
# Recommendations for Medical Rehabilitation of Persons Injured After An Earthquake

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## MESSAGE

Honorable Prime Minister of India's suggestion, based on his experience of the Bhuj Earthquake in 2002, a booklet on "**Recommendations for Medical Rehabilitation of Persons injured after an Earthquake**" has been conceptualized and prepared with an effort to minimize physical morbidity after earthquakes. Sudden onset of earthquake in prone areas without any warning, results in tremendous loss of human lives and leaves thousands injured. These injured persons are prone to develop disabilities, if not managed appropriately and at the right time. At times, it is difficult for doctors and specific technical staff to be available on site, which leaves early rehabilitative measures in the hands of volunteers from general public onsite. Therefore, simple recommendations have been created in easily understandable language for caregivers to prevent disabilities because of locomotor disability arising out of musculoskeletal injuries. Once patient is identified with particular injury, proper positioning, appropriate optimum, their frequency are explained with figures for better understanding in the booklet. Hope this booklet will be very helpful for the field workers, caregivers and doctors to furnish quality care. I congratulate the contributors for their invaluable contributions.

**(Dr. Mansukh Mandaviya)**

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आज़ादी का अमृत महोत्सव

G20 भारत 2023 INDIA

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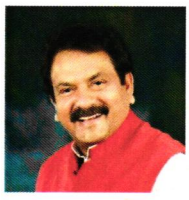

## MESSAGE

I am pleased to share the booklet " **Recommendations for Medical Rehabilitation of Persons injured after an Earthquake",** prepared by an expert team with great efforts. Earthquakes are such powerful natural occurrences that may claim a huge number of lives in a single event. An earthquake is a sudden activity that does not give time to prepare, resulting in the greatest number of causalities at one time. Rehabilitation should begin early after ensuring clinical stability of the injured person and that there is no threat to his life in the immediate future.

The booklet contains recommendations that are based on review published in the form of scientific literature and the experience gained over several years. The booklet suggest adapting the recommendations in individual cases on the basis of factors that may include the individual injured person under care, resources available in terms of numbers, and skills of the manpower and other resources such as equipment, space etc.

The commitment of the Hon'ble Prime Minister in dealing with disasters is evident from the 10-point Agenda to tackle disasters, that he has conceptualized. Thus, under his able leadership, we shall be in a position to support each of our citizens at the time of disaster.

I congratulate the team behind this endeavor which is expected to act as a great support for health care staff at all levels.

**(Prof. S.P. Singh Baghel)**

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## MESSAGE

Earthquake leads to various medical emergencies, particularly those that cause surges in injuries or critical illness, creating enormous rehabilitation needs. Disaster response must advance beyond its primary goal of preserving lives by providing care that maximises patient outcomes. Practical guidance to deliver quality early rehabilitation in these contexts is essential. By ensuring that those injured or unwell achieve the best possible health and functioning outcomes, rehabilitation can play a vital role in emergency responses. The critical role that rehabilitation professionals can play is recognized in many global guidelines, including several WHO publications.

There remains a need to support the strengthening of rehabilitation across the continuum of health emergency and disaster risk management, particularly around all hazard health emergency preparedness.

Early rehabilitation for patients' injuries in conflicts and disasters is an integral part of their recovery to help them achieve a faster recovery time and a greater chance of optimal quality of life. A booklet has been compiled to offer simple but pertinent suggestions to promote early rehabilitation of victims.

The Government of India, under the able leadership of Hon'ble Prime Minister Shri Narendra Modi ji, is always at the forefront of providing humanitarian assistance in times of disaster.

This handbook titled "Recommendations for Medical Rehabilitation of Persons Injured After an Earthquake" will be a handy companion to provide medical rehabilitation services for musculoskeletal impairments, including musculoskeletal injuries, spinal cord injury, traumatic brain injury, and limb amputation rehabilitation. I heartily congratulate the contributors for their vital inputs on the subject.

BP

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Government of India
Department of Health and Family Welfare
Ministry of Health and Family Welfare

## Message

**"Recommendations for Medical Rehabilitation of Persons injured after an Earthquake"** has been prepared by an expert team with great efforts & multi-stakeholders consultations.

Disasters profoundly impact societies, and their effect frequently persists for decades. Musculoskeletal injuries caused by earthquakes need intensive medical rehabilitation. Medical rehabilitation in turn will facilitate earlier discharge from hospitals, improving the overall institutional capacity to treat more patients. Early rehabilitation is a critical component of acute medical treatment for injured patients and is an essential first step in long-term recovery plans. Appropriate, timely rehabilitation treatments can reduce the effects of injuries that cause physical impairment on the individual.

This comprehensive medical rehabilitation handbook will guide an effective and early implementation of medical rehabilitation for minimizing impairments and early recovery after earthquake related Injuries. Many congratulations to all the contributors for their important inputs in finalizing these recommendations.

Place : New Delhi
Date : 12th April 2023

**(Rajesh Bhushan)**

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## INTRODUCTION:

Natural disasters such as earthquakes are often observed to be associated with a quantity, severity, and diversity of injuries. Most people affected by natural disasters do not die and many deaths, secondary injuries and long-term consequences are preventable with timely and appropriate intervention.

Casualties associated with natural disasters, particularly rapid-onset disasters, such as earthquakes are overwhelmingly due to: blunt trauma to limbs, head etc. and crush-related injuries. Persons of any age group or gender may be affected. There was a major earthquake in Gujarat, India in 2001, and the most injured parts of the body were: lower extremity (56%), spinal and pelvic (17%), upper extremity (13%), chest and/or abdomen (<4%), crush syndrome (<2%). These recommendations include the immediate response by the first caregivers including Paramedics, Youth Volunteers, Nurses, Doctors for providing relief and rehabilitations. At times it is difficult for doctors and specific technical staff to be available on site, which leaves early rehabilitative measures in the hands of volunteers from general public onsite. Therefore, simple recommendations have been created in easily understandable language for caregivers to prevent disabilities because of locomotor disability arising out of musculoskeletal injuries. Of course, these may have to be modified, adapted in individual cases based on several factors including the individual injured person under care, resources available in terms of numbers, and skills of the manpower and other resources such as equipment, space etc. Rehabilitation should begin early after ensuring clinical stability of the injured person and no threat to life in immediate future. It may be necessary to transfer some injured persons to more equipped Centres for Advanced Medical Rehabilitation services.

## INITIAL ASSESSMENT:

It is challenging to carry out a thorough assessment in an emergency setting. Before starting rehabilitation key points to be noted are -

- Person should be clinically stable;
- Medical and surgical management to date, and any precautions, such as weight-bearing status;
- Any other known health conditions or previous unrelated surgeries;
- Availability of caregiver(s)…

**Objective assessment: -**

- Neurological status – consciousness, moving limbs or not, numbness.
- Observe for pain, distress, posture, deformities, external/internal fixation, surgical sites or wounds and dressings.
- Function: including balance, mobility and transfers, and activities of daily living (e.g., toileting/washing/ cooking)
- Pressure areas over bony prominences

## Exercises - General Precautions

- Perform the exercises slowly while maintaining good posture.
- Return to starting position after each repetition.
- Stretch slowly, and avoid sudden movements.

**Note: One may feel a stretch or slight discomfort with the exercises which is fine; but do not move to the extent of pain.**

- Symptoms should not intensify as a result of doing exercises. (Pain, Numbness, weakness, swelling).
- Expect some soreness when you first begin exercising.
- Start out with a 2-second hold and gradually increase the amount of time until can comfortably hold stretch upto 20 seconds.

- Start out with two or three repetitions and gradually increase upto 15 repetitions.
- Perform exercises 2-3 times/day.

**When to consult for expert opinion (Red flags)**
Fever, lethargy, irritability in children, pain, swelling, redness and a warm sensation, loss of range of movement, Abnormal movement, Deformity, reduced function, changes in skin blood flow, Abnormal sweating, worsening pain on weight bearing.
**Life threatening emergencies**
Red, hot swollen limb, patient complains of severe pain which is worsened with passive movement could be Compartment syndrome.
Red, hot, swollen limb with lack of pulses. Patient complains of pain and shortness of breath at rest could be Deep venous thrombosis/Pulmonary embolism

- Preserve joint movement – Range of motion & stretching exercises, Bracing/splinting etc. as required
- Restore muscle power – Strengthening exercises
- Activity of daily life training
- Ambulatory aids or assistive devices

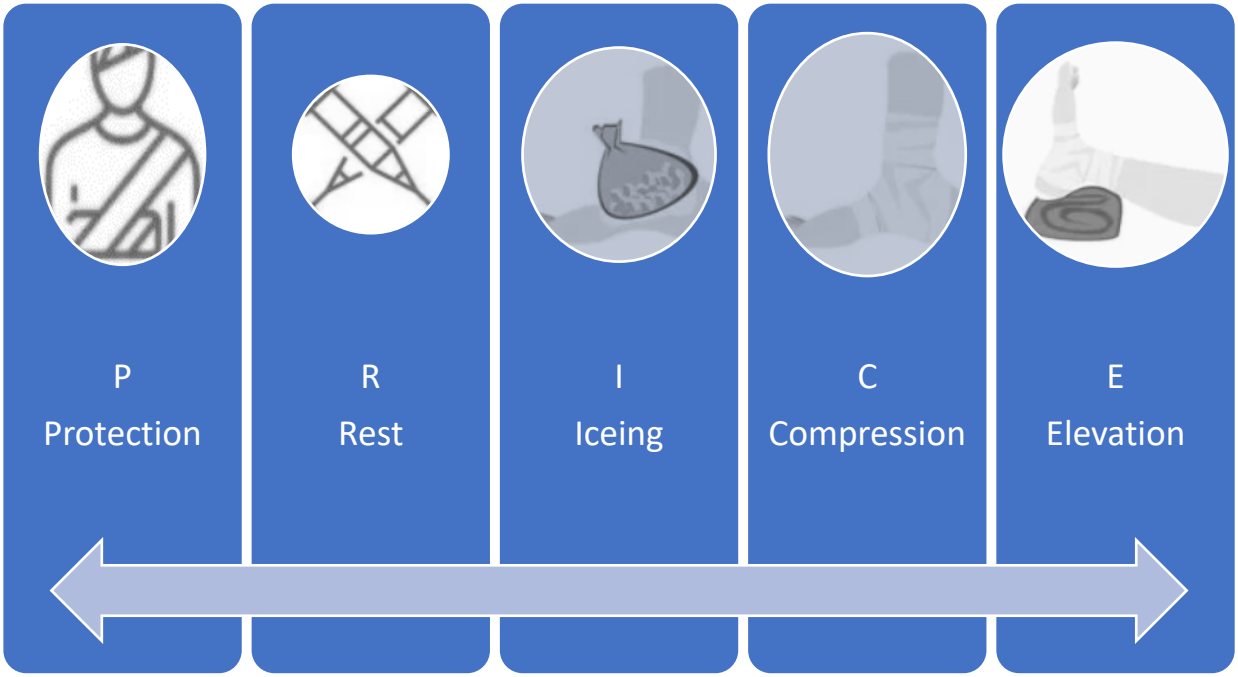



**Fig. 1**

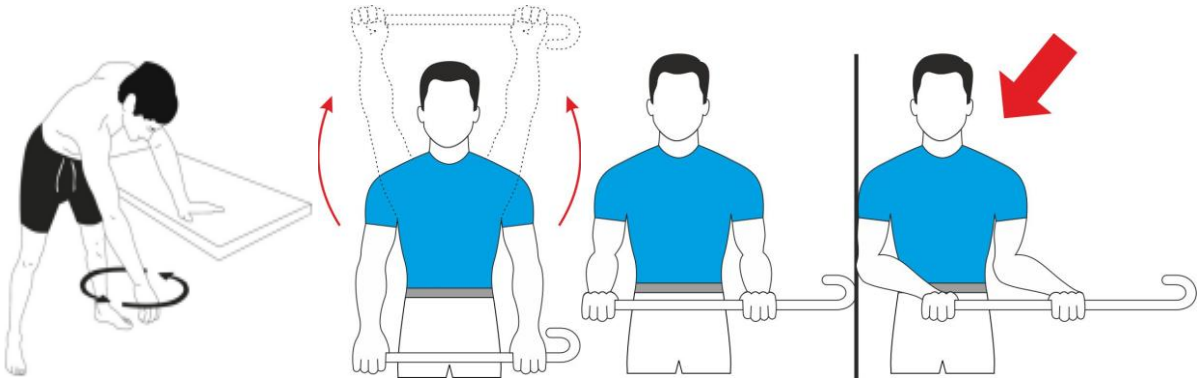
A) Upper limb injuries-

- Stretching of muscles/joints (upto 20 s hold, five repetitions, twice per set, twice a day)
- range of motion (ROM) exercises (active and/or passive) (10 repetitions, two to three sets, twice a day).

(Note: Passive: By caregiver when there is no movement, Active when there is movement)

- Strengthening exercises of the weak muscles and functional training using water bottle and sand bags (10 repetitions, two to three sets, twice a day)
- Encouragement for using affected hand during activities of daily living (ADLs) to maximum
- Transferring objects from one hand to another hand, one place to another using affected hand, opening and closing bottles, lifting objects from the ground. (10 repetitions, two sets, three times a day)

**Shoulder exercises**



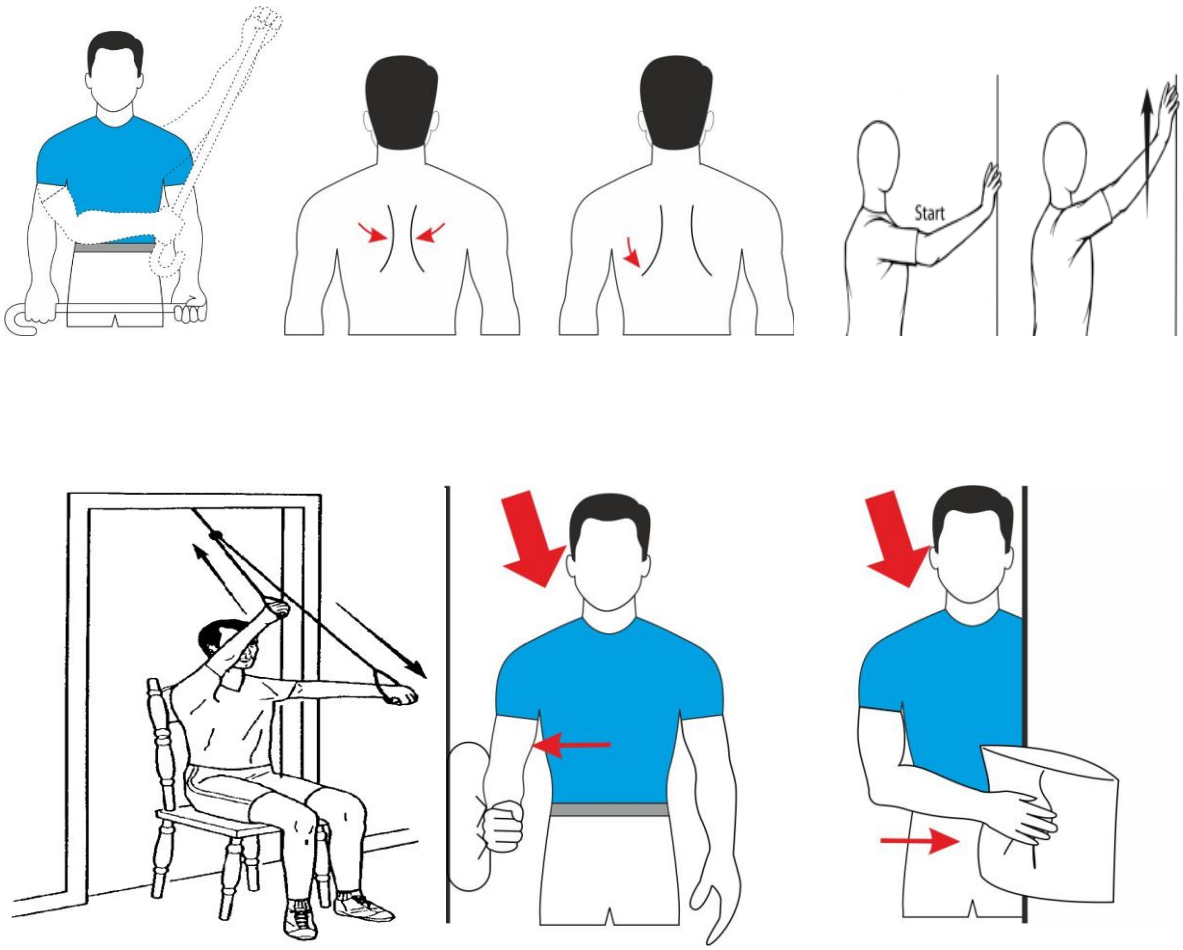



**Fig. 2**

- Pendular circles - Stand next to a table or support and lean forward. Gently let the involved arm hang down freely and relaxed. Swing your arm forwards, backwards, sideways and in circles, using gravity
- Range of motion exercises - Lying on your back, hold the cane with both hands. Raise your arms using the good arm to help guide the injured arm. Next use the good arm to move the injured arm to the side. Lastly, use the good arm to move the injured arm up to the side and up.
- Shoulder Setting: Pinch the back of the shoulder blades together
- Walking fingers up wall: Stand in front of a wall. Gradually slide your hand up the wall until you feel a stretch in the shoulder
- Home pulley system: Set up the pulley system as above. Pull down with good arm to raise the injured shoulder.

- Isometric internal / external rotation: Standing with inner forearm against the wall and your elbow at your side. Push your hand against the wall trying to rotate your forearm into your body

## Elbow Exercises



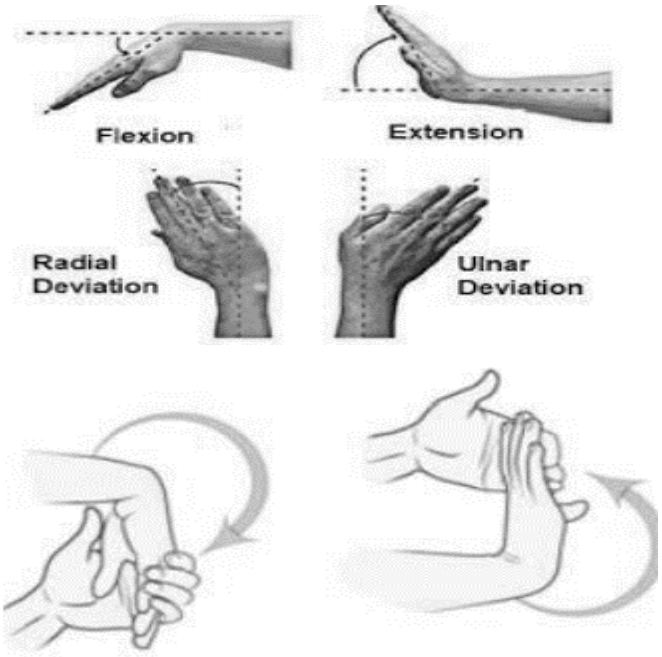






**Fig.3**

## Wrist exercises



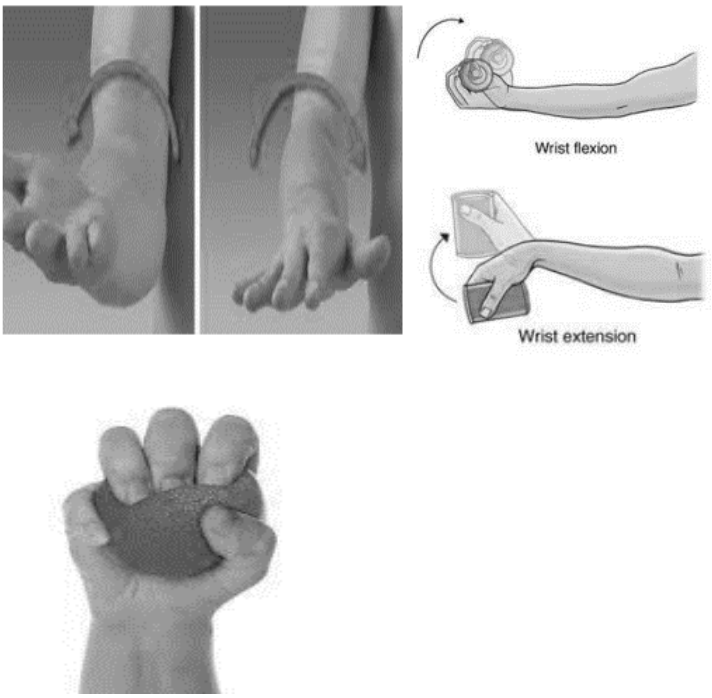



**Fig.4**

B) Rehabilitation protocol for lower limb injuries-

- Stretching of muscles/joints (up to 20s hold, five repetitions, twice per set, twice a day)
- range of motion (ROM) exercises (active and/or passive) (10 repetitions, two to three sets, twice a day).

  (Note: Passive: By caregiver when there is no movement, Active when there is movement)
- Strengthening exercises of the weak muscles (10 repetitions, two to three sets, twice a day)
- Isometric contractions (10s hold, 15 repetitions, three times a day)
- Balance & Gait training – both static and dynamic (one-leg standing, tandem walking, wobble board training, walking on uneven surface) (10 min, twice a day)
- Encouragement for ADL activities, for example, jogging, walking, continuation of regular work
- Walking to grocery shop to buy things, to the fields to bring objects, walking to school

- Counselling to the victim and/or care taker regarding need of long-term rehabilitation, prognosis, and progression of the exercises.

## Lower Limb Exercises

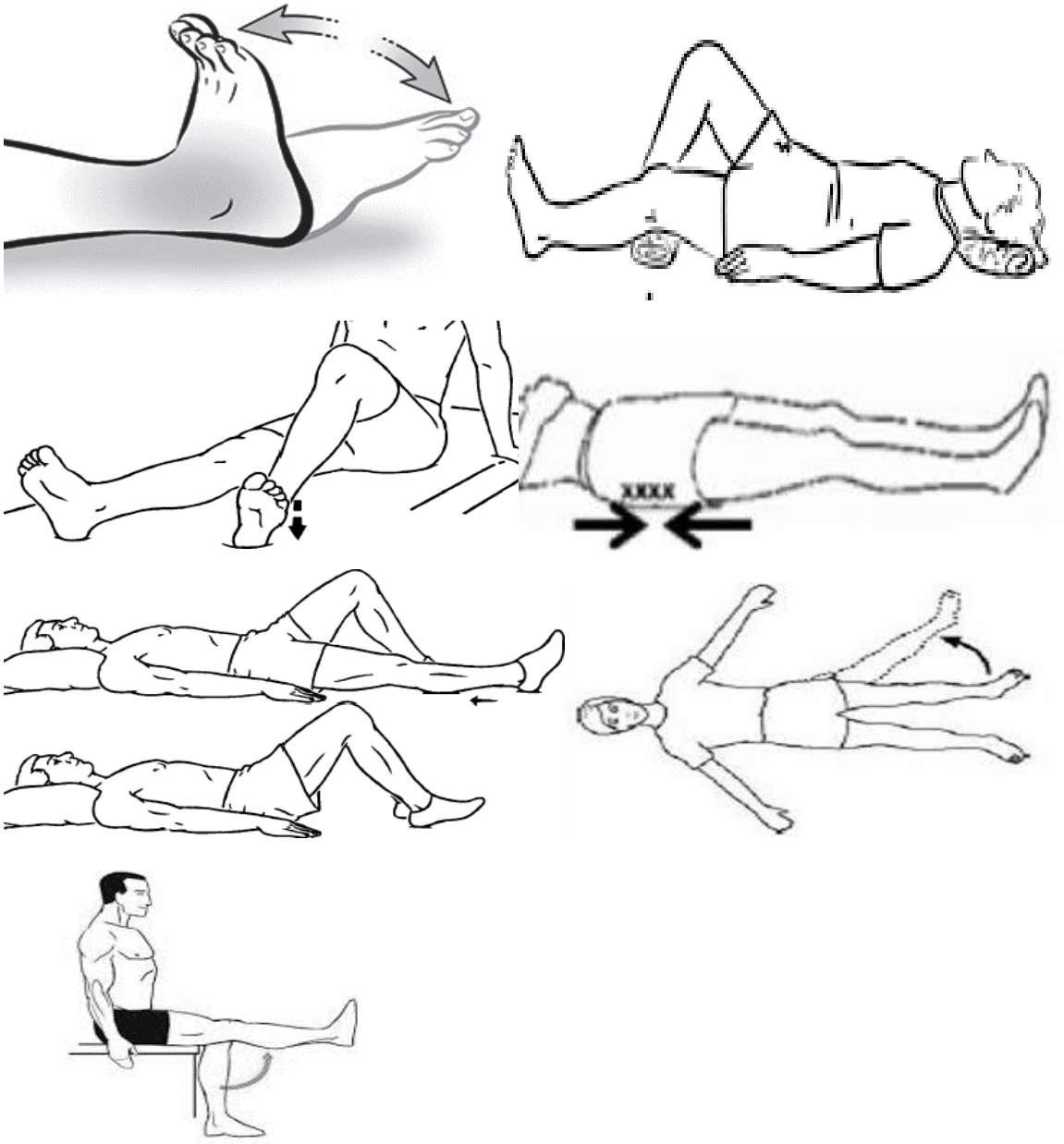


**Fig. 5**

**Ankle Pumps:**Pump ankles up and down as far as you can.

**Quad Set:**Tighten the muscles on the top of surgical thigh, pushing the back of knee down into the bed hold for 10sec

**Hamstring Set:**Bend surgical knee slightly. Dig heel into the bed and pull back like you would take a shoe off hold for 10sec

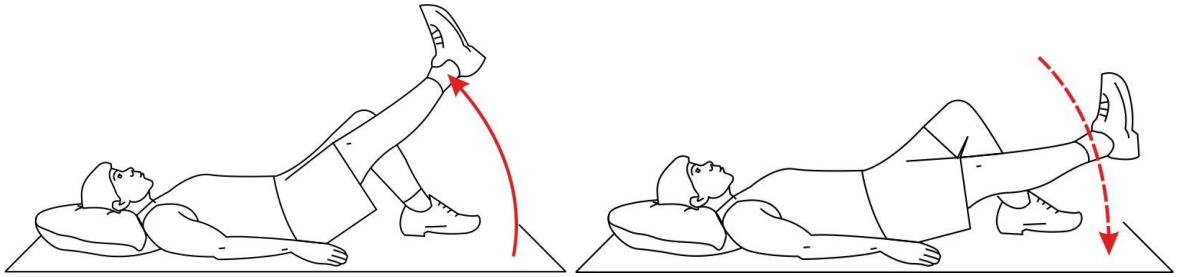
**Gluteal Set:**Squeeze bottom together. Hold for 10 seconds.

**Heel Slide:**Slide surgical heel towards buttock bending knee as far as you can. Hold for 10 seconds.

**Hip Abduction Slide:**surgical leg out to side and back to the middle. Keep toes pointed to the roof. Hold for 10 seconds

**Knee Straightening:** Sitting Sit on a chair that will not roll. Scoot back so thigh is fully on the chair. Lift surgical foot to straighten knee fully. Hold for 10 seconds.

**Knee exercises**



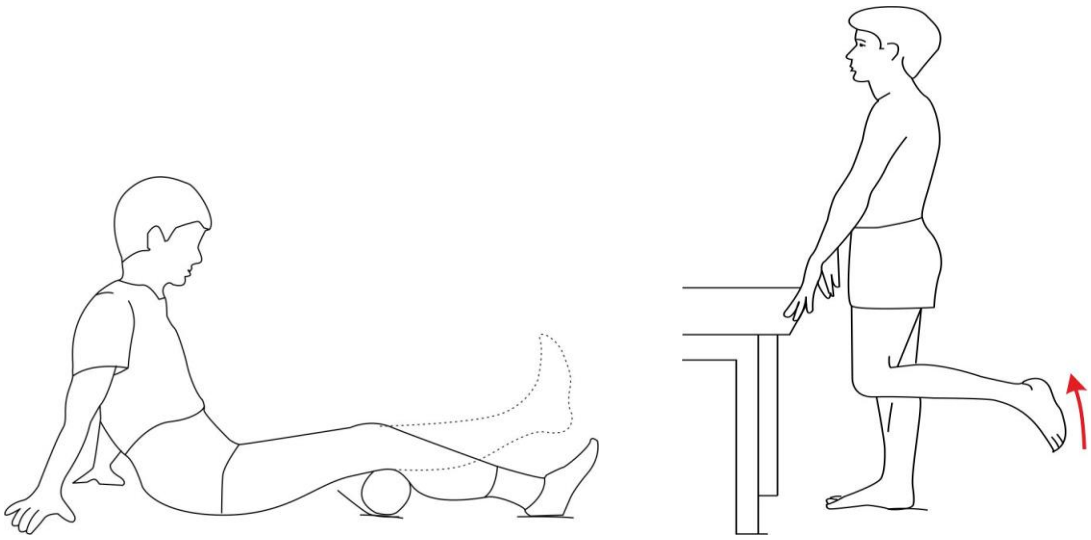
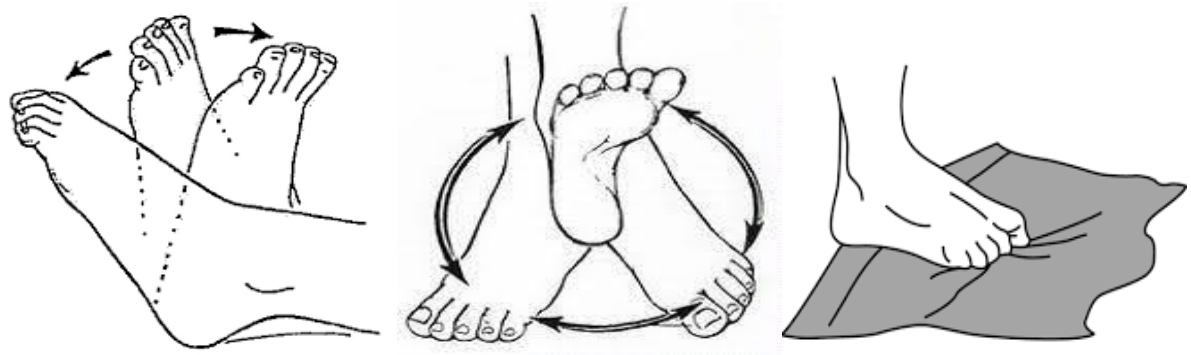


**Fig. 6**

- **Quadriceps sets:**Tighten and hold the front thigh muscle making the knee flat and straight.
- **Heel Slide:**surgical heel towards buttock bending knee as far as you can. Hold for 10 seconds.
- **Hip Abduction Slide:**surgical leg out to side and back to the middle. Keep toes pointed to the roof. Hold for 10 seconds
- **Straight leg lift:**Tighten the quadriceps muscle so that the knee is flat, straight and fully extended. Try to raise the injured up off of the floor or bed.
- Short arc lift:
- Standing hamstring curl:

## Exercises of Foot-Ankle



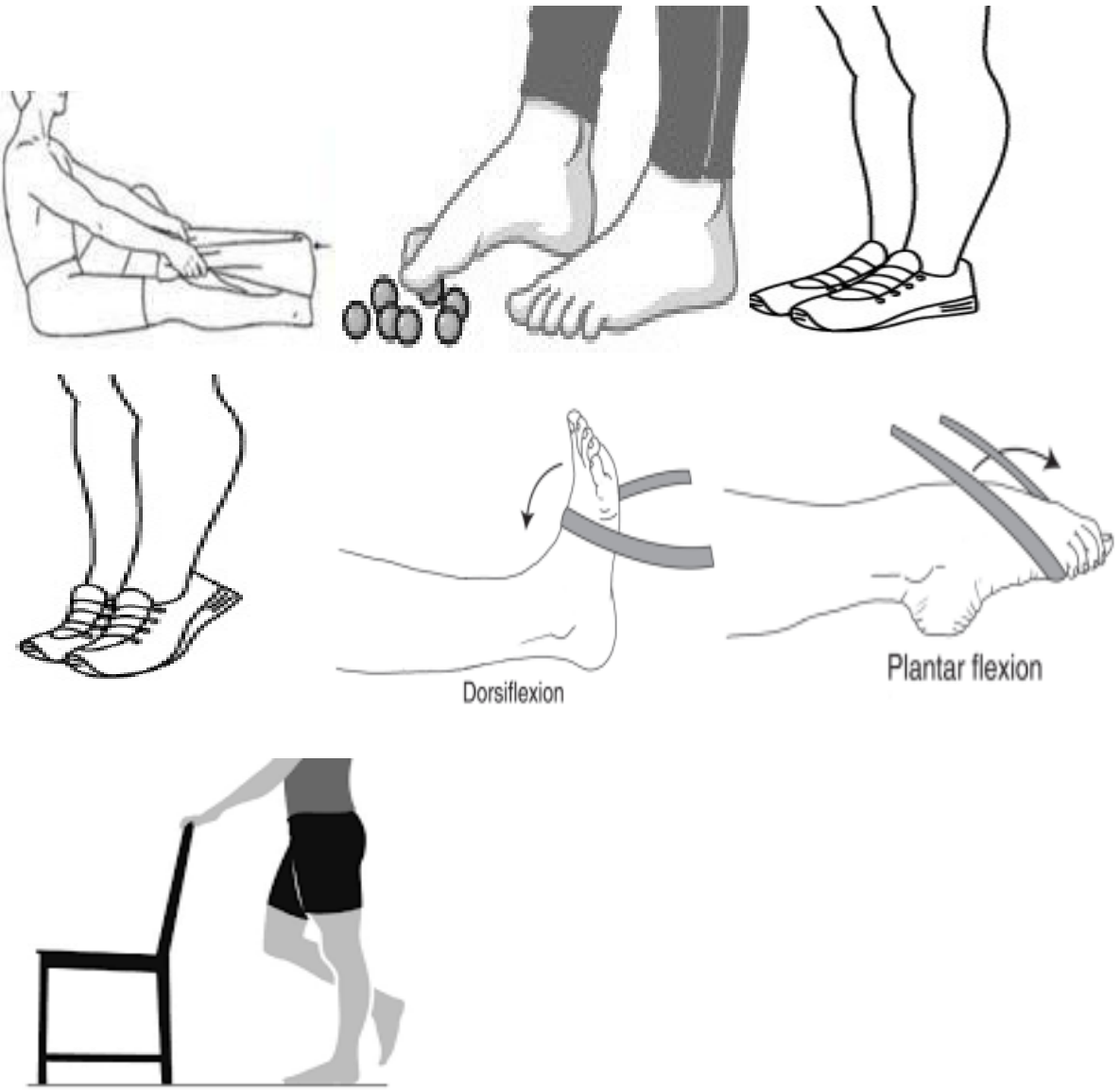



**Fig. 7**

- **Ankle pumps:**Lying on the bed, legs flat on the bed pull foot up and down at the ankle, make circles with ankle.
- **Toe curls:**Spread the towel on the floor. Pull it toward you with toes until the towel is fully gathered around your foot
- **Achilles tendon stretch:**Loop a towel around the ball of the foot and pull toes towards the body, keeping knee straight.
- **Marble Pick-up:** Grasp the marble between first and second toes; pick up and transfer to the opposite pile.

- **Calf Raises:**Standing, balancing on both the feet behind a chair or table. Rise up on the toes, hold for 3 to 5 seconds and then lower down.
- **Ankle dorsi flexion and plantar flexion:**Sit on the floor/bed with legs straight out in front. Anchor the elastic band on a chair or table leg, and then wrap it around the foot. Pull the toes up and slowly return to the start position. Gently point the toes downwards and slowly return to the start position.
- **Single Leg Balance:** Standing without any support and attempt to balance on the injured leg. To Begin with the eyes open and then try to perform the exercise with eyes closed.

## PERIPHERAL NERVE INJURIES

### When to suspect nerve injury:

- **If a person complaint of weakness, tingling, numbness or a total loss of feeling in a limb**

### Management

- Active ROM and passive ROM of affected and surrounding soft tissues

*Avoid if there are injury related contraindications, e.g. recent reconstructive surgery or unstable fracture, avoid movements or positions that could overstretch the nerve and support with splint/stick/locally available materials to avoid further damage.

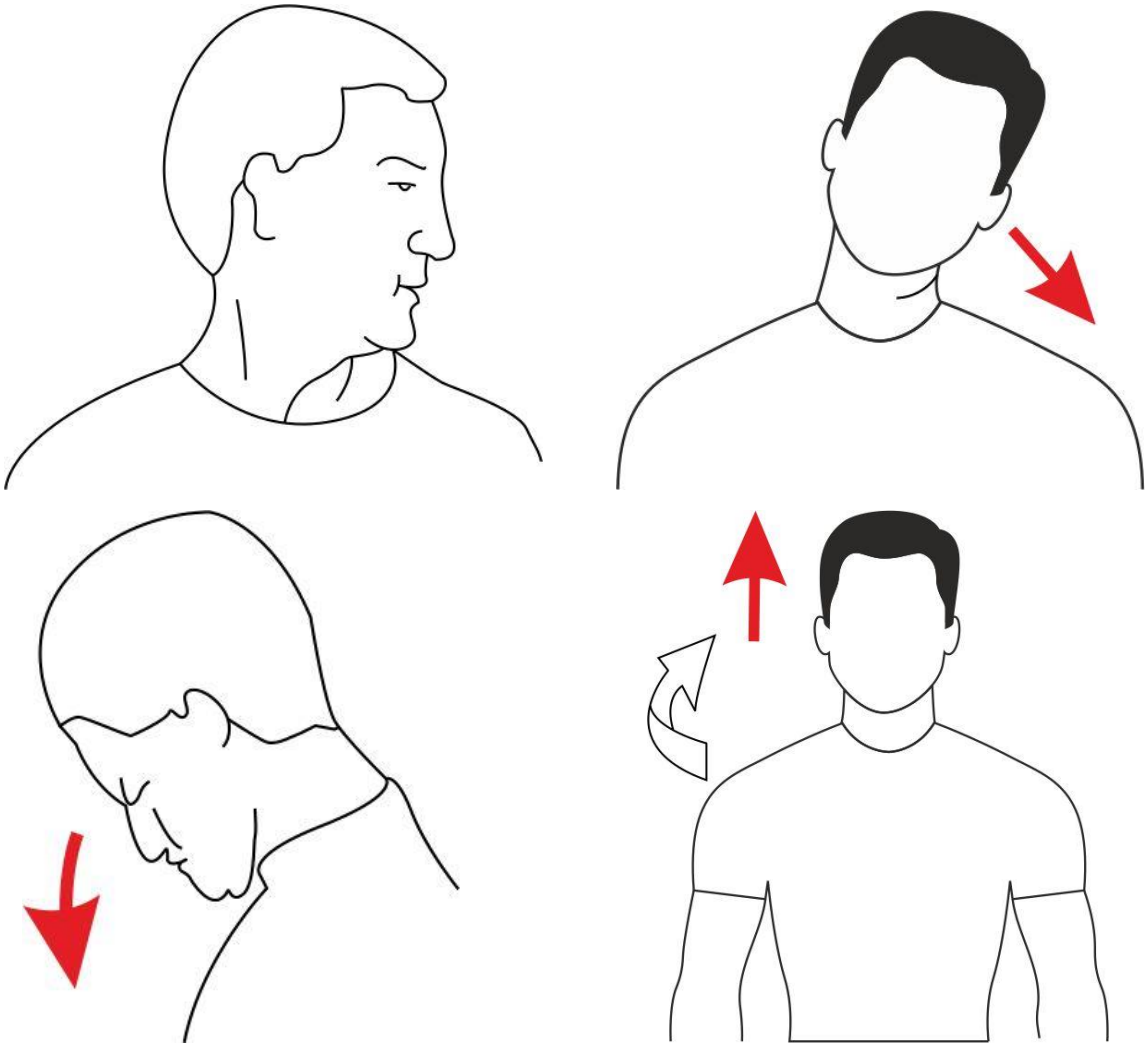
- Strengthening exercises of affected muscles.

## Neck & Back injuries

- Range of motion and stretching of muscles (up to 20s hold, five repetitions, twice per set, twice a day)

- Strengthening exercises for weak back, neck, and lower extremity muscles: 10 repetitions per each exercise, twice a day.
- Core stabilizing techniques: twice a day for about 10–20 min/session
- Encouragement for walking to perform ADL, routine work

**Exercises of Neck:**



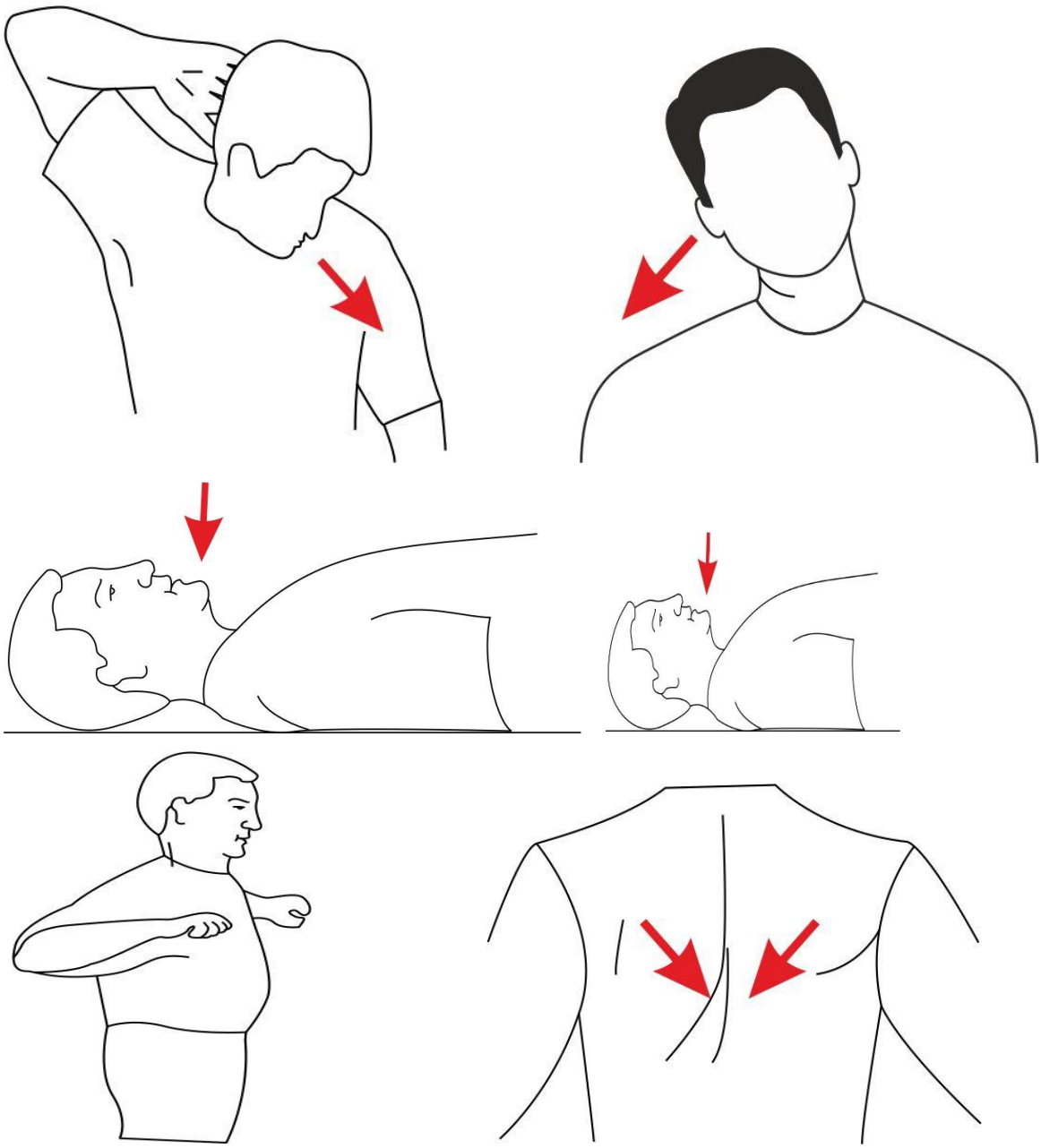


**Fig.8**

## ROM exercises

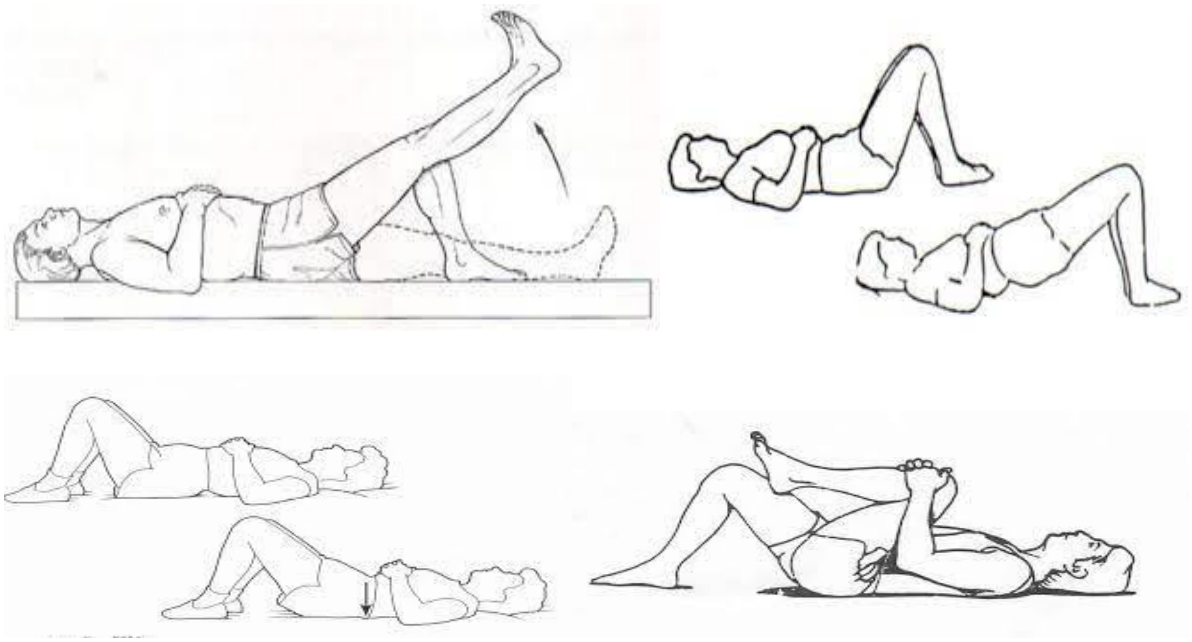
- Rotation: Turn head to each side as looking over shoulder, keeping face perpendicular to ground.
- Side bending: Face parallel to a wall/mirror. Bend head sideways, bringing ear towards the shoulder.
- Forward bending:Tuck chin in, bringing head forward towards chest.

- Shoulder rolls: Make a circular motion with the shoulder girdle by gently shrugging the shoulders up, squeezing the shoulder blades together, and then rolling them down and around as far as possible.
- Stretching exercises
- Levator scapulae stretches: To stretch the right side: Place right hand behind head with elbow pointing upwards. Bring chin towards left chest.
- Upper trapezius stretches: To stretch the left side drop the left shoulder down. Tilt right ear to right shoulder.

**Strengthening exercises:**

- Chin tuck supine: Lying on the back head may be supported by a towel roll. Nod head, bringing chin towards throat.
- Squeeze or pinch shoulder blades down and the together. Keep chin tucked, chest out, and lower back flat.

**Exercises of Back and Legs**



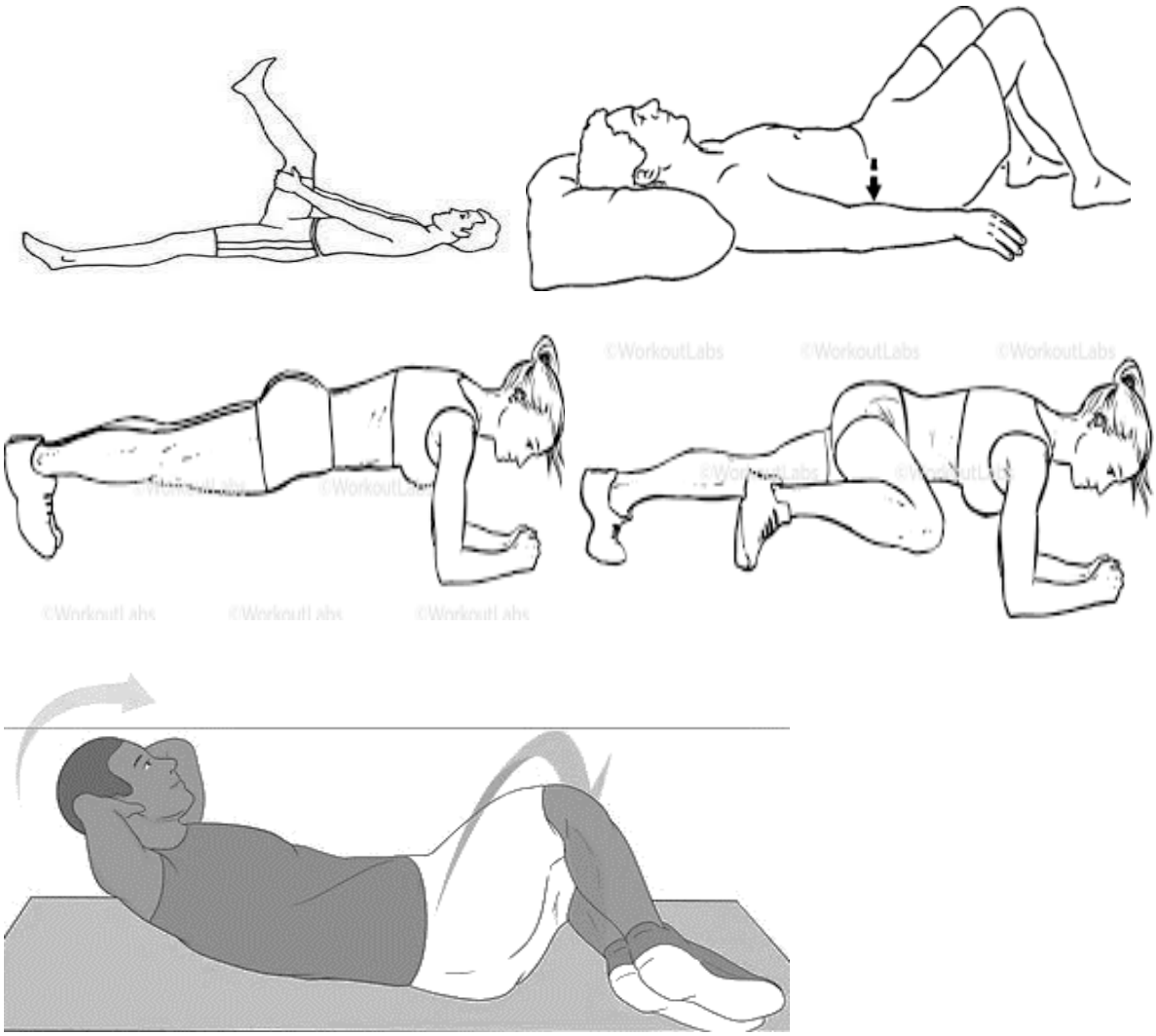


**Fig. 9**

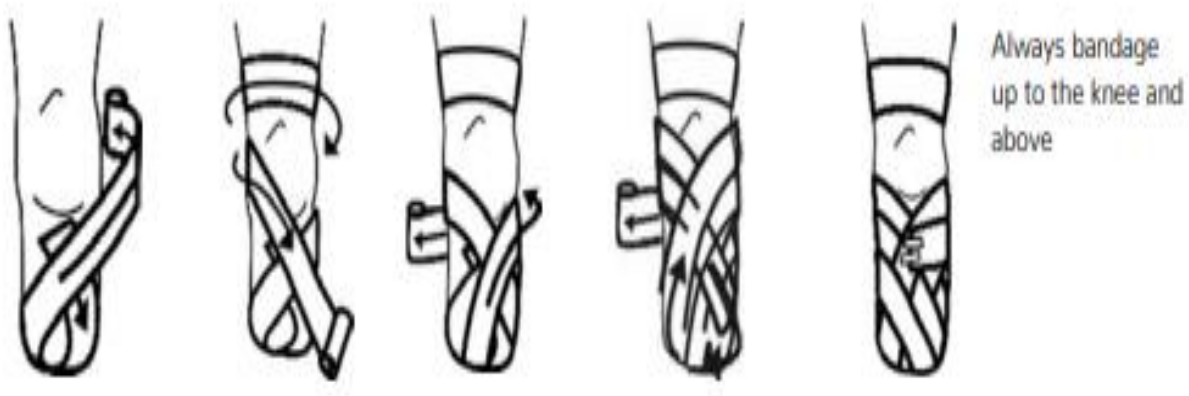
- **Straight leg raises:**Lying on the back with legs laid out comfortably on the floor. Bend the knee of non-injured leg at a 90-degree angle, planting the foot flatly on the floor. Slowly raise the le to around 20 to $40^0$.
- **Pelvic bridging:**Lying on your back with knees bent. Keeping the abdominal muscles tight, raise the hips from the floor and slowly lower back to the floor.
- **Pelvic tilt:**Begin by lying on the back with your knees bent and feet resting on the floor. Slowly bend the low back and tilt your pelvis backward into the floor, then return to the starting position and repeat.

- **Knee to chest:**Begin lying on the back with legs straight. Using the hands, slowly pull one knee toward the chest until gentle stretch is felt in the lower back.
- **Hamstring stretch:**Lying flat on the floor, pull the thigh towards the chest to about $90^0$. Straighten the knee until a stretch is felt in back of the thigh.
- **Isometric Abdominals:**While lying on the back, tighten the stomach muscles by pulling the navel down towards the floor.
- **Knee Planks:**Begin by lying on the stomach, elbows bent, and weight on forearms. Lift body up so that weight is on elbows and knees. Keep back as straight as possible contracting the belly into the spine.
- **Knee Side Planks:**Begin by lying on the side with arm bent and resting weight on the elbow. Knees should be bent as well. Lift body up so that weight is on knee and elbow and gently lower down.
- **Crunches**:Begin by lying on the back with knees bent and hands clasped behind head. Take a deep breath in and on the exhale lift the shoulders off the floor and gently lower down.

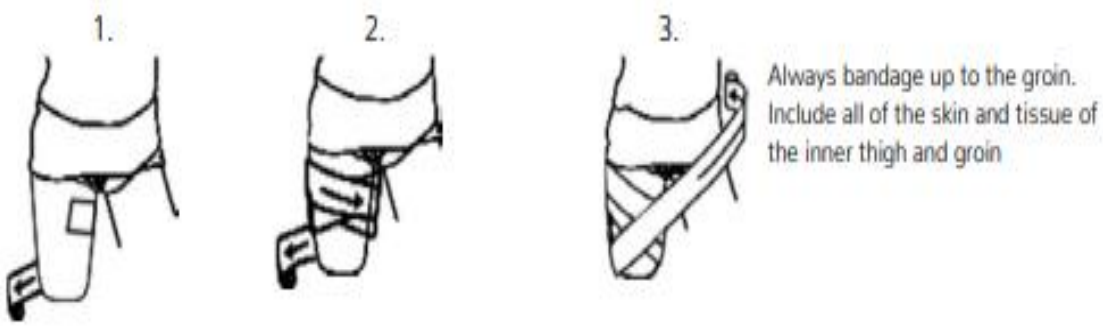
## PERSONS WITH AMPUTATIONS

Rehabilitation is focused on preventing complications and optimizing functional independence and mobility.

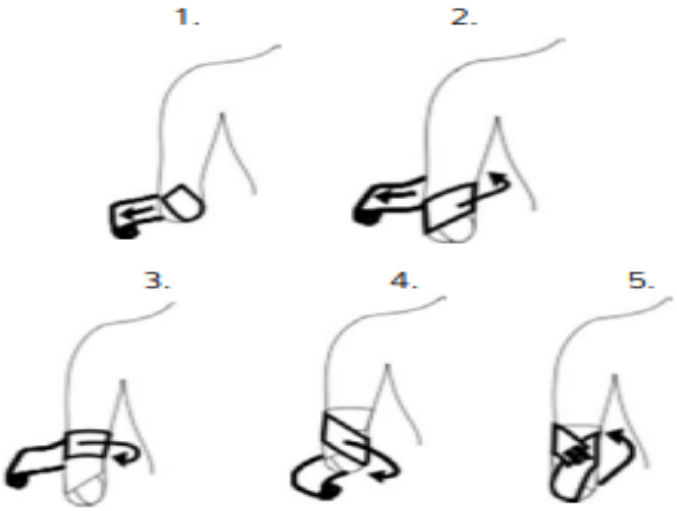
- Management of edema by stump elevation and compression using elasticated bandage
- Positioning
- Prevention of contracture and strengthening of muscles around the available joints
- Strengthening of upper limbs muscles in lower limb amputees
- Planning for prosthesis, mobility devices.



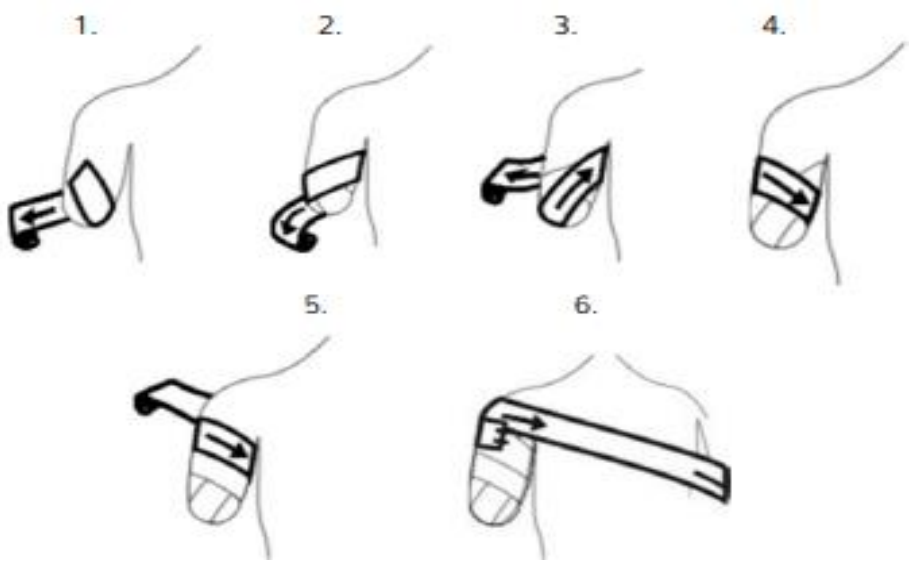

**Compression bandaging of below-knee amputation**




**Compression bandaging of above-knee amputation**

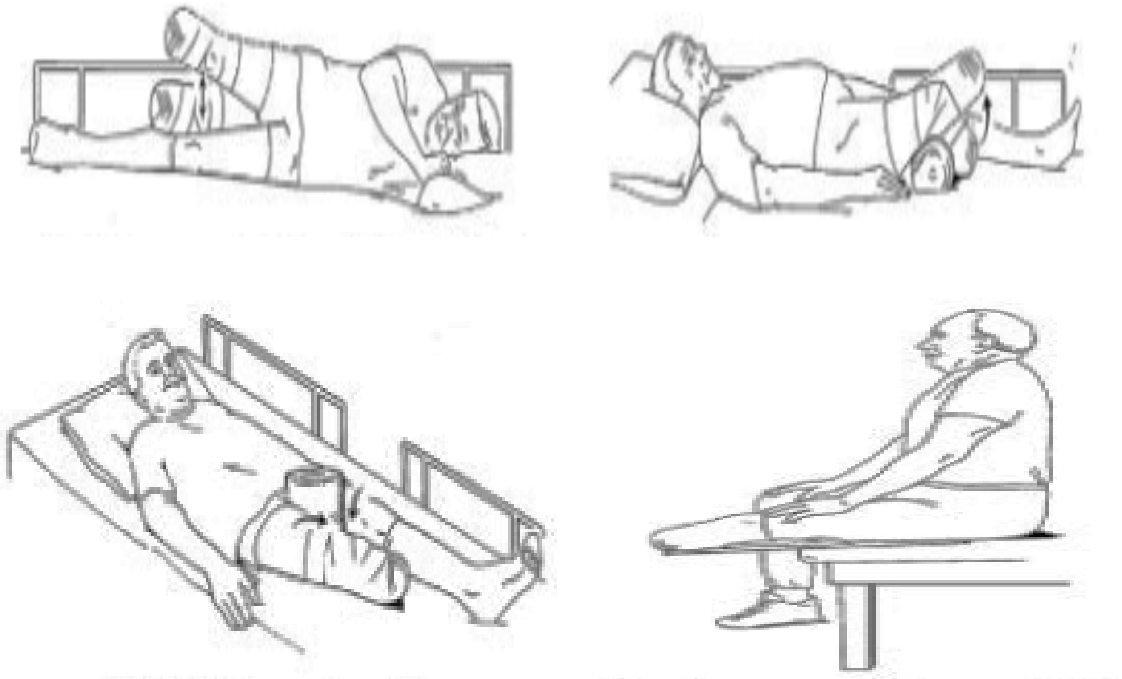



**Compression bandaging of below-elbow amputation**




**Compression bandaging of above-elbow amputation**

## EXERCISES ADVISED TO A PERSON WITH BELOW-KNEE AMPUTATION



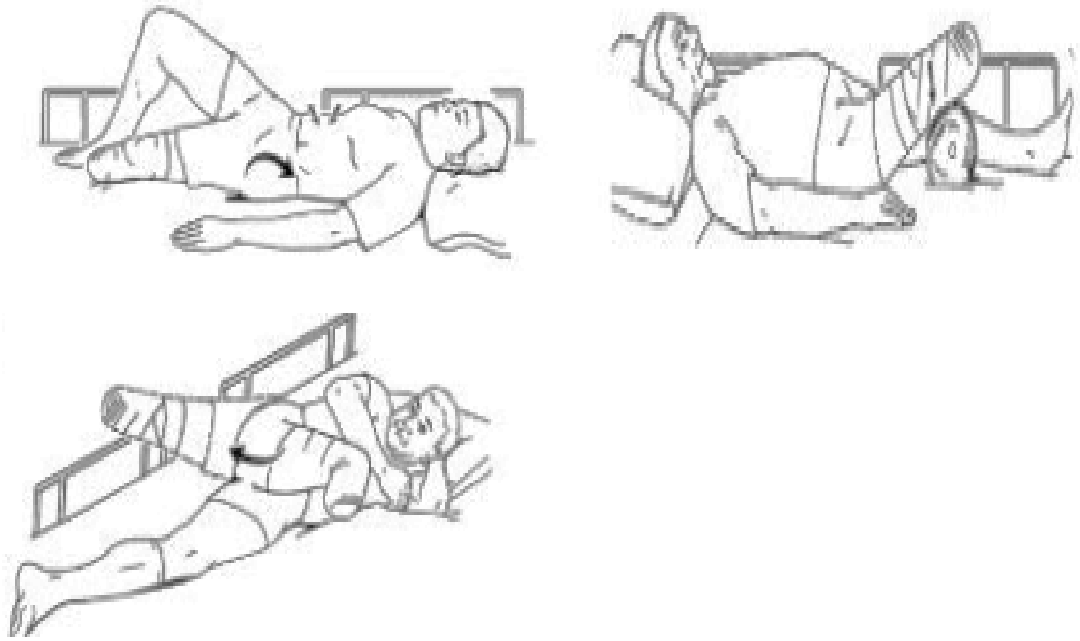


**Fig. 10**

**Person with Below-Knee Amputation:**

- Roll to sound side. Lift the residual limb straight up and down while keeping hip straight.
- With towel roll behind knee gently bend and straighten knee over towel roll.
- With towel roll between thighs, gently squeeze thighs together and down.
- Flatten back by tightening stomach muscles and tilting hips towards waist
- Sitting with residual limb supported, tighten thigh muscle and push down on knee to straighten.
- With towel roll under the calf of residual limb, tighten thigh muscle to straighten knee. Gently push down while tightening buttock muscles.
- Roll to sound side. Bring knee to chest while bending knee. Reach limb back as far as possible while straightening knee.

# EXERCISES FOR A PERSON WITH ABOVE-KNEE AMPUTATION

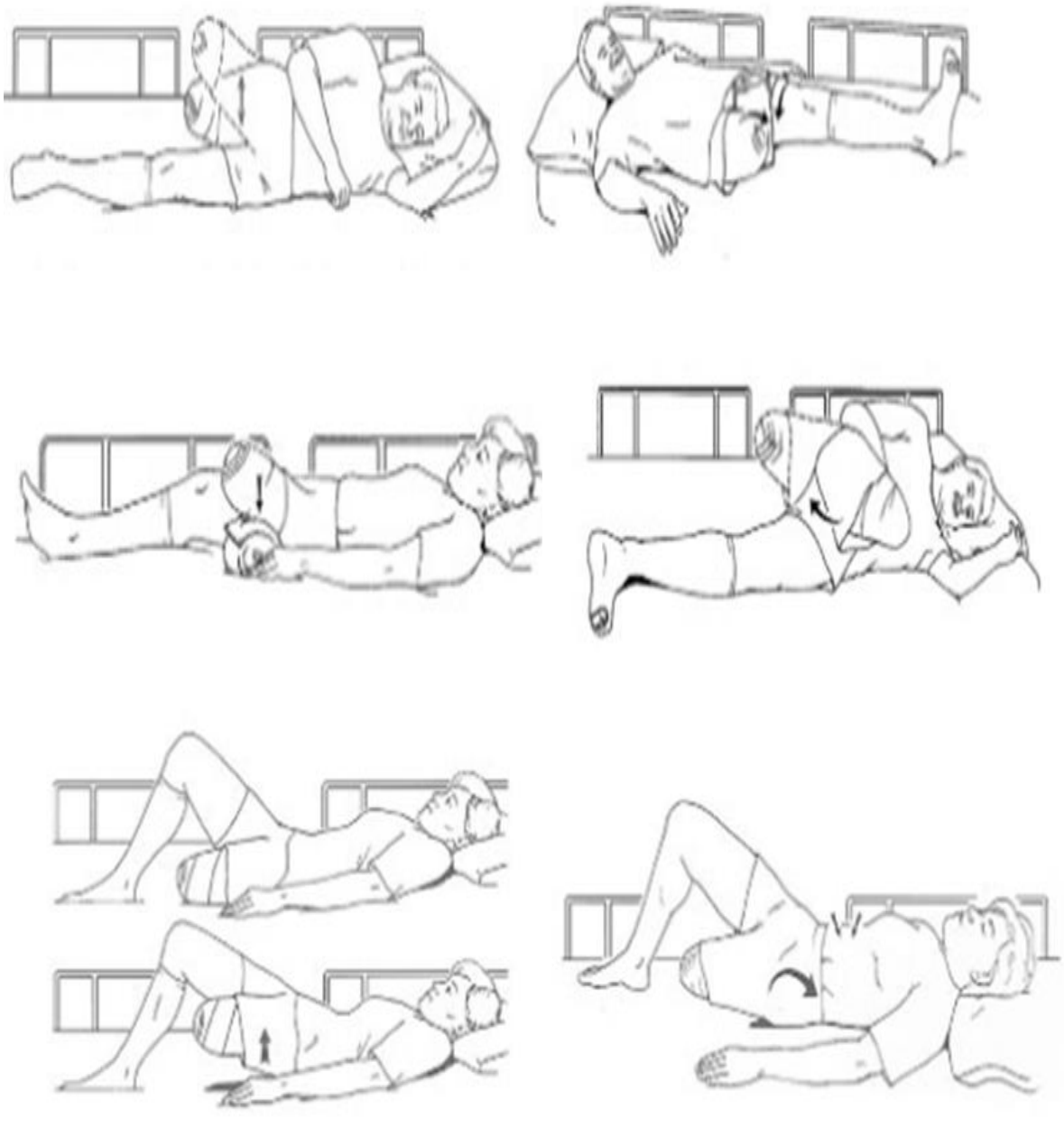


**Fig.11**

## Person with Above-Knee Amputation:

- Roll to sound side. Lift residual limb straight up and down while keeping hip straight.

- With towel roll between thighs, gently squeeze thighs together and down

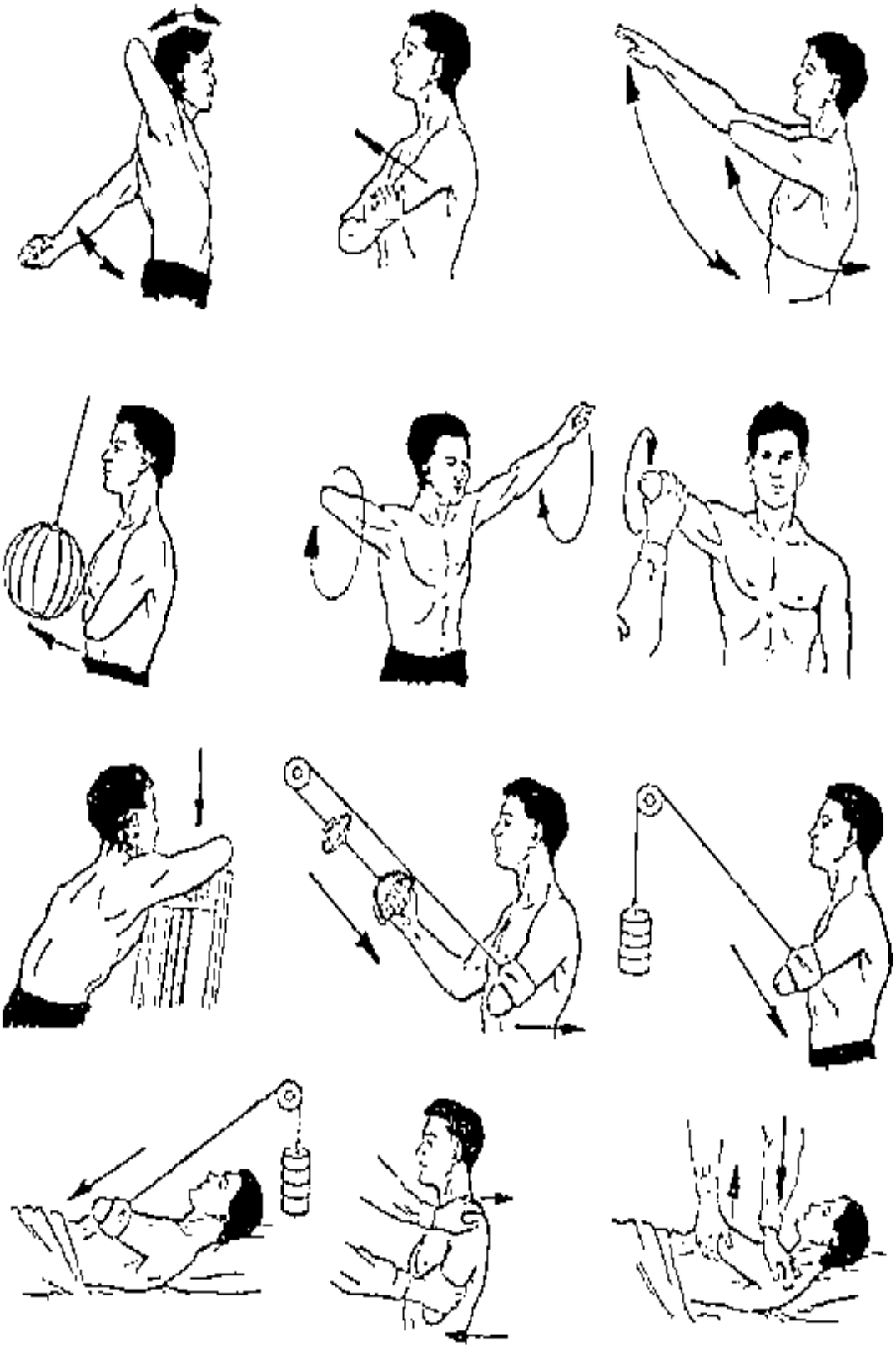
- With towel roll under the residual limb, gently push down into the towel roll while tightening buttock muscles

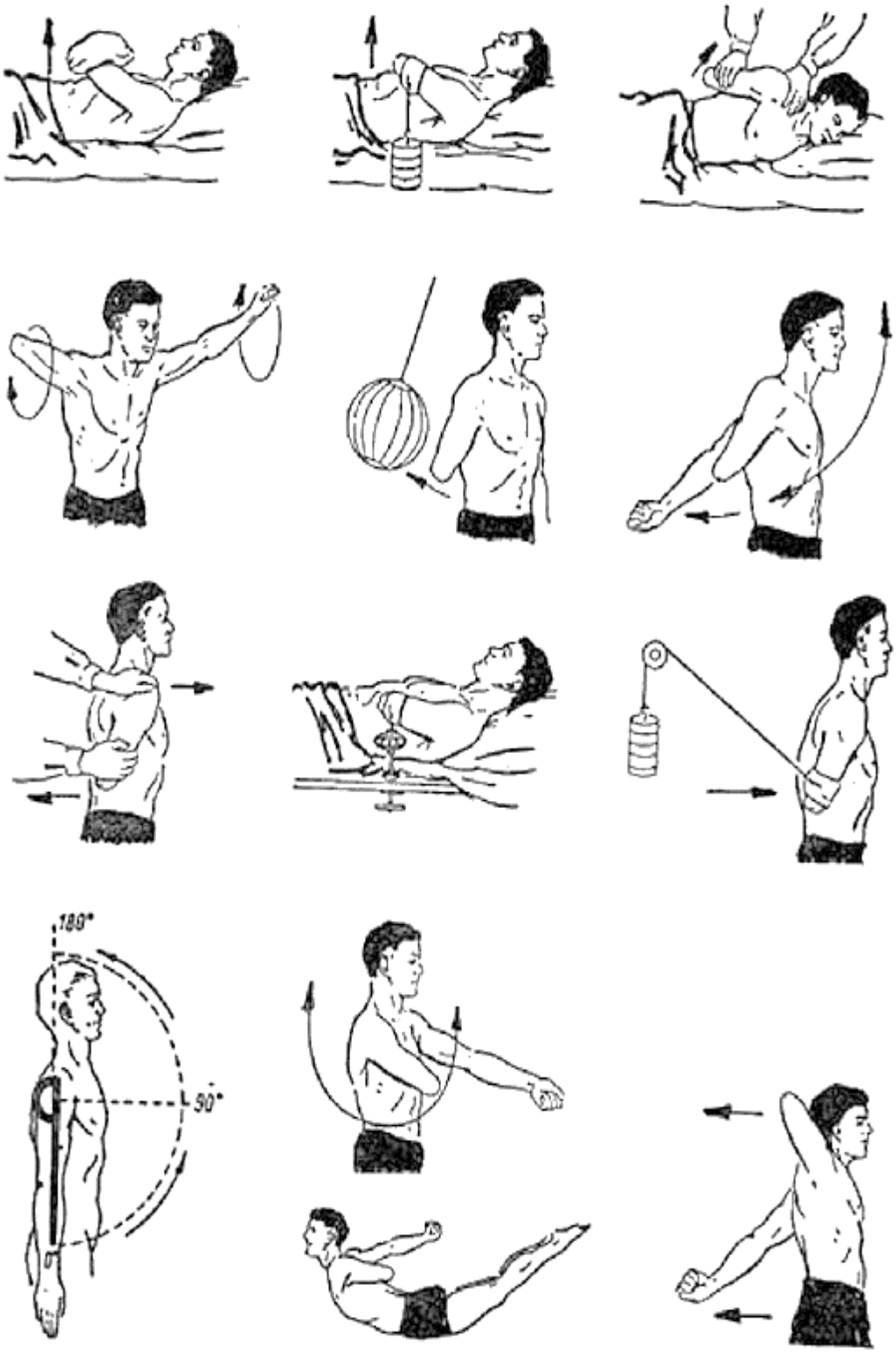
- Roll to sound side. Bring residual limb to chest, then stretch limb back as far as possible.

- With sound knee bent and foot flat, tighten buttock muscles while attempting to lift hips.

- Flatten back by tightening stomach muscles and tilting hips towards waist.

# EXERCISES FOR A PERSON WITH UPPER LIMBAMPUTATION




180°
90°

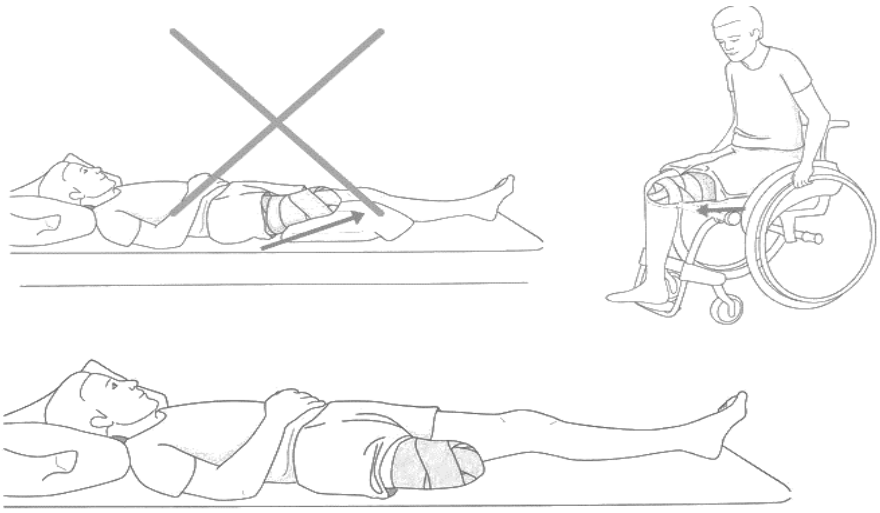


Fig.12

**Ambulation training after lower limb amputation**

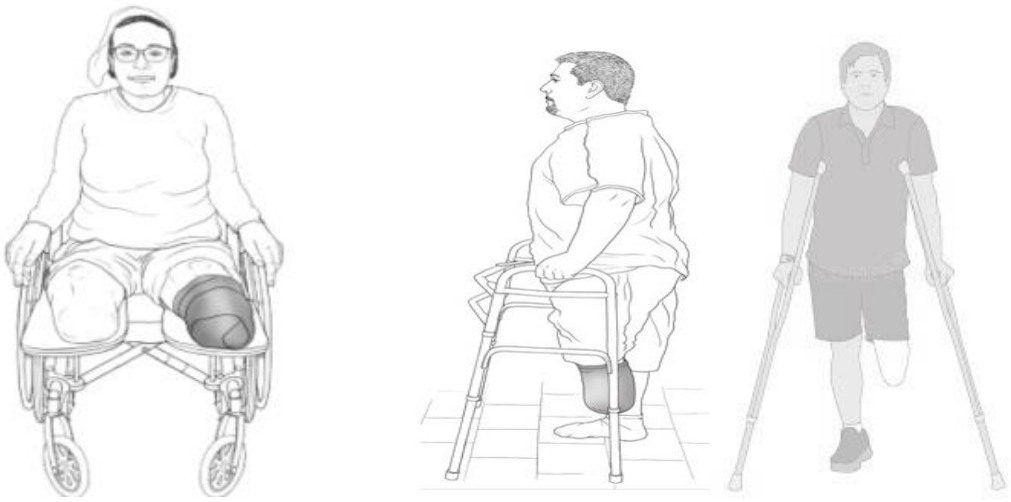


**Fig.13**

**Wheelchair Walker** **Axillary Crutches**

Along with rehabilitation of affected body part, training for activities of daily living should also be integrated which are

**Bed mobility:** The priority (once safe to do so) is for the patient to sit fully upright in the bed, and to teach caregivers the manual-handling techniques to facilitate this. Encourage the patient to assist with this as much as they are able to. Use available tools, such as a rope tied to the end of the bed, to allow the patient to assist and to promote independence with bed mobility.

**Progression for transfers:** Sitting balance to sliding board transfer (if available), Sit to stand, Pivot transfer using a mobility aid (walking or gutter frame), Ambulation (with/without walking aid) whilst respecting the weight-bearing status of each limb

**Fig.14**

**Weight bearing:** Allowed or not, confirm first. If yes then start with teaching good transfer and manual handling techniques that enable the patient and family to continue non weight bearing when transferring without your help, or once discharged.

**Ambulatory aids:** Ambulatory devices are used to reduce the amount of weight bearing on the weak (or affected) lower limb or totally eliminate weight from the

lower limb by transmitting the body weight from the upper limb to the floor through the ambulatory device.

Walkers can be used for non-weight bearing, touch down weight bearing, partial weight bearing, weight bearing as tolerated, full weight bearing.

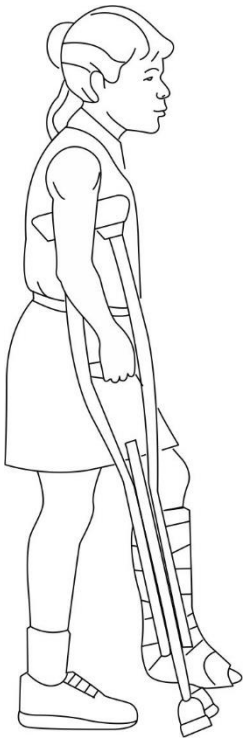


**Fig.15**

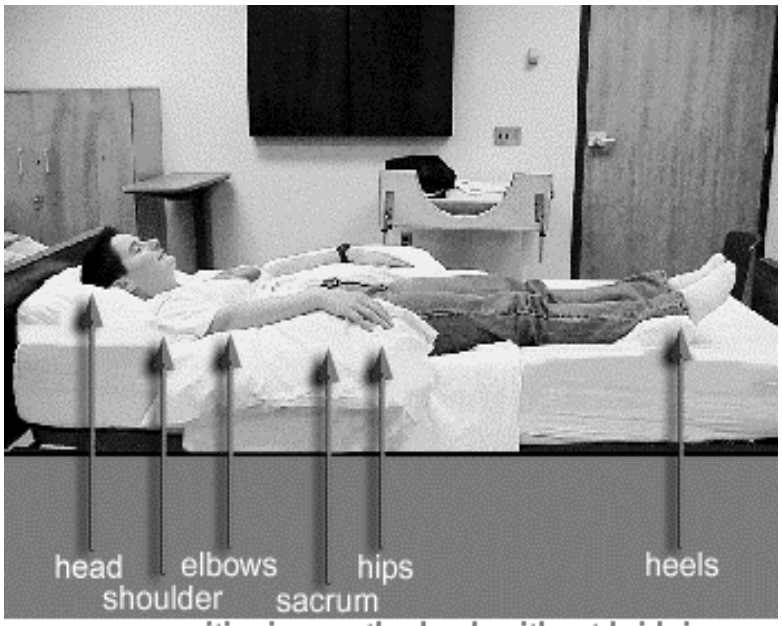
**Move the crutches forward slightly along with injured limb while keeping good limb grounded to maintain balance**

Axillary crutches can be used for non-weight bearing, touch down weight bearing, partial weight bearing, weight bearing as tolerated, full weight bearing.

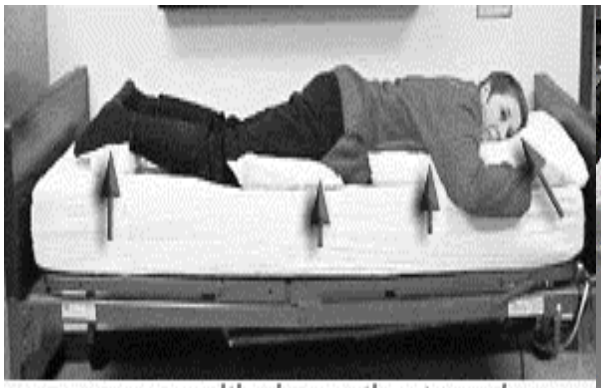
Progression of axillary crutch walking is from non-weight bearing to partial weight bearing. Three-point gait first followed by four-point gait then two-point gait.

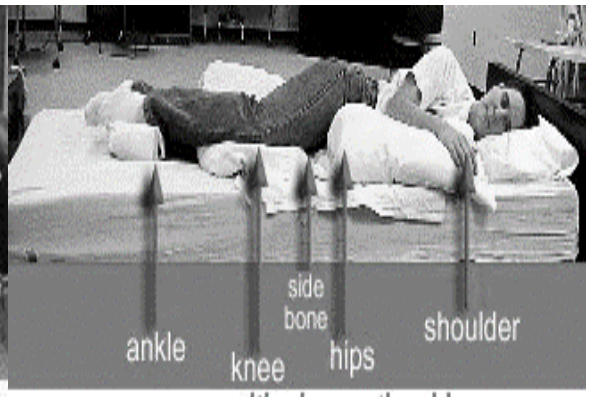
# SPINAL CORD INJURIES

## Positioning



proper positioning on the back without bridging


proper positioning on the stomach



proper positioning on the side

**Fig.16**

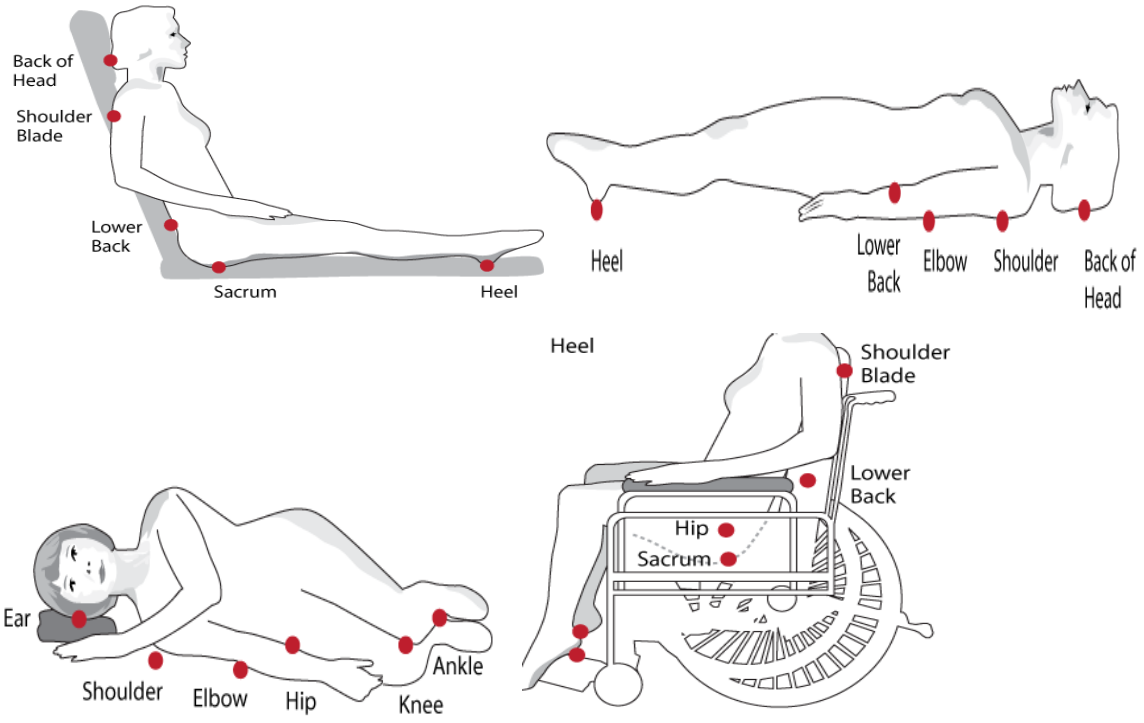
- Two hourly changes in posture on bed. Every 20 to 30 mins while sitting on wheel chair
- Inspection and care of skin daily and regularly
- Static splints/orthotics

- Alternative movement patterns. For example, the tenodesis function of the hand to facilitate adapted grasp and grip activities (see pictures below) or locking the elbow during transfer if triceps are weak.
- Preventing contractures: Exercises, active movement via physical training and daily activities, Stretching, Passive movements.
- Bowel & Bladder care
- Mobility/functional aids. For example, wheelchair or walking aids

**Life threatening emergencies**

Red, hot, swollen limb with lack of pulses. Patient complains of pain and shortness of breath at rest could be **Deep vein thrombosis, Pulmonary embolism.**

Increased blood pressure, Pounding headache, excessive sweating, Flushing of face could be **autonomic dysreflexia Autonomic Dysreflexia**




**Common sites of pressure point prone to develop pressure injury.**

**How to relieve pressure while sitting in a wheelchair?**

**Lean forward as shown above Lean to one side and the other side**

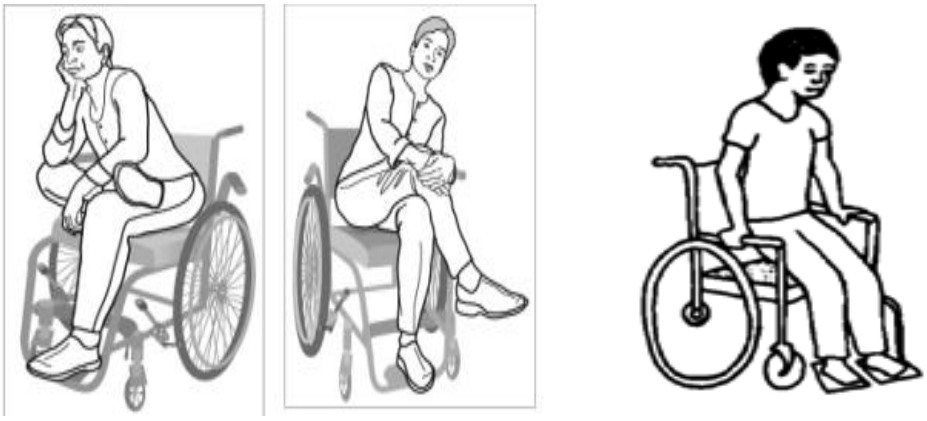
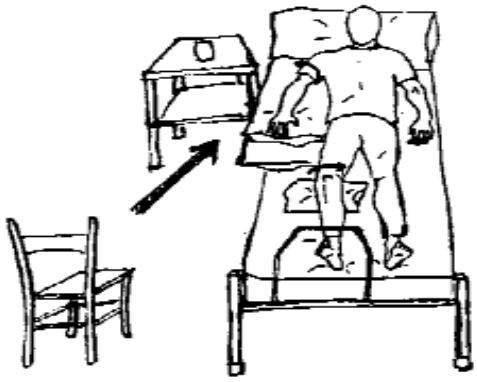


**Fig.17**

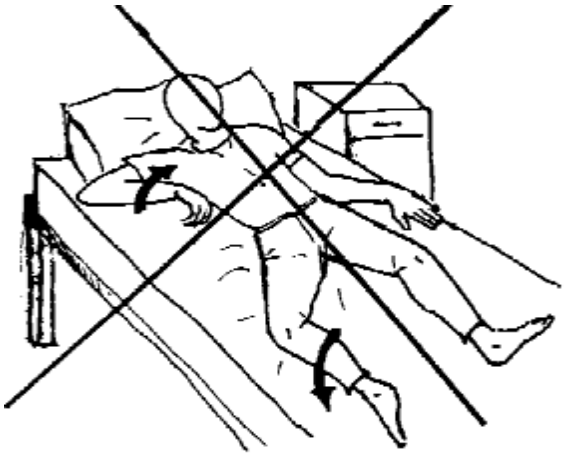
**Shift legs one at a time and reposition Lift bottoms off the seat by holding. armrests and pushing up; hold for 20-30 seconds every 20-30 minutes.**

# HEAD INJURIES

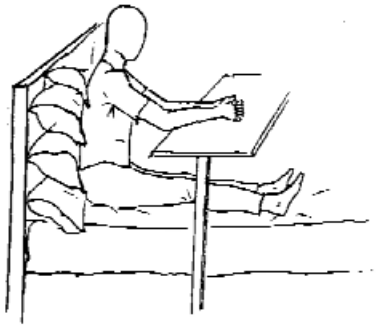
## Positioning



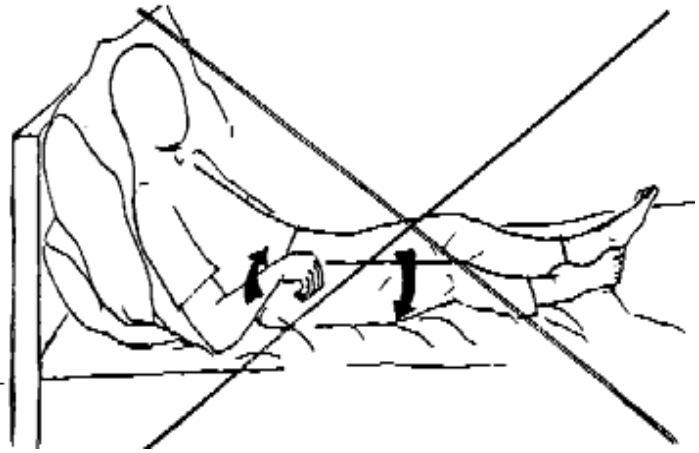
Correct lying position



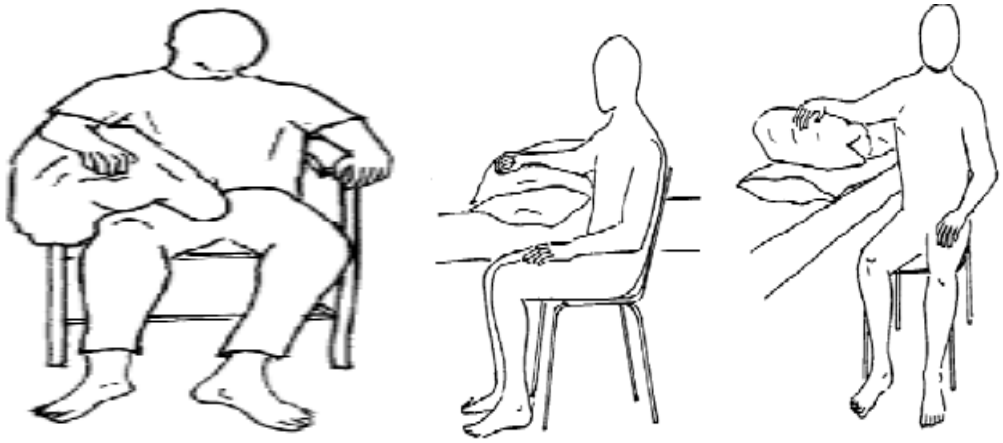
Wrong lying position



Correct sitting position



Wrong sitting position



Sitting in chair with an arm supported

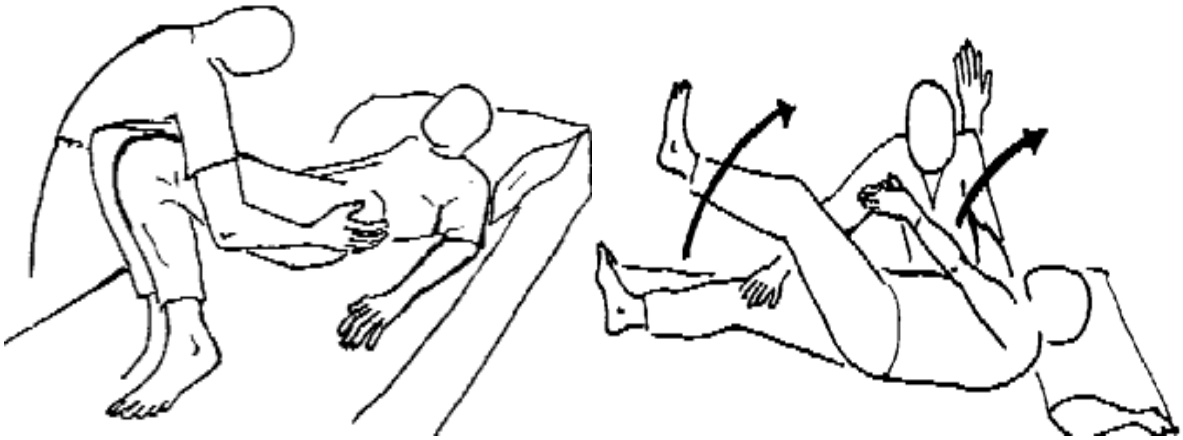


**Fig.18**

## Turning from supine to side lying

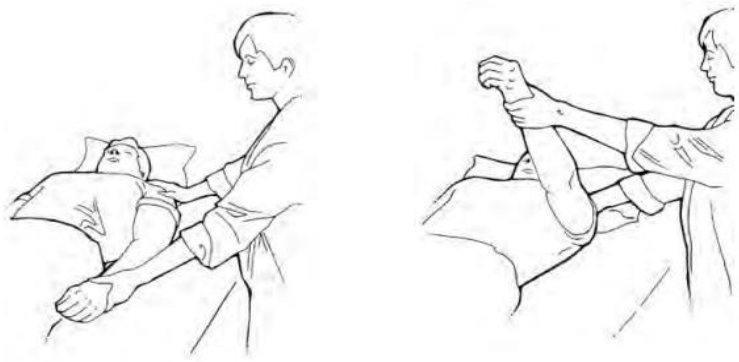
- Training of bed mobility includes teaching the patient how to change position alone or with as little assistance as possible
- Passive movements, Assisted and Active movements
- Stretching of tight muscles with positioning, casts and splints.
- Trunk training exercises
- Skin, bladder and bowel care.

**When to take or refer for expert opinion (Red flags)**

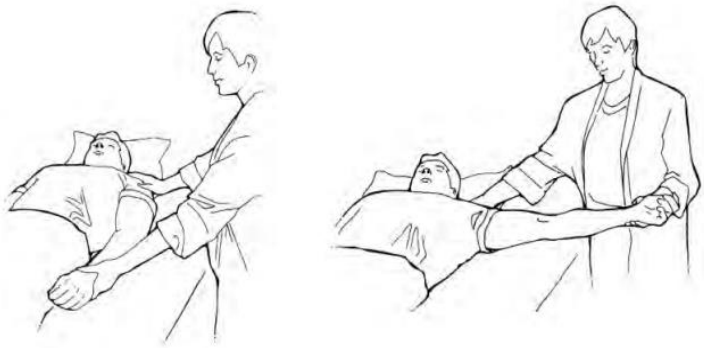
- New onset unusual tiredness/ Increased tiredness (feeling sleepy)
- Headaches that worsen or do not resolve
- Nausea or vomiting
- Irritability or altered mood
- Slurring of words or problems understanding speech
- Weakness in one or more limbs
- Visual problems, such as difficulty focusing or sensitivity to light
- Seizures
- Any bleeding or discharge of clear fluids from the nose or ears

**Range of motion exercises:** All joints where the muscles are paralyzed of performing movements need to be moved passively. Each joint is performed by the care giver 8 -10 times for 2 - 3 sessions a day

**Shoulder Flexion:** Place one hand on the shoulder. Turn the person's palm inward and lift the arm over the head.



**Shoulder Abduction:** Place one hand on the shoulder. Use the other hand to turn the palm outward. Then, bring the person's arm out to the side.



**Shoulder Internal and External rotation:** Place one hand on the shoulder or elbow. Hold wrist with other hand. Bring arm out to side to shoulder level with elbow bent. Turn arm so hand points towards head. Then turn back down so that hand points towards feet.

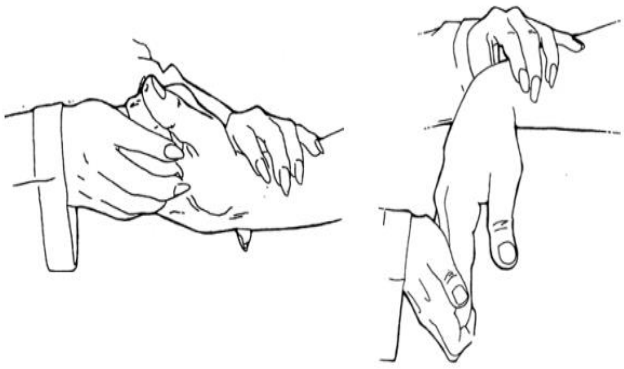
**Abduction and adduction (Horizontal):** Place one hand on elbow. Hold wrist with other hand. Bring arm out to side to shoulder level with elbow bent. Bring arm across chest

**Elbow Flexion and Extension:** Hold upper arm with one hand and forearm with the other hand. Bend arm at elbow so that hand touches shoulder, then straighten arm all the way out.

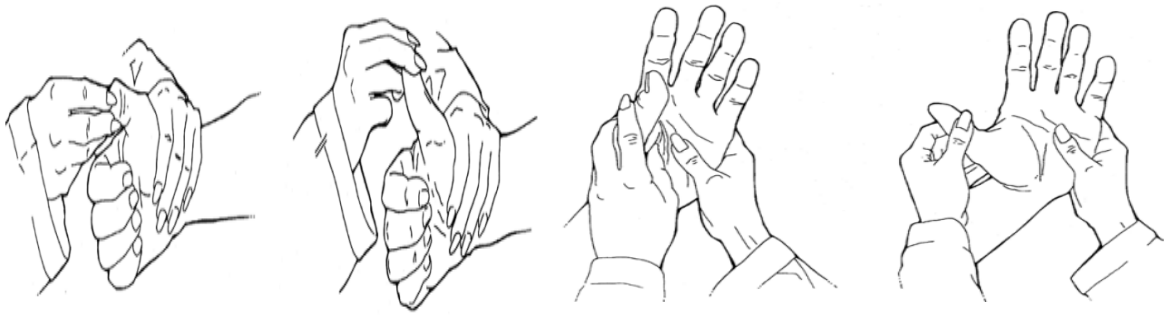
**Forearm Supination and Pronation:** Hold under the elbow with one hand. Hold at wrist with the other hand. Turn palm of hand so it faces up to the ceiling and then down to the floor.

**Wrist Flexion and Extension:** Bring wrist back, bring fingers in to make a fist. Then straighten out fingers as you bend the wrist down.

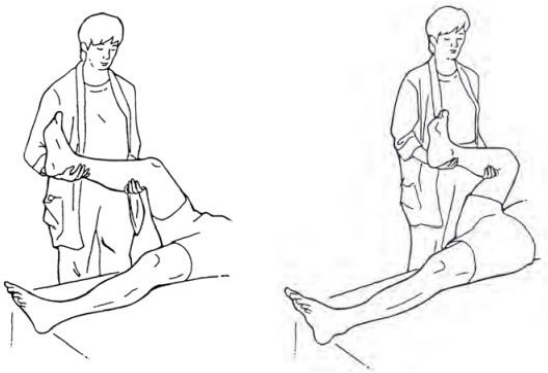
When the wrist is up, the fingers should remain bent. When the wrist is down, the fingers should remain straight.



**Thumb:**Bend and straighten thumb. Stretch thumb out to side to stretch web space.



**Hip and Knee flexion and extension:** One hand is placed under the knee and the other hand is placed under heel. The knee is bent towards chest with the kneecap pointed towards the ceiling. To get a good stretch, push the leg to the chest until there is minimal resistance. The leg is then lowered to the starting position.



**Hip Internal and External Rotation:** Knee is bent halfway to the chest so that there is a ninety-degree angle at the hip & Knee. One hand is placed on top of the knee and the other hand is placed under the heel. Foot will then be pulled outwards and inwards.

**Hip Abduction and Adduction:** One hand is placed under the knee and the other hand is placed under the heel. Keeping knee straight the leg is pulled towards the caregiver with kneecap pointed towards roof. The leg is then brought back towards the other leg.

**Hamstring stretching:**One hand is placed under the knee and the other hand is placed under the heel. With Knee straight and kneecap pointed towards roof, leg raised upwards. The Knee is slightly bent and downward pressure is applied over the knee and leg is moved upwards towards roof.

**Heel cord stretching:** One hand cups the inside of the heel and the forearm is placed against the ball of the foot. The heel cord is stretched by bending the foot towards ankle.

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