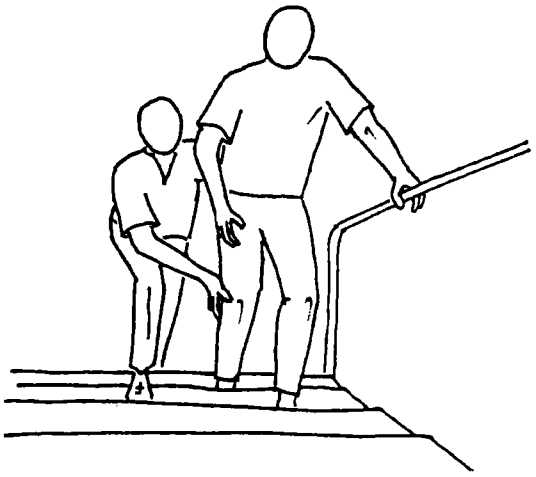
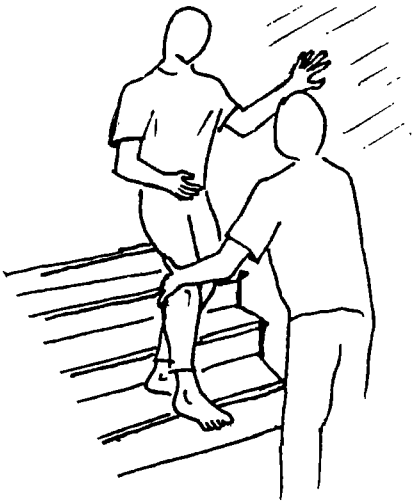
WHO/DAR/99.2
Original: English
Distribution: General

PROMOTING INDEPENDENCE FOLLOWING A STROKE

A Guide for
Therapists and Professionals working in Primary Health Care





Disability and Rehabilitation
World Health Organization

AIFO
Associazione Italiana Amici
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FOREWORD

The first edition of this manual was prepared by Mr Lorenzo Carrero, a Consultant with the Italian Association, Amici di Raoul Follereau (AIFO) in response to a need expressed within community-based rehabilitation programmes. The manual was successfully used in Mongolia, Vietnam and Indonesia providing up-to-date training for therapists acting as referral persons for professionals in primary health care (PHC). AIFO, as an international NGO in official relations with WHO, proposed that the Disability and Rehabilitation Team adopt the text as a joint publication.

Before accepting the proposal the manual was sent by WHO for comments to a selected number of professionals who expressed their appreciation and recommended a wider distribution. Based on those comments the text was revised by the author. We wish to express our gratitude to our good friend, Lorenzo for his dedication and commitment, to Dr Ann Goerdt and to all the other reviewers and to Sarah Lacey for editing.

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ABOUT THIS GUIDE

The purpose of this Guide

There is much that can be done to help someone who has had a stroke. With training and encouragement the individual can regain movement and become more independent. This Guide contains advice on how you can plan and carry out a rehabilitation programme. It includes training suggestions on how to promote independence in all aspects of daily life. It describes activities for lying in bed, sitting, standing, walking, transferring, using the paralysed limbs and doing daily living tasks. The importance of self-care is also stressed.

Who is the Guide for?

This Guide can help doctors and nurses working in hospitals. It stresses the need for early correct positioning to promote recovery from a stroke.

The Guide can help therapists to train Mid-Level Rehabilitation Workers (MLRWs). MLRWs can then use the Guide in their work. They can follow the training suggestions when assisting hospital and community based rehabilitation staff in the handling and early treatment of someone who has had a stroke.

This Guide can also help people who have had a stroke, their families and members of their community. Using the information in the Guide, rehabilitation workers can teach them to take an active part in the rehabilitation process.

The aim of rehabilitation

Independence does not mean that someone who has had a stroke must learn to do everything by himself or herself. The person must be given every chance of returning to a normal life, doing as much as possible without assistance , despite some residual limitations. The aim of rehabilitation is to develop a level of **functional independence** not only in a sheltered environment such as a hospital but especially at home and in the community.

Although this Guide focuses on training activities to overcome the immediate physical disability, other problems that may be present are taken into account. Thus, treatment should be specifically designed to address all aspects of the person's loss rather than the more obvious motor and sensory loss. Always remember that someone who has had a stroke is an individual with his or her own motivation, interests and abilities.

Going through the text

Throughout the text it is assumed that the person who has had a stroke has a right hemiplegia. The use of "he" and "she" (him and her) is alternated with "he" on odd pages and "she" on even pages.

The word "trainer" refers to someone who trains a person who has had a stroke or someone who teaches the family how to help that person .

Reference is made to various training packages which are part of the WHO Manual "Training in the Community for People with Disabilities". These training packages do not contain specific information on stroke treatment hence the need for this Guide.

The technical words used in this guide are explained in the **glossary** at the end of this Guide. The first time you encounter one of these words in the text it will be written in ***italics.*** Look up the word in the glossary where it will be explained in simple terms.

Adapting this Guide

The information contained in this Guide should be translated into the language used by the rehabilitation worker and the community. In the illustrations, the person who has had a stroke and the "trainer" are drawn without making a clear distinction of sex or race. The settings are simple with only basic furniture. Changes may be needed to both the text and the illustrations to make them more suitable for a specific community or to reflect particular environments (e.g. some equipment may be different).

For example, fig. 106 and the associated text describes washing up as a useful and motivating activity which can be used to improve motor and sensory function. It is important that the person uses both hands, that weight bearing is on both sides of the body and the arm is kept into the *recovery pattern.* However, how the person actually does the washing up is less important. Washing up could be done in a standing or sitting position, using a sink or a bucket, using water from the tap or water from the river.

1. Stroke and recovery

1.1 Causes of stroke

A stroke or cerebral vascular accident is caused by an interruption in the supply of blood to the brain. It occurs when an artery supplying blood to the brain either becomes blocked or bursts.

If brain cells lose their supply of oxygen and nutrients, they temporarily stop working or die. Cell death results in areas of localised necrosis known as *cerebral infarcts*. However, there are many remaining cells. If the person is properly handled after he has had a stroke, many lost movements can be regained.

The many causes of stroke include cerebral infarcts, high blood pressure, cerebral haemorrhage, malformation of the blood vessels, brain tumours, traumas, and other miscellaneous conditions.

Virtually all cerebral infarcts result from two pathological processes: thrombosis and embolism.

A thrombosis is a blockage in an artery of the brain caused by a solid blood clot or **thrombus** that forms within the blood vessel system.

An embolism is a blockage caused by a detached fragment of thrombus (or other material) that has formed somewhere else and is carried by the bloodstream to the brain.

1.2 Effects of stroke

Since each half of the brain supervises and controls the activity of the opposite side of the body, any damage to one side of the brain will lead to a disability to the opposite side of the body. Thus, a stroke on the left side of the brain affects the right side of the body and vice versa. The following difficulties may be experienced by someone who has had a stroke:-

- **Loss of normal controlled movements**
  The vital changed function that all stroke patients suffer is the loss of normal ***muscle tone*** on the affected side. When normal muscle tone is altered the person cannot carry out normal controlled movements. Muscle tone may be increased, decreased or both. When muscle tone is increased it is described as *spasticity,* or *hypertonicity.* Where it is decreased it is known as *flaccidity* or *hypotonicity.*

The lack of controlled movement limits the person's ability to carry out daily living tasks. It can lead to other secondary problems if it is not treated correctly from the start. It can result in *pressure sores*, chest infections and constipation. Blood clots may form in the leg which then move up to the lungs to cause a pulmonary embolism.

- **Swallowing difficulties**
  Difficulty in swallowing may result from weakness in the muscles of the face, jaw and tongue. This can cause hunger and discomfort.

- **Incontinence**
  Incontinence of the bladder and the bowel commonly occurs after a stroke. Control of the bladder and the bowels improves and usually normal function returns.

- **Sensory problems**
  The damage to the brain may cause not only the obvious physical disability but also **perception difficulties and loss of sensory discrimination**. As a result, someone who has had a stroke may have difficulty knowing where her limbs are and in what position her body is in e.g. whether it is bent or straight.

  Also, depending on the part of the brain affected, the person may experience problems with touch, sight, hearing, speech, smell and balance. The main problems associated with sensory and *proprioceptive* loss are described in section 18.4 at the end of this guide.

- **Psychological and emotional problems**
  Someone who has had a stroke may become depressed, anxious or suffer mood swings in learning how to cope. This may be a natural response to the person's changed circumstances rather than something actually caused by the stroke.

- **Problems with understanding**
  Memory, concentration and the understanding of spatial concepts (e.g. in/out) may be affected.

- **Social consequences of stroke**
  Following a stroke there may be subtle and major changes in the relationships between the person who has had the stroke and their family members. Stroke can lead to isolation within the family and in the community. There is often a drop in family income.

Note: These additional difficulties which the patient may experience are described more fully in chapter 18

1.3 What happens to a person after stroke?

An initial period of cerebral shock
A period of cerebral shock immediately follows a cerebral infarct. During this period, which can vary in time from a few days to few weeks, the person's muscle tone is flaccid (*hypotonic*). Movement of the affected side is difficult, if not impossible. This includes movement of the muscles of the face, tongue, trunk and limbs.

The Recovery Phase
Following this period of cerebral shock, a recovery phase begins. It usually starts between the **second and sixth week after the stroke**. The recovery phase may progress in three different stages. The length of time for each stage is different in each person. Also, a clear beginning and end of a stage cannot be seen. Often the different stages can be present at the same time in the different parts of the affected side. A description of each stage is given below.

Stages in the Recovery Phase

1. **Persistence of hypotonicity (the flaccid stage)**

   In some people this may last a long time. In this stage, the motor loss is usually accompanied by a **severe sensory loss.** The person's arm is limp and floppy and cannot be supported in space because of muscle weakness and low tone. This is the most disabling stage of the three.

   Very few people who have had a stroke remain flaccid forever and some degree of spasticity is almost always present. Even if the arm seems to be completely flaccid it usually demonstrates «flexor spasm» (see fig. **a**, page 5) in the fingers when strong stretch is applied and held. If the leg seems to be completely flaccid when at rest, passive bending of the hip and knee meets mild resistance when the person lies on his back; a position which increases the tone when spasticity is present.

2. **Evolution towards normal tone (the recovery stage)**

   Movements start again in the limbs, first at ***distal*** level (the hand and arm before the shoulder, the foot and leg before the hip). Movement is often earlier in the upper limb and follows a normal pattern. Despite the stroke killing a number of brain cells the remaining cells are able to take over and lost movements are regained. However, a slight disability usually remains.

3. **Evolution towards hypertonicity (the spastic stage)**

   The recovery of motor function with an evolution towards spasticity is the most frequent occurrence. There is initial recovery of the ***proximal*** movements of the limbs (hip and shoulder). This occurs earlier in the lower limb, following the typical *spasm pattern of hypertonicity* (see fig. **a**, page 5), and progresses towards spasticity.

Increased tone leading to spasticity is seen in many muscles at the same time, particularly in the stronger muscles of the body, known as «***antigravity muscles***» (i.e. those muscles which are used to lift the body and to carry weight against gravity). This developing spasticity in the antigravity muscles together with the inability to initiate movement on the affected side is responsible for **asymmetry, lack of rotation, no body adaptation to gravity, no graduation of movement and no protective extension of the arm.**

Muscle tone will be different in each individual person. Its state will condition the quality of movement as follows:-

- with **severe spasticity**: movements are difficult if not impossible because of the state of continuous muscular contraction;
- with **moderate spasticity**: movements will be slow and are performed with strain and abnormal co-ordination;
- with **slight spasticity** : gross movements of the limbs are possible whilst the fine movements of the hand are difficult.

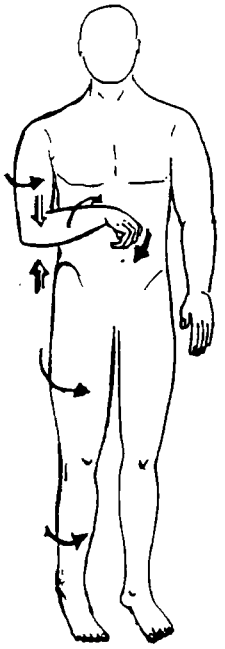
4. Ataxia

In a few cases of hemiplegia, (mainly those caused by trauma) the *cerebellum or cerebellar system* may be affected. This results in ***ataxia.*** The person's movements become uncontrolled and excessive. There are difficulties in performing and maintaining the intermediate positions of a movement. Voluntary attempts carried out by the person to solve these problems cause intentional *tremor* and *dysmetria.*

The typical spasm pattern of stroke

Fig. a illustrates the «typical spasm pattern» caused by the increased muscle tone in the antigravity muscles if it progresses towards severe spasticity:

Fig. a

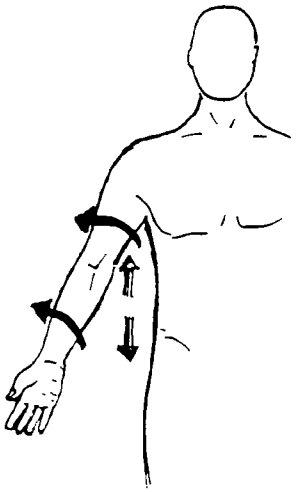


- Shoulder drawn backward and downward, arm turned inward
- Elbow bent usually accompanied by fisted hand, palm down (see «hand spasm» fig. 92)
- Pelvis drawn backward with the leg turned inward (during the flaccid stage, with the reduction of the muscle tone the leg falls to the outside with the knee bent)
- Hip, knee and ankle straightened
- Foot stiffened downward and turned inward
- Lateral trunk shortening

Spasticity must be prevented during the entire rehabilitation programme using the «anti-spasm or recovery pattern» at all times (Fig. b) Example: if a person is developing «spasticity in flexion» in the arm (arm turned in, elbow bent, fisted hand palm down), the anti-spasm pattern will be to position the arm turned out with the elbow and wrist straightened, hand palm up with the thumb and fingers opened. In other words, you must adopt the opposite patterns.

From the day of onset of the paralysis **the person must be placed in the *«anti-spasm pattern»* and all the exercises must lead into recovery patterns.** Particular attention must be given to the position of the shoulder and the hip (see next sections).

Fig. b



- Shoulder forward with the arm turned outward
- Elbow straightened, hand palm up with the fingers open, thumb away from the index finger
- Pelvis drawn forward with the leg turned to the inside
- Hip, knee and ankle slightly bent
- Elongation of the trunk

1.4 Factors that influence the recovery

Some people will make almost a complete recovery from a stroke, others may still have considerable difficulties one year on. There are a number of factors that can influence the outcome as follows:

- **Quality of the rehabilitation treatment**
  Whilst the degree of recovery is dependent upon the extent and location of the stroke it is very much influenced by the quality of the treatment received in hospital and at home. This includes **prevention and treatment of complications** (bowel trouble, contractures, retractions, pressure sores etc.) which can increase the damage caused by the stroke. **The first weeks after a stroke are crucial.** During this period it is important to stimulate and use the potential the person has to be rehabilitated.

- **The motivation of the patient and his family**
  The motivation of the individual and the support of family and friends will also determine the degree of recovery. A person who is motivated to do activities such as feeding, dressing, washing, can use movements in these activities which will help recovery to occur. The quality of care and encouragement given by family members can make a real difference.

- **Age of the patient**
  Young people are more likely to make a better recovery than people over sixty years of age. This is due to additional problems in the elderly (e.g. cardiac, circulatory, respiratory, psychological and family problems).

- **Persistence of the flaccid stage and delay in treatment**
  These have a negative influence on recovery from the stroke.

1.5 Treatment guidelines

Starting treatment
Rehabilitation must begin in the early stages of the stroke. During the acute phase medical lifesaving management takes priority. However, great care must be taken to **prevent contractures and pressure sores** through correct bed **positioning** and **range of motion activities**. As soon as the person is medically stable, **active treatment** should begin. Treatment must be **early**, **intensive**, and **repetitive** if worthwhile results are to be obtained.

The aim of early treatment is to:

- **prevent the development of abnormal patterns of movement** which result from abnormal muscle tone;
- **teach the person not to compensate in unnecessary and potentially harmful ways with his unaffected side.** In the early stages of recovery if the individual compensates with the unaffected side this may increase spasticity, provoke abnormal «*associated reactions*» and also discourage the use of the affected side.

Stages in the treatment programme
The **direction** of development of controlled movement is **from proximal to distal.** Thus controlled movements of the upper trunk and shoulder and the lower trunk and hip should be established first.

All movements of the affected limbs should be performed through the following progressive stages: **passive movement**, **assisted active movement** and **active movement**. After this, the person will be able to place his limb and hold it in space. If there is sufficient recovery, strengthening with **resistive exercises** can follow.

Progress in stroke rehabilitation is generally made by **working though a sequence of exercise progressions** which closely follow the pattern of motor development acquired during the infant stage of life. For example: rolling → to sitting → to standing → to walking; or rolling →to prone → to propping → to crawling → to standing → to walking.

It is important to stimulate the person to carry out all the **activities of daily living** (see next section) in order to become as independent as possible. The person must learn to dress and undress, to feed himself, to be independent in personal hygiene and so on.

The last stage in rehabilitation will focus on the **controlled movement** of the hand. Precision movements of the hand can be established when controlled shoulder and elbow movements have been re-established and the hand is free from the «flexor grasp».

Use of sensory cues
It is important to make use of sensory cues such as voice, touch and vision.

Verbal input will assist the treatment by providing auditory cues. The commands given by the trainer must be short and easily understood, leaving the person the time to understand. For example, ask the person to «think» about the movement: «*we are going to bend and stretch your knee ..... look at your knee ..... now help me to do it ..... feel the movement.*».

Visual input also is important e.g. a long mirror placed in front of the person will provide a sensory cue.

1.6 Planning the rehabilitation programme

Setting goals
Start by undertaking a thorough evaluation and then **establish realistic goals.** No two people are the same. The person's abilities must be assessed and re-assessed and treatment offered according to the findings. Treatment should be specifically designed to take into account all aspects of the person's loss rather than the more obvious motor and sensory losses.

The goal of rehabilitation for someone who has had a stroke is to obtain the maximum degree of physical and psychological independence. The person should develop a level of **functional independence** not only in a sheltered environment such as a hospital but especially at home and in the community. This means that «treatment» must be carried out during every aspect of daily life, becoming a **part of the daily routine** and not performed as an isolated activity two or three times a week or when a rehabilitation worker visits the household.

It is **active movement** which promotes the recovery of functional abilities. Carrying out passive movements with the person lying in bed for months is a bad habit. Someone who has had a stroke should be helped **to do normal daily activities**, even if these are not done perfectly e.g.:

- getting up from bed in the morning requires bed mobility (section 8.4), rolling to the affected side (section 8.3), sitting up with leg out of bed (section 3.5), transfer from bed and sitting on a chair (section 4) etc.
- toileting (section 17.4): instead of using the toilet by the bed or being half-dragged or carried to the toilet, the person who has had a stroke should be helped by the family trainer to go to the toilet. Walking (section 12.5) to the toilet thus becomes for the person part of «treatment».
- sitting balance: the training activities suggested in section 9 are important for the restoration of sitting balance especially in the early stage after a stroke. Sitting and reaching for a comb or a game of cards placed on a table slightly to the affected side can accomplish the same objective. The added bonus is that these activities are part of the person's daily routine.

Planning for progress

Select activities that the person can perform as well as skills that may advance her to a higher functional level.. You can often break down a given activity into its component motions. The person should be encouraged to **practice each component** as an exercise. In the final stages of treatment, the activity can be practised in its entirety (e.g. the exercises listed in section 7 are useful at the start of treatment for the improvement of hip movements and control; bridging is a functional ability that follows this improvement and it is useful in nursing care, use of bed pan, dressing).

The capability of the individual

The frustration of failure must be avoided. Any progress in the program must be made **within the person's capability**. For example, the person should learn to balance or stabilise in a position before asking her to move from that position .

2. Correct positioning and early handling

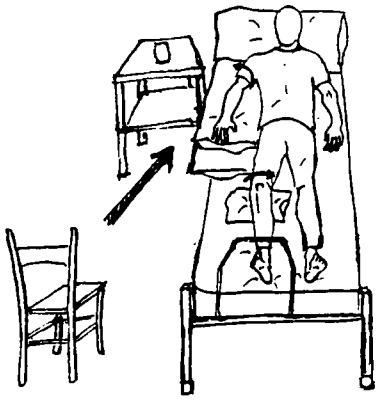
2.1 Introduction

The correct positioning of the body is extremely important. It is especially so in the **acute stage** of stroke. Good positioning will help to:

- **prevent musculo-skeletal deformities**
- **prevent pressure sores**
- **prevent circulatory problems (blood and lymphatic)**
- **send normal inputs to the brain, contrasting with the temporary lack of sensory inputs caused by the stroke**
- **promote recognition and awareness of the affected side**

Lying in bed for several hours in the same position is not good for someone who has had a stroke. Just changing position will provide different stimuli that may help in restoring sensory function. Poor positioning (see the illustration below) leads to stiffness, a limited range of motion and muscular retractions. These are all conditions that worsen the disability caused by the stroke.

Fig. 1.1



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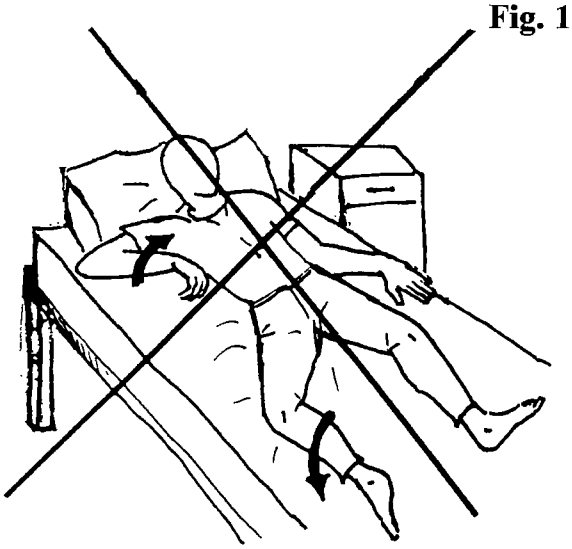


WRONG

A person's position in bed must be adjusted and changed every 2/3 hours. The different positions should be alternated from lying on the back to side-lying on both sides and so on. In this way the position of the joints and body parts will change and as a result different stimuli will be sent to the brain. However, positioning should not be applied in a narrow or static way. It must be a means to prevent joint limitations and not be itself a source of further limitations.

Note:

Positioning for the hip and the shoulder is of primary importance.
Both must be kept forward,
with the leg slightly rotated to the inside and the arm rotated to the outside.

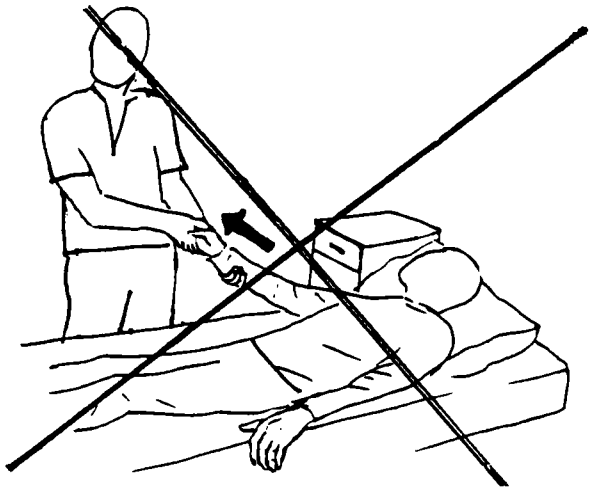
Careful positioning of the body must continue throughout treatment. At all times, remember to view the body as a whole and position the person accordingly. If an exercise involves the upper part of the body, the position of the lower part must be taken into account and vice versa.

At first, the person is **passively positioned**. The position can be maintained with the help of soft pillows or rolled up sheets or towels. Avoid very strong stimuli on the skin. A pillow can be placed under the shin to hold the ankles in a good position and the knee slightly bent (especially when the leg is completely floppy).

The person can then be taught and helped to move into and to maintain these positions without assistance and without supporting aids. When correct positioning is used routinely the person very quickly begins to position herself.

When changing a position do not pull the person's arm whilst holding it at the hand or wrist (see below fig. 1.2). The arm must be supported at proximal and distal level (fig. 1.3) and gently guided into the different positions. The person will eventually need less support or will be able to change the position alone.

Fig. 1.2
do not pull the arm
holding it at distal level



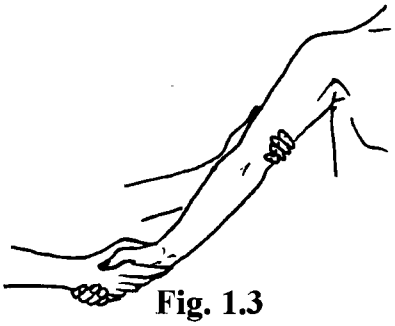
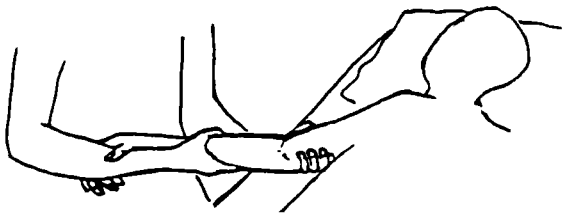


Fig. 1.3
correct handling with proximal and distal support



Correct handling and positioning prevents unwanted complications. It also helps to restore functional motor activity. The different activities of daily living turn into "therapy".

2.2 Influence of position on muscle tone

Some positions can increase the muscle tone, whereas others can decrease or influence the development of the spasm pattern. This is why correct positioning is used to influence muscle tone and to promote recovery.
Thus, any position must be adopted after a careful evaluation of the needs of the individual. For example, where it is necessary to increase the muscle tone in a flaccid leg using the *supine* position, the arm must be positioned with extra care, especially if it is developing spasticity.

2.3 Approaching the person and other sensory inputs

Always approach the person who has had a stroke from the affected side. This promotes turning of the head to this side. Members of the family, visitors and all nursing and care activities must also approach from the affected side. The ward or bedroom furniture should be placed to aid the person's recovery (e.g. the bedside table must be placed on the person's affected side).

The exception to this are those cases where the individual has been severely neglected. Someone who has suffered severe neglect may become more impaired, confused and isolated if all stimulation comes from the affected side. Thus, in the beginning it is better to approach the person from his unaffected side, or from the middle. Then gradually move toward the affected side. After he improves somewhat it may be possible to follow the above suggestions.

The person should have a firm bed, but one which is not too hard. A bed which is too soft does not help the blood and lymphatic circulation. It increases spasticity and can cause pressure sores. To reduce spasticity, try to remove any factors that can increase the muscle tone. Keep the room warm, ensure that it is not too noisy and bright and limit any emotional stress. Speak to the person from his affected side, your voice will stimulate his hearing and vision, giving important sensory stimulation.

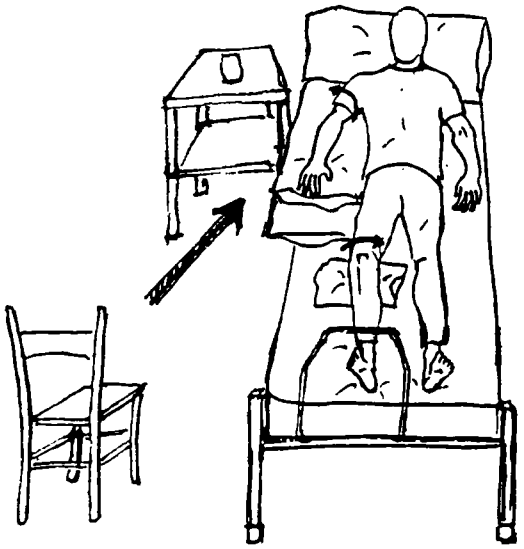


Fig. 2.1

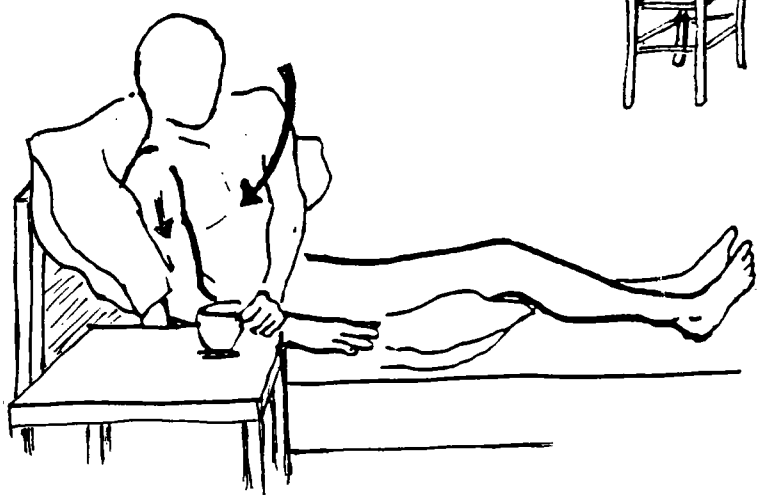


Fig. 2.2
The bedside table is placed on the affected side. This allows the person who has gained sitting balance to reach for an object on it with the unaffected hand, rotating the trunk and propping on the affected elbow.

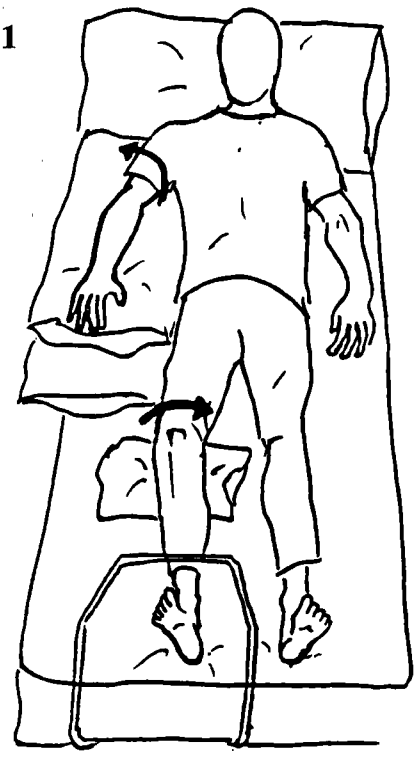
3. Lying and sitting in bed

3.1 Lying on the back (supine position)

The position illustrated below is frequently used. However, if used without due attention it can cause pressure sores and reinforce the typical spasm pattern (see fig. **a**, page 5). Always, use great care when positioning the person in the anti-spasm pattern (fig. **b**, page 5).

- the head is turned towards the affected side (not lifted too much forward by supporting pillows)
- place a pillow under the shoulder to keep it lifted forward
- the arm is placed on a pillow with the elbow and the wrist straight
- the hand is palm down, with the thumb and fingers opened
- place a pillow under the hip to prevent retraction or a dropping backward of the pelvis with the leg rotated to the outside (the leg must be kept in a neutral position)
- a small pillow may be placed under the knee to keep it slightly bent, avoiding the leg rotation to the outside, if the leg is completely floppy
- a soft pillow can be placed under the foot to prevent downward stiffness

Fig. 3.1



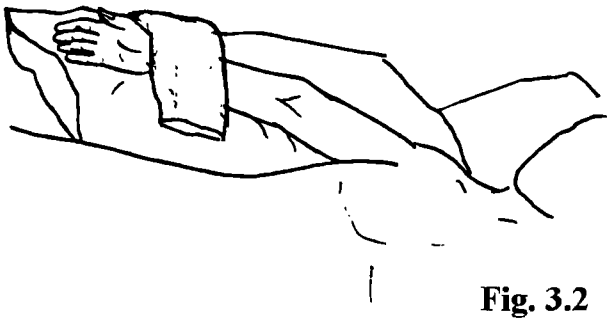


Fig. 3.2

The position of the hand (palm up or down) higher than the shoulder makes the circulation easier, preventing swelling of the hand. A small sand bag may be used to maintain this hand position

Note: **A supporting footboard should not be used if the individual is developing spasticity** in the leg , particularly the foot. The resulting pressure on the fore part of the foot will reinforce the muscle tone in the leg. However an arch must be used from the start to avoid the weight of the blanket on the foot and to prevent the foot stiffening downward.

Additional positions for the arm are suggested in fig. 92.1.

Not all body parts will be in the same stage at the same time e.g. someone may have a spastic arm while the leg continues to be flaccid. This is why any position must be adopted according to the individual's problems and needs.

- **Supine position for someone with a good shoulder range of motion**

The following positions can be maintained for those people with a good shoulder range of motion and without pain in the shoulder joint.
In placing the arm in the suggested positions, perform the movements gently and gradually, avoiding any quick stretching of the muscles. To avoid this problem, especially if the person is developing spasticity, intermediate positions are preferred.

- the head is not lifted too far forward by supporting pillows (neck flexion forward increases unwanted flexor tone in the forearm)
- the shoulder is lifted forward, arm turned out and wide apart, elbow bent, wrist slightly bent backward placed on a pillow (if possible, the hand can be placed under the person's head as well)
- the hip and the knee are slightly bent
- a pillow can be placed under the foot to prevent the foot hanging down

Fig. 3.3

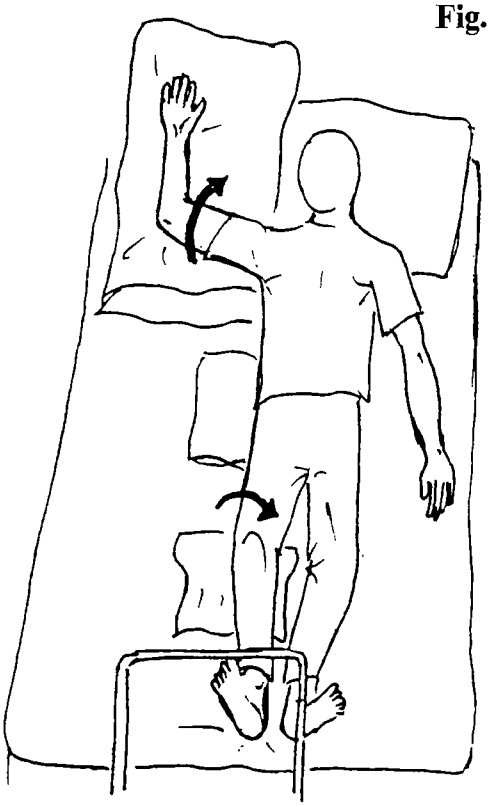
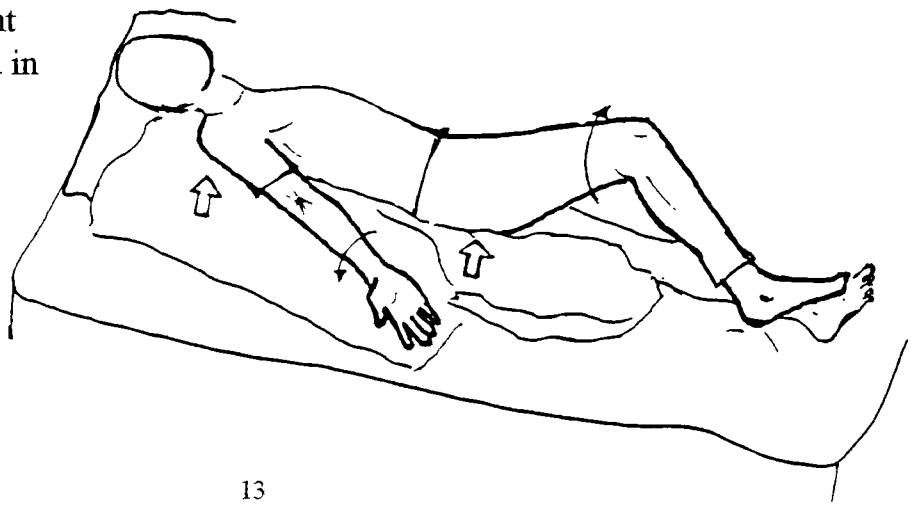


Fig. 3.4

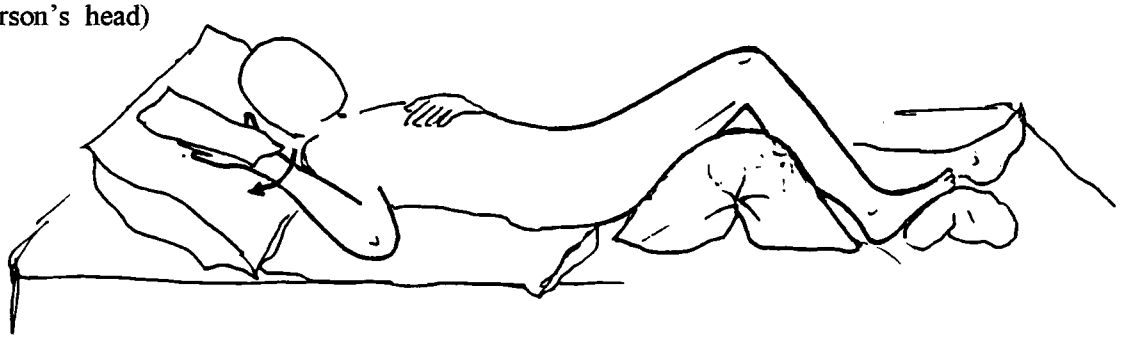
- the arm is turned out
- the elbow is straight with the hand palm up
- the hip and knee are bent
- the leg is slightly turned in



- **Supine position for someone who is developing spasticity in the leg and in the arm**

- the hip and knee are bent
- the foot is slightly bent, supported by a soft pillow
- the arm is turned out and kept wide apart from the body
- the elbow is bent, hand palm up
- the wrist is bent backward and the fingers are opened, placed on a pillow (a small sandbag can help in maintaining the position)

Fig. 3.5
(the hand can be placed also under the person's head)



- the shoulder is brought forward by a small pillow placed under it (**extra care is taken not to allow the shoulder to turn inwards to the spasm pattern of internal rotation**)
- the elbow is bent to 90°, forearm higher than the shoulder
- the hand is placed open on the pillow

- the hip and knee are slightly bent
- the foot is upward

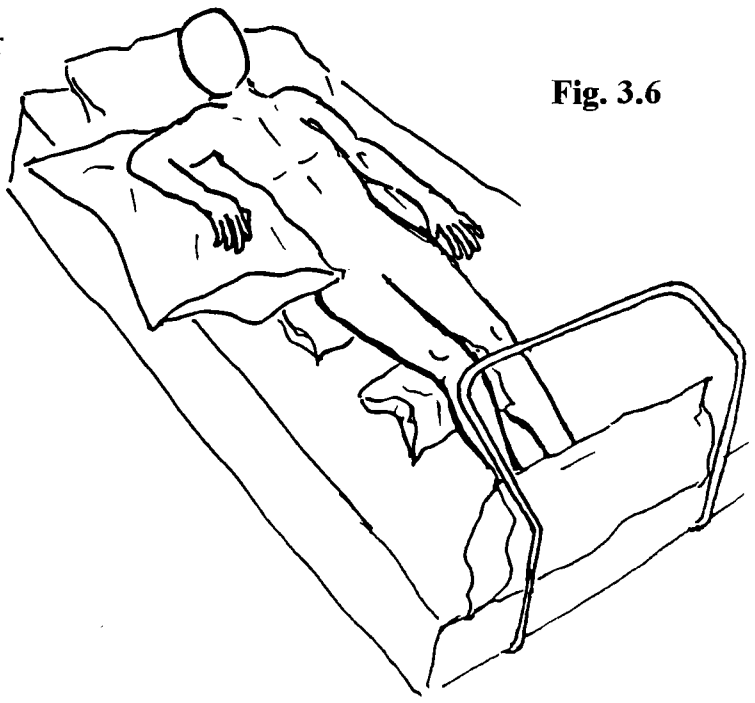
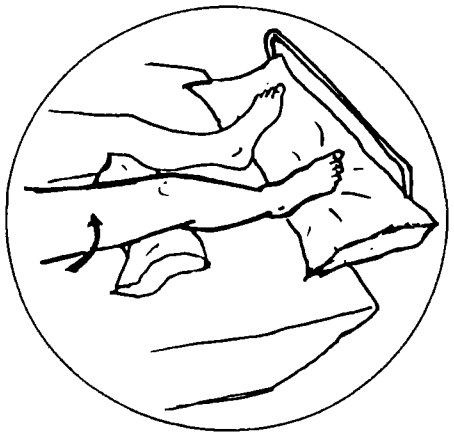


Fig. 3.6



3.2 Side-lying positions

The following positions do not increase spasticity. They should be used wherever possible. They are especially suggested for individuals who develop the "typical spasm in extension" illustrated in fig. a, page 5.

- **Side lying on the affected side**

At no time should someone who has had a stroke be rolled over onto a trapped shoulder. This is one of the common ways of starting off the "painful shoulder" syndrome (see section 15.2).

- the shoulder is drawn forward with the arm turned outward
- the elbow is straight (or bent with the hand tucked under the pillow)
- the hand is positioned with the palm uppermost
- the affected leg is straight with the knee slightly bent
- the unaffected leg is bent

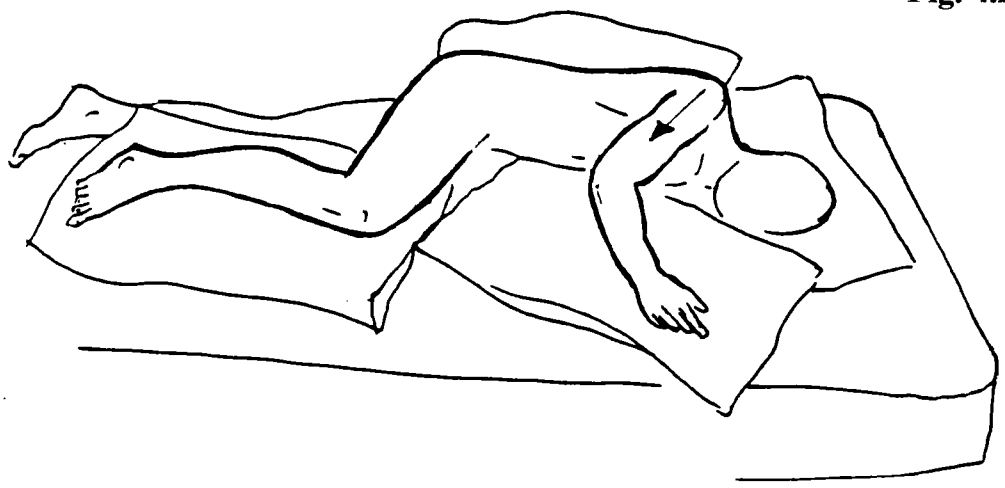
Fig. 4.1

- **Side lying on the unaffected side**

This is a good position as it is easy to place the affected limbs in the "anti-spasm pattern". It will also prevent pressure sores on the affected side and facilitate breathing on the affected side of the chest.

- the affected arm is drawn forward on a pillow
- the elbow and wrist are straight, the hand with the fingers opened
- the affected lower limb is bent on a pillow and in neutral rotation position
- the head should be supported, but should not be bent to the affected side

Fig. 4.2



It is more difficult for someone who has had a stroke to actively achieve side-lying on the unaffected side compared to side-lying on the affected side. To begin with the person needs more help. Start with the person lying on her back with her hands clasped and elevated over her head. You can then help her to bend her affected leg and guide the rotation of her trunk towards the unaffected side.

3.3 Lying on the stomach (prone position)

Lying on the stomach reduces pressure especially on the sacrum and the chest. It also maintains the hip and knee straight. However, elderly people or those with heart problems find it difficult to maintain this position.

Prone position for a person with a free shoulder joint, no joint limitations or muscle retraction (this position facilitates and strengthens the extensor pattern in the arm and the flexion in the leg).

- the head is rotated towards the unaffected side
- the affected arm is raised up and forward, with elbow, wrist and fingers straight
- the **affected hip is straight** while the unaffected leg is slightly bent
- the shin must be placed on a pillow to avoid the plantar flexion of the foot and to keep the **affected knee slightly bent**

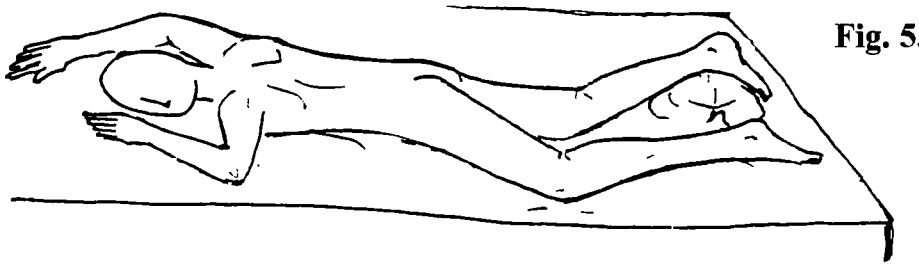


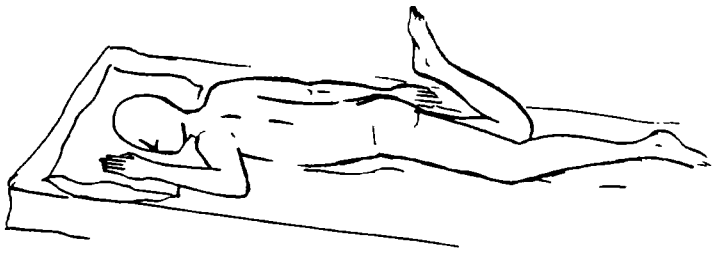
Fig. 5.1

Prone position for inhibition

Fig. 5.2 illustrates a good inhibiting position. If it is difficult to maintain a sandbag may be useful in keeping the position.

- the head is rotated toward the unaffected side
- the affected arm is placed by the side, palm up
- the unaffected leg lies straight
- the affected leg with the hip straight and the knee totally bent

Fig. 5.2



Prone position: another alternative

- the affected arm is turned in, with the hand placed on the right buttock
- the lower leg lies with the hip straight, knee slightly bent with a pillow under the ankle

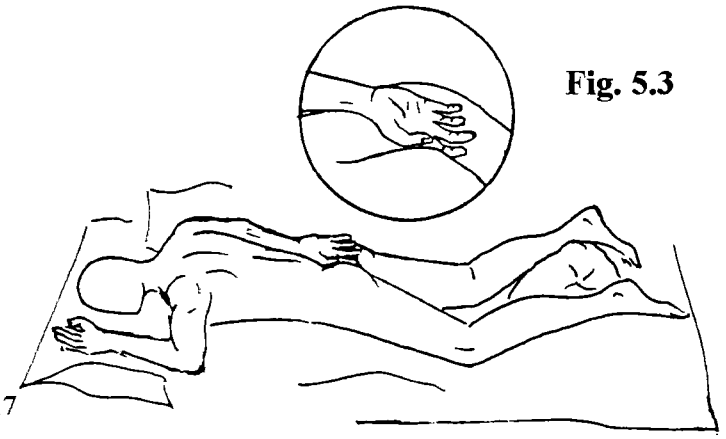


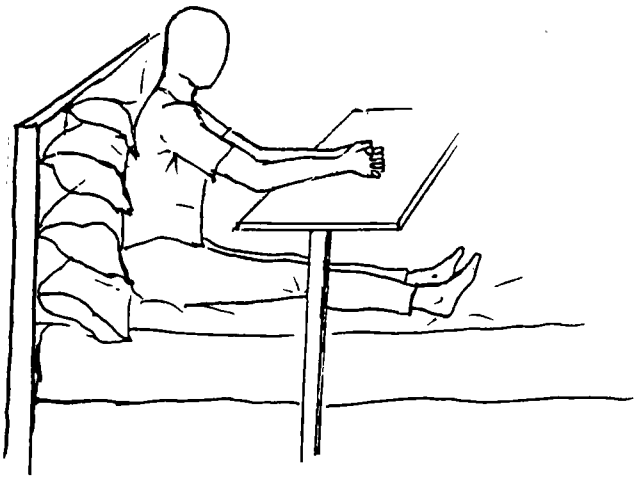
Fig. 5.3

3.4 Sitting up in bed

Sit the person up in bed before she is allowed to get out of bed. Again, positioning is very important. The person should be well propped in an upright position using pillows or small cardboard boxes to preventing lateral flexion of the trunk to the affected side.

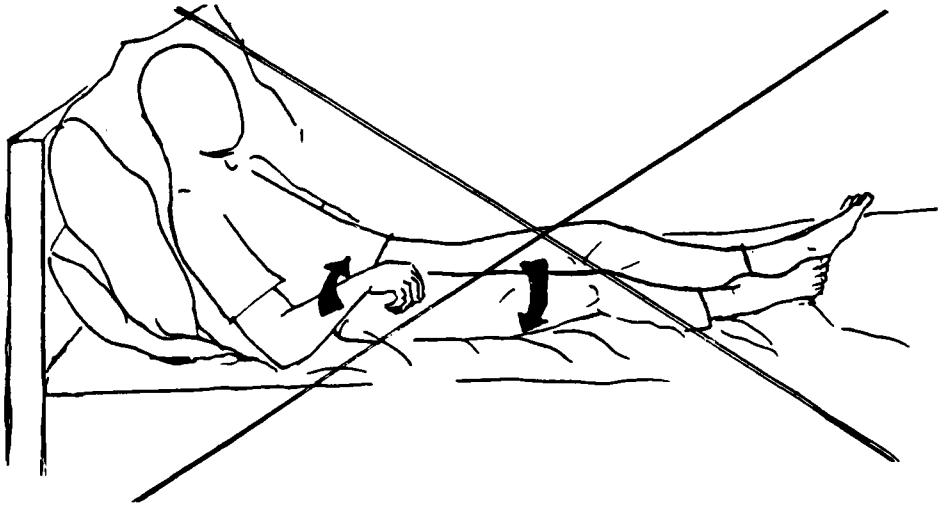
- the trunk is straight (pillows behind the back, not the head)
- weight bearing is on both buttocks
- the shoulder is drawn forward, with the arm turned out and straightened

Fig. 6



When someone who has had a stroke is sitting in bed (or in a wide armchair) avoid the position illustrated below in fig. 6.1. This half-sitting position results in a tendency to slip towards the foot of the bed. The bearing of weight mainly on the sacrum and the rubbing of the skin can cause pressure sores.

Fig. 6.1



3.5 Sitting up with the legs out of bed

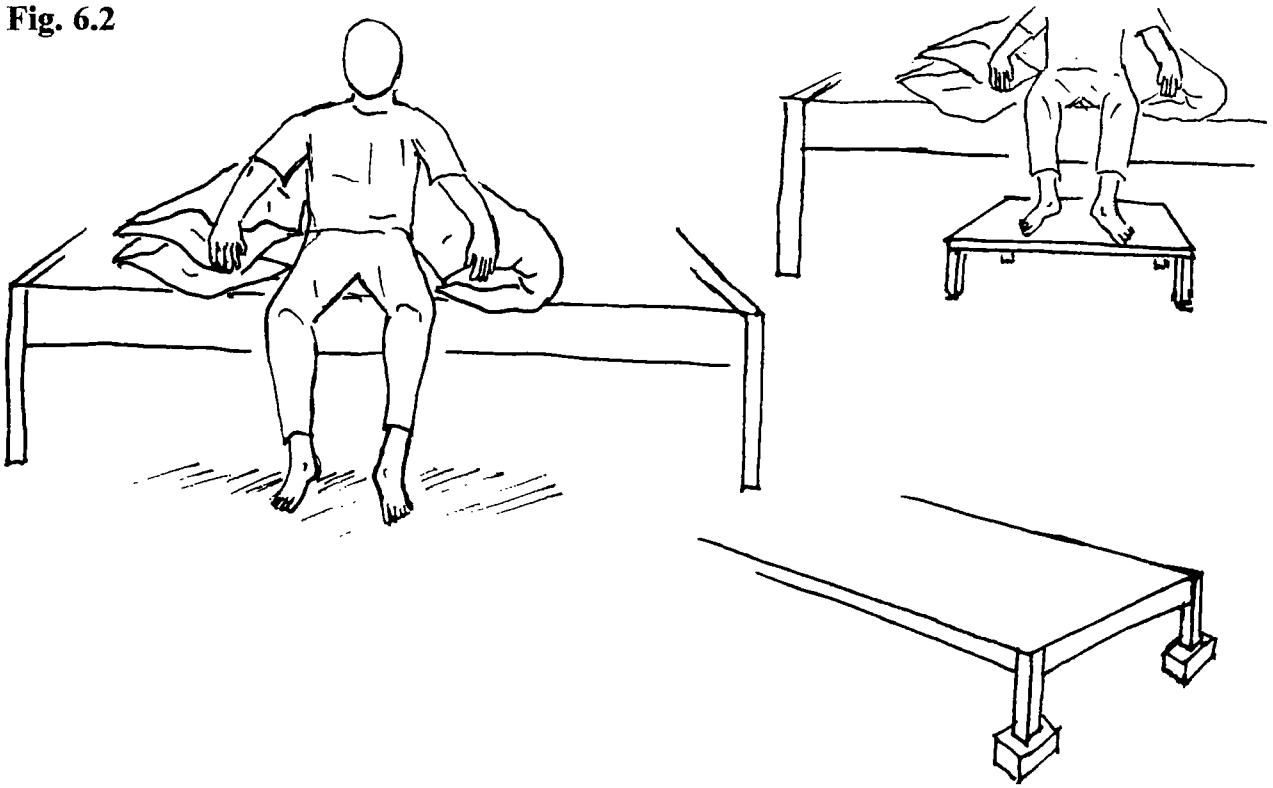
Being able to sit with the legs out of the bed (illustrated in fig. 6.2) is an important step in regaining motor function. This position improves the chest expansion and makes breathing easier. It also simulates the re-establishment of the supporting and equilibrium reactions.

To achieve this position, it is usually easier to roll towards the affected side (see section 8.3).

At first the person who has had a stroke may have some difficulty in controlling his body. He may fall backward or forward or he may fall toward the affected side. Reassure him by standing in front of him or sitting close to him at the affected side. The position is more stable if the bed is not too soft. Three or four pillows should be placed behind the person and others used by his side to support his arms.

The feet must be flat on the floor, with the knee and ankle bent to 90°. The feet can be placed on a stool if the bed is too high. Wooden blocks or bricks may be placed under the bed if the bed is too near the ground.

Fig. 6.2



A correct weight-bearing base makes control of the body easier whilst also sending correct tactile and sensory messages to the brain. Many people who have had a stroke may have difficulty in feeling the affected limb, its movements, its position in space and its relationship to the body. This is due to the **loss of *proprioceptive sense***. Sensory messages from proprioceptors of muscles and joints contribute to the brain's awareness of the different parts of the body and their relationship to space. Loss of tactile sensation may also have some effect (see section 18.4).

4. Transfer from the bed and sitting on a chair

4.1 Transfer from bed to chair

The process of getting from the bed to a chair is a specific exercise in the rehabilitation programme of someone who has had a stroke. However, it is important to put her in a sitting position very early. **At first the transfer is mainly a passive-assisted activity**. Right from the start, encourage her to take an active part during transfers. As time passes, she will be able to carry out this activity unaided.

The sequence of this activity is:
a) rolling towards the affected side (section 8.3)
b) propping on the affected elbow (section 8.5)
c) sitting on the edge of the bed, feet flat on the floor
d) transfer from bed to chair

a) rolling towards the affected side

First shift the person to the side of the bed, opposite the rotation, in order to have more room to roll.
If left unaided, she will try to carry out the movement using the unaffected side. Instead, guide her so that her motor activity will be symmetrical.

- ask the person to bend her legs, help her in bending the affected leg
- hold your hands on the person's pelvis, ask and help the person to raise her buttocks and then to move the pelvis to the side (see "bridging", section 7.7)

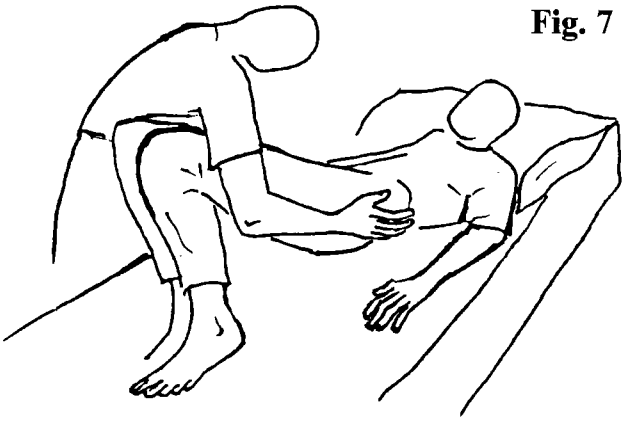


Fig. 7

- next roll the person towards the affected side

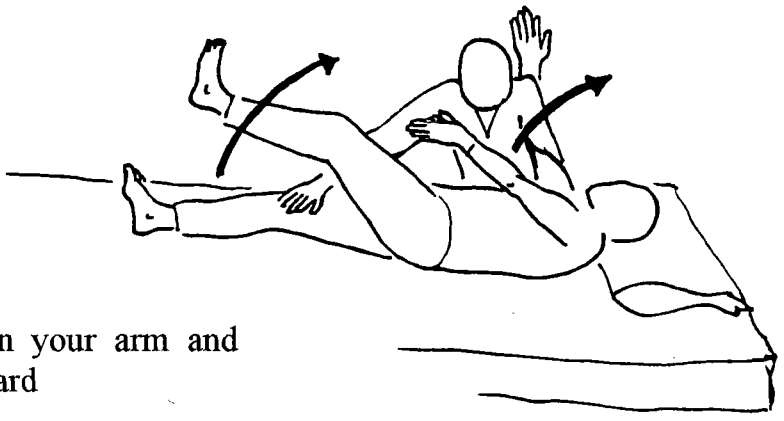


Fig. 7.1

- hold her affected arm between your arm and body to keep the shoulder forward

b) propping on the affected elbow

See section 8.5

c) sitting on the edge of the bed, feet flat on the floor

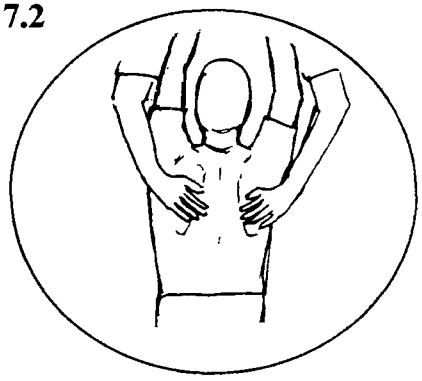
At first, the person may need help to sit on the edge of the bed (see fig. 7.2).

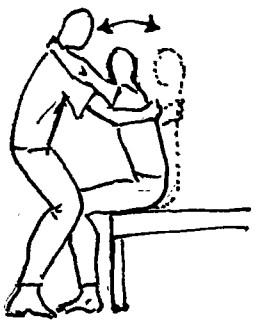
d) transfer from bed to chair

Teach the person to lean forward over his feet (which are kept flat on the floor) to stand up, to turn and to sit down. Bare feet help in stimulating sensation in the sole of the foot and holding the floor without slipping.

- Stand in front of him , hold his shoulders (fig. 7.2)
- his hands are on your shoulders (the positions illustrated in fig. 43. and 43.3. may be used as well)
- use your knees to support his knees, especially the affected one (fig. 7.3)
- bend his body, pulling him forward from the shoulders; he can help by pushing forward to raise his buttocks (fig. 7.4)
- when he has raised his bottom, you can rotate him towards the chair or the bed (fig. 7.5); <u>the person should not stand completely</u>

Fig. 7.2





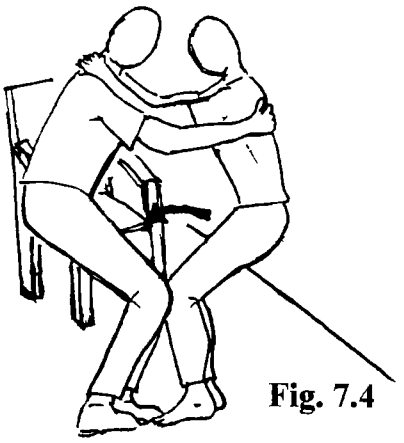


Fig. 7.4

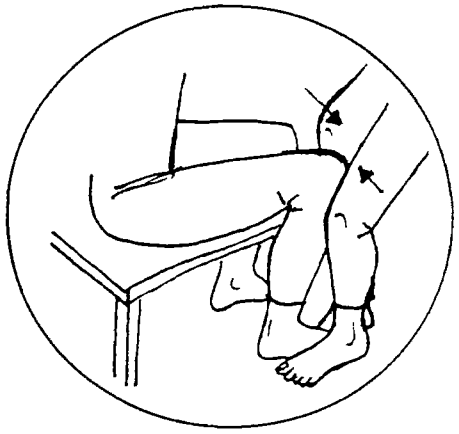


Fig 7.3

You can control the person's affected knee and foot with your knee and foot respectively

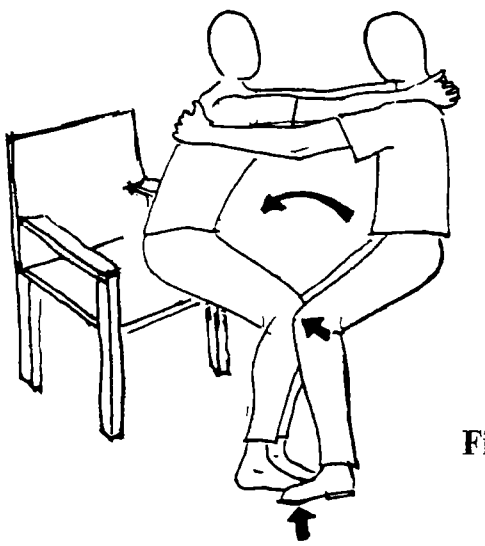


Fig. 7.5

4.2 Transfer with help

- the person clasps her hands and **leans forward** to place them on a low table (or a chair)
- her feet are flat, heel in contact with the floor
- then she lifts her bottom and turning moves it on a chair
- you can help her in raising her buttocks.

Fig. 8
The trainer helps the person from the pelvis in raising her buttocks

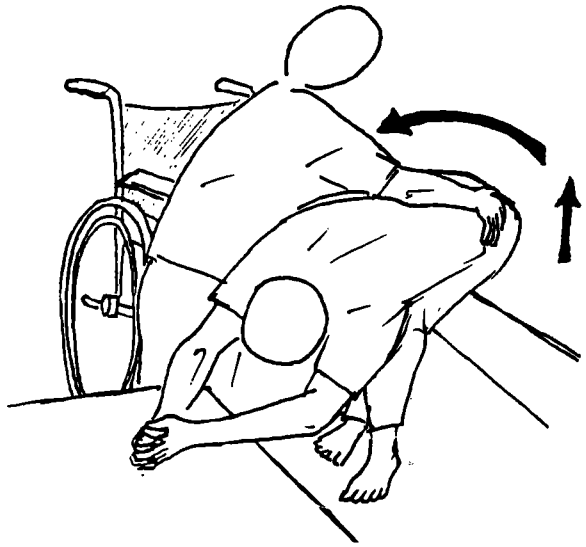
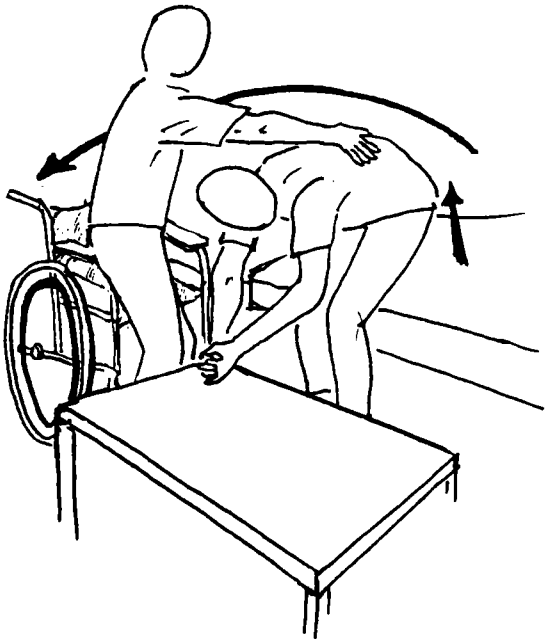


Fig. 8.1
or
assistance is offered from the shoulders



4.3 Transfer without help

- the shoulders are drawn forward, hands clasped, elbows straight
- she **leans forward** over her feet, stands up and turns, transferring part of the weight through her affected side
- she sits down on the chair

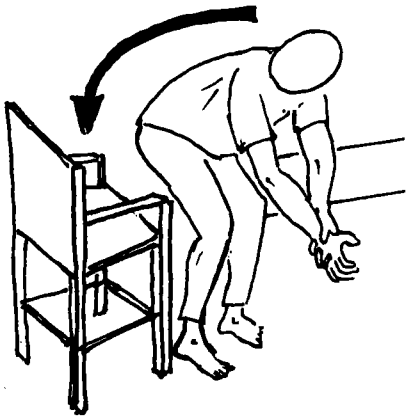
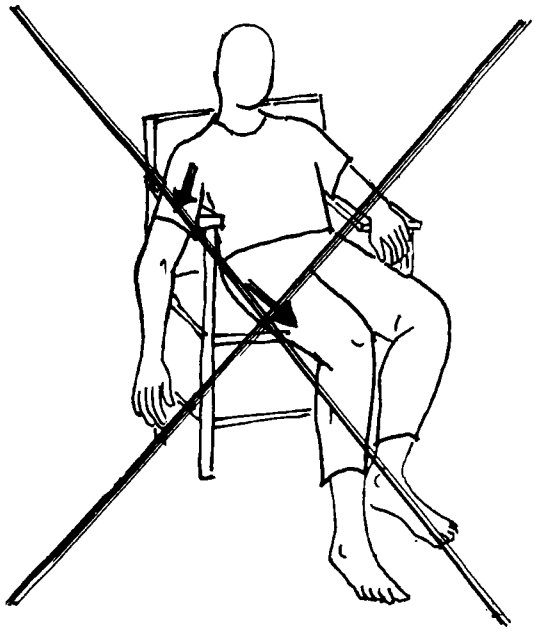


Fig. 9
The affected leg is kept slightly forward

4.4 Sitting on a chair with armrests

When someone who has had a stroke is sitting on a chair with armrests it is important to **prevent the arm hanging down, the leg turning out, the pelvis slipping forward and the trunk bending sideways** (fig. 10).

Fig. 10



A correct position must include:

⇨ the affected arm must be supported with a pillow (an arm which is hanging down causes the stretching of the shoulder joint, this causes pain);

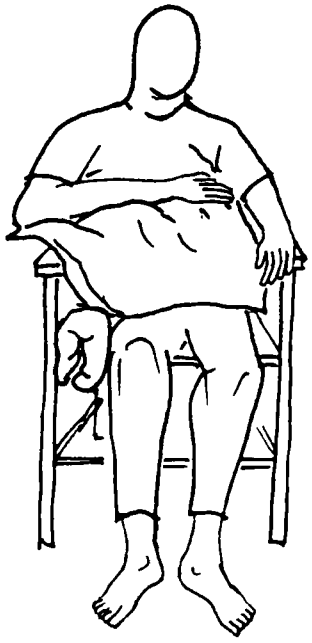
⇨ the lower limbs must be bent at the knee to 90° and the feet kept flat on the on the floor;

⇨ the trunk must be upright, leaning against the back of the chair

The position of the affected arm should be changed often, e.g.:

- the arm should be turned inward with the forearm bent and close to the body, the hand is placed on a pillow (fig. 10.1)
- the arm should be turned outward, elbow bent, the hand is placed on the armrest (fig. 10.2)

Fig. 10.1



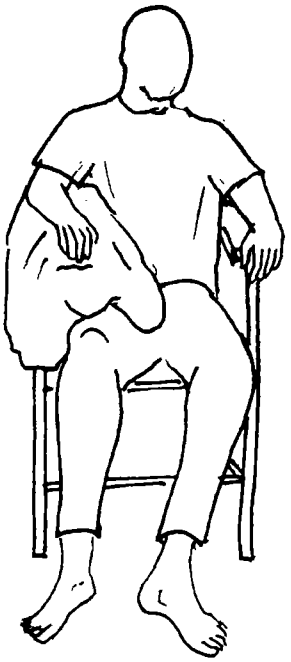


Fig. 10.2

4.5 Sitting on a chair without armrests

The next step is to sit the person on a chair without armrests.

- The person sits by the side of a bed (or table), with the affected elbow and forearm placed on it. A pillow or a cardboard box can be used to support the arm (see the illustrations below)

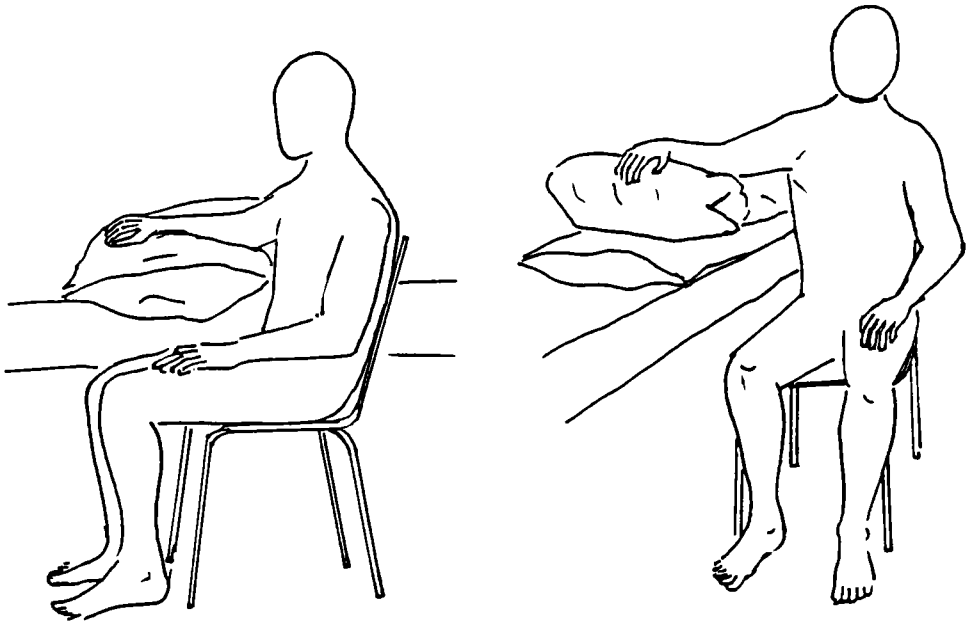


Fig. 11

the above position is important to avoid a downward stretching of the shoulder joint and to prevent the hand from swelling (the hand is placed slightly higher than the elbow)

DO NOT support the affected arm in a bent position using a cloth tied behind the neck (fig. 11.1).
This position facilitates the typical flexor spasm pattern of the arm. Also if the cloth does not support the elbow, the shoulder is pulled down.

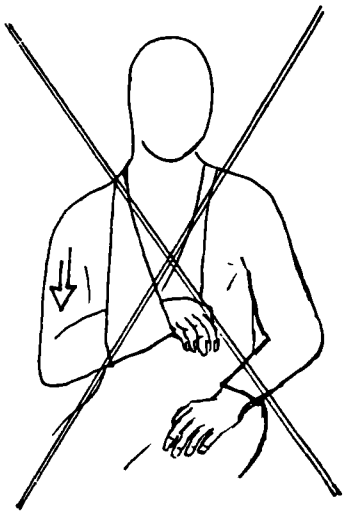


Fig. 11.1

<u>If a shoulder support is needed, for example due to a severe flaccidity, see the suggestions contained in section 16.2, fig. 93.4)</u>

4.6 How to correct the sitting position

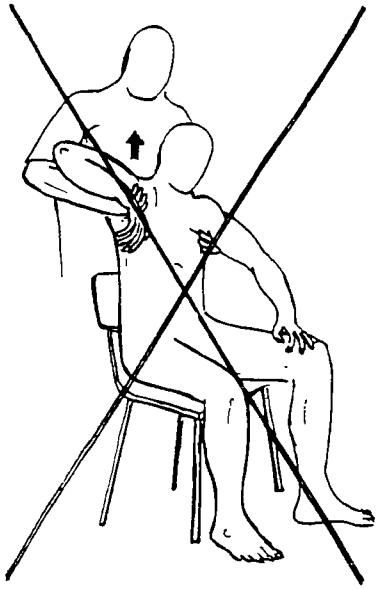


Fig. 12

If the person needs to be lifted and better positioned when sitting on a chair or wheelchair (e.g. if his pelvis has slipped forward), **he should not be lifted from the shoulders**, by pulling up with your hands under the person's armpits.

The correct way is:

- The person sits with his hands clasped (or with the unaffected hand he grabs the affected wrist)
- Stand behind him, bend your knees, maintaining the trunk upright and then, pass your hands under his armpits
- Hold his wrists and straighten your knees raising him at the same time

At the start, this is a **passive movement**. Later on, with the improvement of the person's ability it will be an **active assisted movement**. Teach him to lean forward, to transfer the body weight from one buttock to the other, moving the pelvis backward at the same time.

Fig. 12.1

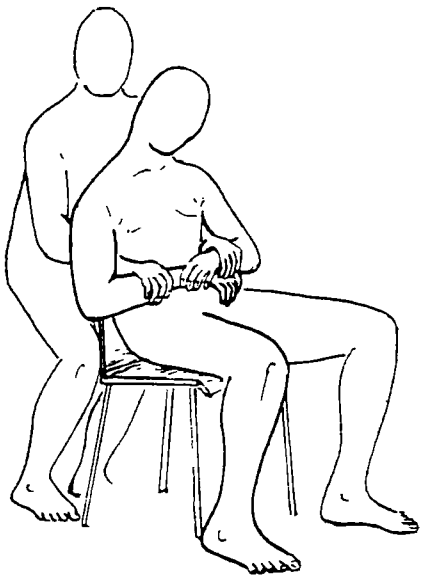
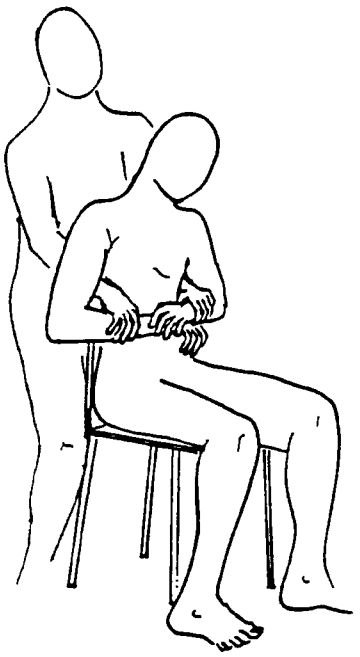


Fig. 12.2



Note: **Correct handling and positioning is essential for someone who has had a stroke. It is also important for the trainer to carry out these activities in the simplest and least tiring manner.**

4.7 Getting back into bed

The procedure for getting out of bed (section. 4.1) is repeated in reverse:

- the person stands with her hands clasped, elbows straightened,
- she takes a quarter turn to position her bottom on the bed,
- she sits down

From this sitting position, someone who has had a stroke should not hook the unaffected leg under the affected one to help it up onto the bed. Encourage and train her to do the following:

- she clasps her hands and straightens her elbows,
- she swings both arms round to follow the movement of the head as she rolls back onto the bed,
- the unaffected leg follows the trunk movement,
- you can support and lift the affected leg

5. Performing Range of Motion (ROM) activities

5.1 The benefits of range of motion activities

The longer that someone who has had a stroke remains inactive, the more work it takes to regain mobility. Rehabilitation starts with passive mobilisation. As the individual's ability improves, movement will become more active but the person will still need assistance. With further progress, active movements (voluntary controlled movements) are possible. Finally, the person will be able to move and hold a limb in space.

Mobilisation is important because :

- Early passive mobilisation of the joints will help to keep **their range of motion free and functional**, maintaining the elasticity of the soft tissues (ligaments and muscles). This reduces the risk of contractures, retractions and deformities developing.

- It **keeps the "image of the movement"** at cerebral level. Movement of the body causes a flow of information to the brain. When movement is reduced in the early days after the onset of a stroke there is a sudden break in the flow of this information. After a stroke the person "forgets" how to move the affected limbs because all stimuli, produced during movements, quickly cease to reach the brain. Through correct positioning and early passive exercises it is possible to generate proprioceptive stimuli, produced by the stretching of the capsular and muscular apparatus.

- It helps the circulation of blood and lymph and **prevents** the affected limbs from **swelling**.

5.2 Performing range of motion (ROM) activities

- All joints on the affected side, must be **passively moved** in all directions and through the normal range of motion. Movement must be performed **slowly** (quick movements will increase the joint stiffness) and **gently** (to avoid joint dislocations or other traumas). **In the very early days after a stroke, the shoulder and hip must be given special attention**.

- **Careful positioning must continue** during hip and shoulder mobilisation. If an activity involves the upper limb, the position of the lower limb must be taken into account, and vice versa. For example, the shoulder exercise when lying on the back must be carried out after careful positioning of the affected leg in the "anti-spasm pattern" (hip drawn forward with the leg turned inward, plus hip, knee and ankle bent).

- The person must also learn to carry out **self ROM** for the upper limb e.g. holding the hands together and using the unaffected arm to move the flaccid one .

6. Care of the shoulder

Even if someone has severe paralysis it is important to have a mobile arm. A spastic and painful arm disturbs the balance reactions when standing and disturbs the general movements of the body. It also interferes with the daily living activities.

6.1 Arm elevation with outward rotation lying on the back

- lay the person on her back, with the affected leg bent and placed in a position that is *neutral* between internal and external rotation.
- raise her arm forward and upwards over her head
- then, open her affected hand, stretching the fingers and opening the thumb (fig. 13.1)

Fig. 13

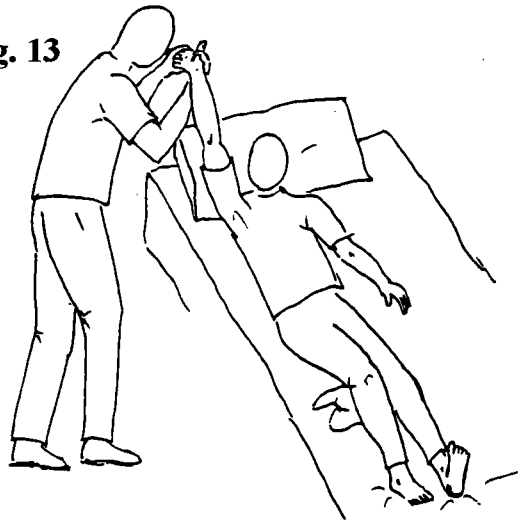


Fig. 13.2
another handgrip that may be used

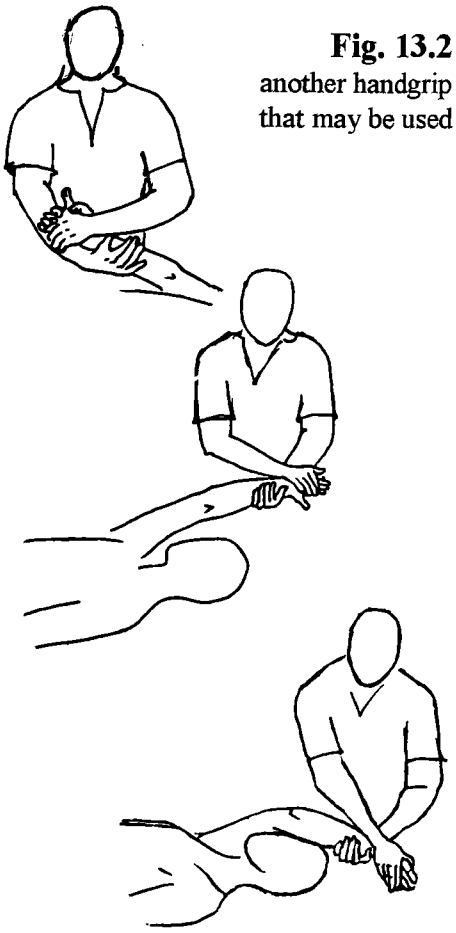
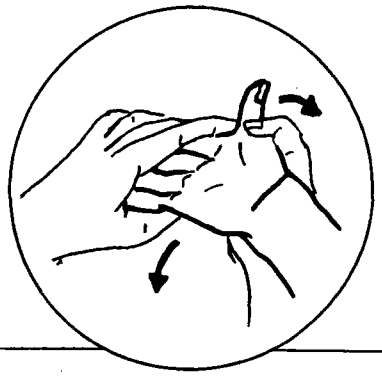


Fig 13.1



Note: This **handgrip** is used in many exercises for the rehabilitation of the arm:

- the trainer keeps the person's thumb away from the index finger and the wrist bent backward, making the releasing of fingers easier;
- through this grip the elbow is kept straight and the shoulder is turned to the outside.

Manual pressure (see section 14.3) can be added as an additional inhibiting influence, maintaining the elbow straightened and the wrist bent backward.

6.2 Arm elevation with outward rotation in side-lying position

The position of the arm is maintained throughout this exercise by :

- the arm is raised straight, with the shoulder turned out
- the palm faces upward towards the head of the bed, the thumb pointing away from the body
- the handshake grasp used (see note below) keeps the thumb uppermost, the wrist bent backward and the shoulder turned outward.

Fig. 14
if the person has a painful shoulder
do not fully elevated the arm

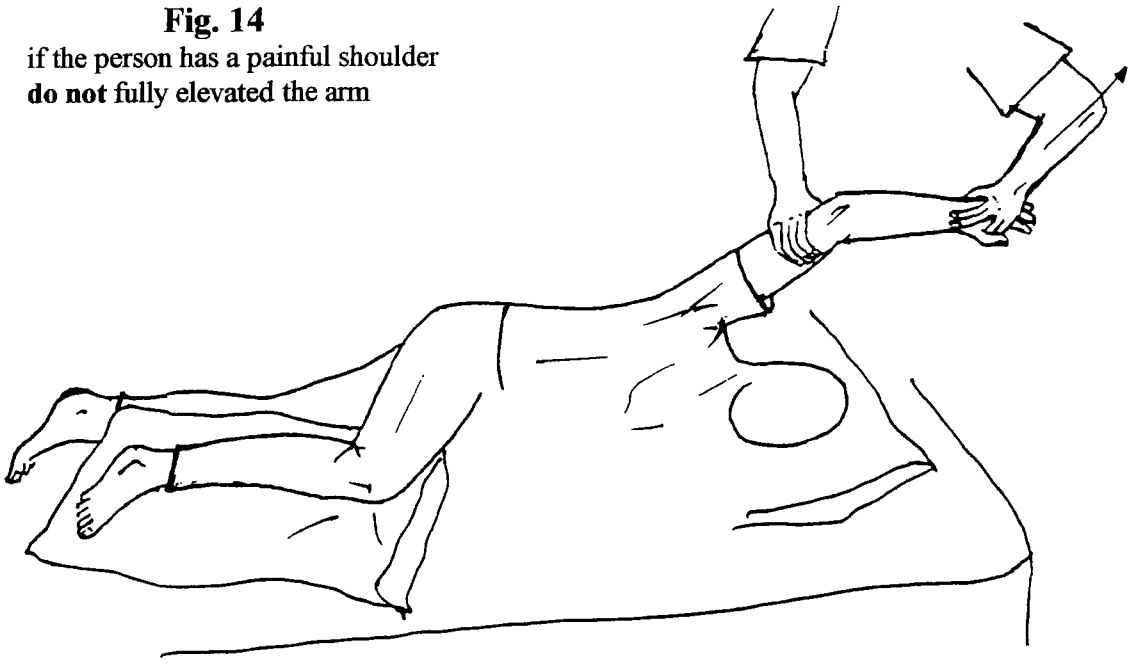
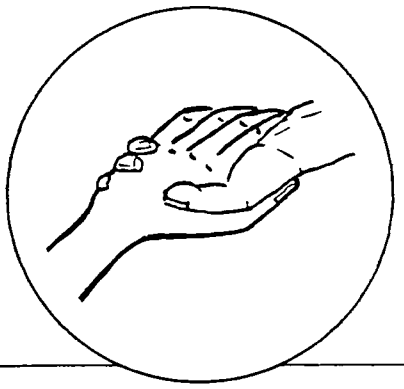


Fig 14.1



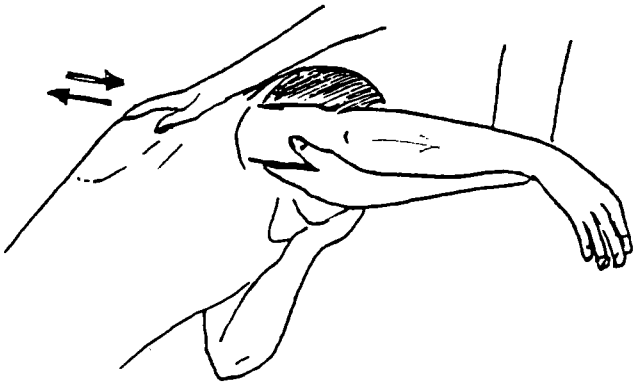
Note: The **handgrip** illustrated here is used in several other training activities when the person is sitting or standing. The handgrip keeps the thumb uppermost, the fingers opened, the wrist bent backward, the shoulder and the arm turned outward.
By keeping your first and second fingers straightened, you can support the person's wrist, giving an additional control (see Figure 14).

6.3 Scapular mobilisation

With the person lying on her unaffected side

- place one of your hands over the shoulder blade of the affected side and support the affected arm turned outward with your other hand and forearm
- you are now in a good position to support the affected arm and maintain the shoulder forward while you move the shoulder blade over the full range

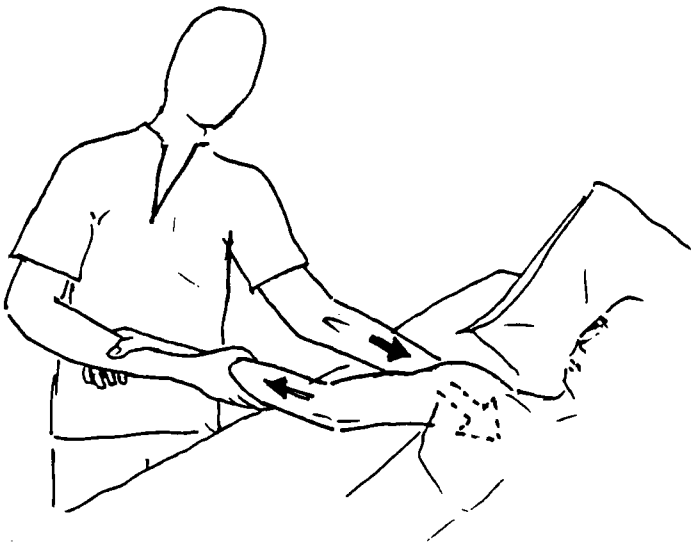
Fig. 15.1



With the person lying on her back

- with one hand fix the person's shoulder blade, with your other hand support her arm which is turned outward
- now draw forward and raise her shoulder, pushing down her shoulder blade

Fig. 15.2



6.4 Self ROM: Arm elevation

This exercise should be carried out several times a day by someone who has had a stroke. It can be done whilst lying in bed or in a sitting position.

- Ask the person to clasp his hands, palms touching, with the affected thumb over the unaffected one, fingers separated. If the thumb of the affected hand is uppermost it can be held in a good position by the unaffected thumb (see picture in the circle).
- he straightens his arms forward, his elbows are straight
- keeping the shoulders forward and turned outward, the person raises his arms over his head

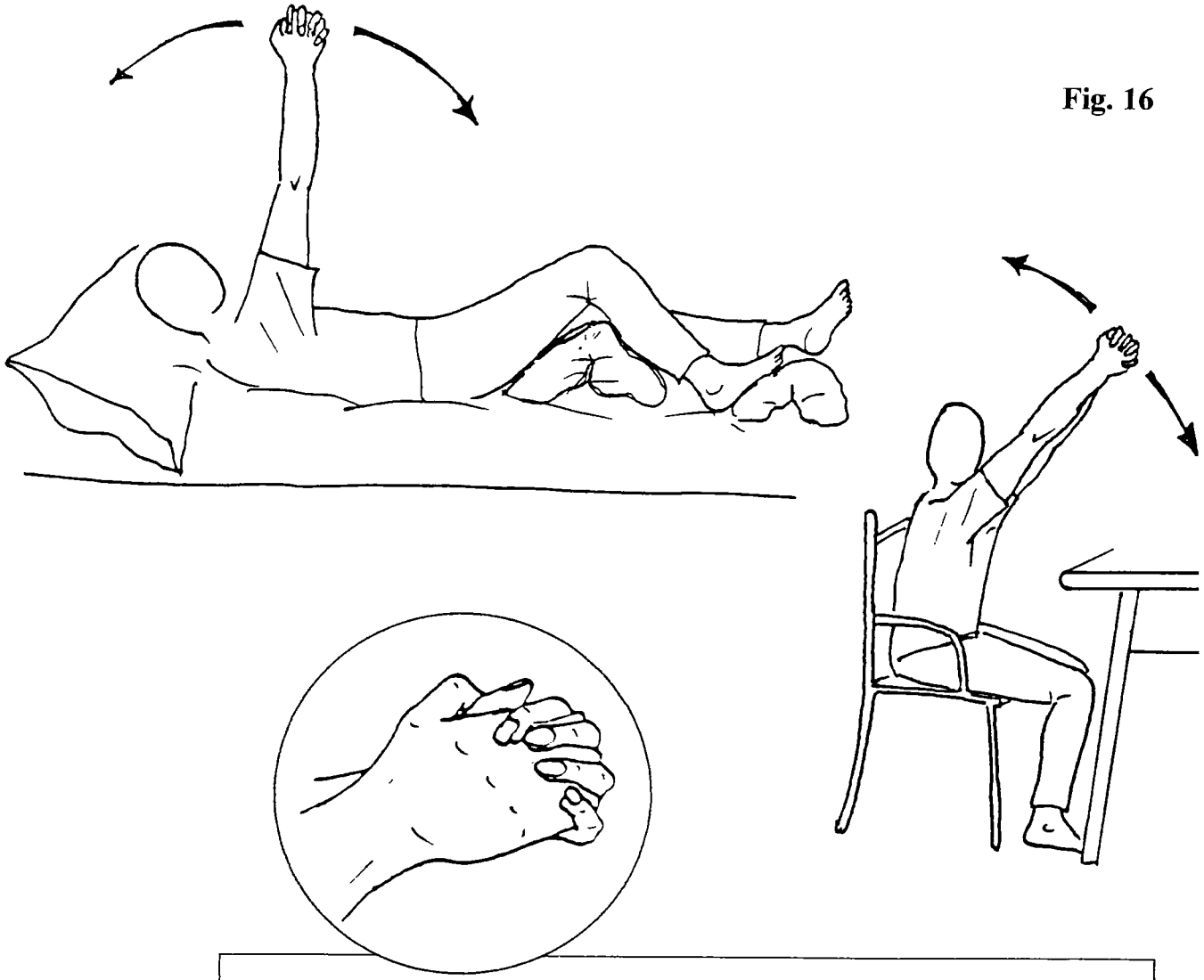


Fig. 16

Note: **This handclasp position with palms touching**, in front of the body and in elevation, prevents the affected arm from falling backwards and inwards.
It holds the **shoulder** well **forward.**
It holds the affected **fingers and thumb** opened and **wide apart**.
It also helps the person to **be aware** of his affected side and to maintain contact with it.

6.5 Other self ROM techniques for the arm

Encourage the person who has had a stroke to use the unaffected hand to assist the affected one in performing any movement. Control of the affected hand is possible by holding the wrist or with the hands clasped and the fingers interlaced.

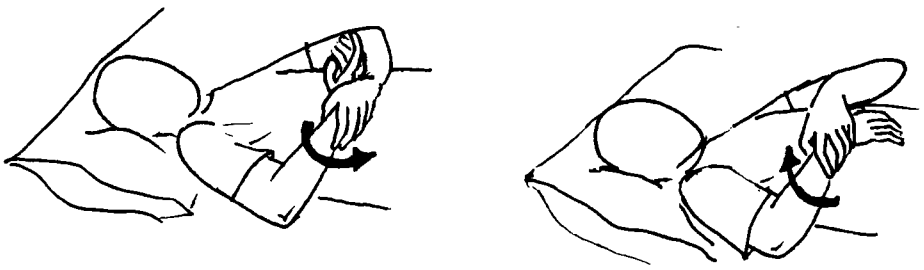


Fig 17
the forearm is turned
inward and outward

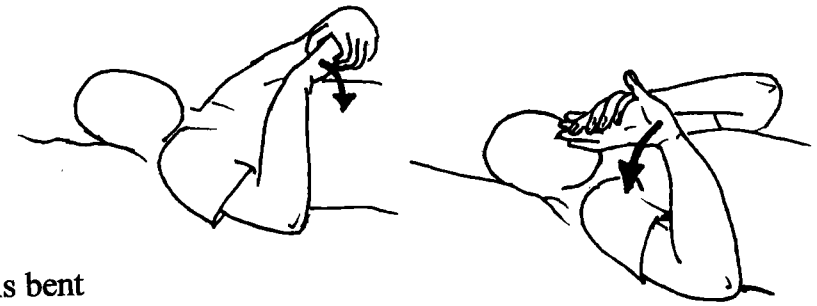


Fig. 17.1
the wrist is bent
upward and downward

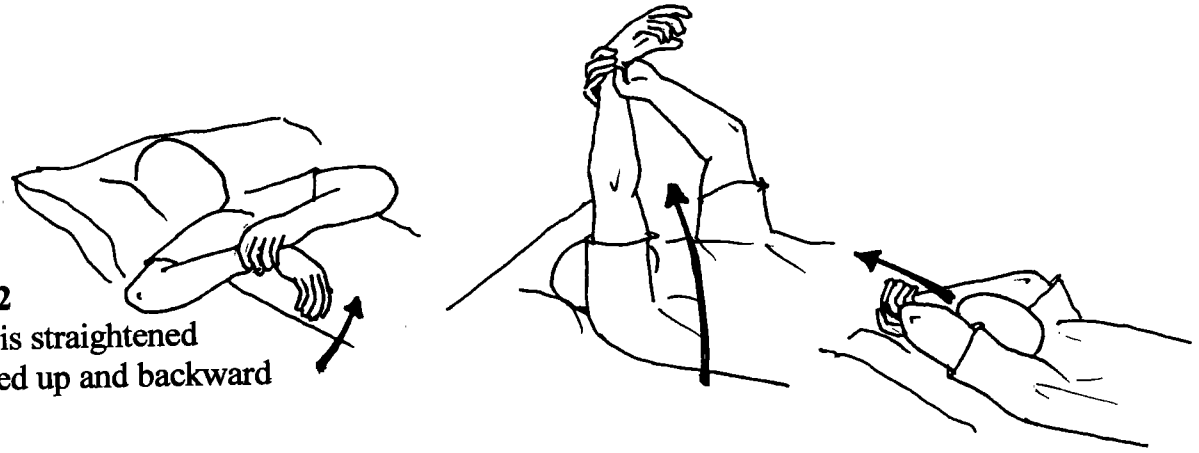


Fig. 17.2
the arm is straightened
and raised up and backward

For additional information,
see WHO Manual, Training Package N° 9

7. Hip care

7.1 Introduction

Hip care should begin immediately after the onset of the stroke with careful positioning of the leg, ensuring it is slightly bent and turned to the inside. Together with positioning, progress in the programme for hip care must include girdle rotation, hip bending, straightening, rotation and bridging.

Note on how to hold the foot:
This grip is used during stretching exercises for the calf muscles and also when holding the foot for knee and hip exercises. During stretching exercises more strength is put on pulling the heel downward and pushing the foot upward.

- with one hand hold up the person's knee
- with the other hand hold the foot as illustrated in the picture below, turning the heel inward a little and pulling the heel down ↓
- using your forearm to hold the foot, gently push the foot upward ↑
- hold for a count of 10 until stretch; then relax the foot and repeat this about 5or10 times

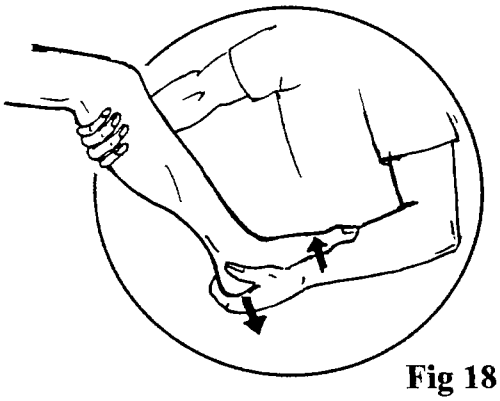


Fig 18

7.2 Hip girdle rotation

This exercise is important for the stretching (elongation) of the trunk on the affected side and to move the person into rotation of the trunk from side to side (**outward rotation of the shoulder and inward rotation of the leg**).

- lay the person on his back with the leg bent and turned inward

- hold his shoulder down with one hand, while stretching his trunk (especially the affected side). Place your other hand on his pelvis.

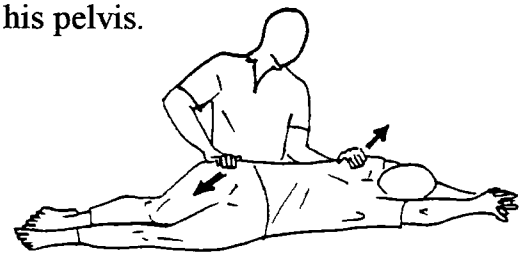
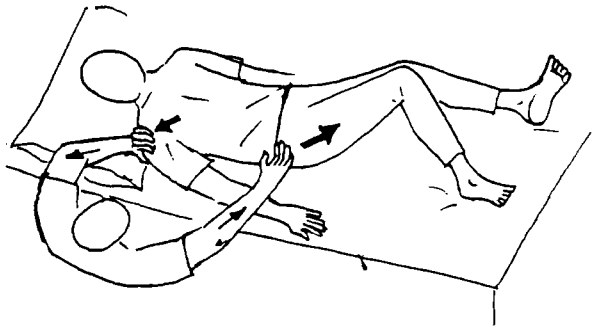


Fig. 19



7.3 Full hip straightening/bending

Full hip straightening must not be lost. If it is, it will later prove very difficult for someone who has a stroke to walk in a stable and rhythmic manner.

During the following activities the person should clasp her hands above her head with the palms touching and the elbow straightened. This will bring the shoulder forward with the arm turned outward and in full elevation (see Fig. 16). This is especially important if the individual is developing spasticity in the affected arm.

- Lying on her back with the unaffected leg bent, the person places her leg over the edge of the bed
- Help her to lift her leg up with the knee bent

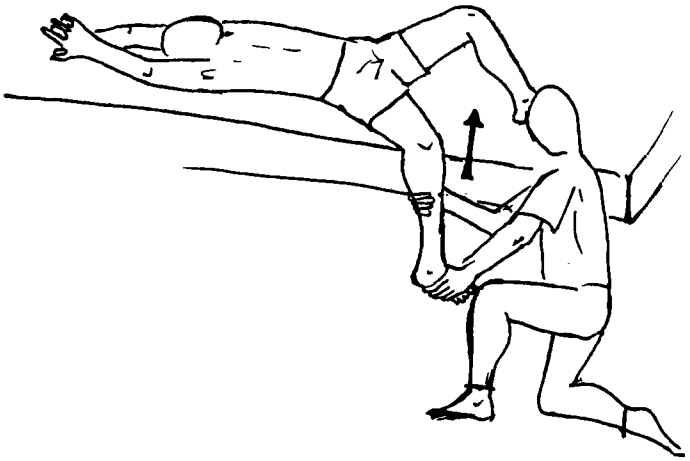


Fig. 20

7.4 Knee exercises

To maintain good knee function both the muscles that straighten and the muscles that bend the knee joint must be exercised. This can be done in an active assisted manner.

- Maintain the person's foot up while moving the leg from flexion to extension in intermediate rotation

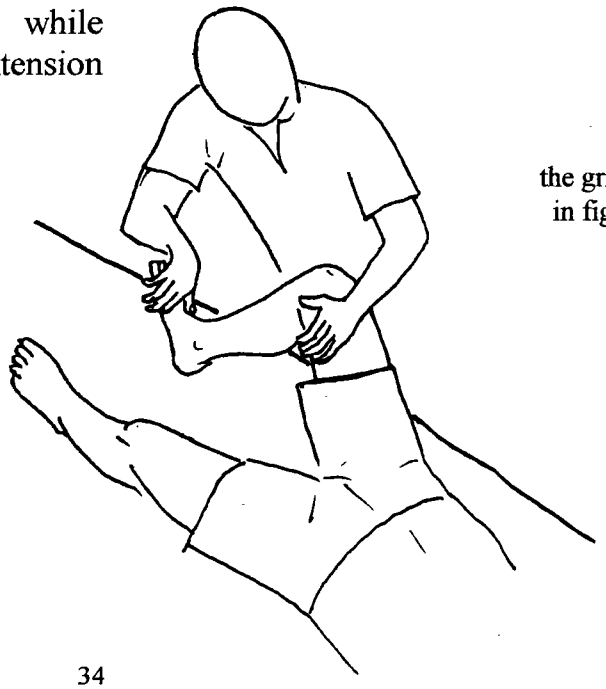


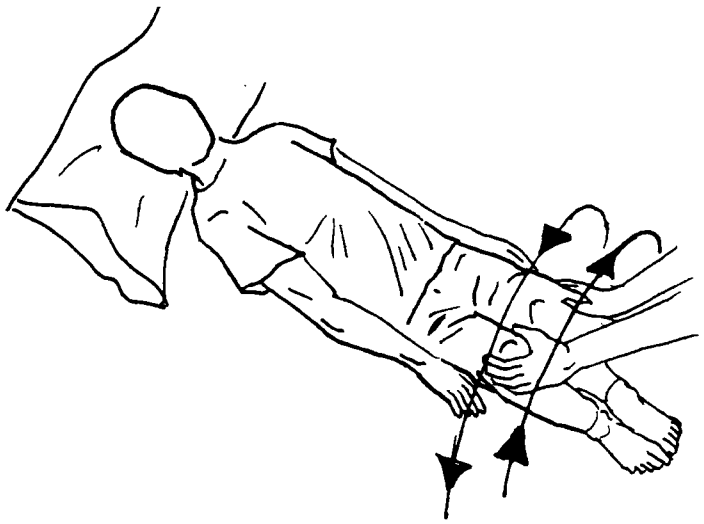
Fig. 21
the grip illustrated in fig. 18 may be used as well

7.5 Active internal and external rotation of the hip

Someone who has had a stroke should practice **hip rotation** even in the early days after the stroke. This activity is important before establishing bridging.

- At first, you can support the affected leg in crook-lying position
- then both knees are moved, as one, from side to side

Fig. 22



- the person moves outward and inward the affected leg, **without lifting the pelvis** or moving the unaffected leg. The foot is placed on the bed.
- You can assist the movement.

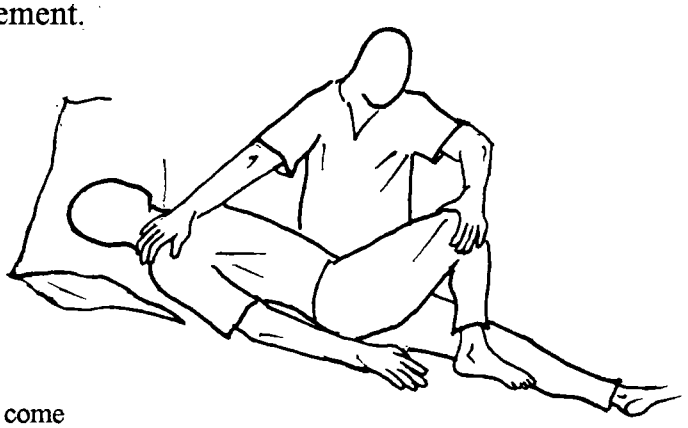


Fig. 22.1
if the affected shoulder tends to come off the bed, you need to place one hand on the person's shoulder to prevent it from moving

- Then ask the person to keep the **hip lifted** whilst moving the knee inward and outward

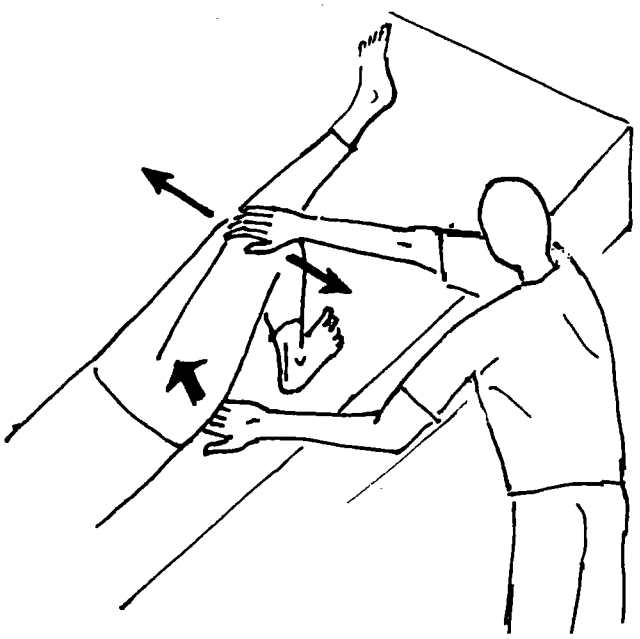
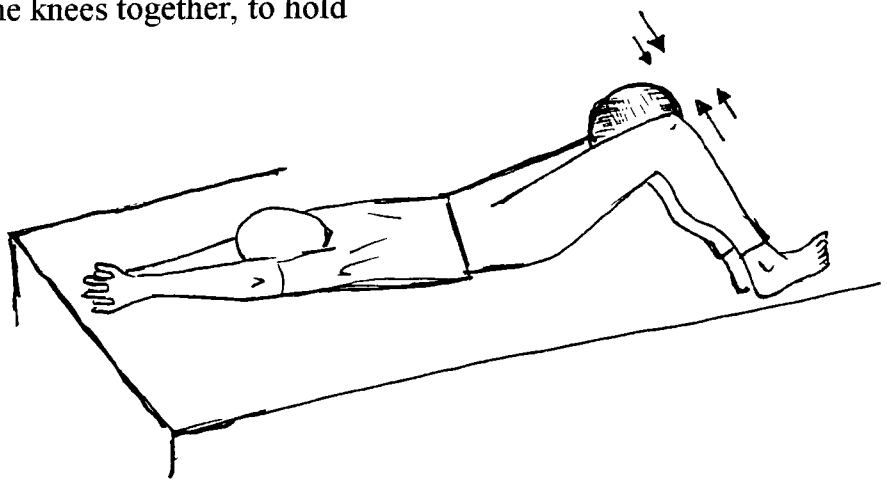


Fig. 23.1
the person can practice this activity , controlling the affected leg with the unaffected one

7.6 Hip adduction

- Both knees are bent and held firmly together to prevent the hip turning out
- It is useful to place something between the knees (e.g. a hard backed book or a ball)
- Teach the person to watch the knees, to press the knees together, to hold

Fig. 24
To start with the person's bottom is on the bed, she is then asked to raise it



7.7 Bridging (hip extension)

This exercise is necessary to re-establish controlled and functional movement of the hips. It should be performed from the early stages of treatment. From a nursing viewpoint, it is useful in delivering a bed-pad and dressing and undressing the person. It is also useful because it enables the person who has had a stroke to take his weight off his buttocks at frequent intervals, thus reducing the risk of pressure sores.

- Lying on the back with both knees bent, the person lift the hips up and balances in this position
- In the beginning it may be necessary to help him to bend his affected leg, to hold it in the required crook position and to raise his buttocks
- With your left hand help him in raising the hip. With your other hand you may give a sensory reminder (see "*tapping*")

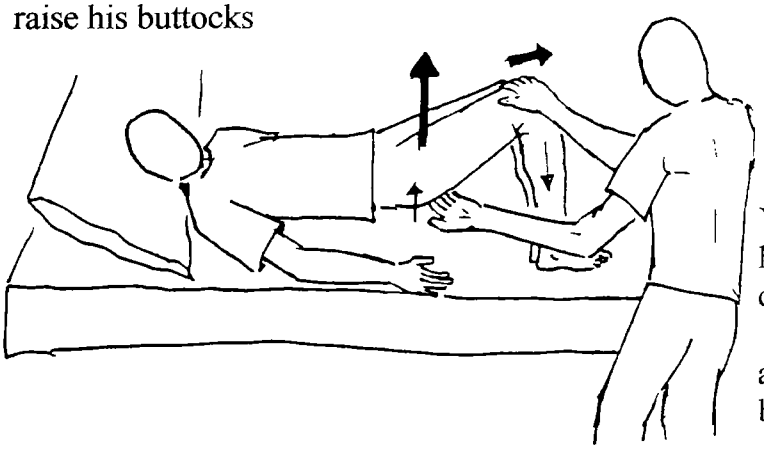


Fig. 25

You can help the person by pulling his knee forward and pressing it down (*approximation*)

a brisk *tapping* on the bottom may be used as a sensory reminder

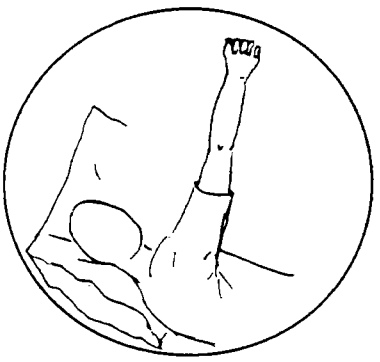


Fig. 26

the upper limbs can be maintained above the head (hands clasped, elbows straightened, trunk elongated)

7.8 Other hip exercises

The following exercises can be carried out by the person with or without assistance. You can offer assistance in keeping the person's foot down, thus controlling the leg from turning outward.

- Lying on the back with both knees bent, lifting the hips up to **balance** in this position

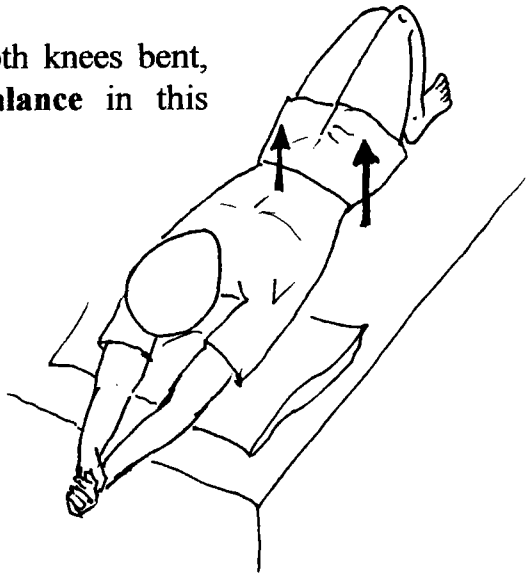


Fig. 27

- **Pelvic rotations** from side to side, keeping the hips raised

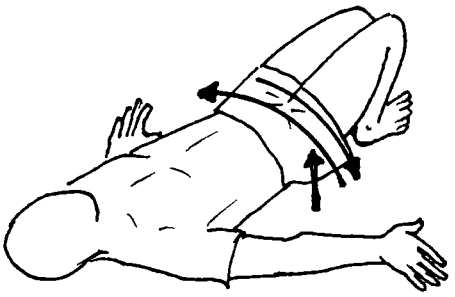


Fig. 28

- Bridging on the affected leg

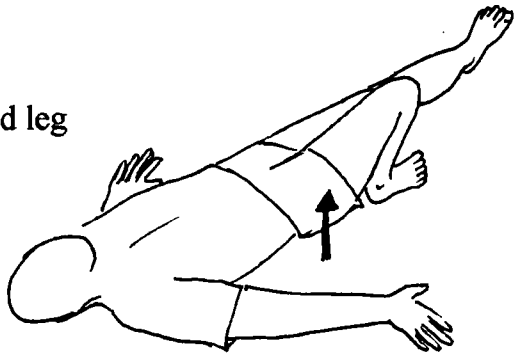


Fig. 29

Note: for additional information, see WHO Manual, Training Package N° 9

8. From lying to sitting

8.1 Rotation of the shoulder over the pelvis

The rotation of the shoulder over the pelvis is an important movement to reduce the extensor spasm pattern. This is an **active exercise** for the someone who has had a stroke to do on his own. At first, however, you can help the person by holding the affected shoulder forward with the arm straightened.

- the person has clasped hands, palms touching (fingers interlaced)
- his wrists and elbows are straightened, the shoulders are drawn forward
- the affected leg is bent
- both arms are then raised up and down by the person (see «handclasp exercise», section 6.4)

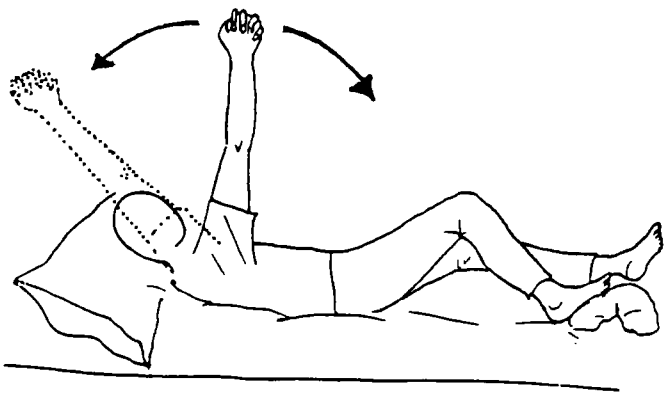
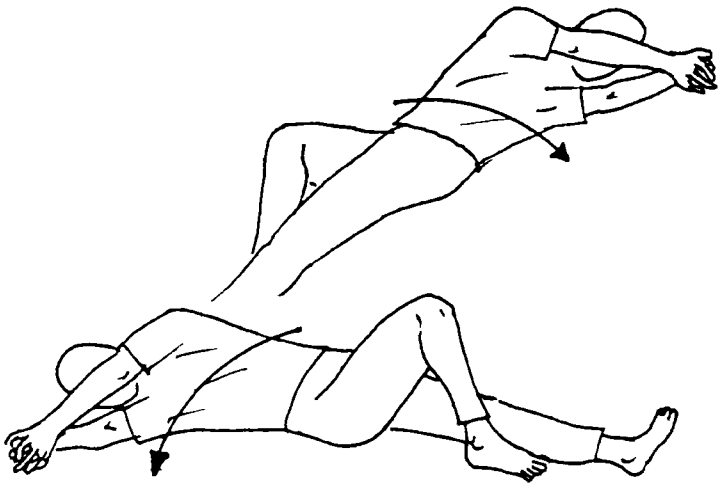


Fig. 30

Or

- he moves his shoulders from side to side (see picture below)

Fig. 30.1



8.2 Rolling to the unaffected side

Someone who has had a stroke will find it much harder to rotate her body towards the unaffected side than to rotate towards the affected side. Some assistance may be necessary.

- From lying on the back, hands clasped
- Affected leg bent, feet on the bed
- Encourage her to look towards the unaffected side and straighten both arms towards this side; this will help the body to roll towards the unaffected side

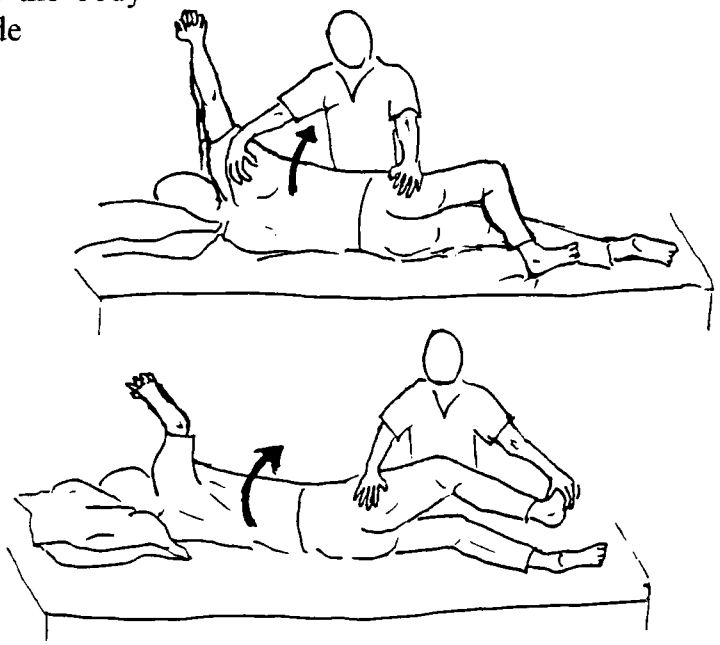


Fig. 31

You can help the person to roll, guiding her movement from her affected shoulder and hip

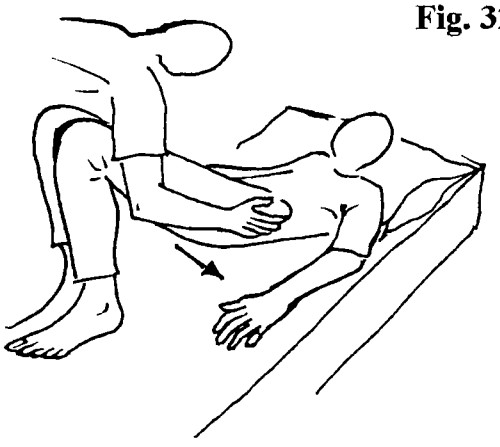
8.3 Rolling to the affected side

If necessary, shift the person to the side of the bed opposite to the rotation before starting this activity. This will give more room to roll.

If left unaided, she will try to carry out the movement using the unaffected side. However you must teach her to perform the movement **using both sides** so that her activity will be symmetric.

- ask the person to bend her legs, giving some help in bending the affected one
- hold your hands on her pelvis, ask and help the to raise her buttocks and to move the pelvis laterally (see «bridging», section 7.7)

Fig. 32



- the next step is to assist the person in rolling towards the affected side
- you control the affected limbs; the person moves the unaffected ones

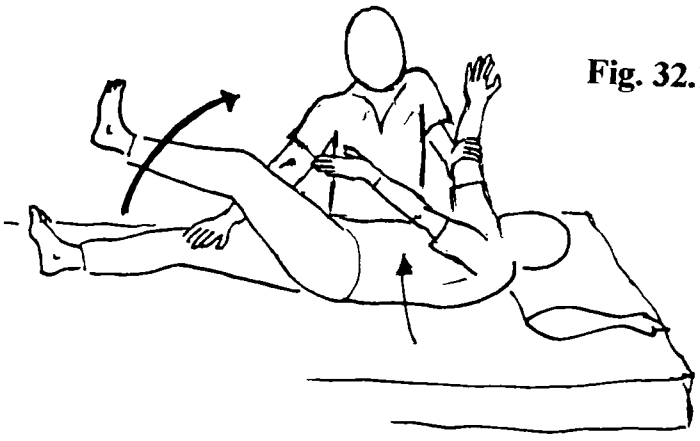
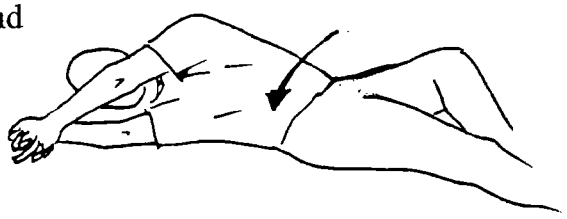


Fig. 32.1

Fig.32.2

Or

- he rolls unaided with clasped hands, fingers interlaced and shoulders forward



Note:

The **handgrip** described in the «Note» in section 6.1 can be used to facilitate shoulder protraction and to reduce the typical spasm pattern in flexion of the affected arm (see fig. a, page 5):

- keep the person's thumb opened and the wrist bent backward; this makes releasing of fingers easier
- through this grip, keep his shoulder forward and turned outward with the elbow straightened
- encourage him to bend the unaffected leg so that the foot is flat on the bed
- pushing with the foot on the bed he brings the hip forward, towards the affected side
- help him to roll forward and sideways

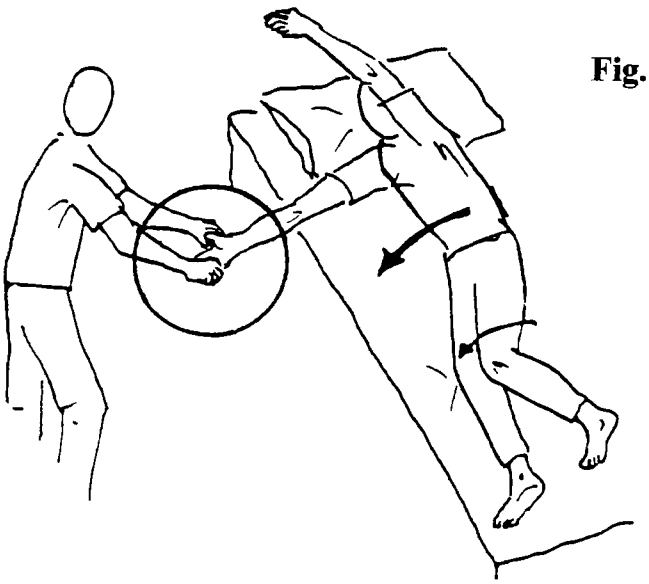


Fig. 32.3

8.4 Transfer from lying to sitting

The person who has had a stroke should learn to use her affected side when getting out of bed. At first, she will need help to move from lying to sitting (passive–assisted). With practice, less help will be needed (active-assisted). Finally, teach her to reach the sitting position without help. This activity will help to reduce the spasm pattern in flexion of the arm and will increase the individual's awareness of her affected side.

Sequence of movements to reach the sitting position from the affected side

Passive assisted movement

- the person rotates towards the affected side (see section 8.3)

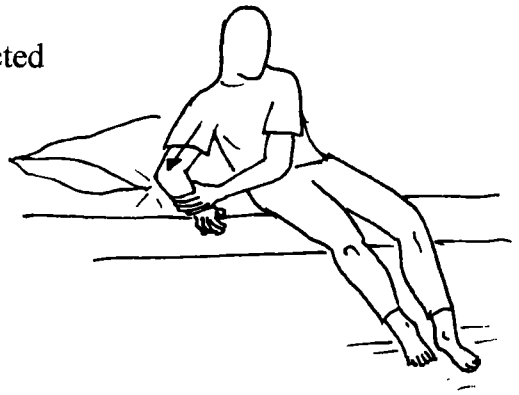


Fig. 33

- hold the person's scapula with one hand; with your other hand help her to move her legs out of bed
- encourage her to push with the unaffected hand placed on the edge of the bed (see fig 33) or by maintaining clasped hands, palms touching

Fig. 33.1

Active assisted movement

- the person rolls towards the affected side with legs bent until she starts to reach the sitting position pushing with the hand placed on the edge of the bed and straightening the elbow

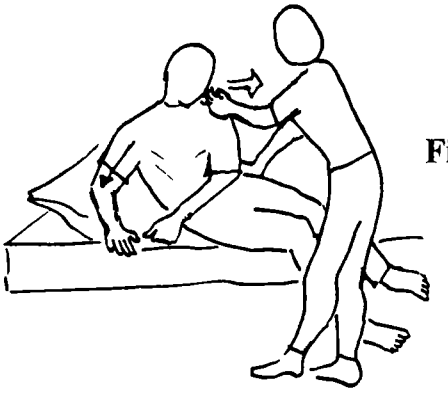


Fig 33.2

- guide the movement from the pelvis and push downwards with your hand placed on her unaffected shoulder and hip

- she reaches the sitting position, with her feet flat on the floor

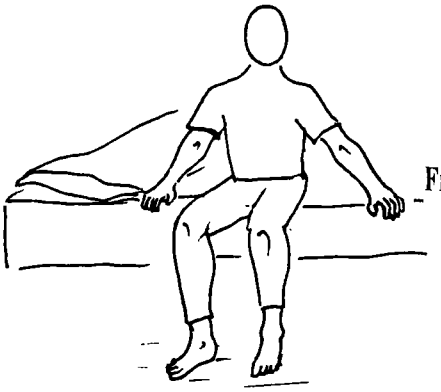


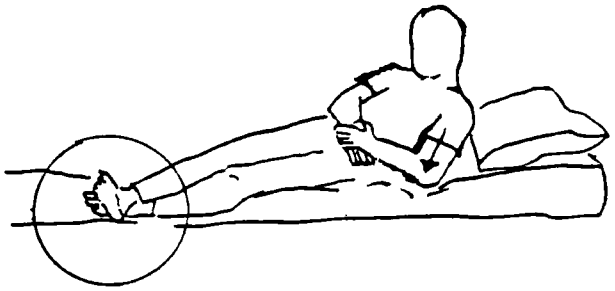
Fig. 33.3

In some individuals the motor and/or sensory loss is so severe that the they cannot actively use the affected side and rotation is possible only toward the unaffected side. Even so, some involvement of the affected side is still important.

Sequence of movements to reach the sitting position from the unaffected side (unaided)

- the person grabs the affected wrist with the unaffected hand (or he adopts the «handclasped» position)
- he takes the affected leg near the edge of the bed with the unaffected leg

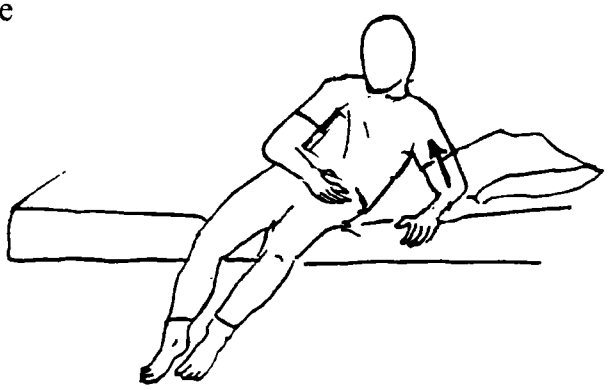
Fig. 34



Note: Someone who has had a stroke must be taught to actively move the affected leg. Only if this proves impossible should the person learn to hook his unaffected leg under the affected one to lift it out of the bed.

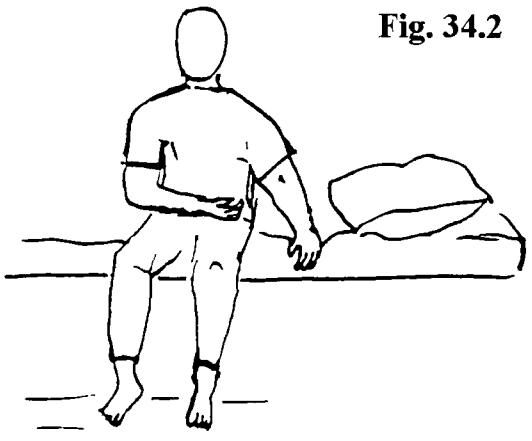
Fig. 34.1

- lifting the head and propping on the unaffected elbow (see next section), he moves the affected leg out of the bed



- the person will reach sitting position propping on the unaffected arm

Fig. 34.2

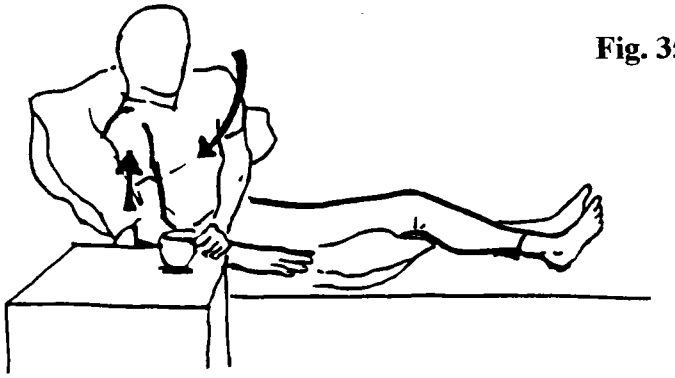


8.5 Propping on the affected elbow

Rolling to prop on the affected elbow is one of the early bed exercises which you must teach the person who has a stroke to do. This activity will increase the **extensor tone** in the upper affected limb. The rotation of the shoulder over the pelvis is important for early **weight bearing** on the affected side.

Provided that the shoulder is correctly positioned, the person will be taking an active part in her own rehabilitation every time she rotates her shoulder over her pelvis and reaches across her body toward the bed table. This is an additional reason for placing the bed table on the affected side.

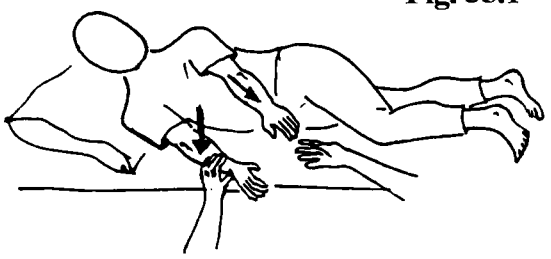
Fig. 35

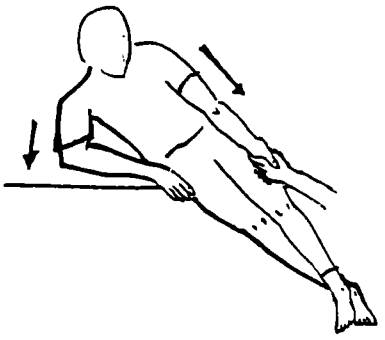


The person who has had a stroke can practise this exercise and use it to reach the sitting position from lying on the back, rolling towards the affected side. You can help her from the unaffected shoulder and hip, as described in section 8.4 (fig. 33.2). If more help is needed, carry out the procedure described below:

- the person rolls to prop on the affected elbow
- she lifts the unaffected leg across the affected one
- use the handshake grasp to pull her from the unaffected hand, while with your free hand control her affected hand and elbow
- the person should try to push with her affected arm

Fig. 35.1





9. Training sitting balance

9.1 Weight transfer from hip to hip

- with the person in sitting position, trunk upright, legs bent to 90° with knees apart, feet placed on the floor
- you can control his affected leg with your knee to avoid the hip turning outward
- you can facilitate the trunk control and the weight transfer from hip to hip from his shoulders

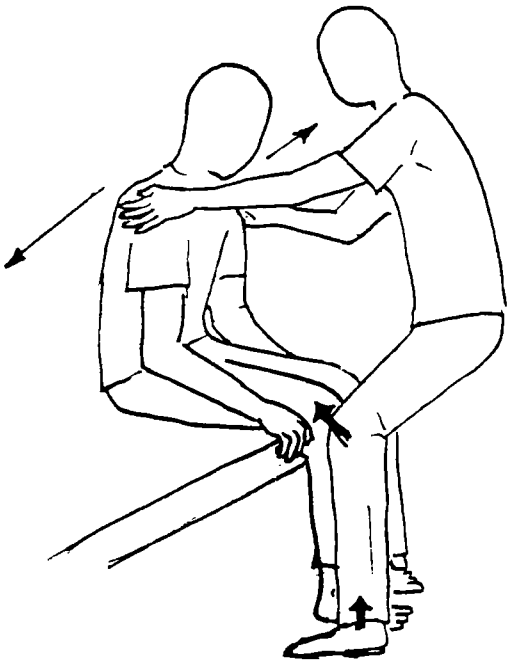


Fig. 36

9.2 Weight transfer from hip to hip and trunk elongation

This exercise will facilitate weight transfer from hip to hip and trunk elongation on the affected side. It should be repeated rhythmically.

- Sit at the person's affected side
- help him to bear the weight on the affected side
- keep his affected arm turned outward, straightened and apart from the body, with the shoulder forward
- keep his feet flat on the floor (you can control this with your own left foot)
- help him to transfer the weight on the unaffected hip, asking him to raise the affected hip

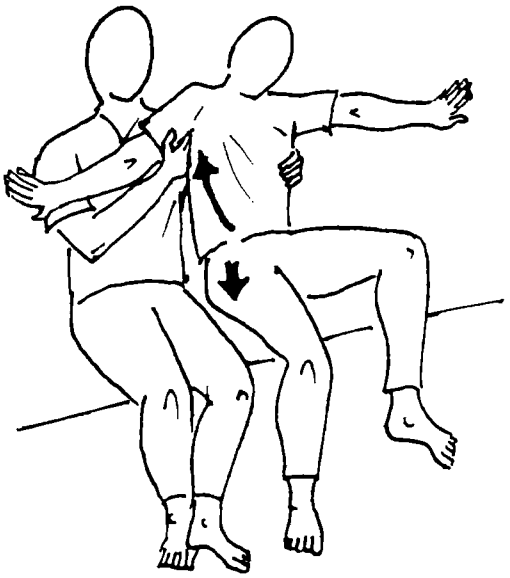
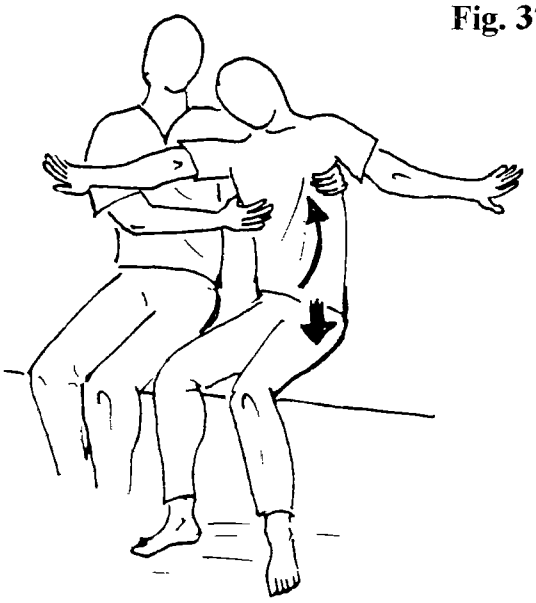


Fig. 37

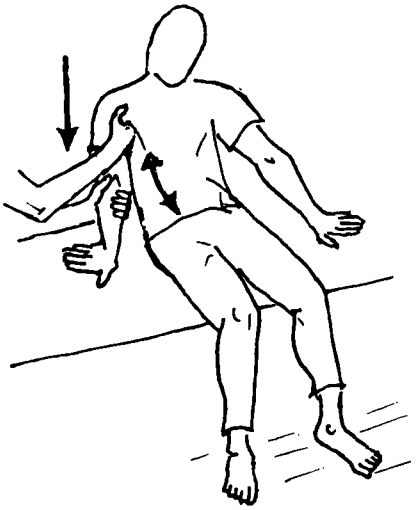


9.3 Weight transfer, bearing weight on the affected arm

This is an exercise to facilitate transfer and weight bearing on the affected side and to promote elongation of the trunk. It inhibits the "spasm pattern of the arm in flexion" described in fig. a, page 5.

Fig. 38

- place the person's affected hand on the bed (or training table)
- with one hand you should support her shoulder, while your other hand facilitates the elbow straightening
- with your right hand pull her towards you, elongating the affected side
- the hand remains open on the table for support



9.4 Protective lateral straightening of the arm

- Hold the person's hand on your hand, maintaining the elbow straightened
- **use manual pressure** to teach her to hold the position (give a short and quick push through the palm of her hand to the arm kept turned outward)
- repeat until her arm remains straight (without the elbow straightening provided by you) and the hand remains open during weight bearing (support)
- the protective lateral extension should be re-established as an **automatic reaction**

Fig 39

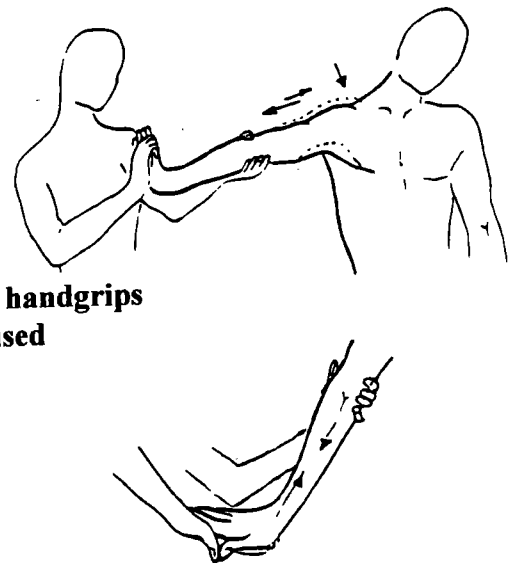
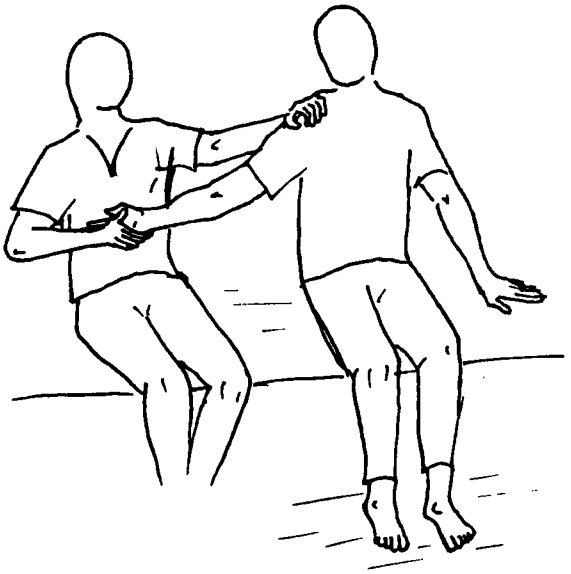


Fig 39.1
different handgrips may be used

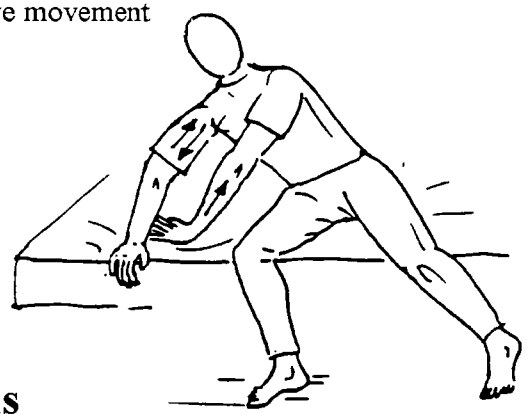


9.5 Exercises to practice when sitting alone

(see section 8.4)

- from lying on the back, the person moves the affected leg out
- than he rotates towards the affected side, moving the unaffected shoulder forward and placing the unaffected hand on the bed
- he then moves out the unaffected leg,
- **he props on the affected arm** to reach the sitting position

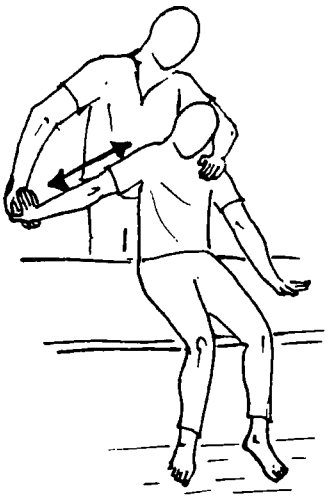
Fig. 40
From an active-assisted exercise, as described in fig. 33.2, to an active movement



9.6 Weight-transfer backwards on both arms

- carefully grasp the person's arms and brings them backwards providing support with your hands
- you can make his arms straighten easier by pushing and pulling them slowly and within a small range of motion, until the arms bear the weight (the elbows remain straight)
- he should then practice weight bearing from one arm to the other maintaining the elbow straightened

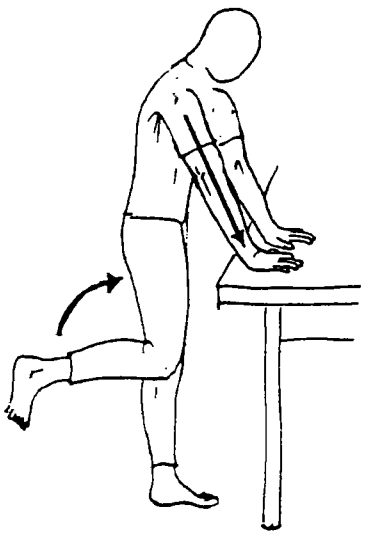
Fig. 41



9.7 Approximation from shoulder to hand

Fig. 41.1
if necessary, approximation with manual pressure can be added by the trainer (see fig. 39.1)

The person is weight-bearing from the heel of his hand (thumbs and fingers opened, wrist bent backward) through a straightened elbow to an turned outward shoulder



Activities:

- rock backwards and forwards over a straightened wrist and elbow
- lean over finger-tips through straightened and opened fingers and thumbs (see fig. 89)
- weight bearing over the affected leg
- leg exercises (i.e. control of the leg in space) can also be practised

10. Training for standing

The **lateral transfer** of body weight and the ability to **move the hips forwards and backwards** in a sitting position are important exercises in preparation for standing. They further improve the pelvis mobility and control. The person must first learn to sit on the edge of the bed or on a chair.

10.1 Practice of pelvis movement forward and backward.

Encourage the person who has had a stroke to practice haunch walking, moving forward to the edge of the bed and backward to the starting position. The hip must be lifted clear of the bed the feet placed on the floor.

The transfer of body weight can be practised by the person with her hands placed at your side (fig. 42) or with her hands clasped and arms straightened (fig 42.1). With improvement in the restoration of movement, this activity can be practised with the arms free for balance (fig. 42.2).

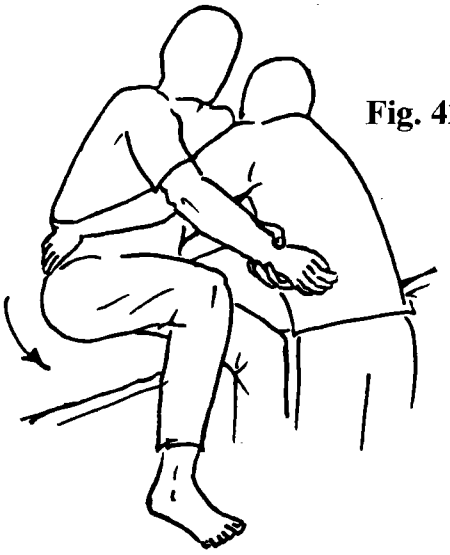


Fig. 42

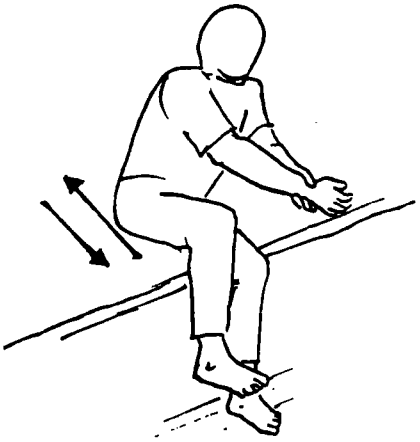


Fig. 42.1

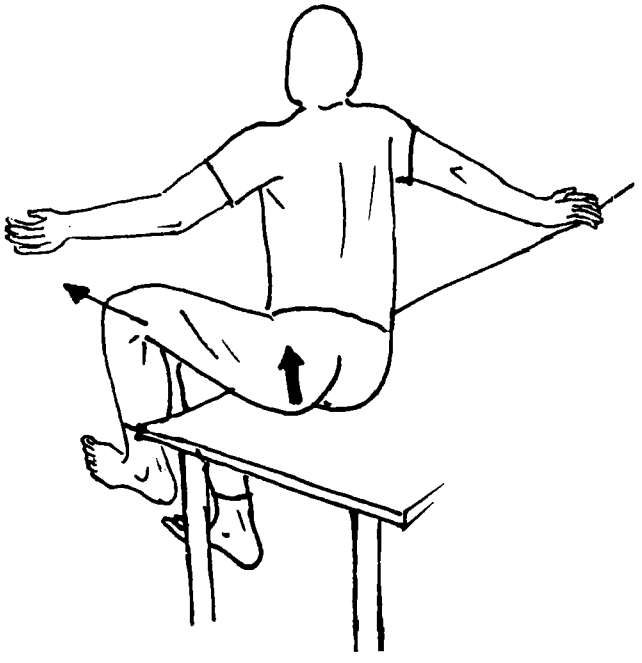


Fig. 42.2

10.2 Standing up and sitting down

A variety of solutions can be adopted to help someone who has had a stroke to stand up. The choice depends on the person's ability.

It is important to **start with rocking movements**, teaching the person to **push forward** to standing, and **not to pull**. As soon as he pushes forward, you can put one hand on the back of his head to give mild resistance to neck straightening

Fig. 43

The person must stand on a correctly positioned foot. This means that **weight must be transmitted through the heel**, with the whole of the foot resting on the floor. The feet should be parallel. If he lifts his affected foot, you must keep it down with gentle pressure from your own foot. It is important to avoid backward over-stretching of the knee.

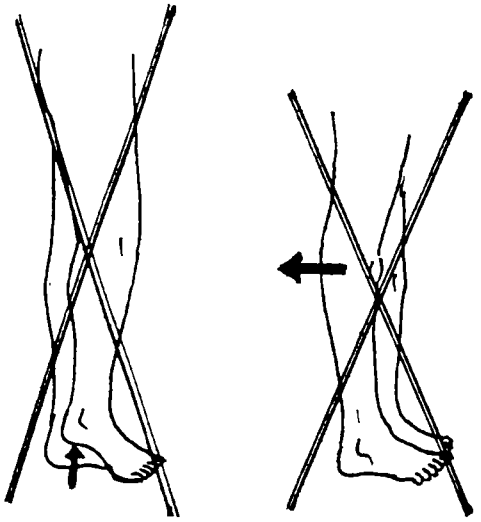


Fig. 43.1

If the foot stiffens downward, resting on tiptoe with the heel off the floor, you can apply **manual pressure** downwards from the hip to the heel. Hold the pelvis laterally with firm manual contact and apply strong pressure downwards in vigorous thrusts.

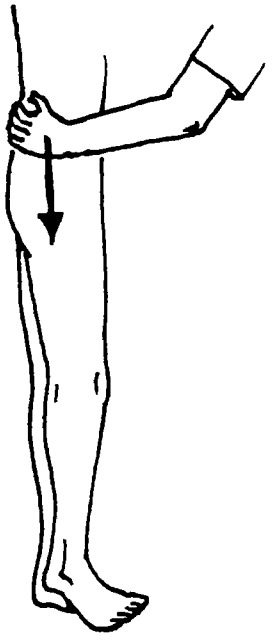


Fig. 43.2

10.3 Other exercises for standing

The following training suggestions can be used according to the stage of the rehabilitation programme and the progress made by the individual.

Begin with the passive exercises and work towards the person carrying out independent activities.

- Use your knees to support the person's knees, leaving your hands free to control her pelvis movement so as to encourage weight transference forward over the foot

- she keeps her hands on your shoulders (or her interlaced fingers are kept behind your neck)

- in the beginning of the movement, you can control her shoulder retraction, as shown in the circle

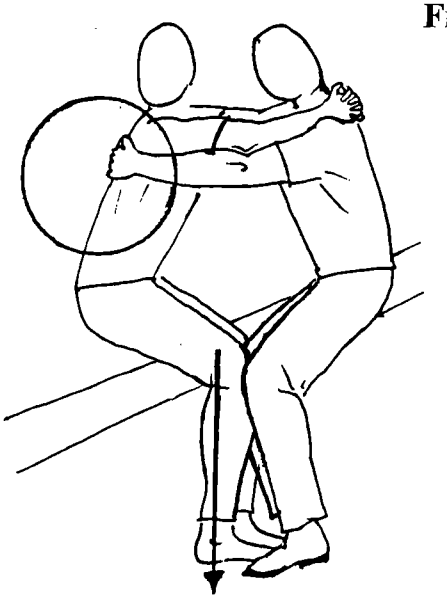
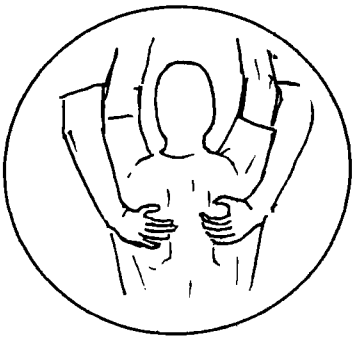


Fig. 43.3



- Using your arm, grip and support the person's affected arm in a good position (shoulder forward with the arm turned outward and straightened) leaving your hands free to control her pelvis

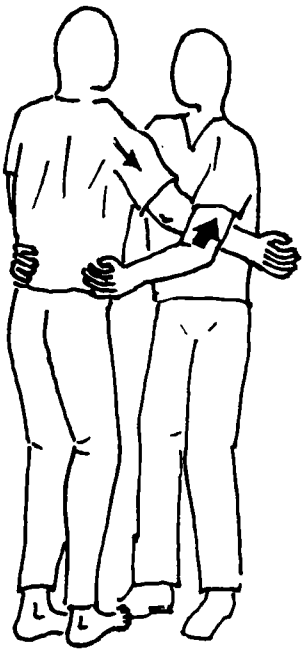
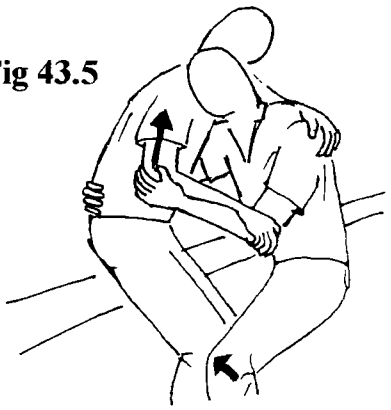


Fig. 43.4

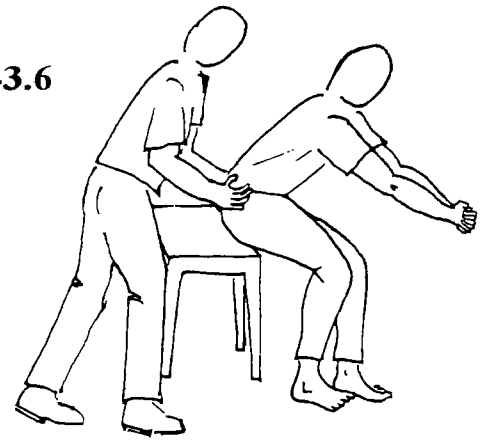
- If the person has a painful shoulder or an affected arm which is completely floppy an alternative exercise for standing is suggested in fig 43.5.

Fig 43.5



- place your hands on the person's pelvis (to help him in raising his bottom)
- his affected foot is slightly backwards
- he holds his arms forward with hands clasped and then he bends his body forward to stand up

Fig. 43.6



- the person **actively** reaches the standing position
- guide the movement from his hands and from the back (your hand placed on his neck helps him in pushing up and forward)

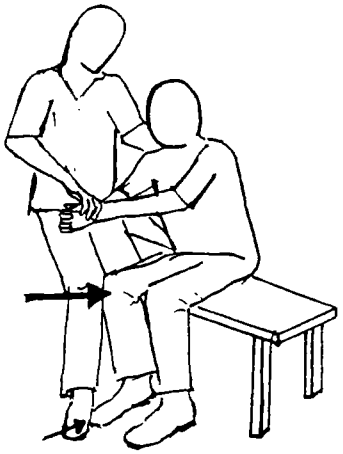
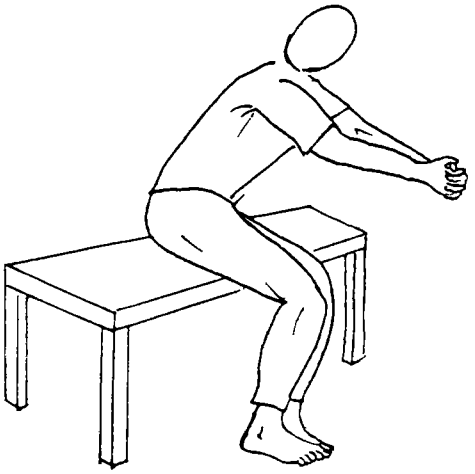


Fig. 43.7
stand at his affected side, using your knee and foot to stabilise person's knee and foot

- the final aim of these exercises is to prepare the person for **standing up unassisted** with his hands clasped and elbow straightened

Fig. 43.8



11. Sitting position

11.1 Seating and the correct sitting position

The person who has had a stroke will spend much of their time sitting, especially in the early days after the stroke. A correct sitting position is illustrated below. The person is resting, leaning forward, forearms on the table and a straight trunk. The feet must be flat on the floor.

At first, use a comfortable chair which has armrests, an upright back and a broad seat at the right height. Teach the person to sit with her knees bent to 90° and her feet flat on the floor. Later on, the person can learn to sit on a chair without armrests or on a stool.

A small table (preferably of adjustable height) can be used so that the person may lean forward to support herself equally on both forearms, hands clasped and palms touching. **Take care to ensure that the table will not move when weight is placed on it**

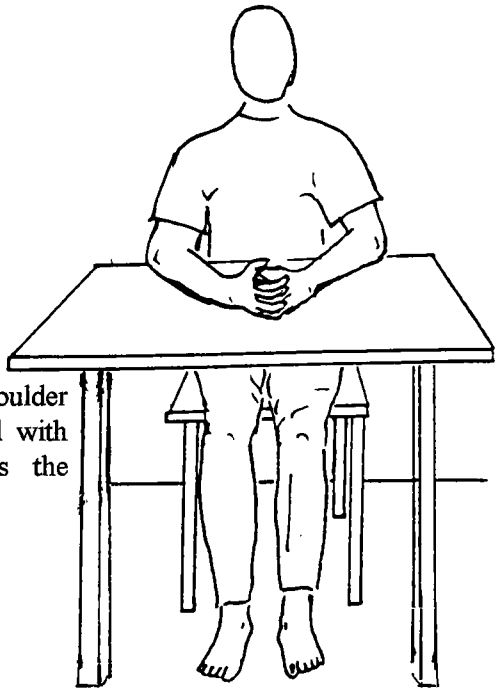


Fig. 44

- the person keeps the affected shoulder forward and the elbow straightened with her hands clasped (or she holds the affected wrist with the other hand)

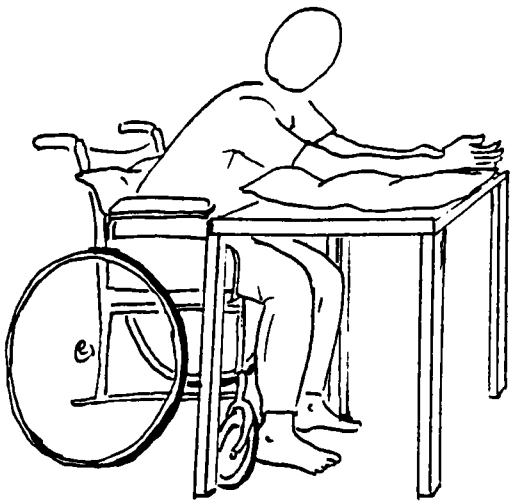


Fig. 44.1

- elbows on the table,
- a pillow may be placed on the back,
- feet flat on the floor

11.2 Activities to carry out in the sitting position

Self care of the affected arm

These activities start as active-assisted movements for the affected hand, progressing to active movements and then to resisted movement. Assistance and resistance are offered by the unaffected hand. All these activities should be practised frequently as free exercises.

- **Lateral transference of weight from forearm to forearm, forearms parallel on the table.** The palm of each hand should face each other. The wrist and fingers are straightened, the thumb and fingers opened and the shoulder turned outward. Teach the person to make sure the forearms do not turn inwards.

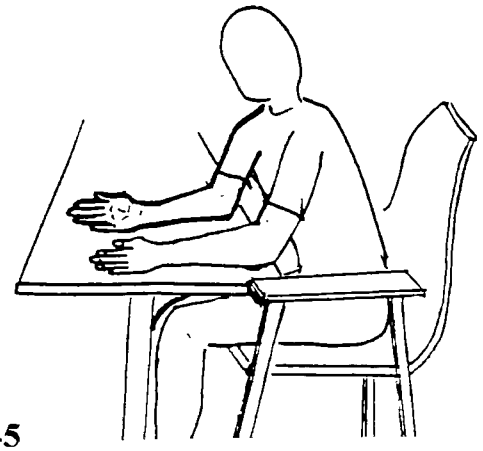


Fig. 45

- **Turn the palms up with the arm turned outward.** Practise as a controlled voluntary movement. Teach the person to use the affected hand to mimic the movement made by his unaffected one.

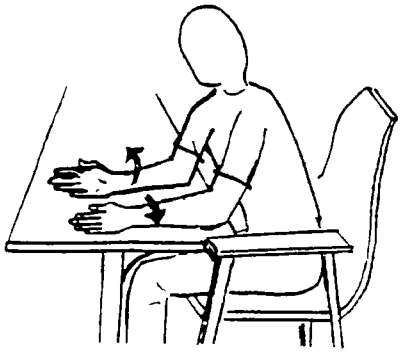


Fig 46

- If the person is unable to perform this movement, start with clasped hands and fingers interlaced. He then uses the unaffected hand to assist the affected one into **outward rotation** of the forearm.

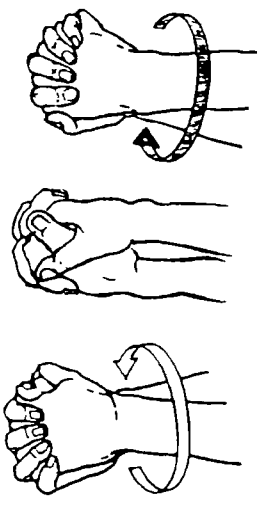


Fig 47

- Ask the person to bend the **wrist backward and forward** with clasped hands. With improving ability, this wrist movement may be practised keeping palms and fingers pressed firmly together, with fingers and thumb opened. Resistance is offered by the unaffected hand.

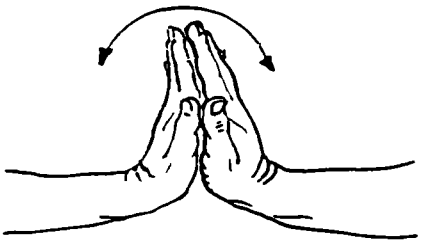


Fig. 48

- The final step of this activity, leading to finger control, consists of separating the palms whilst keeping the finger-tips in contact. Ask the person to press her thumbs and finger-tips firmly together.

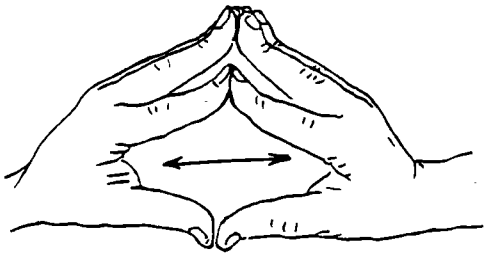


Fig 49

- The person sits in a correct position with the table in front of her. She clasps her hands, palms touching, elbows straightened. She brings her shoulders forward and raises her **arms straight forward and up** above her head.

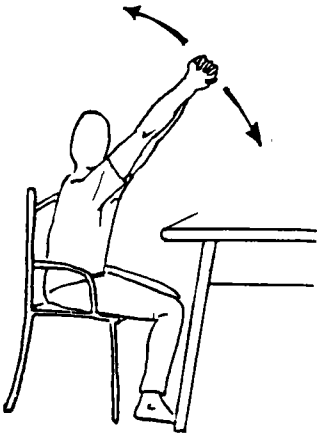


Fig. 50

- Ask her to look up at her hands and rotate her forearm. This **turns outward** the affected forearm and it turns **inward** the unaffected one.

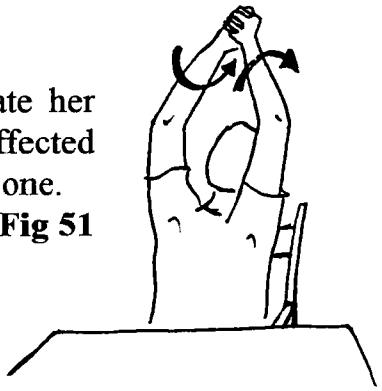


Fig 51

- The person sits with hands clasped, elbows straightened, shoulders forward. This exercise consists of **movements of the arms from side to side.** She leans forward and to each side.

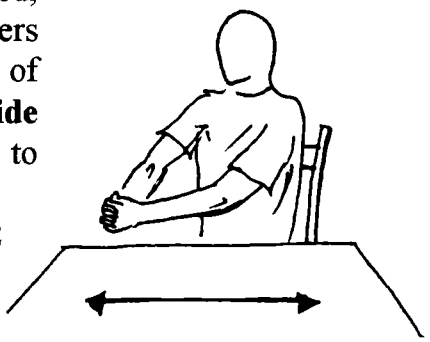


Fig. 52

11.3 Hip movements and the lateral transference of weight

- **Lateral transfer of body weight, sitting on the edge of a chair**

The person, with hands clasped and shoulders forward, leans forward bearing the weight on both feet. Ask him to move each buttock forward, first one and then the other transferring weight with each movement. **The feet are kept flat on the floor.**

This should be repeated with a backward movement of the buttocks.

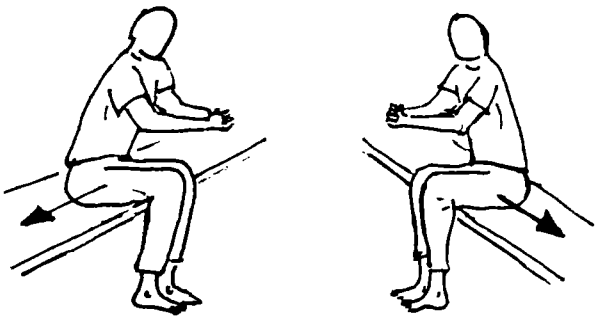


Fig. 53

- **Leaning forward and downward**

The person sits with feet flat on the floor. He keeps his hands clasped, palms touching, elbows straightened and shoulders forward. Ask him to lean forward and downward (to try to touch the floor). Ask him to lean to the right then to the left.

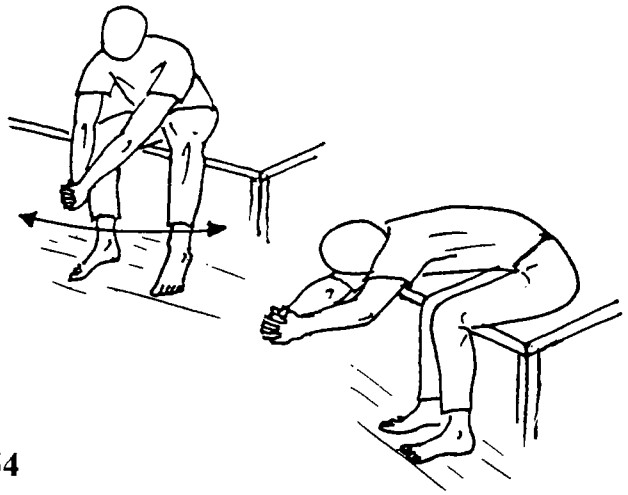


Fig. 54

- **Lateral stabilising in sitting**

The person transfers his weight over his affected hand and then he pushes on his hand to straighten the elbow (with and without assistance).

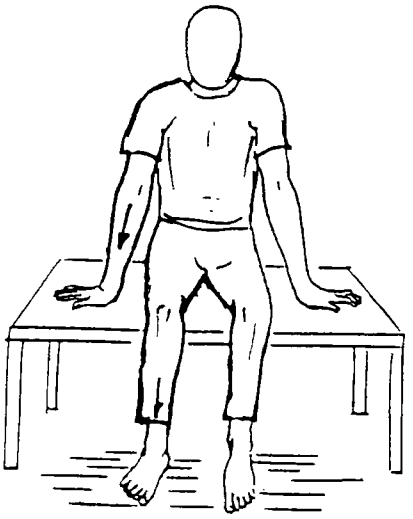
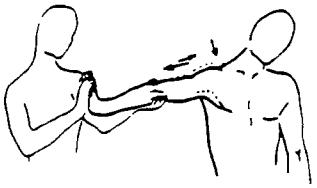


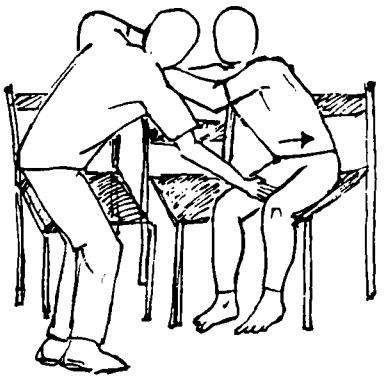
Fig. 55



Note: It is helpful if the exercise in lateral stabilising in sitting is proceeded by **shoulder to hand approximation**, reinforced by manual pressure(see section 14.1). If needed, some assistance can be given to keep the affected elbow straight.

- **Lateral transference** (using three chairs or a wide stool)

This exercise leads to stability in sitting, increases controlled hip movement and improves the lateral transference of weight over the affected leg.



- The person has clasped hands, shoulders forward
- Affected leg slightly behind
- You can guide and control the movement, especially the trunk elongation and rotation

Fig. 56

- **Standing up and sitting down**

Ask the person to clasp her hands keeping her palms together. Her elbows should be straightened and her shoulders forward.
Teach her to reach her hands forward and to lean forward to transfer the weight over her feet.
She then lifts her buttocks off the chair.

- The person's **affected leg** is placed slightly **behind** the unaffected one.
- **Avoid hyperextension** of the affected knee.

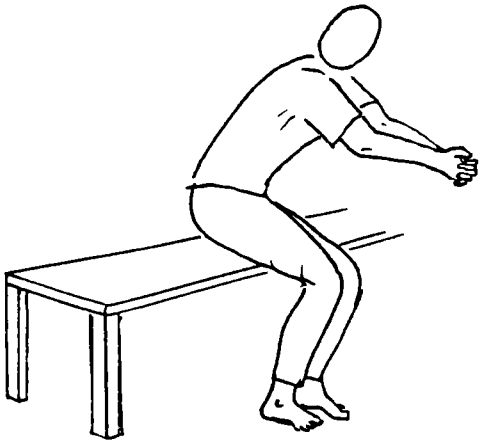


Fig. 57

Note:

⇨ This exercise may be practised as a rocking movement. Once confidence is gained and postural reactions are facilitated in the affected leg, the person can be taught to stand.

⇨ In the beginning you can help the person to transfer the weight onto the affected side.

⇨ The person will find **the last phase of sitting down** the most difficult movement to control. At first she will fall heavily down onto the chair. This is why it is important to adjust the height of the chair. Start with a high seat and then gradually use a lower one.

⇨ Similarly for **standing up**: the more the leg is bent, the more difficult it will be for the person to stand up.

- Another correct and safe way to stand up and sit down is to place a stool in front of the person. Teach him to lean forward and place his hands on the stool. Then he can stand up.

(this activity can also be practised using a chair in front. He bends forward to place his hands on the armrests and then he stands up in this position, weight bearing on all four limbs).

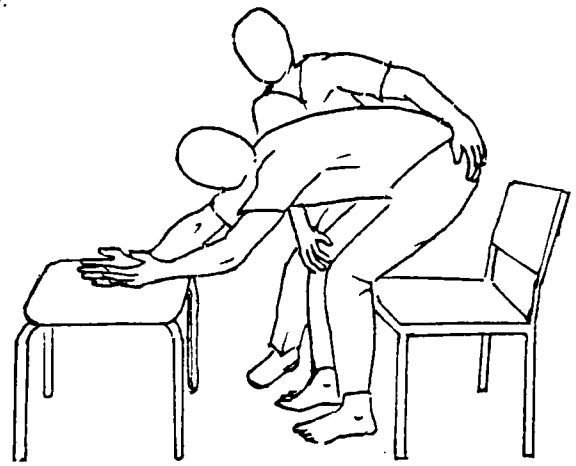
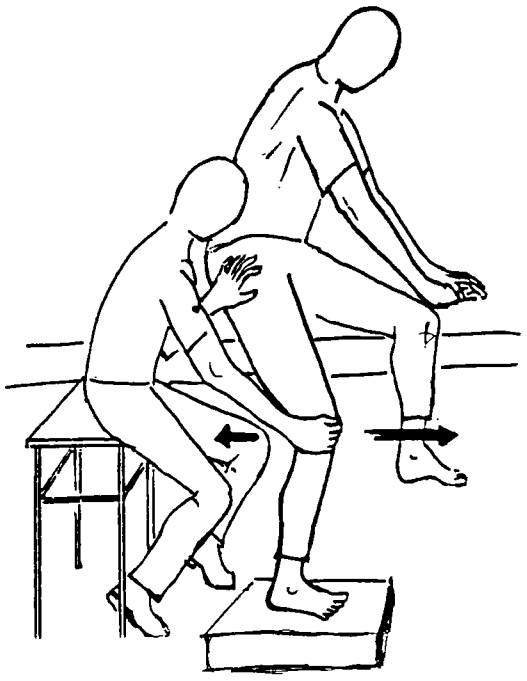


Fig 58
you can support the affected knee with one hand while your other hand controls the hip

- **Weight-bearing over a bent knee**

This exercise is important to regain knee control and it will help the person who has had a stroke in learning to stand. Weight bearing is on the affected side. You can use steps or blocks of variable height to raise the level of the person's foot to the required starting position for specific exercises.

Fig. 59.1
with the unaffected hand the person can control the affected one



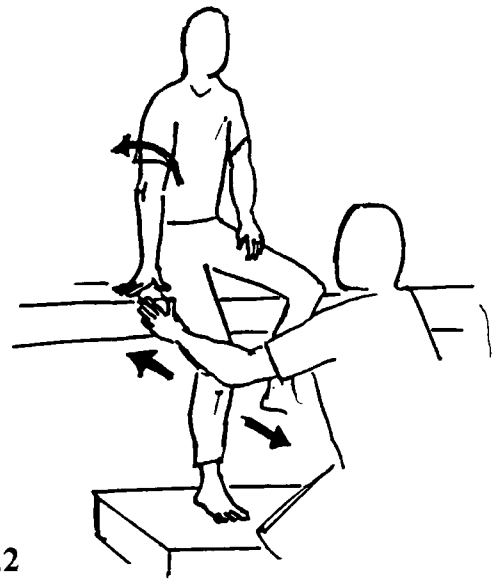


Fig. 59.2
This is a better position because the person's arm is turned outward (you can control his hand); however this position is more difficult to maintain because more trunk control is needed

12. Training for walking

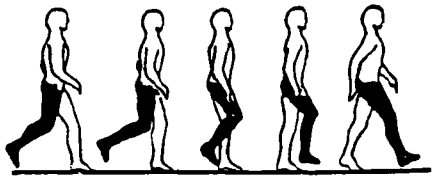
12.1 The goal of gait training

➔ The goal of gait training is to regain the lost automatic pattern of gait. For someone to have real independence when moving the gait must be **effective**, **safe** and **adaptable.** You should teach the person to walk on different terrain, to walk with other people around and to look for and avoid obstacles. He should hold his head up and look forward when walking and not look at the ground.

➔ It is important to teach the person to **balance** (or stabilise) in a position before asking him to move off from that that position. If someone is afraid that he cannot balance, he will be unable to move because he will be inhibited by fear. Stability is usually obtained by asking the person to hold a position against gentle pressure (see section 14.3. "**manual pressure**").

➔ Remember that you must always **approach** the individual and offer all assistance **from the affected side**.

The illustration below shows the **swing phase of the gait** of someone who has normal movement.



Someone who has had a stroke may walk using a different gait. People with severe paralysis and/or those who start to walk without any training often adopt the following ways of walking:

⇨ The individual is unable to bend the affected knee during the **swing phase** of the gait (see above). Depending on the roughness of the terrain, the foot slips and the person stumbles when the affected leg is left behind and has to be moved forward.

Without training, the person will adopt another way of walking

⇨ **The affected leg is moved forward passively using a rotation movement of the trunk around the unaffected leg.** The affected knee is kept straight and the leg is brought to the outside to help the foot lift off the floor.
The person walks with an awkward gait, making an effort to swing the affected leg. This major effort will increase the muscle tone in the affected arm.

Fig. 60

⇨ **Another solution adopted by some people is to move forward sideways.**

This way of walking is often adopted by people who hold a stick with the unaffected hand.
The stick is moved forward first. Then, the unaffected leg is moved towards the stick. The affected leg is pulled toward the unaffected one, but placed a little behind it.

Fig. 60.1

With early intervention and proper training it is possible to avoid these problems.

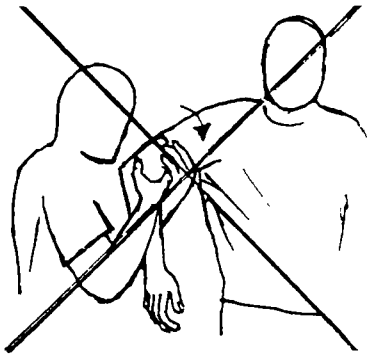
⇨ Note on the hip, knee, ankle and foot in the standing position

The person must adopt a **correct standing position.** This means that **weight must be transmitted through the heel** with the **whole of the foot** resting on the floor with the feet parallel. If necessary, the foot can be placed in position by the trainer. **The ankle must not be held with the heel off the floor.** You can help the person to maintain the correct position by applying **manual pressure** from hip to heel (place your hands on the person's hip with firm manual contact and then apply strong pressure downwards in vigorous thrusts).
The **knee** must be held slightly bent (to avoid knee hyperextension).
The **hip** must be held forward (protracted).

⇨ Note on the affected arm

The activity of the lower limb during gait can increase the upper limb "*spasm pattern* in flexion". **This must be avoided**. The two illustrations below show a wrong way (fig. 61) and a correct way (fig. 62) to help the person during gait training.

Fig. 61 WRONG



- the person's arm is pulled and turned inwards, the elbow is bent

Fig. 62 CORRECT

- You must control the arm by holding it at distal (hand) and proximal level (shoulder). Keep it in the "recovery pattern" (arm turned outward, elbow straight, wrist bent backward)
- Stand close to the person, you can then control his affected knee as well

⇨ Note on walking rehabilitation

No two people are the same. You must assess and re-assess the person's ability to walk and then offer treatment according to the findings. This is why there are different solutions to help each individual (see section 12.5). Here are some examples:

- at proximal level you can assist by controlling the shoulder. At distal level, different handgrips may be used, specially the **"handshake"** grasp (fig. 62)
- sometimes, especially during the first stage of gait training, it may be more useful to guide the person by standing in front of her with proximal grips on her back, over the shoulder blades
- you can guide the person from the pelvis

The use of parallel bars

Parallel bars can be used for walking training. They can give the person support on her unaffected side. However, there is always the danger that she will cling to the unaffected side, thus losing the correct walking pattern. Walking must include the transfer of weight over the affected side.

Parallel bars should not be used as a means of pulling to standing with the unaffected arm. They should not be used as a means of maintaining balance by supporting the unaffected side.
The bars must be adjusted to allow the person's hands to hold a weight-bearing position with straight elbows.

Use of a mirror in walking training

A full-length mirror can be used to help train someone to adopt a correct standing position and in training for weight transference over the affected side. People who have had a stroke should be reminded often to keep their shoulders level, to correct their own head position and to keep their body into alignment in an erect posture. A mirror can give useful visual feedback. A mirror is particularly useful for someone who has sensory loss.

Walking sticks

If possible, avoid the use of a walking stick or three-footed cane. They encourage the user to compensate for their disability with the unaffected side. A walking stick or cane will throw excessive unwanted tone into the affected side, reinforcing the pattern of spasticity.

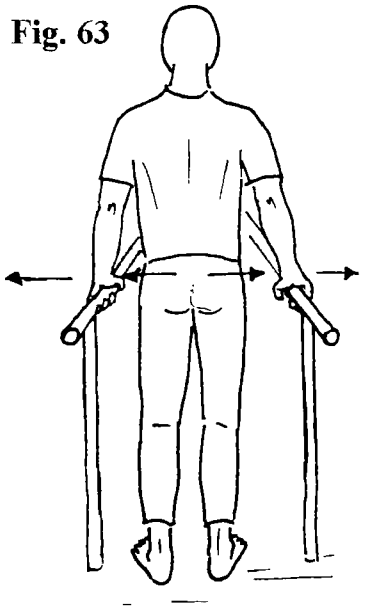
A walking stick or three-footed cane can be used during the first stages of gait training and during rehabilitation sessions. However, they should <u>not be used as a matter of routine</u>.
A walking stick should only be adopted as a routine walking aid if it is the only means by which the person can walk independently or with assistance.

See WHO Manual, Training Package N° 13 for further information on walking devices.

12. 2 Maintaining a correct weight-bearing base.

- The correct weight-bearing base of the **foot** is the heel, with the foot pointing straight forward and not turned out.
- The correct weight-bearing base of the **hand** is the hand's heel with the thumb opened.
- The person transfers the weight from side to side.
- If you stand behind him, you can help in placing the hand and the foot correctly, if necessary.

Fig. 63



- Ask the person to stand between the parallel bars with his affected foot carefully positioned in the correct weight-bearing position (as described above).
- Teach him to hold this position with his knees slightly apart and his lower legs parallel.
- Teach him to transfer his weight over a correctly positioned foot and then to lift his unaffected foot clear off the ground (a low step may be used for this). If needed you can help in maintaining the forward protracted hip position

Fig. 63.1

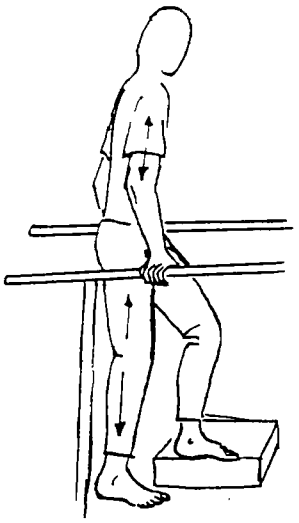
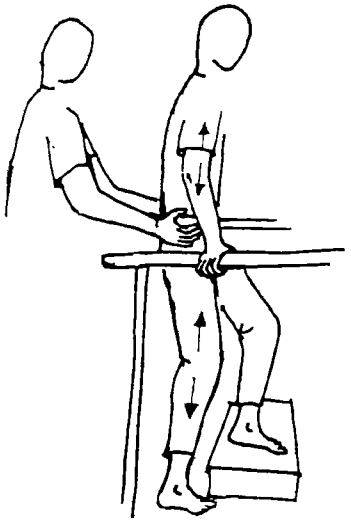


Fig. 63.2



- You may offer assistance as shown opposite

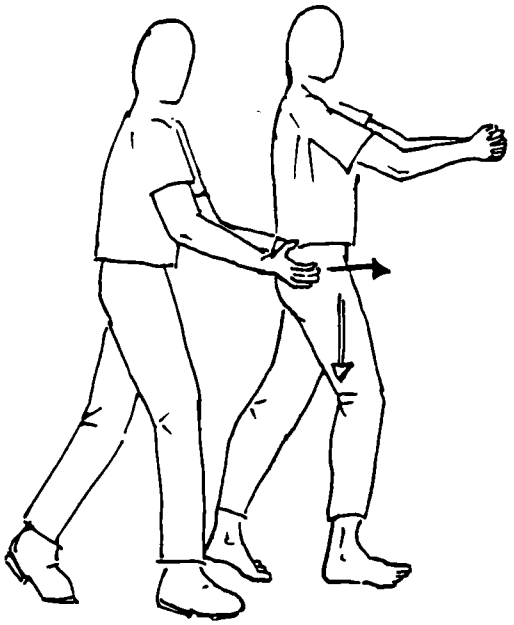
12.3 Transfer of weight in standing

These exercises can be practised in the early stages of treatment using parallel bars.

Correct lateral transfer of weight over the hip

- For a correct lateral transfer of weight over the hip, assist the person's **lateral and forward movement over the hip** by placing your hands on the brim of her pelvis.
- If keeping the hip forward proves difficult and the person holds it backward, tap the person's buttocks to act as a **sensory reminder** (see "tapping", section 14.2)
- As she moves her weight over the affected foot, you can use also **manual pressure** (section 14.3) to assist the transfer of weight laterally and forwards over the hip.
- Offer assistance from her affected side. You can also use your knee to **support the person's knee to prevent hyperextension** and to assist in knee stabilising. Supporting assistance can also be given to the elbow if necessary.

Fig. 64
the hip must be kept forward during the movement



Rocking from side to side over a fixed base

- Still standing behind the person, with your hands on the brim of her pelvis ask her to **rock slowly from side to side over a fixed base**. During this exercise you can give gentle pressure to control and guide the movement (**lateral movement with a forward emphasis over the affected hip**). This should be practised as a rhythmic exercise. Gradually the person gains control and will take over the movement for herself.
- The exercise can be performed with the **affected leg placed forward**. The swaying movement (with assistance) again emphasises the **lateral-forward movement over the affected hip**.

12.4 Weight bearing on the affected leg (knee re-education)

Controlled movement over a slightly bent knee

Both the affected knee and the arm will almost certainly need some supporting assistance. The affected knee may still be unstable and must be stabilised.
This exercise consists in **practising bending and straightening movements of the knee**, i.e. controlled movement over a slightly bent knee in order to prevent backward knee over-stretching.

- **The person** stands with both feet parallel, **heels in contact with the floor**, both knees slightly bent, but the **unaffected foot** is one step forward
- The affected knee is slightly bent; the person straightens the knee, going back into the starting position of mild bending.

- **You can** provide support to the affected hand on the bar. The person's arm is turned outward.
- You can assist in keeping the affected hip forward.
- You can provide anterior knee support during bending or prevent knee's over-stretching backward during straightening.

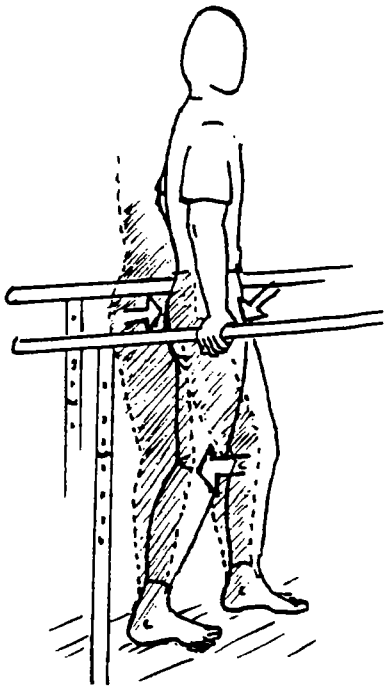


Fig. 65

Stepping up and down

The person should be taught to use alternate legs when practising stepping on and off a low (5-10 cm) step.

- The person continues to hold the rail. He lifts his unaffected leg forward onto the step and holds the position
- He straightens the leg and brings the affected leg up on the step
- Then he slightly bends both knees and moves the affected leg back onto the floor

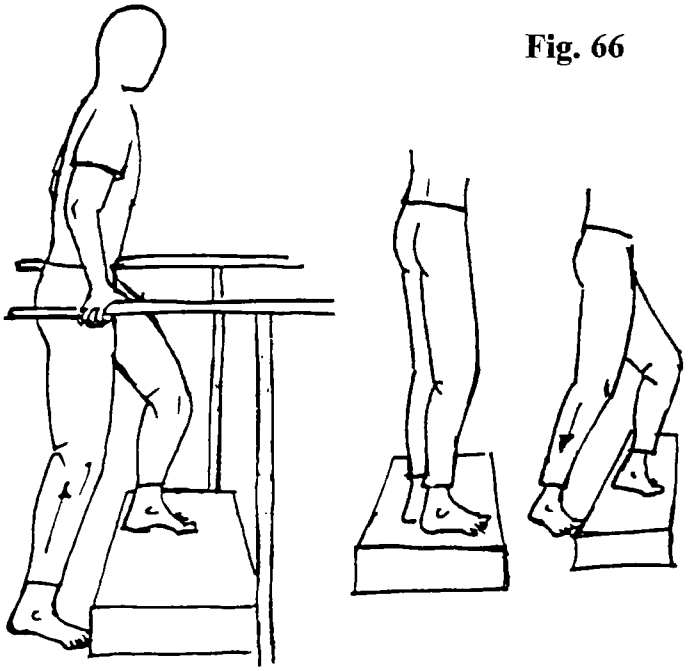


Fig. 66

Stepping sideways on and off a low step

- Stand close to the person. You can then control her affected hip and provide support to the affected knee if needed

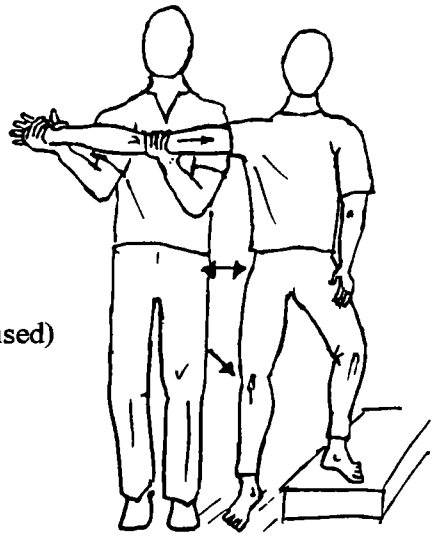


Fig. 66.1
(note the handgrip used)

Note:
Stepping up and down should be practised by moving the unaffected leg forward onto the step first. Then the exercise must be repeated moving the affected leg first onto the step. In this way the legs are alternated and both sides of the body are trained.

12.5 Assisted walking

This exercise can be practised with the parallel bars. The bars should not be touched but they will add a feeling of security and self-confidence that some people need. Where training for walking is concerned, the parallel bars should be left behind as soon as possible.

- the person clasps her hands at the front

- walk behind her, giving supporting control to her pelvis (hip forward and lateral transfer of weight over the affected hip)

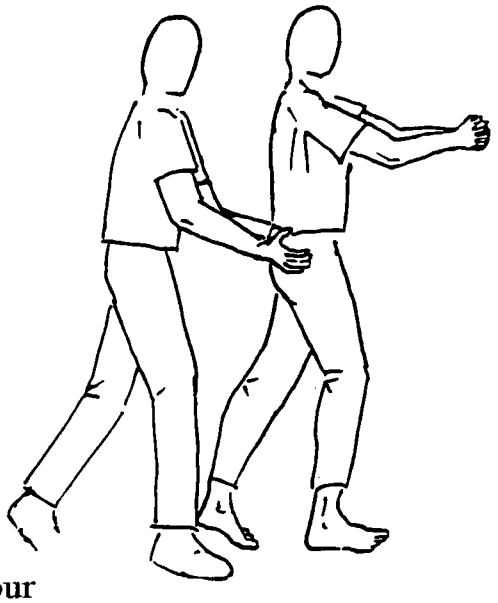


Fig. 67

or

- the person's arms can be placed up on your shoulders

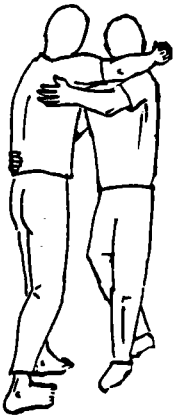
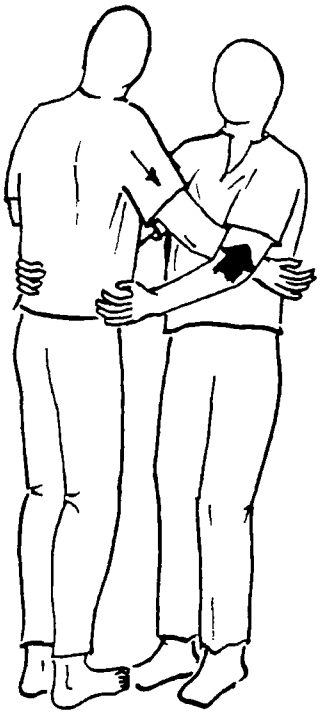


Fig. 68

or

- you can grip the person's affected forearm between your trunk and your forearm

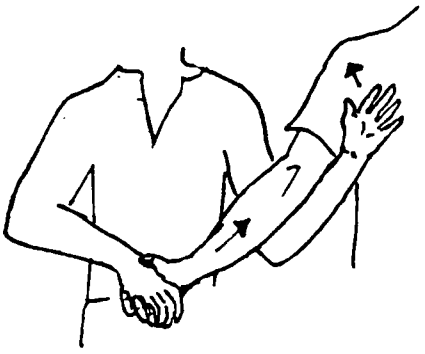
Fig. 69



or

- you can use the handshake grip to control his arm.
- His elbow is kept straight by your upper arm
- Bend the wrist of your hand backwards to give the maximum hand contact on the person's chest

Fig. 70



or

- You can provide less control. Use the handgrip shown to prevent the person's elbow from bending

Fig. 71

12.6 Going up and down stairs

- The safest way for someone who has had a stroke to go upstairs is to move the unaffected leg forward first. To go down, the affected leg is moved first.

- The unaffected hand can hold the hand-rail. If there is no hand-rail, stability can be improved by leaning against the wall.

- You can help the person to go up stairs. Give assistance from her affected side or behind her. (fig.72).

- When she goes downstairs it is better to stand in front of her. It is easier for you to guide and control the movement of the affected leg forward (especially in bending the knee) and hip (fig.73).

Fig. 72

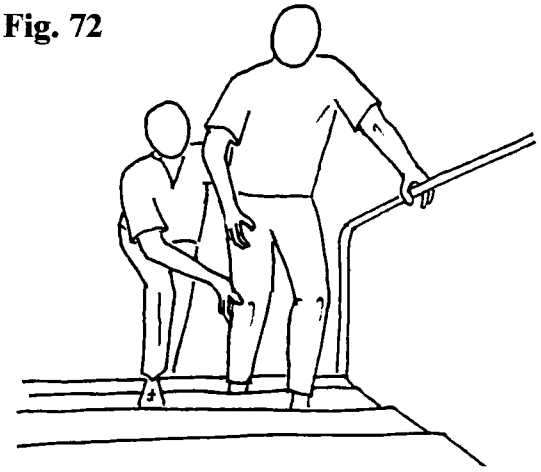
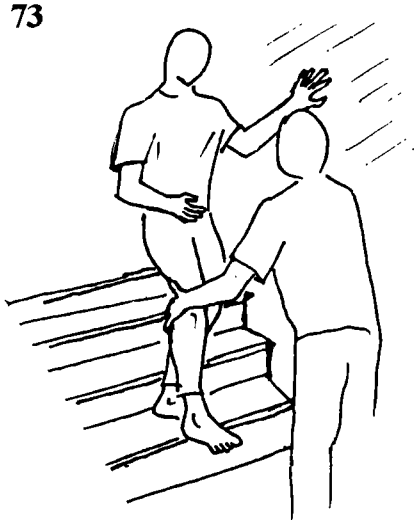


Fig. 73



other exercises:

Affected leg on a low step

- **The person steps up** with the unaffected leg
- You can assist weight-bearing on the affected leg and in straightening the knee

- **Stepping down backwards**

this movement can be practised with the improvement of the affected leg control:

- **stepping down forwards** (bring down the unaffected leg)

Fig. 73.1

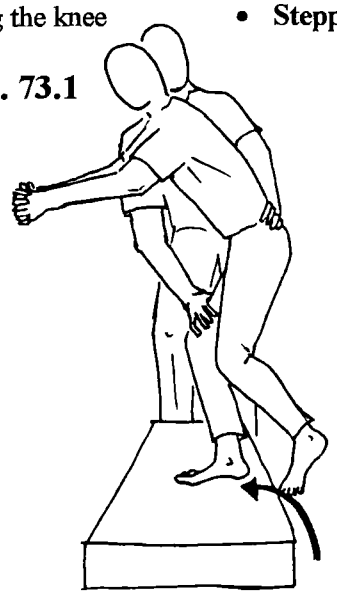


Fig. 73.2

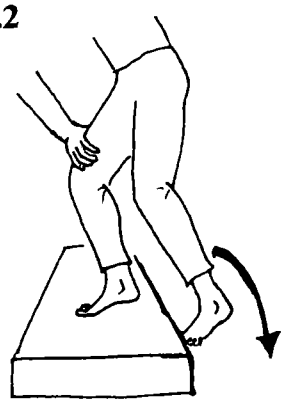
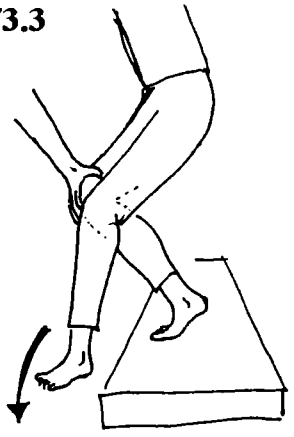


Fig. 73.3



13. Intermediate positions

13.1 Introduction

The activities suggested in the first part of this guide, especially in sections 6, 7 and 8, follow the normal sequence of movement from lying on the back to standing, through rolling and sitting (rolling → to sitting → to standing → to walking).

Some functional activities such as rolling from side to side in bed, rolling to sit on the edge of the bed, rising to standing and sitting beside the bed etc. have also been described.

However, other activities must be included when planning to use the normal sequence of movement during rehabilitation. These include rolling → to prone → to propping → to crawling → to kneeling → to standing → to walking.

Do not push someone who has had a stroke beyond his or her ability in following this progression. The person must be stabilised in a position before moving to a more advanced position. Always remember that no two people are the same and therefore the rehabilitation programme must be planned to suit individual requirements. The exercise sequence suggested here is simply an attempt to give **a broad outline** of treatment.

13.2 Lying on the stomach (prone position)

Activities in the prone position are important to maintain full hip extension. They must be used also for the rehabilitation of the arm. In the example below there is active extension of the head and forearms support.

Correct positioning must include:

- The forearms parallel, pointing straight forward to prevent turning inward of shoulders
- Elbow directly below the shoulder, hands with fingers open
- a pillow is placed under the shins to hold the ankles in the correct position and the knees are slightly bent

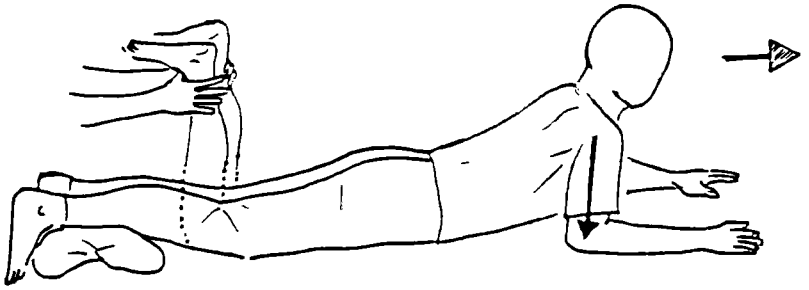


Fig. 74

⇨ when the position is stable and the person has enough shoulder control, he should practice the **transfer of weight** from side to side over the forearm

⇨ **assisted and active knee bending** can be practised as a bilateral or symmetrical movement (place a mirror so that the person can watch and control his legs)

⇨ you can reinforce the normal **approximation** from elbow to shoulder by applying **manual pressure**.

13.3 Kneeling with forearm support

- the person lies on her stomach on a mat as illustrated in fig. 74.
- Stand astride her. With your hands around her hips, pull her upwards and backwards into a kneeling position (or, if the person is lying on a training table, you can help her from her affected hip and shoulder).

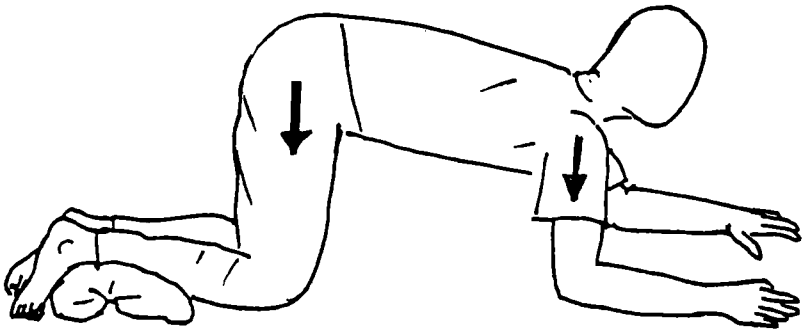


Fig. 75
the forearms must remain parallel and the affected hand should not move across the body into the typical spasm pattern

Fig. 75.1
An alternative position for prone lying, i.e. for the elderly or those with cardiac problems

Activities that may be practised when lying on the stomach:

⇨ **weight-bearing** from forearm to shoulder and from knee to hip (weight-bearing may be reinforced by **manual pressure)**

⇨ **balancing** over the forearms

⇨ **transfer** of weight from side to side over alternate forearm

⇨ **rocking** backward and forward

⇨ the person **leans** to push backward and forward (active movement)

⇨ the person is taught to **maintain a steady position against resistance** offered by the trainer from any direction. Resistance must be offered firmly and gently and built up slowly. The person must be correctly positioned to avoid spasticity.

13.4 Crawling position

- Ask the person to get up on to his hands from the position illustrated in fig. 75
- You may need to support his affected arm, holding the hand flat on the floor and the elbow straightened

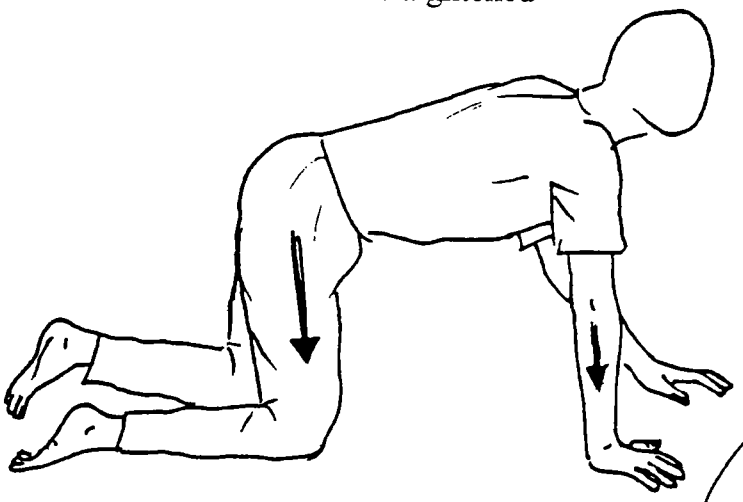


Fig. 76
weight-bearing from the heel of the hand through a straightened elbow to a shoulder turned outward

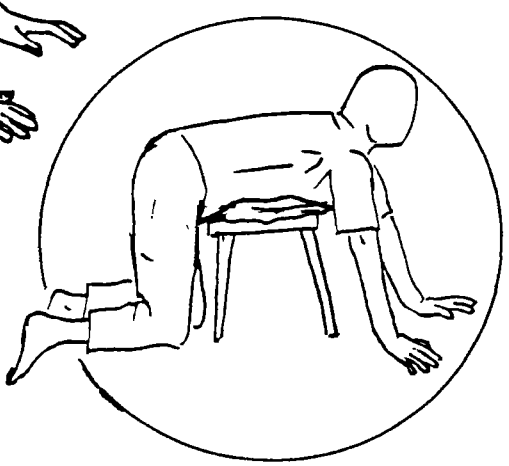


Fig. 76.1
An alternative position for elderly people
(the stool top must be well padded to avoid compression on the rib cage)

Activities that may be practised in this position:-

⇨ **stabilising** the position (the normal approximation, from hand to shoulder and from knee to hip applied by gravity, can be reinforced by the trainer with **manual pressure**)

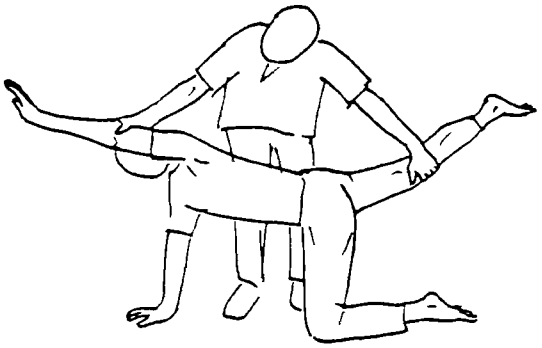
⇨ **weight transfer** over the affected side (a brisk **tapping** on the posterior surface of the elbow may be used as a sensory reminder to facilitate its straightening)

⇨ **active exercises** (i.e. reaching arm forward with wrist straightened)

⇨ **rocking** backwards, forwards and from side to side

⇨ **crawling**: teach the person to move his limbs rhythmically

⇨ **balancing** on one hand and the opposite knee, one hand reaching forward and the opposite leg straightened backward (see illustration below)



13.5 Kneeling

Kneeling follows the crawling position. To get up into the kneeling position, some help is usually required at first.

- Stand astride the person's legs. Bend your legs so that your knees prod her buttocks
- Lean forward and place your hands on the front of her shoulders
- You can then assist her movement into the kneeling upright position

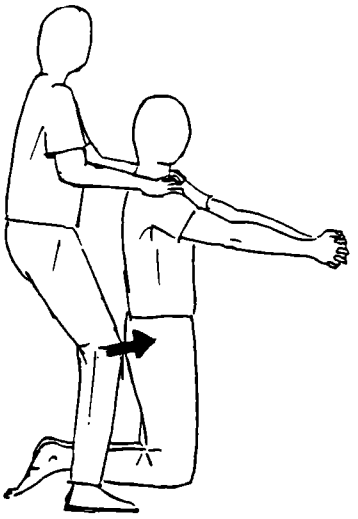


Fig 77

➔ At first, to help keep the kneeling (and stand kneeling) position, ask the person to place her hands (clasped hands, elbows straightened) on a stool in front of her. You can then teach her to lift her hands forward off the stool.

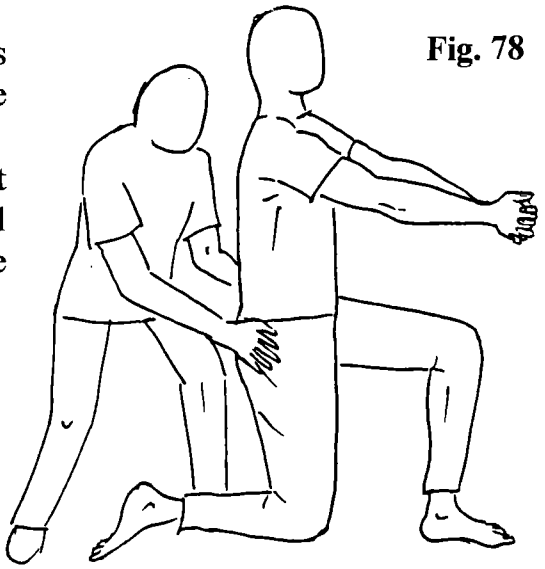
➔ Initially it may be difficult for her to keep her **hips straightened** and she sags into bending. You may then use your knees to give a few firm prods on her buttocks (tapping on the buttocks may also be used).

➔ A **mirror** may be used to give a visual boost to the person's sensory input.

13.6 Stand kneeling

- To get up into this position the person transfers her weight over the affected leg and lifts the unaffected leg forward.
- Place your hands on her pelvis. You can assist the movement giving pelvic supporting control and assist the lateral transfer of weight over the affected hip.

Fig. 78



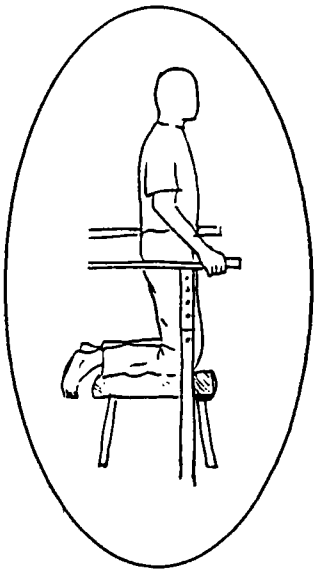


Fig. 78.1
Alternative positioning: stand kneeling on a soft padded stool between parallel bars (or two chairs)

Activities to carry out in kneeling and stand kneeling:

⇨ **pelvic stabilising**: teach the person to maintain a steady position against mild resistance offered by you.

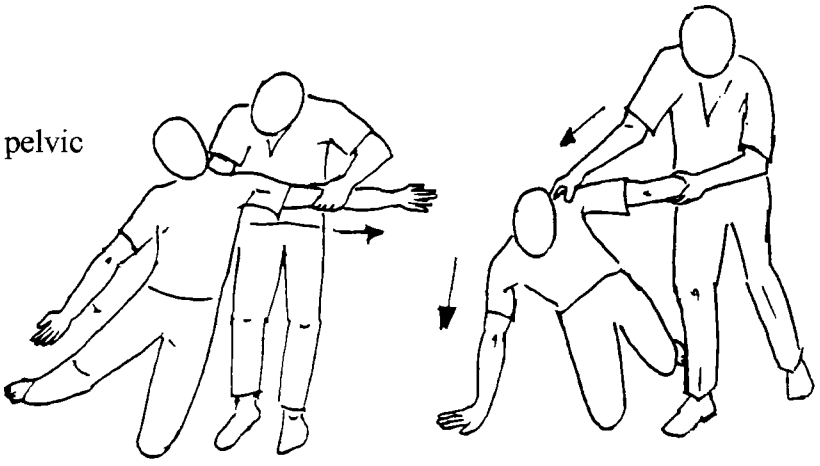
⇨ **lateral transfer** of weight from side to side over alternate knee

⇨ **knee walking**

⇨ **approximation** from shoulder to knee through a controlled hip, or from pelvis to knee, with manual pressure

⇨ **bilateral weight transfers** over controlled hips with hands clasped in elevation

⇨ **balancing** over alternate knees and pelvic stabilising with hip control

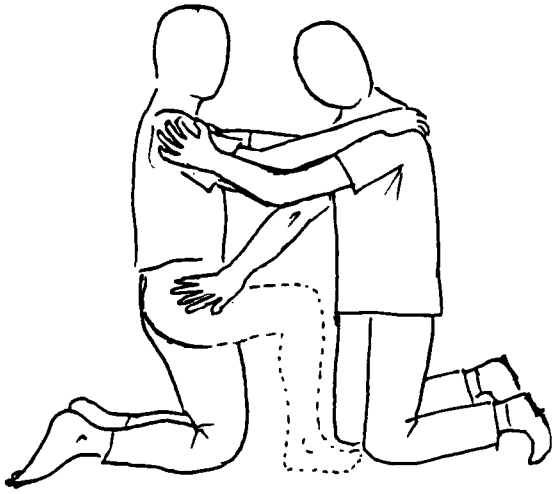


13.7 Lateral transference in kneeling

This position may be useful for an elderly person who has difficulty in balancing in the stand kneeling position and thus needs additional support.

- The person's arm is positioned with the shoulder forward and turned outward
- Pull the person's pelvis forwards before pushing gently laterally towards the unaffected side.
- Then assist her in **lifting the affected leg forward**. She transfers her weight forwards over her affected foot
- The heel must be firmly on the floor to give the normal weight-bearing position of the foot
- Your hands are free to assist in hip control with **manual pressure** necessary to encourage the lateral transfer of body weight

Fig. 79



14. Specific techniques for functional training

14. 1 Weight-bearing or approximation

The term "approximation" refers to a situation where two or more joints are **closed together with pressure.**

➔ Approximation occurs during weight-bearing due to the gravity (fig. 80). Weight-bearing through the affected limbs into the recovery pattern is an important part of treatment.

➔ Approximation can be reinforced or applied by the trainer. This reinforcement of gravity approximation by manual pressure is used repeatedly during the rehabilitation programme. You can give "approximation" with **counter pressure** (or **intermittent pressure**) as used when compression is applied through the articulating surfaces of a joint (fig 81 ➔➔).

Fig. 80
Normal approximation from elbow to shoulder during weight-bearing due to gravity

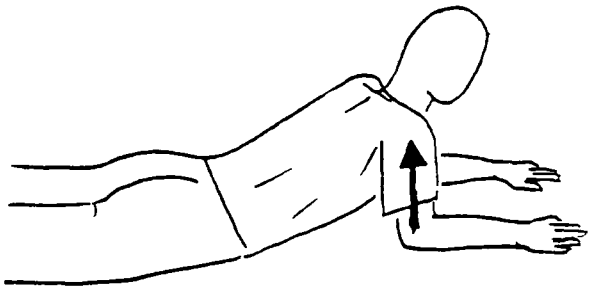


Fig. 82
Reinforce approximation to stabilise the standing position

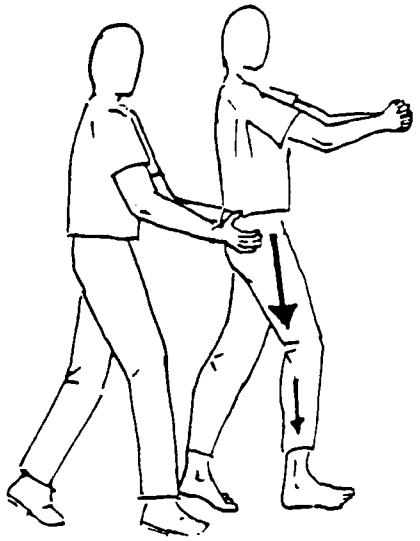
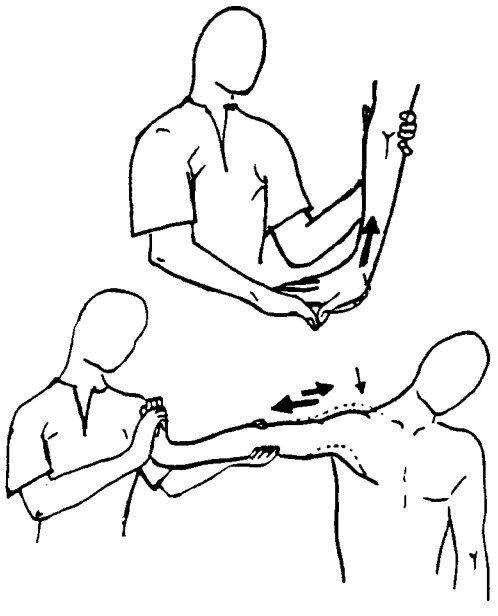


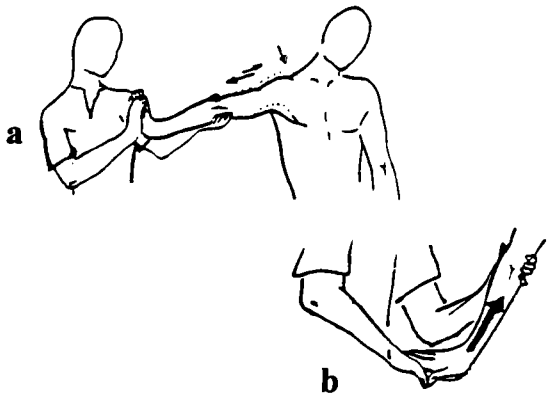
Fig. 81
With one of your hands you can keep the person's wrist bent backward and the thumb open. With the other hand you can stabilise the elbow in a straight position
(an open thumb together with pressure on the heel of the hand helps to release fingers)

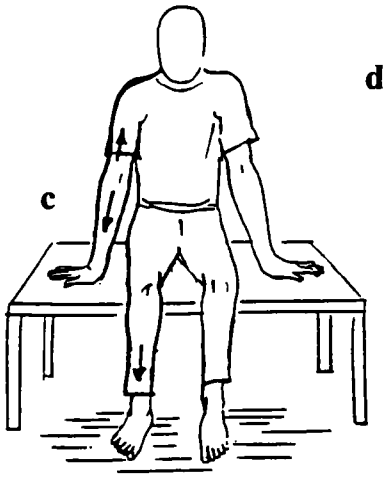


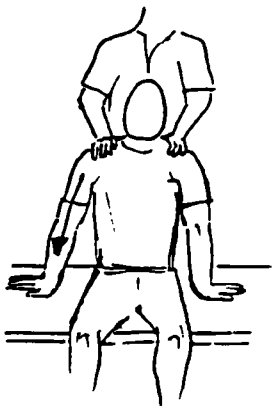
- **You can give approximation from the heel of the person's hand to the shoulder through a straightened elbow and the arm turned outward**
- **approximation may be given with counter-pressure (remember to push and pull slowly and rhythmically)**

Approximation can be used to gain different and specific responses: -

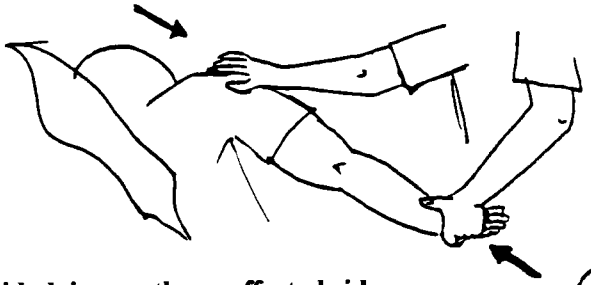
- to give movement within the joints, boosting the proprioceptive sense
- to inhibit the influence of the spasm pattern and to reduce spasticity
- to prepare the person to reach and to maintain a specific position (see **a** and **b**)
- to strengthen the muscle tone, i.e. where the muscles are very flaccid (see **c**)
- to stabilise a position (see **d**)







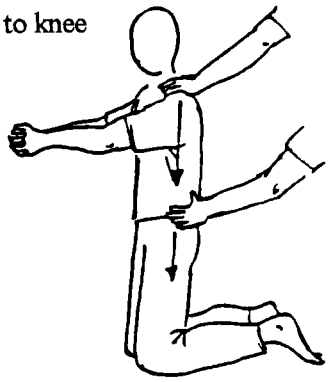
Approximation may be used from the early stages of stroke rehabilitation. It can be applied in any position.

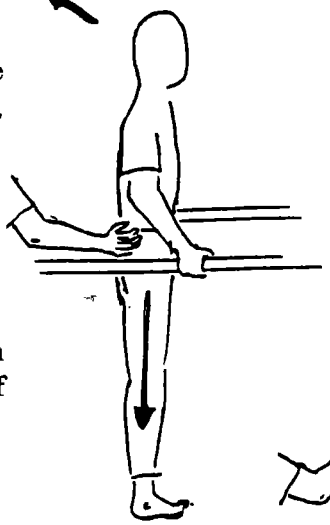


Side-lying on the unaffected side
Approximation from the heel of the hand to the shoulder drawn forward, with the arm turned outward

Stand-kneeling position
approximation from shoulder to knee through a controlled hip

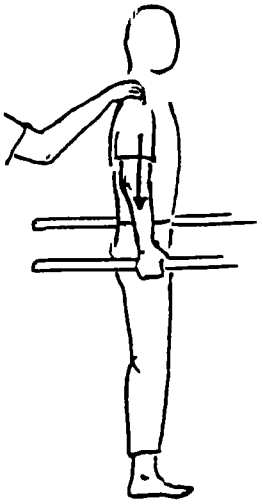
or
from pelvis to knee





Standing position at the parallel bars.
If you stand behind the person, you can apply approximation from the brim of the pelvis down to the heel

Approximation is also applied from the shoulder to the heel of the hand through a straightened elbow



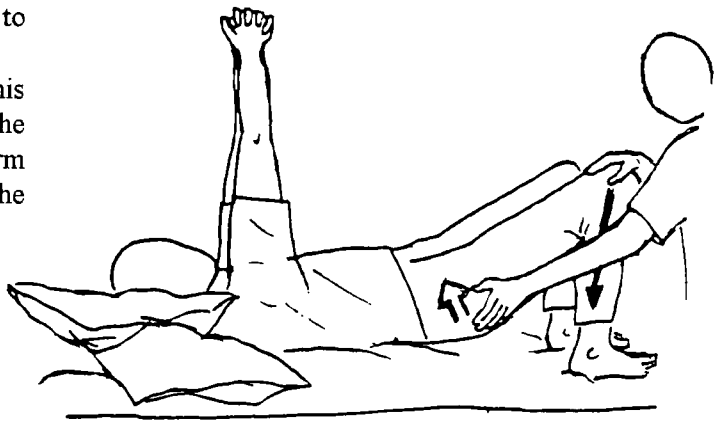
14.2 Tapping

"Tapping" refers to the short, brisk prods which you can give to gain a specific response from someone who has had a stroke. Tapping is often applied in combination with other techniques. It can be used as a sensory reminder to prompt the person to move a limb in a desired direction or to gain a response by upsetting an equilibrium.

The two illustrations below show how you can use tapping combined with other techniques.

Fig. 83
Bridging

- ask the person to raise his buttocks
- he may clasp his hands keeping the affected arm straightened and the shoulder forward



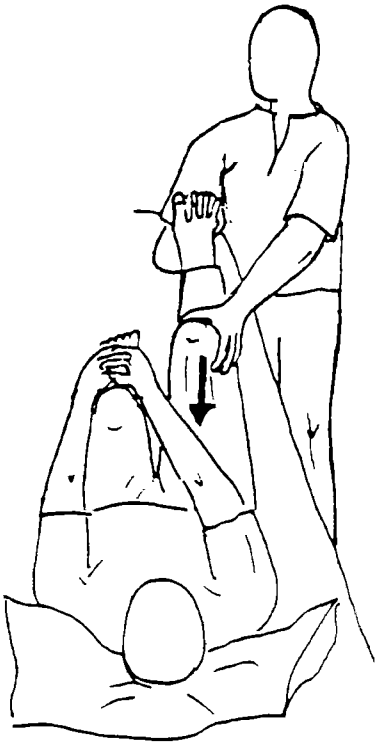
You can apply approximation from the person's knee to feet (with your hand push down towards the heel)

↑ a brisk **tapping** on the buttock can be used as a sensory reminder

Fig. 83.1
Crook-lying position

In this position

- the affected arm is straightened, the shoulder is forward
- affected hip bending is facilitated by bending the unaffected leg to tilt the pelvis
- the person clasps his hands and holds them round the unaffected knee
- bending of the affected knee is taught working through the stages of **placing** the leg with the knee at 90° and asking the person to **hold** it into this position



approximation may be applied from knee to hip

If the hip tends to turn outward you can facilitate its turning inward and active holding of the limb in space by giving short and brisk **tapping** to the medial aspect of the affected knee joint

14. 3 Manual pressure

Manual pressure can be used to **stabilise a position** when teaching someone to hold that position and/or to gain specific responses (**equilibrium responses**) when disturbing balance. **This is not the same technique as when prodding movements are given to gain a response.**

Manual pressure should be used when a position is stable and the person is calm and relaxed. If he or she is tense or frightened they will respond to manual pressure by becoming rigid or will suffer increasing spasticity in the affected side.

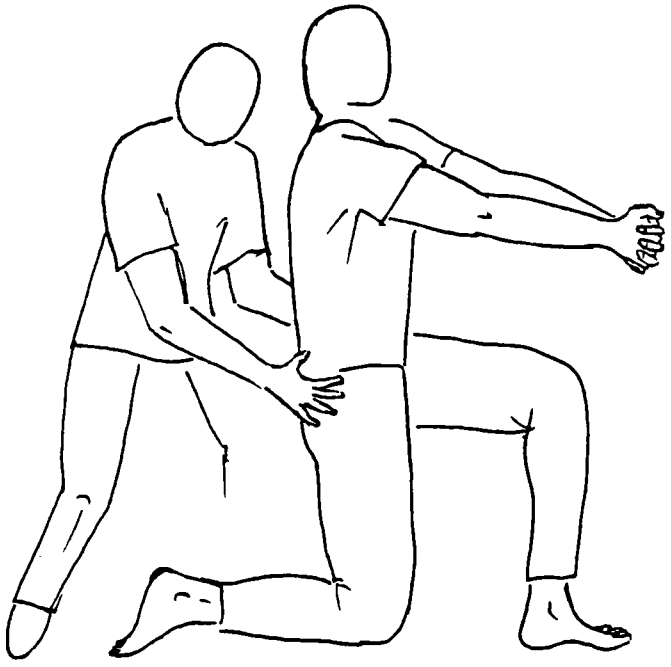
Ask the person to "hold" a position using short commands, for example: "*hold .....stay where you are .....don't let me move you.....*"

Manual pressure can then be offered in a firm but gentle way. It must be built up slowly. Enough manual pressure must be given to gain the required response. Sufficient time must be allowed for the person to give a complete response.

Manual pressure is usually applied to specific points of the body (***"key points of control***) from which the strength and the distribution of the muscle tone in the rest of the body can be influenced (see fig. 84). These key points are the back of the head and the pelvic and shoulder girdles.

Fig. 84
Example with the person in stand-kneeling position

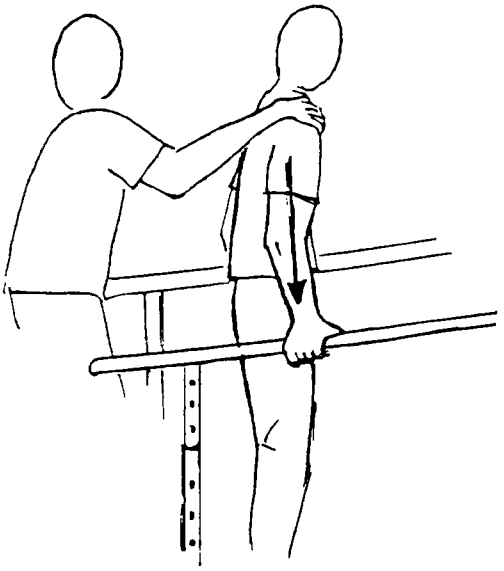
- stand behind the person, place your hands firmly on the person's pelvic brim (or on the shoulder girdle)
- push her gently in the desired direction:
  ↑**forward**
  or
  ← → **laterally**
  or
  ↓ **backwards**
- ask her to "hold" using short commands: "stay where you are .... don't let me move you..."
- as you try to move the person, she should then hold against this manual pressure



Other examples:

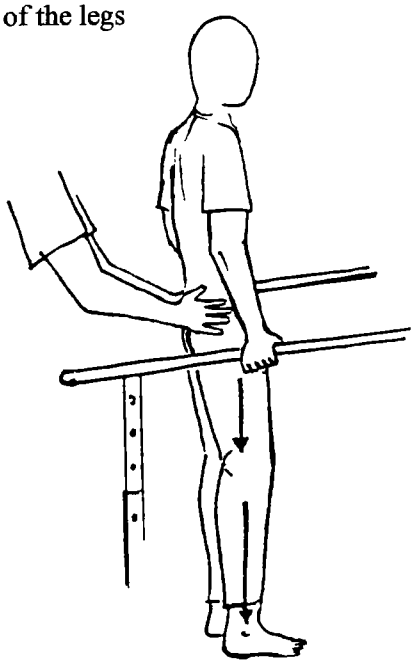
The examples below show how the different techniques of approximation and manual pressure may be applied in combination and in different positions

Fig. 84.1



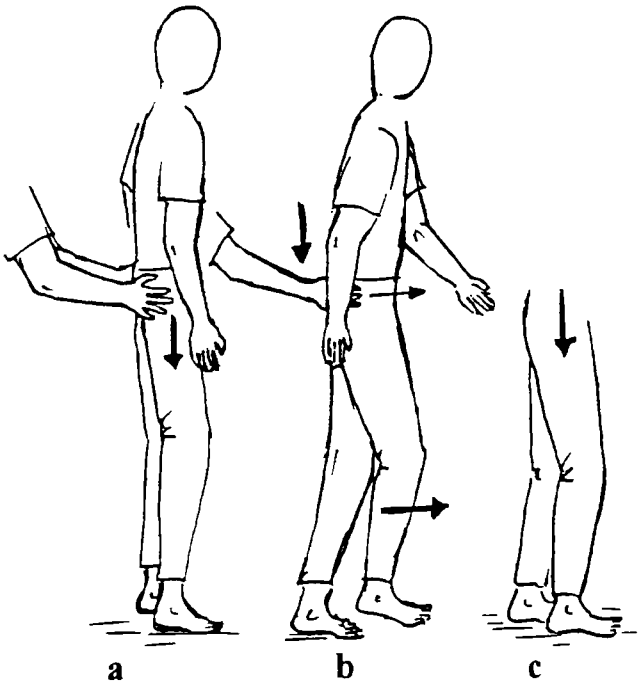
The person stands at the parallel bars or in any other standing position

- Standing behind the person, apply **approximation** from the brim of the pelvis down to the heel and **manual pressure** to stabilise the position
  Or
- **Manual pressure** can be applied (backwards, forwards or laterally) to gain equilibrium responses of the legs



- **approximation** may also be applied from the shoulder to the heel of the hand through a straightened elbow

Fig. 84.2



- you can apply manual pressure from the pelvis down to the heel to stabilise the standing position (**approximation**)- see fig. **a**
- then shift the person's weight onto the left leg (**manual pressure**) - see fig. **b**
- You can then push forwards to gain the leg equilibrium response. The person automatically takes one step forward to counterpoise- see fig. **c**

15. Strengthening of hand movements

15.1 Introduction

The final stage in restoring the normal function of the arm consists of **strengthening the movement** of the hand and **establishing precision movements** of the hand.

To regain precision movements, the hand must be kept free from the typical spasm pattern (see fig. a, page 5) through correct positioning.

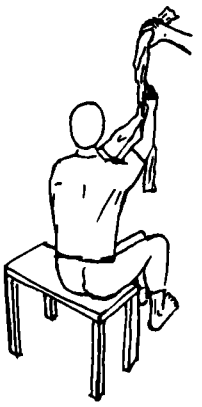
The **shoulder and elbow movement** must be restored first (see section 6); the **muscles** of the affected arm must be **strengthened** by active exercises (see sections 8.1 and 11.2).

The person must be taught to **support, hold and move her arm in space** in different positions, releasing the hand for functional movements as described below.

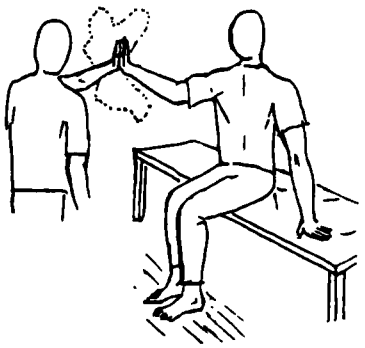
- Hold a rolled towel (a stick or a rope) in front of the person
- the person is taught to grasp and release the towel

and/or

- to move the hands up on the towel, grasping one hand on the top of the other



the arm must be kept straightened with the shoulder forward (**anti-spasm pattern**)



- the person keeps her hand against your hand without pushing and follows the movements performed by you

You can encourage hand movement by asking the person to **think of the specific movement taking place in the joint concerned.** Remember to give the movement commands slowly and clearly (e.g. *"Think about your elbow..... Look at it.....help me to bend your elbow...."*). If the commands do not gain the required response, you should then demonstrate the exercise.

It is best to start with a simple sequence of movement or a series of actions. Encourage the person to practise constant repetitions of the exercise. The movement can be reinforced by **approximation** with manual pressure (from the heel of the hand through a straightened elbow to an outward rotated shoulder -see sections 9.3 to 9.7)

Give the person **different objects and modelling materials to hold** (e.g. plasticine, wax for moulding, modelling clay, lumps of foam rubber, plastic foam, small balls of various sizes etc.) This will allow different weights, shapes and textures to be experienced. It can encourage the person to practise different grips. Remember to insist on the exercise of both hands.

15.2 Activities to establish precision hand movement

When using the hand, the **elbow should be supported** on a table (see Figs.44/45) until the muscle tone has been restored. The following movements should be practised by the patient:

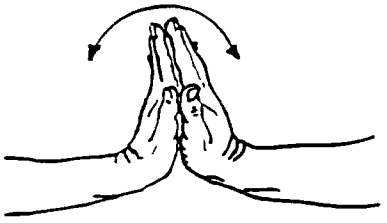
- making a fist
- elbow bending/straightening
- wrist bending backward/forward
- wrist rotations
- hands pressed together, with thumb and fingers open and apart (unaffected hand assisting the movement of the affected one)
- finger-tips pressed together
- sliding, palms placed over a tin
- finger-tips grips
- precision movements, including small grips (e.g. when building a tower with small blocks of wood) and a pinch grip (e.g. using a pen)

15.3 Wrist bending backward

The person sits, the hands are pressed together, with thumbs and fingers spread. The elbows are supported on a table.

- Wrist bending backward is practised. First as a passive movement with the assistance of the unaffected hand (see fig. 48) and then as a graduated active/resisted movement working against the unaffected hand

Fig. 85



Ask the person you are training to stand. When he is standing (as shown in fig. 41.1) ensure that weight bearing is over a correctly positioned hand, with the shoulder in external rotation. The elbow and wrist are extended.

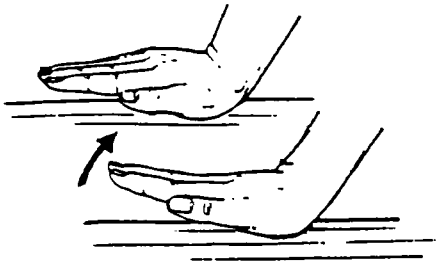
- Ask the person to roll out a piece of modelling material, pressing down on the palm. The fingers are kept straightened when pushing away and relaxed when pulling back.

Fig. 86

With the person standing, the affected hand is placed palm down on a table, thumb and fingers straightened and open

- The person lifts the hand off by bending backward the wrist. The heel of the hand is left in contact with the table.

Fig. 87



15.4 Wrist bending forward

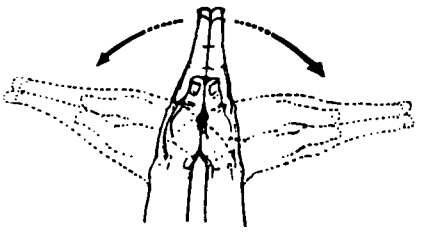


Fig. 88

- The hands are positioned with thumb and fingers open. Wrist bending forward is then practised using the unaffected hand to give graduated resistance to the affected one.

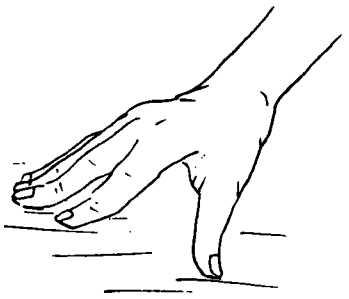


Fig. 88.1

- The hand is placed palm down on a table. Wrist bending forward is practised by lifting the palm and leaving the fingers in contact with the table.

15.5 Weight -bearing on the finger-tips

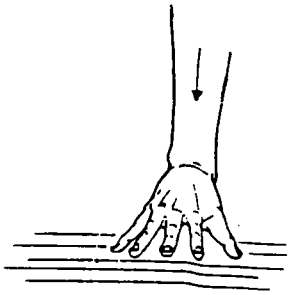


Fig 89

- The person stands in front of a table. The thumb and finger-tips are pressed down firmly: Practice supporting the body and increasing the amount of weight over controlled finger-tips

15.6 Close and spread the fingers

Fig. 90

- Grip a little ball firmly, then release, opening the hand to straighten the fingers

15.7 Thumb Opposition

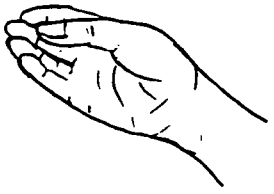


Fig. 91

- Use thumb bending to touch the finger-tips

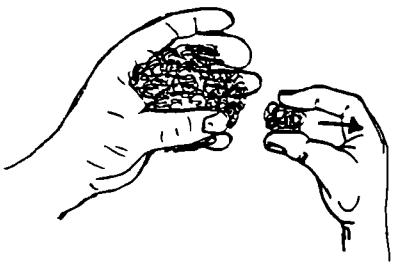


Fig. 91.1

- Pinch and pull out small pieces from a lump (i.e. thick foam rubber) held in the unaffected hand, using thumb and first finger, thumb and second finger, and so on

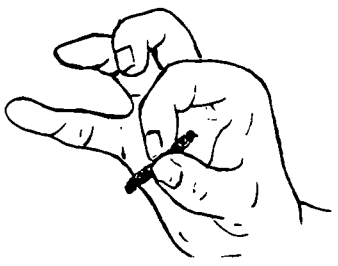
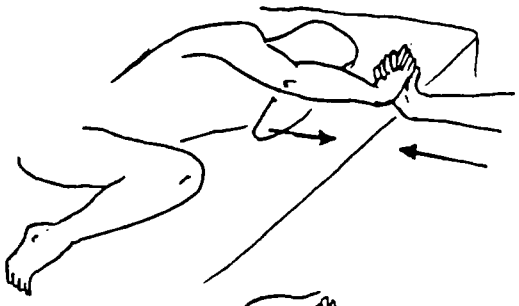


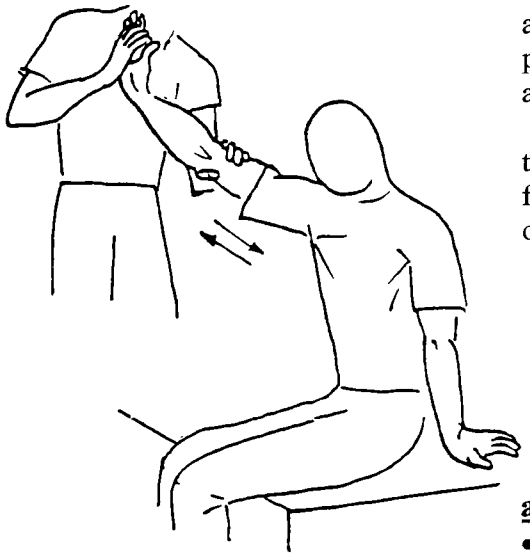
Fig. 91.2

- Roll a very small piece of modelling material between thumb and first finger

15.8 Sequence of activities

Precision movements of the hand can be established when controlled shoulder and elbow movements have been re-established and the hand is free from the "flexor spasm".
The following illustrations summarise some of the training activities (suggested in this Guide) that can facilitate this task. The examples are related particularly to the upper limb.





activities:

gravity approximation reinforced by manual pressure

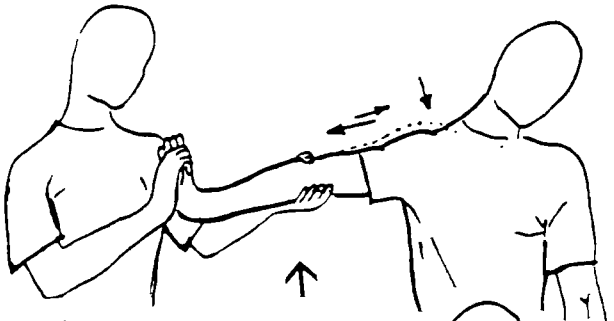
manual pressure is given with **counter-pressure**

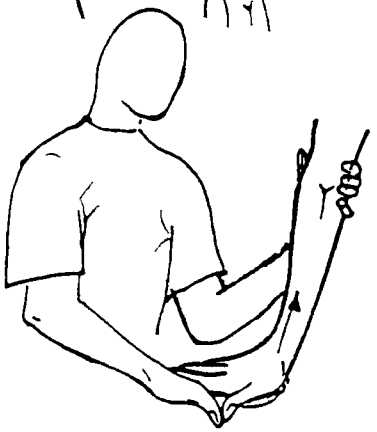
all activities are taking place in the different positions (side-lying, sitting, standing, etc.) through a correctly positioned base (**recovery pattern**)

the **handgrip** is used to inhibit the spasm pattern in flexion (an open thumb, with pressure on the heel of the hand, helps to release fingers)

aims:

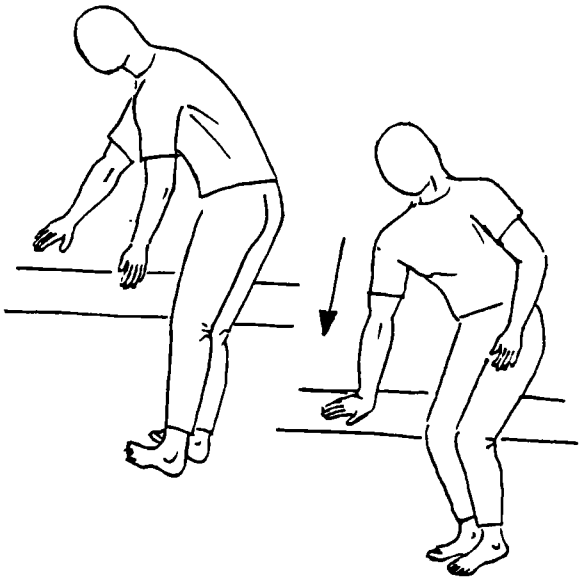
- to reduce flexor spasticity in the arm
- to obtain an arm elevation without pain
- to enable the person to keep the shoulder in the different positions with the elbow straightened





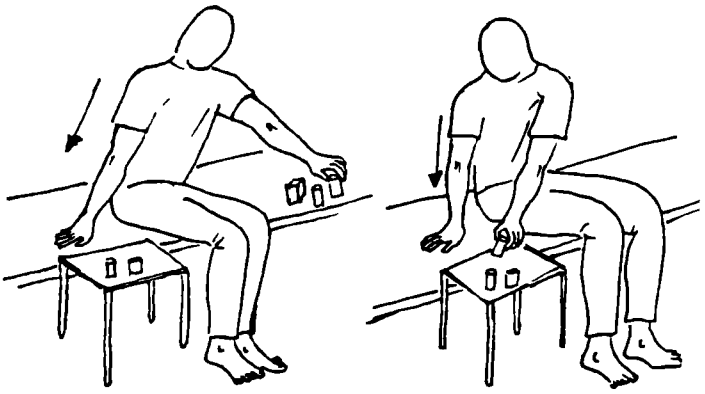
Note on handgrip:

- distal (hand) and proximal arm control
- inhibiting handgrips are used during approximation (elbow control is needed in the early stages; the aim is to achieve the ability to hold the arm straightened without elbow support)

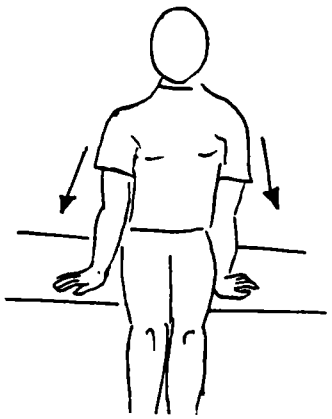


weight- bearing on the affected limbs

- the arm is moved not only in regard to the body, but the person is taught to use the arm as a fixed point for trunk movements (body movements in regard to the arm)

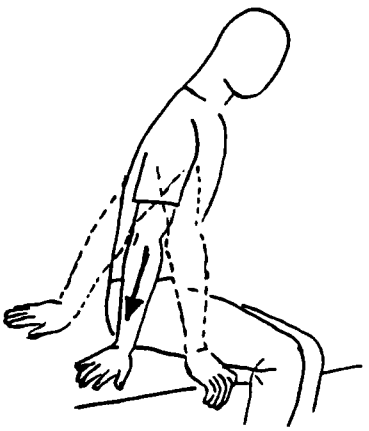


cross facilitation: the person works with the unaffected side of the body, across the mid-line, to the affected side to initiate bilateral activity and vice versa

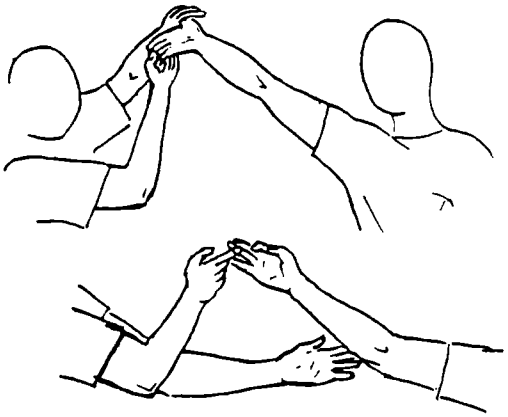


In sitting position, feet flat on the floor

- he lifts the buttocks straightening the arms



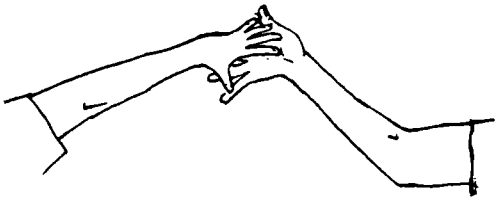
- weight-bearing on the affected arm held in different positions, maintaining the elbow straightened, shoulder forward



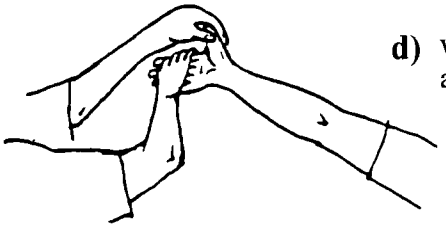
place and hold a limb in space (a, b, c, d):

a) the arm is maintained by the trainer into the **recovery pattern**:
thumb and fingers open, wrist bent backward and elbow straightened,
arm turned outward with shoulder forward

b) a brisk **tapping** may be used on the elbow to keep it straight



c) the **person holds** the arm into the recovery pattern with your assistance



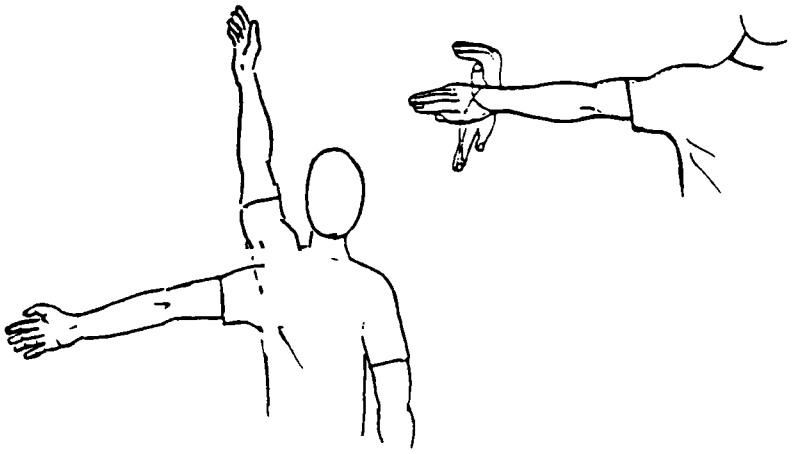
d) wrist bent backward position may be added as an additional inhibiting influence

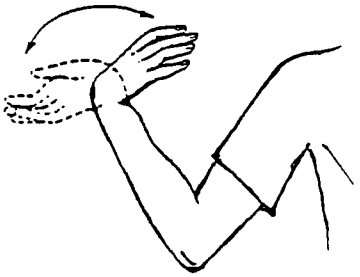
<u>final stage</u>:

- the person holds (and move) the upper limb in space in any position, into recovery pattern and without your assistance

practice

- active movements of wrist and fingers
- **precision movements** of the hand (different grips)





16. Some common problems to avoid

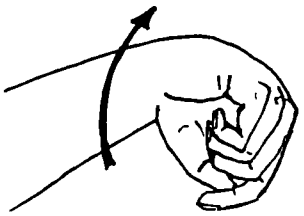
16.1 Hand spasm

After a stroke special care must be given to prevent the development of the typical spasm pattern in the affected hand (see fig. 92). Correct positioning of the person is needed from the early days to avoid this.

Fig. 92

CORRECT

WRONG



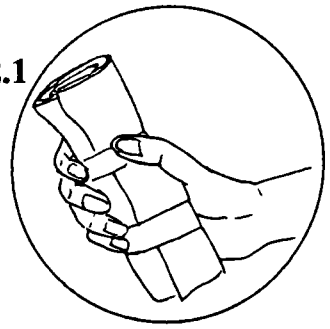
If severe spasticity and muscular retractions in the hand are prevented the person will have more potential to regain controlled movements of the hand and fingers.

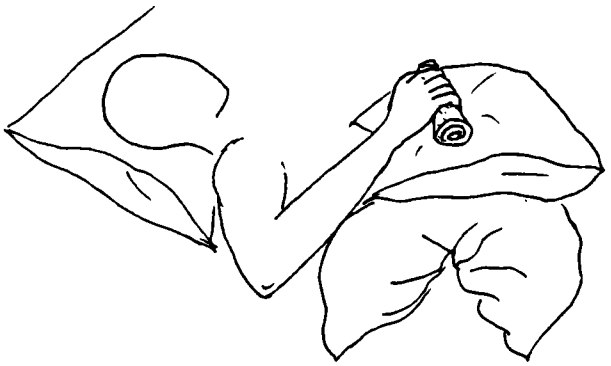
A good **functional hand position** is one where the wrist is bent backward, the fingers are partially bent and the thumb is opened. It can be facilitated by good positioning, range of motion activities, active movements and the use of simple devices The simple devices described below can help to promote a functional hand position.

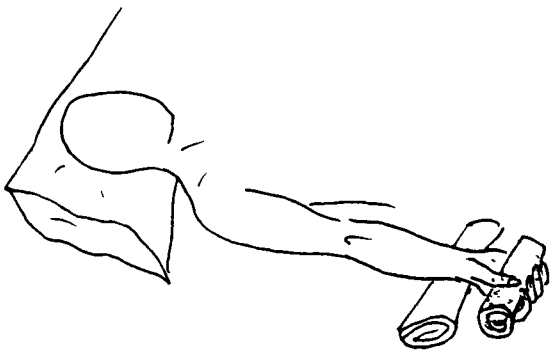
- **Hand roll**

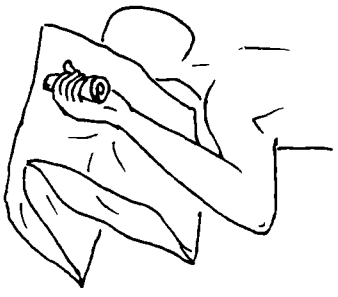
A hand roll (made by rolling a cloth, a towel or other soft material) can be placed in the hand of the person who is developing severe spasticity.

Fig. 92.1







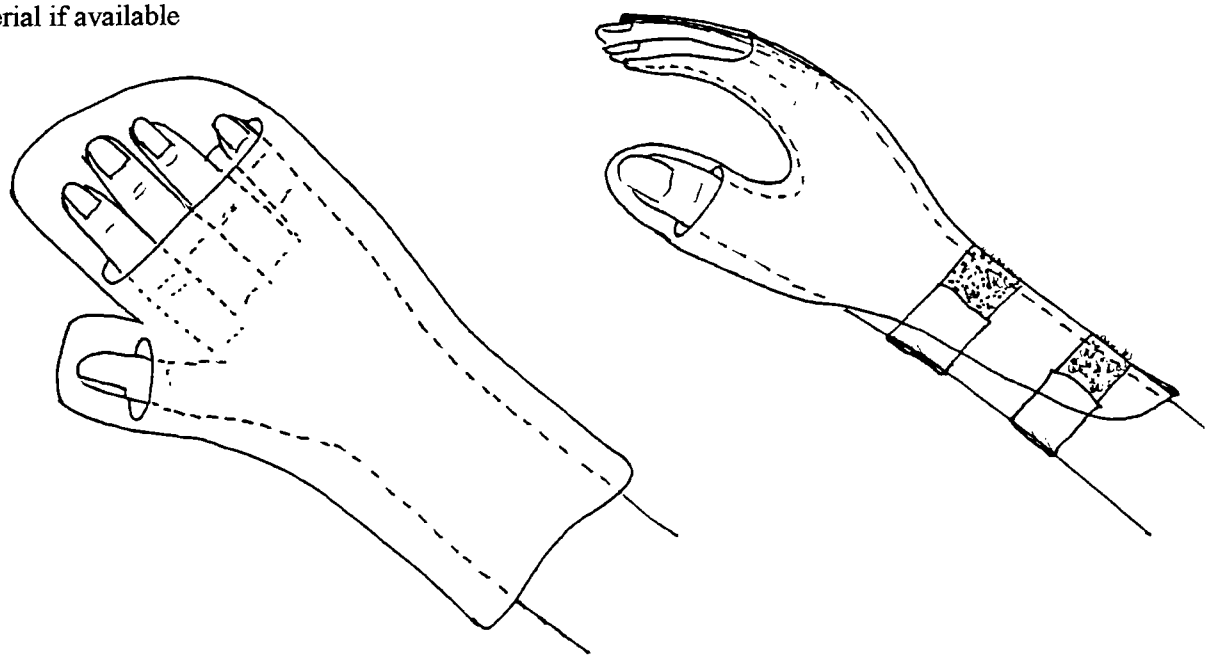


- **Palmar positioning splint**

The splint covers the anterior aspect of the hand and the anterior and distal side of the fingers and thumb. The splint does not cover the palm area because pressure on this area may increase spasticity. The hand is in the functional position, with the wrist bent backward, fingers partially bent and thumb open.

Fig. 92.2

this splint can be made of sheet aluminium, PVC plastic or thermoplastic material if available



- **Soft fingers divider**

Another simple device can be made using soft foam rubber. This soft fingers divider will promote better bending backward of the wrist and fingers.
The divider keeps the fingers widely apart, it reduces also the flexor spasticity of the whole arm and it prevents the development of swelling in the hand. If the person finds this device comfortable she can wear it at night to help in keeping the fingers apart.

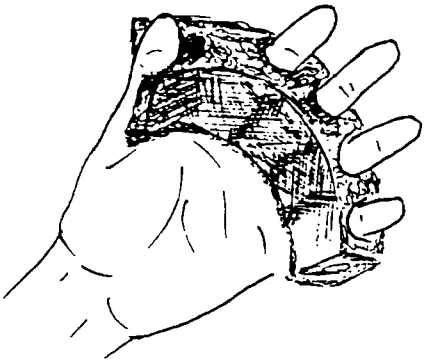


Fig. 92.3

Keeping the **hands clasped with the fingers interlaced** has the same effect in reducing flexor spasticity in the arm.

16.2 Subluxation of the shoulder and painful shoulder

The shoulder joint is dependent on **the support of muscles and ligaments** to maintain articulation of the head of the humerus with the cavity of the scapula.

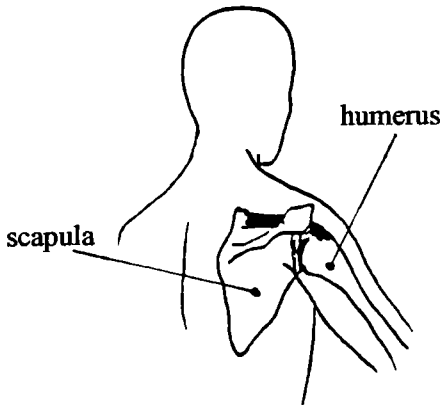
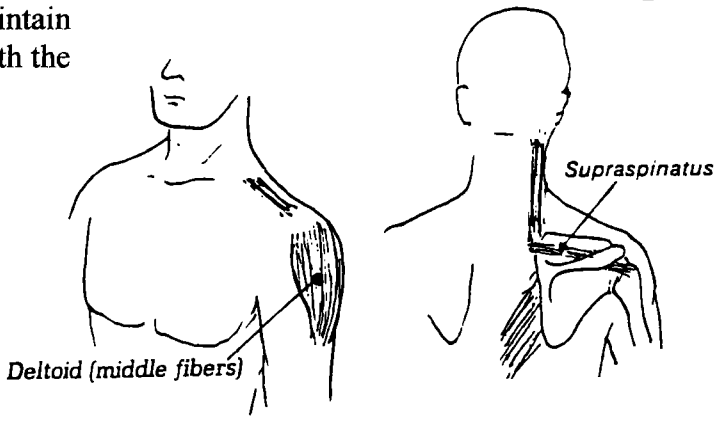


Fig. 93



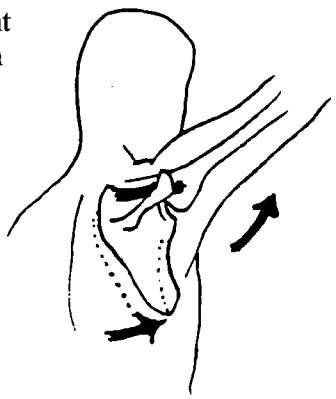
Without adequate stabilising support, because of mechanical position, or due to a flaccid hanging arm, subluxation may follow.

In many people, the partial dislocation (subluxation) of the shoulder joint becomes a problem in sitting, standing and walking. This is particularly so if the muscles (the deltoid and supraspinatus) that support the arm are **flaccid** and the arm is hanging down because of the lack of support. However, even in a flaccid arm there is **some degree of spasticity** in the wrist and fingers, and in the muscles around the scapula.

The main causes of shoulder joint subluxation can be summarised as follows:-

- the muscles that should support the arm are flaccid and weak
- the weight of the arm and gravity pull the arm downward
- the muscles around the scapula are retracted because of spasticity: This prevents the scapula turning outward and upwards when the arm is raised up and it increases the depression of the shoulder joint

Fig. 93.1
normal movement and joint position



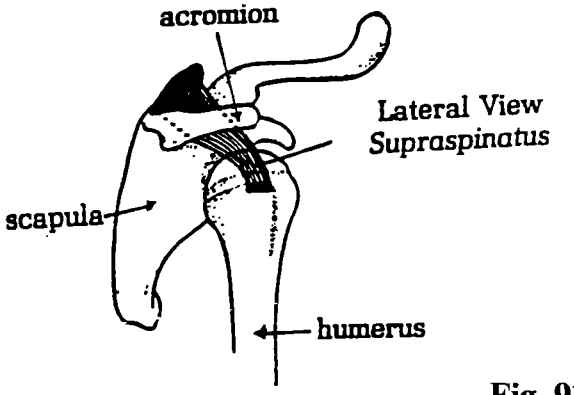


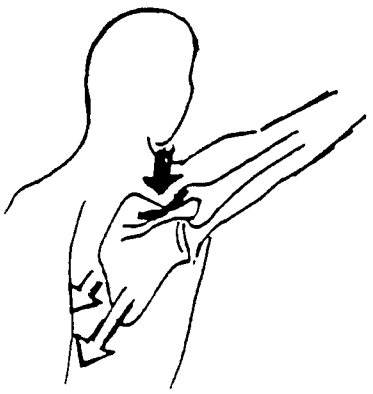
Fig. 93.2

The Painful shoulder

The "**painful shoulder**" that is often suffered by a person who has had a stroke is not linked to the problem of shoulder subluxation. **The pain is associated with strained muscles and ligaments** caused by incorrect positioning and bad lifting (for example, see fig. 10 or fig. 12) combined with the following:

- an immobile scapula
- an altered plane of the joint between the scapula and the humerus
- muscle weakness and lax ligaments
- **pinching** of the rotator cuff and **impinging** of bony surfaces between scapula and humerus

Fig. 93 3



the cavity in the scapula in which the head of the humerus is placed remains rotated downward when the arm is passively raised up

the joint capsule and the supraspinatus muscle are pinched against the acromion (see fig. 93.2)

this mechanical problem is exacerbated if the arm is held turned inward and the scapula is drawn backward

How to prevent the onset of a painful shoulder

The individual needs to be correctly handled in the early days after a stroke, especially during the flaccid stage. This must include the maintenance of a free scapula (see chapter 3, "Range of motion activities"). Trainers, nurses, family members and the person herself must be taught how to maintain the **correct positioning** of the shoulder. Everyone must be fully aware that the person's future upper extremity function, range of motion and comfort all depend on it.

In addition to correct positioning it is important to strengthen the flaccid muscles (the deltoid and supraspinatus muscles) that provide support to the shoulder.

The following actions are recommended:-

- Weight-bearing through a correctly positioned shoulder will reinforce the mechanical stability of the joint.

- The shoulder must be raised up with the shoulder joint turned outward.

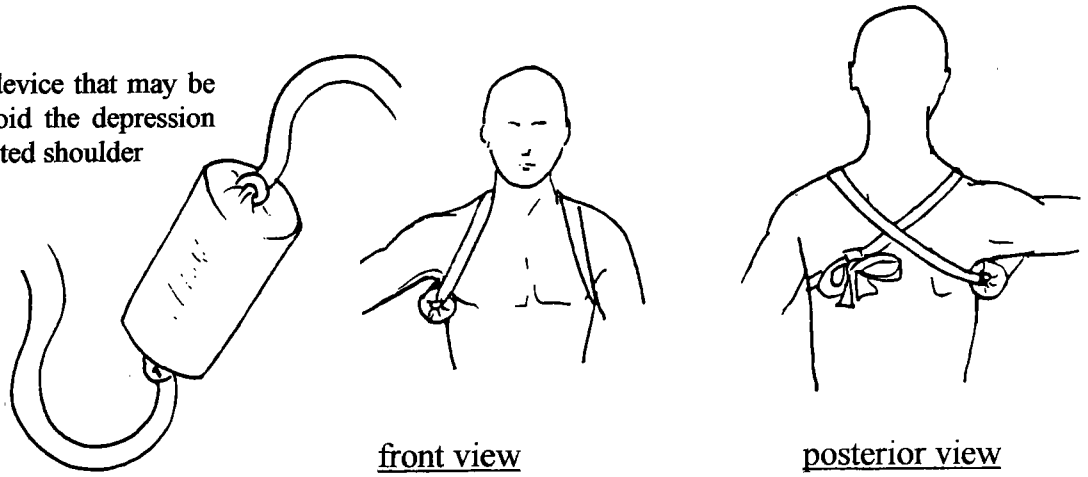
- Rolling exercises must always be carried out by the person with hands clasped, both arms reaching forward, shoulder forward and turned outward.

- Sitting at a table with both arms supported and hands clasped, the person should try to reach forward as far as possible across the table.

Shoulder support aids

In the early stages of treatment, a **temporary shoulder support** may be needed to prevent strong and prolonged stretching of the muscles and ligaments that support the arm. This device consists of a roll of soft material (i.e. cotton, wool, foam rubber) with a diameter of about 10 cm. It is placed under the affected armpit. It may be needed especially when the person is standing.

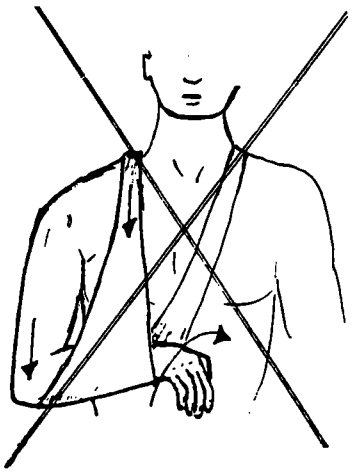
Fig. 93.4
A correct device that may be used to avoid the depression of the affected shoulder



front view posterior view

Important: a sling should NOT be used

Fig. 93.5



it is wrong to think that a sling keeps the arm upwards preventing the subluxation;

in this position the elbow is bent, the arm is kept towards the body and turned inward, hand palm down (the typical spasm pattern in flexion);

the spasticity of the arm is reinforced not reduced thus increasing the risk of subluxation. Furthermore, the bent position increases the swelling of the hand

However, if the arm remains flaccid and it hangs down when the person is sitting or standing (the person's hand is swelling) the shoulder support may not be enough. In that case a **wider sling** may be used, keeping the elbow and the whole hand in it.

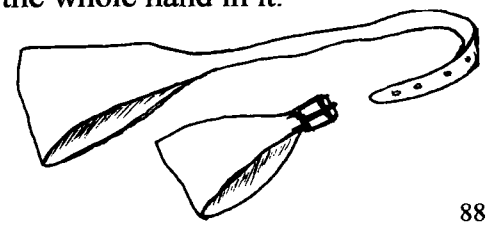
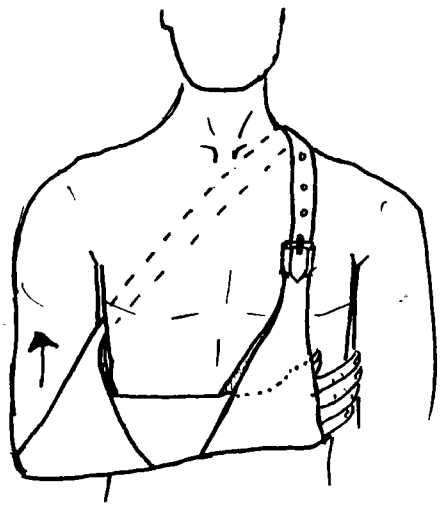


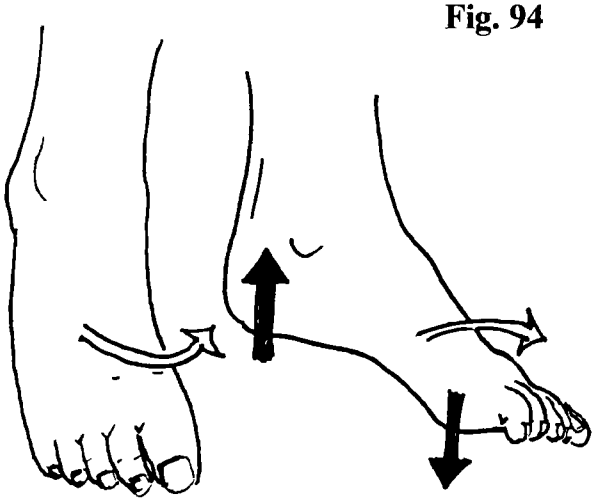
Fig. 93.6



16.3 Leg spasticity

An effective gait will be difficult to achieve if the person develops severe spasticity in the affected leg some weeks after the onset of the stroke. Due to spasticity, it will be difficult for the person to bend her hip and knee when walking. He will walk with an awkward gait, making a great effort to **swing the affected leg forward** (see fig. 60). This major effort will increase unwanted muscle tone in the affected arm. **An important rule in stroke treatment is that lower limb activity should not activate upper limb activity.**

Fig. 94



The person will also bear weight on the forepart of her foot and not through the heel, and this will further reinforce spasticity in the leg.
The foot hangs down and is turned inward. This foot position may begin due to the initial floppy weakness, but it will become stiff from contractures if preventive measures are not taken.

How to prevent extensor leg spasticity

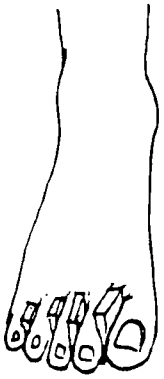
The following activities should be adopted to reduce the spasm pattern. They are given in sequential order:-

- careful positioning at all times
- passive movements in "recovery pattern"
- assisted- active movement
- placing and holding a limb in space and active movement
- weight bearing over a correctly positioned base (preventing the knee drift with the hip turned outward)

Devices to reduce the spasm pattern

When standing and walking many persons bear weight on the forepart of the foot. The toes of some of them are so bent that standing and walking are painful. Foam rubber pads placed between widely spread toes can be used to break down the spasm pattern. The opening of toes reduces the spasticity of the whole foot.

Fig. 94.1
Toes can be kept widely apart using foam rubber or cotton pads



17. Promoting independence in daily living activities

17.1 Introduction

The ultimate goal of rehabilitation is to help someone to do as much as possible for himself/herself within the limitations of any residual disability. If this aim is to be achieved, there must be no delay in starting self-care activities. **From the onset of the stroke every activity of daily living can and must be incorporated into the treatment plan.**

Rolling in bed, bridging, double arm elevation, rolling to reach for articles on a bed table, rolling to sit up, sitting to standing and standing to sit have all been shown as necessary steps in the rehabilitation programme. These are also steps towards self-care. In addition, someone who has had a stroke must learn to dress and undress, wash and feed himself/herself and to be independent in personal hygiene. In practising these activities normal patterns of movement will be adopted. Furthermore, these activities are also important for recovery of the sensory loss.

All self-care movements will be active-assisted in the beginning and with the improvement of the individual's motor function should become active-voluntary movements. Again, it is important to **avoid the frustration of failure thus any progress forward** in the rehabilitation programme must be made **within the person's capability**.

For further information See the WHO manual Training Package No 14

How to assist someone during daily activities

- Encourage the person to carry out daily activities using normal patterns of movement whilst also stimulating the person's senses

- Work with the person to try to solve the different problems that may be present (on the following pages there is advice on how to carry out different activities of daily living)

- Ensure that the individual is involved in meaningful activities

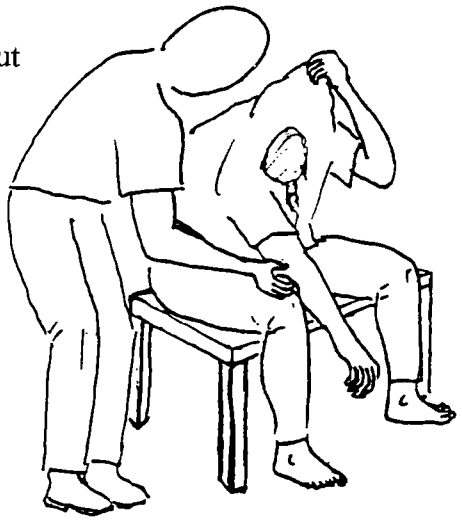
- You can assist the person when she handles an object. Guide her hand with your own hand placed on it.

- You can guide and control the whole body of the person from her affected side

17.2 Undressing

- the person sits with his feet flat on the floor
- the affected arm is hanging down between his knees
- he pulls the garment over his head with the unaffected hand
- he pulls the unaffected arm out the sleeve first
- then with his unaffected hand he takes out the sleeve from the affected arm

Fig. 95
You can control the person's balance in the sitting position, keeping her affected shoulder forward and the elbow straightened



17.3 Washing

If the person you are training cannot stand to wash himself, he can sit on a plastic stool or a chair.

How to wash the face, trunk and the affected arm with the unaffected hand

- a washmitt can be made by cutting two pieces of towel to fit the hand size and then sewing them together
- you can guide his affected hand in holding the washmitt while he puts the unaffected hand into the mitt
- he can then wash himself (with assistance from you if needed)

Fig 96

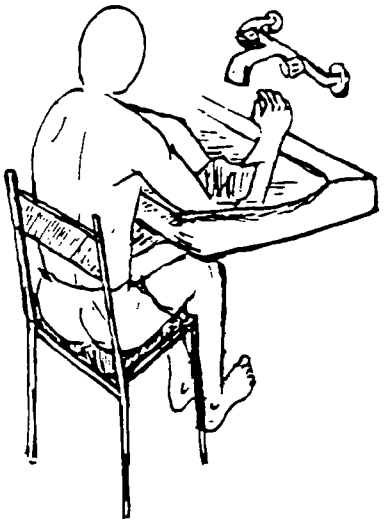


Fig. 96.1

the affected arm in a wash-basin
or other small basin paced on a table

How to wash the unaffected arm with the affected hand

- the person wears the washmitt on the affected hand keeping the arm hanging down between the two legs
- the unaffected hand pulls the washmitt up
- the unaffected arm is kept forwards, placed on the wash-basin

Fig. 97
to dry hermself he can use a dry washmitt

- you can guide the affected arm, supporting it from the elbow and keeping the shoulder forward

How to wash the lower limbs

Fig. 98

- the person brings the affected leg onto the unaffected one using both hands

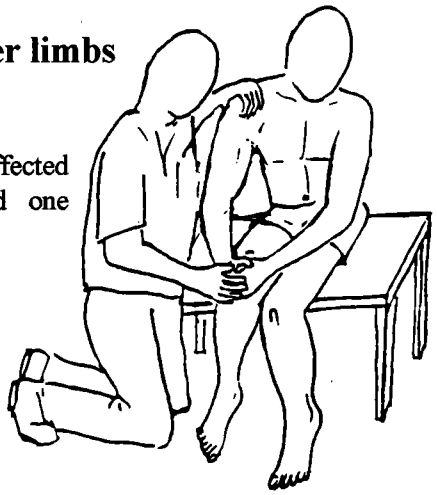
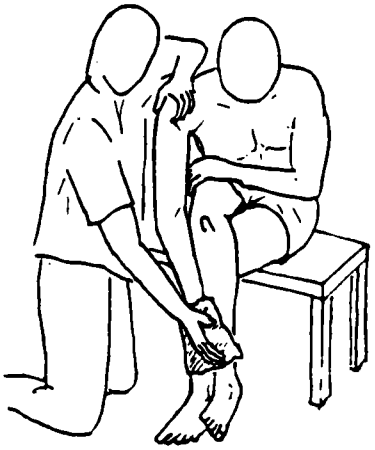


Fig. 98.1
You can assist in washing the leg by providing shoulder support



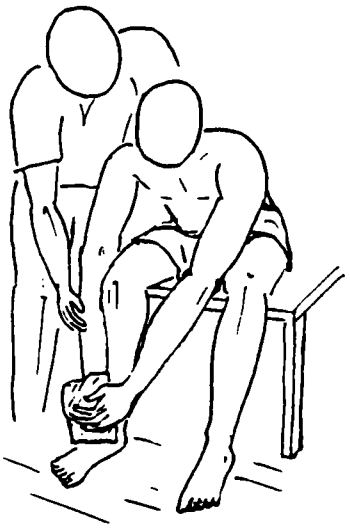


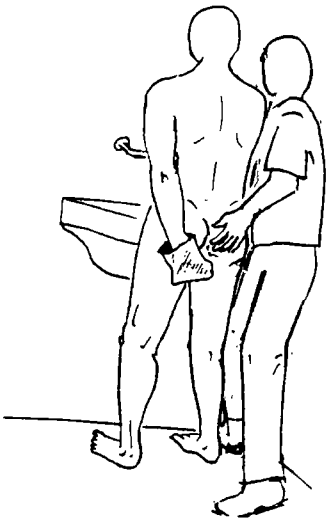
Fig. 98.2

- she washes her affected leg with both hands

Personal hygiene

- the person stands in front of a wash-basin, affected hand placed on it (see fig. 41.1)
- he washes himself with a washmitt using the unaffected hand
- control the person's position, ensuring an equal weight-bearing on both legs

Fig. 99
(the same position can be used for hair combing, tooth brushing, applying cosmetics etc.)

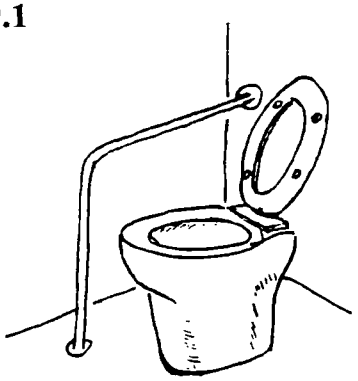


17.4 Using the toilet

Some adaptation may be needed to the toilet especially when used by someone who has had a stroke in the last few months.

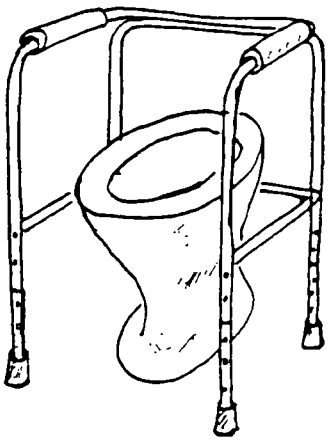
Fig. 99.1

A **rail** beside the toilet or handles on the wall may be needed to help with moving onto and off it



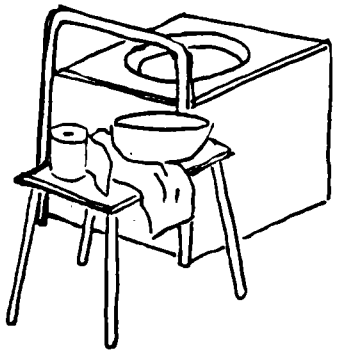
or
a **walking frame** may be used for this purpose

Fig. 99.2

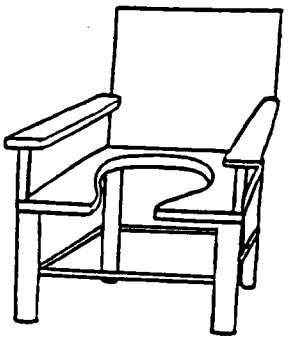


When using a squatting toilet,
a toilet seat can be made from wood

Fig. 99.3
everything the person needs
should be in easy reach
beside the toilet



or
a commode can be made from a wooden chair
(the chair is placed over the toilet)
Fig. 99.4



- Cleaning and washing the bottom area after defecating

Fig. 99.5

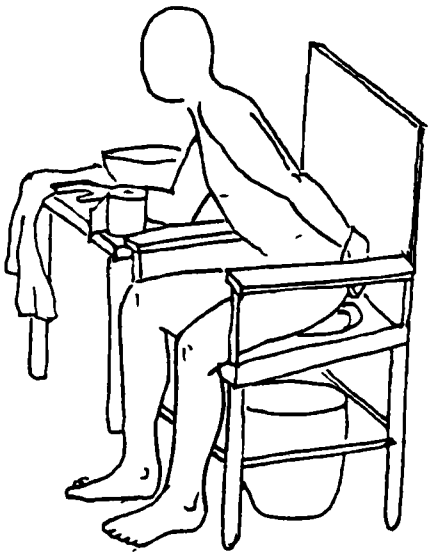
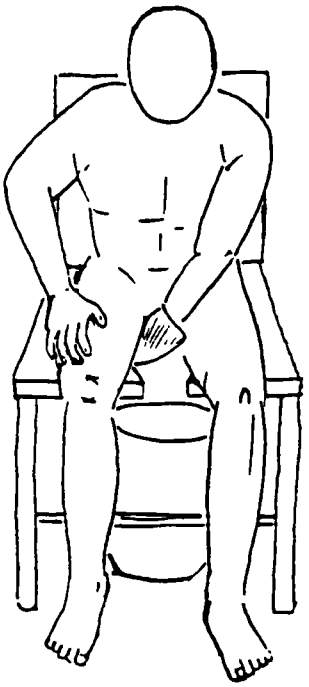


Fig. 99.6
Again, it is important to transfer weight from one side to the other in the use of both arms



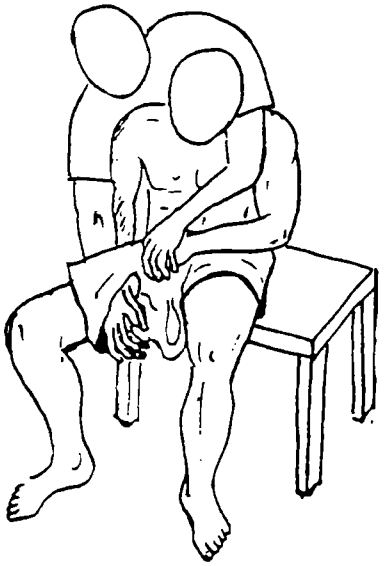
17.5 Self-dressing

Self-dressing should be part of the self-care plan as early as possible. This means it should be tackled as soon as it can be approached in a therapeutic way using the development patterns of movement in the correct sequence.

How to put on a T-shirt

- Put the T-shirt on the unaffected thigh
- Keep the affected arm hanging down relaxed
- With the unaffected hand put the T-shirt on the affected arm above the elbow
- Put the unaffected arm through
- Then the T-shirt is brought over the head with the unaffected arm

Fig. 100
in the beginning, when pulling the T-shirt on completely, lean the trunk forward slightly



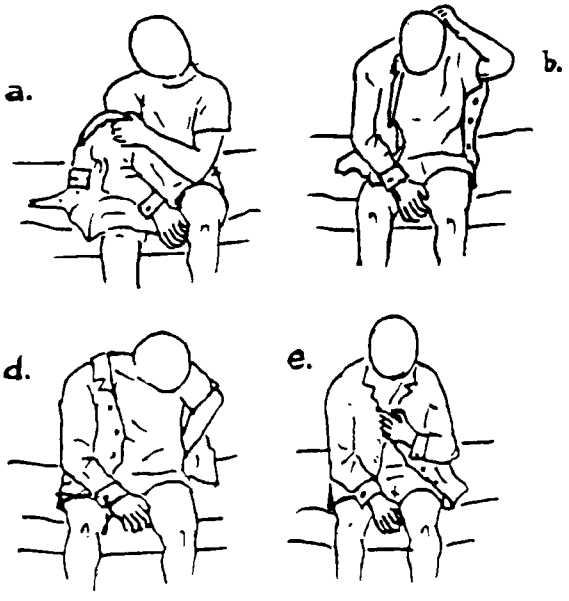


Fig. 100.1
When putting a blouse on, the person should **dress the affected side first.**
He should wear loose-fitting clothes that open easily in front (e.g with press buttons – also known as "press studs", "snaps", "poppers").

If a woman has difficulty in fastening a bra:

- she can fasten the bra in front, pull it around the neck, then put her arms through the straps

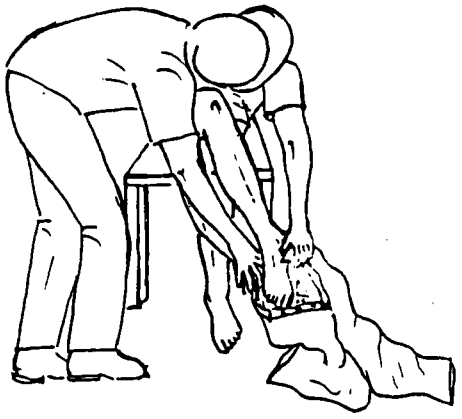
or

- the opening can be made in the front part using a press button or velcro

How to put on trousers or a skirt

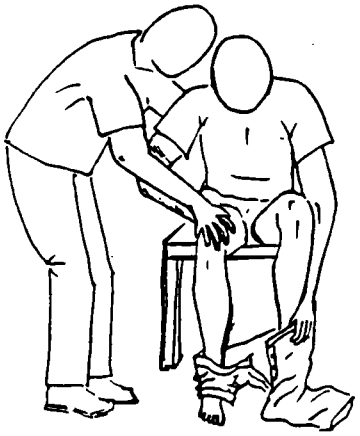
The starting position is illustrated in fig. 98. Those individuals who have problems in balancing may sit in front of a table or the bed.

Fig. 101
Help the person by guiding his hands



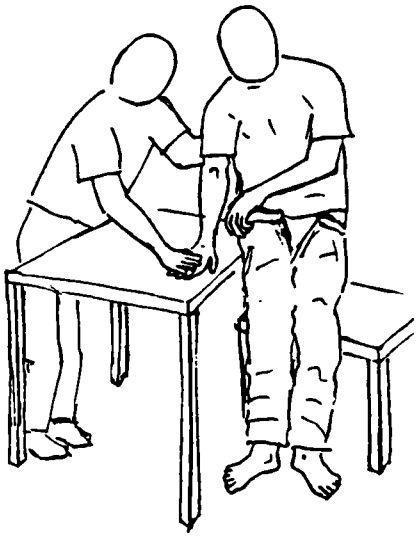
- ask him to cross his legs
- with the unaffected hand he puts the trousers on the affected leg first
- then he puts his foot down, heel in contact with the floor

Fig. 102
You can control weight-bearing on the person's affected foot



- he puts the trousers on his unaffected leg

Fig. 103



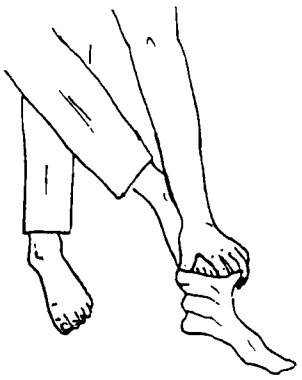
- he reaches the standing position,
- he pulls up the trousers using his unaffected hand
- then he sits down to button or zip them up

How to put socks and shoes on

- The starting position is illustrated in fig. 98. If the person is unable to cross his affected leg, he can use his clasped hands for help. This solution is important as it also keeps the affected shoulder forward.

Fig. 104

- he puts the sock on with his unaffected hand. The sock is kept open with the thumb, index and middle finger.



- using the position illustrated in fig. 104
- the person puts the shoe on the front of the foot with the unaffected hand
- with the foot on the floor, press down from the affected knee to introduce the heel into the shoe

Fig 104.1

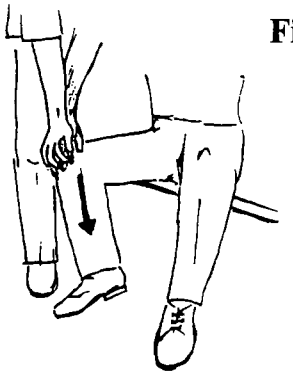


Fig. 104.2
Shoe-horn with a longer handle

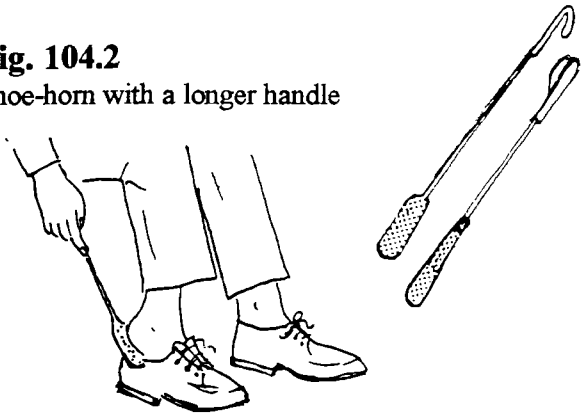


Fig. 104. 3
how to lace shoes using one hand

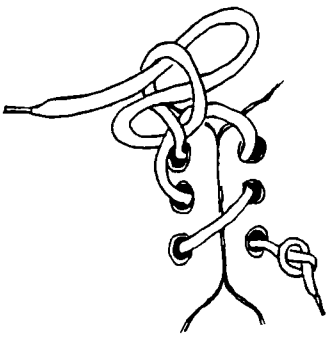
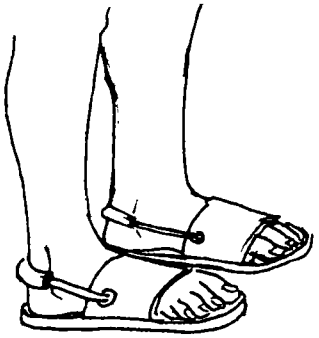


Fig. 104.4
if the person wears sandals, tie it onto the affected foot with a strap



17.6 Eating and drinking

Sometimes someone may have difficulty in chewing and swallowing food because of motor loss in the neck, face and tongue muscles on the side affected by the stroke. If the muscles are very weak start with small pieces of food (or mashed food). Encourage the person who has had a stroke to use the affected side of her mouth when eating. This will promote bilateral movements of the mouth and face, strengthening the weaker muscles.
If necessary assist with **jaw control**; this will help the person to keep her mouth closed while chewing and swallowing (**see WHO Manual, TP 25**).
Do not let her eat or drink while lying down because this makes it very difficult for her to swallow. **A correct sitting position with the trunk upright helps chewing and swallowing.**

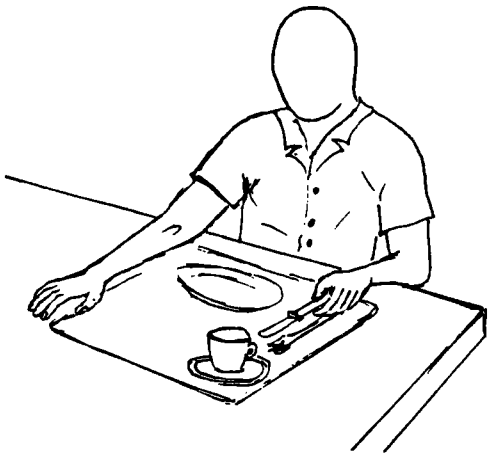


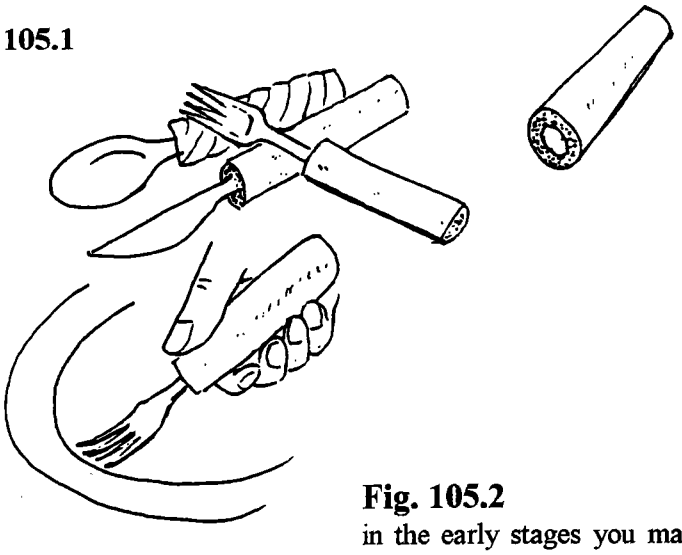
Fig. 105

- the person leans forward over the table, trunk upright
- the affected arm is straightened, the shoulder forward, elbow on the table

← a non-shifting surface (i.e. a rubber mat or a wet cloth) may be placed on the table to prevent movement of the plate

When the individual reaches an advanced enough stage to begin using both hands for feeding, or when a right-handed person begins using her right hand again, cutlery with various sizes of grip may be useful.

Fig. 105.1



← The equipment must be adapted to suit the person's handgrip. Foam rubber, cloth or other material can be wrapped around the handles
When it is difficult to reach the mouth, the handle can be bent

Fig. 105.2
in the early stages you may need to guide the person in feeding herself

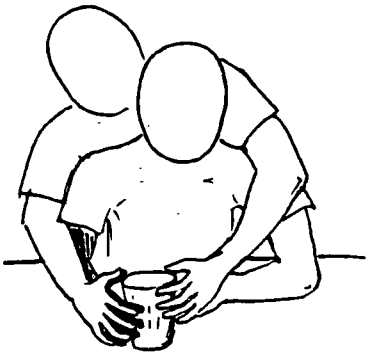


Fig. 105.3
correct position

Fig. 105.4
wrong position

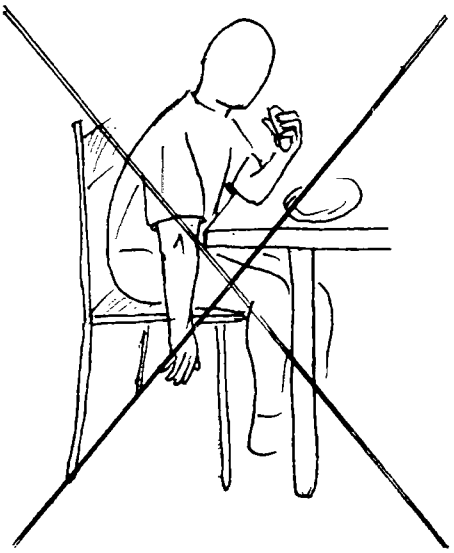


Fig. 105.5

when a right-handed person reaches an advanced stage he may begin using his right hand

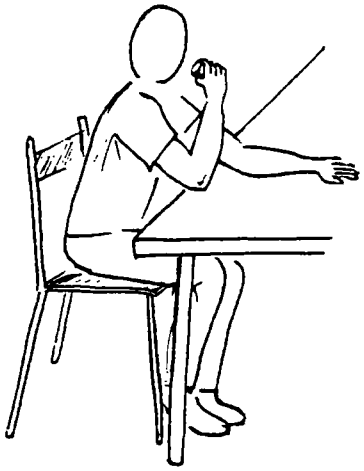
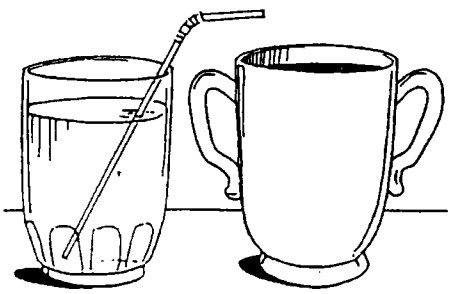


Fig. 105.6
if the affected hand is too weak to hold the cup, the person can drink from a straw or she can uses a cup with two handles



17.7 Household activities

See WHO Manual, training package 29

After a stroke, the person must learn to use the affected arm as much as possible when carrying out all household activities. For example when dusting furniture the cloth should be used with both hands (the unaffected hand guiding the affected one). The affected hand may be used in washing up, doing the washing, cooking, etc.

Fig. 106
Washing up

These activities are important not only for the recovery of movement, but also for the improvement of tactile sensation

Fig. 107
doing the washing

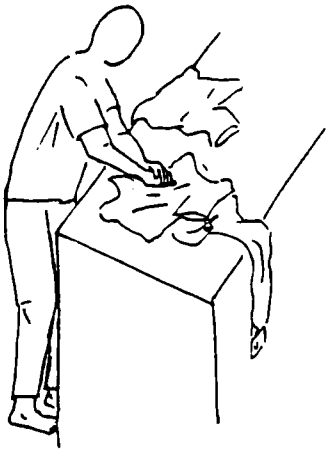
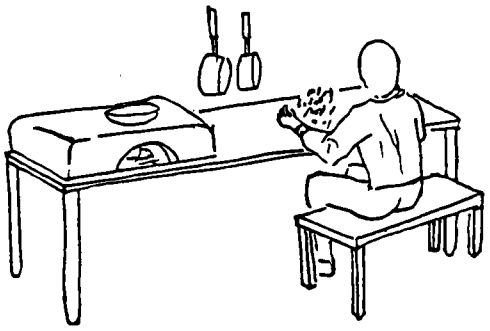
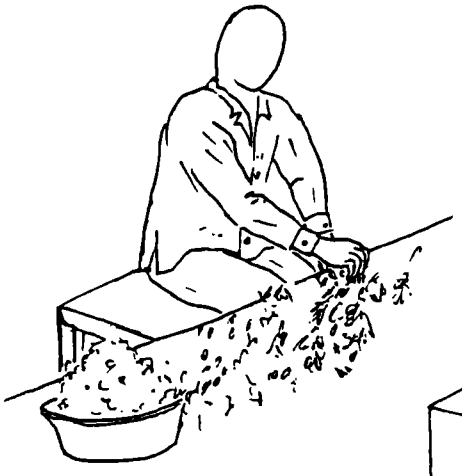
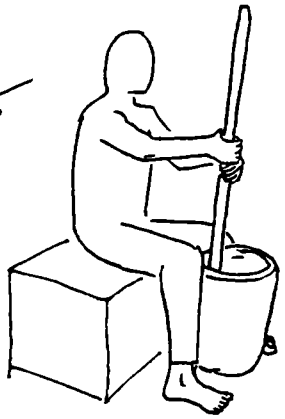


Fig. 108
Preparing food



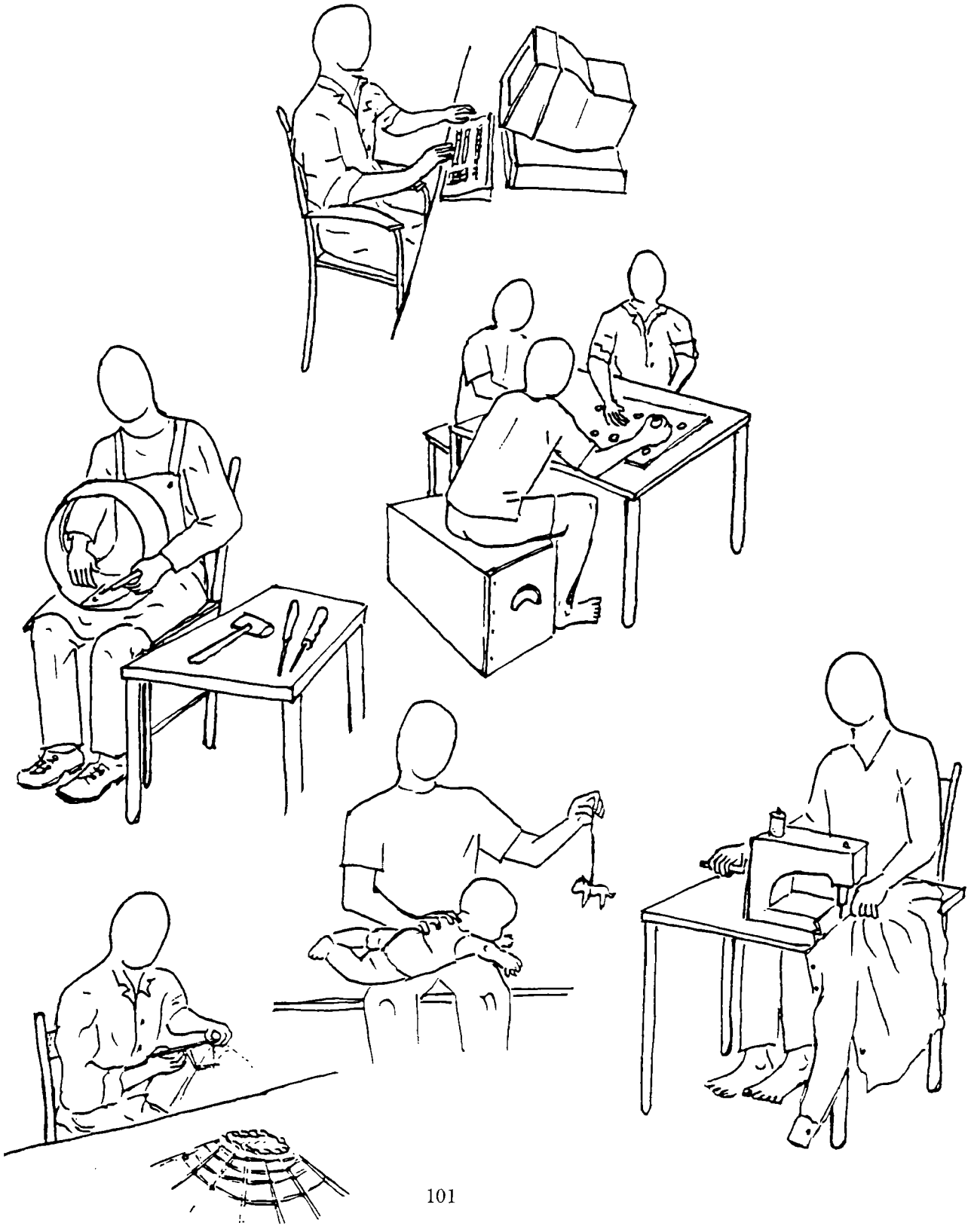




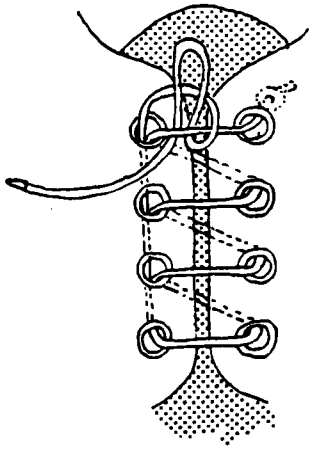
17.8 Keeping active

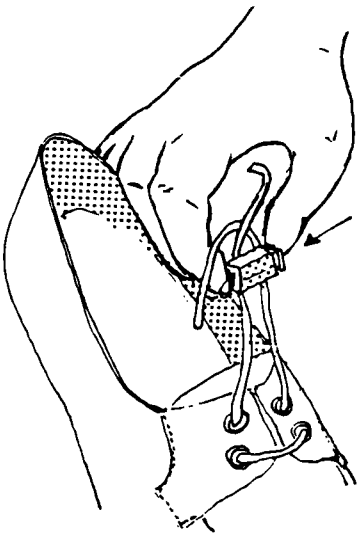
See WHO Manual, training packages 28 and 30

Those who have recovered from a stroke must still take part in family life, play, go to work and remain involved with their community. Some assistance or some equipment may be needed to do some of these activities. With the support and encouragement of their family, friends and the community they can become active and useful members of society again.

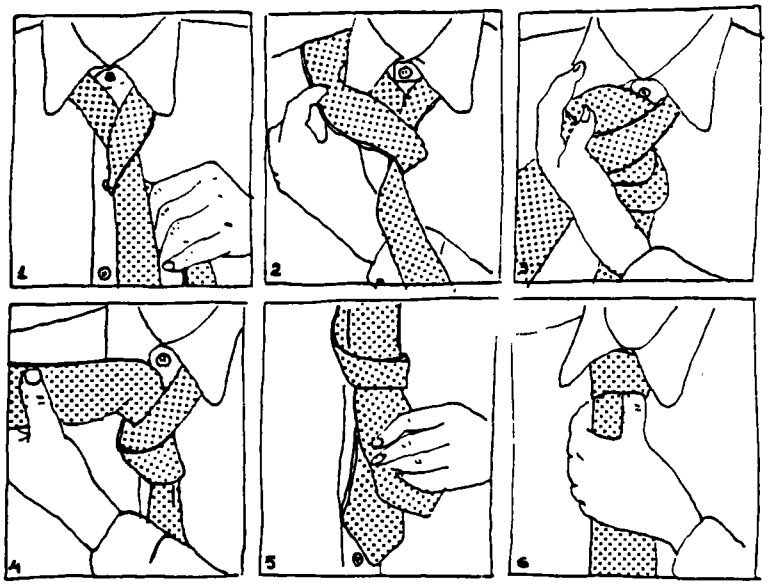


17.9 Other aids and suggestions for self care





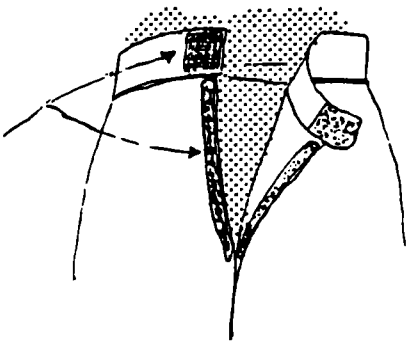
- different ways to lace up shoes using one hand

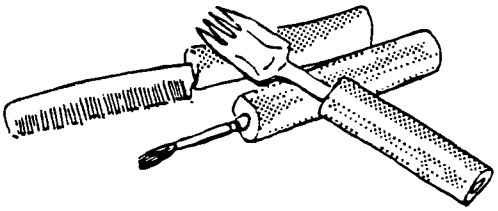


- sequence showing how someone can tie his tie using one hand

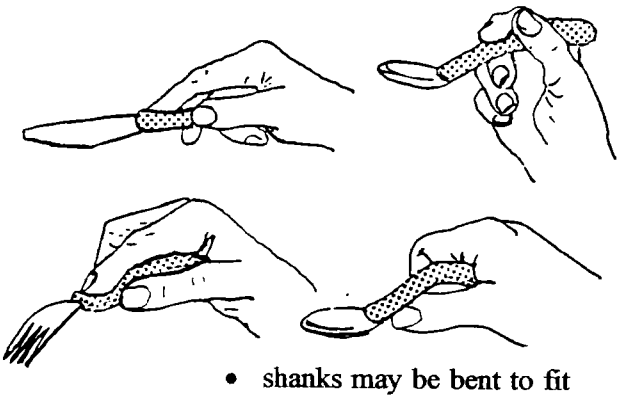
Velcro

- *Velcro* straps may be used instead of buttons to fasten trousers, skirt other garments.

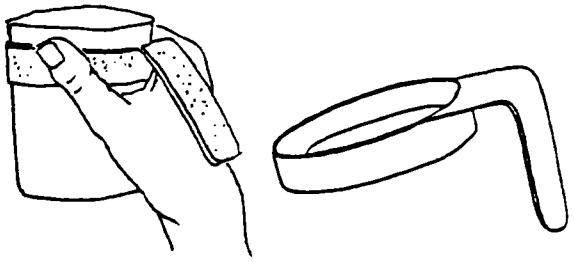


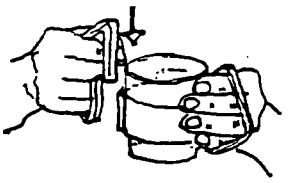


- A handle can be made thicker and easier to hold by pushing it into a piece of foam



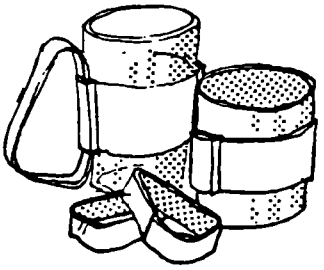
- shanks may be bent to fit the different grips

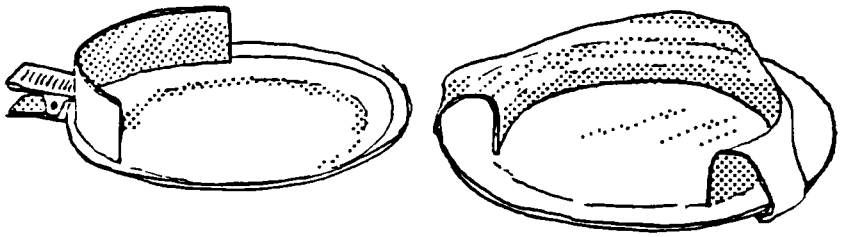




- a removable handle, which the hand slips under, may be used to hold a cup with the affected hand

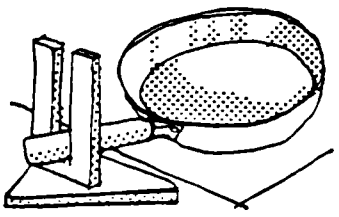
- other solutions



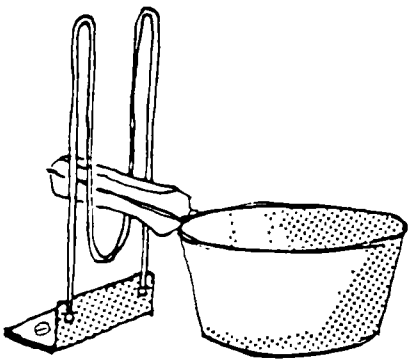


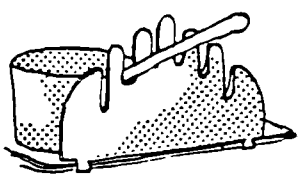
the edge of a plate can be made higher

- using a clip and a small stripe of plastic or tin-plate
- moulding thermo-plastic material



- different supports can be made to fix a pot on the stove/fire when cooking





18. Additional difficulties resulting from stroke

18.1 Introduction

Someone who has had a stroke will face **problems related to movement and feeling** on the affected side. Whilst this guide focuses on activities promoting movement, everyone involved in the management of a person after the stroke must be aware of the main problems that may be associated with the motor loss. An understanding of these problems is essential if a global approach to the rehabilitation of the stroke patient is to be used.

In general, someone with a right-sided hemiplegia may have severe spasticity and speech problems (see section 18.2).
Slight spasticity and in some cases flaccidity, may be found in persons with a left-sided hemiplegia, associated with problems in sensorimotor functions and perceptual difficulties (see section 18.3). Flaccidity is most marked where there is a severe sensory loss.

These associated problems may include any of the following difficulties. However, all disabilities will not be present in any one person at the same time.

18.2 Communication problems

There are two types of communication problems that can occur following a stroke:

- **Difficulty using language**
  This results from damage to the language centre in the brain.

  → **there is difficulty in thinking, saying or writing the appropriate words**
  The person can understand what is being said but she cannot find the correct words to communicate. This is the most frequent form of communication difficulty. The person may repeat one word over and over again or she may say the same meaningless phrase when she tries to speak. Persons with less severe damage may be able to speak using single words and short phrases, but they may from time to time have difficulty in finding the correct words.

  → **there is difficulty understanding words spoken or written by others**
  The person may understand very little of what is said to her and therefore cannot speak logically. She may be unable to find the correct words, or she may repeat one word over and over again. She may speak using words which are meaningless. **This is the most severe communication disorder.**

  Difficulty in using language frequently occurs in those individuals who have a right hemiplegia. It rarely occurs with left hemiplegia.

- **Difficulty speaking**
  This results from the weakness of muscles used in speaking and breathing.
  There is **difficulty in articulating words** due to a weakness in the muscles of the lips,

tongue, palate and throat. Speech is slow, monotonous and slurred. The person may produce wrong sounds or words, or have a recurrent utterance.
Difficulty in speaking occurs more often in those individuals who have a left hemiplegia, but it can also occur in someone who has a right hemiplegia.

How can you help the person with communication difficulties?

⇨ Maintain social contact

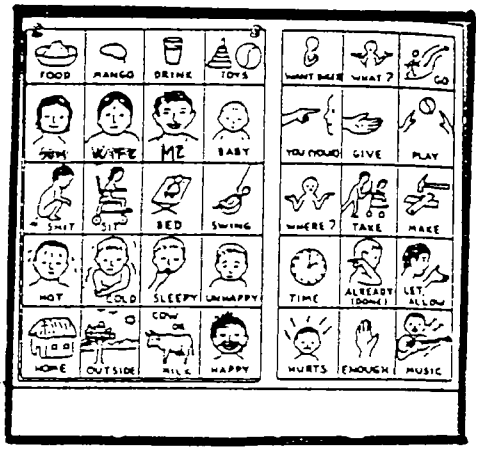
You should explain to family members and friends of the person that his comprehension has most likely remained intact and his intellect and will are normal. They can help him by maintaining contact with him, not leaving him to sit in a corner with a complete breakdown in the communication. It is important not to isolate the person but to reassure her.

Do not increase his frustration by asking him to repeat single words or phrases but give him the time to find the words he wants.
Try to ask questions that only need "yes" or "no", rather then asking questions that need long answer. It helps the person if you speak slowly and clearly.

⇨ Non verbal communication

Every effort must be made to compensate for any temporary loss of verbal communication by using all possible means of communication. Non-verbal language (e.g. mime) may be used . Another helpful aid is a "**communication board**". This consists of a chart where there are pictures of different articles the person may need or illustrations about different daily activities. **The person can express his needs or wants by showing on the chart.**

Some people however may be unable to select the appropriate picture due to the damaged mental processing, or they may be unable to recognise or see the pictures because of associated visual impairment (see section 18.5).



⇨ Exercises to improve speech

Someone who has a communication disorder due to a motor defect can be helped by strengthening the muscles weakness through exercises for the tongue, the lips, the jaw, etc. (see section 18.3 on "**facial paralysis**"). Breathing exercises and practising saying words and phrases will also improve the speech.

18.3 Facial paralysis

In some individuals, the motor loss can be present in the muscles of the face on the affected side. The person often appears sombre. The muscles of the face are weak. The person may have problem in closing the eye and/or the mouth, with dribbling and swallowing problems. The tongue may be laterally deviated with the muscle tone increased or reduced. There is difficulty in articulating words due to the weakness of the muscles of the lips, tongue, and throat.

Treatment in this case consist of:

- ➔ re-education of muscle weakness through exercises to improve the movement of eyebrow, eye, nose, mouth, tongue, lips, jaw, etc.;
- ➔ use your fingers and thumbs to give the person the sensation of the movement, then ask the person to perform the movement, giving assistance or resistance as necessary (i.e. see "expression of surprise", fig. 109)
- ➔ the exercises can be practised with the person lying on her back or in sitting position (a mirror is helpful in practising these facial exercises)

expression of surprise

- The person raises eyebrows forming horizontal wrinkles in the forehead

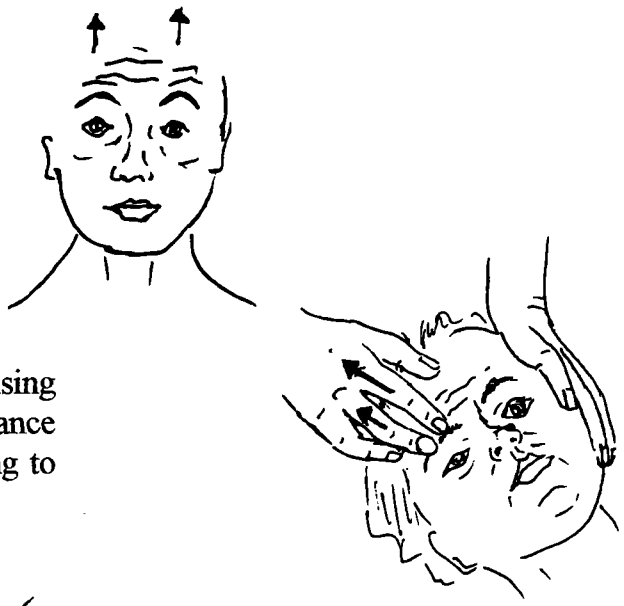


Fig. 109

You can use your fingers to help in raising the eyebrow on the affected side (assistance or mild resistance will be given according to the restoration of the movement)

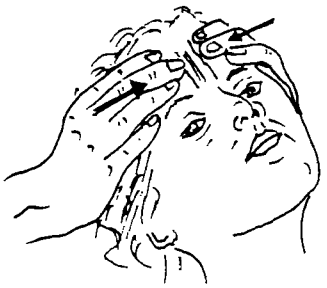
- The person closes her eyes tightly

Fig. 110

frowning

- The person draws eyebrows medially and downward, forming vertical wrinkles in the forehead

Fig. 111



In the beginning, you can use your fingers to assist the person in forming the wrinkles especially on the affected side;
With improving movement, you can offer some resistance to the movement using your fingers

blowing

- The person brings the lips together and compresses the cheeks

Fig. 112

pouting

- The person raises the tip of chin and protrudes lower lip

Fig. 113

- The person draws the corner of mouth downward strongly

Fig. 114

expression of distaste

- The person lifts lateral borders of nostrils, forming diagonal wrinkles along the bridge of the nose

Fig. 115

- The person dilates nostrils followed by compression

Fig. 116

smiling

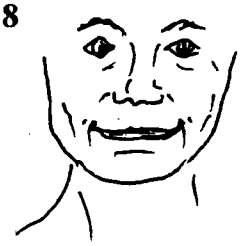
- The person raises the lateral angle of the mouth upward and laterally

Fig. 117

grimacing

- The person brings the lips together and draws the corners of the mouth laterally

Fig. 118



Other exercises:

- the person should practice eyes movements:
  in a direction upward to the right
  in a direction downward to the left

- the person can sniff against mild resistance offered when closing her nose with finger and the thumb;

- tongue movements may be practised against resistance offered by a wooden spatula;

- the person closes her jaw tightly; she moves her lower jaw laterally and forward to the right (and to the left);

- she can drink by sucking through a straw held inside her mouth and tightening the lips;

- a small block of wet ice may be used to massage the affected facial muscles.

18.4 Sensory and perceptual loss

Sensory loss and the difficulties that follow are often not detected in the very early days after a stroke. Even when found to be present, it usually takes some time to identify the precise difficulty.
Stimuli arising from movement in the tissue give the sense of muscles and joint position in space (this is known as ***proprioceptive sense***). Sensory messages from muscles and joints, from movements of the head and from changes in muscle tone all contribute to the brain's awareness of the different parts of the body and their relationship to space (this is known as "***body image***").

The right side of our brain interprets what is happening to our body in relation to the environment. After a stroke, the person can easily "forget" this side due to the loss of cutaneous sensibility, or tactile sensation of the affected side, with no messages arriving from and sent to the brain.

People with left-sided hemiplegia may have problems with:

1) Disturbance of body image

The inability to feel a limb, to appreciate its place in space and its relationship to the rest of the body means that **the person is not aware of the affected side of his body**. If the brain is no longer aware of body image the person will be incapable of determining his position in space.
Where the deficit is marked the person may **neglect or deny** the presence of the affected limbs. If the damaged area in the brain is very deep and vast, the person **will not "see"** the area or the objects on the affected side.

Testing for loss of proprioception
Test for loss of *proprioception* by passive movement of the index finger and big toe.
Ask the person to first watch the movement. Then cover his eyes and ask him to say if each movement is "up" or "down". If he is uncertain or he does not know, the larger joints are tested.

Testing for loss of sensation
Sensation must also be tested. Cutaneous sensibility, or tactile sensation, can be assessed by asking the blindfolded person to identify light touch on any part of his body.

How to help the person
(see section 2.3: "Approaching the person and other sensory inputs")

2) Inability to plan movement, to perform a task

Some people after having a stroke are not able to perform simple tasks.
The person may **not able to make a plan** to perform tasks in the right order anymore, although she is able to perform one step of this task. For example: if she wants to make a cup of tea, she can put the sugar in the teapot, stir the empty cup with a spoon and pour

the tea on a saucer.
Or the person is **not able to carry out one step of a task**, although she is able to tell you how she wants to do it. For example: the person wants to dress herself, but does not know where to find the sleeve of her blouse , she puts her legs through the sleeve or tries to put her blouse on up side down.

How can you help the person ?
If someone is unable to make a plan to perform a task, repeat several steps of this task in the right order, until the person can follow this order herself. Each time she is able to perform few steps in the right order, add one more step until the whole task can be completed.
If the person is not able to carry out one step of a task, repeat that step many times until she is able to do it herself then practice the next step, until she is able to complete the whole task.

3) Additional difficulties

Because of disorders of body image and sensory loss, some people may have additional problems as follows:-

- inability to deal effectively with or manipulate objects
- postural difficulties (i.e. trunk lateral leaning)
- inability to recognise familiar objects by their shape, size, texture when held in the affected hand without using eyesight
- difficulty in identifying right/left;
- difficulty in identifying fingers
- difficulty in following directions.

18.5 Hearing loss

Hearing loss frequently resolves in the first month or two after the onset of the stroke.
A deficit in the perception of sound gives the person distorted hearing. The person does not understand what is being said from the affected side and cannot tolerate noise.

18.6 Visual loss

Visual loss may be present due to a loss in perception. The person can see but cannot interpret what he sees. Do not confuse this disorder with blindness in one half of the visual field of one or both eyes.

Testing for visual loss
Test visual loss by making simultaneous finger movements in both sides of the person's visual field. The **movement** will be picked up on the unaffected side and **ignored on the**

affected side. The person who is aware of the deficit is easily taught to rotate his head to compensate for this disability. If someone is unaware of the deficit and cannot compensate for it family members should receive training to improve the safety of the person..

18.7 Emotional and social difficulties

After a stroke the person may have problems in **controlling his emotions**, for example he may become very sensitive and may easily be angry, cry, laugh or shout. He may be depressed or easily confused. He may use bad language you have never heard from him before.
Emotional reactions to the stroke often present obstacles to learning.

Depression is common after the onset of a stroke.
Do not confuse a person who is depressed with a person who has behaviour problems. A person who is depressed will be sad and maybe crying for a long period of time. He cannot get quickly over his sadness. A person who has emotional changes may be crying at one moment, the next one he is laughing his emotions changes very quickly.
Depression, anxiety, fear, frustration, anger, hostility, or denial may prevent the person from co-operating in the rehabilitation programme.

In addition to these difficulties there may be **other problems** about the intellectual function, communication, psychological problems, employment difficulties, social and family problems.

- **How can you help the person?**

Community/Family education
Emotional changes
Ignore the behaviour that is inappropriate or the behaviour that you do not want. Encourage the behaviour that is appropriate.

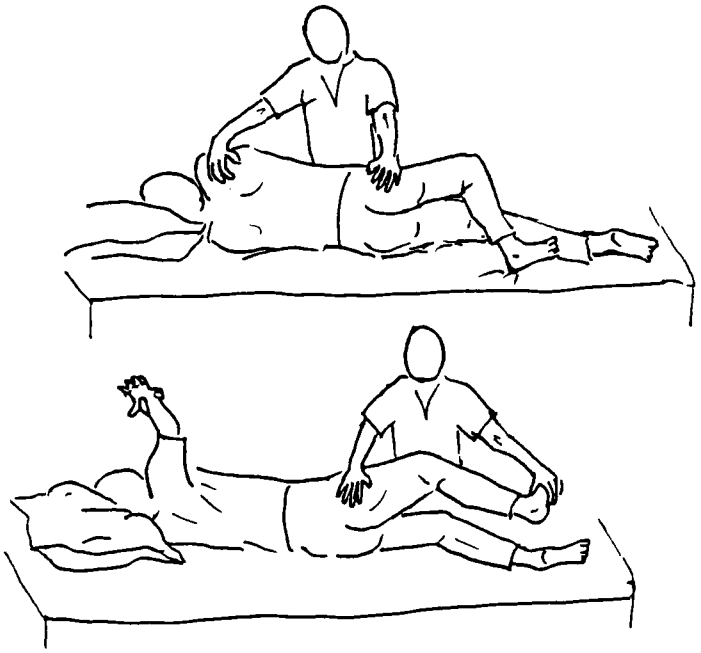
Depression
It is important to discuss with the family how to help a person who is depressed. Do not leave the person by herself for long periods of time. Talk to her even if she does not seem to hear or understand you. Ask her to help you in the household activities. Ask people to visit her. Encourage her to go out.

Support groups
Psychological support is important, especially for people who have communication difficulties.
Bring the person in contact with other people who have had a stroke, together with their families. It usually helps when a person who has just had a stroke can meet with someone who had a stroke a while ago and is much further on in the rehabilitation and recovery process.
Small community groups can be arranged regularly (even just once a month) for exercise, socialising, etc.

18.8 An integrated approach to treatment

All movement is a direct response to different sensory stimuli (from vision, hearing, superficial and deep pressure). From these sensory stimuli we get the sense of muscular and joint position (*proprioceptive sense*). After a stroke the person forgets the feeling of normal movement and begins to move using abnormal patterns of movement, memorising quickly these movements as normal (see "disturbance of body image").The re-education of sensory loss and the re-development of motor function must move forward together.
In this example overleaf you can see the importance of using different stimuli (hearing, vision and touch) in stroke rehabilitation.

Example: **rolling towards the unaffected side**



⇧
In the early stages, the handclasp position with the palms touching can be used to prevent the affected arm from falling backwards and inwards

Your voice can be used to stimulate the person's hearing and vision:

- **hearing**: the instructions given by you must be short, dynamic and delivered from a correct place to gain a response. Do not shout at the person .All commands must be short and easily understood, leaving the person the time to understand: "*roll towards me*".

- **vision**: the person moves his eyes and turn her head towards you

- **manual contact** plays a considerable part in physical and sensory re- education; touch must include **superficial and deep pressure** (place your hands firmly on the person's affected shoulder and hip to assist the movement)

IMPORTANT: everyone who cares for someone who has communication and language difficulties must remember:

- **to reassure the person**
- **do not aggravate his/her frustration,**
- **maintain contact with them using every possible mean of communication.**

GLOSSARY

The technical words used in this guide are listed here in alphabetic order. The first time one of these words is used in the guide, it is written in *italics*. Sometimes there is reference to a section or to a specific page of the guide where additional or more complete information may be found.

Active movement: movement performed by the person which is done without any assistance or any resistance offered by an outside force (i.e. another person).

Active assisted movement: movement where the actions are assisted by an outside force.

Antigravity muscles: The muscles that are used to lift the body and to carry weight against gravity. These are the muscles that straighten the limbs, the trunk and the neck, the muscles that bend the forearm and the muscles that draw down the shoulder. In all these muscles the skeletal muscle tone is more marked than elsewhere.

Anatomical position (see the end of this chapter).

Anti-spasm pattern. (see ***recovery pattern***)

"Approximation" or **weight-bearing** (see section 14.1): to close together with pressure. This term is used when compression is applied through the articulating surface of a joint or supporting the weight of the body on a particular joint or limb. Approximation occurs during weight-bearing due to gravity or it may be applied or reinforced by the trainer.

Associated reactions: these involuntary reactions occur where:
(1) movement of the unaffected side of the body increases tone in the affected side or
(2)) where movement of the upper half of the body increases tone in the lower half.
In stroke patients this tone increase follows the pattern of the unwanted *spasm pattern*. You cannot afford to neglect completely these reactions but you must control them by meticulous positioning at all times. The more severe the spasticity is the more these reactions appear and interfere with the restoration of movement.

Ataxia, the person has difficulty with balance and co-ordination due to damage to the ***cerebellum***. He/she has difficulty beginning to sit and to stand and is very clumsy in using their hands.
To test for ataxia: hold a finger in front of the person and ask her to touch it on the first try (or ask her to touch her nose with her index finger). If ataxia is present, the person will try to touch the nose with a trembling movement (***tremor)*** but she will fail "to hit the target" (***dysmetria***).

Body image *(body awareness)*: the ability to feel a limb, to appreciate its position in space and its relationship to the rest of the body.

Cerebellum/cerebellar system: part of the nervous system, the cerebellum is situated between the posterior base of the brain and the spinal cord. The cerebellum controls the co-ordination of movement, equilibrium and the muscular contractions required to maintain posture.

Cerebral infarct: a site of localised necroses , or cell death in the brain precipitated by deprivation of blood and the consequent lack of oxygen to that tissue.

Cross facilitation: working with the unaffected side of the body across the midline to the affected side to initiate bilateral activities (see fig. 2.2 and section 15.8 -"sequence of activities").

Dysmetria: Movements are not accurately adjusted to their object. For example when someone tries to touch their nose, their finger will over-shoot the target.

Equilibrium responses: automatic reactions which make it possible for the body to remain balanced e.g. while the person changes position or when the person is pushed or bumps into another person or barrier.

Flaccidity: see hypotonic

Functional training: exercise or therapy is functional when it is done as part of some useful activity, thus serving a purpose in the person' s day to day life.

Hemiplegia: paralysis or loss of movement especially in the muscles of the arm and leg on one side of the body.

Hypertonic *(hypertonicity)*: the muscle tone is increased or the tone is more than normal.

Hypotonic *(hypotonicity)*: the muscle tone is lower than normal or it seems to be lacking (flaccidity).

Infarct: is a site of localised necroses or cell death, precipitated by deprivation of blood and the consequent lack of oxygen to that tissue.

Inhibit: reduce or orient the influence of muscle tone during the recovery phase through different training activities (positioning, correct handling, etc.) and key points of controls. These activities are carried out within the "recovery or anti-spasm pattern".

Joint dislocation: the bone ends have slipped out of their normal position. Dislocation can be from birth (hip dislocation) from muscle weakness (i.e. hypotonicity) or from muscle imbalance (i.e. polio).

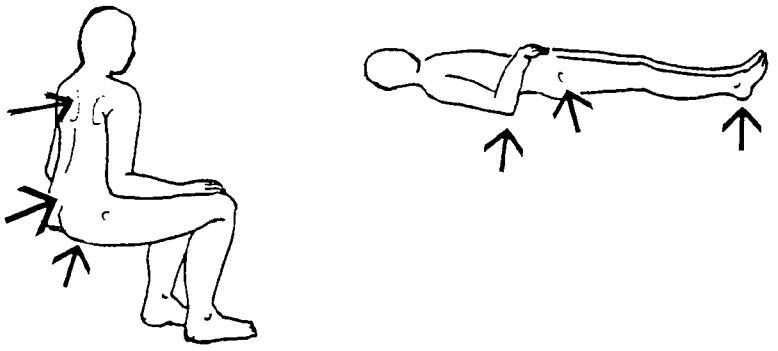
Key points of control: parts of the body from which the strength and distribution of muscle tone in rest of the body may be influenced. These points are the back of the head, the pelvic and shoulder girdles.

"Manual pressure" (see section 14.3): is used to teach the patient to hold the position, as in all stabilising of the rehabilitation positions. For example, when the stand-kneeling position is stabilised, manual pressure is used to disturb the stable position and to obtain specific responses (i.e. equilibrium responses). This technique is used throughout the process of rehabilitation.
Manual pressure is a different technique from ***tapping*** (or prodding). The latter is used as a sensory cue to stimulate the person to move a limb in a desired direction or to gain a response by suddenly upsetting equilibrium.

Muscle tone: even when they are at rest, our muscles are always maintained in a state of mild contraction and this is called "muscle tone". This state of normal, slight tension of the muscle fibres (which is entirely reflex in character) enables the muscles to respond more swiftly to a stimulus. Muscle tone is present to some degree in all voluntary muscles but it is more marked in the muscles which hold the body upright against gravity (*antigravity muscles*).

Positioning: placing a person's body in healthy or helpful positions, through padding and supports, to promote recovery (see chapter 2)

Pressure sore: is an area of damaged skin and flesh. A pressure sore is usually caused by sitting or lying in the same position for too long without moving. People who have spinal cord injury or people who have had a stroke (especially if they are old people and have problems feeling) can develop a pressure sore. They may not be able to feel that they have been in one position for too long or they may not be able to change their position. Pressure sores develop on the part of the body which take the person's weight and where the bones can be easily felt under the skin (see the picture below).



Proprioception/proprioceptive sense: the sense of muscular and joint position given by stimuli arising from movement in the tissue.

Recovery or anti-spasm pattern (see fig. b, page 5): the pattern of movement, opposite to *the* ***spasm pattern***, which inhibits or reduces spasticity in the affected side. It is adopted to promote the recovery.

Spatial orientation: the awareness of our body position in relation to space.

Spasm pattern: the typical pattern present in the hemiplegic side due to the increase of tone in the antigravity-muscles (see fig. a, page 5). A state of continuous muscular contraction is present in these group of muscles.

Sensory nerves: the nerves which bring messages from parts of the body to the brain to give information on what the body sees, hears, smells and feels.

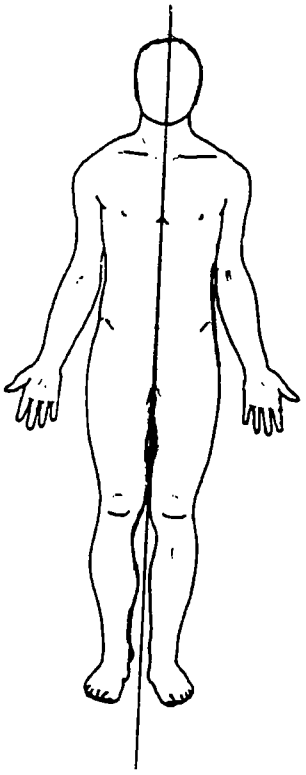
Spasticity: uncontrolled tightening or pulling of muscles that make it difficult for a person to control his movements.

"Tapping" (see section 14.2): this term is used when prodding movements are given on specific body parts to gain a specific response. Tapping may be used as a sensory stimulus to prompt the patient to move a limb in a desired direction, or to gain a response by suddenly upsetting equilibrium.

Tremor: a trembling movement

Anatomical position: this is used as the reference position when describing locations and the position of the body and its parts. This position is:

- standing position with the back straight
- head and feet facing forward
- palms facing forward
- elbows and knees straight



technical vocabulary	**common vocabulary**
proximal	nearer to the trunk
distal	farther from the trunk
prone	lying on stomach
supine	lying on back
anterior (ventral)	in front of
posterior (dorsal)	behind
superior	above
inferior	below
protract	to draw forward, or lengthen
retract	to draw back, or shorten
internal (medial)	to the inside
external (lateral)	to the outside
supination	hand palm up
pronation	hand palm down
adduction	bringing (limb/hand/foot/thumb or finger) towards the body's centre
abduction	bringing away from the centre of the body
flexion, flexed	bending, bent
extension, extended	straightening, straightened
internal rotation	turning to the inside
external rotation	turning to the outside
neutral (or intermediate)	in a position that is neutral between internal and external rotation
plantar flexion	foot up
dorsi flexion	foot down
inversion	internal side of foot up
eversion	internal side of foot down
opposition	the thumb contacts the finger-tip of the index finger

FURTHER READING

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9. How to prevent deformities of the person's arms and legs
10. How to prevent sores from pressure on the skin
11. How to train the person to turn over and sit
13. How to train the person to move around
14. How to train the person to care for himself or herself
16. Exercises for weak, stiff or painful arms and legs
28. Social activities
29. Household activities
30. Job placement

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Giaquinto S.- "Medicina Riabilitativa"
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The following articles appearing in Italian periodicals have been of wide interest:
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Hemiplegia (based on the Bobath's approach)

Quaderni AITR (I° year, n°: 1, 2, 3- II° year: n° 1, 2, 3)
"Ausili per la vita quotidiana dell'emiplegico"

ACKNOWLEDGEMENTS

Some of the illustrations, partly modified, at page 100 and 101 in this guide are from chapter 8 of the WHO guide "Independence Following a Spinal Cord Injury .

I would like to thank my colleagues
Beltrame Giuseppe, who has given me the opportunity to practice these activities with stroke patients in his rehabilitation centre and Garbui Mosè; who has given me part of his teaching material on stroke rehabilitation he is using at the "Nurses Training School".
For her relevant and detailed suggestions in preparing this guide, special thanks go to Ann Goerdt.
Finally, I would like to give an extra word of thanks to Sarah Lacey, who edited this guide.