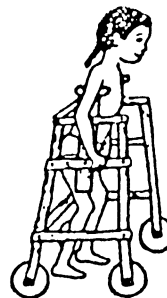
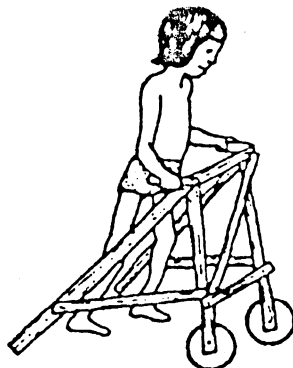
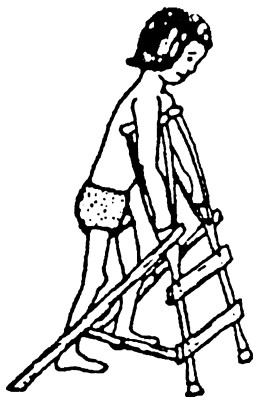
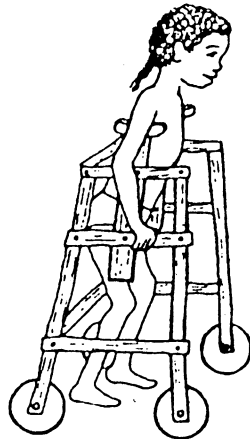
A child with strong arms and good body control can use a simple low walker.



A child with weak elbows and poor balance or body control needs a higher walker with armsrests.



A child with weak legs and poor balance does best with underarm crutches built into the walker.



Finding the design that works best for a particular person often involves experimenting!

2. CRUTCHES

- For people who injure a leg and are not allowed to put weight on that leg yet.
- For people with a leg or legs, that are not strong enough to carry them.
- People with one or two braces who need the extra stability and support that crutches can give.
- People who need some extra help to prevent them from falling, because balance and coordination are poor.
- People who only have one leg.
- People with one leg shorter than the other.

How to measure the person:

Top of crutch should be 3 fingers' width below armpit, so it does not press under the arms.

RIGHT

WRONG

RIGHT

WARNING : Bearing weight under the arms like this can cause nerve damage that in time can lead to numbness and even paralysis of the hands.

Teach the child to put weight on her hands, not on her armpits.

Elbow should be bent a little so that arms can lift body when walking.

Full weight on hand.

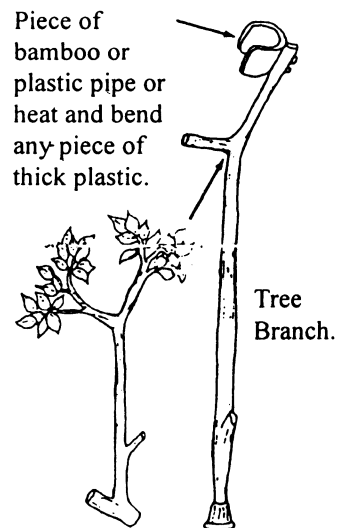
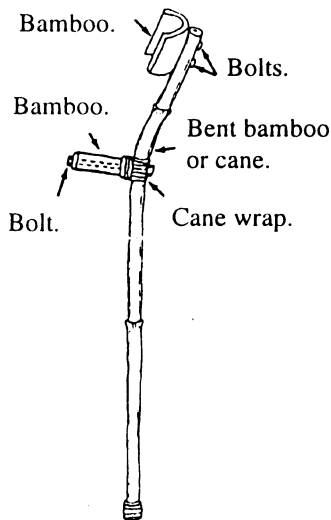
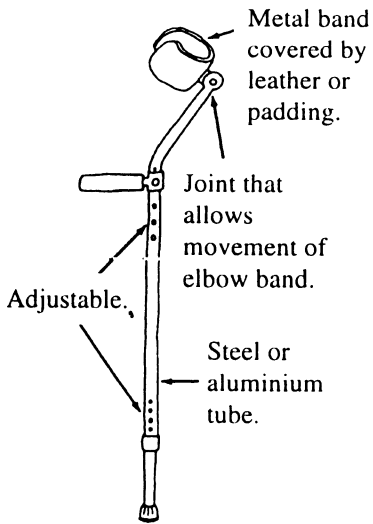
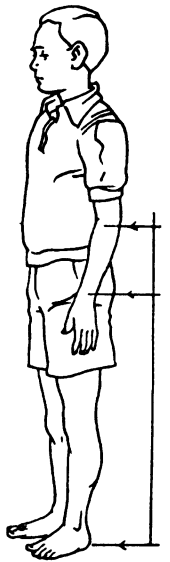
Handgrip should be placed for comfort-usually about 1/3 of the way down crutch.

One good way to make sure the child does not hang on the crutches with her armpits is to use elbow crutches like this.

How to measure the person :

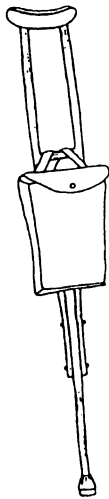
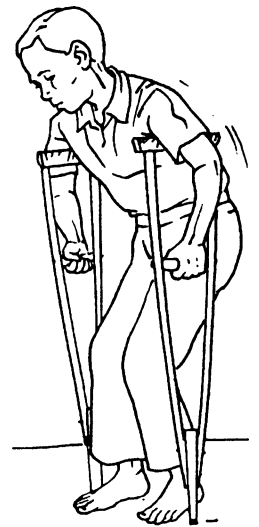
Measure from the floor to the wrist. At that height the grip for the hand should be.

Measure from wrist to just under the elbow: this is the distance between handgrip and elbow ring.



Person walking with too low crutches, bent too far forward.

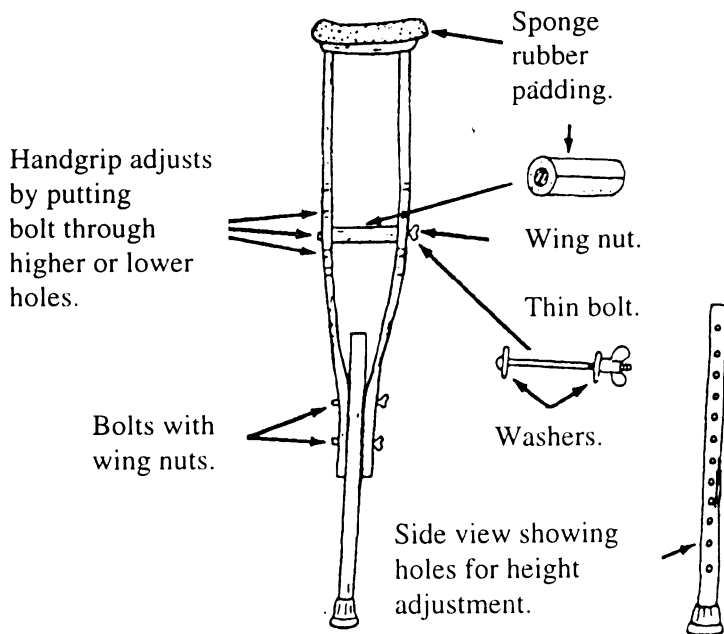
Some examples to make the crutches more functional.



Crutch sling to free hands for work.



How to make crutches adjustable so that children can use them as they grow.



MEASURING AND MAKING CRUTCHES

HOW TO MEASURE FOR THE CRUTCHES

- First the person stands up holding on to a tree or wall with one arm. The other arm is by the person's side.
- Then you hold a long stick against the person's side.
- Put two fingers below the armpit of the person and mark the stick at this point. This point marks how long the crutches will be.
- Then mark the stick at the level of the person's hand.

WHAT YOU NEED TO MAKE THE CRUTCHES

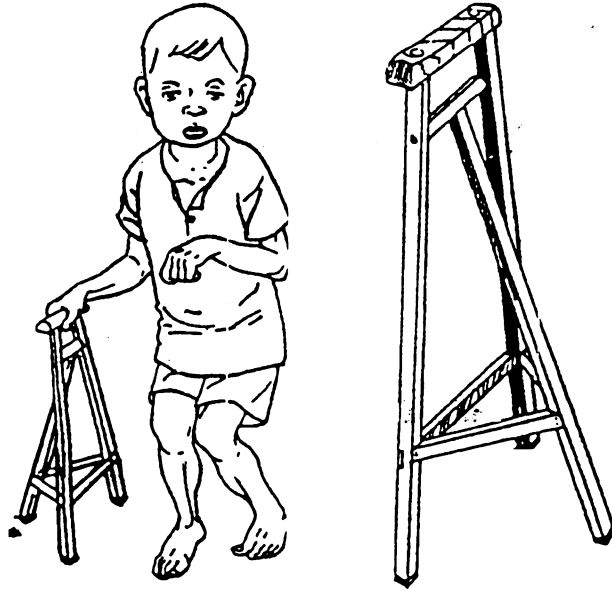
- You will need two pieces of wood that are as high as the crutches and as thick as two fingers.
- You will need four round pieces of wood that are two fingers thick and as long as the width of your hand.
- You will need screws and glue.
- You will need cloth or soft rubber for padding.
- You will need two pieces of rubber for the bottom of the crutches.

HOW TO MAKE CRUTCHES

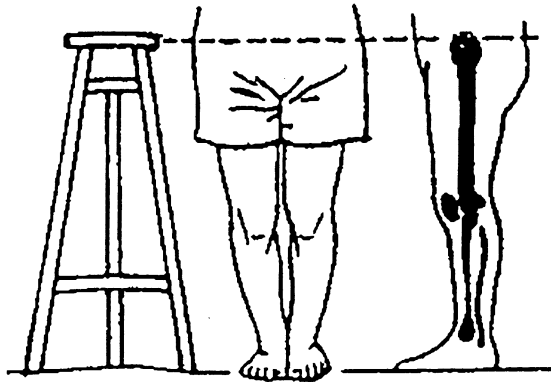
- Each long piece of wood is to make one crutch. On each of the long pieces of wood, mark a point at one-third of its length from the ground up.
- Make a hole through the wood at this point. The hole should be the size of your little finger. Make very sure that you make the hole in the centre of the piece of wood.
- Split each piece of wood from the top down to the point that you have marked.
- Now put two short pieces of wood in each crutch. One piece goes at the mark you have made for the position of the hand. The other piece goes at the top of the crutch inside the split wood.
- Screw these in place. Also put a screw just above the point where the split in the wood ends. This will prevent the crutch from breaking.

3. TRIPOD

- For people who have problems with their balance and need something they can lean on, which gives more stability than a stick or crutch.



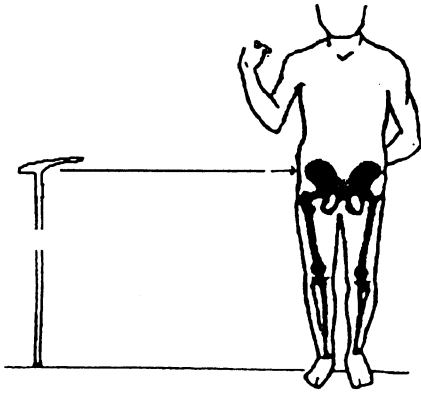
How to measure the person :



4. STICK

- For adults who feel that they need a little help to keep their balance. The stick gives them confidence.
- Adults who have nearly recovered from an injured leg. They are allowed to use their leg almost completely again, but especially when walking longer distances they still need some extra support.

How to measure the person :



MEASURING AND MAKING A STICK

HOW TO MEASURE FOR THE STICK

- First the person stands up holding on to a tree or wall with one hand. The other arm is by the person's side.
- Then you hold a long, thin stick against the person's side.
- Mark the point on the stick which is at the level of the person's wrist. This point marks how long the stick should be.

WHAT YOU NEED TO MAKE THE STICK

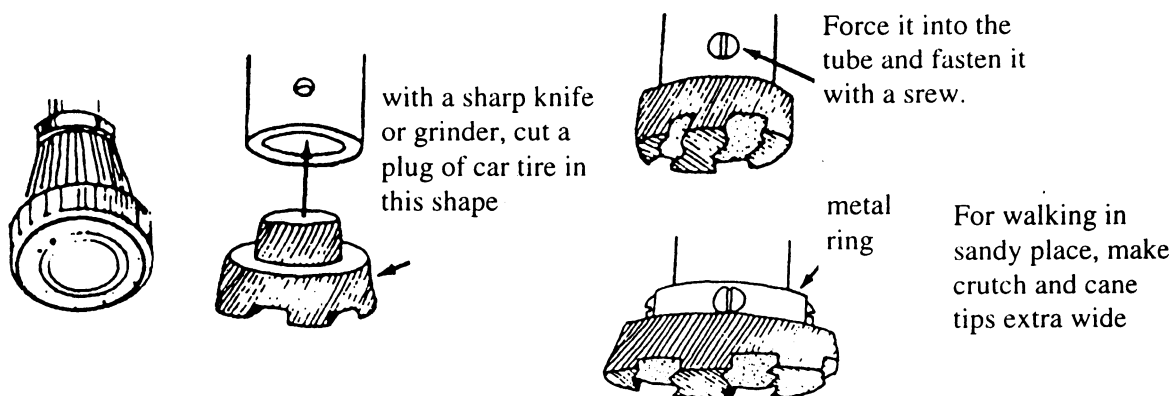
- You will need a strong tree branch shaped like this. The branch should be as long as the distance you measured above. The branch should be two fingers thick. It must be strong enough to hold the person's weight.
- You will need cloth for the hand.
- You will need a pieces of rubber for the bottom of the stick.
- You will need glue.

HOW TO MAKE THE STICKS

- First smooth the end of the stick so that the wood will not hurt the person's hand.
- Or wrap pieces of cloth around the handle to make them easier for the person to hold.
- Fix the pieces of rubber to the bottom of the stick so that it will not slip.

With a rubber tip made from a car tire you can stop the crutches or a stick from slipping.

STANDARD CRUTCH AND CANE TIP



5. FOOT SPLINT

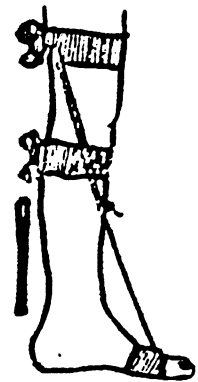
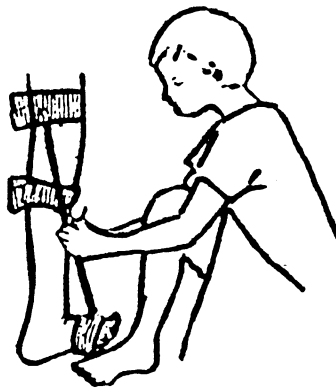
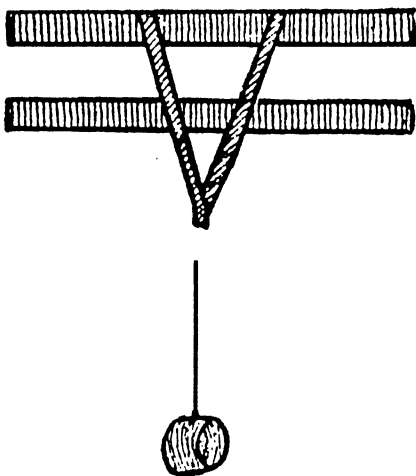
Good for - a person who drags his toes when he walks.

Bad for - a person who can walk on his own.

Things to remember - If the foot muscles are working but are very weak make sure that the person takes off the splint and does exercise for stiffness and weakness for the foot 3 times a day. He should try and stand without the splint. If the foot is paralysed and the muscles do not work do exercises for stiffness twice a day to prevent stiffness.

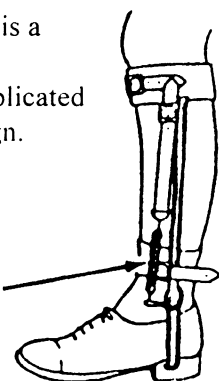
HOW TO MAKE A SPLINT FOR THE FOOT

The person's foot may drag on the ground when he or she walks. Make a splint for the person to wear when walking so that the foot will not drag on the ground.



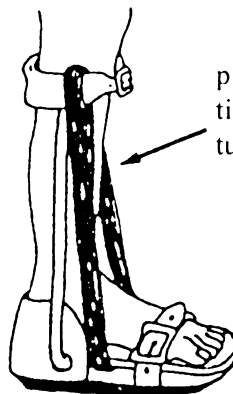
This is a more complicated design.

wire spring.



This is a simpler design.

piece of car tire inner tube.



HOW TO WEAR THE SPLINT

- Tie two wide straps firmly on the leg. Tie one above the knee and the other below. A narrow piece of cloth holds the two straps together.
- Put a strap around the foot. The strap has a piece of string or elastic sewn to it. The string should be on the middle of the person's foot.
- Tie the other end of the elastic to the narrow piece of cloth which holds the straps together.

WHAT YOU NEED TO MAKE THE SPLINT

- You will need two wide straps of canvas or thick cloth which are three fingers wide and long enough to tie around the leg.
- You will need a narrow strap of canvas or thick cloth which is two fingers wide. It should be as long as the wide straps which are tied around the leg.
- You will need a strap of canvas or thick cloth that will fit around the person's foot. It should be three fingers wide.
- You will need a piece of string or elastic which is the length of the person's leg from the knee to the ground.
- You will need a needle and thread

HOW TO MAKE THE SPLINT

- Put the two wide straps flat on the ground or on a table. The distance between them should be the length of your hand.
- Fold the narrow strap in two. Fix this strap to the wide straps so that it will lie on each side of the knee, as shown in the drawing.
- Fix the piece of string or elastic to the strap which goes around the foot.
- If the person does not wear shoes or sandals, make a strap to go around the person's foot. If the person wears shoes or sandals, the strap can go around them.
- Make splints for both feet, if necessary.
- Teach the person how to tie on the splint. Put the strap around the foot. Fix the string to the narrow strap.
- Teach the person to take off the splints without help.

- Walk with the person. Find out if he or she has difficulty using the splint. If the person has difficulty walking he or she may need to use sticks.

6. SHOE RAISE

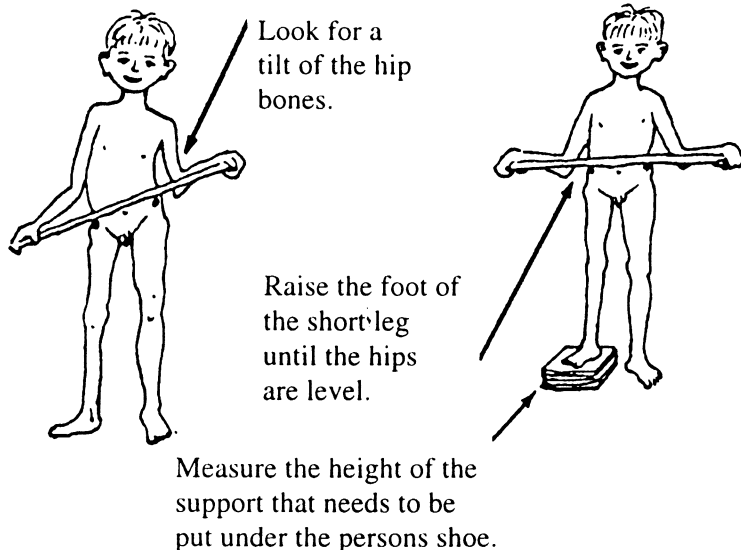
Good for - a person with one leg shorter than the other.

Bad for - a person who can walk without a shoe raise.

Things to remember - Sometimes a person with one leg longer than the other is able to get around without any problems. He does not want a shoe raise because he does not wear shoes, or it looks odd or it is too heavy to walk with. Sometimes a person looks as if he has one leg shorter than the other but this is because the hips or back is bent. Check that the hips and back are straight.

One of the person's legs may be shorter than the other. Make a raise for the shoe that the person wears on the foot of the shorter leg.

If the child can stand



HOW TO MEASURE FOR THE SHOE RAISE

- First the person stands up holding on to a tree or wall.
- Put pieces of flat wood under the foot of the shorter leg until the person is able to stand up perfectly straight.
- Now measure carefully the pieces of wood that you put under the foot. You will need to know exactly how high they are. This will be the height of the shoe.

WHAT YOU NEED TO MAKE THE SHOE RAISE

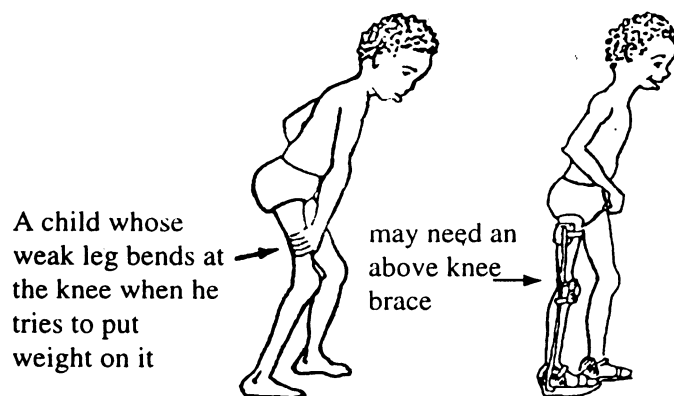
- You will need a piece of cork or light wood. Make this the same width, length, and shape as the bottom of the person's shoe.
- You will need a thin piece of rubber in the same shape as the cork or light wood.
- You will need a glue.

HOW TO MAKE THE SHOE RAISE

- Cut the cork or light wood to make it the correct height.
- Shape the raise to the bottom of the shoe.
- Fix the raise to the shoe.
- Fix the rubber to the bottom of the raise. This prevents the shoe from slipping.
- Teach the person to walk using the shoe raise.

For people with weak knees that cannot be kept straight when they put their full weight on their feet.

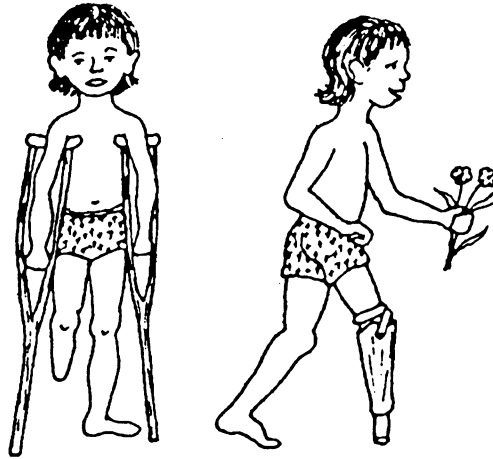
How to make a knee splint see page 30 (Standing equipment).



7. CALIPER and ARTIFICIAL LEG

To make a good caliper you need special skills. It is best to try to get calipers from a special workshop.

If you want to know more about how to make calipers and artificial legs see "Disabled Village Children" by David Werner.



Even a simple artificial limb
can make a big difference.

8. PRINCIPLES

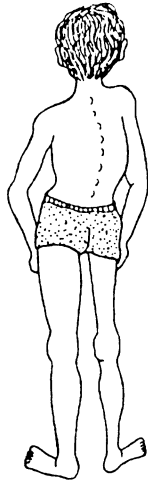
Make sure the equipment you use will help the person. Test all equipment before making it permanent.

Sometimes it may be best not to correct a contracture, like in these pictures.



In a child with polio, the weaker leg is often shorter.

The foot hangs down and often develops a tiptoe contracture which, in effect, makes the leg longer.



If we correct the foot contracture, the leg will, in effect, become "shorter". This can cause tilting of the hips, a spinal curve, and more awkward walking.



To correct the hip tilt and spinal curve, the child will need a lift on the shoe, and probably a brace too.

This usually makes walking more difficult, and the disability more noticeable, than before the contracture was corrected.

Walking equipment that is the wrong height often does not help. Be sure to look at the pictures to see how to measure correctly.

For more information how to walk with walking equipment, how to climb stairs, etc., see the manual "Helping a Person to Move".

5. EQUIPMENT TO USE IN AND AROUND THE HOUSE

If someone cannot walk around the house then special adaptations can be made.

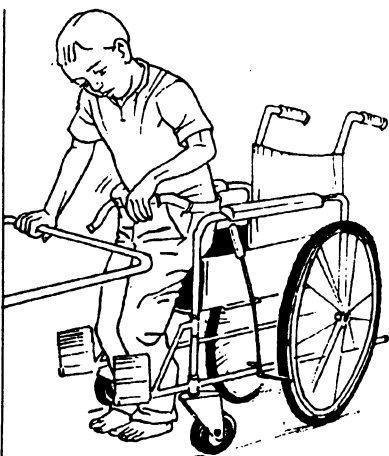
First see how the person moves around. Do they need walking equipment or a wheelchair? Find the way of moving first, after that see if the person still has problems going into and around the house.

1. RAILS

Put rails in places where the person needs something stable to hold onto.

The rail must be at about the same height as a walking stick should be for that person. (See for measurement the section about walking equipment).

Is easier when a handrail is built beside the path.

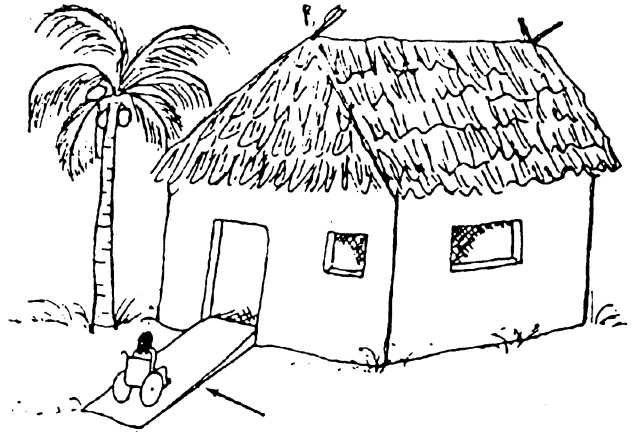


This person is dressing himself, by holding on a rail (next to his bed) with one hand, with the other he is pulling up his trousers.

2. ADAPTATIONS IN THE HOUSE

The kind of adaptations needed depends on the kind of disability the person has. A blind person needs different adaptations than someone using a walker or a wheelchair. The adaptations for a person who is completely dependant, will be of more help to the family that takes care of them. The disabled person who can do a lot for her or himself may be helped by adaptations that make self-care and house work easier. Here are some examples.

A simple ramp may work well for a wheelchair entrance to a house near ground level.



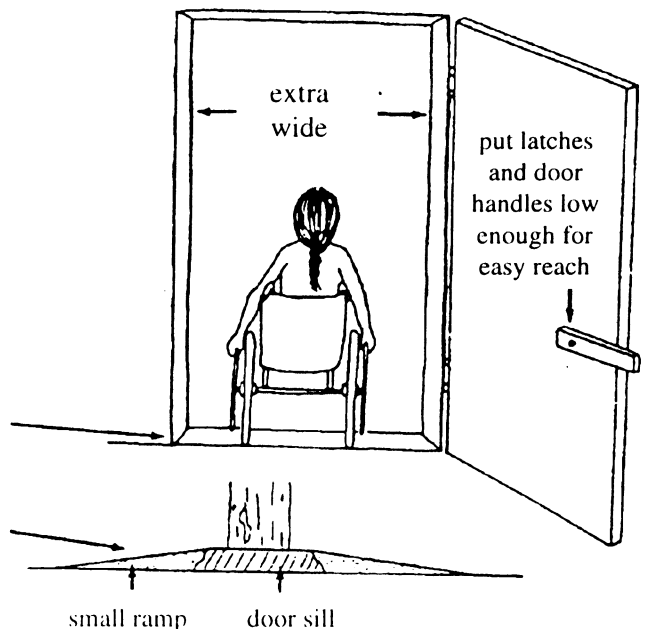
Ramp can be made of wood or of dirt or rocks, perhaps covered with a thin layer of cement.

DOORWAYS

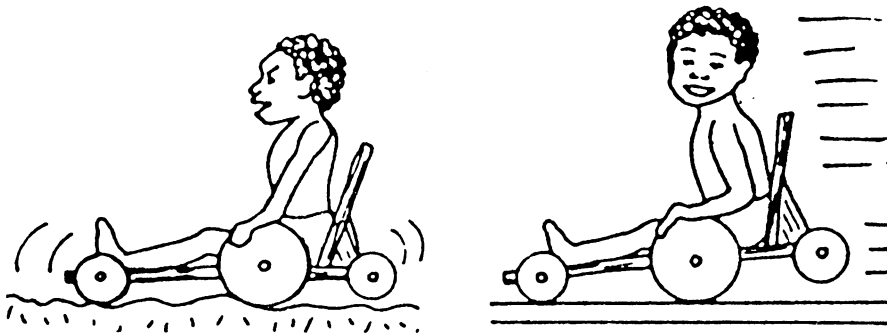
Make all doorways extra wide. Remember, your child will grow and may need a bigger, wider wheelchair.

In a house that already has very narrow doorways, be sure the wheelchair you buy or make is narrow enough to fit through easily. Most commercial chairs are much wider than necessary, especially for a child.

Try to avoid any rise or bump at the doorway. If it already has a raised sill and you cannot remove it, build a small ramp to go over it.



Having no step or bump at doorways makes going through much easier for people who use a walker or crutches!



FLOORS

For almost any disabled person-but especially those who use wheelboards or scooters with small wheels, the floor should be as smooth and firm as possible (but not slick or slippery). Cement is even better for long-lasting use of a trolley or wheelchair. Although expensive, a smooth cement floor makes getting around a lot easier.

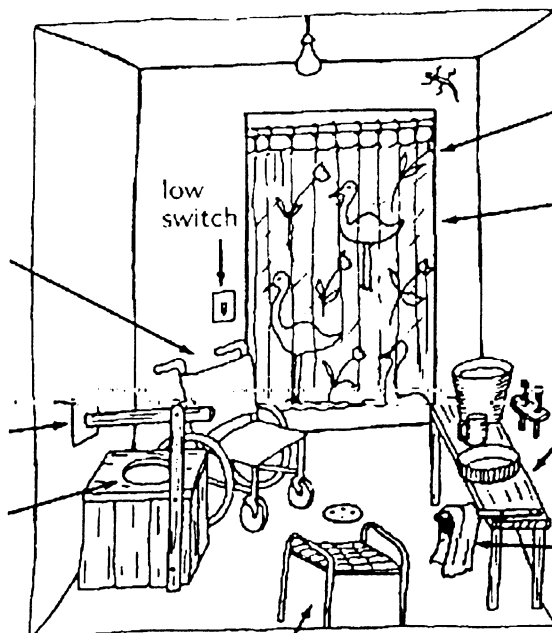
BATHROOM OR OUTHOUSE (LATRINE)

Be sure the room is big enough for a wheelchair to turn around in easily.

A wheelchair without armrests or with a removable armrest is best for transferring to the toilet.

Hand rail on far side from wheelchair.

Toilet seat the same height as seat of wheelchair.



Wide doorway

For a wheelchair rider, a curtain is often easier to open and close than a door

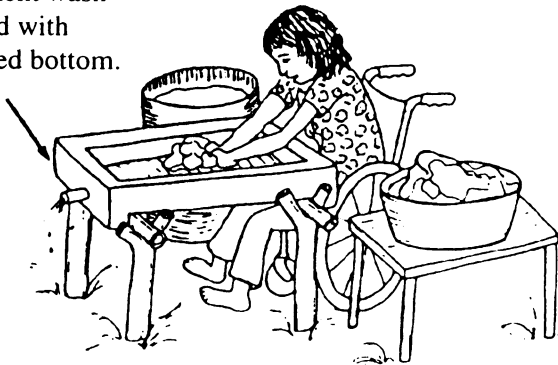
Washstand at height just above knees of wheelchair rider

Towel on low rack.

Bathing stool same height as wheelchair, with metal frame and woven plastic or rubber strips of car inner tube.

WASHING AREA (OUTDOOR)

Cement wash stand with ridged bottom.



MAKING HAND PADS AND KNEE PADS

WHAT YOU NEED TO MAKE HAND PADS

- You will need two blocks of wood, each the size of the person's hand. They should be two fingers thick.
- You will need two pieces of rubber, each the same size as the blocks of wood.
- You will need two straps of leather that are as long as your hand. They should be three fingers wide.
- You will also need nails and glue.

HOW TO MAKE PADS

- First cut the blocks of wood in a shape that the person can hold easily.
- Smooth the wood and fix a strap of leather or rubber to each block so that the person can hold it easily.
- Put the pieces of rubber on the bottom of each block. These will keep the pads from slipping.
- Or the person may use slippers as hand pads by pushing their hands into the toes.

WHAT YOU NEED TO MAKE HAND-HOLDS

- You will need six pieces of wood for handles. Each of them should be two fingers thick and as long as the width of the person's hand. You can cut these from a strong tree branch.
- You will need two pieces of rubber, the same size as the pieces of wood, and nails and glue.

HOW TO MAKE HAND-HOLDS

- Use one piece of wood for the base and two pieces for the sides of each hand-hold.
- Fix two sides to each base with nails.
- Fix the handles in place with nails.
- Fix a piece of rubber to the bottom of each base to keep the hand-holds from slipping.
- You can also make a hand-hold by putting a wooden stick through holes in each end of a small wooden box.

MAKING KNEE PADS

WHAT YOU NEED TO MAKE KNEE PADS

- You will need two pieces of tyre rubber or leather.
- You will need four long pieces of cloth or soft leather to make straps.

HOW TO MEASURE FOR KNEE PADS

- The pads should be two hands long.
- The pads should be wide enough to cover the front of the person's knee.

HOW TO MAKE KNEE PADS

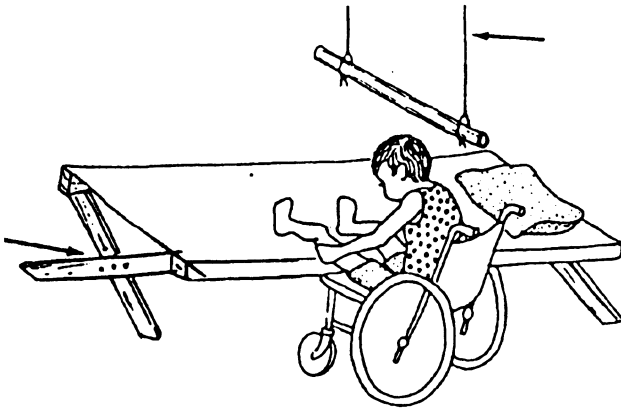
- Make four holes at each end of the pieces of tyre rubber or leather. Put the straps through the holes.

HOW TO PUT ON THE KNEE PADS

- Put the middle of the pad over the middle of the person's knee. Tie the straps above and below the knee as shown in the picture.

ANOTHER WAY TO MAKE KNEE PADS

- You can also make knee pads from wood and leather or rubber.



The bed or cot should be the same height as the wheelchair for easier transfer. One or more hanging bars or other supports may help the person to transfer or to sit up in bed.

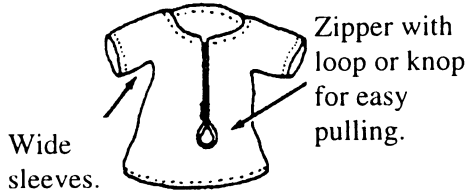
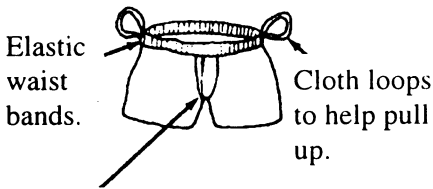
6. EQUIPMENT TO HELP WITH ACTIVITIES OF DAILY LIVING

If someone has problems with activities of daily living, like (un)dressing, eating, drinking, bathing, toileting, or writing then make special adaptations.

1. (UN)DRESSING

If someone has problems with (un)dressing, because of poor balance or poor hand and finger control, some of the following ideas may be useful.

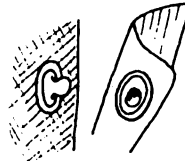
If the balance is poor in standing or sitting, always look for the easiest position for the person to dress or undress him or herself!



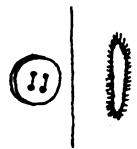
Overlap fly without buttons or zipper-or with velcro.



Velcro

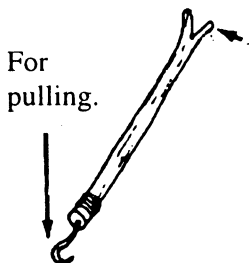


Press-together studs (snaps) are easier to open and close than buttons.

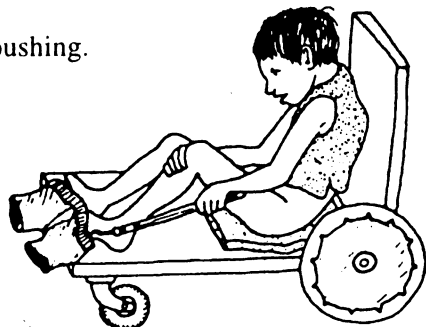


If buttons are used, use large buttons and make buttonholes extra big.

For the person who has difficulty reaching his feet, a stick with a hook may help.



For pushing.



2. EATING

If someone has problems holding a spoon, try one of these ideas :



Rubber tube.



Rubber ball.



Strip of tire tube
(wrapped).



Velcro
(or buckle).



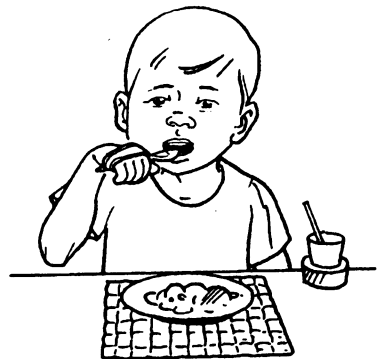
Old tool
handle.

Cut off
spoon.



Bend the handle
to fit the child's
grip.

If someone can not hold his or her plate, put a wet cloth under the plate or make a non-slip mat.



If a person's arm and hand are too weak to lift to their mouth, make:

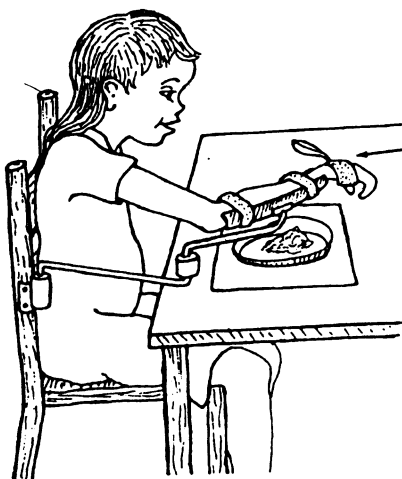


Pin to let it tip
up and down

Bamboo.

Post put into
holes in base.

Heavy wood base.



The spoon holder can also be adapted to hold a pen, brush, and other things.



If someone has no arms he or cannot use either arm and hand for eating, you can try this:



Pick up food holding spoon in mouth.

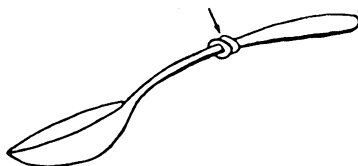


Slip spoon into clothespin.



With the lips, turn clothespin so that spoon enters mouth.

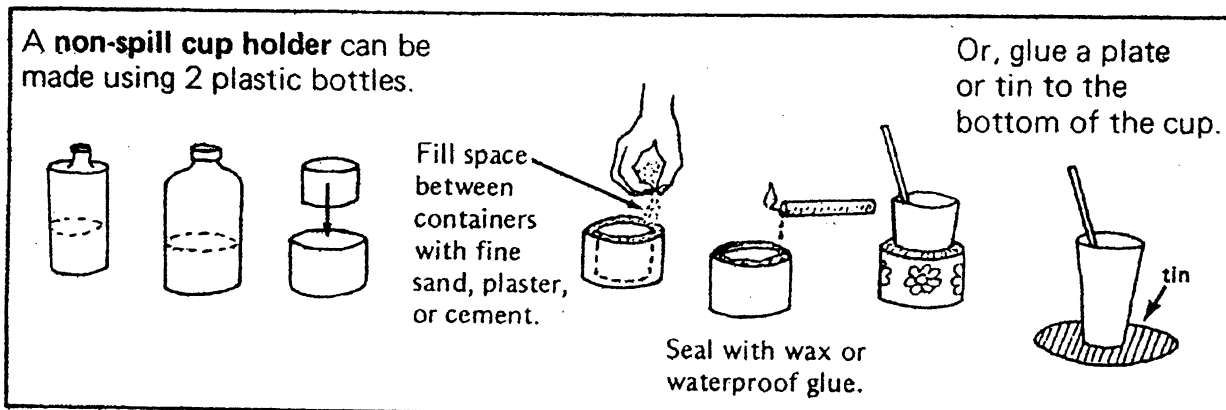
Put a rubber band or clip on the spoon handle to keep spoon from slipping in clothespin.



For more information about how to solve eating problems, see the manual "Helping children with problems eating and drinking".

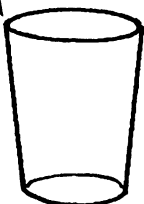
3. DRINKING

If someone has problems with arm and hand coordination and is always spilling their drinks, you could try a non-spill cup holder.

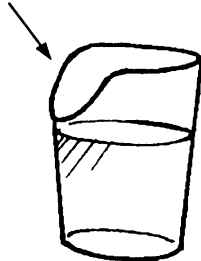


If someone has problems drinking, and when he tries to empty his cup he loses head and body control, try to use a special cup. A plastic cup with a piece cut out, let him drink without bending his head back.

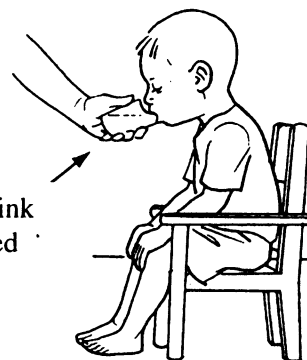
The cup should have a projecting rim.

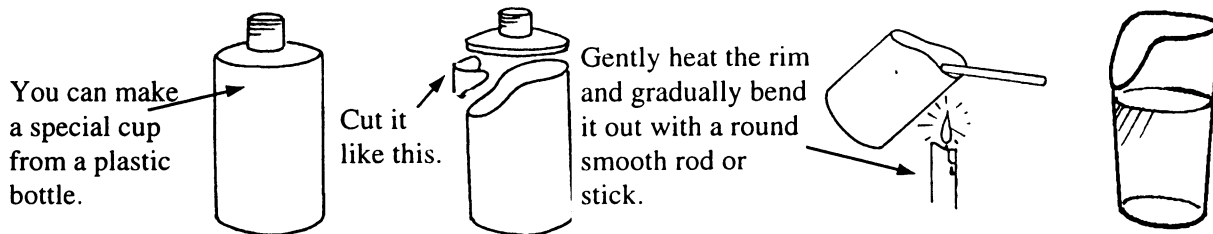


Cut out a space to fit around the child's nose.



This way the child can drink in a better, more controlled position.

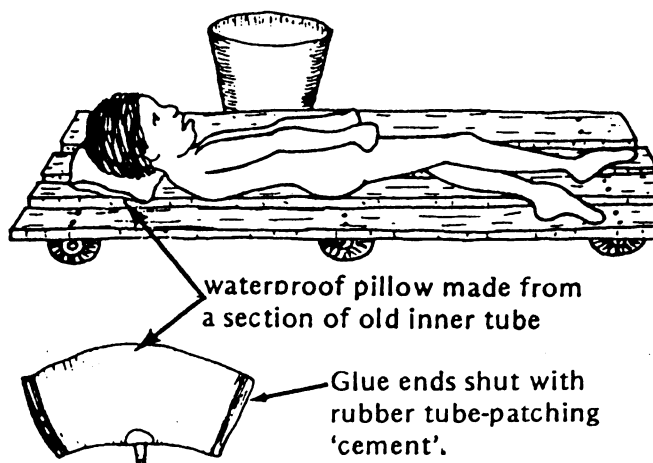




For more information about how to solve drinking problems, see the manual "Helping children with problems eating and drinking".

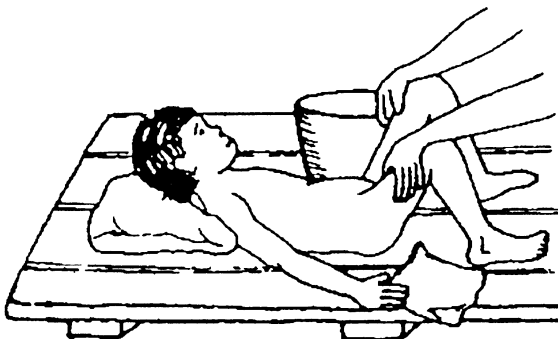
4. BATHING

If someone has problems bathing themselves, or if someone else has to wash them and has problems with it, make special adaptations.



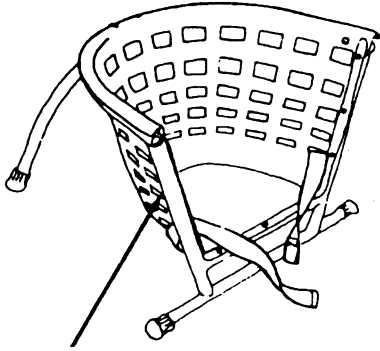
In this position the person is still uncomfortable and washing will be very difficult, because the legs are crossed and the arms are stiff.

If a small pillow is not enough, try this:

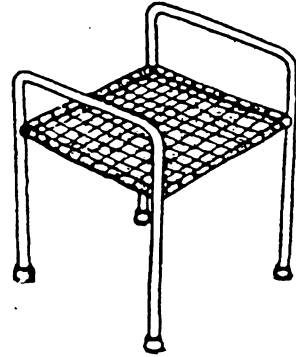


If someone has problems keeping his balance in sitting or standing while bathing, make a chair.

A bath seat made from half a plastic bucket or laundry basket on a metal tube frame.



A stool with a seat woven from strips of car tire inner tube.

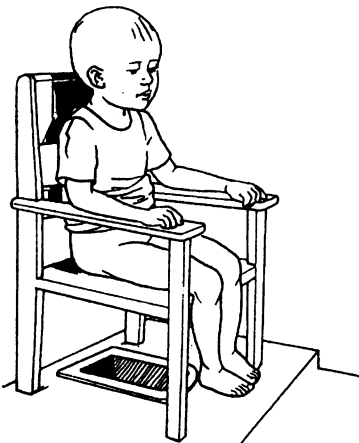


If there is no bathroom and the person is used to bathing in the river, adapt a special place for her. For example:



5. TOILETTING

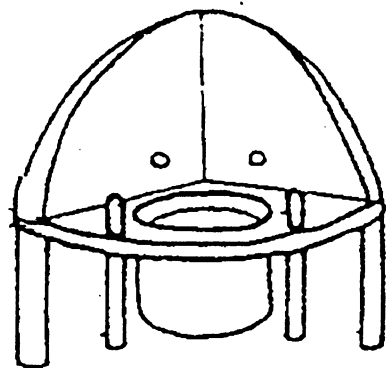
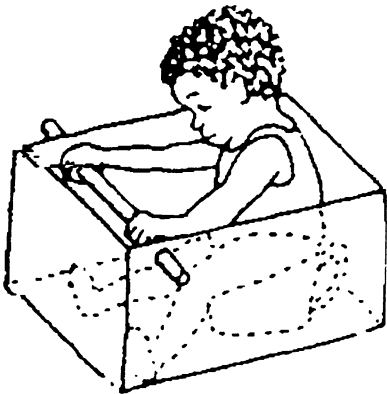
If someone has problems keeping his balance in squatting, make a rail to hold onto.



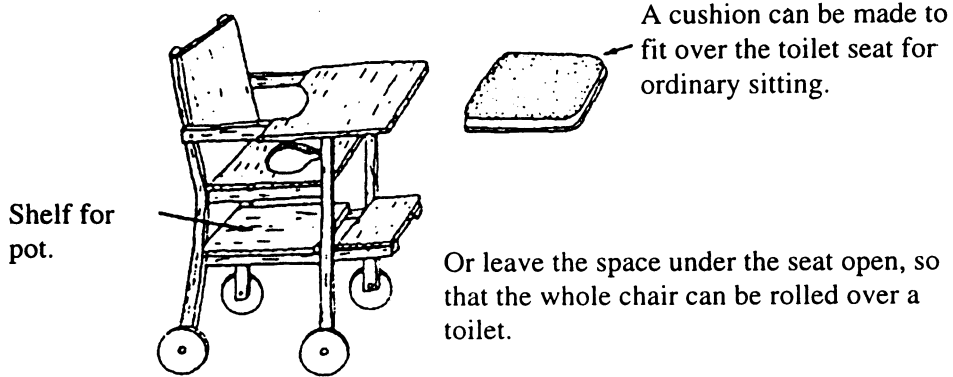
If someone can not squat, make a chair with a hole in it, to put above the toilet

If someone has problems keeping her balance in sitting, make a special chair to put above the toilet.

A cardboard box can also make a good sitting frame.

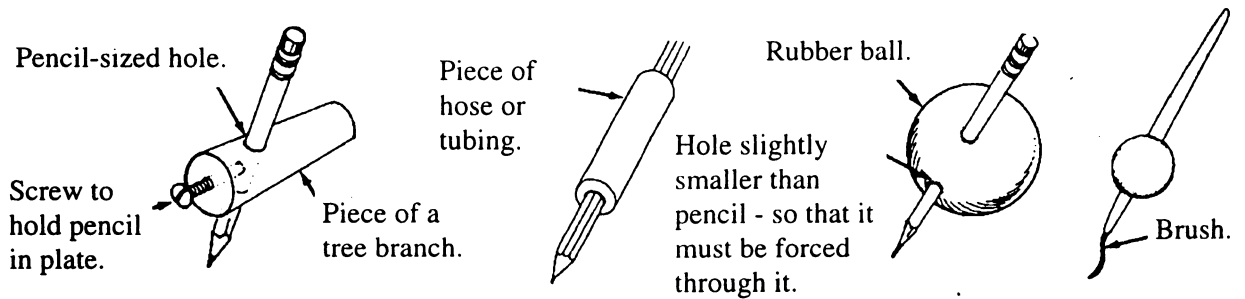


For severely handicapped children, "toilet seats" can be built into specially designed chairs :

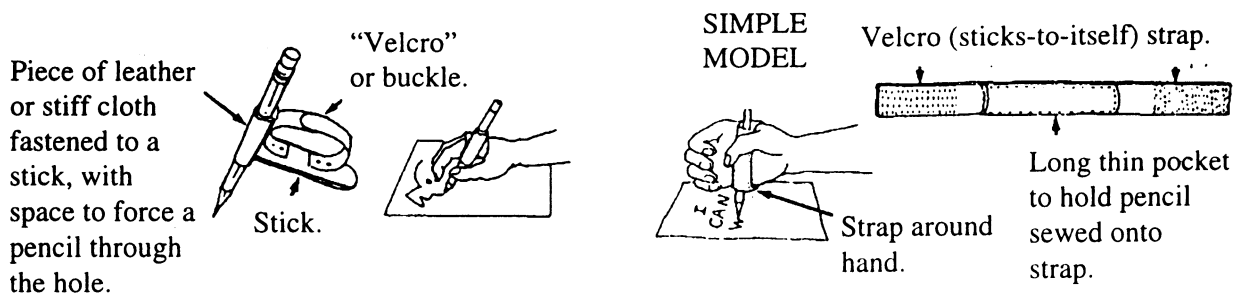


6. WRITING

If someone has problems holding a pencil, pen or brush, make a thick handhold, which gives better grip and control.



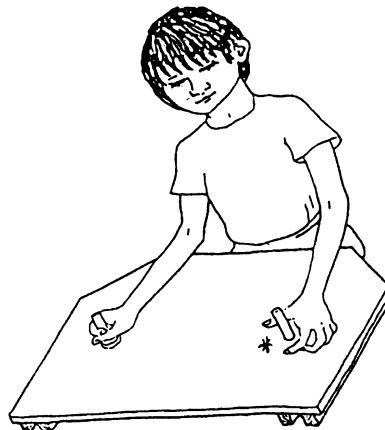
If someone has a weak hand and can not hold a pen or pencil, make adaptations . Here are a few more examples.





Another way to help a person to gain more control when writing is to have them write or draw on a tilted board . Both the wrist and the forearm should be able to rest.

Another way to help someone to gain more control over his body, is to put a fixed peg in the table. In this way he she can hold on to the peg, which will give more stability and control over his body and he may be able to write and draw better.



7. EQUIPMENT TO HELP WITH TRANSPORT

If someone has problems with getting from one place to another by themselves then make special equipment for transport.

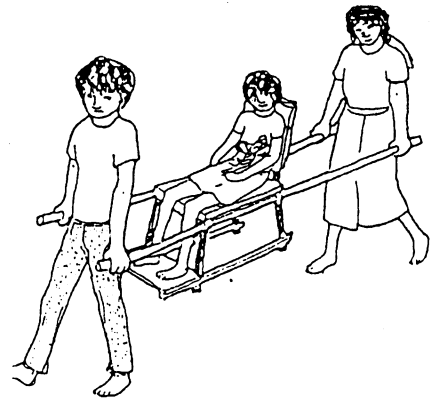
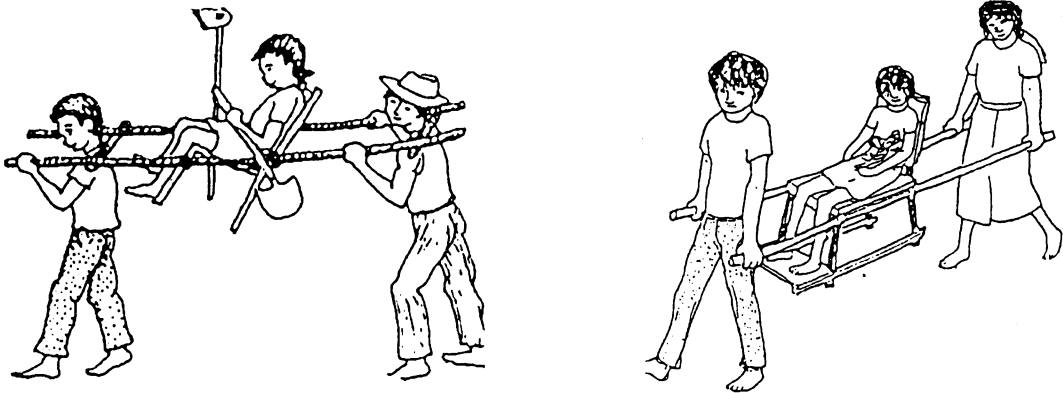
1. WHEELCHAIR/TROLLEY

See for more information about wheelchairs and trolleys the section about equipment for sitting.

2. HORSE

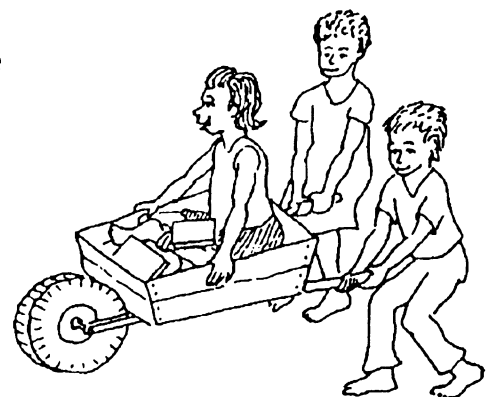
When horses are used in the community for transport, they could also be used to transport a disabled person. The disabled person could sit in front of another person or maybe they are able to go by themselves.

3. SEDAN CHAIR



4. WHEELBARROW

You can use also a wheelbarrow to bring someone from one place to another.



5. CART

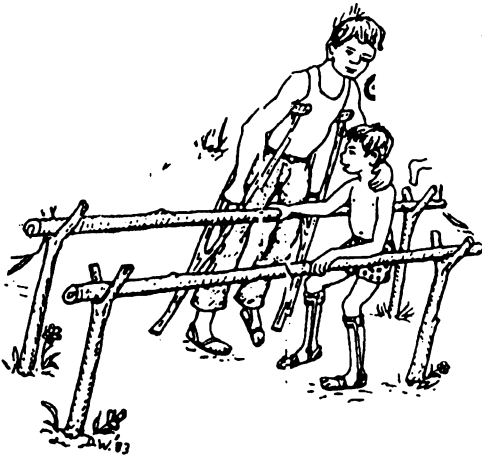
Picture of child being transported on a simple cart.



8. SIMPLE EQUIPMENT FOR DOING EXERCISES

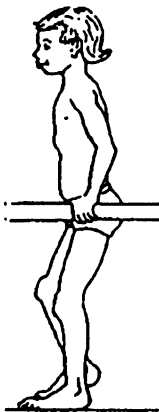
The equipment mentioned here is simple to make. It is useful to have some of it made for home exercises if you have to use it for a long time. It is also useful to have this made if a person does exercises with several people do exercises one house.

1. PARALLEL BARS

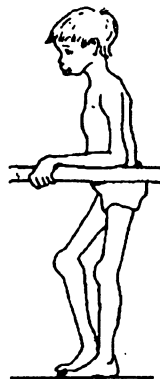


Parallel bars can be made for people to learn to walk, but for whom walking equipment is not stable enough yet. It is also easier to start walking between parallel bars because the person has only to hold on and does not need to take equipment with them. The parallel bars will give them more confidence.

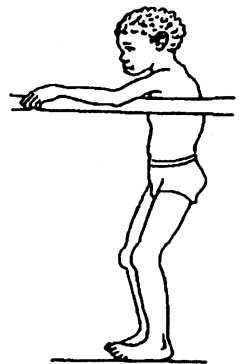
For most people, the bar should be about hip height, so that the elbows are a little bent (the same height as the handles of crutches).



A person with very weak upper arms may find it easier to rest his forearms on the bar. The bar will need to be elbow high.

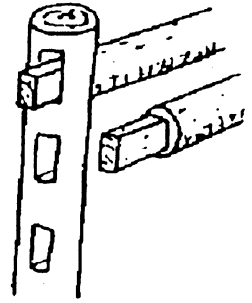
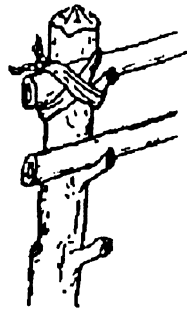
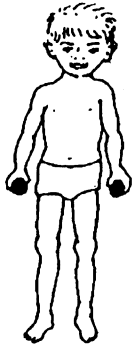


A person who tends to slump forward may be helped to stand straighter if the bar is high, so that he has to stand straighter to rest his arms on it.



SEPARATION OF BARS

Bars should be close enough to leave only a little room on either side of the child's body. Too close, they get in the way. Too far apart makes weight bearing more difficult.



Bars need to adjust to different heights for different people. Here are 2 simple ways.

MEASURING AND MAKING BARS

HOW TO MEASURE FOR THE BARS

- The person stands up holding on to a tree or a wall with one hand. The other arm is by the side.
- You then hold a long, thin stick at the person's side.
- Mark the stick at the level of the person's wrist.
- This point marks the height that the walking bars will be.
- Now use the stick to measure the length of the person's arm.
- The bars should be as far apart as the length of the person's arm.
- Make the bars as long as you like, according to how much space you have in the house or the yard.

WHAT YOU NEED TO MAKE THE BARS

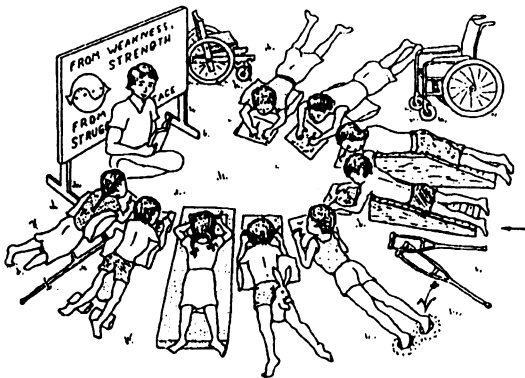
- You will need two poles as long as the bars will be. You can use bamboo or tree branches as poles. They should be at least three fingers thick and strong enough to hold the person's weight.
- You will need four posts to fix the poles to. If you want the bars to be very long, you will need six posts or more. The posts should be at least three fingers thick. You may use strong wood or tree branches as posts. Or you may use trees as posts.

HOW TO MAKE THE BARS

- First dig deep holes to put the posts in the ground along the path where the bars will be. Push the posts all the way down into the deep holes.
- Tie the poles to the posts to make the bars. Put the rope in water first and use wet rope to tie the bars. Then when the rope dries it will hold the poles well.

2. WEDGE

A wedge can be made for people who have problems with controlling their head or leaning on their arms when lying on their stomach. See pages 11 and 12.



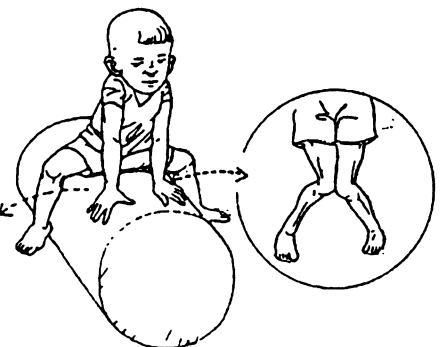
A activities can often be done lying on the floor, on wedges or on mats.

3. BARREL

Barrels can be used for people who have problems with their balance in lying, sitting or standing.

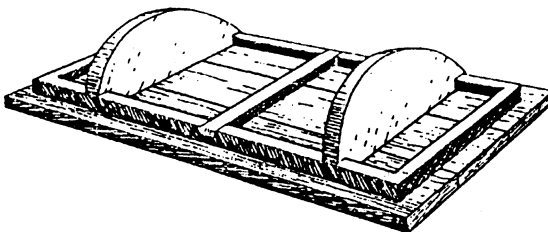
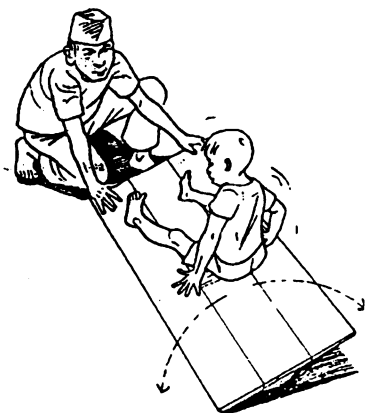


Barrels can also be used to correct the position of a person's legs.

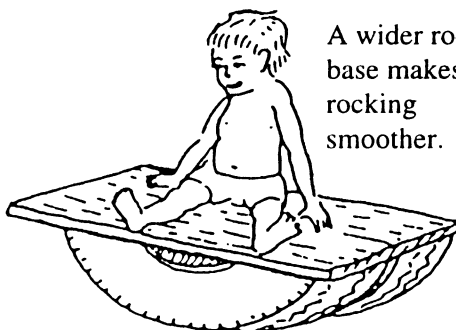


4. ROCKER TABLE OR BALANCE BOARDS

A rocker table can be used to help people improve their balance in lying, sitting, or standing.



A balance board like this rocks less smoothly because the center rocker is so narrow.

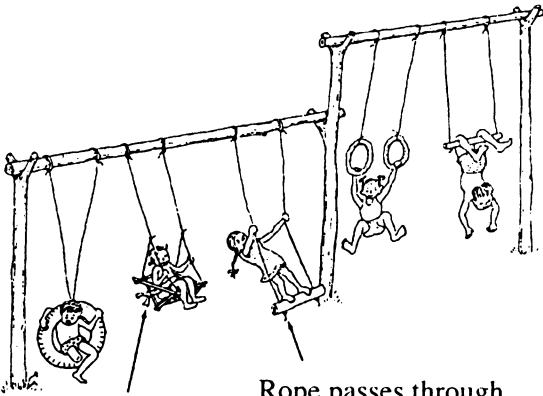


A wider rocker base makes rocking smoother.

For the rocker, you can use 2 pieces of old tire.

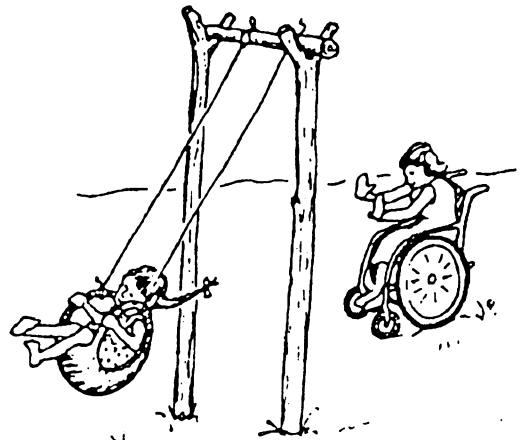
5. SWING

A swing is fun for most children and may help develop balance, head control, coordination, and strength. Adapt the swing to the needs of the child.



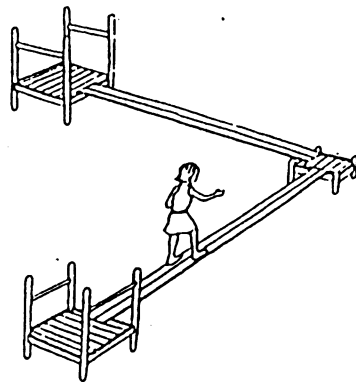
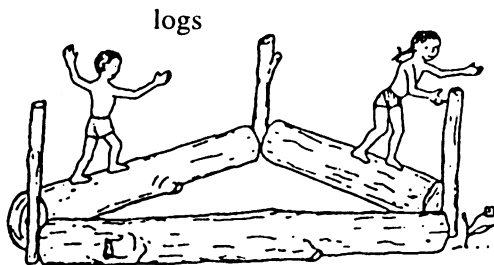
Tie to hold child in swing.

Rope passes through hole in bamboo, and is knotted.



6. BALANCE BEAMS

Balance beams or logs can be used to help people improve their balance or coordination while walking on their own.



7. PRINCIPLES

When working with children exercising must be fun! Children should have the feeling that they are playing.

Use toys and games to make exercises more fun. Use toys and games the child likes and which correspond with his ability to think and solve problems.

Balls are always good to have. Playing with balls can be good exercise if you want to improve a persons coordination , not only for children but also with adults. Playing with a ball in sitting or lying positions makes the exercise more difficult, but also more fun.