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DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

TM 8-292

DEPARTMENT OF THE
AIR FORCE MANUAL

AFM 160-16

PHYSICAL RECONDITIONING

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AND THE AIR FORCE

WASHINGTON 25, D. C., 8 May 1952

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CHAPTER 1

INTRODUCTION

1. General

a. Purpose. The purpose of this manual is to describe procedures and activities for the physical reconditioning section or comparable sections established as a component part of the Physical Medicine Service in hospitals.

b. Medical Supervision. The activities described in this manual are the basic activities conducted in the physical reconditioning sections or comparable sections under the medical supervision of a physiatrist.

c. Scope. This manual outlines activities designed for patients at different stages of recovery—bed, semiambulant, and ambulant patients. The activities are arranged so as to be utilized on an individual prescription basis for each patient. They will be found generally suitable for conditions specified but it is not intended that all activities will be used in each individual case. The selection and prescription of specific activities will depend on the conditions involved as determined by the medical officer in charge.

d. Definition. Physical reconditioning therapy is the process which aims to maintain or restore physical and psychological fitness through participation in progressively graded physical activities during the period of hospitalization.

2. Objectives and Mission of Physical Reconditioning Program

a. Objectives. The physical reconditioning program is designed to—

- (1) Allay and prevent deconditioning.
- (2) Accelerate physical recovery.
- (3) Ameliorate the condition.
- (4) Restore a patient's physical condition to a level that will fit him for return to his assigned duties.
- (5) Contribute to psychological readjustment and resocialization by providing group activities in which patients can participate, and in which they are afforded opportunities for self-expression and release from physical and emotional tension.

b. Mission.

- (1) The physical reconditioning section will be operated for the purpose of providing treatment on the ward, in the physical reconditioning clinics, and other designated facilities by the use of physical activities as prescribed by the medical officer of the Physical Medicine Service.
- (2) Physical reconditioning therapy will be confined to general and specific supportive measures. In cases of constitutional or generalized conditions particular care will be taken to advance exercises carefully and progressively.
- (3) Physical reconditioning activities for psychiatric patients will be carried out by coordination between the Chief of the Physical Medicine Service and the Chief of the Neuropsychiatric Service.

3. Activities

The program in physical reconditioning is directed toward preventing loss of the patient's original level of physical condition before hospitalization. The restorative phase is directed toward regaining physical condition in the patient whose condition has been lowered by prolonged inactivity. The specific supportive activity phase is directed toward the development of strength, endurance, speed and coordination. All activities are prescribed and supervised by the psychiatrist and may or may not supplement those of the physical therapist and the occupational therapist.

a. General conditioning activities including bed, ambulant and advanced physical activities, are prescribed for the prevention of deconditioning phenomena and/or the restoration of lost fitness.

b. Specific supportive activities, including remedial and developmental exercises, posture exercises and other prescribed functional activities directed toward the development of strength, endurance, speed, and skill in the patient.

c. Physical activities for resocialization are planned and conducted for the neuropsychiatric patients under the technical and professional supervision of the Neuropsychiatry Service in coordination with Chief, Physical Medicine Service.

CHAPTER 2

APPLICATION OF PHYSICAL RECONDITIONING PROGRAM

4. Classification of Patients

a. Bed patients are those who are confined to beds or chairs and must perform their prescribed exercises in beds or chairs.

b. Ambulant patients are those in hospital wards who still require medical or surgical treatment, are ambulatory, and may take their prescribed exercises in a standing position.

5. Admission to Bed Exercise Program

a. Surgical and Medical Patients. The ward medical officer will refer the patient to the Physical Medicine Service. Physical reconditioning is concerned with maintaining in the patient an optimum state of general fitness, achieved by exercises which do not involve the disability, and with restoring optimum function to the part involved in a disability after definitive treatment has been discontinued or as prescribed by the physiatrist.

b. Medical Patients.

- (1) Although it may be safe to begin exercise for many medical patients on the first afebrile day, medical opinion indicates that most patients may begin general exercise after 2 or 3 days of normal temperature; begin moderate exercise 1 or 2 days later, and relatively severe exercise 5 days later as indicated by the ward officer or the physiatrist.
- (2) It is the ward officer's responsibility to refer his patients as soon as practicable for classification and for the initiation of physical reconditioning activities. The physiatrist will then prescribe the exercise program if indicated.

6. Examination and Reclassification of Patients

a. Bed patients will be examined at frequent intervals by the *physiatrist* to determine when they are ready to progress to the ambulant group. *Progress reports* of the patient's response to the exercise pro-

gram will be made at regular intervals to the medical officer which may be used to supplement his clinical and functional examination.

b. It is often not desirable that every patient go through each class successively. He should be routed through the various classifications to discharge him from the reconditioning program as rapidly as is consistent with his physical and mental welfare. Some ambulant patients may be placed in the bed group due to surgery or medical treatment which demands that they be confined temporarily to bed. Progress from one class to another depends entirely upon the rate of improvement in physical fitness of the individual patient.

7. Physiologic Effects of Rest

a. *Indications for Rest.* Rest is an important phase of treatment of some abnormal body conditions. Bed rest is indicated when it is necessary to—

- (1) Reduce the demand exacted by physical exertion on a cardiovascular and respiratory system rendered incompetent by disease and which may be further embarrassed by physical effort.
- (2) Repair infected tissue or bone injury. (Unaffected parts may be exercised unless general condition contraindicates.)
- (3) Immobilize areas of acute inflammation. (Unaffected parts may be exercised unless general condition contraindicates.)
- (4) Maintain immobilization of healing surfaces and deeper tissues. (Unaffected parts may be exercised unless general condition contraindicates.)
- (5) Eliminate pain and alleviate other distressing symptomatology and anxiety connected with physical movement.
- (6) To avoid motion in pathological joints.
- (7) Arrest hemorrhage or prevent its recurrence.

b. *Harmful Effects of Excessive Bed Rest.*

- (1) When a person lies motionless and relaxed for an extended period of time, his muscles tend to atrophy from disuse. This is seen in the atrophy of the quadriceps following knee operations in cases which are immobilized for two weeks or more. Gluteals, quadriceps, and deltoids atrophy quickly when inactive for an extended period of time. Prolonged bed rest promotes vasomotor instability and a decrease in circulatory efficiency as evidenced by tachycardia, loss of endurance, thrombi either in the venous system with subsequent pulmonary complications, or in the arteries. The development of decubitis ulcers is an example of the abuse of bed rest.
- (2) Metabolic function decreases during enforced inactivity. Digestion is often hampered by bed rest. Decreased bowel

action and constipation are frequent sequelae of bed rest. The body chemistry may be thrown out of balance with definite evidence of loss of nitrogen, potassium, calcium, and phosphorous.

- (3) Atelectasis may result from enforced bed rest with compression of the dorsal areas of the lung with vascular stasis and the accumulation of secretions in the large bronchi. Inactivity and disuse in orthopedic surgery cases frequently result in atrophy of muscles, bone and skin, as well as adhesions due to the formation of fibrous tissue in and around the affected joint.
- (4) In addition to the physical deterioration which accompanies enforced bed rest, "psychic-invalidism" should be considered. A person long confined to bed, having to be assisted in all his simplest needs, often becomes more and more dependent. He loses confidence in himself. It is important to consider progressive weakening of the ego-strength in all cases involving prolonged bed rest.

c. Prescribed Activity During Convalescence. The earlier convalescent exercises are instituted, the less are the atonic and atrophic processes accompanying bed rest on the normal physiological balance of the musculo-skeletal, and the cardiovascular systems. Activity is recognized as a valuable adjunct in the treatment of surgical and orthopedic disabilities and in addition benefits certain medical cases. Activities which stimulate the circulation tend to reduce the incidence of thrombotic complications. The increase in the patient's zeal, enthusiasm, sense of "feeling better," with carefully prescribed exercises, turns the patient's attention from his sickness toward his recovery. Physical reconditioning improves the muscular condition, cardiovascular tone, and also the patient's morale. Unless there are specific indications for complete rest, early exercise should be considered as one means of preventing many of the harmful effects of bed rest.

8. Important Factors in the Psychology of Fitness

a. In addition to improving the physical fitness of the patient, the physical reconditioning staff should endeavor to improve his psychological attitude. Primarily, such improvement is a result of the approach used and of the man-to-man contacts with the patients.

b. The attitude of the patient toward going back to duty, especially combat duty in wartime, may be greatly affected by the attitude and conversation of the instructor. The instructor should exhibit the following attitudes:

- (1) He should be diligent and conscientious about his duties and show great personal interest in the progress of each patient.
- (2) He should, while actually giving diligent attention to the

progress of each patient, not overstress his *concern* for the patient, but should seem to assume that rapid and satisfactory progress is being made.

- (3) He should give evidence that he knows the physiological basis of the physical reconditioning process and be ready to explain it in simple and intelligent terms.

- (4) He should always be encouraging and helpful.

c. The words used by the instructor may greatly influence the patient's attitude. For example, such terms as weakness, disability, illness, getting well slowly, are discouraging terms. "Toughness," "getting in training," "you are getting stronger fast," "you are almost back in good shape," "as good as new," are more encouraging terms. The instructor should be positive and constructive, not negative and discouraging.

d. The atmosphere created by the physical reconditioning staff should be one of expectation of rapid recovery.

e. Many patients, especially in wartime, exhibit symptoms of anxieties not greatly different from those exhibited by some neuropsychiatric patients. In planning a program for these patients, many of the considerations discussed in the chapter on psychiatric patients should be kept in mind.

f. Patients induced to engage wholeheartedly in an activity program may be led to face the realities of day-by-day living rather than dwelling on situations, real or imaginary, which may have produced their anxieties.

CHAPTER 3

EXERCISE ANALYSIS

9. General

This chapter includes the major kinesiological movements of the physical reconditioning activities described in this manual. The material is presented in functional groups which include the upper extremity, lower extremity, spinal column and trunk, and thorax and neck.

10. Muscle Analysis Tables

a. The principal muscles involved are indicated in each of the following muscle analysis tables, with a brief description of their origin, insertion, and action. Detailed anatomical and kinesiological descriptions have not been included. There is included a list of typical exercises which are applicable with each table. Also, wherever possible, anatomical illustrations depicting the individual muscles and/or muscle groups are shown, together with figures illustrating particular muscle actions, such as flexion of the forearm or extension of the leg.

b. Each exercise has been analyzed to determine the major muscle action. The muscle actions are designated by a simple code. The key to this code and the individual muscles included in each group appears in appendix I.

Table 1. *Muscles moving the Spinal Column and Trunk—Posterior*

Muscle	Origin	Insertion	Major action	Typical exercises
Splenius cervicis and capitis -----	Lower two-thirds ligamentum nuchae, spinous processes seventh cervical and upper 5 thoracic vertebrae.	Base of skull and transverse processes of upper cervical vertebrae.	Neck extension, neck rotation.	Neck firm and on toes.
Erector spinae consisting of: 1. Inner division: spinalis dorsi, spinalis cervicis, spinalis capitis. 2. Middle division: longissimus dorsi, longissimus cervicis, longissimus capitis. 3. Outer division: iliocostalis, dorsi, cervicis lumborum.	Posterior one-fifth of crest of ilium, back of sacrum spinous processes of the lumbar and last 3 thoracic vertebrae, and transverse processes of all the thoracic vertebrae.	Transverse and spinous processes of the vertebrae, angles of the ribs, base of the skull.	Neck extension, trunk extension, trunk sidebend, exhalation.	Hip raiser.
Oblique extensors which include: 1. Semispinalis, semispinalis cervicis, semispinalis dorsi, semispinalis capitis (Complexus). 2. Multifidus. 3. Rotators in the chest region.	Transverse processes of the vertebrae.	Spinous processes of the vertebrae a little above the origin.	Trunk extension, oblique extension, neck extension.	Chest raiser.
Suboccipitals Rectus capitis posterior major.	Axis -----	Occipit -----	Extension head -----	Bridge raiser.
Rectus capitis posterior minor	Atlas -----	do -----	Rotation head -----	
Obliquus capitis inferior -----	Axis -----	Atlas -----		
Obliquus capitis superior -----	Atlas -----	Occipit -----		
Quadratus lumborum -----	Crest ilium, iliosacral lig., transverse processes of lower 4 lumbar vertebrae.	Transverse processes of upper 2 lumbar vertebrae, lower border last rib.	Trunk side bend, trunk extension (slight).	Side bend.

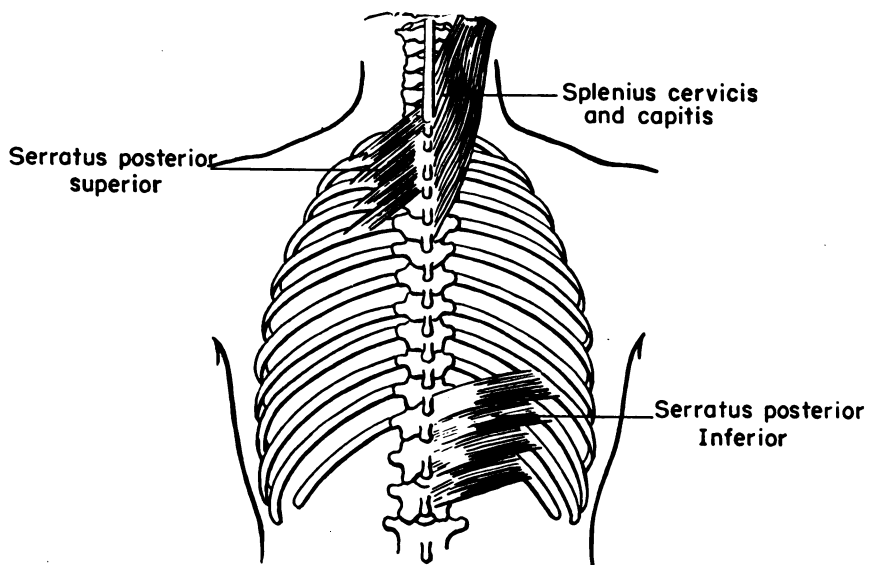


Figure 1. Muscles moving the spinal column and trunk—posterior.

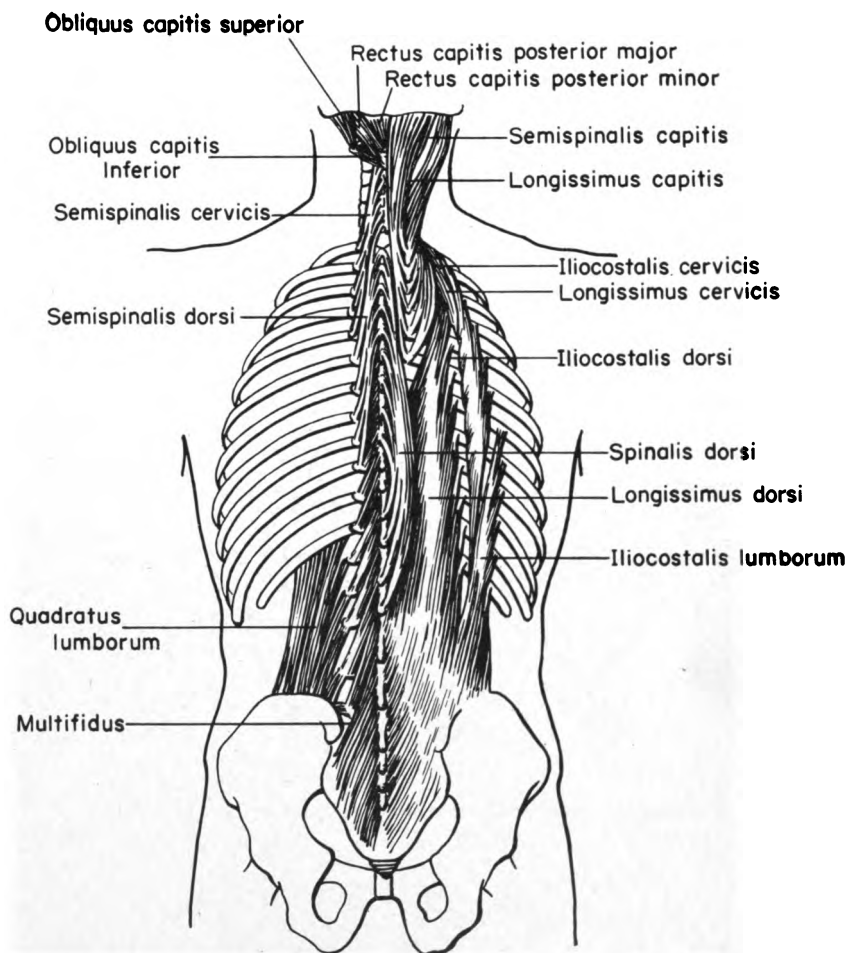
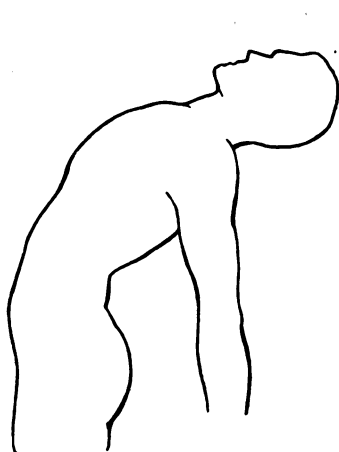
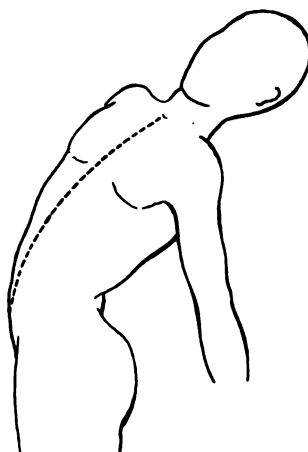


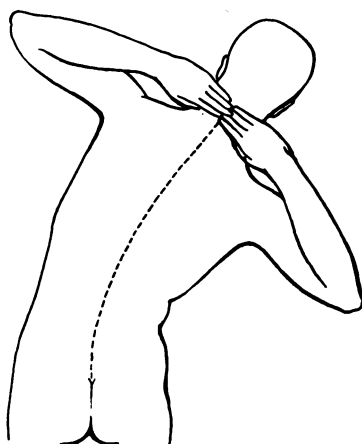
Figure 1—Continued.



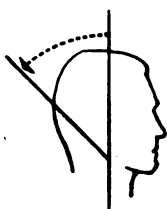
1. Trunk extension.



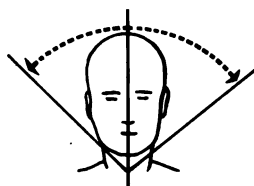
2. Trunk oblique extension.



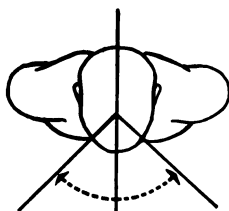
3. Trunk lateral flexion.



4. Neck extension.



5. Neck bending laterally.



6. Head rotation.

Figure 2. Movements of trunk and neck.

Table II. *Muscles Moving the Spinal Column and Trunk—Anterior*

Muscle	Origin	Insertion	Action	Typical exercises
External Oblique.....	Lower 8 ribs.....	Crest of ilium pubes, linea alba, fascia of thigh.	Trunk flexion, trunk side- bend, trunk rotation, compression.	Curl and twist.
Internal Oblique.....	Crest of ilium, anterior two-thirds, upper half Poupart's ligament, lumbar fascia. Crest of pubis.....	Costal cartilages, eighth, ninth, tenth ribs and linea alba. Cartilages of fifth, sixth, and seventh ribs. Atlas.....	Trunk flexion, trunk ro- tation, trunk sidebend exhalation. Trunk flexion, exhalation compression. Neck flexion.....	Do.
Rectus abdominis.....	Transverse processes third to fifth cervical vertebrae. Transverse processes third to sixth cervical vertebrae. Atlas.....	Occipit.....	do.....	Do.
Longus colli.....				Do.
Longus capitis.....				Do.
Rectus capitis Anterior and lateralis.		do.....	Head flexion, head side- bend.	Do.

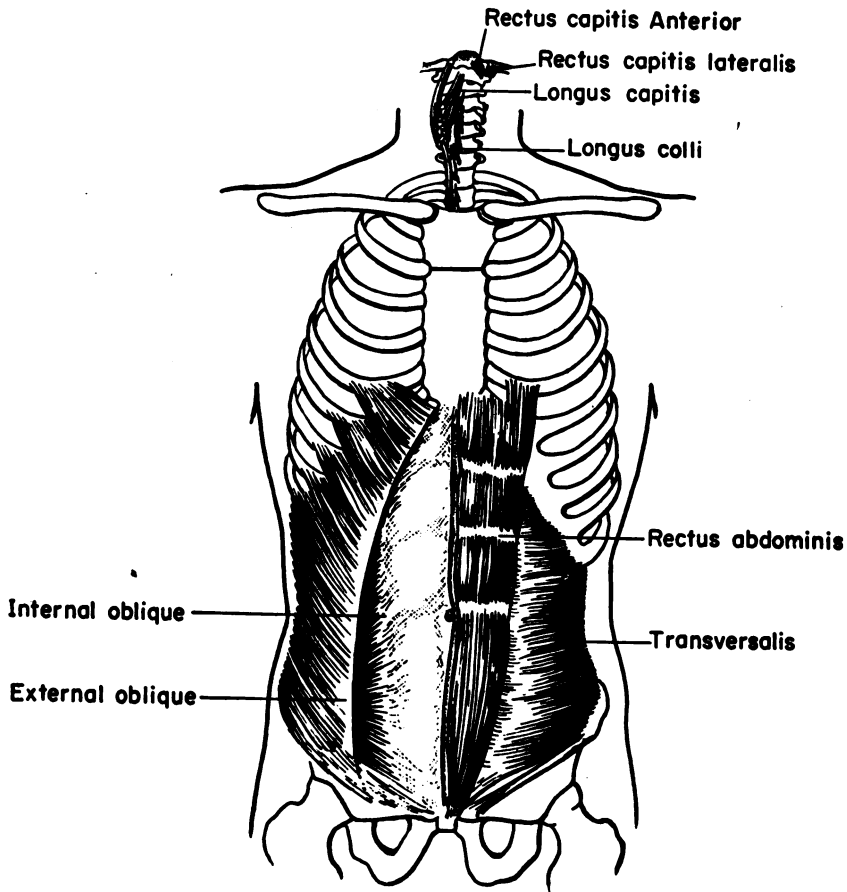


Figure 3. Muscles moving the spinal column and trunk—anterior.

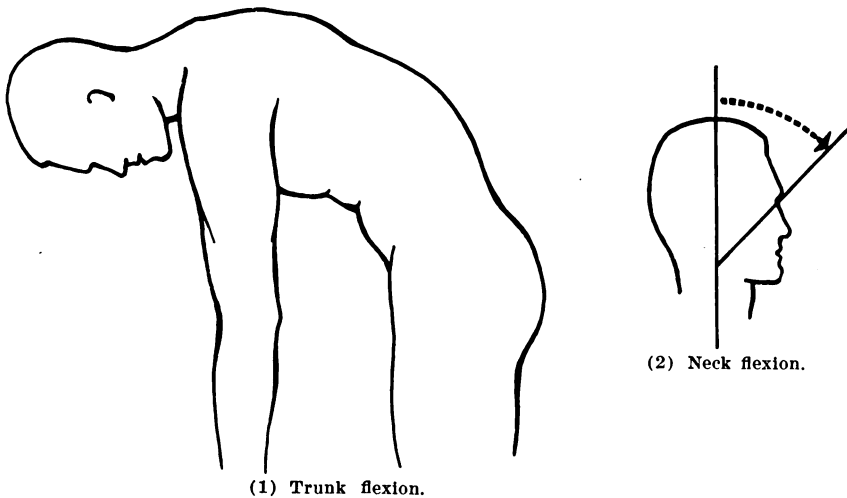


Figure 4. Trunk and neck flexion.

Table III. *Muscles of Inspiration and Expiration*

Muscle	Origin	Insertion	Action	Typical exercises
External intercostals.....	Lower borders of first 11 ribs.	Upper borders of last 11 ribs.	Lift ribs in inspiration.....	Four-count breather.
Internal intercostals.....	These are muscular sheet just beneath the external intercostals. Upper 2 lumbar vertebrae and lumbar fascia; on the side or the lower 2 ribs; at front to the 6 lower costal cartilages and the sternum.	Central tendon which forms the summit of the dome.	Action in dispute. Inhalation or exhalation. Inhalation.....	Do. Do.
Diaphragm (an almost circular line passing entirely the inner surface of the body wall).				
Transversalis.....	Inguinal ligament, iliac crest, lumbar vertebrae, lower six ribs.	Into midline and crest of pubis.	Compression, exhalation.....	Do.
Serratus posterior superior.....	Lig. muchae, spinous processes of seventh and first 3 thoracic vertebrae.	Second to fifth ribs beyond their angles.	Forced exhalation.....	Do.
Serratus posterior inferior.....	Spine of last 2 thoracic and first 2 lumbar vertebrae.	Last 4 or 5 ribs beyond their angles.	do.....	Do.
Neck Sternocleidomastoid.....	Mastoid process of skull..	Front of sternum, inner fourth of posterior border of the clavicle.	Forced inhalation, neck flexion, neck rotation.	Do.
Scaleni anterior medius posterior.	Transverse processes of the cervical vertebrae.	Anterior and middle scapulari on upper surface of first rib; posterior on second rib.	Lift the upper ribs in forced inhalation.	Do.

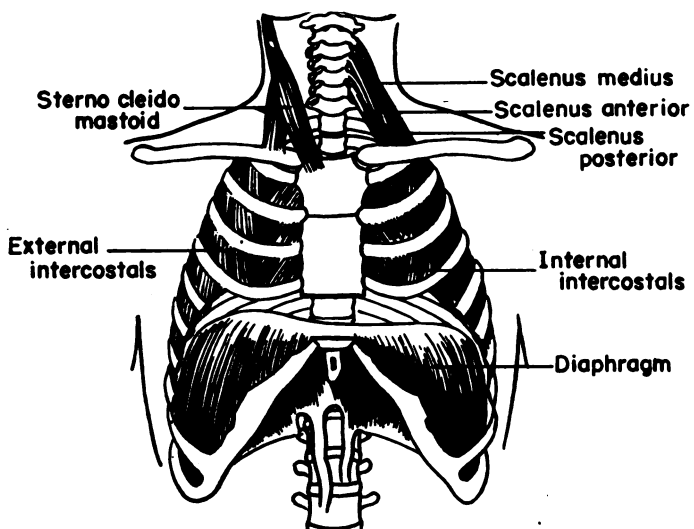
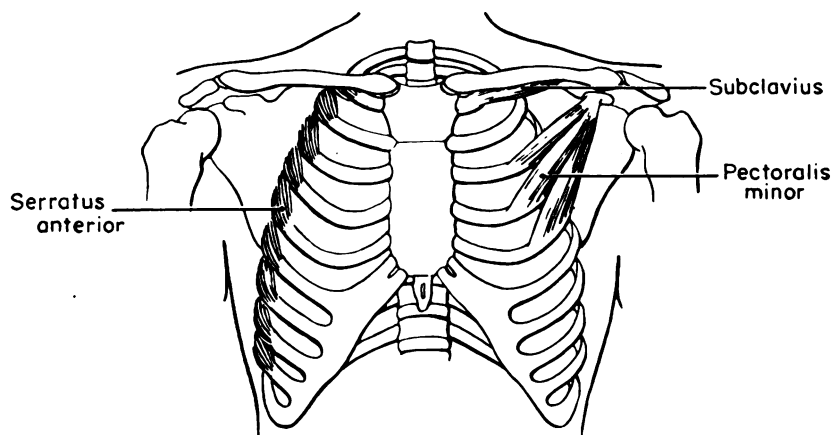


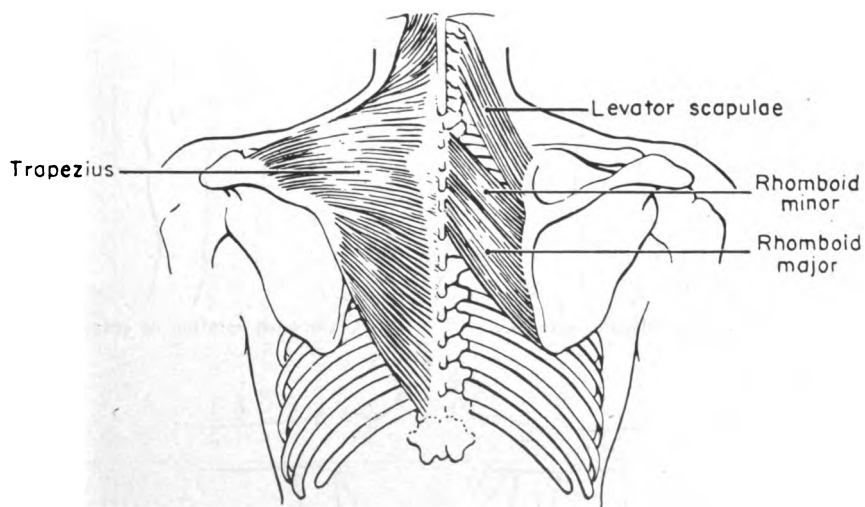
Figure 5. Muscles of inspiration and expiration.

Table IV. *Muscles Moving Shoulder Girdle*

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Serratus Anterior-----	Outer surfaces of the upper nine ribs at the side of the chest. Third to fifth rib on front of chest.	Vertebral border of scapula from upper to lower angle ventrally. Coracoid process of scapula.	Abduct scapula, outward rotation of scapula.	Raise and push.
Pectoralis Minor-----			Abduct scapula, inward rotation scapula (downward rotation of scapula).	Chest raiser.
Subclavius-----	Upper surface first rib at place where it joins its cartilage.	Groove extending along middle half of under side of clavicle.	Depress clavicle-----	Curl and twist.
<i>Posterior</i>				
Trapezius----- (<i>Note.</i> In order to understand the apparently contradictory actions of this muscle it is best to consider it in 4 parts passing from above downward.)	Base of skull, ligament of neck, spinous processes from seventh cervical to twelfth thoracic.	Outer third posterior border of clavicle. Top of acromion, upper border of spine of scapula.	Adduct scapula (depression), raise scapula (elevation), outward rotation of scapula.	Shoulder blade squeezer.
Levator scapulae-----	Transverse processes upper 4 or 5 cervical vertebrae.	Vertebral border scapula from spine to superior angle.	Raise scapula (elevation), neck sidebend, adduct shoulder.	Chinning.
Rhomboid major and minor-	Spinous processes of the seventh cervical to the fifth thoracic vertebrae.	Vertebral border of scapula from the spine to the inferior angle.	Adduct scapula, inward rotation scapula.	Shoulder retractor.

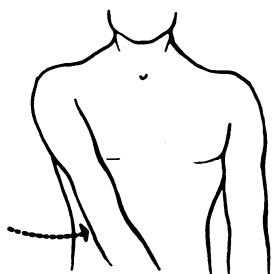


1. Anterior.

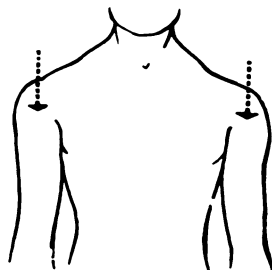


2. Posterior.

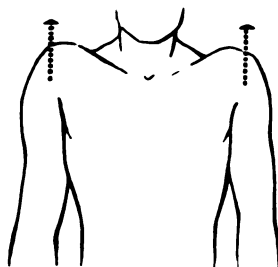
Figure 6. Muscles moving shoulder girdle.



1. Adduction of shoulder girdle.



2. Depression of shoulder girdle.



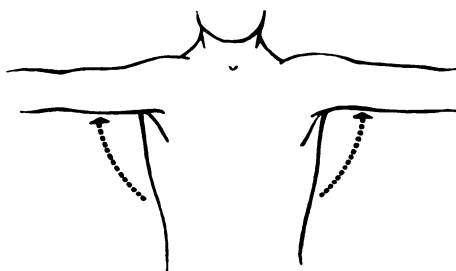
3. Elevation of shoulder girdle.



4. Inward rotation of scapula.



5. Outward rotation of scapula.



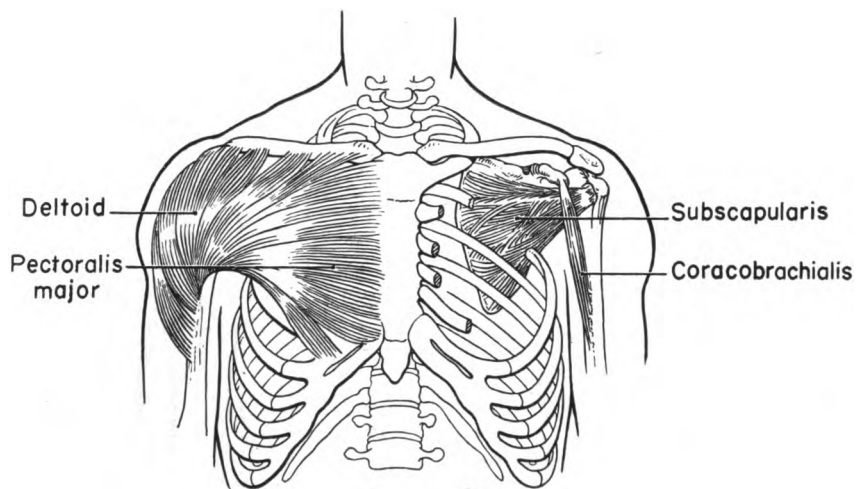
6. Abduction of shoulder girdle.

Figure 7. Movements of shoulder girdle and scapula.

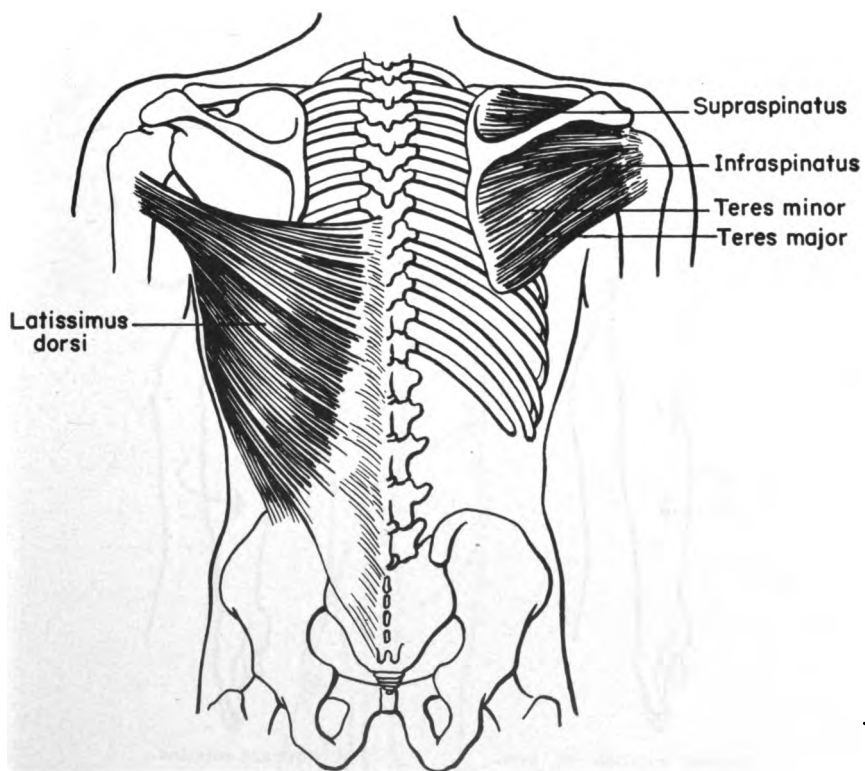
Table V. *Muscles Moving Shoulder Joint and Arm*

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Pectoralis Major	Inner half of anterior surface of clavicle, Anterior surface of costal cartilage of the first 6 ribs adjoining portion of sternum.	Outer lip of bicipital groove of humerus.	Adduct arm, inward rotation of arm.	Shoulder retractor.
Deltoid	Front outer one-third of clavicular border of acromion lower edge of spine of scapula.	Deltoid tubercle on middle surface of humerus.	Abduct arm, flex arm, extend arm.	Raiser push.
Coracobrachialis	Tip of coracoid process.	Middle of inner surface of humerus.	Adduct arm, flex arm.	Curl and twist.
Subscapularis	Entire surface of subscapular fossa.	Lesser tuberosity of humerus.	Inward rotation of arm.	Front kick.
<i>Posterior</i>				
Infraspinatus	Infraspinous fossa.	Middle great tuberosity of humerus.	Outward rotation of arm.	Shoulder blade squeezer.
Teres Minor	Upper two-thirds of dorsal surface of axillary border of scapula.	Greater tuberosity of humerus (lower part).	Outward rotation of arm (external rotation).	Do.
Teres Major	Dorsum of inferior angle of scapula.	Crest of lesser tubercle of humerus.	Adduct arm, extend arm, inward rotation of arm.	Hip raiser.

Muscle	Origin	Insertion	Action	Typical exercises
<i>Posterior</i> —Continued				
Supraspinatus.....	Supraspinatus fossa of scapula.	Top of great tuberosity of humerus.	Abduct arm	Bridge raiser.
Latissimus dorsi.....	Spinous processes of last 6 thoracic and all the lumbar vertebrae, back of sacrum, crest of of ilium, lower 3 ribs.	Floor of bicipital groove of humerus.	Inward rotation of arm, adduct arm, extend arm.	Chest raiser.

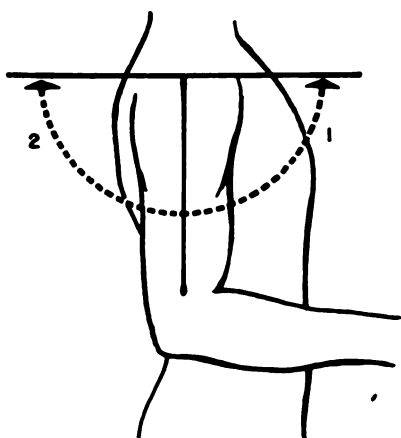


1. Anterior.

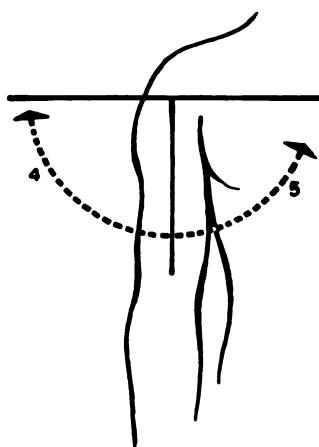


2. Posterior.

Figure 8. Muscles moving shoulder joint and arm.



1. Flexion of arm. }
2. Extension of arm. }



4. Abduction of arm. }
5. Adduction of arm. }



3. Inward rotation of arm.

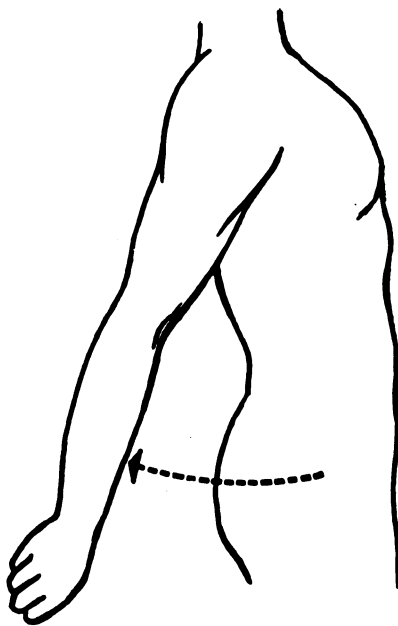


6. Outward rotation.

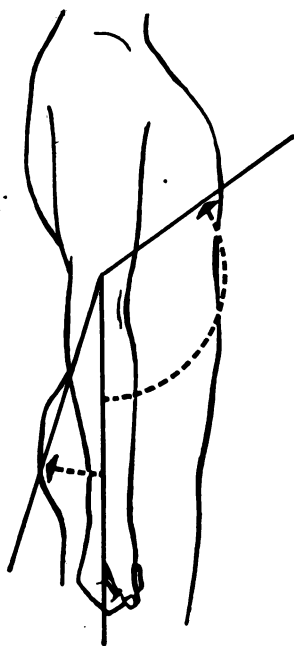
Figure 9. Movements of the shoulder joint and arm.



7. Circumduction.



8. Hyperextension of arm.



9. Forward flexion.

Figure 9—Continued.

Table VI. *Muscles Moving Elbow Joint and Forearm*

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Biceps brachii.....	Two heads, top of coracoid process, upper lip of glenoid fossa.	Bicipital tuberosity of radius.	Forearm flexion, forearm supination.	Raise and push.
Brachialis.....	Lower half of front of humerus.	Coronoid process of ulna.	Forearm flexion.....	Do.
Pronator teres.....	Lower part of inner condyloid ridge of humerus and medial side of coracoid process of ulna.	Middle third of outer surface of radius.	Forearm flexion, hand pronate.	Do.
Brachioradialis.....	Lower two-thirds or outer condyloid ridge of humerus.	Outer surface of lower end of radius at styloid.	Forearm flexion, hand pronate, hand supinate.	Do.
Pronator quad.....	Lower one-fourth of front of ulna.	Lower one-fourth of front of radius.	Hand pronate.....	Front kick.
<i>Posterior</i>				
Triceps brachii.....	(1) Lower lip of glenoid fossa and axillary border just below. (2) Space half inch wide from middle of the shaft up to great tuberosity. (3) Lower two-thirds of back of shaft of humerus.	End of olecranon process of ulna.	Forearm extend.....	Hip raiser.
Anconeus.....	Outer condyle humerus....	Posterior upper and ulna.	Forearm extend.....	Do.
Supinator.....	Outer condyloid ridge of humerus and neighboring part of ulna.	Outer surface of upper third of radius.	Hand supinate.....	Shoulder blade squeezer.

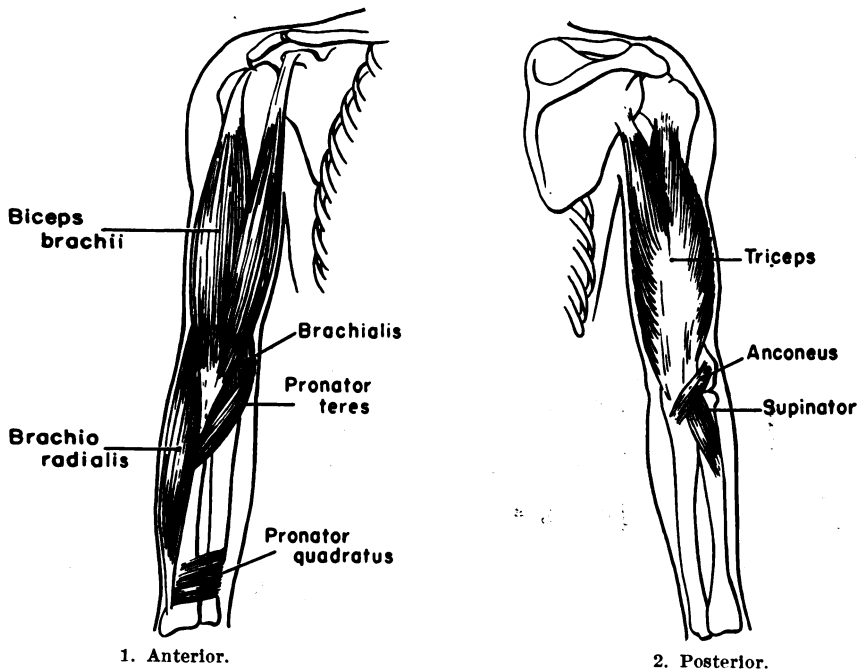


Figure 10. Muscles moving elbow joint and forearm.

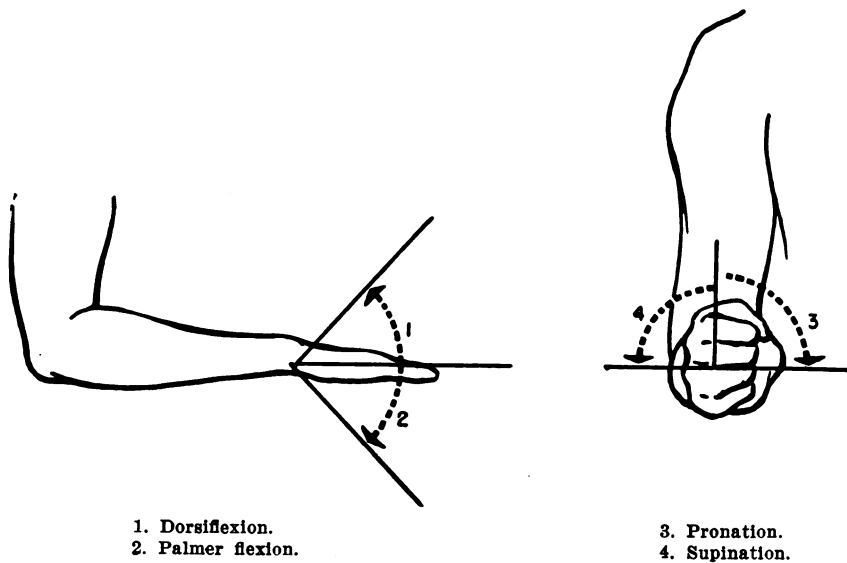
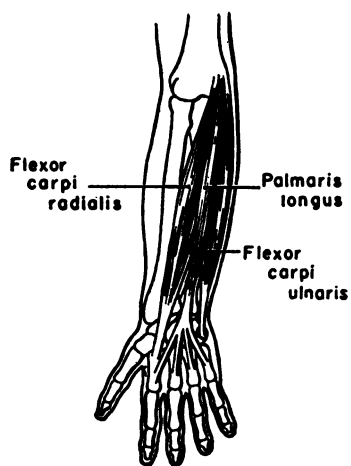


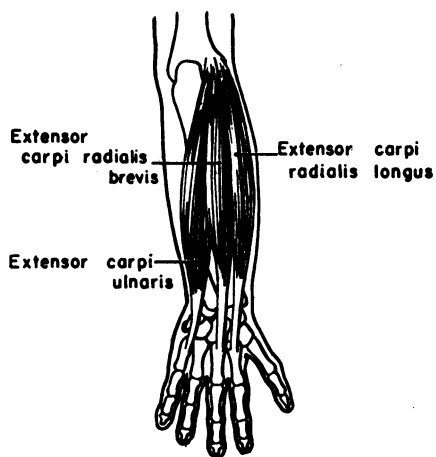
Figure 11. Movements of hand.

Table VII. *Muscles Moving Wrist Joint and Hand*

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Flexor carpi radialis-----	Inner condyle of humerus	Anterior surface second metacarpal bone.	Hand flexion (palmar flexion), hand abduct (radial deviation).	Chest raiser.
Flexor carpi ulnaris-----	Inner condyle of humerus and upper back of ulna.	Pisiform, hamate and fifth metacarpal.	Hand flexion (palmar flexion) hand adduct (ulnar deviation).	Do.
Palmaris longus-----	Inner condyle humerus----	Transverse carpal ligament of the wrist and palmar fascia.	Hand flexion-----	Do.
<i>Posterior</i>				
Extensor carpi radialis longus.	Outer condyle of humerus.	Base of second metacarpal.	Hand extend, hand abduct (radial deviation).	Shoulder blade squeezer.
Extensor carpi radialis brevis.	-----do-----	Dorsal surface of base of third metacarpal.	-----do-----	Do.
Extensor carpi ulnaris-----	Outer condyle humerus and back of shaft of ulna.	Ulnar side of base of fifth metacarpal.	Hand extend, hand adduct, (ulnar deviation).	Do.

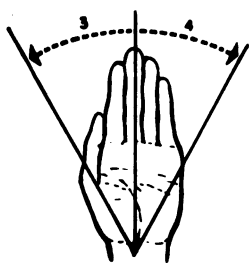


1. Anterior.

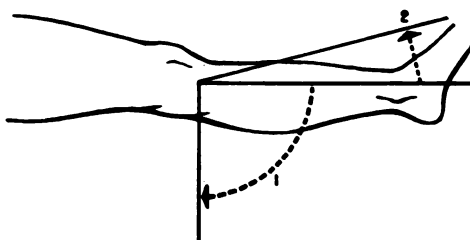


2. Posterior.

Figure 12. Muscles moving wrist joint and hand.



(1) WRIST
1. Abduction.
2. Adduction.



(2) KNEE
1. Flexion.
2. Hyperextension.

Figure 13. Movements of wrist and knee.

Table VIII. *Muscles Moving Hip Joint and Thigh*

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Psoas major	Sides of bodies of last thoracic and all lumbar vertebrae.	Lesser trochanter of femur.	Thigh flexed (pulls spine fwd in reversed action).	Front kick.
Iliacus	Inner surface of ilium and inner surface of sacrum adjoining the ilium.	Joins tendon of psoas and inserts on the lesser trochanter of femur and the shaft just below trochanter.	Thigh flexed, thigh extend rotate.	Do.
Pectineus	Space an inch wide on front of pubis just above crest.	Rough line leading from lesser trochanter down to linea aspera.	Thigh extend rotate, thigh thigh flexed, thigh adduct.	Do.
<i>Medial</i>				
Adductor longus	Front of pubis just below its crest.	Middle third of the linea aspera.	Thigh flexed, thigh adduct, thigh extend rotate.	Split and cross.
Adductor magnus	Edge of entire ramus of pubis and ischium and tuberosity of ischium.	Whole length of linea aspera and inner condyloid ridge.	do	Do.
Adductor brevis	Front of pubis just below origin of longus.	Upper half of linea aspera.	Thigh flex, thigh adduct.	Do.
Gracilis	Anterior margins of lower half of symphysis pubis and upper half of pubic arch.	Upper part of medial surface of body of tibia below the condyle.	Thigh adduct, thigh flexed.	Do.

Lateral

Tensor fasciae latae-----

Anterior iliac crest and surface of ilium just below crest.

Fascia of the thigh one-fourth of the way down on the outside.

Thigh flexed, thigh abducted, thigh inward, rotation.

Sidebend.

Gluteus medius-----

Outer surface of ilium just below crest.

Oblique ridge on lateral surface of great trochanter of femur.

Thigh abducted (anterior fibers give a combination of abduction with movement forward and rotation inward; posterior fibers give movement backward and rotation outward).

Do.

Posterior

Gluteus maximus-----

Posterior fourth of ilium, posterior surface of sacrum near ilium, fascia of lumbar area.

Gluteal line leading from great trochanter down to linea aspera.

Thigh extend, thigh rotate out (upper fibers are also capable of producing abduction, while the lower fibers can adduct the thigh).

"Squat" and up.

Gluteus minimus-----

Outer surface of ilium below origin of medius.

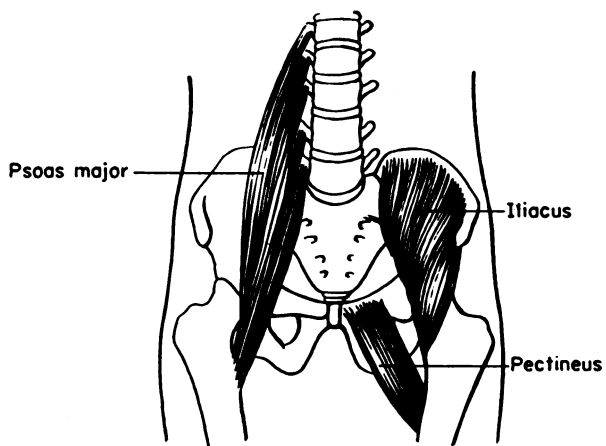
Anterior surface of great trochanter of femur.

Thigh abducted, thigh rotate inward.

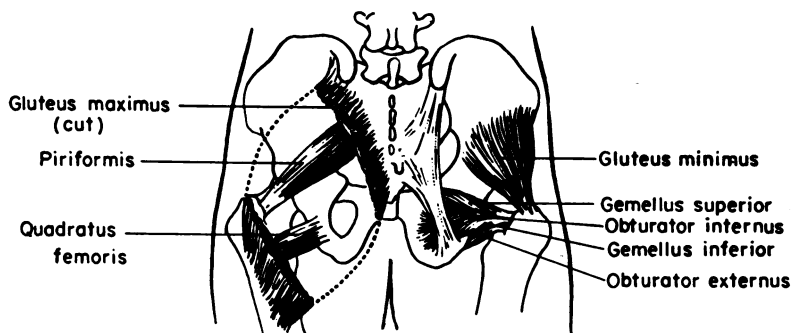
Sidebend.

Table VIII. *Muscles Moving Hip Joint and Thigh*—Continued

Muscle	Origin	Insertion	Action	Typical exercises
<i>Six Outward Rotators</i>				
Piriformis, quadratus femoris, obturator externus, obturator internus. Gemellus inferior (5 other muscles of the leg group act on the hip joint).	On the pelvic bone (ilium and ischium).	On the femur, upper end of the neck and the greater trochanter.	Thigh rotate (used in walking, running, etc.).	Foot supinators.
Sartorius	Notch between the anterior superior and anterior inferior spines of ilium.	Lower front of inner tuberosity of tibia.	Thigh flexed, leg flexed, leg rotate in, thigh rotate out (rotate knee inward if knee is in a flexed position of 90° or more).	Foot supinator.
Biceps femoris	Tuberosity of ischium, lower half of linea aspera, outer condyloid ridge.	Outer tuberosity of tibia and head of fibula.	Leg flexed, leg rotate out, thigh extend, thigh rotate out.	Squat and up.
Semitendinosus	Tuberosity of ischium	Lower front of inner tuberosity of tibia.	Thigh extend, thigh rotate in, leg flexed, leg rotate in (internal rotation of knee if knee is flexed to 90° or more).	Do.
Seminembranosus	do.	Posterior surface of inner tuberosity of tibia.	do.	Do.

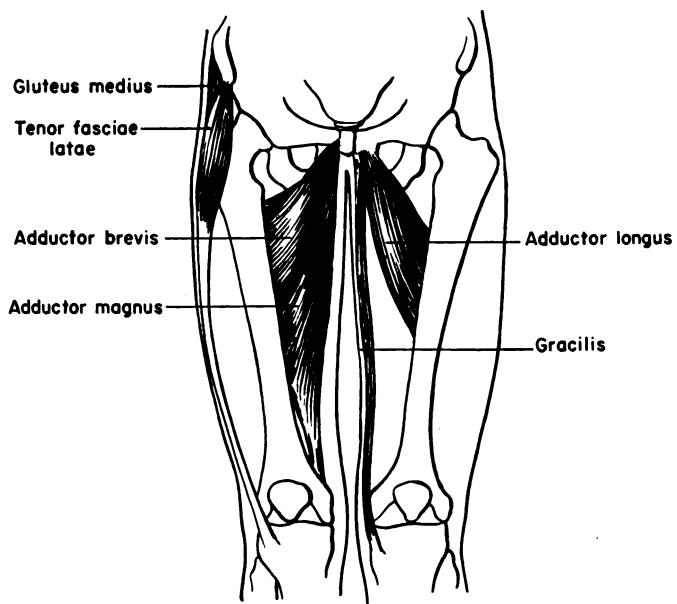


1. Anterior.



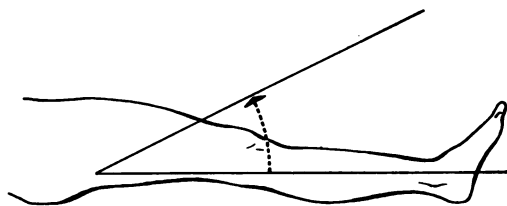
2. Lateral.

Figure 14. Muscles moving hip joint and thigh.

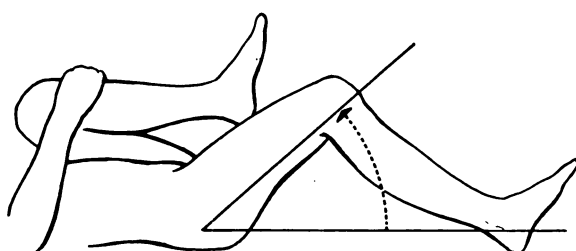


3. Medial.

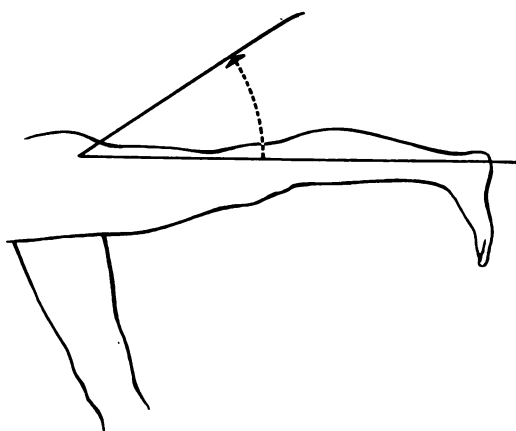
Figure 14—Continued.



1. Flexion.

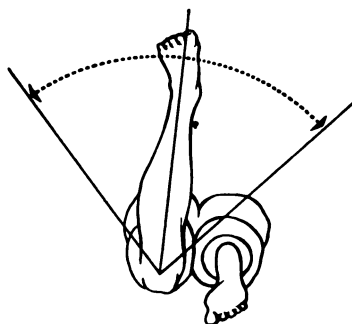


2. Hip and knee.

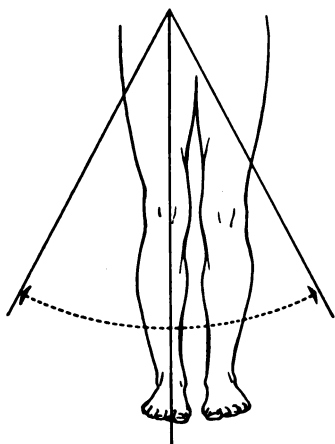


3. Hyperextension.

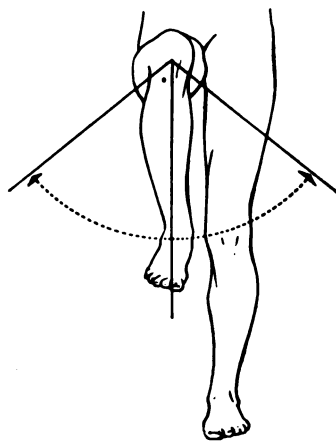
Figure 15. Movements at the hip and knee.



4. Rotation in hip.



5. Abduction and adduction.



6. Rotation in hip.

Figure 15—Continued.

Table IX. Muscles Moving the Knee Joint and Leg

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Rectus femoris	Anterior inferior spine of ilium between its tip and the hip joint.	Top of patella	Leg extend, thigh flexed.	Front kick.
Vastus intermedius	Surface of upper two-thirds of front of femur.	Upper border of patella	Leg extended	Alternate leg raiser.
Vastus medialis (Internus)	Length of linea aspera and inner condyloid line.	Common tendon of quadriceps.	Leg extended draws patella inward.	Do.
Vastus lateralis	Outer surface of femur below great trochanter and upper half of linea aspera.	Outer half of upper border of patella.	do	Do.
<i>Posterior</i>				
Popliteus	Lateral condyle of femur	Medial two-thirds of the triangular surface above the popliteal line on the posterior surface of the body of the tibia.	Leg flexed, leg rotate inward.	Hip raiser.

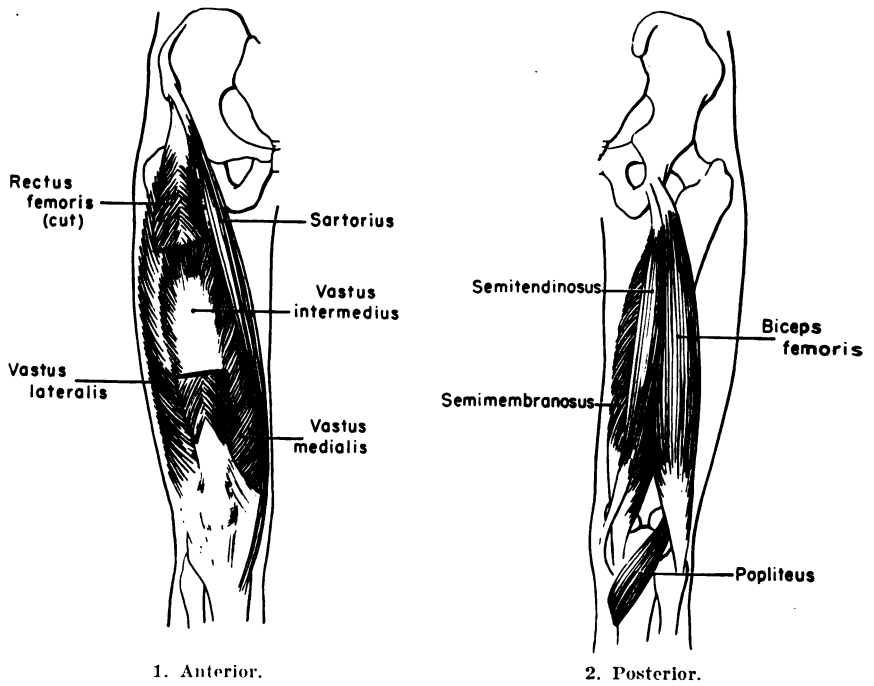


Figure 16. Muscles moving knee joint and leg.

Table X. *Muscles Moving the Ankle and Foot*

Muscle	Origin	Insertion	Action	Typical exercises
<i>Anterior</i>				
Tibialis anterior.....	Outer tuberosity and upper part of shaft of tibia interosseous membrane, fascia and intermuscular septum.	Internal cuneiform and metatarsal bone of great toe.	Foot flexed, foot supinate.	Leg stretcher.
Peroneus tertius.....	Lower outer fibula, interosseous membrane and septum.	Base fifth metatarsal.....	Foot flexed, foot pronate (eversion).	Do.
Peroneus longus.....	Head and upper two-thirds of outer surface of fibula.	Undersurfaces of first cuneiform and first metatarsal.	Foot extended, foot pronate (eversion).	Stationary run.
Peroneus brevis.....	Lower two-thirds of outer surface of fibula.	Tuberosity of fifth metatarsal bone.	do.....do.....	Do.

Muscle	Origin	Insertion	Action	Typical exercises
<i>Posterior</i>				
Gastrocnemius-----	Back of the two condyles of the femur.	Posterior surface of calcaneus.	Foot extended, leg flexed.	Neck firm and on toes.
Soleus-----	Upper part of posterior surfaces of the tibia, fibula and interosseous membrane.	-----do-----	Foot extended.	Do.
Plantaris-----	Lower part of lateral prolongation of linea aspera and from the oblique popliteal ligament of the knee joint.	Posterior part of calcaneus.	Leg flexed, foot extended.	Do.
Tibialis posterior-----	Posterior surface of upper half of interosseous membrane and adjacent surface of tibia and fibula.	Tuberosity of navicular bone and by fibrous expansions of most of the tarsal and metatarsal bones.	Foot extended, foot pronate (eversion).	Stationary run.

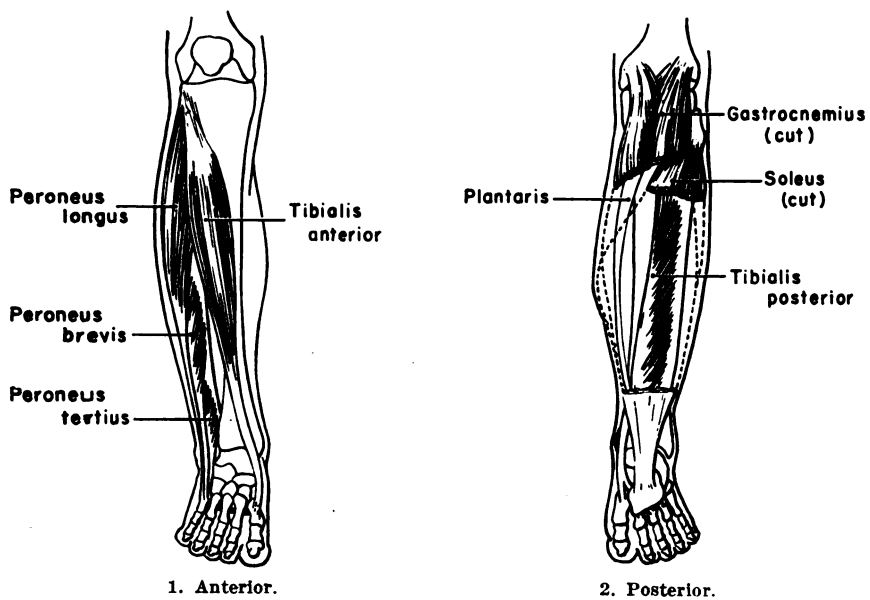
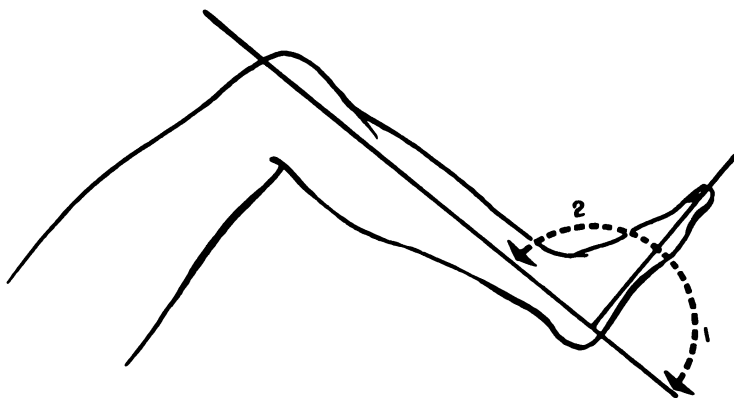
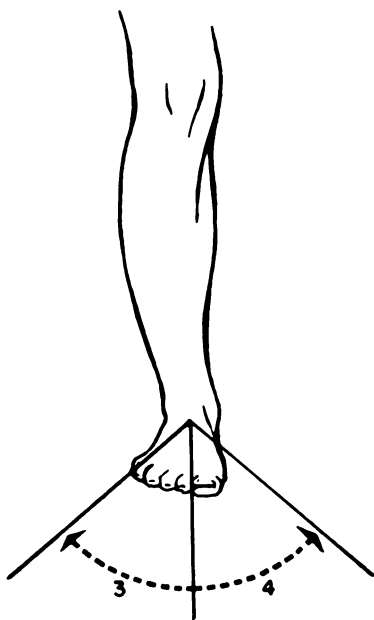


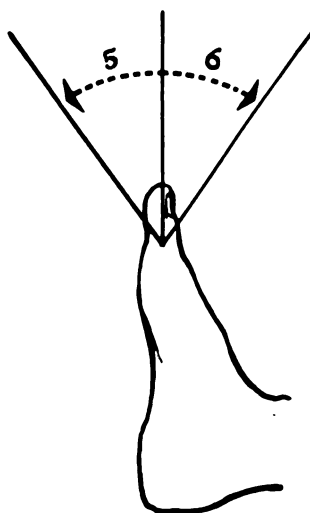
Figure 17. Muscles moving the ankle and foot.



ANKLE:
 1. Plantar flexion.
 2. Dorsiflexion.



ANKLE:
 3. Eversion.
 4. Inversion.



TOE:
 5. Flexion.
 6. Extension.

Figure 18. Movements of ankle and toes.

CHAPTER 4

RECONDITIONING PROGRAM FOR BED PATIENTS

Section I. GENERAL

11. Adaptation of Exercises

a. Exercises Must Fit Individual Needs. When the most desirable series of exercises have been prescribed for a bed patient, he should have the individual attention of the instructor while learning the exercises. When each patient has mastered his individual exercises, a single instructor may administer the exercises to several patients at the same time. The small group method provides motivation which may be lacking in completely individualized exercise. This manual provides for general conditioning and developmental exercises for patients with different degrees of disability. Similar types of patients can be grouped together for their exercises. A certain amount of group interest can be used to motivate individuals within the group; an exercise "mind set" makes exercises more desirable for the group than to have one patient exercise while others are doing nothing or engaging in distracting activities. Where ratio of numbers of physical reconditioning instructors to patients is adequate, the individual approach will be emphasized. In times of emergency, where the ratio of physical reconditioning instructors is inadequate for the individual method, the group method will be used.

Caution: When untoward effects of exercise are noted, the doctor or nurse should be summoned immediately.

b. Muscle Testing.

- (1) Since physical reconditioning in its early application involves primarily the noninjured parts of the body, preliminary individual testing procedures for these parts are not considered on the same basis as those for injured members. In physical reconditioning, the development and conditioning of muscle groups are of primary concern rather than activities designed to develop individual muscles. However, it is important that the results of muscle tests given for diagnostic purpose be considered when physical reconditioning activi-

ties are prescribed or carried out. Stress should be laid on activities that tend to counteract muscle imbalance, which may lead to fixed deformities.

- (2) Weak muscles are easily subjected to strain by overloading or overexertion or exercise. A muscle that has developed a contraction as a result of weakness of the antagonistic muscles usually is an abnormally strong muscle. Recognition of this abnormally strong pull in the muscle is important in relation to physical reconditioning as stretching of the overly strong muscle may or may not be indicated.

c. Exercise Tolerance. The bed patient is usually able to undergo more exercise than ordinarily is thought possible as he is recumbent and the prescribed exercises use relatively limited muscle groups. Allowing adequate rest periods between exercises is essential. In this recumbent position the blood supply to his brain is completely adequate; thus, there is little tendency to untoward sympathetic responses which might cause faintness if one were standing. To prevent or retard deterioration while in bed, the patient should be given exercises to the point of tolerance within his medical or surgical limitations. It is important that the patient start with exercises which are within his physiologic tolerance. The exercises should be gradually and progressively increased as the patient's physiologic tolerance increases. The nearer the exercise approaches the limit of a patient's tolerance, the more rapid will be his progress. Due consideration must be given to individual variations in age and physical condition. Some enter the hospital in very good condition, others do not. Some have been injured severely, others have experienced minor injuries or illnesses. Some are overweight and unaccustomed to exercise. While the majority of patients are youths, there will be a considerable number of men over 30 years of age who have not exercised regularly until they entered the service. All such types may be located in the same ward. To adapt to these varying conditions, the reconditioning personnel will individualize the exercise program as far as is possible in accordance with the prescription of the medical officers.

d. Time Allotment. Most bed patients who are taking part in the exercise program should exercise approximately 45 minutes per day divided into two periods of 25 and 20 minutes each. The daily schedule of the patient should provide specific periods for physical exercise and the ward routine should allocate a definite amount of time for its accomplishment. Unless contra-indicated, patients should be encouraged to spend additional time performing "on-the-hour" exercises to further their recovery. This should not be permitted to conflict with other medical prescriptions.

e. Bed Patients' Program.

- (1) The strongest emphasis for this class of patients will be placed on conditioning exercises. The types of activities engaged in will consist of the following:
 - (a) General conditioning exercises.
 - (b) Resistant exercises with and without apparatus.
 - (c) Posture bed series.
 - (d) Specific supportive exercises.
 - (e) Self-administered activities where it is indicated by the medical officer that the patient should perform them.
- (2) The use of spring and resistant exercises is strongly recommended as a supplement to bed calisthenics to augment the exercise in those cases where additional activity is indicated. One series of conditioning exercises has been designed for bed patients to prevent deconditioning of the unaffected parts. These are often prescribed to be done every hour. Suitable alternates have been suggested to meet individual needs. The use of these alternates and/or specific remedial activities provide a variety of alternates which make it possible for each patient to have an *individually prescribed series of activities designed for his general conditioning and also designed to ameliorate his particular disability*. This routine eliminates the necessity for teaching new exercises. The series of exercises makes possible the increasing dosage of activity in a gradual and progressive manner. Each patient is encouraged to memorize his set of exercises so that the conduct of the program may be facilitated.

12. Patient Orientation

a. Responsibility.

- (1) The success of the reconditioning program is directly proportional to the manner in which patients respond to the activities. It is the task of all hospital personnel to interpret the program to patients so as to secure their understanding and cooperation.
- (2) Definite plans should be made to explain the physiologic basis of the exercises prescribed. The best way to bring about a patient's wholehearted participation in the physical reconditioning activities is for his medical officer to prescribe them. Nurses and ward attendants should understand the purposes of the program and give constant support to it.

b. Understanding. A sympathetic understanding of the patient's mental attitude is necessary in the much needed rapport between the patient and the hospital staff. Remembering names and small personal details about the patient and his family adds greatly to the

patient's confidence in the physical reconditioning instructor. The physical reconditioning instructor should understand the patient's mental attitude toward exercise. Many patients are fearful of the possible ill effects of exercise; others are naturally reluctant to exercise. Patients should be given a simple explanation of "why" exercises will be of help to them (the purpose of exercise for one's specific disability) as well as reasons why the exercises will not harm them.

Section II. PLANNED EXERCISE SERIES

13. Exercise Selection

a. Since deconditioning of the unaffected parts can be prevented by carefully prescribed conditioning exercises, a series of exercises has been outlined for this purpose. For many patients this series may be prescribed without any significant change. Alternate exercises, however, are provided for patients with specific disabilities who may not engage in certain exercises of the series. *Alternate exercises are those which do not involve the affected part.* Alternate exercises can be executed unless the patient suffers multiple injuries. The patient should not be permitted to remain inactive because of his disability (additional alternates may be selected). In paragraph 15, alternate exercises follow each described exercise. Thus exercise (2A) is an alternate for exercise (2) for leg disabilities for which exercise is contraindicated.

b. By selecting suitable alternate exercises to replace contraindicated exercises in the series suggested for bed patients, a series of specific exercises to meet each patient's individual needs can be developed. Routinely, there are seven exercises in the series for bed patients. These should cover the principle muscle groups of the body, except where exercise of specific muscle groups is contraindicated. To insure sufficient dosage of exercise for strengthening the various muscle groups and to prevent over-fatiguing, the exercise series is executed through once, then repeated immediately, a total of 14 exercises.

14. Administering Exercises

a. Limitation. Patients who are just beginning a program of bed exercises should be limited to 4-count repetitions prescribed for each exercise with a generous rest period between each exercise. As patients show improvement, the number of repetitions may be increased to a maximum of 12 repetitions for each exercise, with rest periods between exercises very much reduced.

b. Cadence. Cadence for all exercises will be indicated as "slow," "moderate," or "fast." It is impracticable to express cadence in counts per minute. This would require a highly developed sense of timing

on the part of the instructor. What would be "fast" cadence for an exercise of long range, involving the whole body, would be a "slow" cadence for a movement of one part over a short range. For example: a full front bend of the trunk versus the flexion and extension of the fingers. In general, a "fast" cadence may be taken to indicate that the movement is done as rapidly as it can be comfortably executed, without any appreciable pause or tension at the end of each movement. "Moderate" indicates that the movement is slow enough to enable the patient to make a momentary pause in full muscular contraction at the end of each phase of the movement. "Slow" indicates that the movement will allow a sustained pause under full muscular contraction at the end of each movement. Almost all remedial exercises will be done in "slow" cadence.

c. Modifications. The situation may occur where most of the exercise may be used, yet a disability of one part of the body will contraindicate some of the movements of the exercise. For example: in the exercise "leg stretcher" the fingers are to be flexed hard. In patients with a hand disability, of course, this part of the exercise would be omitted. A similar condition may apply in all exercises where movement of some part of the body would be contraindicated.

Table XI. Conditioning Exercises for Bed Patients Showing Adaptations for Different Disabilities

	Disability			
	Upper extremity	Lower extremity	Abdominal	Back
(1) Raise and push.....	(-)	(x)	(x)	(x)
(1A) Alternate leg raiser.....	(x)	(-)	(-)	(*)
(2) Leg stretcher.....	(x)	(-)	(x)	(-)
(2A) Body stretch.....	(-)	(*)	(*)	(-)
(3) Shoulder retractor.....	(-)	(x)	(x)	(x)
(3A) Chest raiser.....	(x)	(*)	(*)	(-)
(4) Curl and twist.....	(x)	(x)	(-)	(-)
(4A) Foot supinator.....	(*)	(-)	(x)	(x)
(5) Bridge raiser.....	(-)	(-)	(x)	(-)
(5A) Split and cross.....	(x)	(-)	(-)	(-)
(6) Hip shrugger.....	(x)	(-)	(x)	(x)
(6A) Back flattener.....	(x)	(x)	(x)	(-)
(7) Four-count breather.....	(x)	(x)	(x)	(x)

(-) Contraindicated.

(x) Indicated.

(*) May replace original exercises.

Section III. CONDITIONING EXERCISES FOR BED PATIENTS SHOWING ADAPTATIONS FOR DIFFERENT DISABILITIES



STARTING POSITION

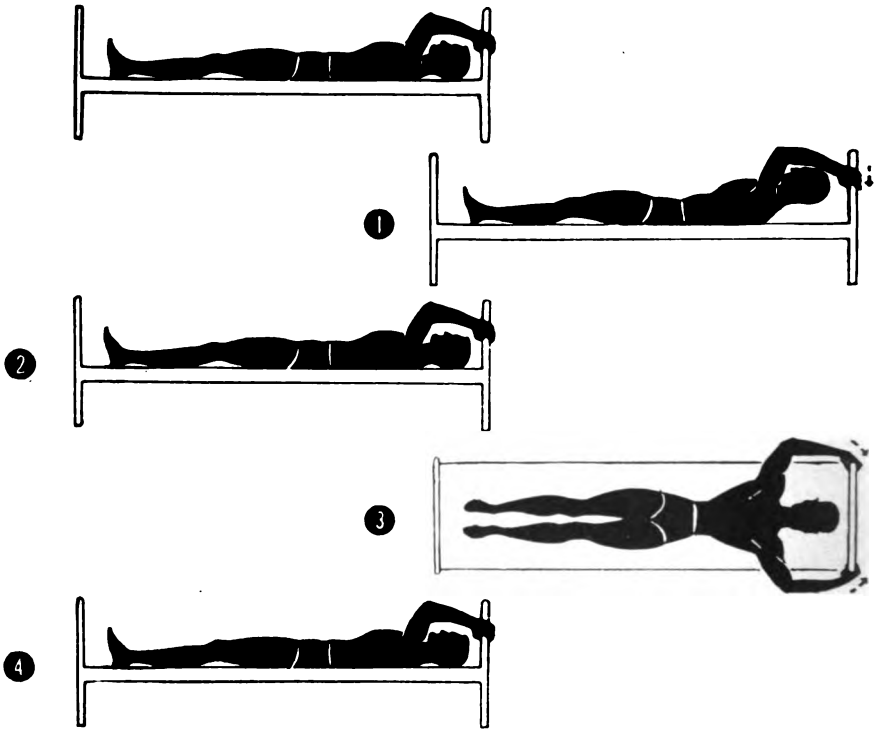


Figure 19. Raise and push.

15. Exercises Adapted to Disabilities

(1) *Raise and push.*

CADENCE: Slow.

STARTING POSITION: Supine, hands grasping the sides of the head of the bed about 8 inches above the level of the mattress.

MOVEMENT: (1) Push down toward the floor with the hands, pushing hard enough to lift head and shoulders slightly from the bed. Do not assist this movement with the abdominal or thigh flexor muscles. Do not bent head forward. (2) Recover to starting position. (3) Push with both hands overhead in a direction away from the feet, and at the same time move hands together inward toward the middle line of the bed. (4) Recover the starting position.

MUSCLE GROUPS ACTING: (p) out ro sc, ar fwd to up, fo fl, fi, fl, po fl, po add, add sec, ar sdw to up, h fl (s) tr ex, n fl, h abd.

STARTING POSITION

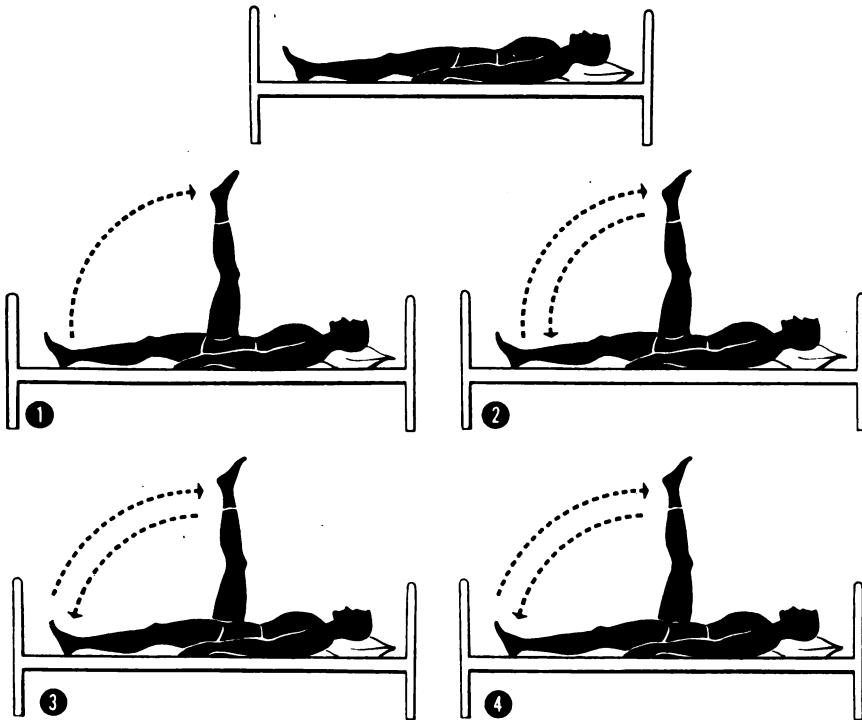


Figure 20. Alternate leg raiser.

(1A) Alternate leg raiser.

CADENCE: Moderate.

STARTING POSITION: Supine, feet together, arms at side.

MOVEMENT: (1) Raise left leg upward to the vertical. (2) Lower left leg and at the same time raise right leg to the vertical. Knees should not be bent. (3) Lower right leg and at the same time raise left leg to vertical. (4) Lower left leg and at the same time raise right leg to vertical. On last repetition finish with both legs on bed.

MUSCLE GROUPS ACTING: (p) th fl, (s) tr fl, l ex.

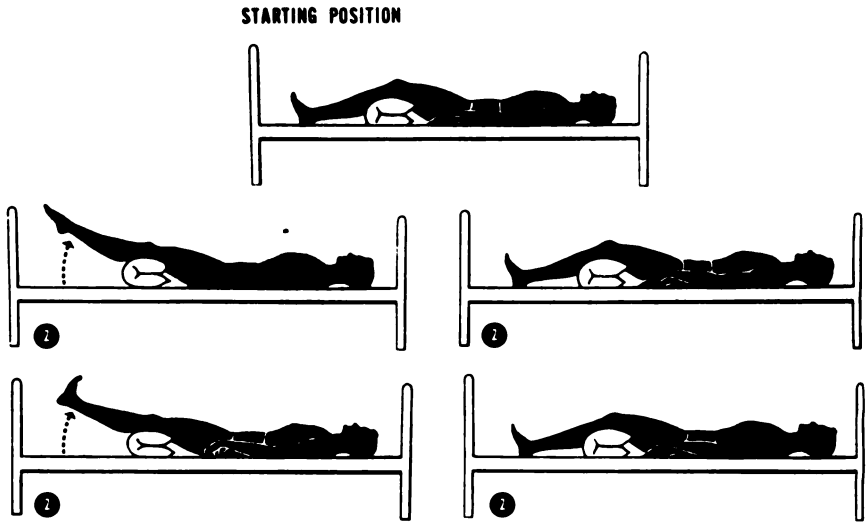


Figure 21. Leg stretcher.

(2) Leg stretcher.

CADENCE: Slow.

STARTING POSITION: Supine with pillow doubled and placed under knees, feet together, arms at side.

MOVEMENT: (1) Extend lower legs, extend feet, pointing toes downward, forcibly resting knees on pillow; flexing fingers hard (2) Recover to starting position, opening hands hard. (3) Extend lower legs hard and flex feet, pushing forward with heels and flex fingers hard. (4) Recover to starting position, opening hands hard.

MUSCLE GROUPS ACTING: l ex, ft ex, ft fl.

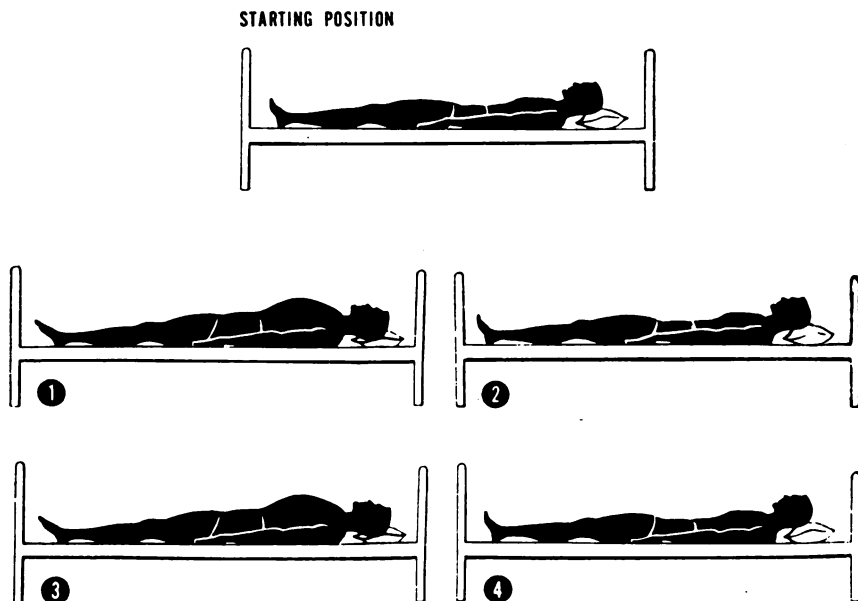


Figure 22. Body stretch.

(2A) Body stretch.

CADENCE: Slow.

STARTING POSITION: Supine.

MOVEMENT: (1) Tighten muscles on both sides of the thighs (quadriceps and hamstrings) and extend feet, stretching toes downward hard. Learn to make muscles hard like trying to "make a muscle" on upper arm. Inhale with this count. (2) Relax the leg muscles generally but flex upward hard and exhale. (3) Repeat count (1). (4) Repeat count (2). Four to six repetitions.

Note. This exercise which tenses muscles on both sides of the thighs, may be used when it is inadvisable to contract strongly muscles of one side of thigh only; as in nearly healed fractures of the thigh.

MUSCLE GROUPS ACTING: (p) th ex, th fl, ft fl, ft ex, (s) insp, expr, l fl, l ex.

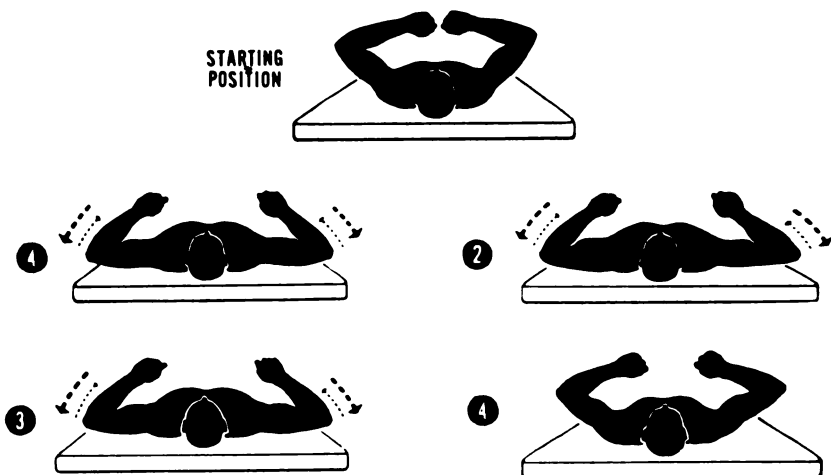


Figure 23. *Shoulder retractor.*

(3) *Shoulder retractor.*

CADENCE: Slow.

STARTING POSITION. Supine, elbows raised sideward, slightly off the bed, fingers flexed in front of shoulders.

MOVEMENT: (1) Move elbows back hard as if trying to break a chain held in the two hands. Press elbows hard against the bed, then relax. (2) Pull again, then relax. (3) Repeat count (2). (4) Recover to starting position. Four to six repetitions.

MUSCLE GROUPS ACTING: (p) ad sc, ar sdw to bkw, (s) tr ex, n ex, fo fl, fi fl, po fl, po add.

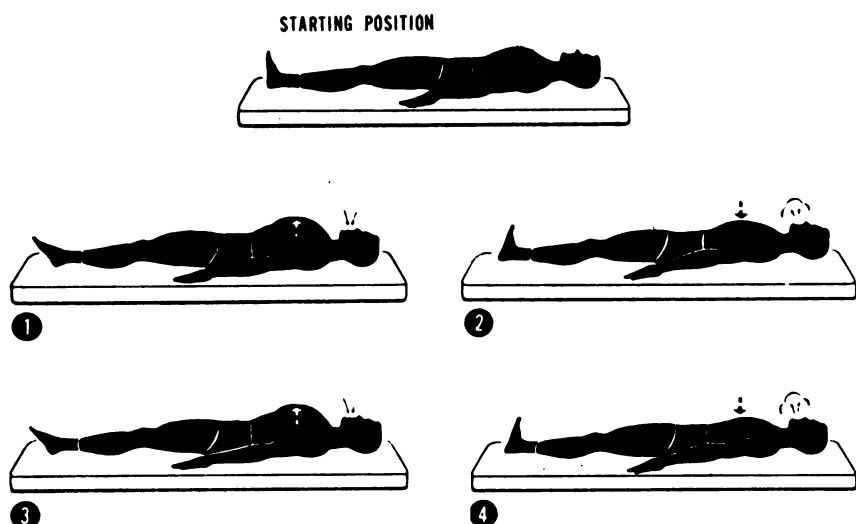


Figure 24. Chest raiser.

(3A) Chest raiser.

CADENCE: Moderate.

STARTING POSITION: Supine, arms by side, palms down.

MOVEMENT: (1) Raise chest forcibly and inhale deeply, press backward against bed with head and arms. At the same time contract all of the back muscles hard. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

MUSCLE GROUPS ACTING: (p) tr ex, n ex, ar bkw, insp, in ro sc, (s) fo ex, h fl, l fl, l ex.

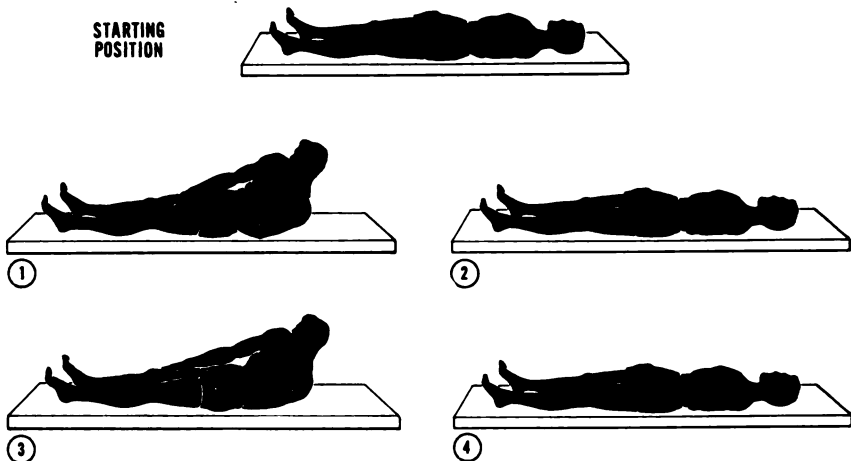


Figure 25. Curl and twist.

(4) *Curl and twist.*

CADENCE: Moderate.

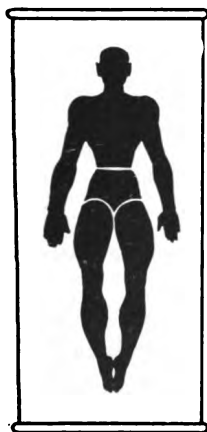
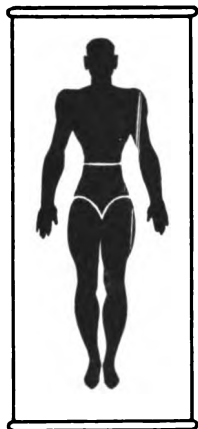
STARTING POSITION: Supine, feet about 24 inches apart, hands on tops of thighs.

MOVEMENT: (1) Raise head and shoulders from bed, raising right shoulder the higher. Touch left knee with right hand. Keep lumbar region on bed. (2) Recover to starting position. (3) Repeat count (1) on other side. (4) Recover to starting position.

Note. Contraindicated in hip disabilities.

MUSCLE GROUPS ACTING: (p) tr fl, tr ro, th fl, abd sc, (s) n fl, l ex, ar fwd in ra, fo ex.

**STARTING
POSITION**



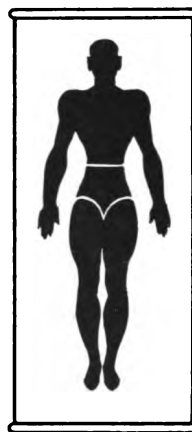
1



2



3



4

Figure 26. Foot supinator.

(4A) *Foot supinator.*

CADENCE: Slow.

STARTING POSITION: Supine, feet together, toes pointed downward.

MOVEMENT: (1) Bend ankles inward until soles of feet are together and knees very slightly bent; press soles together hard; (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

Note. If the patient has undergone a recent abdominal operation he should press his heels hard against the bed.

MUSCLE GROUPS ACTING: (p) th add, ft sup, ft ex.

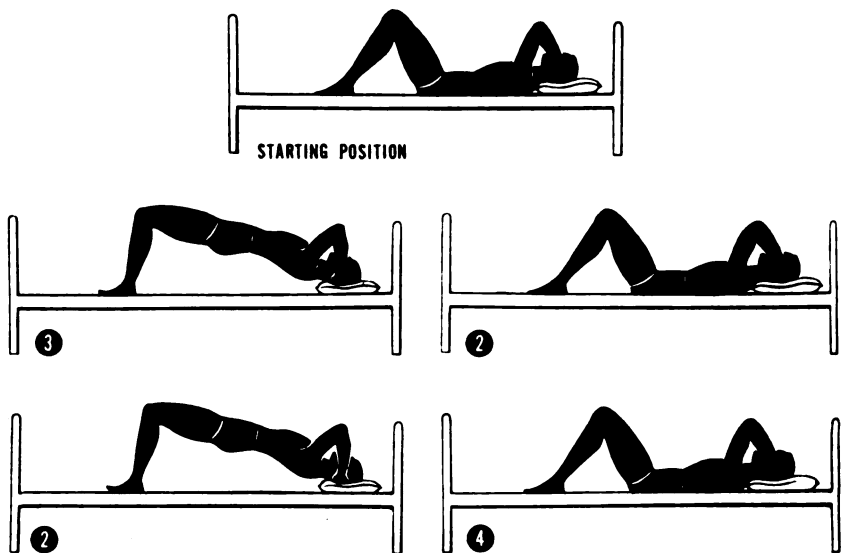


Figure 27. Bridge raiser.

(5) *Bridge raiser.*

CADENCE: Slow.

STARTING POSITION: Supine with knees fully flexed and feet about 2 feet apart. Fists are pressed on pillow at sides of head.

MOVEMENT: (1) Raise trunk from bed, resting weight solely on head, fists and feet. Hips should be raised until the body is approximately straight from shoulders to knees. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

MUSCLE GROUPS ACTING: (p) tr ex, n ex, th ex, out ro sc, ar fwd to up, l ex, (s) fo ex, h fl, h ex.

UV

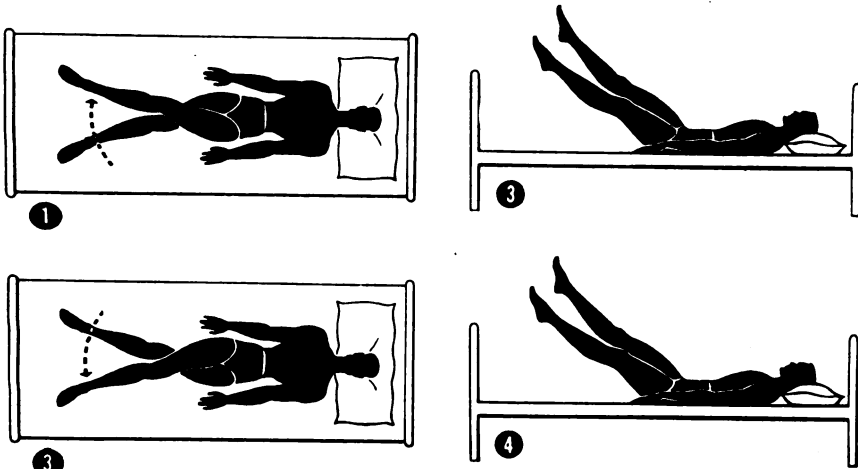
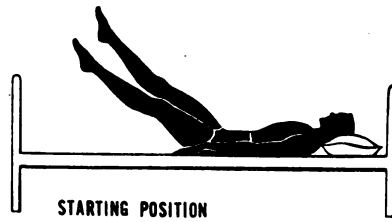


Figure 28. *Split and cross.*

(5A) *Split and cross.*

CADENCE: Moderate.

STARTING POSITION: Supine, legs raised from bed approximately 45° and separated widely, knees straight, arms at side.

MOVEMENT: (1) Swing legs together and cross them as far as possible, left leg over right leg. (2) Recover to starting position, with legs widely separated. (3) Swing legs together and cross them, right leg over left leg. (4) Recover to starting position.

Note. Exercise becomes more strenuous as angle between legs and bed decreases. For leg in traction, substitute "chest raiser."

MUSCLE GROUPS ACTING: (p) tr fl, th fl, (s) th abd, th add, l ex.

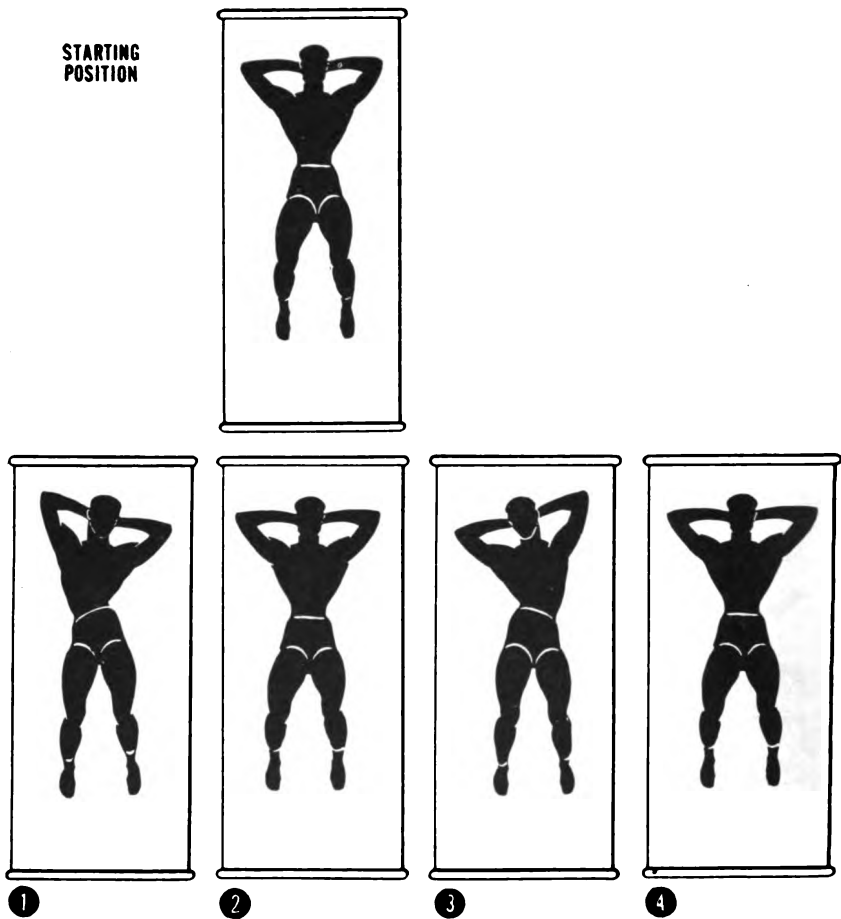


Figure 29. Hip shrugger.

(6) *Hip shrugger.*

CADENCE: Slow.

STARTING POINT: Supine, knees flexed, feet about 14 inches apart, hands behind head.

MOVEMENT: (1) Raise left hip from the bed and shrug it up toward the armpit on that side as though trying to bring top of hip bone under the armpit. The hip movement is like raising one's foot from the ground while standing with both knees straight. (2) Recover to starting position. (3) Shrug the right hip upwards toward the right armpit in a similar manner. (4) Recover to starting position.

Note. Contraindicated in hip disabilities.

MUSCLE GROUPS ACTING: (p) tr ab, (s) tr ro, th ex, l ex. The last two muscle groups (th ex and l ex) act if patient assists by straightening legs.

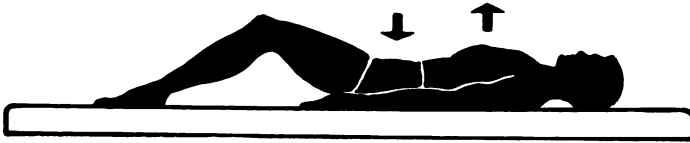


Figure 30. *Back flattener.*

(6A) *Back flattener (alternate).*

CADENCE: Slow.

STARTING POSITION: Supine, knees slightly flexed.

MOVEMENT: (1) Draw in abdomen, contract buttocks, tilt pelvis forward and exhale. (2) Inhale, keeping abdomen in and chest raised, relax pelvis. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) tr abd ret, th ex, (s) th out ro, insp expr.

STARTING POSITION

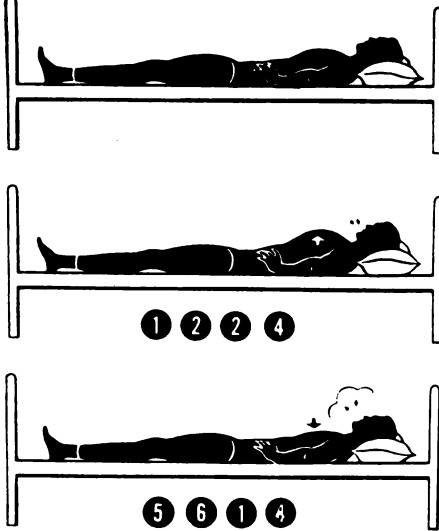


Figure 31. *Four-count breather.*

(7) *Four-count breather.*

CADENCE: Slow.

STARTING POSITION:

Supine, hands on hips.

MOVEMENT: (1) (2) (3) (4) Inhale on four counts, taking a deeper breath on each count. Usually, the patient will have inhaled fully by the third count, but he should try to inhale further on the fourth count. (5) (6) (7) (8) Exhale in "waves" in four counts. Try to blow out all of the air on the seventh and eighth counts.

MUSCLE GROUPS ACTING: (p) expr, inspr.

16. Resistant Exercises for Bed Patients

Resistant exercises for bed patients will divided into—

Manual resistant exercises.

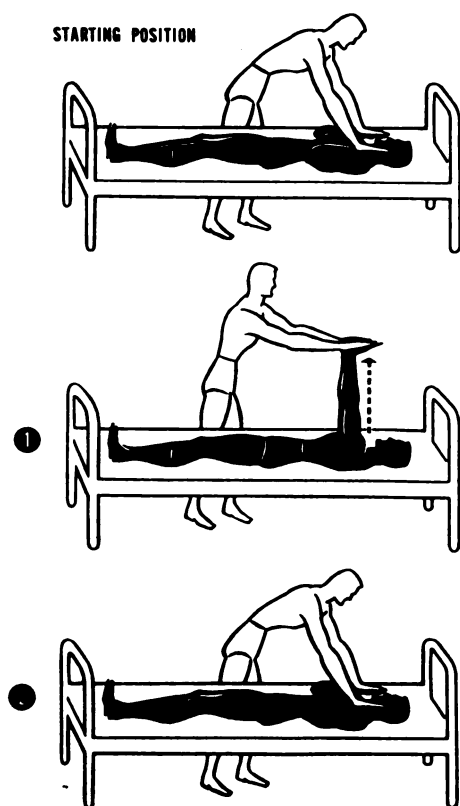
Resistant excercises with apparatus, weights, or springs, or rubber cables.

Specific supportive resistant exercises.

17. Manual Resistant Exercise for Bed Patients

a. In manual resistant exercises the instructor resists the movements of the patient. "A" refers to the patient and "B" refers to the physical reconditioning instructor. The resistant exercises given below are designed to exercise most of the important groups of muscles. They exercise primarily the arms and legs. The preceding exercises (conditioning exercises for bed patients) should be used to exercise muscles of the body for general conditioning and resistant exercises should be used as a supplement.

b. Before beginning resistant exercises, the patient should warm up by doing a few flexions and extensions of the limbs. More extensive warming up is not necessary, as the resistant exercises are all done at slow or moderate cadence.



(1) *Arms thrusting forward.*

CADENCE: Slow.

STARTING POSITION:

"A" supine, forearms flexed, fingers flexed.

"B" places palms down on "A's" hands.

MOVEMENT: (1) "A"

extends forearms and raises elbows, until arms are at an angle of 90° to bed. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

MUSCLE GROUPS ACT-

ING: abd sc, ar fwd ra, fo ex, h fl.

Figure 32. Arms thrusting forward.

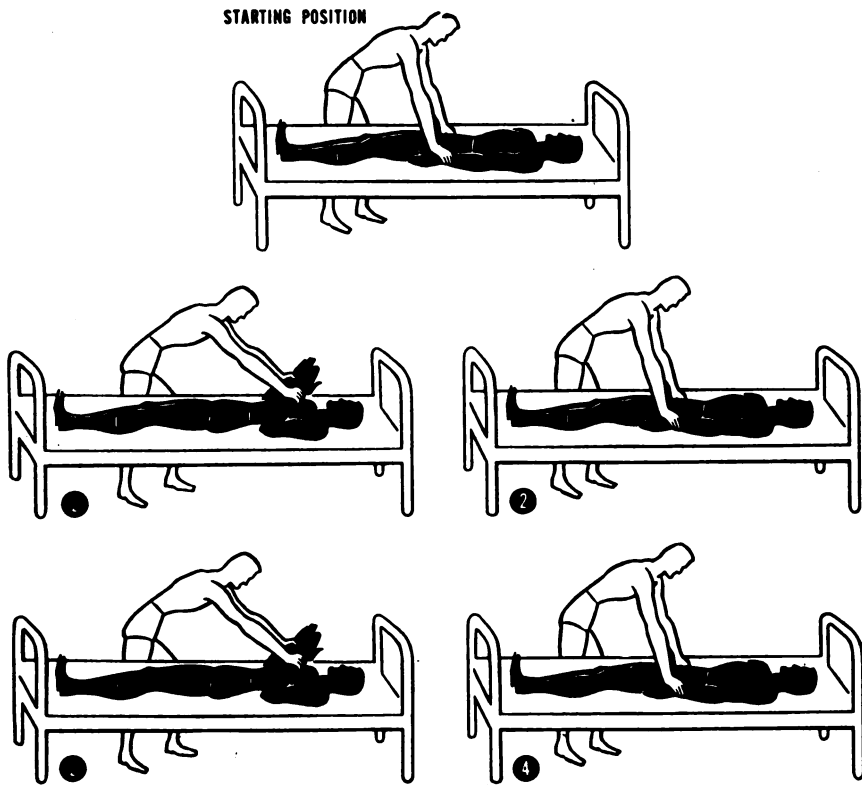


Figure 33. Flexing elbows.

(2) *Flexing elbows.*

CADENCE: Slow.

STARTING POSITION: "A" supine, arms by side. "B" grasps "A's" wrists.

MOVEMENT: (1) "A" flexes elbows, "B" resists. (2) "A" returns to starting position as "B" resists. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p_1) fo fl, (p_2) fo ex, (s) ar bk w.

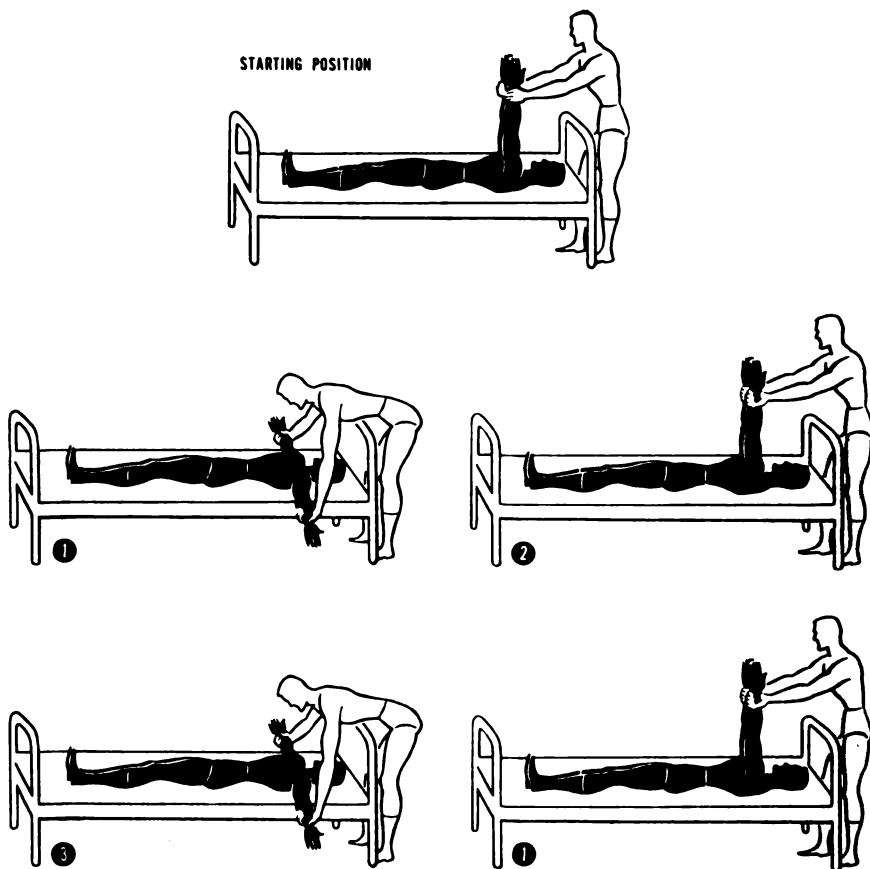


Figure 34. Arms separated and inward.

(3) *Arms separated and inward.*

CADENCE: Slow.

STARTING POSITION: "A" supine, arms forward (toward ceiling), "B" grasps outside of "A's" wrists.

MOVEMENT: (1) "A" spreads arms trying to swing them horizontally to the side so that his upper arms are against the bed. "B" resists. (2) "B" grasps inside of "A's" wrists and resists his efforts to return to starting position. (3) Repeat count (2).

MUSCLE GROUPS ACTING: (p_1) add sc, ar fwd to sdw, (s) fo ex, (p_2) abd sc, ar sdw to fwd, (s) fo fl.

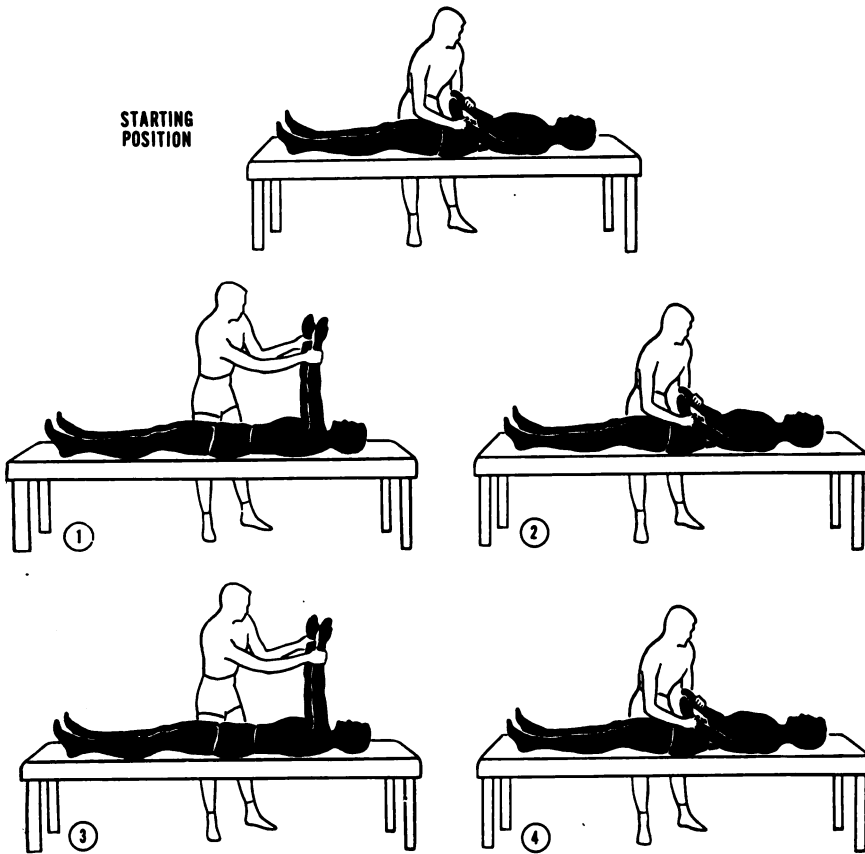


Figure 35. Arms forward and up.

(4) *Arms forward and up.*

CADENCE: Slow.

STARTING POSITION: "A" supine, arms by side. "B" grasps "A's" wrists, palms down, thumbs forward.

MOVEMENT: (1) "A" swings arms forward to above chest position. "B" resists this movement enough to make it difficult. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: out ro sc, ar dwn to fwd, fo fl, (s) tr ex.

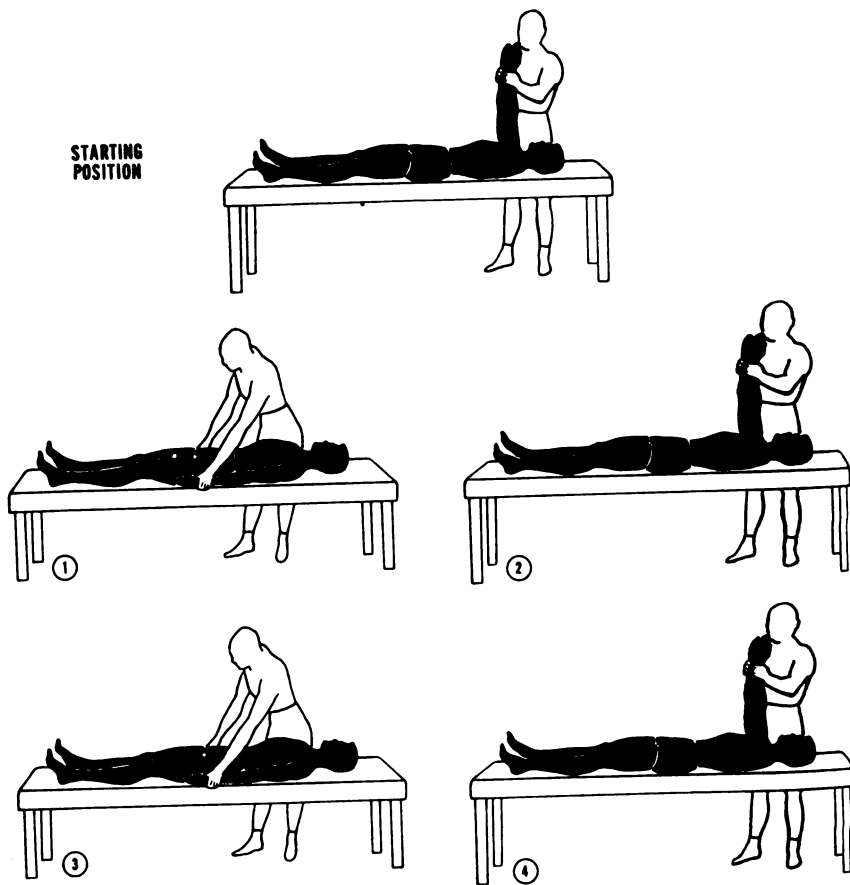


Figure 36. Arms forward to downward.

(5) *Arms forward to downward.*

CADENCE: Slow.

STARTING POSITION: "A" supine, arms forward, "B" with palms up, grasping "A's" wrists.

MOVEMENT: (1) "A" moves forward downward to side. "B" resisting enough to make it difficult. (2) "A" recovers to starting position, "B" resisting. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) in ro sc, ar fwd to dwn fo ex, (s) tr fl (slight).

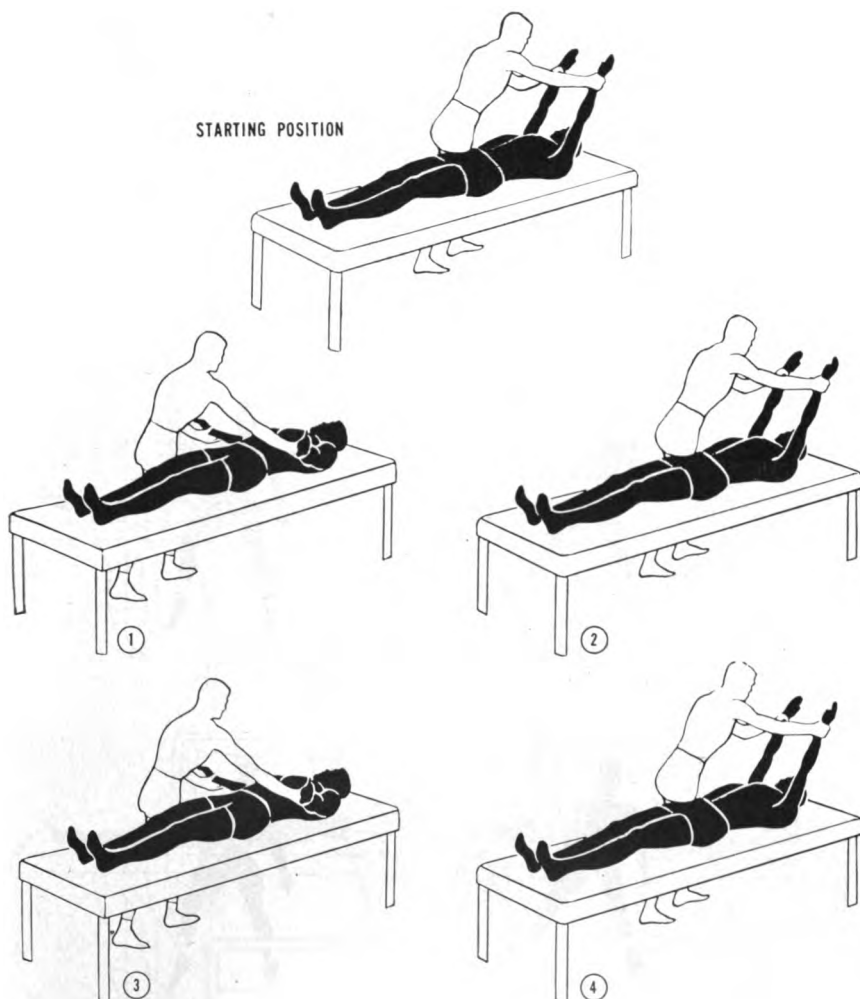


Figure 37. Arms upward oblique to forward.

(6) *Arms upward oblique to forward.*

CADENCE: Slow.

STARTING POSITION: "A" supine, arms parallel as far above head as the head of bed will permit. "B" grasps "A's" wrists with thumbs inside.

MOVEMENT: (1) "A" moves arms forward downward to forward-downward-oblique position. "B" resists, bending his elbows as "A's" arms descend. (2) "A" recovers to starting position, "B" resisting. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p_1) in ro sc, ar up to fwd, (s_1) fo ex, tr ex (slight), (p_2), out ro sc, ar fwd to up, (s_2) fo fl, tr ex (slight).

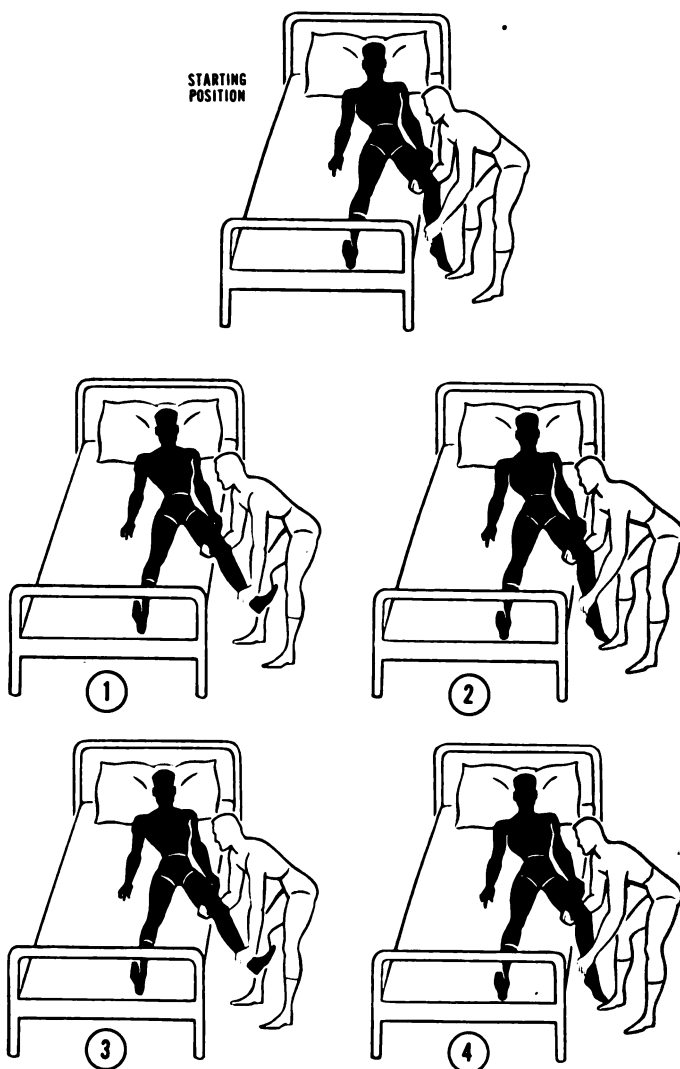


Figure 38. Leg quarter nelson.

(7) *Leg quarter nelson.*

CADENCE: Slow.

STARTING POSITION: "A" lies on back with left leg hanging over side of bed. "B's" right forearm is under "A's" left knee and his left hand is on "A's" left ankle.

MOVEMENT: (1) "A" extends left leg until knee is straight. "B" resists enough to make it difficult. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2). Execute half the total repetitions with each leg. If one leg cannot be exercised, the other should be exercised.

MUSCLE GROUPS ACTING: (p) 1 ex.

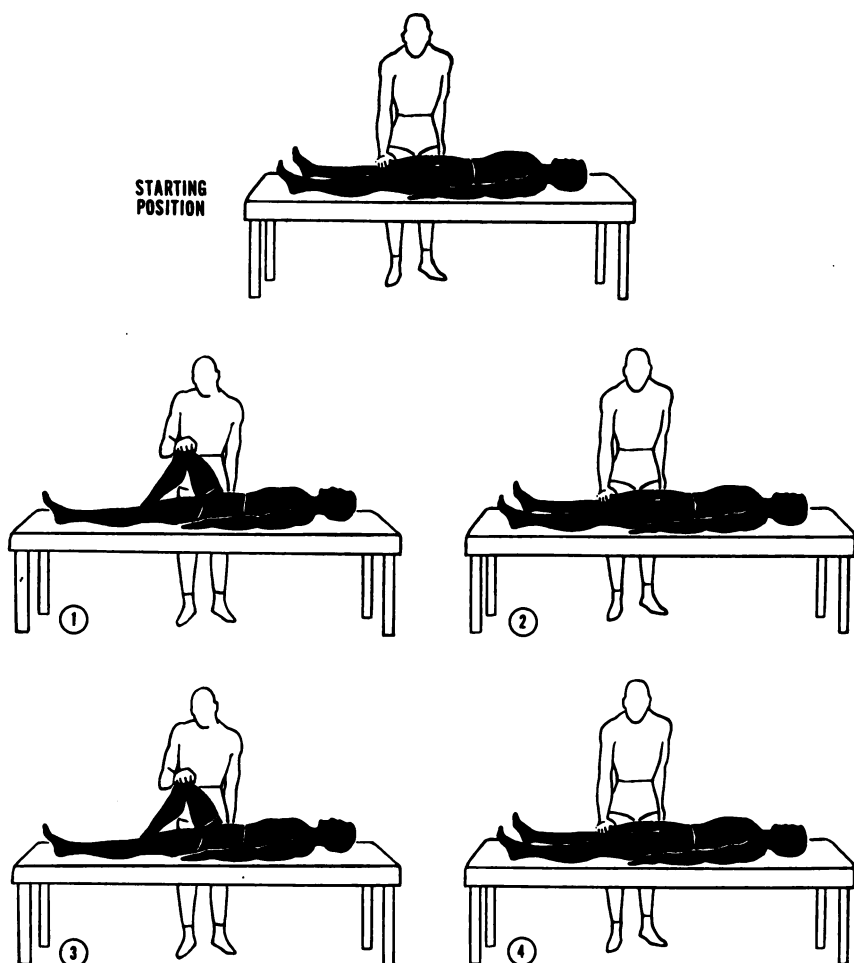


Figure 39. *Knee up.*

(8) *Knee up.*

CADENCE: Slow.

STARTING POSITION: "A" supine, feet separated slightly.

"B" stands facing head of patient, hand away from "A's" head, resting on "A's" near knee.

MOVEMENT: (1) "A" raises near knee, sliding heel along sheet, "B" resists. (2) "A" recovers to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p_1) th fl, l fl, (s_2) l ex.

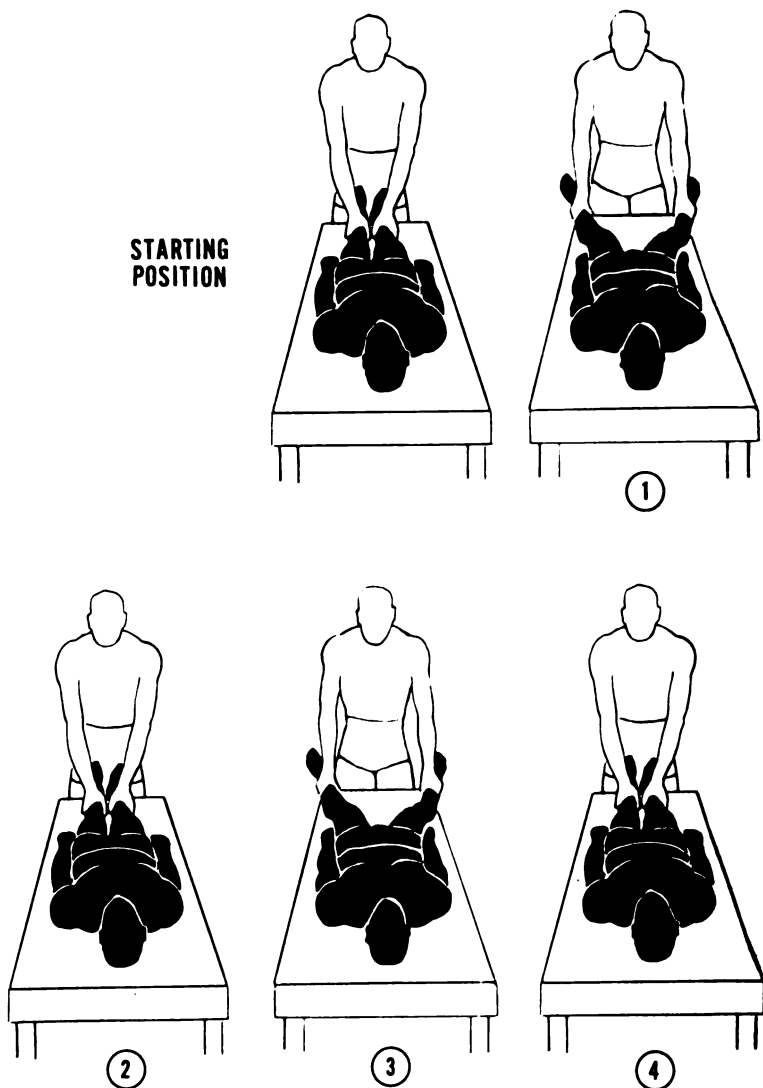


Figure 40. Abduct legs.

(9) *Abduct legs.*

CADENCE: Slow.

STARTING POSITION: "A" supine. "B" stands by foot of bed and grasps "A's" ankles.

MOVEMENT: (1) "A" separates legs about 2 feet. "B" resists enough to make movement difficult. (2) "A" recovers to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) th abd.

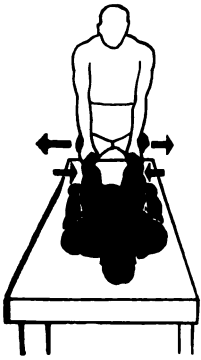


Figure 41. Adduct and abduct legs.

(10) *Adduct and abduct legs.*

CADENCE: Slow.

STARTING POSITION: "A" supine with pillow between knees. "B" stands beside foot of bed, grasping "A's" ankles.

MOVEMENT: (1) "A" adducts legs, pressing hard against pillow, "B" encourages and presses outward on ankles. (2) "A" recovers to starting position. "B" resists enough to make it difficult. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) th add, th abdl, (s) th fl, l ex.

STARTING POSITION

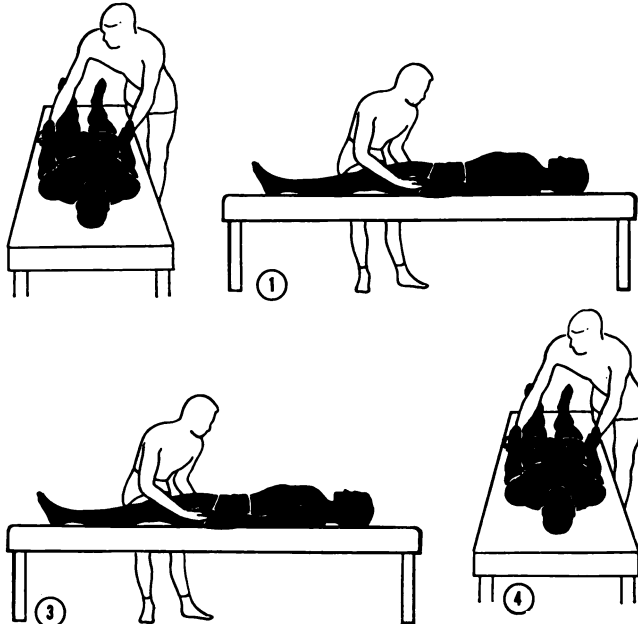


Figure 42. Mattress flattener.

(11) *Mattress flattener.*

CADENCE: Slow.

STARTING POSITION: "A" supine, arms at side, palms down, resting in "B's" hands. "B" stands by side of bed.

MOVEMENT: (1) "A" presses hard against "B's" hands (and against mattress with arms), lifting chest and arching back. "B" gauges effort by feeling in hands. If "A" is not pressing hard enough, "B" resists by lifting "A's" hands. (2) "A" recovers to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) in ro sc, ar bkw, (s) tr ex, fo ex, n ex, h fl.

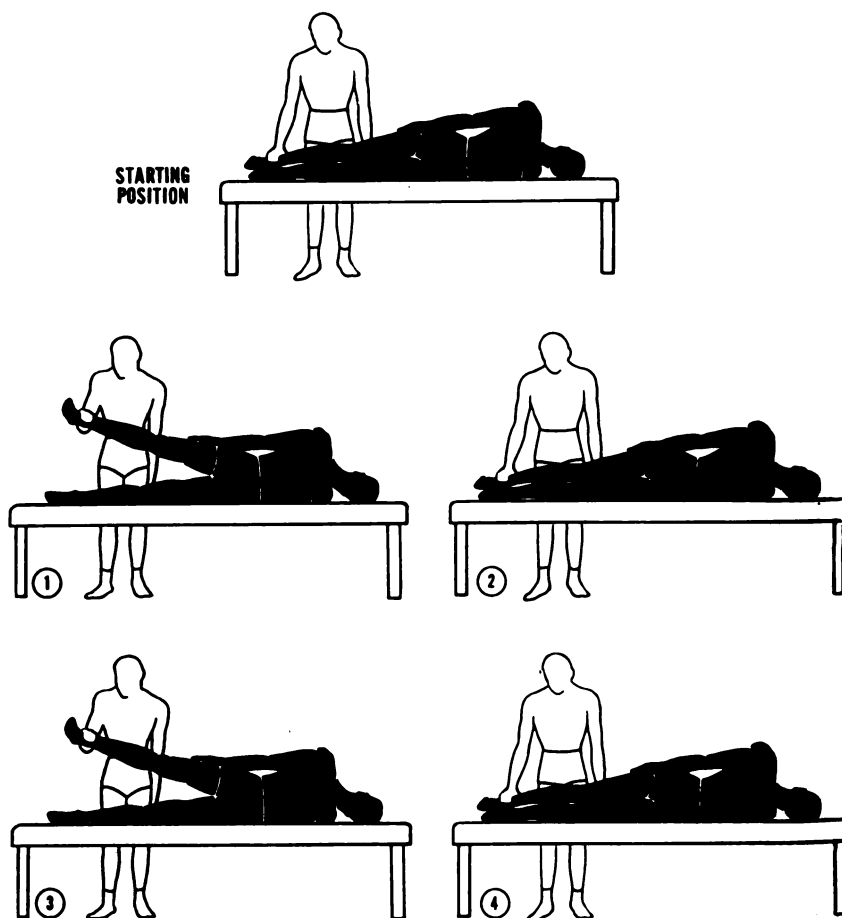


Figure 43. Side leg abductor.

(12) *Side leg abductor.*

CADENCE: Slow.

STARTING POSITION: "A" on left side, left arm in front of shoulder, legs together. "B" stands by side of bed, hand that is distant from "A's" back resting on "A's" right ankle.

MOVEMENT: (1) "A" abducts right leg, "B" resists. (2) "A" recovers to starting position. (3) Repeat count (1). (4) Repeat count (2). Exercise should be repeated on other side.

MUSCLE GROUPS ACTING: (p) tr sb, th abd, tr sb, (s) i ex (static contraction to support knee joint).

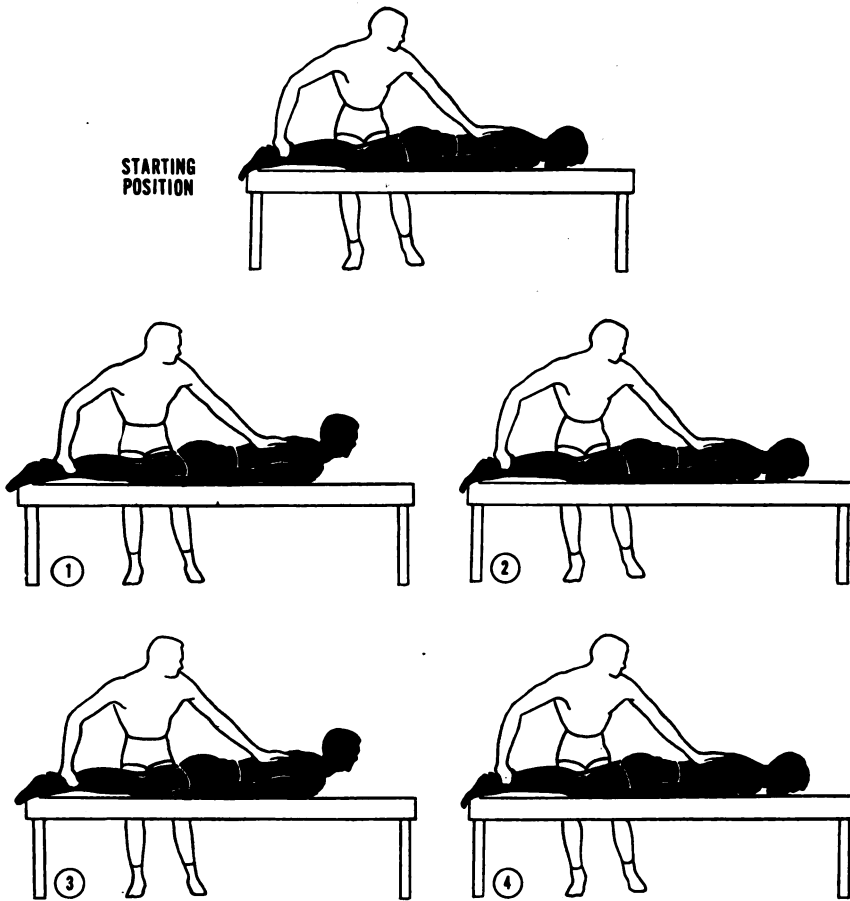


Figure 44. Trunk raising.

(13) *Trunk raising.*

CADENCE: Slow.

STARTING POSITION: "A" prone, arms at side, "B" holds "A's" feet down with one hand and rests other hand on "A's" upper back.

MOVEMENT: (1) "A" raises head and chest from bed, "B" resists. (2) "A" recovers to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr ex, n ex, th ex (s) 1 fl.

18. Resistant Exercises With Apparatus

a. Resistant Exercises with Weights—Dumbbells. Dumbbells are an excellent means of providing resistant exercises for bed patients. This type of exercise is largely limited to exercises involving the arms. Before beginning the exercise, a pillow should be placed lengthwise under the back and shoulders; or, when the exercise is done in the prone position, under the abdomen and chest.

b. Dumbbells should be of such weight that the patient can do only 60 to 10 four-count repetitions—the lighter weight (those with which he can do more repetitions) to be used by the patient just beginning the bed patient regime. Add more weight when patient works up to from 20 to 25 repetitions.

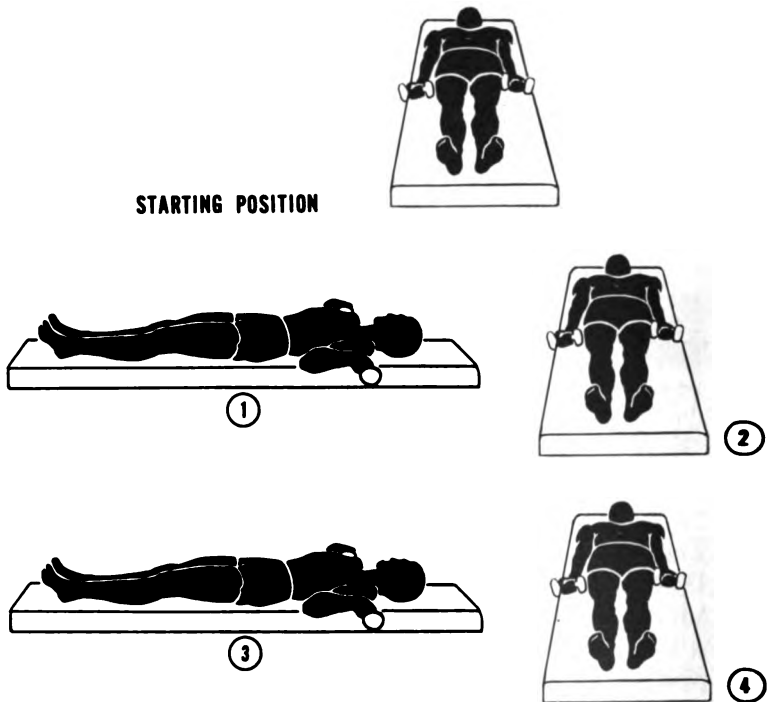


Figure 45. Forearm flexions.

(1) *Forearm flexions.*

CADENCE: Slow.

STARTING POSITION: Supine, arms at side, bells in hands, palms up.

MOVEMENT: (1) Flex forearms to shoulders, first flexing hand. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: *fo fl.*

STARTING POSITION

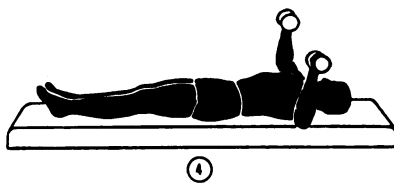
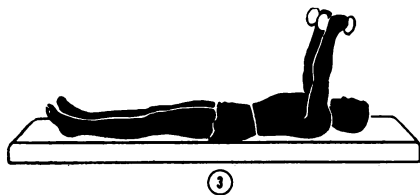
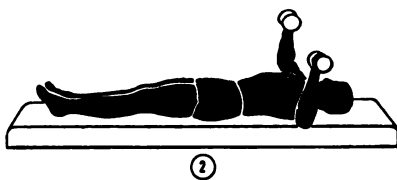
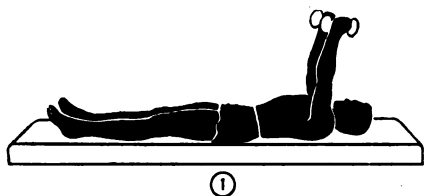
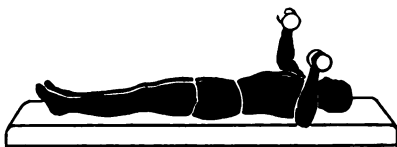


Figure 46. Thrust bells forward.

(2) *Thrust bells forward.*

CADENCE: Slow.

STARTING POSITION: Supine, forearm flexed, bells in front of shoulders.

MOVEMENT: (1) Thrust bells to forward position. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (r) abd sc, ar dwn to fwd, fo ex, (s) fi fl, po fl, po add.

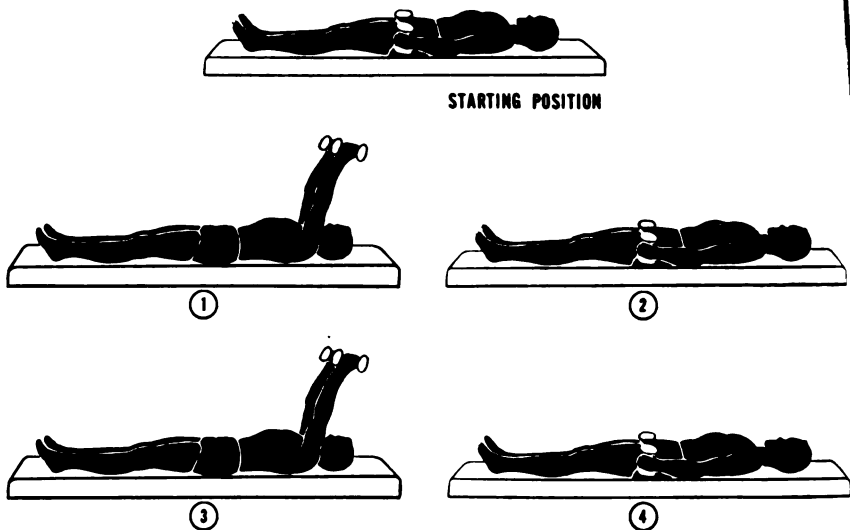


Figure 47. Arms forward—upward.

(3) *Arms forward-upward.*

CADENCE: Slow.

STARTING POSITION: Supine, arms at sides, bells pointing upward.

MOVEMENT: (1) Swing arms forward and as far upward as head of bed will permit. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: in ro sc, ar dn to fwd, ar up to fwd, (s) fo fl, fo ex, h abd, h add.

STARTING POSITION

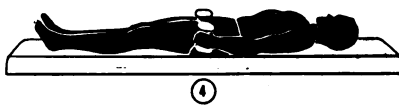
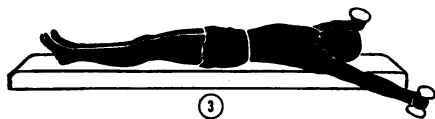
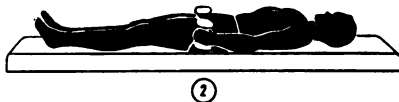
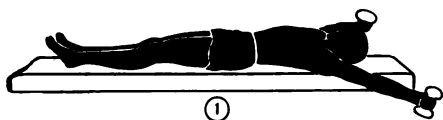


Figure 48. Arms side up.

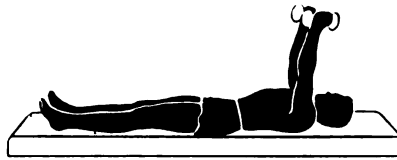
(4) *Arms side up.*

CADENCE: Slow.

STARTING POSITION: Supine, arms at side, bells pointing upward.

MOVEMENT: (1) Swing bells sideward and upward as far as head of bed will permit. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) out ro sc, ar adw to fwd, ar sdw ra, ar up to sdw.



STARTING POSITION

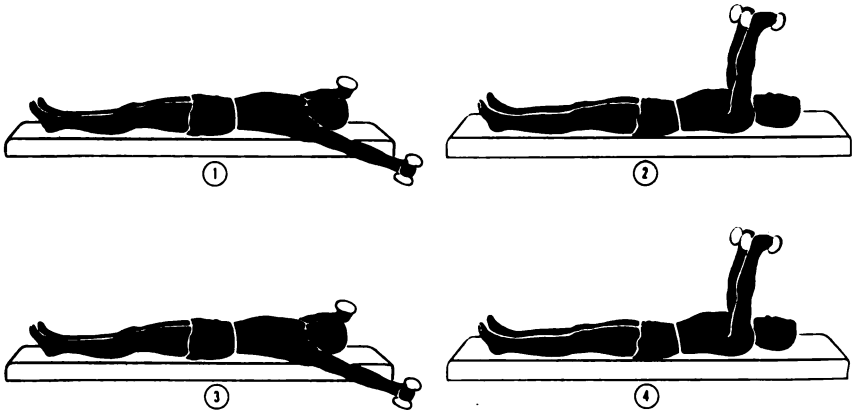


Figure 49. Arms forward to side.

(5) *Arms forward to side.*

CADENCE: Slow.

STARTING POSITION: Supine, arms forward, bells in hands, palms facing.

MOVEMENT: (1) Swing arms sideward and as far backward as head of bed will permit. (2) Recover to starting position.

(3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) ar sdw to fwd, (s_1) add sc, (s_2) abd sc, fi fl, po fl, po add.

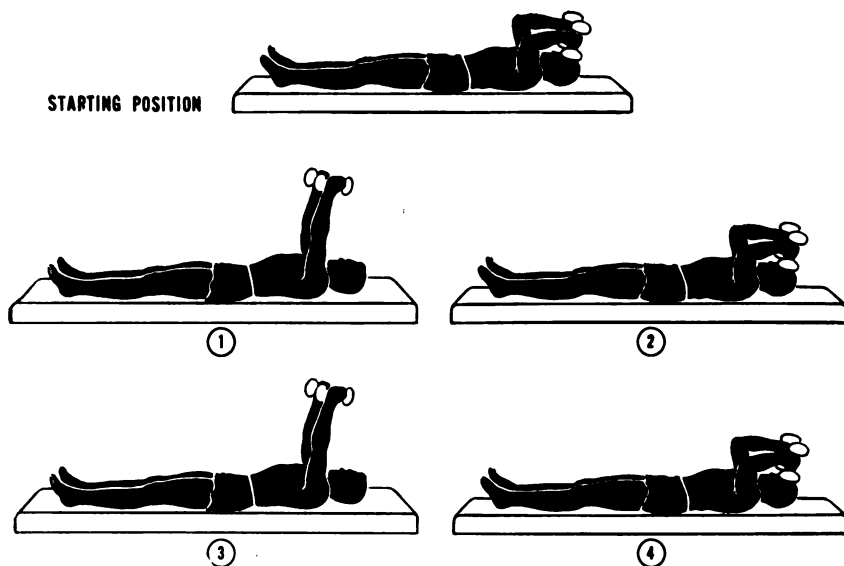


Figure 50. Strike-thrust.

(6) *Strike-thrust.*

CADENCE: Slow.

STARTING POSITION: Supine, upper arms forward, forearms flexed upward, bells by sides of head.

MOVEMENT: (1) Extend forearms until arm is forward.

(2) Recover to starting position. (3) Repeat count (1).

(4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) fo ex, (s) h add, ar fwd to dwn, fi fl, po fl, po add.

STARTING POSITION

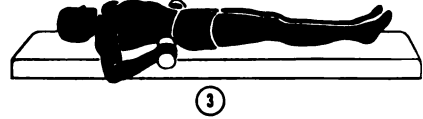
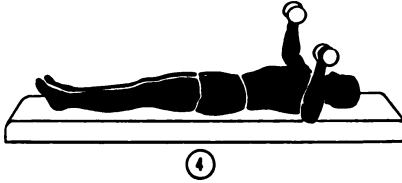
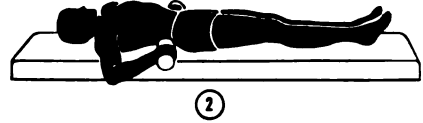
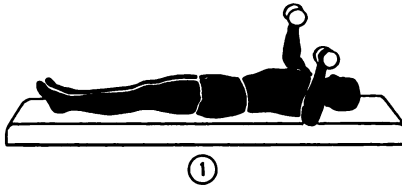
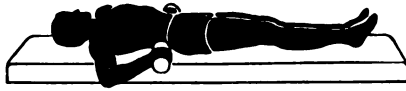


Figure 51. Outward rotations.

(7) Outward rotations.

CADENCE: Slow.

STARTING POSITION: Supine, upper arms sideward, forearms flexed downward, resting on edges of bed, bells in hands, palms down.

MOVEMENT: (1) Rotate upper arm backward (outward) until forearms are forward. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) ar out ro, (s) h ex, fi fl, po fl, po add.

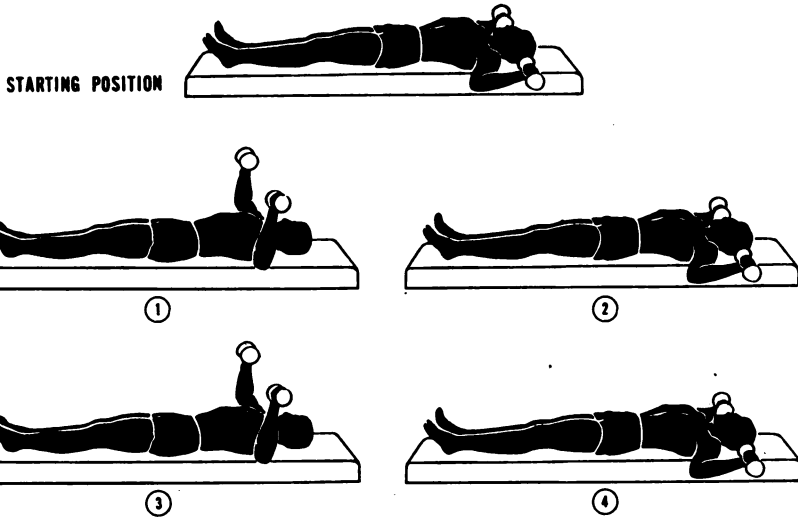


Figure 52. Inward rotations.

(8) *Inward rotations.*

CADENCE: Slow.

STARTING POSITION: Supine, upper arms sideward, forearms flexed upward, resting on sides of bed, bells in hands, palms up.

MOVEMENT: (1) Rotate upper arms forward (inward) until forearm is forward. (2) Recover starting position. (3) Repeat count (1). (4) Repeat count (2).

Note. Exercises "Outward Rotations" and "Inward Rotations" may be combined if indicated.

MUSCLE GROUPS ACTING: ar in ro, (s) h fl, fi fl, po fl, po add.

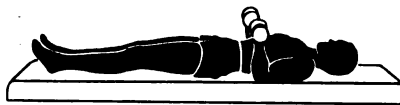


Figure 53. Rotate forearms.

(9) *Rotate forearms.*

CADENCE: Slow.

STARTING POSITION: Supine, upper arms at sides, forearms flexed forward, bells in hands, palms facing head.

MOVEMENT: (1) Pronate and supinate forearms to near limit of motion. Inertia of the bells provides the resistance. The faster the cadence, the greater the dosage.

MUSCLE GROUPS ACTING: (p) fo, pro, fo sup, (s) fo ex, fi fl, fo fl, po fl, po add.

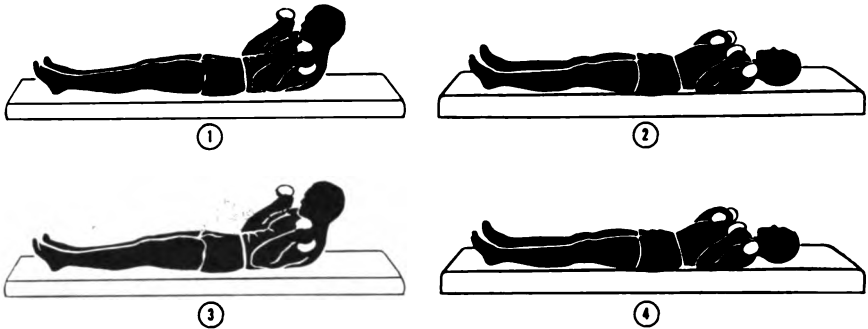
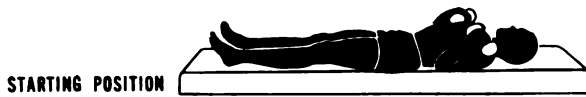


Figure 54. Bells at thrust—curl trunk.

(10) *Bells at thrust—curl trunk.*

CADENCE: Slow.

STARTING POSITION: Supine, bells at sides of shoulders, forearms flexed, elbows by sides.

MOVEMENT: (1) Holding bells in place, curl trunk forward as far as possible, keeping lumbar spine in contact with bed.

(2) Recover to starting position. (3) Repeat count (1).

(4) Repeat count (2).

MUSCLE GROUPS ACTING: tr fl, th fl, (s) n fl, l ex, fi fl, po fl, po add.

STARTING POSITION

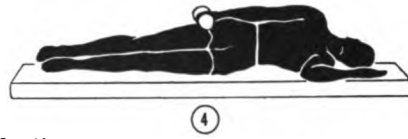
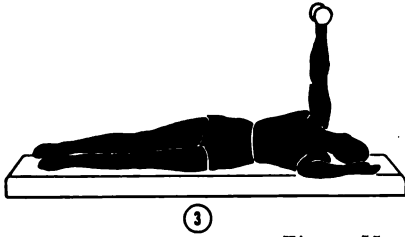
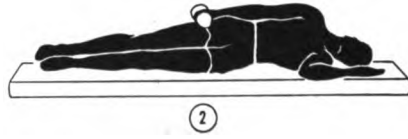
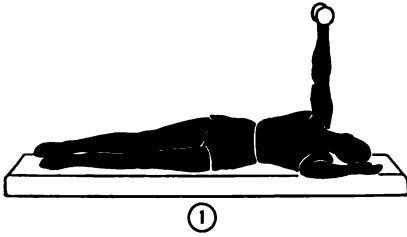


Figure 55. Abducting arms.

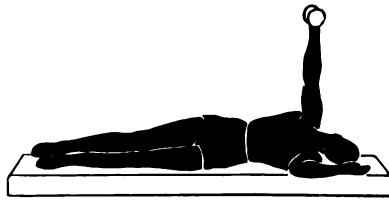
(11) Abducting arms.

CADENCE: Slow.

STARTING POSITION: Lying on left side, right arm at side, bell in hand, palm down.

MOVEMENT: (1) Abduct upper arm to side. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2). Repeat to other side.

MUSCLE GROUPS ACTING: out ro sc, ar dwn to sdw, (s) fo ex, fi fl, h ex, po fl, po add.



STARTING POSITION

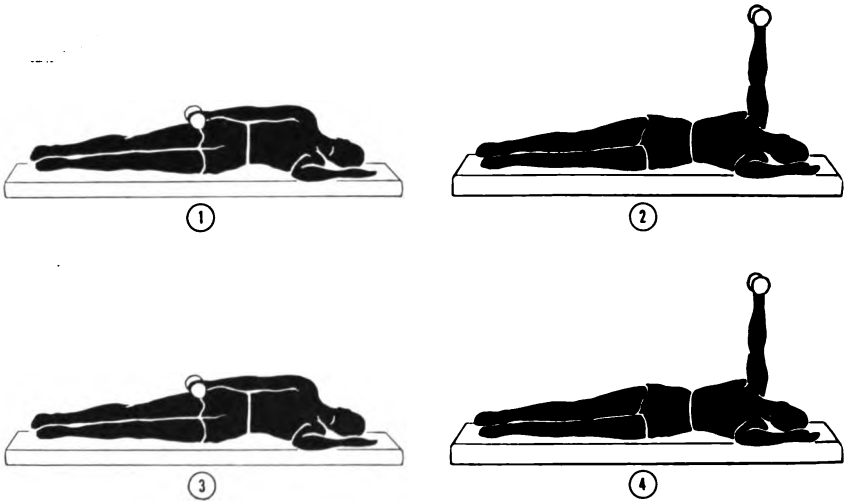


Figure 56. Abduct to side.

(12) *Abduct to side.*

CADENCE: Slow.

STARTING POSITION: On left side, right arm forward, bell in hand, palm facing feet.

MOVEMENT: (1) Swing arm to sideward position. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) in ro sc, dwn to sdw, (s) fo ex, h ex, fi fl, po fl, po add.

STARTING POSITION

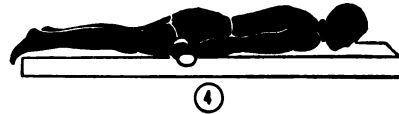
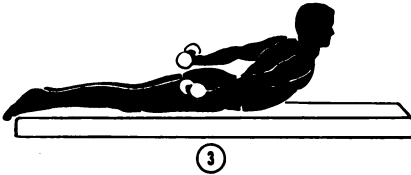
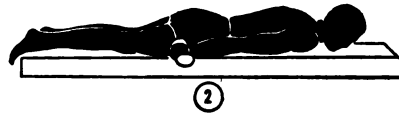
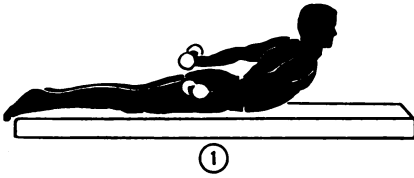


Figure 57. Down and backward.

(13) *Down and backward.*

CADENCE: Slow.

STARTING POSITION: Prone, arms at sides, bells in hands, palms up.

MOVEMENT: (1) Raise arms backward as far as possible, head erect. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: add sc, ar bk, n ex, tr ex, (s) fo ex, h fl, fi fl, po fl, po add.

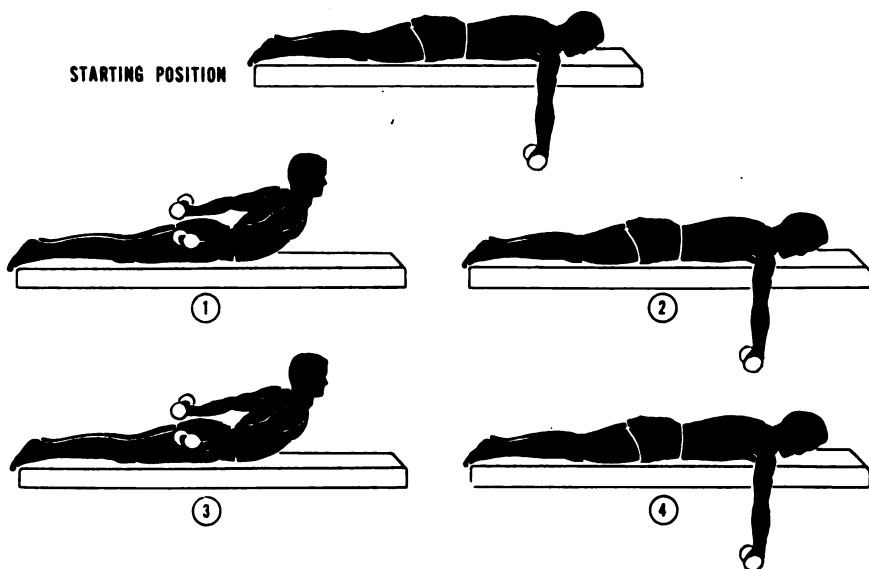


Figure 58. Sideward to backward.

(14) *Sideward to backward.*

CADENCE: Slow.

STARTING POSITION: Prone, arms sideward, resting against bed, forearms flexed.

MOVEMENT: (1) Extend forearms and raise arms backward as far as possible, head erect. (2) Recover to starting position.

(3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) add sc, ar sdw to bkw, fo ex, n ex, (s) tr ex, h ex, fi fl, po fl, po add.

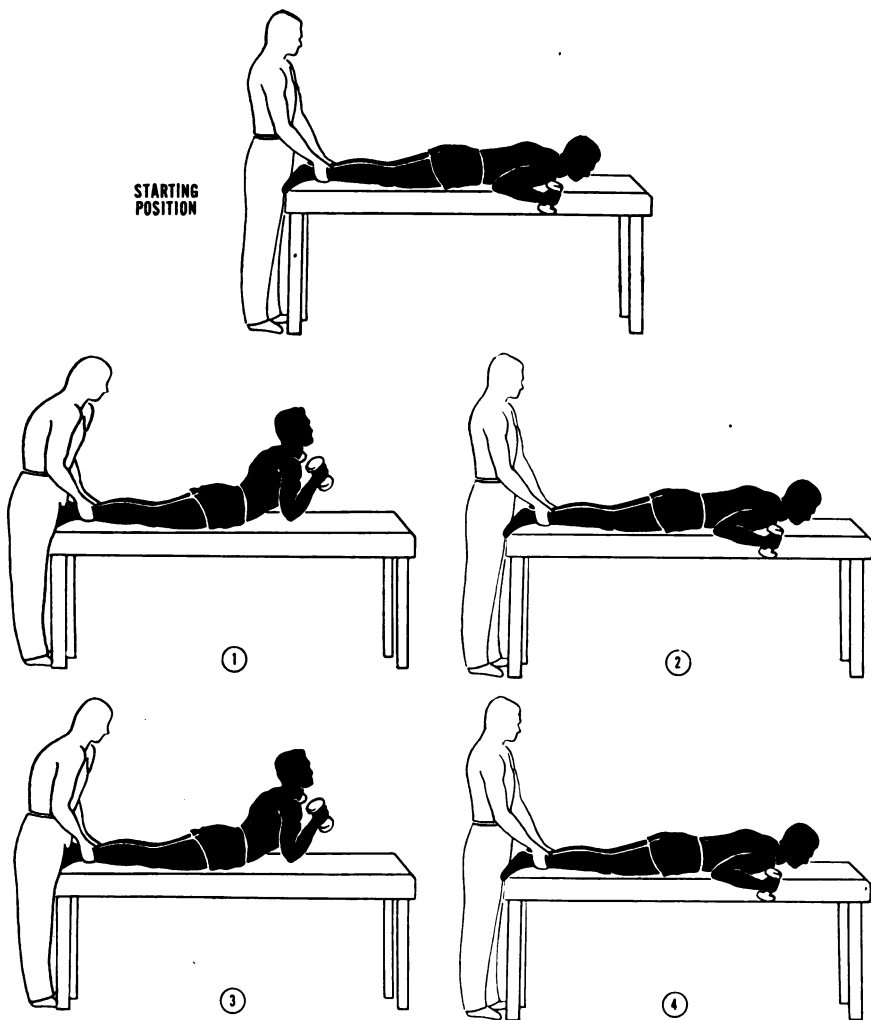


Figure 59. *Back extension.*

(15) *Back extension.*

CADENCE: Slow.

STARTING POSITION: Prone, bells on either side of shoulder, forearms flexed and close to sides. Feet supported

MOVEMENT: (1) Raise trunk backward, keeping bells in position by shoulder. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr ex, n ex, th ex, n ex, (s) add sc, ar out ro, fo fl, h abd, l fl, fi fl, po fl, po add.

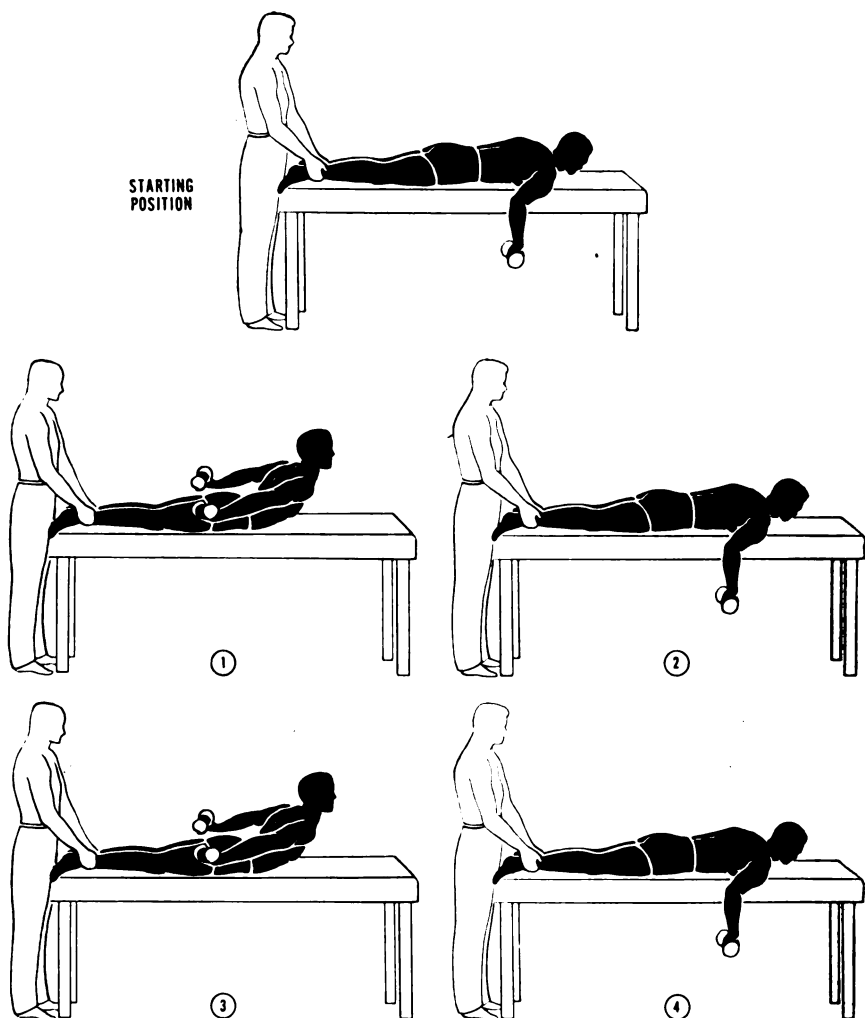


Figure 60. Back extension with side raising of arms.

(16) *Back extension with side raising of arms.*

CADENCE: Slow.

STARTING POSITION: Prone, arms out sideward, forearms flexed forward over edge of bed, bells in hands, palms facing feet. Feet supported.

MOVEMENT: (1) Raise arms backward, extending forearms and raising trunk and head backwards. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: n ex, tr ex, th ex, add sc, ar sdw to bkw, fo ex, (s) h fl, l fl, fi fl, po fl, po add.

19. Resistant Exercises With Spring or Rubber Exercisers

a. Exercises with springs or rubber exerciser cannot be as easily graded as exercises with dumbbells, as there is too great a difference when a spring or cable is added. When progressing from one spring to two, the resistance is doubled. However, these exercises are popular and some of them well adapted to bed patients.

b. Some of the exercises are done with springs or cables having a hand grip on each end. Others are done with two sets of cables attached to stirrups with a hand grip on the end to be grasped. The stirrups are held down by the feet. When using the stirrups, sandals should be worn, otherwise the stirrups will hurt the bottoms of the feet. As an alternative, stirrups may be fastened to the foot of the bed.

c. Because of the large variance in resistance when adding springs or cables, the number of repetitions will vary more than when using dumbbells. The patient should start with a resistance with which he can do about 6 to 8 four-count repetitions. When he can do 15 such repetitions, he should add a spring or cable. In all the following exercises, cadence is slow unless otherwise indicated. All exercises are two-count exercises, and all exercises begin in the supine position.

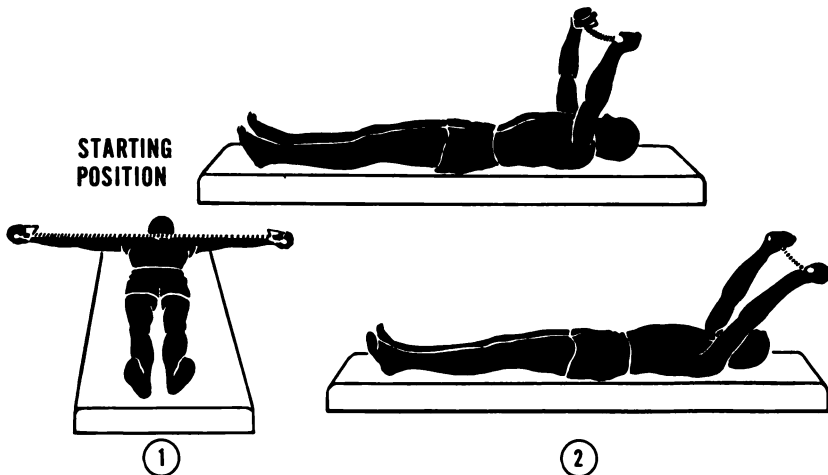


Figure 61. Shoulder blade squeezer.

(1) *Shoulder blade squeezer.*

CADENCE: Slow.

STARTING POSITION: Supine, holding exerciser in front of chest, arms straight.

MOVEMENT: (1) Separate arms sideways slowly but steadily until springs touch chest. (2) Recover to starting position.

(3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: add sc, ar fwd to sdw, fo ex, h ex, (s) fi fl, po fl, po add.

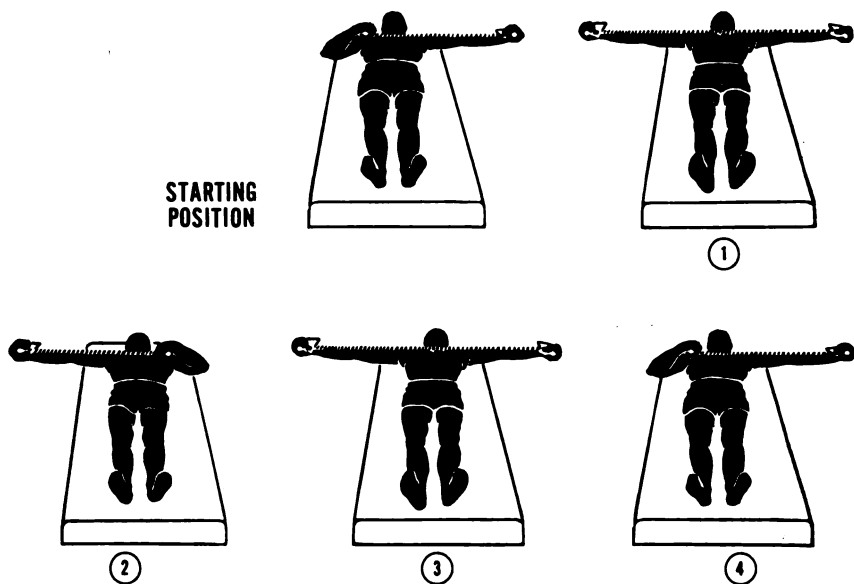


Figure 62. *Triceps exercise.*

(2) *Triceps exercise.*

CADENCE: Slow.

STARTING POSITION: Supine. Left arm extended sideward, right upper arm sideward, forearms fully flexed forward, hand in front of chest, hands gripping exerciser.

MOVEMENT: (1) Extend right forearm sideward right, keeping elbow back and at shoulder level. (2) Flex left forearm to position with hand in front of chest. (3) Extend left forearm to side. (4) Recover to starting position.

MUSCLE GROUPS ACTING: (p) add sc, ar fwd to sdw, fo ex, h ex, (s) fi fl, po fl, po add.

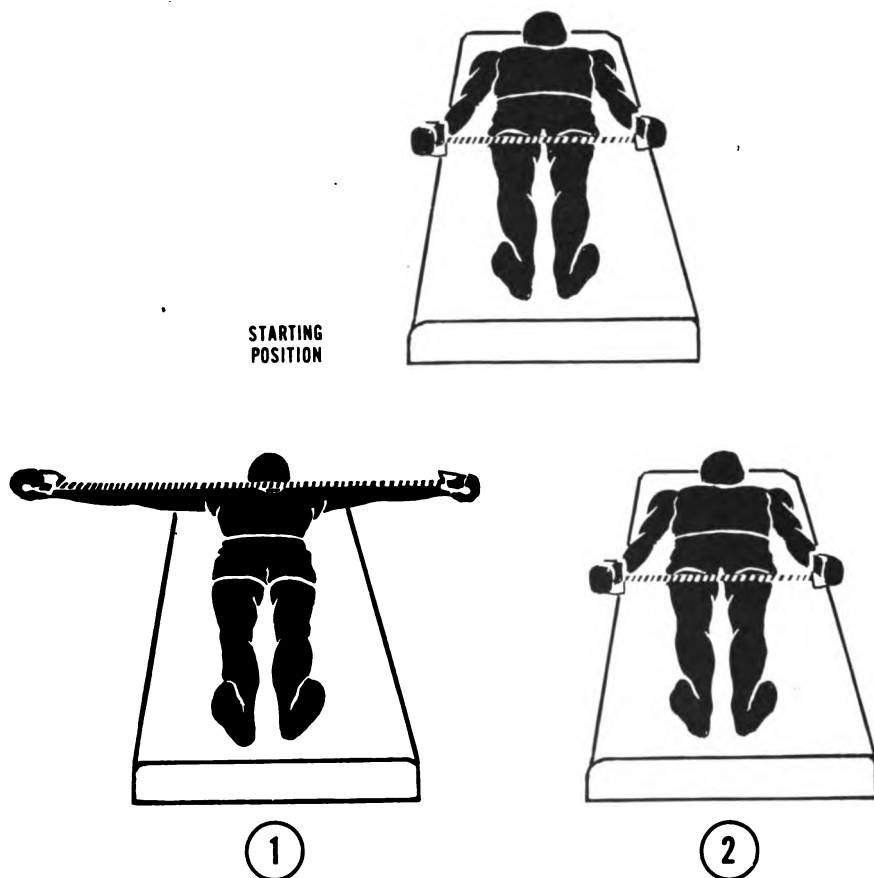


Figure 63. Posterior shoulder exercise.

(3) *Posterior shoulder exercise.*

CADENCE: Slow.

STARTING POSITION: Supine. Exerciser in front of thighs, arms sideward downward oblique.

MOVEMENT: (1) Swing arms slowly to side horizontal and enough forward that exerciser is just touching front of chest.

(2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: out ro sc, ar sdw ra, ar fwd to sdw, fo ex, h ex.

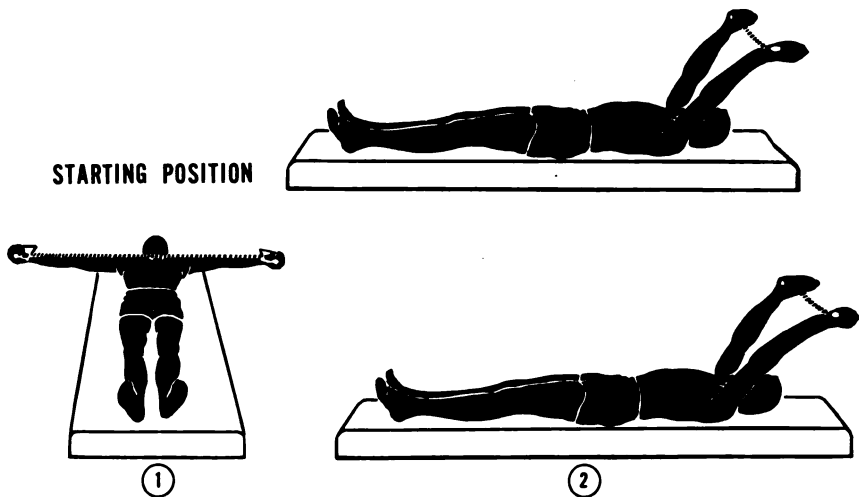


Figure 64. Chest raiser.

(4) *Chest raiser.*

CADENCE: Slow.

STARTING POSITION: Supine. Arms upward and outward oblique, exerciser near head of bed and about one and one-half feet above mattress.

MOVEMENT: (1) Swing arms slowly to side and enough forward that exerciser just touches front of chest. (2) Recover to starting position.

MUSCLE GROUPS ACTING: in ro sc, ar up to sdw, fo ex, ar fwd to sdw, h ex, (s) fi fl, po fl, po add.

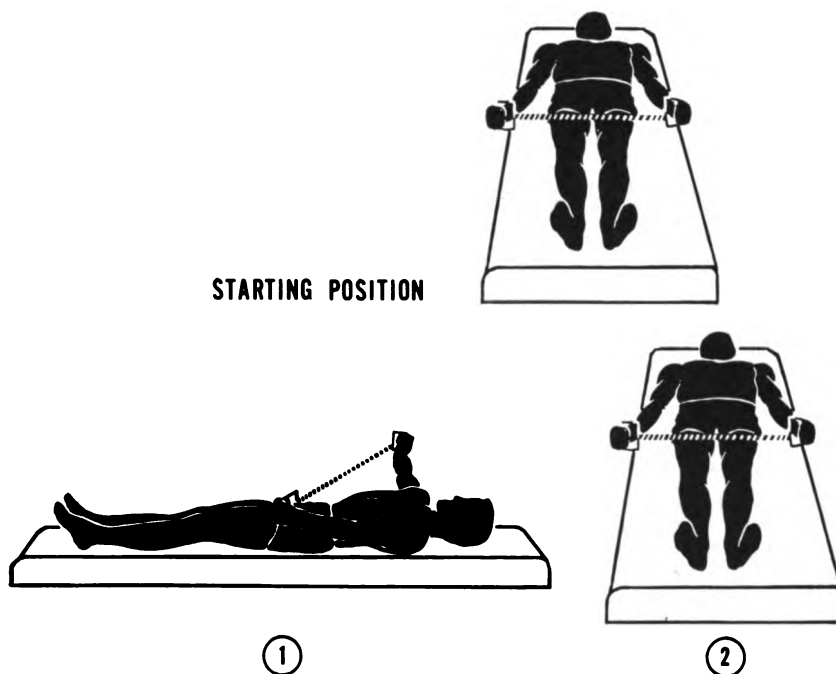


Figure 65. *Shoulder developer.*

(5) *Shoulder developer.*

CADENCE: Slow.

STARTING POSITION: Supine. Hold exerciser in front of hips, arms straight, palms facing.

MOVEMENT: (1) Swing right arm sideward or higher, left hand in front of left hip. (2) Recover to starting position. Repeat exercise on left side.

MUSCLE GROUPS ACTING: (p) out ro sc, ar sdw ra, h ex, (s) fi fl, po fl, po add.

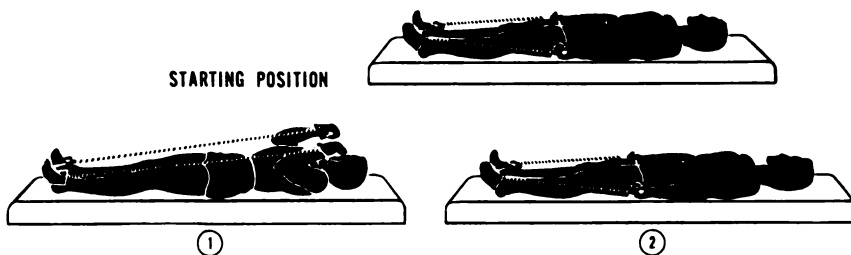


Figure 66. Arm curls.

(6) *Arm curls.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet in stirrups, hands grasping handle grips, arms down, palms forward.

MOVEMENT: (1) Flex forearms until hands are in front of shoulders. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: ra sc, fo fl, h fl, (s) fi fl, po fl. po add, tr ex, th ex, ft ex, ar fwd ra, out ro sc.

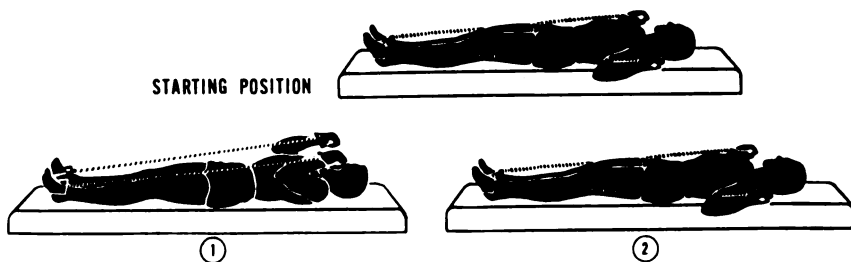


Figure 67. Arm curl and raise.

(7) *Arm curl and raise.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet in stirrups, forearms flexed until hands are at side of shoulders.

MOVEMENT: (1) Raise elbows forward and upward, springs inside of elbows. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) ra sc, fo fl, h fl, ar fwd ra, ra sc, (s) out ro sc, fi fl, po fl, po add, tr ex, th ex, ft ex.

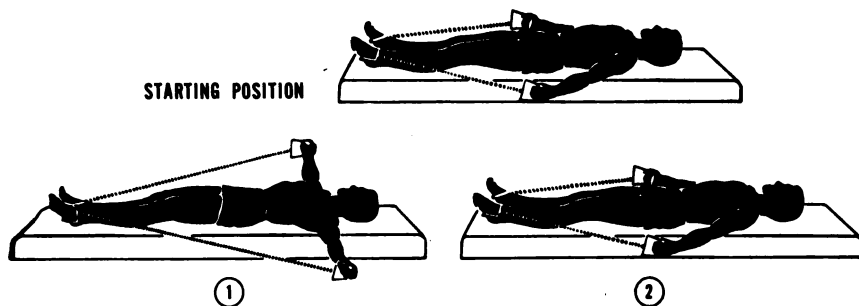


Figure 68. Side shoulder puller.

(8) *Side shoulder fuller.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet in stirrups, arms downward and obliquely outward.

MOVEMENT: (1) Pull exerciser hand grips as far sideward as possible, arms straight. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

Note. Usually only one spring or cable will be used.

MUSCLE GROUPS ACTING: ra sc, out ro sc, ar sdw ra, fo ex, h ex (s) fi fl, po fl, po add, th ex, l ex, th add, ft ex.

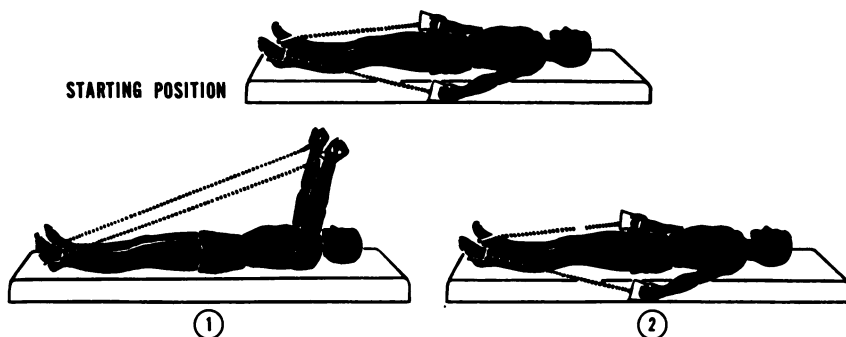


Figure 69. Front shoulder puller.

(9) *Front shoulder puller.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet in stirrups, arms downward and obliquely outward.

MOVEMENT: (1) Pull exerciser hand grips as far forward as possible, arms straight. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

Note. Usually only one spring or cable will be used.

MUSCLE GROUPS ACTING: ra sc, out ro sc, ar fwd ra, h ex, fo ex, (s) tr ex, th ex, ft ex, fi fl, po fl, po add.

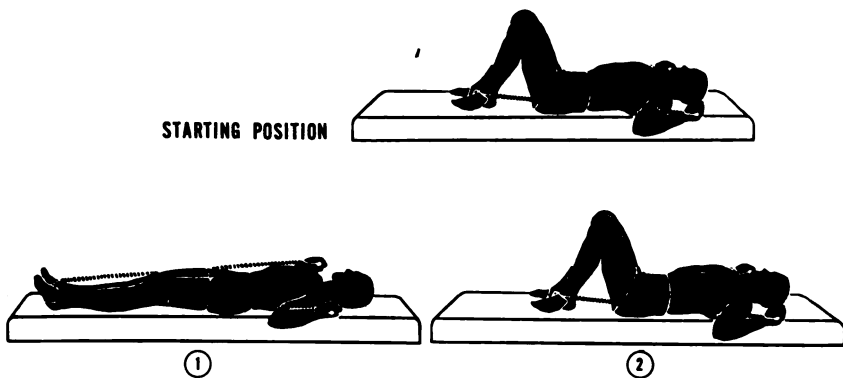


Figure 70. Leg puller.

(10) *Leg puller.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet in stirrups, forearms flexed, hands at sides of shoulders, lower legs flexed and raised, toes turned out.

MOVEMENT: (1) Thrust feet and legs downward until straight.

(2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: ra sc, fo fl, h fl, th ex, l ex, ar out ro, (s) tr ex, ft sup, fi fl, po fl, po add

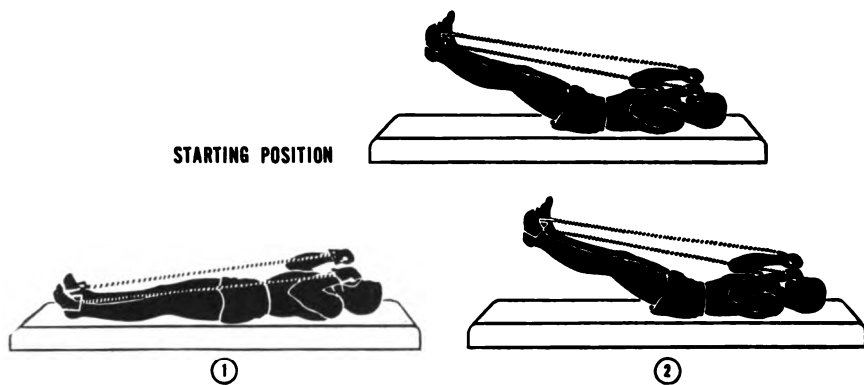


Figure 71. Hip puller.

(11) *Hip puller.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet in stirrups, forearms flexed, hands front of shoulders, legs raised forward, knees straight or nearly so.

MOVEMENT: (1) Holding hand grip in front of shoulders, lower legs to bed. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

Note. Keep toes turned down to prevent stirrups from slipping off feet.

MUSCLE GROUPS ACTING: fo fl, ar fwd ra, ra sc, h ft, th ex, (s) l ex, tr ex, fi fl, po fl, po add.

20. Self-Administering Bed Exercises

In certain cases where indicated by the physiatrist, the physical reconditioning prescription may call for self-administering exercises. The regular exercises for bed patients may be used for this purpose.

If it is indicated, the patient may engage in more strenuous exercise by the use of self-resistive movements. The following exercises employ all groups of muscles adequately. All exercises are done from the supine position and the cadence is slow. The pillow should be removed. Movements are generally repeated 6 to 20 times.

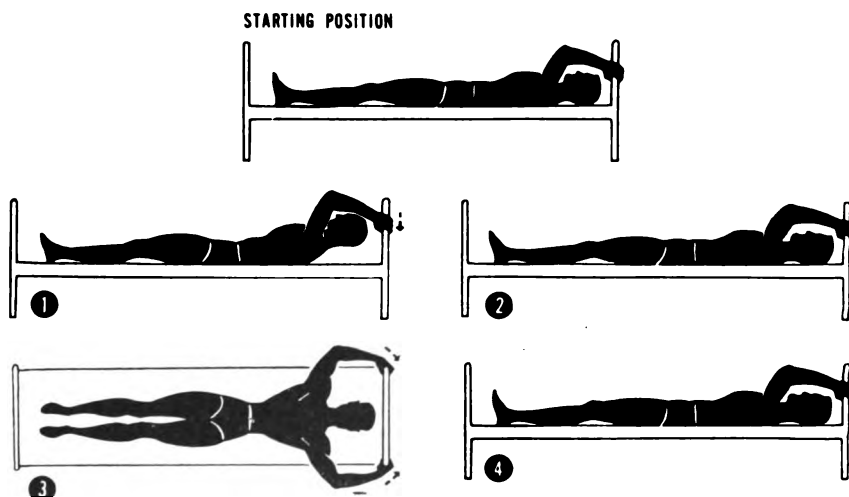


Figure 72. Raise and push.

(1) *Raise and push.*

CADENCE: Slow.

STARTING POSITION: Supine, hands grasping the sides of the head of the bed about 8 inches above level of mattress.

MOVEMENT: (1) Push down toward the floor with the hands, pushing hard enough to lift head and shoulders slightly from the bed. Do not assist this movement with the abdominal or flexor thigh muscles. Do not bend forward. (2) Recover to starting position. (3) Push with both hands overhead in a direction away from the feet and at the same time move hands together inward toward the middle line of the bed. (4) Recover to starting position.

MUSCLE GROUPS ACTING: out ro sc, ar fwd to up, fo fl, h abd, fi fl, po fl, po add, ad sc, ar sdw to up, h fl, fo fl, (s) tr ex, n fl, h abd.

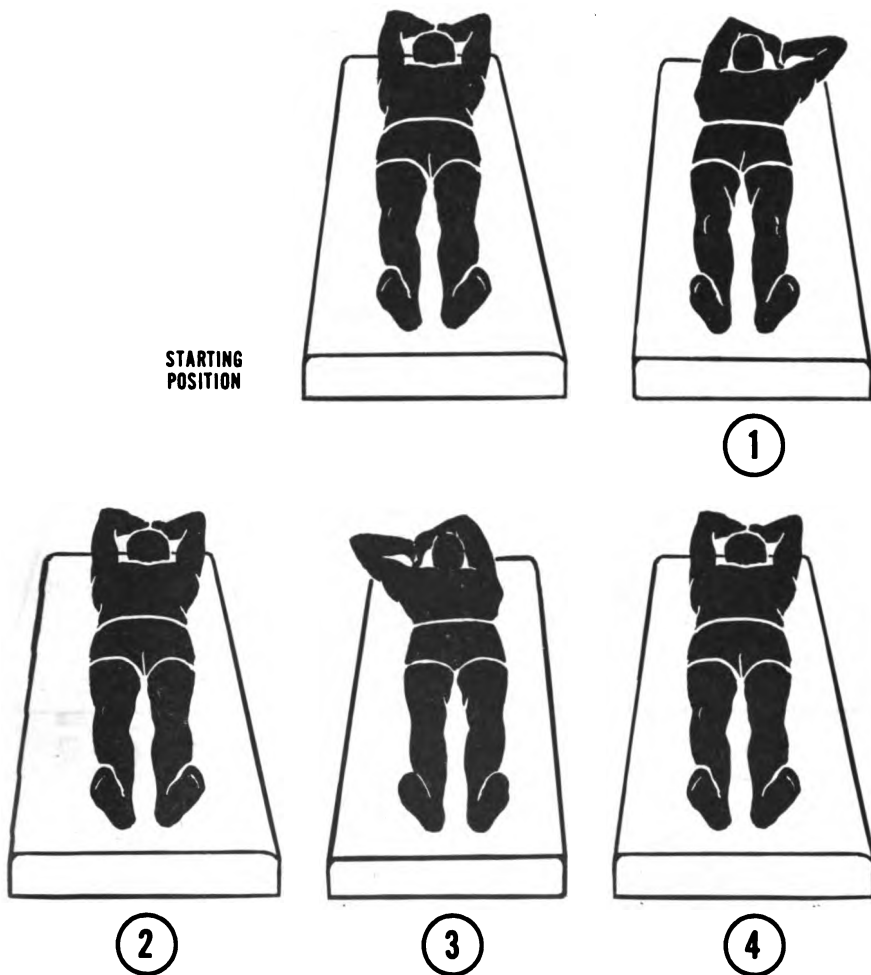


Figure 73. Overhead push.

(2) *Overhead push.*

CADENCE: Slow.

STARTING POSITION: Palms clasped together just above head, elbows bent at right angles.

MOVEMENT: (1) Push hard to left with right hand, resisting with left hand. (2) Recover to starting position. (3) Push hard to right with left hand, resisting with right. (4) Recover to starting position.

MUSCLE GROUPS ACTING: abd sc, ra sc, ar sdw to up, fo fl, fo ex, (s) h fl, abd sc.

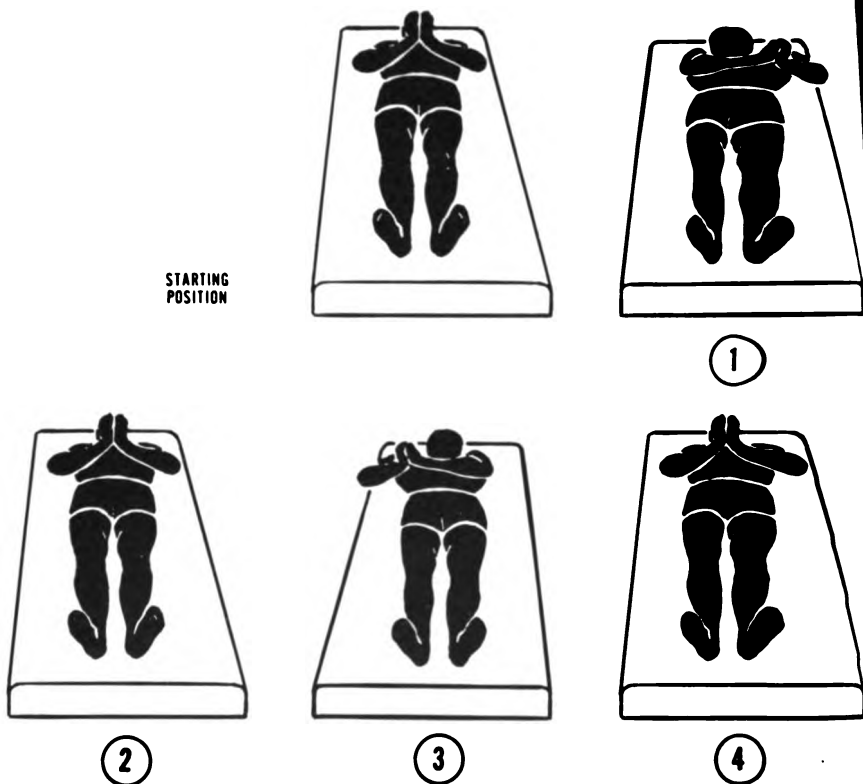


Figure 74. Chest push.

(3) *Chest push.*

CADENCE: Slow.

STARTING POSITION: Supine. Palms clasped together in front of chest.

MOVEMENT: (1) Push hard to left with right hand, resisting with left. (2) Recover to starting position. (3) Reverse and repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: abd sc, ar sdw to fwd, fo fl, fo ex, (s) h fl, abd sc.



STARTING POSITION



①



②

Figure 75. Push down.

(4) *Push down.*

CADENCE: Slow.

STARTING POSITION: Supine, arms by sides, palms down.

MOVEMENT: (1) Press downward hard against the bed. (2)

Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: add sc, ar bkw, fo ex, (s) h fl.



Figure 76. Side Push.

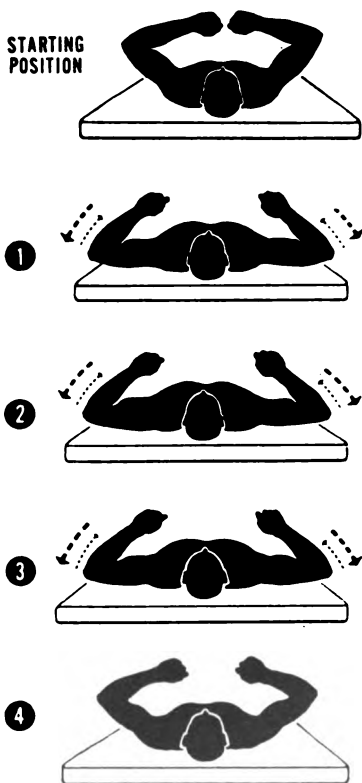
(5) *Side push.*

CADENCE: Slow.

STARTING POSITION: Supine, arms by sides, palms facing thighs.

MOVEMENT: (1) Press arms hard against sides of trunk, hips and legs. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) add sc, ar sdw to dwn, fo fl. (s) h fl.



(6) *Shoulder retractor.*

CADENCE: Slow.

STARTING POSITION: Supine, elbows raised sideward, slightly off the bed, fingers flexed in front of shoulders.

MOVEMENT: (1) Move elbows back hard as if trying to break a chain held in the two hands. Press elbows hard against the bed then relax. (2) Pull again, then relax. (3) Repeat count (2). (4) Recover to starting position. 4 to 6 repetitions.

MUSCLE GROUPS ACTING: add sc, ar wdw to bkw.

Figure 77. Shoulder retractor.

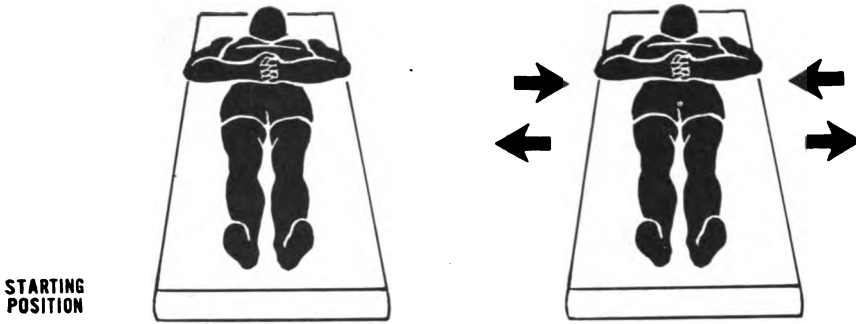


Figure 78. Front pull.

(7) Front pull.

CADENCE: Slow.

STARTING POSITION: Supine. Hands clasped in front of abdomen.

MOVEMENT: (1) Pull right and left with resistance of other arm. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

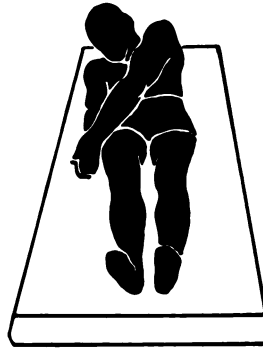
MUSCLE GROUPS ACTING: (p) ra sc, ar dwn to wdw, fo fl, fo ex (s) h ex.



**STARTING
POSITION**



1



2

Figure 79. Forearm flexion.

(8) Forearm flexion.

CADENCE: Slow.

STARTING POSITION: Supine. Right arm at side, palm up. Palm of left hand resting on palm of right hand.

MOVEMENT: (1) Flex right forearm against resistance of left. (2) Recover to starting position. (3) Reverse count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p right) fo fl, h fl, (slight) ar fwd ra, (p left) fo ex, h fl, ar fwd to dwn, fi fl, po fl.



STARTING
POSITION



1



2

Figure 80. Forearm, extension.

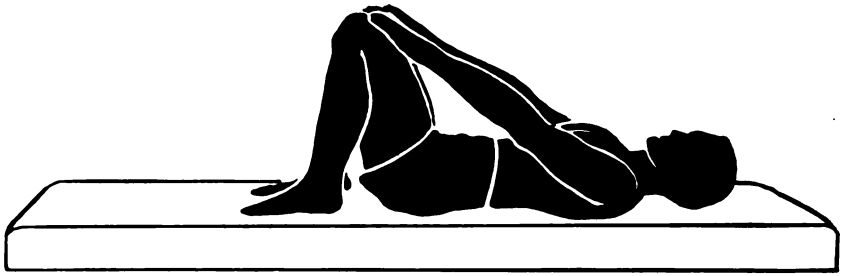
(9) Forearm extension.

CADENCE: Slow.

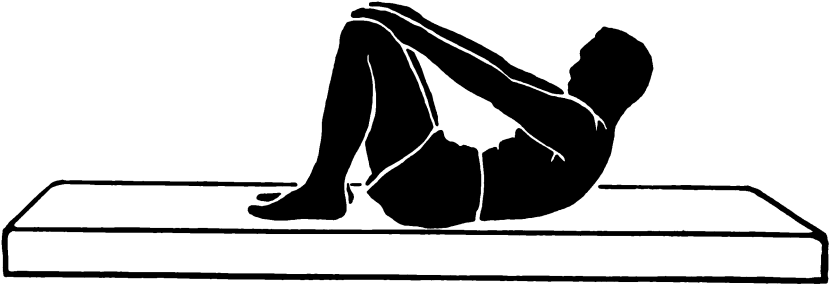
STARTING POSITION: Supine. Palm of left hand below right wrist, right elbow completely flexed.

MOVEMENT: (1) Extend right forearm against resistance of left hand. (2) Recover to starting position. (3) Reverse count (1). (4) Repeat count (2).

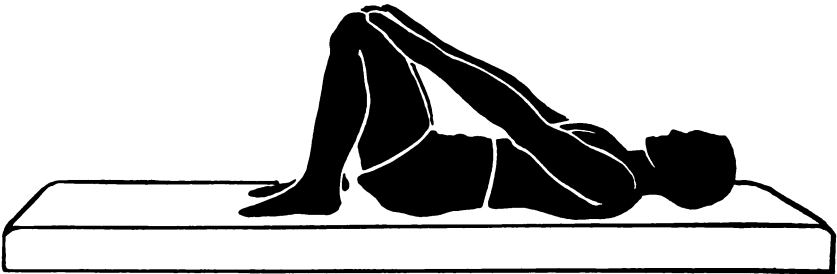
MUSCLE GROUPS ACTING: (p right) fo ex, (p left) fo fl, h fl, (s right) ar fwd to dwn, (s left) fi fl, po fl, po add, ar dwn to fwd.



STARTING POSITION



①



②

Figure 81. Curl and push.

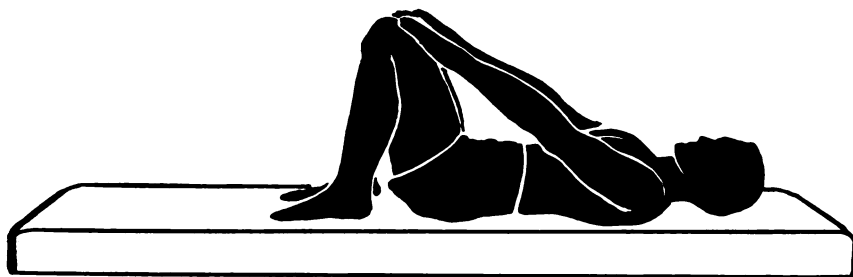
(10) *Curl and push.*

CADENCE: Slow.

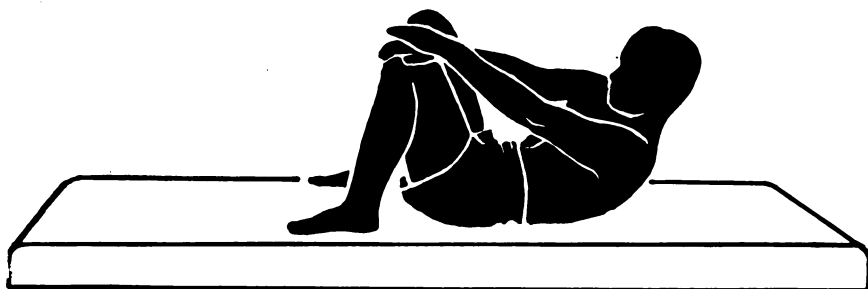
STARTING POSITION: Supine, knees drawn up, soles of feet on bed near hips, hands at side.

MOVEMENT: (1) "Curl" by lifting head, shoulders and chest from bed and push against knees with hands. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

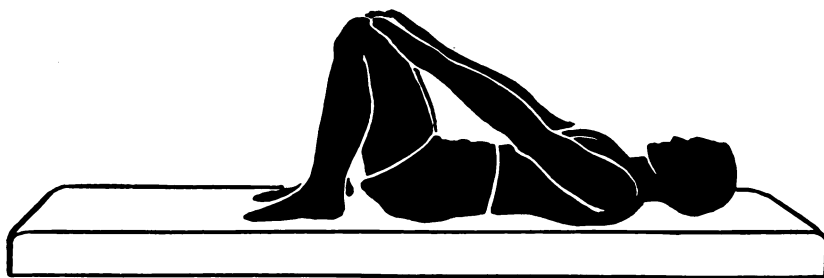
MUSCLE GROUPS ACTING: (p) tr fl, n fl, th fl, fo ex, abd sc, (s) h fl.



STARTING POSITION



1



2

Figure 82. Curl, twist, and push.

(11) *Curl, twist, and push.*

CADENCE: Slow.

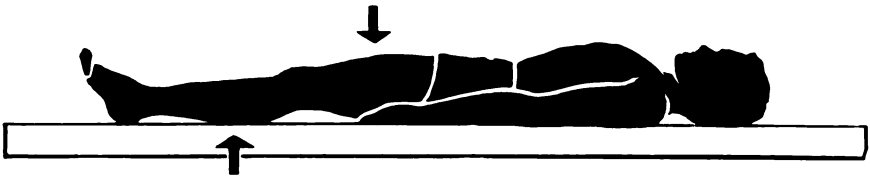
STARTING POSITION: Supine, knees up and spread apart with feet separated, hands on knees.

MOVEMENT: (1) Curl and push against one knee with both hands. (2) Recover to starting position. (3) Reverse knee count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) tr fl, n fl, th fl, ar fwd inwd ra, fo ex, abd sc, (s) h fl.



STARTING POSITION



①



②

Figure 83. *Leg tensing.*

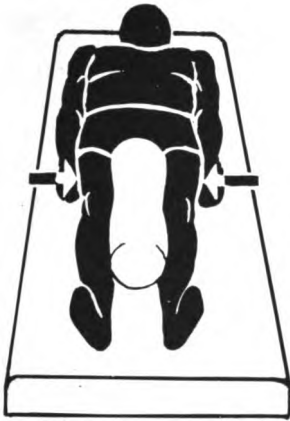
(12) *Leg tensing.*

CADENCE: Slow.

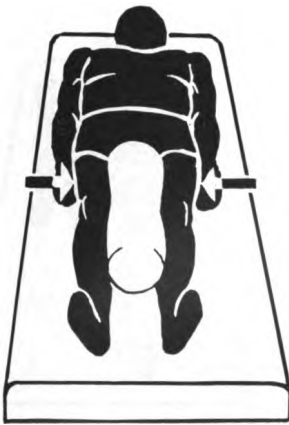
STARTING POSITION: Supine, arms by sides.

MOVEMENT: (1) Tense muscles in both legs hard. (2) Recover to starting position. (Do this exercise double the number of counts of other exercises prescribed.)

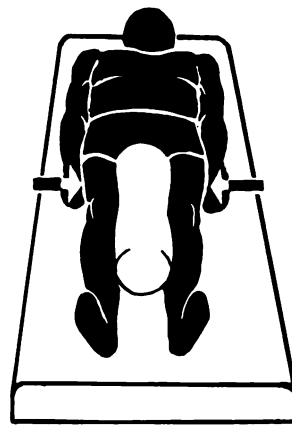
MUSCLE GROUPS ACTING: (p) l ex, l fl, th ex, th fl, ft fl, ft ex.



STARTING POSITION



1



2

Figure 84. Thigh adduction.

(13) Thigh adduction.

CADENCE: Slow.

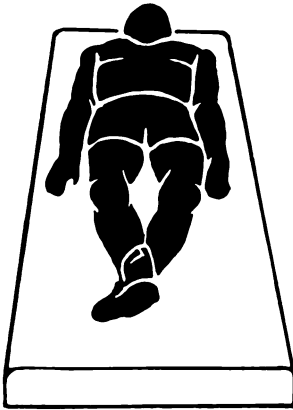
STARTING POSITION: Supine, pillow between knees, hands at sides.

MOVEMENT: (1) Press thighs together hard. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) th add.



STARTING POSITION



1



2

Figure 85. Leg abduction.

(14) *Leg abduction.*

CADENCE: Slow.

STARTING POSITION: Supine, right foot over left.

MOVEMENT: (1) Try to abduct legs, resisting with crossed feet. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) th abd, l ex, (s) th out ro, ft fl, ft. ex.

STARTING POSITION

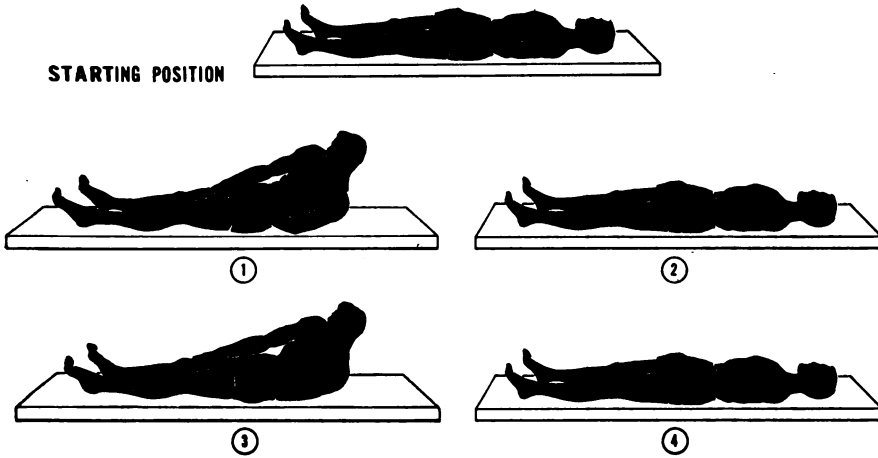


Figure 86. Curl and twist.

(15) *Curl and Twist.*

CADENCE: Slow.

STARTING POSITION: Supine. Feet separated about 2 feet, hands on tops of thighs.

MOVEMENT: (1) Raise head and shoulders from bed, raising right shoulder the higher. Touch left knee with right hand. Keep lumbar region on bed. (2) Recover to starting position. (3) Repeat count (1) on other side. (4) Recover to starting position.

Note. Contraindicated in hip disabilities.

MUSCLE GROUPS ACTING: (p) tr fl, tr ro, th fl, abd sc,
(s) n fl, l ex, ar fwd in ra, fo ex.

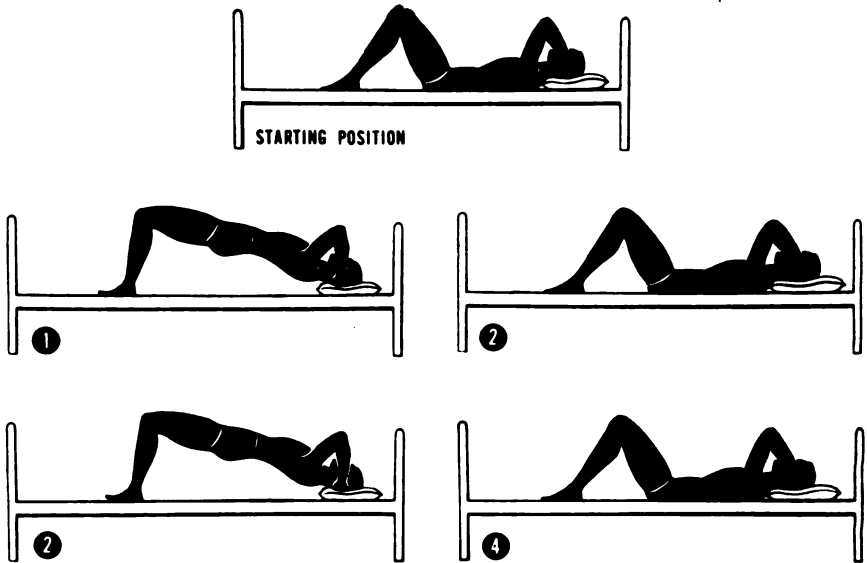


Figure 87. Bridge raiser.

(16) *Bridge raiser.*

CADENCE: Slow.

STARTING POSITION: Supine, with knees flexed and feet about 2 feet apart; fists are pressed on pillow on either side of head; elbows are elevated.

MOVEMENT: (1) Raise trunk from bed, resting weight solely on head, fists and feet. Hips should be raised until the body is approximately straight from shoulders to knees. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

MUSCLE GROUPS ACTING: (p) tr ex, n ex, th ex, l fl, out ro sc, ar fwd to up, (s) fo ex, h fl, h ex.

21. Conditioning Exercises for Crutch Walking

Many bed patients will require gait training before progressing to the ambulant classification. As soon as his condition permits sitting in a wheel chair, the patient should take the following exercises. The purpose of this series is to strengthen hands, arms and shoulder girdle in preparation for gait training.

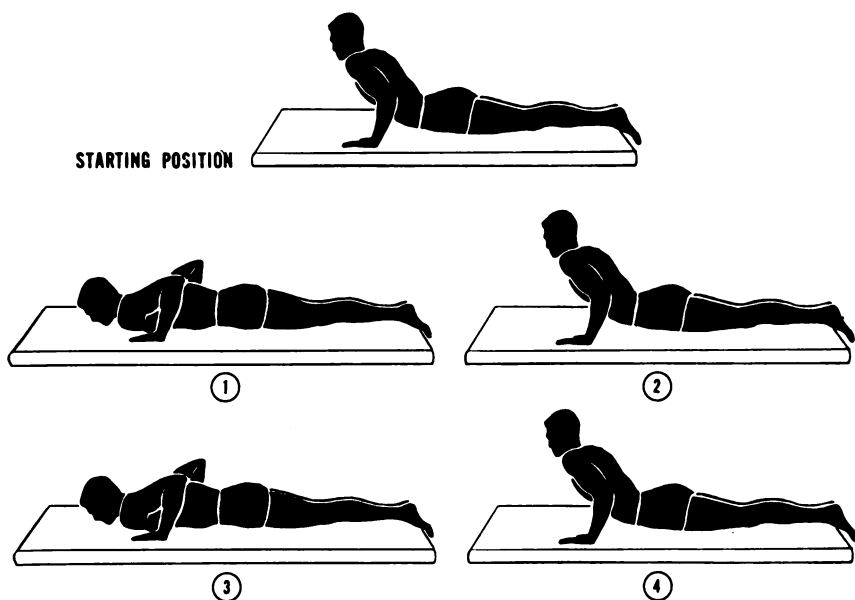


Figure 88. Modified push-ups.

(1) *Modified push-ups.*

STARTING POSITION: Front leaning rest on hands, waist to feet on mat.

MOVEMENT: (1) Bend elbows lowering chest to mat. Go down as far as possible without touching face to the ground.

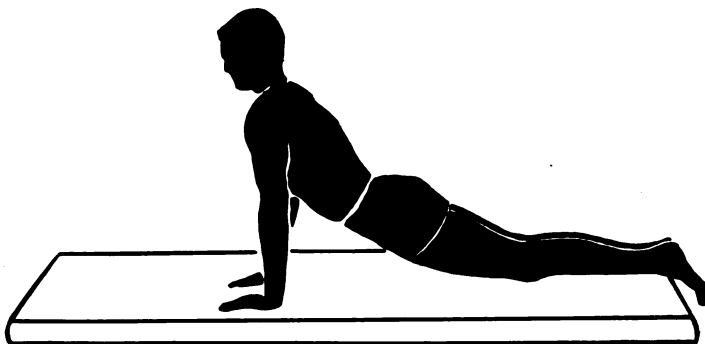
(2) Straighten elbows, raising body to starting position. (3)

Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: (p) tr fl, th fl, n ex, l ex, l fl, abd sc, ar fwd ra, fo ex, h fl.



STARTING POSITION



①



②

Figure 89. Prone extension press-up.

(2) *Prone extension press-up.*

STARTING POSITION: On mat. Prone with arms extended above head in line with body.

MOVEMENT: (1) Slide hands toward shoulders, allowing elbows, hips, and knees to bend until the body is raised, with weight resting on hands and knees. (2) Recover to original position. Repeat 4 times.

MUSCLE GROUPS ACTING: (p) tr ex, n ex, abd sc, ar up to fwd, add sc, fo ex, h fl, fi fl, th fl, l fl, (s) fo fl, tr fl.

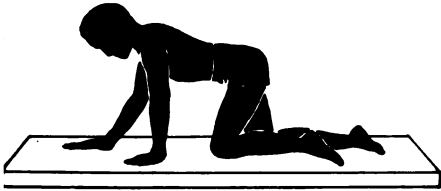


Figure 90. Crawling.

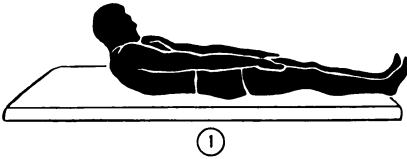
(3) *Crawling.*

STARTING POSITION:
Hands and knees on mat.

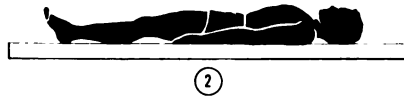
MOVEMENT: (1) Place one hand and opposite knee forward. (2) Place hand and knee of same side forward, then alternate side forward. Continue in this manner for 3 minutes.

MUSCLE GROUPS ACTING: (p) tr fl, n ex, th fl, th ex, l fl, l ex, abd sc, ar fwd ra, ar fwd to dwn, h fl.

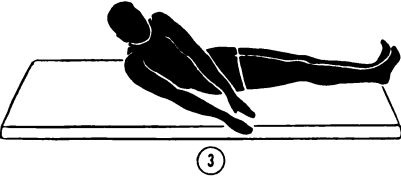
STARTING POSITION



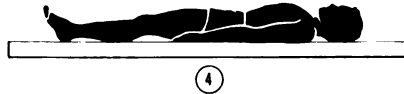
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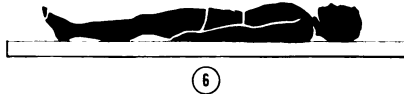
③



④



⑤



⑥

Figure 91. Raise and stretch.

(4) *Raise and stretch.*

STARTING POSITION: On mat. Supine with hands at sides.

MOVEMENT: (1) Raise head and shoulders off mat and reach forward with hands along upper part of legs. Hold for 5 counts. (2) Recover to starting position. (3) Raise head and shoulders off mat and reach obliquely right. Hold for 5 counts. (4) Recover to starting position. (5) Raise head and shoulders off mat and reach obliquely left. (6) Recover to starting position.

MUSCLE GROUPS ACTING: (p) tr fl, tr ro, n fl, th fl, de sc, abd sc, (s) ar fwd ra, fo ex, h ex, ar fwd in ra.

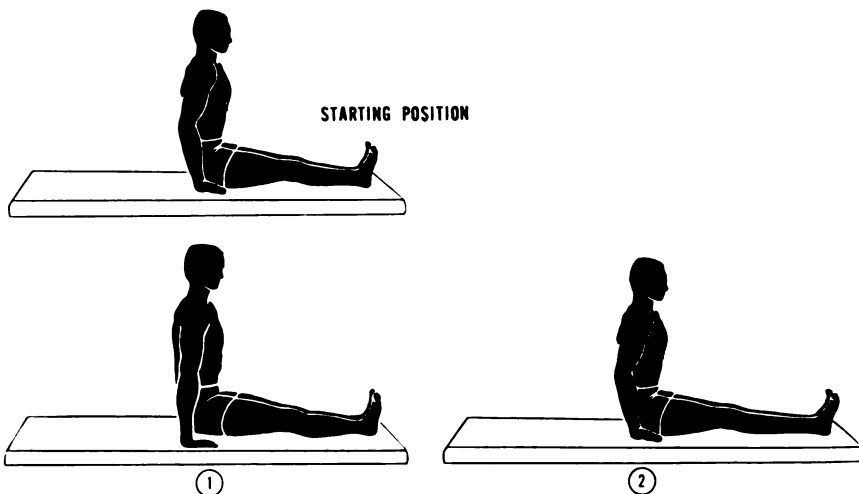


Figure 92. Sit and push.

(5) *Sit and push.*

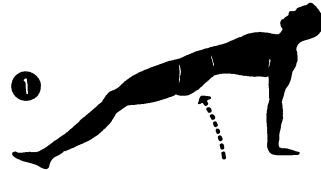
STARTING POSITION: Sitting on mat, arms at sides, palms flat on mat, fingers pointing forward.

MOVEMENT: Raise the body off the mat by keeping the shoulder girdle down and extending forearms downward. (2)

Relax. Repeat 4 times.

MUSCLE GROUPS ACTING: (p) de sc, abd sc, ar fwd ra, fo ex, h fl, tr fl, th fl, l ex.

Note. If arms are short, use books under hands. If arms are long, use pillow under buttocks.



(6) *Hip raiser.*

STARTING POSITION: Back leaning rest on mat, with buttocks on the mat.

MOVEMENT: (1) Raise hips with knees straight until hips are slightly above a line drawn from shoulders to heels. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

MUSCLE GROUPS ACTING: (p) tr fl, th fl, n ex, l ex, ft fl, ft ex, abd sc, ar fwd ra, fo ex, h fl.

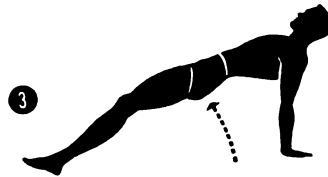
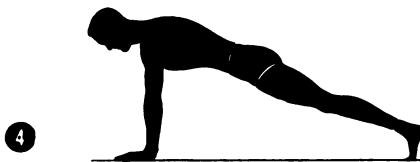
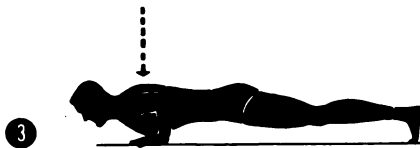
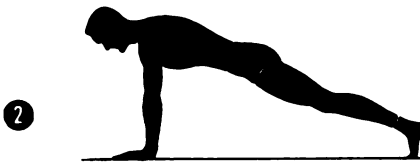
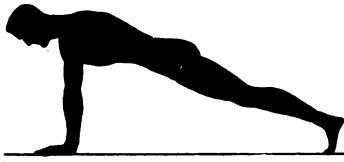


Figure 93. Hip raiser.

STARTING POSITION



(7) *Push-ups.*

STARTING POSITION :

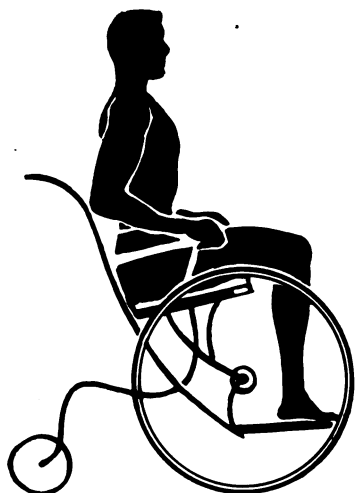
Front leaving rest on mat.

MOVEMENT: (1) Flex forearm and touch chest to ground, keeping body straight. (2) Extend forearm, raising body to straight line. (3) Repeat count (1). (4) Recover to starting position.

MUSCLE GROUPS ACT-

ING: (p) tr fl, th fl, n ex, l ex, ft fl, ft ex, abd sc, ar fwd ra, fo ex, h fl.

Figure 94. Push-ups.



STARTING POSITION



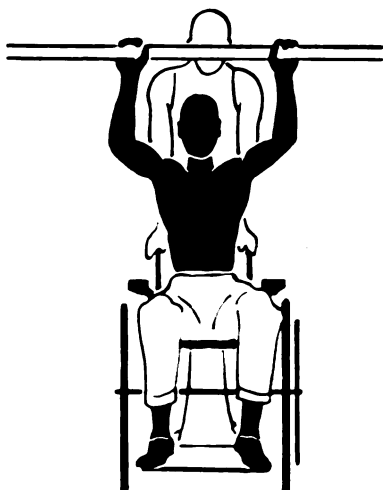
Figure 95. Push-up in chair.

(8) *Push-up in chair.*

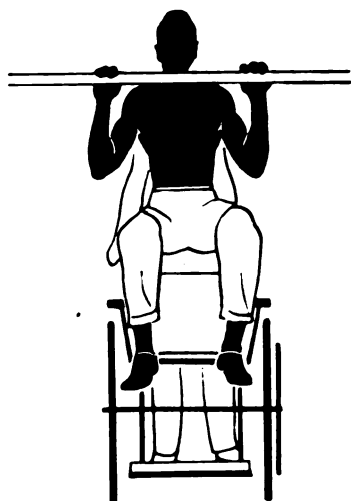
STARTING POSITION: Sitting in wheel chair, hands gripping arms of chair.

MOVEMENT: (1) Keeping shoulder girdle down, extend forearms and raise body out of the seat of chair. (2) Recover to starting position. Repeat 10 times.

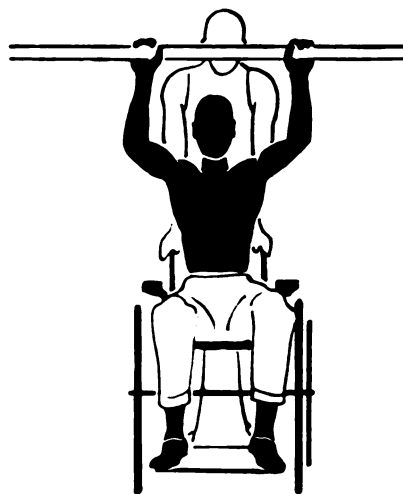
MUSCLE GROUPS ACTING: (p) de sc, ar sdw to dwn, fo ex, h fl, (s) fi fl, po fl, po add, tr fl, th fl.



STARTING POSITION



①



②

Figure 96. Chinning.

(9) Chining.

STARTING POSITION: Sitting in wheel chair before a horizontal bar which is just within reach from sitting position, grasp bar with both hands.

MOVEMENT: (1) Keeping the shoulders down, grasp bar and raise body out of wheel chair. (2) Recover to starting position.

MUSCLE GROUPS ACTING: (p) de sc, ar upw to fwd, ar fwd to dwn, fo fl, h fl, fi fl, po fl, po add, tr fl, th fl.

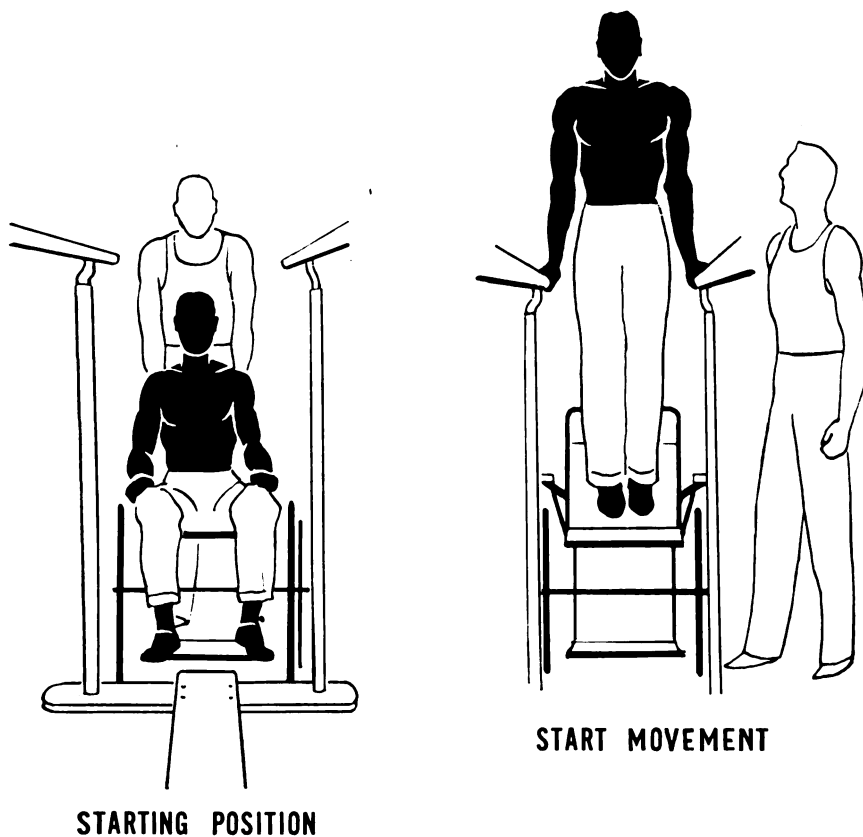


Figure 97. Hand walk.

(10) *Hand walk.*

STARTING POSITION: Sitting in wheel chair facing end of parallel bars.

MOVEMENT: Hoist body to erect position (locking braces if braces are worn), and pull body to a suspended position between parallel bars. Weight is now supported on hands, with elbows straight and shoulder girdle down. Progress forward by raising alternate hands and arms and moving forward by short "steps." Proceed backwards. Return to chair. One complete repetition.

MUSCLE GROUPS ACTING: (p) de sc, ar fwd ra, ar bkw ra, fo ex, tr sb, (s) tr ex, tr fl, n ex, th ex, th add, l ex, ft ex.

Note. Patient is assisted in mounting parallel bars and also in dismounting.

CHAPTER 5

RECONDITIONING EXERCISES FOR AMBULANT PATIENTS

22. Adaptation of Exercises to Different Disabilities

No set series of exercises is applicable to all physical conditions. Adaptation of exercise to specific conditions is necessary. The exercises described in this chapter may, with their alternates, be adapted to various physical conditions.

23. Table of Adaptations

a. Table XII indicates which exercises are indicated and which are contraindicated for specific disabilities. The series is to be repeated as in the exercises for bed patients (par. 15). However, the sixth exercise will differ on the second application. For example, that given the first time would be the side bend, and the one given the second time the stationary run.

Table XII. Reconditioning Exercises for Ambulant Patients Showing Adaptations for Different Disabilities

	Disability			
	Upper extremity	Lower extremity	Abdominal	Back (*)
(1) Neck firm and on toes	(x)	(x)	(x)	(x)
(2) Squat and up	(x)	(b)	(x)	(x)
(3) Shoulder blade squeezer	(e)	(x)	(x)	(x)
(4) Curl and twist	(x)	(x)	(-)	(x)
(4A) Front kick	(*)	(*)	(-)	(*)
(4B) Stair climber	(-)	(-)	(x)	(*)
(5) The bobber	(x)	(*)	(-)	(-)
(5A) Hip raiser	(-)	(x)	(x)	(x)
(6 (1)) Side bend	(x)	(x)	(x)	(x)
(6 (2)) Stationary run	(x)	(-)	(x)	(x)
(7) Four count breather	(x)	(x)	(x)	(x)

(*) For back disabilities for which forward bending of the spine is contraindicated, use "stair climber" and substitute "stationary run" for "side bend."

(b) Modified.

(e) One arm.

(-) Contraindicated.

(x) Indicated.

(*) May replace original exercise.

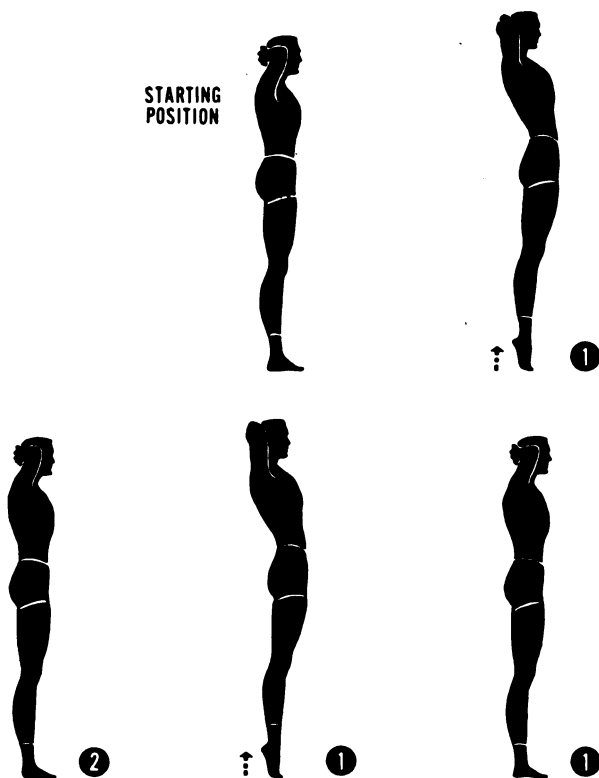


Figure 98. Neck firm and on toes.

b. Exercises for ambulant patients.

(1) *Neck firm and on toes.*

CADENCE: Slow.

STARTING POSITION: Standing erect, fingers laced behind head.

MOVEMENT: (1) Press head and neck backward, raising chest high, straightening upper back and resisting the head and neck movement forcibly with hands. Move elbows backward and extend feet, rising on toes. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

Note. Men with arm or shoulder disabilities exercise only the good arm.

If both arms are incapacitated, they execute the head, back and on-toes movement without using their hands. A man with a neck disability will do as much of the movement as is prescribed for him.

MUSCLE GROUPS ACTING: tr ex, n ex, th ex, ch ra, out ro sc, ar in ro, ar sdw to bkw, l ex, ft ex.

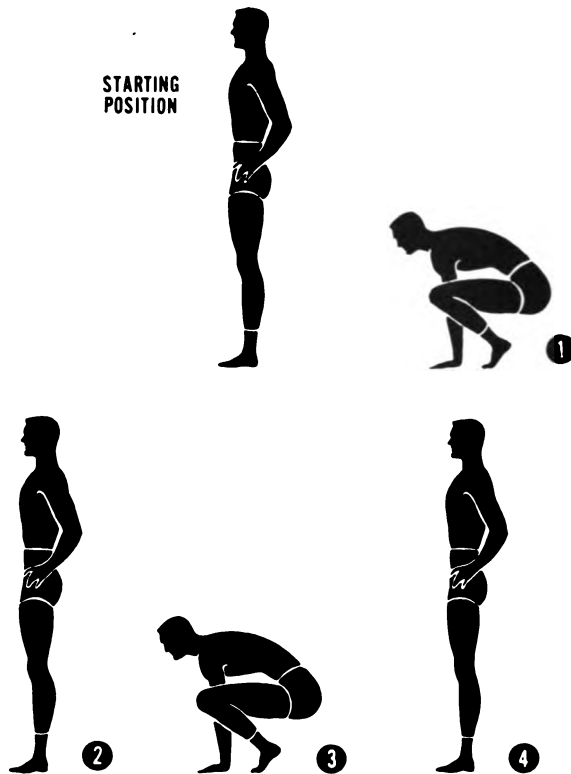


Figure 99. Squat and up.

(2) *Squat and up.*

CADENCE: Moderate.

STARTING POSITION: Standing, hands on hips.

MOVEMENT: (1) Squat fully, placing hands on floor. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

Note. Men with any knee or hip disabilities should modify the movement as much as necessary by separating the feet and squatting principally on one-leg or by going only at a half squat position. Men with knee or back disabilities should keep feet flat on floor.

MUSCLE GROUPS ACTING: tr ex, n ex, th ex, l ex, ft ex.

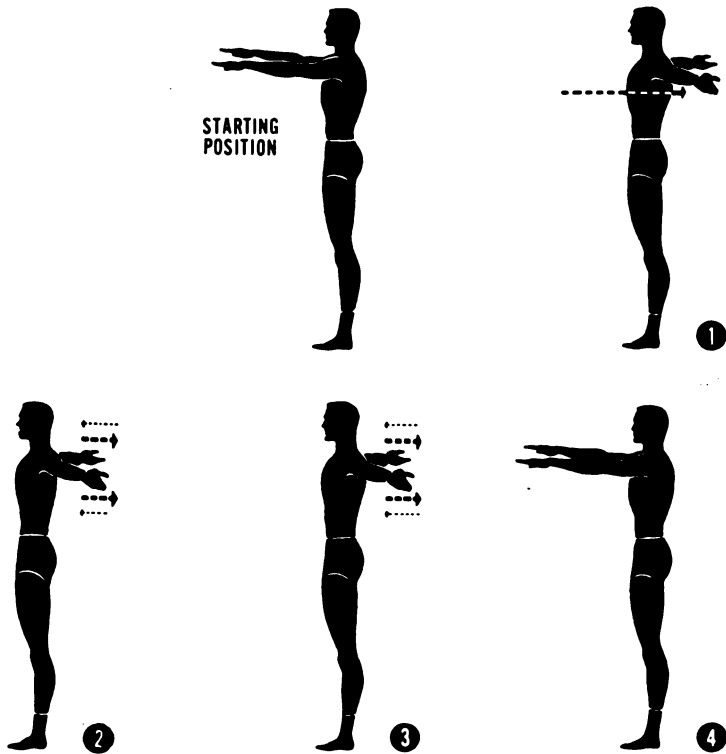


Figure 100. Shoulder blade squeezer.

(3) *Shoulder blade squeezer.*

CADENCE: Slow.

STARTING POSITION: Standing, arms forward, palms down.

MOVEMENT: (1) Swing arms sideward and backward as far as possible, palms up. (2) Relax slightly and swing arms backward again. (3) Repeat count (2). (4) Return to starting position.

MUSCLE GROUPS ACTING: ra sc, out ro sc, add sc, ar sdw ra, ar sdw to bkw, ar out ro, fo ex.

STARTING POSITION

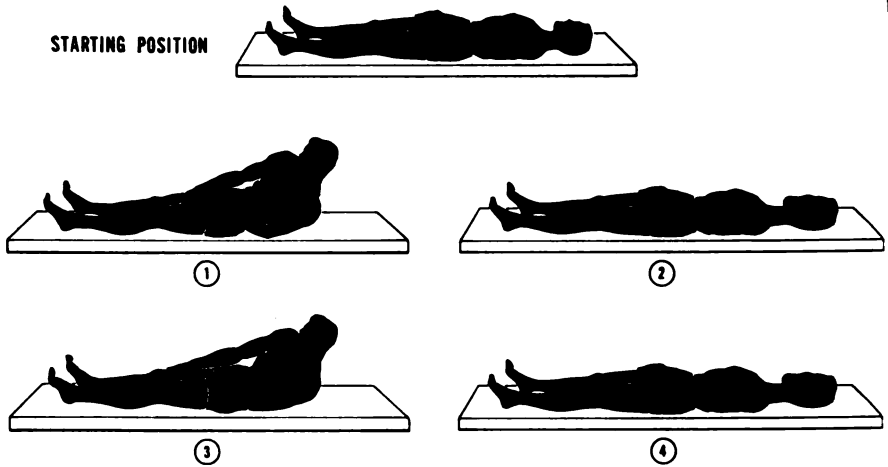


Figure 101. Curl and twist.

(4) *Curl and twist.*

CADENCE: Moderate.

STARTING POSITION: Supine, feet separated about 24 inches, hands on top of thighs.

MOVEMENT: (1) Raise head and shoulders from floor, raising right shoulder the higher, attempting to touch left knee with right hand. Keep both feet on floor. Keep lower back on floor. (2) Recover to starting position. (3) Repeat count (1) to other side. (4) Recover to starting position.

Note. If it is impracticable to lie on the floor or ground, substitute front kick on stair-climber.

MUSCLE GROUPS ACTING: tr fl, tr ro, th fl, abd sc.

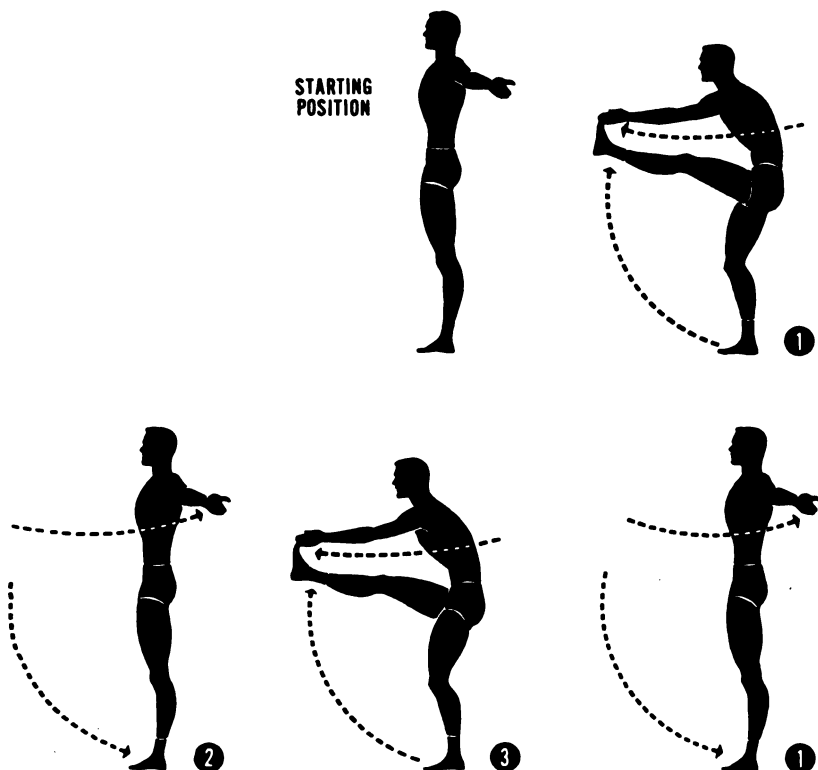


Figure 102. Front kick.

(4A) *Front kick.*

CADENCE: Moderate.

STARTING POSITION: Standing, arms sideward, palms up.

MOVEMENT: (1) Raise left leg forward, with knee straight, until foot is approximately the height of the shoulder. At the same time, swing arms forward touching foot with hands. The right knee may be somewhat bent, back should be kept as straight as possible. (2) Recover to starting position. (3) Repeat count (1) with right foot. (4) Recover to starting position.

Note. Those men who are unable to perform either exercise substitute the following:

MUSCLE GROUPS ACTING: tr fl, tr ex, tr sb, th fl, th ex, l ex, ft fl, ft ex, fo fl, abd sc.

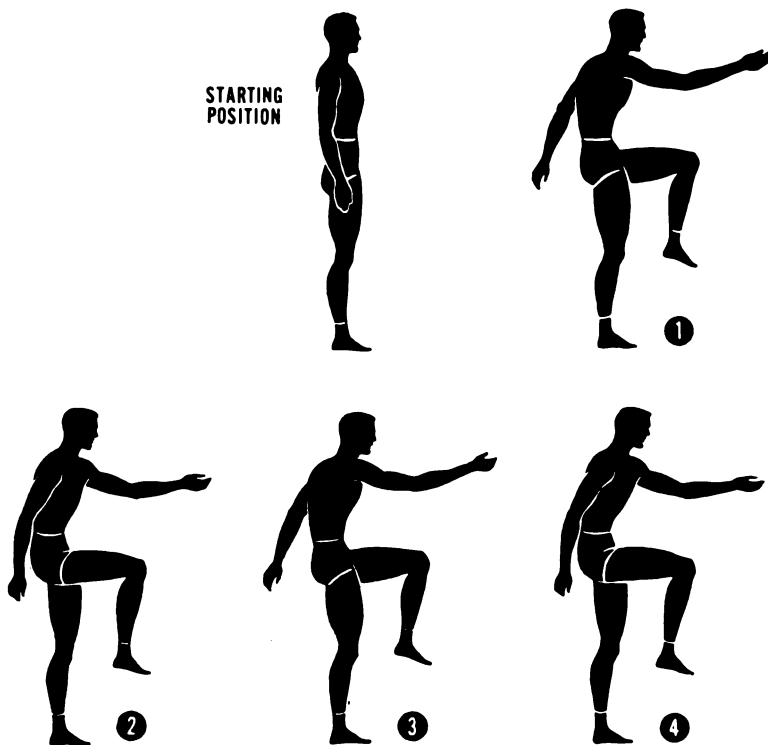


Figure 103. Stair climber.

(4B) *Stair climber.*

CADENCE: Moderate.

STARTING POSITION: Standing.

MOVEMENT: (1) Lift left knee to height of hips and swing right arm forward, then return to starting position. Inhale. (2) Lift right knee to height of hips and swing left arm forward, then return to starting position. Continue inhaling. (3) Repeat Count (1). Exhale. (4) Repeat count (2). Continue exhaling. This exercise is done continuously as a marking time.

MUSCLE GROUPS ACTING: tr ex, tr fl, tr sb, th ex, th fl, l fl, l ex, sc abd, sc add, ar fwd ra, ar bkw ra, insp, expr.

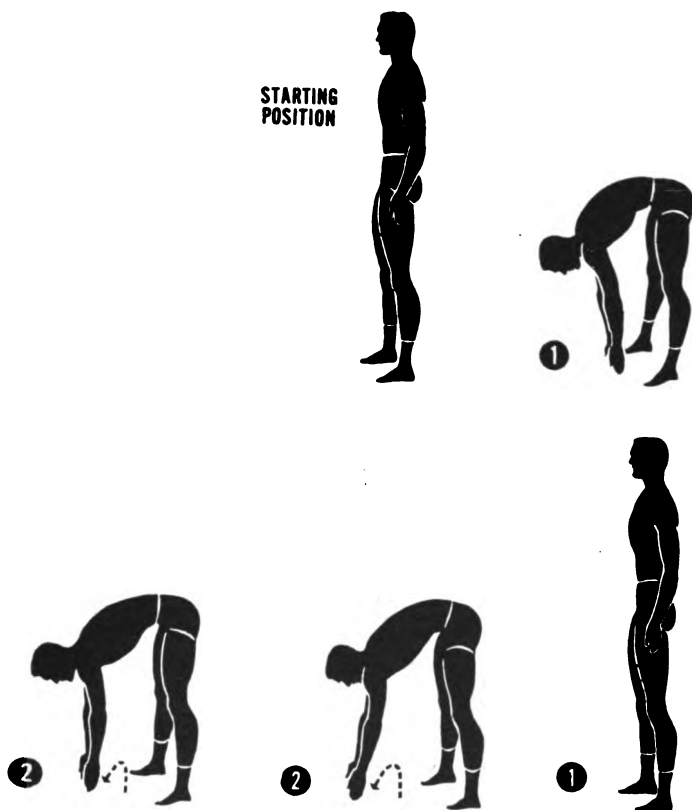


Figure 104. Bobber.

(5) *Bobber.*

CADENCE: Moderate.

STARTING POSITION: Side straddle, hands at side.

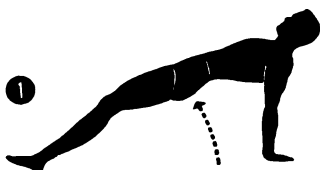
MOVEMENT: (1) Bend forward with knees straight and touch floor between feet. (2) Relax slightly and "bob" downward again, touching floor from 6 to 8 inches farther forward. (3) Repeat count (2) touching floor still farther forward. (4) Recover to starting position.

Note. Patients with back disabilities should keep back straight, should restrict the amplitude of the movements, or should substitute the following exercises:

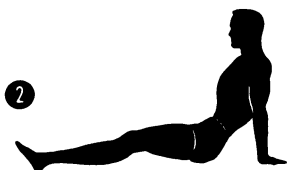
MUSCLE GROUPS ACTING: tr ex, n ex, th ex, l ex, out ro sc, abd sc, ar fwd ra, fo ex.



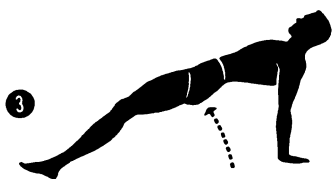
STARTING
POSITION



1



2



3



4

(5A) *Hip raiser.*

CADENCE: Moderate.

STARTING POSITION: Back leaning rest, buttocks on ground.

MOVEMENT: (1) Raise hips with knees straight until hips are slightly above a line drawn from shoulders to heels. (2) Recover to starting position. (3) Repeat count (1). (4) Recover to starting position.

Note. This exercise is indicated for patients with back disabilities which contraindicates forward bending of the spine.

MUSCLE GROUPS ACTING: tr ex, th ex, n fl, de sc, add sc, ar bkw ra, fo ex, h fl.

Figure 105. *Hip raiser.*

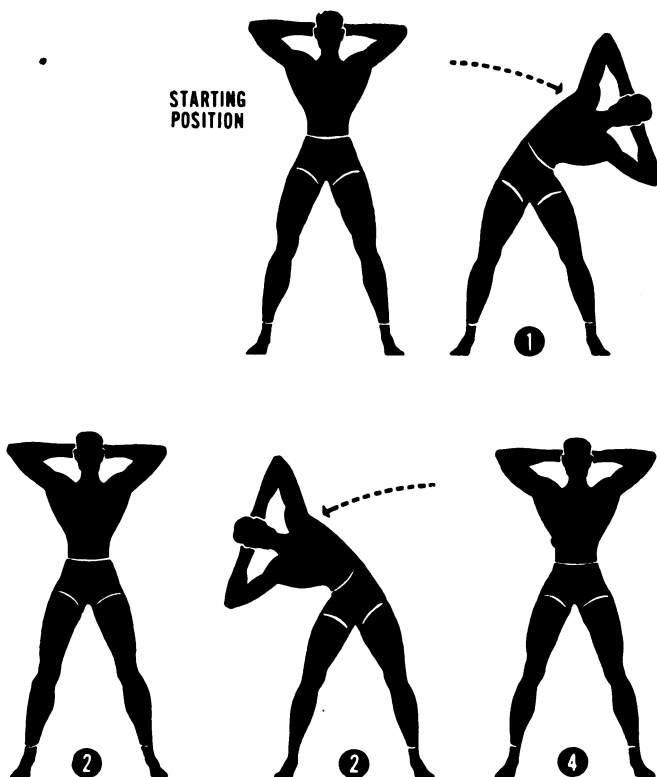


Figure 106. Side bend.

(6a). *Side bend.*

CADENCE: Moderate.

STARTING POSITION: Side straddle, fingers laced behind head, chest high.

MOVEMENT: (1) Bend trunk sideward left, keeping knees straight. (2) Recover to starting position. (3) Repeat count (1) on opposite side. (4) Recover to starting position.

MUSCLE GROUPS ACTING: tr sb, tr ex, n sb, th abd, th add, l ex, ra sc, out ro sc, ar sdw ra, fo fl, ch ra.

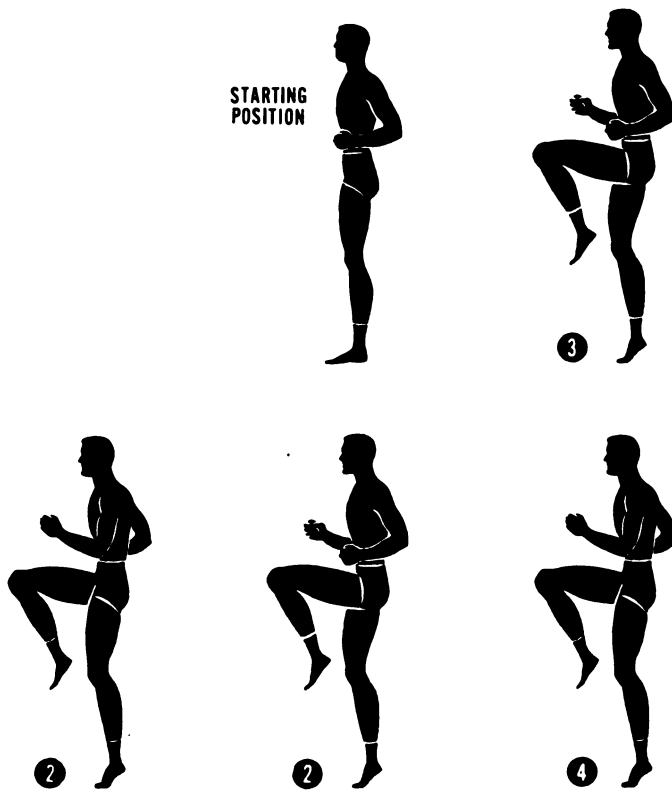


Figure 107. Stationary run.

(6b). *Stationary run.*

CADENCE: Slow, fast, slow.

STARTING POSITION: Standing, arms at thrust.

MOVEMENT: (1) Begin slowly, then speed up, raising knees to the height of the hips. Run for a while at almost full speed raising knees forcibly. Then slow down. The total time spent should be from 30 seconds to 1 minute.

Note. If it is impracticable to do the stationary run because of a leg disability, substitute hopping on the unaffected leg. The principle muscles used will be the same as in the stationary run except that they will be confined to the active leg.

**STARTING
POSITION**



(7) *Four-count breather.*

CADENCE: Slow.

STARTING POSITION: Standing hands on hips.

MOVEMENT: (1) (2) (3) (4). Inhale on four counts, taking a deeper breath on each count. Usually the patient will have inhaled fully by the third count. (5) (6) (7) (8). Exhale in "waves" on four counts. Try to blow all the air out on the seventh and eighth counts.

MUSCLE GROUPS ACTING: tr ex, ch ra, insp, expr.



4 3 3 4



5 5 7 6

Figure 108. Four-count breather.

CHAPTER 6

POSTURE TRAINING

Section I. GENERAL

24. Concept of Good Posture

The physical architecture of individuals differs according to the bony structure inherited. There is no *one* "best posture"; however, certain general principles, if intelligently applied either to a group as a whole or to an individual, will aid in developing good body alignment. Recognizing these general principles will not only provide knowledge of the elements of good posture, but will enable the individual to "feel" or practice correct body alignment and thus motivate him to acquire the habit of good posture. Many people do not know the difference between good and poor posture. In the mistaken belief of assuming good posture, they throw back their shoulders, thrust the head and abdomen forward, arch the lower back and turn out their feet to an angle of 45° . There are some people who "feel" more natural while maintaining poor posture.

25. Teaching Good Posture

Good posture or correct body mechanics must be taught.

a. Standing Posture. The patient should be taught to stand with his feet about four inches apart and approximately parallel. The line of gravity falls through the center of the supporting structure and just in front of the axis of the ankle joint. This position can be more easily acquired by having the patient stand as tall as possible with special attention given to elevating the chest and maintaining the proper pelvic tilt. This tilt is acquired by drawing the abdomen in and rolling the buttocks down and under. The use of a mirror is helpful in teaching the correct standing position. Good posture requires the individual to be erect, poised, and relaxed. Good balance, coupled with good muscle tone and a feeling of alertness are also required. Good posture is psychological as well as physical.

b. Sitting Posture. The essentials of correct body mechanics in sitting are essentially the same as those of standing, except that the weight rests on the under surface of the thighs and buttocks. The hips should be well back in the chair. The patient should move his weight from time to time to relieve the pressure on the buttocks and to encourage circulation in those parts. In addition, careful attention should be given to his abdominal and other trunk muscles, gluteals, quadriceps, foot, shoulder and neck muscles. To prepare for ambulation with crutches, special attention must be given to the hand, arm, and shoulder muscles. When the patient is permitted ambulatory privileges, he should be given specific instruction and practice in correct body alignment. Suitable exercises to strengthen the muscles needed to maintain correct body mechanics in the erect position should be stressed.

c. Lying Posture. While the patient is confined to his bed, he should be taught good bed posture. The tone of the abdominal muscles should be maintained, as should the quadriceps, the foot muscles, the gluteals and the muscles of the trunk, posterior, shoulder and neck. When the patient is first allowed to sit in a chair, further emphasis should be given to the strengthening of all the muscles which aid in the maintaining of good posture.

26. Motivating Good Posture

Regardless of the amount of exercise and instruction one receives, a person habitually assumes good posture only if he has felt a need for it. That is why motivation is so important. The hospital patient must be shown the need for good posture as an aid to his recovery.

a. As a part of the patient's orientation to the physical medicine program, the physical reconditioning instructor can give a short talk on the therapeutic advantages of good posture. The leg amputee can be shown the need for body balance and for additional strength in the unaffected leg in order to compensate for the leg which has been amputated. The patient who has had an abdominal operation can be shown the need for abdominal tone to protect his incision, to promote better elimination and better appetite. The various bed posture exercises will strengthen his muscles so that when he is able to get out of bed he will be strong enough to support his body weight without the usual discomfort which follows long periods of bed rest. Understanding the value of good posture, the performance of these exercises becomes meaningful to the patient.

b. As the patient progresses from the bed to the wheel chair and finally becomes ambulatory, more emphasis should be placed on the

desirability of good posture as a mark of good morale. The economic value of good posture when the man is discharged from service should not be overlooked.

c. The psychological value of good posture is important in raising the morale of one who is ill or injured. Poor posture easily contributes to a negative and discouraged attitude. Good posture improves the patient's personal appearance—his morale is concomitantly improved. Performing exercise to promote good posture benefits the patients physically and psychologically.

d. The following rules may aid physical reconditioning instructors in teaching good posture:

- (1) Constant demonstration by personal good posture.
- (2) Advocation of good body alinement as an aid in recovery and as a means of preventing excessive body fatigue.
- (3) Provision of visual aids illustrating good posture.
- (4) Use of mirrors, placed where patients will have opportunities to observe their posture.
- (5) Compliment those who have good posture.
- (6) Encourage those who have poor posture.

Section II. POSTURE EXERCISES FOR CERTAIN GROUPS

27. General

a. Certain muscle groups must have special strengthening and training to maintain good posture without undue fatigue. The exercises below will give this training. As the need arises, many of these exercises can be included with the exercises prescribed for bed, ambulant and convalescent patients.

b. The bed posture series may be given on alternate days in place of the usual conditioning exercises for bed patients. The wheel chair series is designed especially for patients who must spend a long period of convalescence in their wheel chairs. The particular condition will determine how many of these exercises the medical officer will prescribe. The ambulatory posture exercises may be given on alternate days in place of the usual ambulant or convalescent exercise series. Weights may be used in many cases to increase dosage.

c. Whether one or all of a series is given to a patient, each exercise will be of value only if the patient exercises each muscle group as vigorously as his strength permits. When the exercise calls for arms to be extended fully overhead the patient must really "stretch." Meaningless repetition of movements without effort will not improve a case of poor posture.

28. Posture Exercises

a. Exercises for Bed Patients.



Figure 109. Bed posture.

(1) *Bed posture.*

POSTURE:

- Head and neck in midline.
- Shoulders even.
- Trunk straight.
- Pelvis even.
- Small pillow under head.
- Regular pillow under knees.

Note. A right-angle footboard and full-length bedboard may be needed in many cases. A small pillow under upper back including inferior angle of the scapular may also be used to improve posture of upper back.

MUSCLE GROUPS ACTING: passive—no important muscle action.

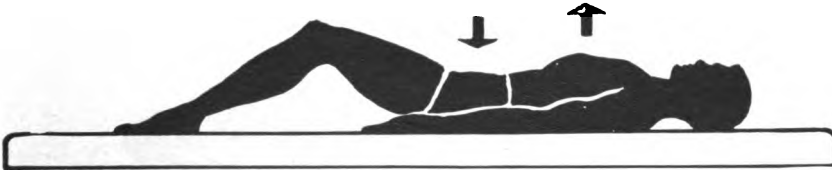


Figure 110. Back flattener.

(2) *Back flattener.*

CADENCE: Slow.

STARTING POSITION: Supine, hands at sides, knees slightly flexed.

MOVEMENT: (1) Draw in abdomen, contract buttocks, and exhale. (2) Inhale keeping abdomen in and chest raised. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr ab ret, th ex.

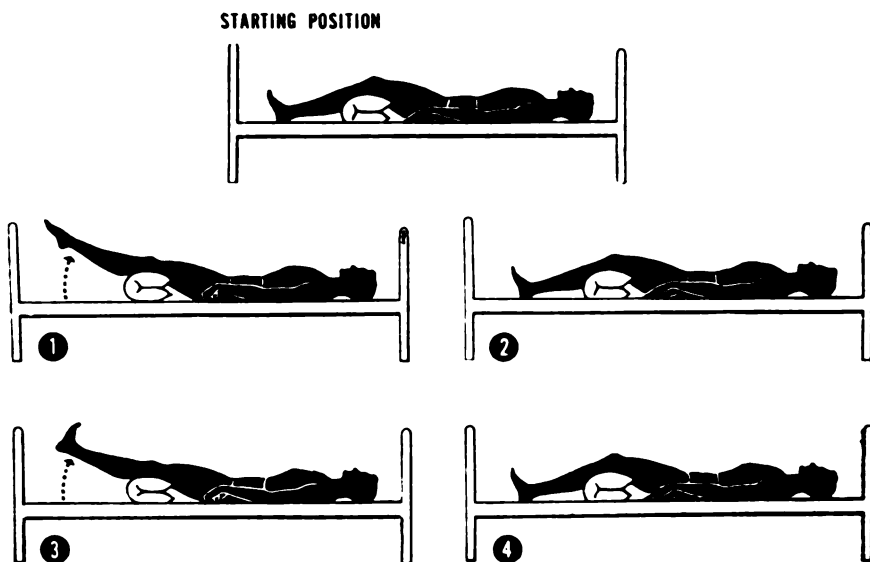


Figure 111. Leg stretcher.

(3) *Leg stretcher.*

CADENCE: Slow.

STARTING POSITION: Supine, with hands at side and folded pillow under knees, feet together.

MOVEMENT: (1) Extend leg and feet, resting knees on pillow, flex fingers. (2) Relax. (3) Extend legs, flex feet, curl toes in plantar flexion, and flex fingers. (4) Relax.

MUSCLE GROUPS ACTING: l ex, ft ex, ft fl, to fl.

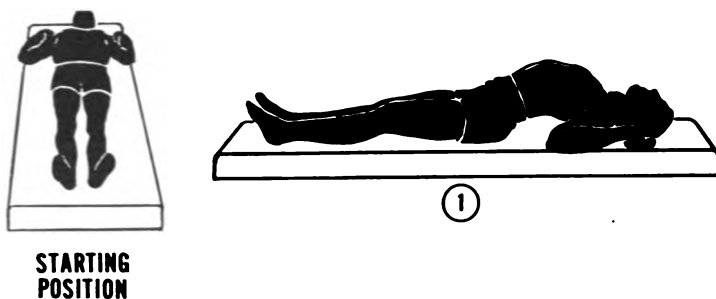


Figure 112. Chest lift.

(4) *Chest lift.*

STARTING POSITION: Supine, with forearms flexed, fingers flexed at sides of shoulder.

MOVEMENT: (1) Press head and elbows down against mattress while inhaling. (2) Relax—exhale. (3) Press more strenuously. (4) Relax.

MUSCLE GROUPS ACTING: tr ex, n ex, add sc, ar out ro, ar bkw in ra.

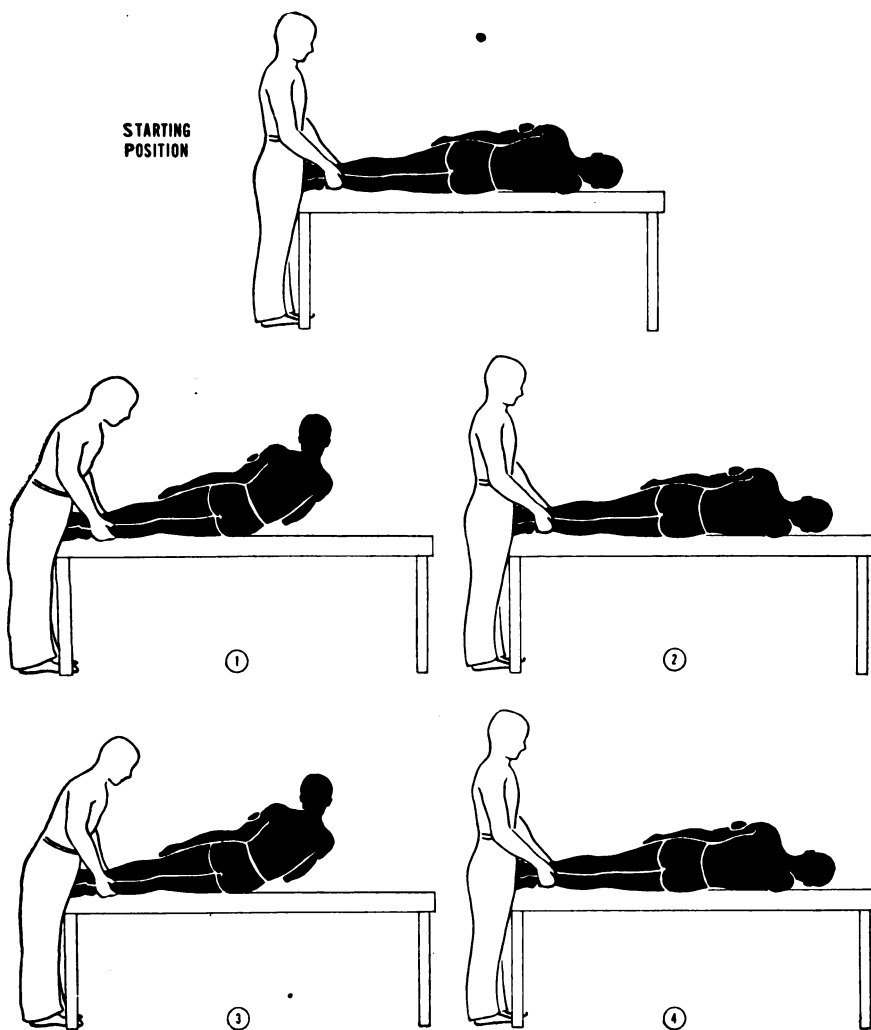


Figure 113. Lateral trunk raise.

(5) *Lateral trunk raise.*

CADENCE: Slow.

STARTING POSITION: Lying on right side and right forearm in front of chest, left hand stretched along top side of body, feet supported.

MOVEMENT: (1) Raise head and shoulders off mattress and extend left arm along body toward side of left knee. (2) Slowly lower body to table. (3) Repeat count (1). (4) Repeat count (2).

Note. Be sure patient does not assist body lift with his right elbow. Do half the number of total count on right side and repeat exercise on left side.

MUSCLE GROUPS ACTING: tr sb, n sb, th abd, th add.

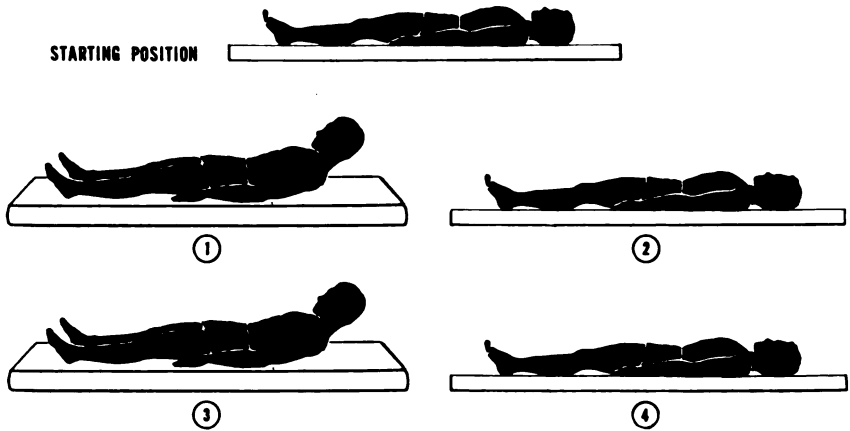


Figure 114. Shoulder raise.

(6) *Shoulder raise.*

CADENCE: Slow.

STARTING POSITION: Supine, with hands at sides.

MOVEMENT: (1) Contract buttocks, draw in abdomen, slowly raise head and shoulders slightly off mattress and exhale. (2) Slowly lower head and shoulders to original position and relax. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr fl, n fl, tr ab ret, th out ro, th in ro, expr.

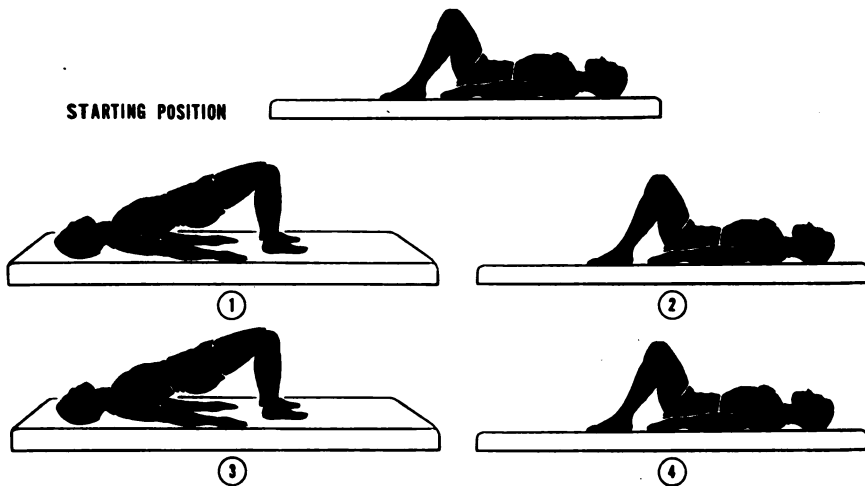


Figure 115. Modified bridge.

(7) *Modified bridge.*

CADENCE: Slow.

STARTING POSITION: Supine, with knees bent and hands at sides.

MOVEMENT: (1) Pressing head and feet into mattress, raise hips slightly and vigorously contract buttocks—hold for 5 seconds. (2) Relax. (3) Repeat holding for 10 seconds. (4) Relax.

MUSCLE GROUPS ACTING: (p) tr ex, th ex, l fl, (s) n ex (possibly) ar bkw ra.

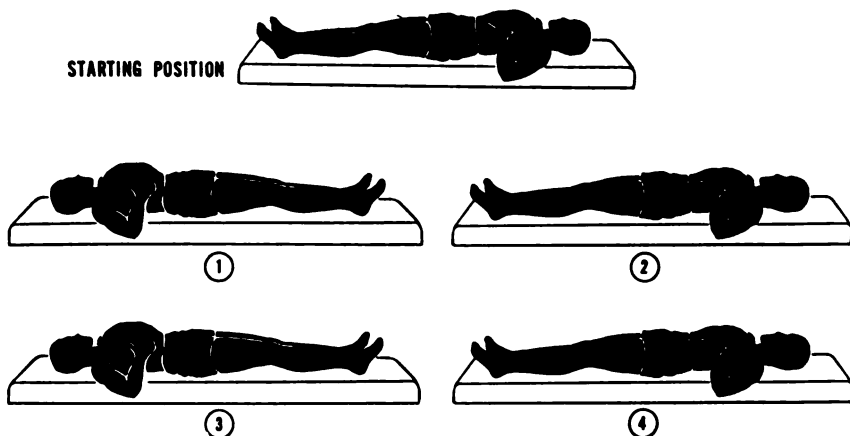


Figure 116. Chest expander.

(8) *Chest expander.*

CADENCE: Slow.

STARTING POSITION: Supine, with palms of hands resting on lateral rib cage.

MOVEMENT: (1) Inhale expanding ribs out against slight resistance of hands. (2) Relax and exhale. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: insp, expr.

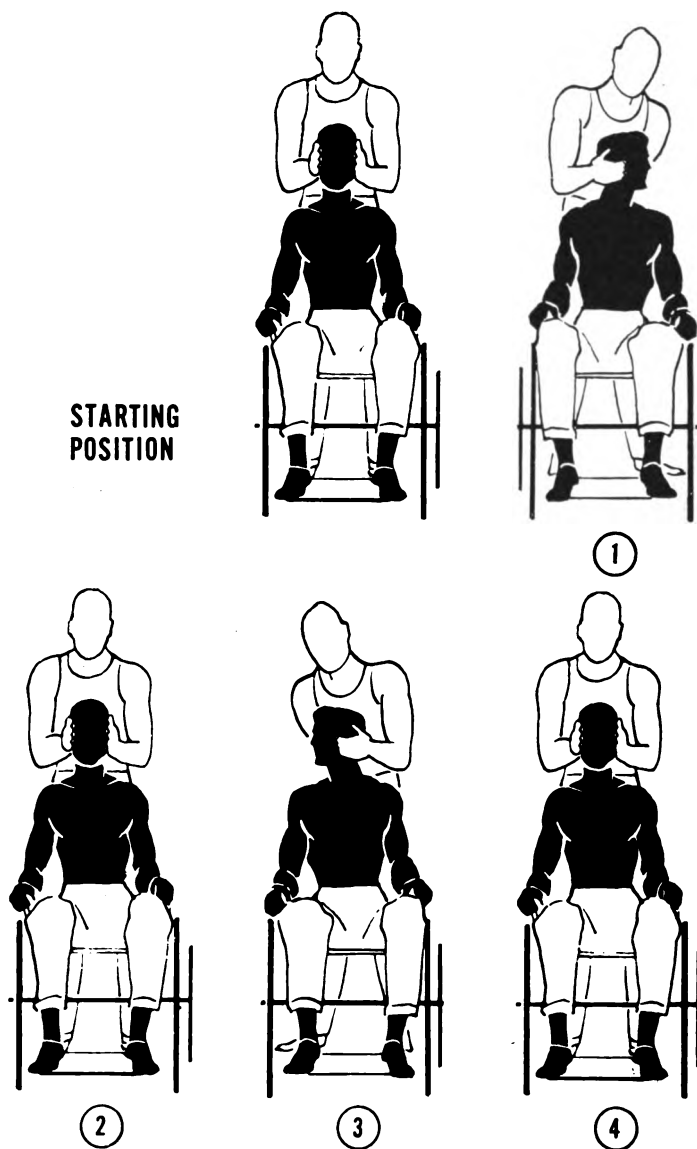


Figure 117. Head turning.

b. Exercises for Wheel Chair Patients.

(1) *Head turning.*

CADENCE: Slow.

STARTING POSITION: Sitting in wheel chair, instructor's hands at sides of patient's head.

MOVEMENT: (1) Slowly turn head to left against real (own hands or instructor's hands) resistance. (2) Relax. (3) Repeat on right side. (4) Relax.

MUSCLE GROUPS ACTING: no ro.

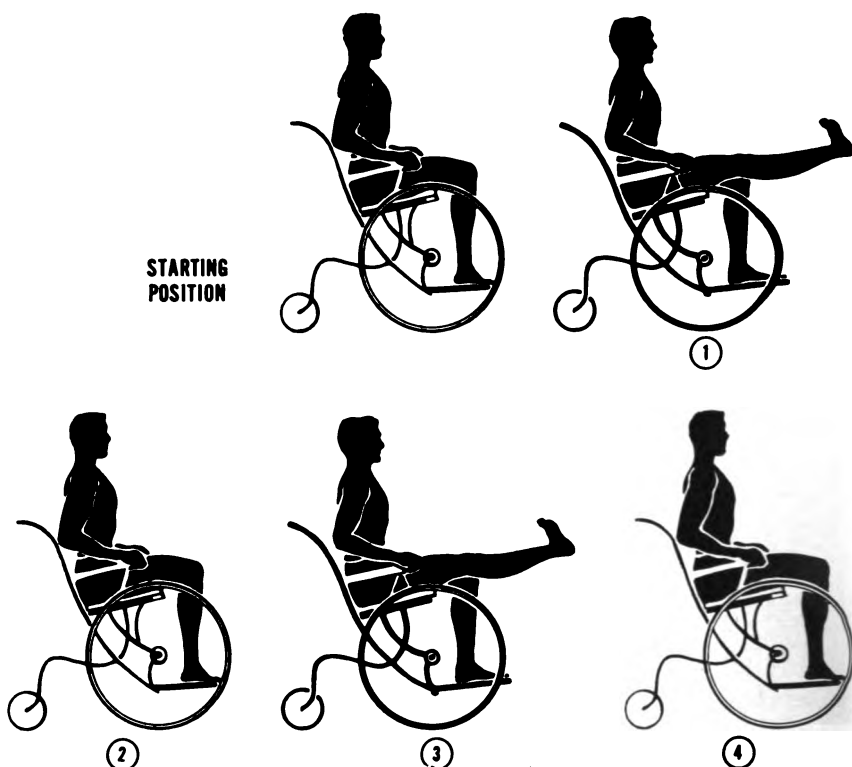


Figure 118. Quadriceps sitting.

(2) *Quadriceps sitting.*

CADENCE: Slow.

STARTING POSITION: Sitting in wheel chair with trunk fully extended and abdomen drawn in.

MOVEMENT: (1) Raise left leg to a horizontal position dorsiflex supinate foot and curl toes in plantar flexion. (2) Lower leg and relax. (3) Repeat with right leg. (4) Lower leg and relax.

MUSCLE GROUPS ACTING: l ex, ft ex, ft sup, to fl.

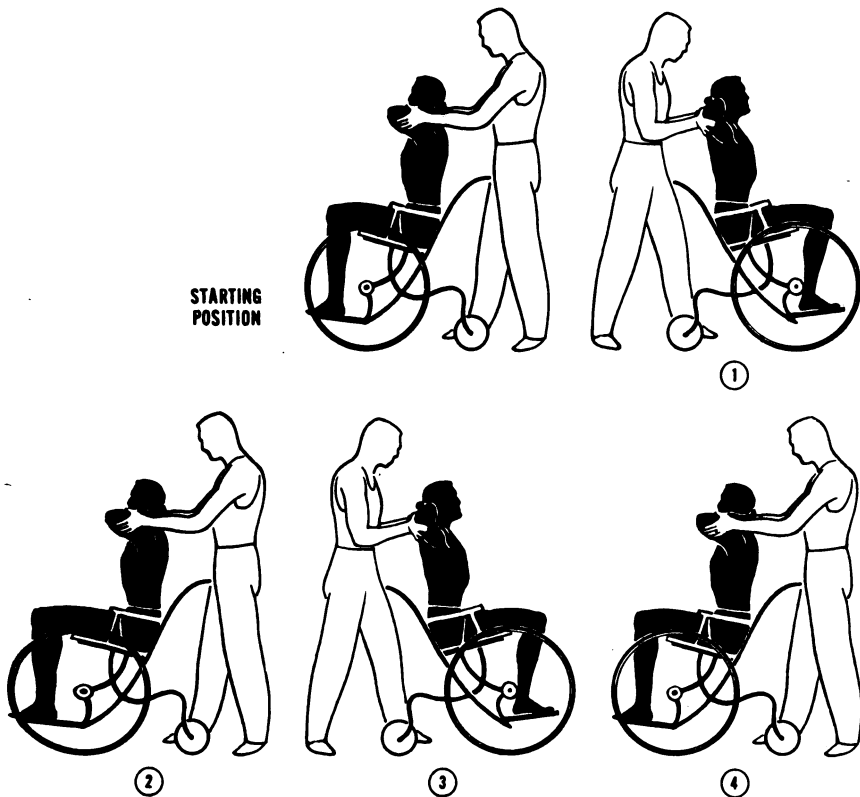


Figure 119. *Wing spread.*

(3) *Wing spread.*

CADENCE: Slow.

STARTING POSITION: sitting in wheel chair with elbows at shoulder height and hands clasped behind head, instructor's hands behind patient's elbows.

MOVEMENT: (1) Slowly, with trunk fully extended, and abdomen drawn in, press elbows back against real (instructor's hands) resistance. (2) Relax. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr ex, n ex, add sc, ar sdw to bkw, ar in ro, fo fl, h fl, fi fl, po fl, po add, tr ab ret.

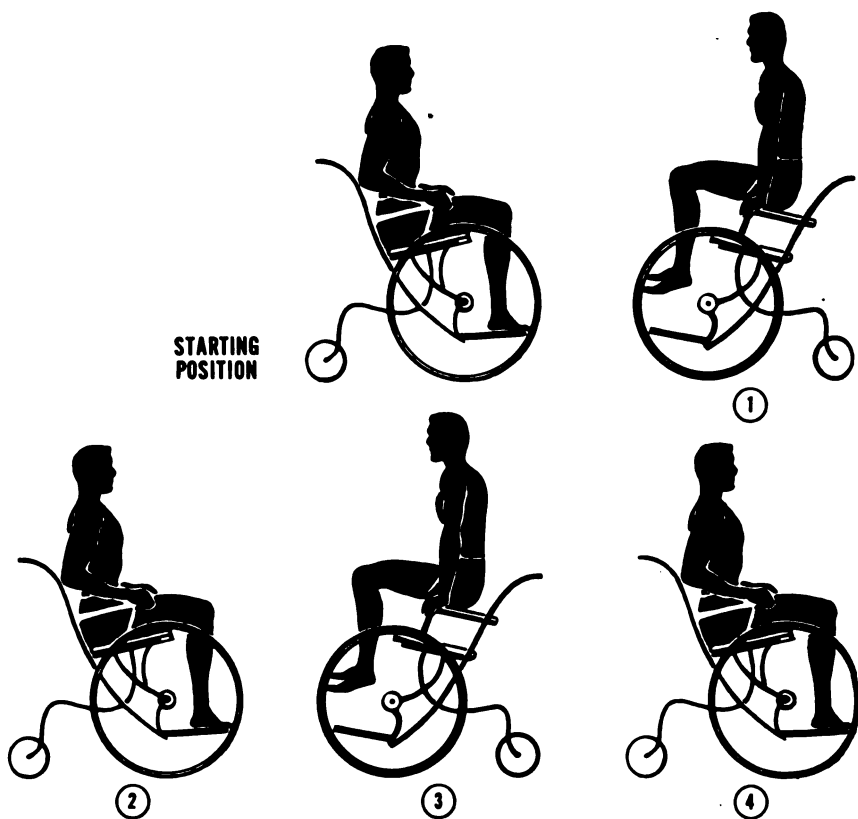


Figure 120. Push-up in chair.

(4) *Push-up in chair.*

STARTING POSITION: Sitting with hands grasping arms of wheel chair.

MOVEMENT: (1) Keeping the shoulder girdle held down, straighten arms and raise body off seat of chair. (2) Relax.

(3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: de sc, ar bkw ra, ar fwd ra, fo ex, h fl.

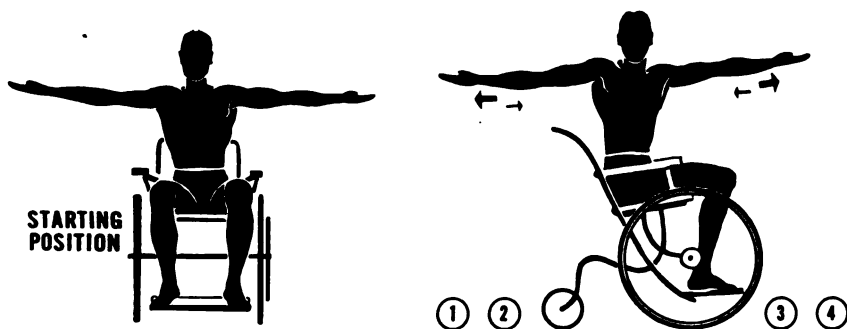


Figure 121. Trunk twister.

(5) *Trunk twister.*

CADENCE: Slow.

STARTING POSITION: Sitting in wheel chair with arms extended out to sides at shoulder height, palms up.

MOVEMENT: (1) Keeping hips firm rotate trunk to right and hold. (2) Relax and rotate trunk more. (3) Rotate trunk to left and hold. (4) Relax and rotate trunk more.

MUSCLE GROUPS ACTING: tr ro.

(6) *Marble picker.*

CADENCE: Slow.

STARTING POSITION: Sitting with marble placed 6" to left of toes of left foot.

MOVEMENT: (1) Grasp marble with toes of left foot. Keeping toes plantar flexed and foot supinated, bring left foot outside of right knee and drop marble in right hand. (2) Replace left foot and place marble to right of right foot. (3) Repeat picking up marble with left foot. (4) Repeat picking up marble with right foot.

MUSCLE GROUPS ACTING: th fl, th in ro, ft ex, ft sup, to fl, th out ro, h fl.

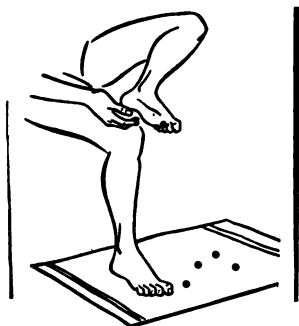


Figure 122. Marble picker.

STARTING POSITION



Figure 123. Shoulder retractor.

(7) *Shoulder retractor.*

CADENCE: Slow.

STARTING POSITION: Sitting with elbows at side shoulder level, hands in front of chest as if grasping a chain.

MOVEMENT: (1) Move shoulders backward and slowly pull fists, as if against resistance, to a position directly in front of shoulders. (2) Relax and pull again. (3) Relax and pull still more. (4) Recover to starting position.

MUSCLE GROUPS ACTING: ar sdw ra, fo fl, out ro sc, add sc.

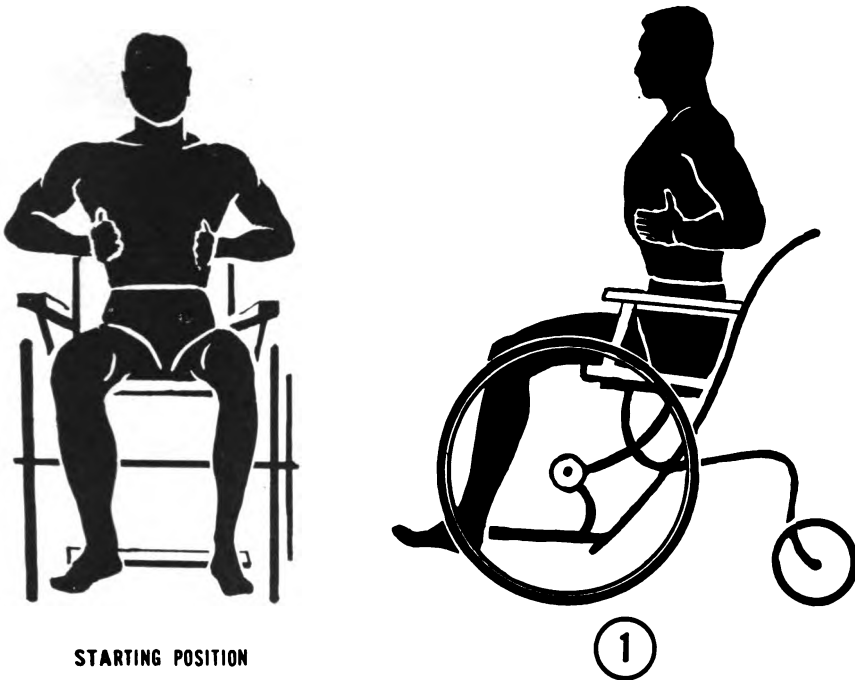


Figure 124. Lung conditioner.

(8) *Lung conditioner.*

STARTING POSITION: Sitting with palms of hands resting on lateral rib cage.

MOVEMENT: (1) Inhale, extending spine and expanding ribs against resistance of hand. (2) Relax and exhale. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: insp, expr.

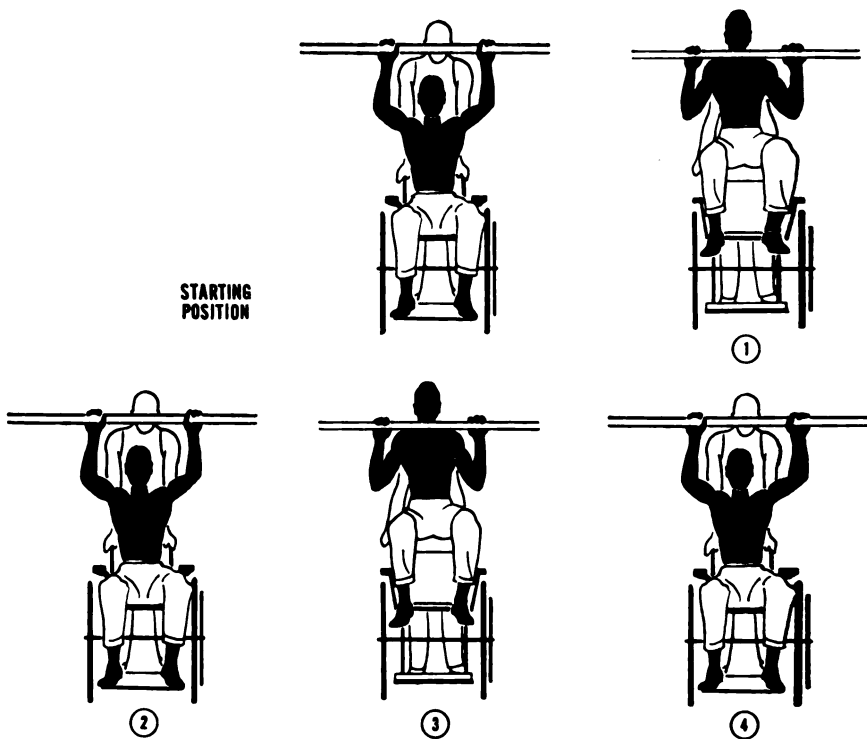


Figure 125. Chinning.

(9) *Chinning.*

STARTING POSITION: Sitting under horizontal bar (or doorway gym bar) with bar at height which the patient can reach.

MOVEMENT: (1) Keeping the shoulder girdle down, bend arms and raise body as high as possible. (2) Lower body to chair and relax. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: de sc, ar upw to fwd, ar fwd to dwn, fo fl, h fl, fi fl, po fl, po add, tr fl, th fl.

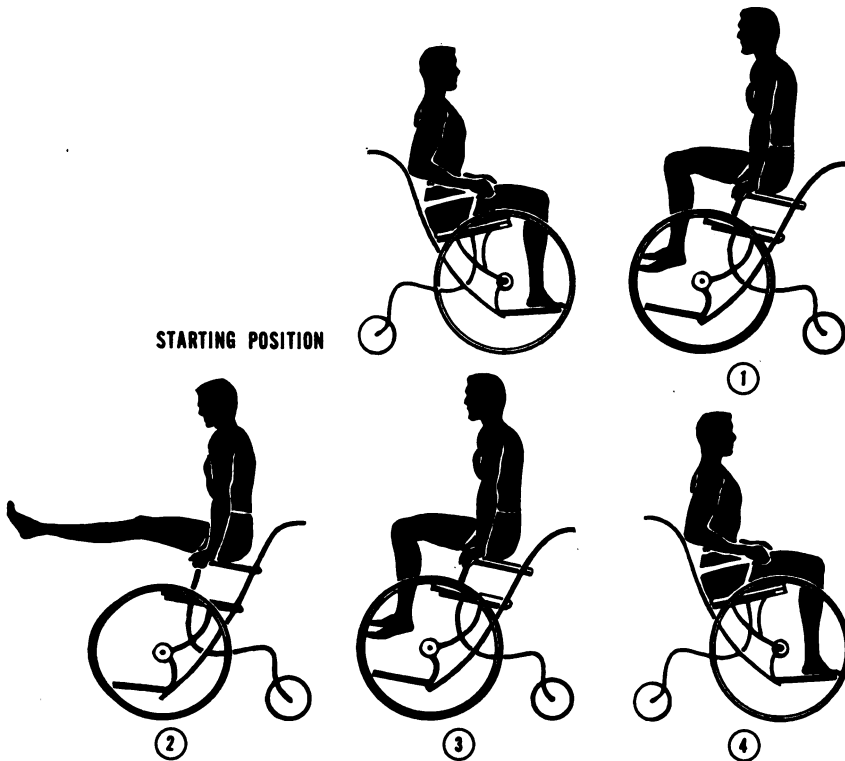


Figure 126. Half lever.

(10) *Half lever.*

STARTING POSITION: Sitting with hands grasping arms of wheel chair.

MOVEMENT: (1) Keeping the shoulder girdle held down, straighten arms and raise body off seat of chair. (2) Extend legs to horizontal position. (3) Recover to original position. (4) Relax.

MUSCLE GROUPS ACTING: de sc, ar bkw ra, ar fwd ra, fo ex, h fl, fi fl, po fl, po add, tr fl, th fl, l ex.

c. *Exercises for Ambulatory Patients.*

(1) *Wall standing.* (No illustration.)

STARTING POSITION: Standing with heels four inches away from wall.

MOVEMENT: (1) With head erect and shoulders against wall, contract buttocks, roll hips down and under, contract abdominal muscles upward and push lower back against wall. (2) Relax. (3) Repeat count (1). (4) Repeat count (2).

Note. A slight bend of the knees will help the patient get the "feel" of the correct back and pelvic position.

MUSCLE GROUPS ACTING: tr ex, n ex, tr ab ret, th out ro, th in ro.

(2) *Free standing.* (No illustration.)

STARTING POSITION: Standing before mirror.

MOVEMENT: (1) With the assistance of the instructor, patient aligns his various body segments as follows: (a) **Head**, trunk and thighs in straight line. (b) Chest high and slightly forward. (c) Abdomen drawn in. (d) Back curves not exaggerated. (e) Feet parallel and weight toward the balls of the feet.

MUSCLE GROUPS ACTING: tr ex, n ex, h fl, tr fl, tr ab ret, th ex, th out ro, th in ro, l ex, ft ex, ft sup, ch ra.

(3) *Correct walking.* (No illustration.)

STARTING POSITION: Standing erect.

MOVEMENT: Simultaneously with a shifting of the body weight to the right foot the body leans slightly forward, the hip flexors of the left leg bring the thigh forward with the knee bent by its own weight. The knee is extended, partly by the contraction of the quadriceps and partly by momentum. The heel of the left foot strikes the floor lightly and the weight is transferred almost simultaneously, to the outer border of the foot and across the entire forepart of the left foot. As the forefoot comes in contact with the floor the right heel is raised and the extensors of the knee and hip help to push the weight forward over the left foot. Once the weight is over the left foot the process is repeated on the other side of the body.

Note. Special emphasis must be given to correct body alignment—head up, chest held high, abdomen in, arms swing naturally at sides and feet parallel. Following knee operations, Potts' fracture, etc., it is advisable to have patient walk with feet slightly inverted, to overcome natural tendency toward pronation.

MUSCLE GROUPS ACTING: tr ex, tr fl, n ex, n fl, th fl, th ex, l ex, l fl, ft fl, ft ex, ft sup, fo fl, fo ex, out ro sc, in ro sc, ar fwd ra, ar bk w ra.

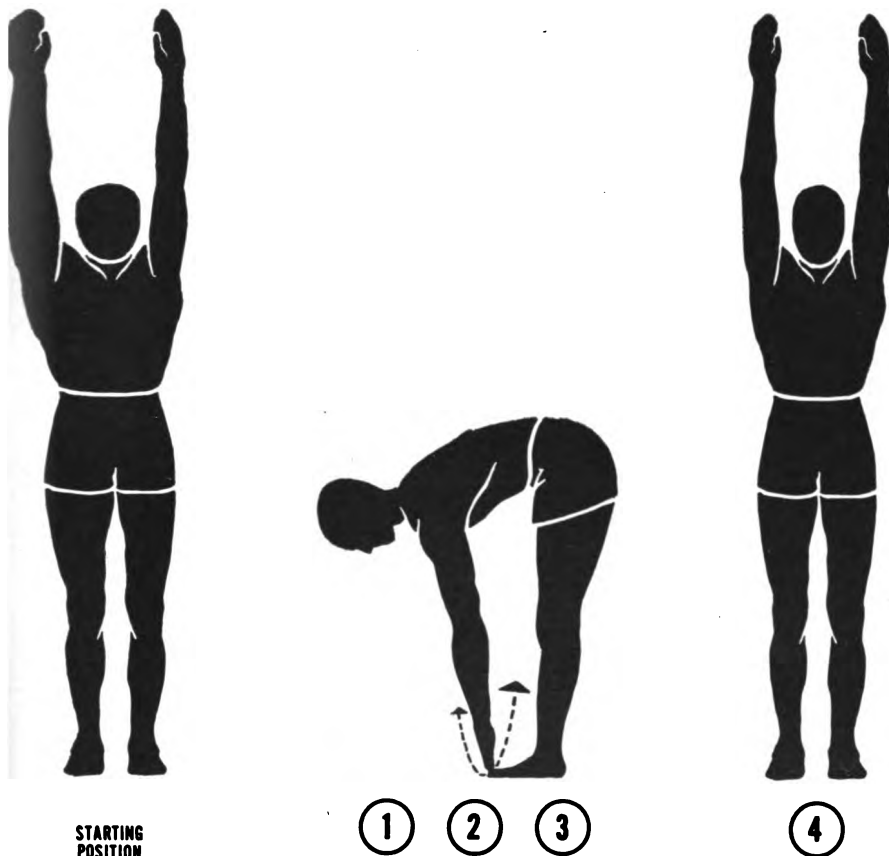


Figure 127. *Folding spine.*

(4) *Folding spine.*

STARTING POSITION: Standing with back against wall with heels four inches from wall, arms straight above head.

MOVEMENT: (1) Drop arms forward, bend head forward, and continue bending through dorsal spine and at hips until fingers touch floor. Exhale. (2) Swing arms loosely to right and to left. (3) Slowly extend body starting at hips, through dorsal spine, through cervical spine, raise head and finally raise arms above head. (4) With abdomen in and lower back flat, stretch arms fully above head.

MUSCLE GROUPS ACTING: tr ex, n ex, th ex, l ex, ra sc, out ro sc, ar fwd ra, ar fwd to up, fo ex, sh ex, h fl, ft ex, abd sc, tr ro, tr ab ret.

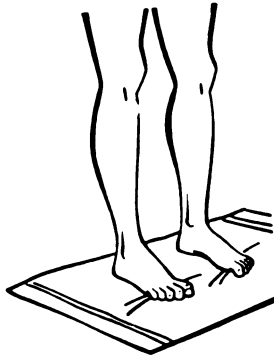


Figure 128. Towel grasp.

(5) *Towel grasp.*

STARTING POSITION: Standing in center of towel with feet 6'' apart.

MOVEMENT: (1) Resting weight on heels, slowly plantar flex toes and invert feet bunching towel between feet. (2) Relax. (3) Repeat count (1). (4) Relax.

Note. Continue until major portion of towel is bunched between feet.

MUSCLE GROUPS ACTING: th in ro, th out ro, l ex, ft fl, ft ex, ft sup, fo fl, fo ex, ft pro.

STARTING POSITION



①



②



③



④

Figure 129. Knee kiss.

(6) *Knee kiss.*

STARTING POSITION: Supine, with knees bent and arms extended in line with body.

MOVEMENT: (1) Raise body to sitting position, clasp knees and touch chest to knees. (2) Return to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr fl, th fl, tr ab ret, n fl, l fl, in ro sc, out ro sc, ar up to fwd, fo fl, h fl, h ex, fi fl, po fl, po add.

STARTING
POSITION



(7) *Hand circles.*

STARTING POSITION: Standing with body leaning slightly forward and arms extended to side shoulder level with *palms up*.

MOVEMENT: (1) Slowly form 6'' circles *upward* and *backward*, keeping chin in and head erect.

(2) Recover to starting position.

MUSCLE GROUPS ACTING: tr ex, n ex, th ex, ra sc, out ro sc, add sc, ar sdw ra, ar sdw to bkw, ar out ro, ch ra, tr ex, n ex, th ex, fo ex, h fl, ar sdw to fwd, n fl.

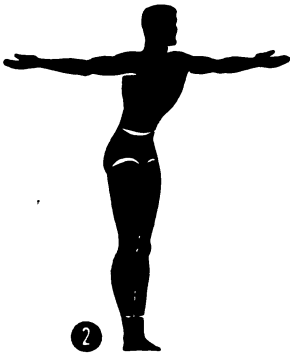
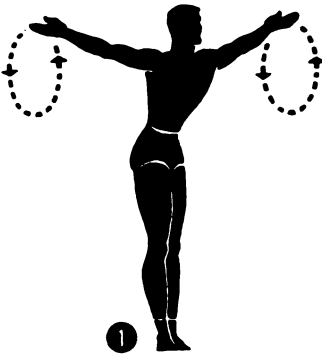


Figure 130. *Hand circles.*

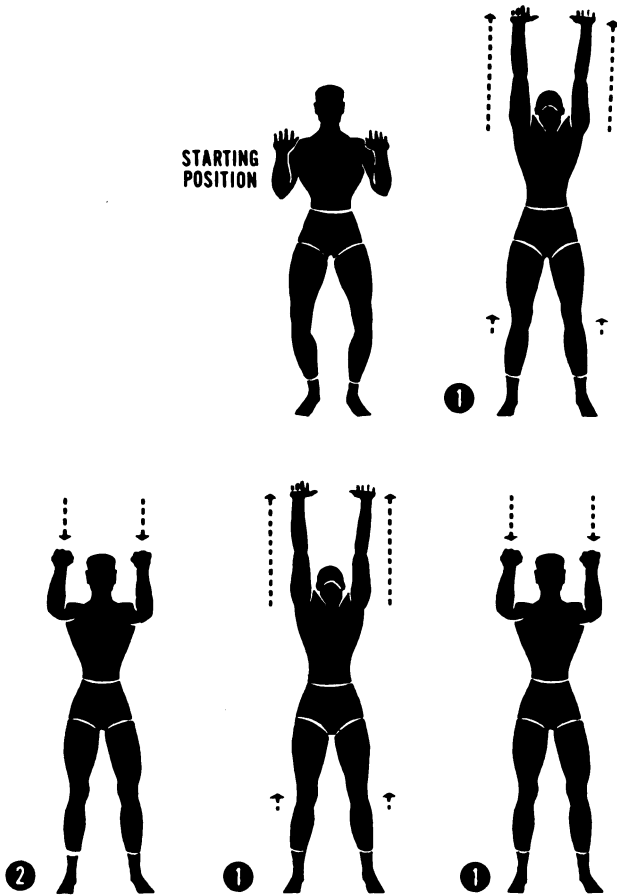


Figure 131. Push and chin.

(8) *Push and chin.*

STARTING POSITION: Feet 12 inches apart, knees slightly bent, with elbows bent and close to body, palms forward.

MOVEMENT: (1) Go through motion of pushing a heavy weight over head. Exhale. (2) Turn palms to rear and do an imaginary pull-up or "chinning," finishing with fists clenched in front of chest. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr ex, n ex, ra sc out ro sc, ar fwd ra, ar fwd to up, fo ex, h fl, fi fl, po fl, po add, ar up to fwd, ar fwd to down, fo fl. (Much of muscular activity is composed of working antagonistic muscles against each other.)

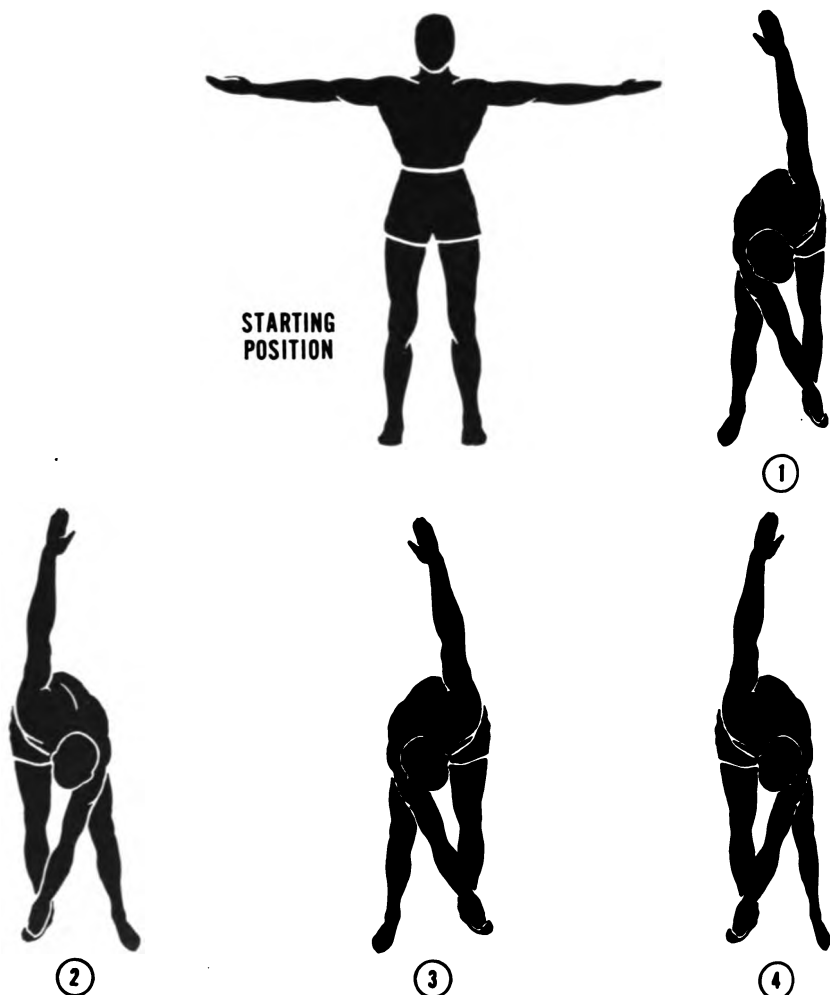


Figure 132. Wind mill.

(9) *Wind mill.*

STARTING POSITION: Standing, feet about 24 inches apart, arms extended to side, shoulder lever position and *palms up*.

MOVEMENT: (1) Rotate body to left, bend forward and touch left foot with right hand, extending left arm upward with palm forward. Exhale. (2) Rotate body to right and touch right foot with left hand. (3) Repeat count (1). (4) Repeat count (2).

Note. Be sure elbow of arm which is extended to rear is straight and palm is facing forward (outward rotation of shoulder). Imagine having a stick extended from the right wrist across back and to the left wrist will help in preserving good arm and shoulder posture.

MUSCLE GROUPS ACTING: tr ex, th ex, l ex, n ex, tr ro, th out ro, th in ro, ra sc, out ro sc, ar sdw ra, ar out ro, ar sdw to bkw, fo ex.

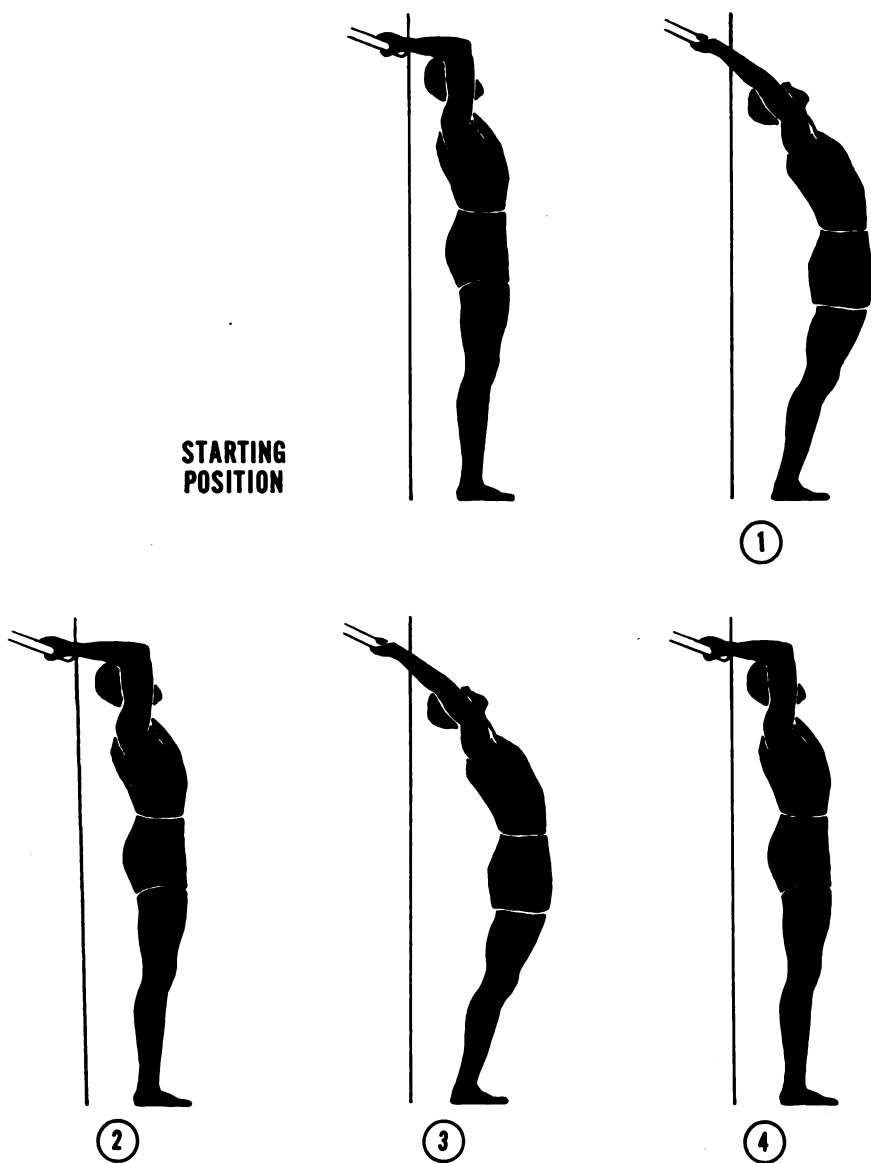


Figure 133. Arching.

(10) *Arching.*

STARTING POSITION: Standing about 18 inches to 24 inches in front of stall bars, facing away from bars, grasping bar about level with top of head or slightly higher.

MOVEMENT: (1) Arch the upper back keeping lower back and elbows straight. (2) Recover to starting position. (3) Repeat count (1). (4) Repeat count (2).

MUSCLE GROUPS ACTING: tr ex, th ex, tr fl, n fl, l ex, ra sc, out ro sc, ar fwd to bkw, fo ex, fi fl, po fl, po add, ch ra.

STARTING
POSITION



4 2 3 4

(11) *Four-count breather.*

STARTING POSITION: Standing, hands on hips.

MOVEMENT: (1) Inhale on 4 counts, taking a deeper breath on each count. (2) Exhale on 4 counts, attempting to blow "all" of the air on the last count. (3) Repeat count (1). (4) Repeat count (2).

Note. Keep body in good position throughout exercise.

MUSCLE GROUPS ACTING: insp, expr, tr ex, in ro sc, ar bkw ra, fo ex, h fl.



5 6 2 6

Figure 134. Four-count breather.

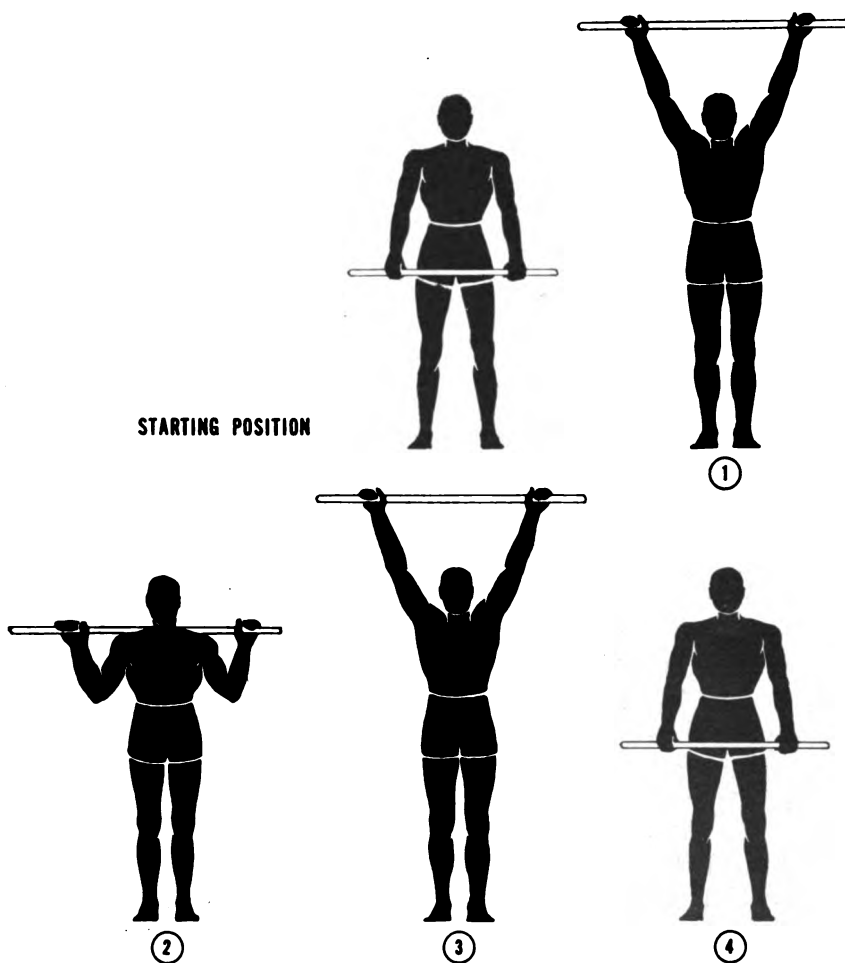


Figure 135. *Shoulder blade pinch.*

(12) *Shoulder blade pinch.*

STARTING POSITION: Good standing position with wand held in hands. Wand is grasped at positions just outside of thighs.

MOVEMENT: (1) Raise wand forward and upward over head.

(2) With head erect bring wand down behind head and to a position behind shoulders. (3) Return to position above head.

(4) Recover to starting position.

MUSCLE GROUPS ACTING: tr ex, n ex, ra sc, out ro sc, in ro sc, add sc, ar fwd ra, ar fwd to up, fo ex, ar sdw ra, ar out ro, fo fl, fi fl, po fl, po add.

CHAPTER 7

PHYSICAL RECONDITIONING FOR PSYCHIATRIC PATIENTS

Section I. GENERAL

29. Purpose

The purpose of physical reconditioning for psychiatric patients is to contribute to the patient's recovery through planned and purposeful activities which are administered under medical attention, supervision, and control. The specific aims are to—

- a.* Improve the general physical condition of the patient.
- b.* Provide an individualized activity for the patient who cannot adjust to a group level.
- c.* Promote physical and emotional relaxation.
- d.* Modify and diversify activity so as to awaken the patient's interest for redirection into constructive behavior.
- e.* Assist in the resocialization of the patient so that he may be able to participate with others in activities both in the hospital and later.
- f.* Provide an outlet in physical activity for emotional tension and overexcitability and to channelize destructive activity into constructive pursuits.

30. Value of Physical Reconditioning for Psychiatric Patients

a. One of the chief characteristics of psychiatric patients is their inclination to be self-centered and absorbed in their own thoughts and conflicts. Their tendency to withdraw makes it difficult to gain their interest and cooperation. Because physical reconditioning activities are objective and universally appealing, they provide an excellent means of eliciting the interest of psychiatric patients. Most individuals have experienced some sports and games in their youth which provided pleasure and satisfaction. The pleasurable recollections of these experiences can be reawakened and may serve as a starting point for an effective therapeutic approach. The happy attitudes produced by play may most naturally broaden the patient's outlook and make him more accessible to further treatment.

b. For certain types of regressed patients who cannot be activated through verbalization, the only initial approach is through a previously formed sensory-motor habit. The problem is to awaken the patient's interest and to advance him to a modifiable relationship. Physical play is a very large part of a child's life and sensory integration is naturally developed in childhood. As regressed patients retain early, rather than late, memory impressions, the sensory-motor adjustments based upon the reawakening of the play experiences of childhood are more easily and more naturally achieved. From this beginning on the sensory-motor level, a higher level of integration may be promoted, advancing from physical to mental, and possibly to social effort.

c. There is no other type of activity which will afford more clues as to his attitude toward himself and others than in natural expressions of play relationships. After the interest of the patient has been aroused, physical reconditioning activities should be used for the purpose of assisting the patient to adjust more happily to his environment, to gain faith in others with whom he comes in contact, to realize his ability to do things of a constructive character, to find encouragement, to mix with others and take part in their activities, and to secure greater emotional satisfactions from engaging in social activities. The patient who feels he is expressing himself in worth-while ways, in ways which are not only approved, but are recognized and rewarded by the group, finds a deep sustaining motivation which will tend to stabilize his participation and maintain it. As the patient becomes more proficient, he most naturally improves in attitude. He becomes more tolerant toward others, and is more willing to take part in group activities of a play-and-work nature.

31. Principles

a. *Emphasis on Social and Psychological Outcomes.*

- (1) It is not the basic purpose of physical reconditioning to concern itself solely with the physiological results of activities. While the improved physiological status of patients is important and should not be overlooked, physical reconditioning must go on considerably beyond this objective. The main objective is to contribute to the readjustment, reeducation, and resocialization of the patient so he can live a more useful, productive and normal life. The chief problems are social and psychological rather than purely physical. Consequently, it is essential that the physical reconditioning be integrated into the total therapeutic program. Activities for activity sake are not the desired objective.
- (2) The reawakening of interest in play activities serves merely as a starting point for an effective therapeutic approach. After the instructor has gained the patient's attention and

interest and established a good relationship with him, he must seek to advance him continually to higher therapeutic levels. The rebuilding of self-confidence through developing pride of accomplishment in the motor area and the happy attitudes produced by pleasurable experience gives physical reconditioning personnel the opportunity to aid patients in reestablishing themselves as adequate and constructive members of a functioning group. From games of the lowest sensory-motor levels patients may be led to games of higher and higher organization requiring increasing teamwork, cooperation, and responsibility to constructive social activity and eventually to work.

b. Play with Rather Than Against. Many physical reconditioning activities are competitive experiences in which one individual or group attempts to show their superiority over their opponents who may easily be conceived as enemies rather than friends. In a therapeutic situation, however, sports and games must be considered as cooperative activities, as utilization of many grades and types of activities for the purpose of giving each participant a sense of worth-while accomplishment rather than to glorify one individual who is placed upon a pedestal as a lone winner. One does not emphasize winning at all costs as a wholesome goal for therapy. Many timid types of individuals are rebuffed in games when they feel the humiliation which comes from being overwhelmed by their opponents. Instructors should teach the fundamental fact that all who make a worth-while effort are winners even though they do not attain the highest score. Patients should be impressed with the idea that winning is not the only desirable objective since all cannot be winners in the sense of attaining the highest score. The activity itself is the important thing and, while the competitive aspects of sports should be retained, it should be constantly examined from the standpoint of its socially cooperative nature so that the participant may find a feeling of worth-while accomplishment. If the physical reconditioning instructor continues to emphasize the validity of conscientious effort and makes the patient feel that his standard of performance is set by the individual himself rather than by some other individual or group, he will have placed before him a sound and satisfying therapeutic objective.

32. Reporting Observations of Patients

Observations on the behavior and attitude of the patient in the informal atmosphere of the physical reconditioning program has value to the psychiatrist in the management of the patient. This information should be transmitted to the psychiatrist at weekly intervals. More frequent reports may be required for special cases.

The report should consist of an objective description of the behavior noted including the patient's conversation. The medical officer should be notified immediately if the observation of any patient indicates that he is not adjusting properly to the activities.

Section II. METHODS OF WORKING WITH PSYCHIATRIC PATIENTS

33. Approach

a. In working with psychiatric patients, physical reconditioning personnel should first strive to arouse their interest. This is difficult to do in some cases. Each individual patient should be studied to determine his interests and ability to participate in physical activities. The discovery of what has been the patient's experience and background in physical education is of particular value. The revelation of his sports preferences and dislikes will prove very helpful in getting the patient started.

b. The patient should be studied as an individual and a friendly relationship established with him, as better results will be obtained if patients like their instructors. Patients need to understand that physical reconditioning personnel are sympathetic toward them and are interested in helping them. The emphasis should be upon leading rather than driving patients into activities. Much patience and persistence is required in many cases before the proper rapport can be established.

c. If there are no medical contraindications, the patient should be allowed a choice in the physical activities in which he participates. It is important to impress the patient with the fact that he is playing in ways which are most pleasing to him, that he is not being coerced and that he is being given recognition for the ability and interest which he shows.

d. Many psychiatric patients will spontaneously participate in physical reconditioning activities. Others are more difficult to enlist in the daily program. Repeated invitations to participate are often necessary. Many individuals are drawn into activities after observing the enjoyment and satisfaction other patients obtain. Actual exposure to the various activities is needed to gain the interest of some patients. Tossing a ball to an individual might stimulate his interest. Some patients who have evinced no interest in swimming will swim if assisted in changing to trunks and in entering the pool.

e. Instruction should be provided as part of the physical reconditioning program. Some patients do not have satisfactory motor skills but respond well to instruction and coaching. While the major emphasis should be upon participation, an instructional program is necessary

for many patients. This is the best method of securing the participation of those who have no specific skills or whose skills are poorly developed. Certain regressed patients need to be reeducated to regain former skills. The development of skill in performance is exceedingly important as there is a high relationship between skill, enjoyment, and participation in an activity. People do not ordinarily desire to continue participation in activities in which they have little or no skill.

34. Maintaining Interest

a. After the patient has started participation in physical reconditioning, his interest must be sustained. A basic factor in motivation is to assist the patient to secure pleasure and satisfaction from his participation. It is essential that he gain some measure of success and achievement. Success is stimulating; failure depressing. Constant alertness is necessary to avoid placing individuals in situations where failure is inevitable. One of the important considerations in this connection is the arrangement of competition for individuals and groups who are approximately equal in ability. If at all possible, there should be several levels of competition for every sport which is included in the program. Physical reconditioning personnel should be alert to detect those individuals who are having difficulty in their participation.

b. Physical reconditioning will not accomplish any worth-while purpose if patients do not regard the activities as important and meaningful. An occasional, isolated game will not prove nearly as valuable as an individual game which is one of a league schedule leading toward a championship. Interest in the program can be stimulated by arranging tournaments and leagues for all competition.

c. There are various methods of giving recognition which motivate participation in the physical reconditioning program. Group photographs of participants and teams may help give the patient a sense of belonging. He retains in his mind tangible evidence of his participation long after the physical activity. The compilation and posting of individual and group records of performance allow the patient to see a tangible picture of his accomplishment. Public recognition of accomplishment in the hospital and local paper and over the hospital intercommunication system should do much to make the patient feel that he is important. Smokers and discussion periods in which patients actively participate have proven very successful. At periodic occasions awards should be given to those deserving them. An effort should be made to honor as many participants as can legitimately be honored. Recognition should also be given to officials, scorekeepers, managers, and other patient personnel who contributed to the success of the program.

35. Uniform

All patients should be required to dress in the prescribed manner for their participation in physical reconditioning. Aside from the hygienic factor, it gives the patients a sense of belonging to a team or group; this in turn may bolster their sense of confidence in themselves.

36. Required Participation

Patients for whom physical reconditioning is not contraindicated will participate in the program. They should not be coerced into participating but the attitude should prevail that these activities constitute part of their therapeutic program which they are expected to follow. The most important factor in developing the proper attitude upon the part of the patients is the prescription of participation by the medical officer.

b. Patients should not be kept in activities in which they are not interested. At times they will try out certain activities to see if they enjoy them. Frequently they will indicate willingness to receive instruction in an activity. If, after a reasonable exposure, patients indicate a dislike for an activity they should be permitted to transfer to something else. The transfer should be made with no intimation that the patient has failed to adjust to the activity.

37. Emphasis Upon Physical Fitness

Reasonable stress should be placed upon physical conditioning. If the strength and endurance of the patient can be improved, he will experience a sense of physical well-being which cannot but help him. With the improvement of physical condition, the patient will be less liable to undergo chronic fatigue. In addition, moderate exercise will enable the patient to sleep better. This may avoid the need for sedation.

38. Safety and Custodial Problems

Some psychiatric patients are potentially assaultive; some suicidal; and some will seek to escape if not kept under surveillance. The physical reconditioning personnel must keep themselves fully informed concerning patients with these tendencies. The psychiatrist should be informed immediately when any patients exhibit such behavior. The instructor must exercise good judgment and common sense in handling such patients while awaiting the arrival of the medical officer. A violent patient must be handled firmly and with-

out any appearance of excitement or hostility. This is best accomplished by leading him away from the rest of the group and encouraging him to return when he "feels better."

39. Patient Leadership

Patient leadership should be encouraged wherever it serves a patient's distinctive needs and does not conflict with the group interest. Some patients with sufficient background in an activity may assist other patients. Recognition of this ability by the physical reconditioning instructor and the assumption of responsibility by the patient will aid in rebuilding his self-confidence and sense of values.

40. Physical Reconditioning on the Ward

Part or all of the physical reconditioning program may have to be conducted on the ward. This is especially true during inclement weather. The ward program, with good leadership, can be successful even though the scope of the program must be limited. Activities for this program may include calisthenics, selected games of low organization, selected low organized relays, and barbell, dumbbell and spring exercises. Competitive games such as shuffleboard, and bean bag tossing have also been used successfully on the ward. A short varied program, if well conducted, will interest and benefit patients. It will, in addition, provide a welcome change in the daily routine.

41. Grading Activities

a. It is very important that physical reconditioning activities be within the capacity of patients. Activities differ in the demands which they make upon participants. Basketball, soccer, speedball, touch football, tennis, handball, and water polo are considered strenuous activities. Volley ball, baseball, softball, golf, table tennis, deck tennis, paddle tennis and walking are moderately strenuous activities. Shuffleboard, horseshoes, bowling, and croquet are mild activities. Calisthenics, weight-lifting, and swimming may be strenuous, moderately strenuous, or mild, depending upon the intensity of participation. Certain of the other activities indicated above may be made more or less strenuous by the manner in which they are played. For example, basketball can be made less strenuous by reducing the size of the playing area, by decreasing the length of the playing period, and by requiring frequent substitution.

b. Physical reconditioning activities may be classified as to complexity as follows:

- (1) Single response activity,
- (2) A multiple response activity, and
- (3) An intermediate response activity.

The single response activity is any form of movement which is of a one set character, such as hitting a volleyball, pitching a horseshoe, rolling a bowling ball, striking a punching bag and playing shuffleboard. The multiple response activity involves numerous related movements. It is illustrated by various sports such as basketball and baseball. Intermediate activities are those which are not too complex yet involve more than a single response. Hiking, deck tennis, rope skipping, swimming and many sport fundamentals are illustrative of this category.

c. Most psychiatric patients can participate in the multiple response type of activity. Some, usually the depressed or negativistic and stuporous types, must begin with simpler, less complex activities. There should be no disposition to permit these individuals to remain at this level. Resourceful perseverance by leaders can induce many of these patients to progress to more complex motor skills and eventually into group activities.

Section III. EXERCISE PROGRAM FOR PSYCHIATRIC PATIENTS

42. Determination of Exercise Program

a. General. The determination of the physical reconditioning program for every psychiatric patient is dependent upon the—

- (1) Medical diagnosis and prescription.
- (2) Available motor skills of the patient.
- (3) Evocable interest of the patient, and
- (4) Learning capacity as shown in exercise situations.

There is no one activity which meets the needs of all psychiatric patients; in fact, there is no one best activity for each type of patient. Each patient must be studied as a unique individual. His illness and its causative factors, his background and characteristics will reveal needs for certain specific activities. The activities must be adjusted to the needs of the individual; not the individual to the activities.

b. Activities for certain types. While each individual must be studied to determine the best activities for him there are certain activities which, from available data, appear better for certain types of patients. These are—

- (1) *For hyperactive cases.* Vigorous, intensive, activities like basketball and handball should be changed when fatigue develops to relaxing and quieting types of exercises, like swimming, calisthenics with music and dancing. One of the most frequently employed and successful activities for these patients is swimming. When this is done in water of an elevated temperature, a marked sedative effect occurs.

- (2) *For regressed types.* This type should be given nonconcentrative types of activity of a simple stimulative type, such as bowling, shuffleboard, horseshoes, croquet, medicine ball throwing and rhythmic activities.
- (3) *For depressed types.* Interesting types of activity of a stimulative nature such as golf, walking, swimming are recommended. These patients must be initially approached with slow, leisurely activities. Group calisthenics are helpful if carried out routinely. They can be gradually led into more vigorous activities.
- (4) *For negativistic types.* Reactive types of exercise and activity based upon early pleasurable patterns such as swimming, graduated calisthenics and baseball, softball, and other sport skills are helpful.
- (5) *For stuporous types.* Simple types of activity broken down into easily followed elements of activity, such as horseshoes, shuffleboard, tetherball, pulley weight exercises may be used.
- (6) *For hostile or antagonistic types.* Games, sports and exercises which will enable these individuals to externalize their resentment into constructive forms of behavior. Tetherball, badminton, handball, bowling, squash, tennis, water games and bag punching are suggested.

43. Classification of Psychiatric Disorders

Psychiatric disorders and reactions are classified into five major categories as follows:

- a. Transient personality reactions.
- b. Psychoneurotic disorders.
- c. Character and behavior disorders.
- d. Disorders of intelligence.
- e. Psychotic disorders.

Since the emphasis in physical reconditioning is with the patients with transient personality reactions, psychoneurotic disorders, and certain types of psychotic disorders, only these will be considered.

44. Application of Physical Reconditioning to Patients With Transient Personality Reactions

a. In wartime this type of patient constitutes a large percentage of all psychiatric cases. During peacetime, however, only a small percentage of patients are in this category. Most of these patients are victims of combat fatigue, operational fatigue, or emotional exhaustion. They are normal people who have simply reached the end of their physical and emotional tolerance and have broken down. They are the normal result of an abnormal situation, as it is situational

stress rather than personality weakness that produces this type of patient.

b. There is no single symptom which characterizes these patients. They may manifest overt and obvious anxiety. They seem confused and are often tearful. Various types of somatic complaints may be exhibited. In some cases patients are uncooperative. Some of these individuals are socially and emotionally immature.

c. The patients with transient personality reactions require immediate treatment, food, rest, and sedatives. Prolonged hospitalization tends to aggravate the symptoms through exaggeration of the concept of illness. As soon as their medical officer considers them ready, they should start in the physical reconditioning program. The expectancy of recovery must permeate the atmosphere. Greater benefits will occur if the patient is aware that his participation in the physical reconditioning program is the prescribed treatment for his disorder and that he has a share in the responsibility for getting well.

d. The chief aim of physical reconditioning is to secure the energetic participation of patients in activities which they enjoy. Sports and games of all types and swimming are valuable and popular. Form activities such as calisthenics should be used to a limited extent, if at all. Competition should be well organized and conducted. Leagues and tournaments should be used rather than informal types of contest.

45. Application of Physical Reconditioning to Psychoneurotic Patients

a. Psychoneuroses are abnormal mental states in which patients manifest either mental or physical symptoms or other signs. These are the result of persistent mental conflicts. There is no disturbance of intellectual functions or a primary emotional disturbance and no distortion of the individual's hold on reality. The mental and physical signs and/or symptoms often arise from strongly repressed emotional charges that may have their root in infantile and childhood developmental experiences.

b. Anxiety is the chief characteristic of the psychoneurotic patient. The anxiety may be directly expressed or with physical signs and/or symptoms as an outward expression. The hysterical patient may be blind although he has no damage to the organic structure of his eyes and there may be paralysis of an extremity without damage to nerves. Sleep walking and amnesia are other types of reaction.

c. The diagnosis of psychoneurotic disorders are recorded as one of the following types of reactions:

- (1) *Anxiety reactions*. Patient feels anxious, apprehensive, irritable, restless, may respond with a start to loud noises.

- (2) *Dissociative reactions.* Amnesia and sleep walking are examples of this form.
- (3) *Phobic reactions.* The anxiety in this form of psychoneurosis is displaced to some symbolic object or situation in the form of a neurotic fear. The common forms of fear are contamination with dirt or fear of contracting syphilis, fear of high places, of being in closed place, etc. In military life, neurotic fears often involve specific weapons, combat noises, airplanes, etc. Oftentimes the patient can control this form of anxiety if he avoids the object or situation that is the basis of his fear.
- (4) *Conversion reaction.* Blindness, deafness, and paralysis are examples of the use of bodily symptoms as an outward expression of a neurotic conflict. Pain is another frequent example.
- (5) *Somatization reaction.* This term describes the discharge of anxiety through the visceral organs, such as stomach, bowel, heart, genito-urinary, allergic and skin reactions. For example, a patient who is emotionally disturbed may have frequent urination or may develop severe hives.
- (6) *Obsessive-compulsive reactions.* A person with this form of neurosis feels compelled oftentimes to wash his hands many times or to count or touch objects. He may have repetitive thoughts. The person so afflicted is overly meticulous and oftentimes overwhelmed by the details which he is compelled to carry out.
- (7) *Hypochondriacal reaction.* The person with this form of psychoneurosis is overly concerned by the state of his health. He usually has multiple complaints of pains in the back, headaches, and complaints about dysfunctioning of the various systems of his body.
- (8) *Neurotic depressive reaction.* The feelings of anxiety are expressed in frustration, depression, and in a sense of guilt or worthlessness. The soldier may feel that he has "let his buddy down." Severe depressions result from a situation which overwhelmed the individual. It may lead to attempts at suicide.

d. For the psychoneurotic patient, the best physical reconditioning activities are those which are suited to his physical tolerance and psychological adaptability and which will divert the patient's interest from himself. This patient will respond to a diversified program of activities carefully graduated and adjusted to his peculiar needs. Any physical reconditioning activity which will enable the patient to externalize his symptoms of anxiety and other reactions will prove valuable.

e. The program of activity for the psychoneurotic patient should include both competitive and cooperative types of play and exercise activity based upon a previously developed pattern, interest, and, in so far as possible, related to his conscious need for treatment. Such activities would include calisthenics which should be carefully graduated and administered to avoid overtaxing patients physically and emotionally. Play activities should employ the competitive motive for the purpose of creating spirit in and for the activity. The feelings of hostility and resentment which may be created in an overly-competitive play situation must be anticipated. Psychoneurotic patients demonstrate a more intensive resentment factor which may grow out of the anxiety situation. Competitive activities properly presented as social activities provide a natural catharsis which enables the patient to drain off much of the feeling of resentment. Initially, competitive activities may produce resentment which may be sublimated and redirected if the activities are continued over a period of time.

46. Application of Physical Reconditioning to Certain Psychotic Patients

Psychoses are more serious disorders than the psychoneuroses. They are characterized by a varying degree of personality disintegration and distortions of reality in various spheres. In addition, individuals with such disorders fail in their ability to relate themselves effectively or happily to other people or to their own work. Of the numerous types of psychoses only a few are encountered in military hospitals.

a. Schizophrenic Disorders.

- (1) *Schizophrenic reaction, simple type.* In the simple type of schizophrenic reaction the individual seems apathetic and indifferent without any other strikingly abnormal behavior. It is occasionally misinterpreted as laziness. The individual tends to withdraw from the group and become seclusive. He might adjust quite well in a situation which does not demand too much of him. These patients show little interest in their environment but may be reached through sport or work activities. It is important not to induct these individuals into complex activities at first. These simple types may frequently develop into good athletes insofar as motor precision is concerned, if allowed to carry out noncomplex activities. They are easily discouraged by any attempts to advance them too rapidly.
- (2) *The hebephrenic type.* This is characterized by silliness, smiling, or laughter which is inconsistent with the ideas expressed. Patients have delusions and hallucinations and

may be untidy and impulsive. The patient finds in his play experiences elements which assist him in becoming more purposive and direct. As they continue to play and improve in skill, there may be noted a tendency to improved stability. While impulsive acts may crop out at any time, such tendencies become less active as the patient becomes better adapted to the social requirements of the group through continuance in activity. Training in team play over a long period of time will enable many of these patients to carry out a systematic and organized type of physical recreation.

- (3) *Catatonic type.* This reaction is characterized by conspicuous motor behavior, exhibiting either marked generalized inhibition resulting in stupor, mutism, or negativism, or excessive motor activity and excitement. While the symptoms are severe, this type of patient has a most favorable prognosis. Swimming may serve to reactivate some of the negativistic types although it is not successful in all cases. Many of these patients will follow calisthenic exercises almost perfectly; others will bowl and play baseball, basketball, and other sports in which they acquired skills in their youth. Generally these patients show a better motor control than the other types of schizophrenics. They seem able to make most exact and precise coordination once they are activated. In the chronic cases there is mental regression and the patient is more successful in activities he learned before the onset of his mental illness.
- (4) *Paranoid type.* This type is characterized by active delusions and hallucinations, generally of a persecutory nature. The patient is generally clear as to what is going on about him. Deep seated suspicions are characteristic of these individuals and become prominent factors in determining the interests and methods with which they engage in various games and exercises. In the beginning these patients desire a certain type of activity in which they can engage and at the same time pay attention to their coveted beliefs. The behavior pattern of suspiciousness is not changed essentially. They work or play despite their dissatisfied suspicious feelings and seem to develop a parallel activity. They may have many mannerisms of self-defense as well as attitudes of importance. As they continue, however, in carefully selected and administered games and exercises, these patients may become much more happily adjusted and, in some cases, sustain a higher relationship in reality. These patients are generally quick to grasp at some form of sport which will enable them to compensate for their feelings of inferiority. Some

of the more regressed patients will exercise most consistently in order to develop a strong physique which will enable them to cope with characters or conditions in their delusioned sphere. While at the outset they will attempt to satisfy their abnormal craving through various types of exercises, the normalizing effects of wholesome activity becomes more prominent as they persist. Day after day as these patients work and play, an increasing evidence of a closer contact with reality may be noted. They become more able to concentrate upon the normal aspects and, through such replacements, mitigate to some extent their delusions of persecution. By actually doing something, they have less time and inclination to dwell on their troubles. Starting on a sensory level, a patient may be able to gain deep-seated phylogenetic satisfactions which will serve to sublimate antagonistic ideas.

b. Manic-Depressive.

- (1) In the manic-depressive reaction the patient has manic and depressive phases. In the manic phase the patient is hyperactive, elated and excited. The typically depressed case shows depression, lack of talkativeness and a decreased bodily activity. As compared to the schizophrenic patient, the manic depressive has closer touch with reality. He appears more affected by the environment, whereas the schizophrenic is more influenced by subjective conditions.
- (2) Physical reconditioning may be of considerable value in the treatment of certain phases of this condition, while in other phases the utilization of exercise is definitely contraindicated. Over-stimulation of these individuals must be avoided. In the manic state patients are often irritable and at times extremely paranoid and combative. Some of these individuals are difficult to handle at this stage. Their attention becomes flighty and hard to retain. For example, they will readily grasp a baseball and play catch. Without warning they will run off to some other activity. For this reason, individual type activity is indicated. It is advisable to allow these individuals to go from activity to activity as long as they do not annoy other patients or engage in activities which might prove injurious. The manic individual requires activity which will serve to calm and quiet him and integrate his activities on a more stable level. Swimming is an ideal sedative for some of these types. As the manic attack subsides, the patient becomes less active and less talkative, but is still able to participate in physical activities. This is the ideal

time for volleyball, softball, golf, bowling and shuffleboard as these activities may serve to direct and interest the patient and will not exact too much from his lowered tolerance.

- (3) The depressive phase may include varying degrees of severity. In the milder forms these patients seem merely to have slowed up. They sit about quietly and move slowly. They appear sad and tired. They should not be considered as stubborn or lazy, but as unhappy victims of a puzzling type of mental illness. In this phase, nonstrenuous types of activity may divert their minds into more active and happier channels. Bowling duckpins is often of value, since the balls are light and this exercise requires neither strenuous nor fast exertion. Golf may be an ideal type of exercise if the patient is properly accompanied and the competitive elements are not overly stressed. A variety of activities should be offered. It must be realized that the patient's own nature, his interests and desires may stimulate him to take part in activities which other patients would not or could not follow. For example, a manic depressive patient who has been an expert golfer might be able to carry out this activity with much motor exactness despite the most disturbing depression.
- (4) In the more severe stages of depression the patient will sit about practically motionless with an expression of marked sadness. A deep seated feeling of hopelessness may permeate the situation. Some of these patients who declare they want to die and have given up all hope of improvement will play in an automatic manner because of their friendly feelings toward the instructor. Some of the patients will enter into a one-response activity such as bowling, complaining all the while, moaning, and possibly crying. If they can persist in such activity, it frequently happens that their emotions become externalized and attached to more objective things, resulting in more stable and satisfying new skills. The sphere of reconstructive activity is based upon performed play patterns.

c. Physical Reconditioning After Shock Therapy. The treatment by electric and insulin shock causes many negativistic patients to become much more accessible and modifiable. Many patients who, prior to shock treatments, were indifferent or resistive to exercise can now be reeducated. Physical reconditioning activities should be used after electric and insulin shock as a psychological follow-up to assist the patient in recreating interest, in expanding his activities in more social directions, and in resuming habits of normal living.

Section IV. RECOMMENDED ACTIVITIES FOR PSYCHIATRIC PATIENTS

47. Badminton

Badminton is a popular sport which can be successfully adapted to the needs of many psychiatric patients. It provides an ideal outlet for the overly aggressive patient. Patients who have never played the sport previously can derive pleasure from volleying the shuttlecock over the net. Beginners rapidly improve their skills because many of the fundamentals of this work are not intricate or complicated. The tempo of the game can be changed to meet the requirements of patients for fast or slow activities.

48. Basketball

Basketball is an excellent activity for those who have played it before. Because of its highly organized team play and absorbing nature, it naturally leads to desirable social expression. It is particularly indicated for the younger patients because of its strenuous nature. Some patients become so absorbed in the game that they go beyond their physical tolerance. Those patients with poor endurance should be limited to shooting field goals and free throws. The game of "21" will appeal to many patients who have had previous basketball experience. One-basket basketball is another modification which is less strenuous than the regular game. The instructor may reduce the length of the court or the playing periods to lessen the physical demands of the activity. Frequent substitutions also may be indicated.

49. Bowling

Bowling is a valuable activity for psychiatric patients of all ages. It is not a strenuous activity although ten pins is more vigorous than duck pins. Most desirable competitive elements are present. Its individual nature makes it an acceptable game for many asocial types who are repelled by the idea of group and individual responsibility which coordinated team play requires. The organization of leagues, however, provides a most effective medium for socialization of larger groups. Another most valuable therapeutic element in this game is the manner in which it is scored, enabling the individual as well as the team score to be seen by the patient. Such measurements of performance enable the patient to see distinct steps of improvement as he increases his individual score. Resocialization values also accrue as the patient contributes his personal score to the success of his team.

50. Calisthenics

The value of this type of activity is its modifiable nature. Many degrees and types of complexity and rhythm may be arranged so that all patients from the least to the most active may find suitable exercises. In the regressed patients single-response, straight-line exercises should be employed. Calisthenics are essential as warm-up exercises for the more vigorous sports. In addition, this type of activity is the best to employ for physical reconditioning program on the ward. There are numerous ways of motivating participation in calisthenics. The use of the cumulative count will provide an objective measure of improvement. Good results may be obtained when this activity is accompanied by music. Mass commands give each patient a feeling of participation. Liberal use of patients to demonstrate various exercises or to lead exercises is recommended.

51. Croquet

Croquet provides a mild outdoor game especially suited to many patients who desire a nonstrenuous and yet competitive game. Many patients who have no background of athletic experience will find this elemental game a source of suitable satisfying exercise. Practically all types of patients may participate. It is particularly indicated for the regressed patients who are not capable of participating in multiple response activities.

52. Games of Low Organization

Of the vast number of games of low organization there are many which can be successfully used with psychiatric patients. These activities are ordinarily not as highly organized, or as strenuous as many traditional sports. From among this number of activities there are many games which will meet the needs of any patient or group of patients.

53. Golf

Golf is one of the most valuable physical reconditioning activities. It appeals to many of all races, ages, and social conditions. The functional types, particularly the schizophrenic, manic depressive and psychoneurotic patients, may attain the necessary coordination to engage in this sport and develop a high grade of skill. The game may progress from putting to short golf on miniature courses to the regular. Golf possesses value for most psychiatric patients. All participants gain satisfaction from their good shots. It gets the patients out of the hospital atmosphere and into the open spaces. Tournaments and other group and individual competitions provide

an ideal medium for reeducation. Seclusive types of patients may gradually be drawn into group competition. Distractable types of patients find they cannot improve their score by playing in a hurried fashion. Golf is one of the best activities for sustaining the interest of patients. Weekly golf tournaments in which handicaps are provided so as to equalize the chances of winning, special contests between patients and outside teams and special tournaments between patients and personnel may well lead to desirable therapeutic benefits.

54. Horseshoes and Quoits

These activities are easily adapted to various types of patients and may be made diversional and relaxing as well as highly competitive forms of exercise. Horseshoes and quoits are indicated for those of slow but accurate motor capacity and retarded types of patients. The courts may be modified in length from fifteen to thirty feet. Quoits, regular horseshoes, or the heavy standard shoes, may be utilized. Tournaments serve to culminate interest and provide the stimulation for sustained activity.

55. Soccer and Speedball

— These are excellent activities for younger psychiatric patients who have previously played the games. Beginners can enjoy soccer and speedball if they are competing with other beginners. These two activities may be modified in many ways to make them simpler and less strenuous.

56. Softball

a. Softball will have a strong attraction for the mentally ill as most patients will have had previous experience with it or with baseball. Early habits which may have been temporarily discontinued or lost should be reestablished. Softball provides one of the early habitual activities which can be frequently revived when efforts to bring back other constructive interests are unavailing. For the far-regressed patient who is unable to take part in group activity, softball may provide the first step in arousing his interest. For the more active patients, softball provides an ideal medium for a social group activity, allowing the patient to show his individual place as pitcher, catcher, in-fielder or out-fielder. The spectator's comments of praise or criticism as well as the players' chatter among themselves creates a social atmosphere of strong therapeutic possibilities. Softball teams organized on the basis of wards or other closely defined units may be of great value in creating a wholesome spirit of interest and feeling of belonging.

b. The game of softball as played with the 16-inch ball and shorter distance between bases will prove more successful in certain instances than the game with the 12-inch ball. This variation provides much more activity for both teams when the pitcher is required to throw the ball high enough so that the top of its flight is above the line tangent to the tops of the hands of the pitcher and batter.

57. Aquatic Activities

a. Swimming is one of the best forms of exercise for the purpose of reactivating many inactive patients for whom other methods are unavailable. Swimming is contraindicated for patients who have a phobia for water, cardiac involvement, or an acute infection.

b. Swimming provides a strong instinctive stimulation which the regressed patients require. It is automatic and operates on the reflex level. When these individuals are placed in the lower end of the pool they will in most cases strike out and swim if they have learned to swim earlier. Swimming also has a quieting, relaxing, and sedative effect upon hyperactive patients. This effect is magnified if the pool temperature is raised.

c. Aquatic activities include swimming with the various strokes, conditioning exercises conducted in the water and water games and sports. Water polo, water basketball, and water volleyball are all popular water sports. These competitive activities are recommended to lend variety and interest to the swimming program.

d. A suggested plan for an aquatic activity period is to start with a brief free swim, followed by group instruction (not in excess of 15 minutes) with particular emphasis upon individual instruction. The instructor should endeavor to teach every patient something new regardless of the patient's degree of skill, provided the patient is teachable. After the instructional phase, the remainder of the period may be devoted to selected organized games, relays, or free swimming. The period should provide gradually increasing intervals of immersion consistent with favorable reaction until the patient is staying in the water for considerable periods of time.

58. Tennis

a. Tennis has a special appeal to those patients who have learned the game before the onset of mental illness. As compared to other sports, because of the relatively high degree of coordination, motor skill, and the general complexity of movements as well as the strenuous nature of the game, tennis is not indicated except for those who have played it before.

b. Paddle tennis is a form of tennis which is suited to most psychiatric patients. It is not as strenuous and does not require nearly the skill and coordination that regular tennis requires.

59. Touch Football

This is an excellent activity to use for young psychiatric patients. It is best scheduled during periods of cool weather, preferably the fall months. This sport is indicated for many psychoneurotic patients and psychotic patients who have had previous experience with regular football or with touch football. The only contraindication is that it should be within the physical tolerance of those who desire to play.

60. Volleyball

Volleyball possesses many advantages for psychiatric patients. It is an easy game for novices to play and enjoy, yet it challenges the highest level of performance of skilled athletes. The game may be played as a very strenuous activity or it may be carried on in a very mild fashion. There is no body contact with opponents. The game is readily adapted to varying number of patients. It can be played either indoors or outdoors and the facilities and equipment are available almost anywhere. For the beginner, the game should start from the elemental stage of hitting the ball over the net with the idea of supplying the basic elements of competitive interest. Once interest is established, the game can advance to the point of a most scientific competition characterized by a highly developed and well coordinated exercise for many far regressed types who will not enter into any other exercises.

61. Weight Lifting

Weight lifting may be indicated for patients who need to express themselves more confidently and aggressively. Even though it is an individual type of activity, it can provide a rich socializing experience when a number of patients participate together. One of the valuable features of this activity is that progress is clearly and objectively measurable. A chart should be provided to record daily performance. Patients must be carefully taught the techniques of the activity.

62. Roller and Ice Skating

These are excellent activities for psychiatric patients. Many individuals have previously experienced them, but those who have not can acquire the skills quickly. This activity is valuable in that the patients participate in a group but each acts independently.

63. Other Activities

Other activities which have been successfully used with psychiatric patients are bicycling, dancing, table tennis, and deck tennis. They are particularly enjoyed by those who have experienced them previously but the skills can be readily acquired by the novice.

CHAPTER 8

RECONDITIONING AQUATICS

Section I. GENERAL CONSIDERATIONS

64. Definition

Conditioning aquatics may be defined as a program of aquatic activities prescribed by the physiatrist, and conducted by skilled swimming technicians as an ameliorative process in which recognized swimming strokes and skills are employed.

65. Remedial Scope

Conditioning aquatics may be applied as an aid to reconditioning or rehabilitating disabled persons of the following general classifications:

- a. Convalescents recovering, without complication, from illness, injury, or disease.
- b. Convalescents whose recovery is complicated by temporary disability of one kind or another; example, loss of function, strength, or control in orthopedic cases.
- c. Convalescents whose recovery is complicated by crippling permanent disabilities; example, amputations and paralysis.
- d. Convalescents who are permanently disabled by a sensory defect; example, blindness.
- e. Convalescents suffering some psychiatric condition.

66. Remedial Objectives

- a. In surgical patients the objective is to aid in the recovery of function, by increasing strength, control, and range of movement in affected parts. In cases of permanent disability the purpose is to apply and adapt compensatory aquatic skills so that the patient may engage in physical activities from which he will derive pleasure and by which he may maintain health and physical fitness.
- b. In medical patients the objective is to provide interesting and diversional activities, to offset boredom, discouragement, and frus-

tration, and to aid in the restoring or regaining muscular strength and endurance and cardiovascular endurance.

c. In psychiatric patients the aim is to provide interesting and diversional activities of a rigorous nature designed to reduce or release physical, neural, and mental tensions and to restore self-confidence through achievement

67. Physiological Values

a. Immersion and activity in the water result in improvement of a peripheral circulation.

b. Pressure of water on abdomen and chest walls make deep breathing (hyperventilation) mandatory.

c. Swimming strokes are effective in exact proportion to the amount of power applied; thus, a person swimming may use as much or as little strength as he possesses. During convalescence this is no small factor in conserving and directing the oftentimes limited strength of the patient.

d. When the body is immersed in water it has either no weight at all or so little as to be a negligible factor. No strength need be employed, therefore, to support the body. This, too, is important in conserving and directing the patient's strength.

e. The, prone, supine, and lateral positions employed in swimming are all favorable to freedom of function of heart and lungs and viscera.

f. Regardless of the level of skills or the nature of the disability, the individual program can be arranged to accomplish a progressive increase in muscular strength and in muscular and cardiorespiratory endurance.

68. Psychological Values

a. Swimming or bathing is fun for almost everyone. It has a wholesome recreational effect on the mind of most patients.

b. Bathing and swimming are often associated in the adult mind with the pleasures of childhood. By going swimming the patient may often recapture a subconscious feeling of happiness and security.

c. Immersion and the movement of swimming, endlessly repeated, can have a slightly hypnotic effect on the swimmer, thereby inducing relaxation and sedation.

d. A person who is handicapped physically is less handicapped in water than on land, and his handicap is less evident to others.

e. The learning processes involved in swimming require mild mental concentration which tends to exclude anxiety.

69. Swimming Record Card

During his initial visit to the swimming pool, each patient will be interviewed by the physical reconditioning officer. This officer will study the physiatrist's prescription for the patients and will use it as a basis on which to plan the patient's individual aquatic program. The activities considered best for the patient will be listed on a swimming record card. As long as the patient continues to participate in the aquatic program, this swimming record card will be used to note the patient's progress. Periodically a progress report will be submitted to the physiatrist.

70. Teaching Approach

a. The success of conditioning aquatics is determined largely by the approach employed by the instructor. Patients must be made aware of the reasons why certain swimming strokes and skills are recommended and why others are not. Some patients have an unreasoning fear of the water, which can be greatly minimized by a sympathetic and understanding instructor. *The instructor must work in the water with such patients until their fear is eliminated.*

b. The aquatics program should insure some degree of achievement for each patient during every period. Because the results are so readily apparent to both the patient and the instructor, any improvement in personal skill will motivate the patient to continue his efforts. The emphasis should always be on acquiring skill rather than on specific movement. If the prescription of the physiatrist has been followed and the proper swimming skills recommended, the mastery of the swimming skills should automatically produce the movements desired.

c. Daily class periods will include both formal and informal activities with the greater portion of the period devoted to the formal or teaching phase. However, the patient, whenever indicated, should have an opportunity to participate in some water games which will induce a happy frame of mind. Since all of the work will be done on a prescription basis, the length of the class period is largely determined by the condition of the patient. It may be as short as 5 minutes or as long as 1 hour. Generally speaking, the actual water work is done in 30 to 45 minutes.

d. In order to increase the effectiveness of the program the following equipment should be secured: swim boards (kick boards), swim fins, hand mitts, "Mae Wests," face plates, ear plugs, nose clips, and water balls. For best results the temperature of the water should range between 80° and 85° F., with the temperature of the air 5° to 10° higher whenever possible.

71. Safety

The following general safety factors should always be taken into consideration when working with patients in and around the water:

- a. Follow the prescription of the physiatrist.*
- b. Look for signs in patient of chilling and fatigue.*
- c. Provide adequate lifesaving equipment such as ring buoys, reaching poles, etc.*
- d. Keep the deck area clear of obstructions.*
- e. Caution patients if the deck is slippery.*
- f. Devise methods of assisting patients in and around the swimming area.*

Section II. APPLICATION TO SPECIFIC CONDITIONS

72. Uncomplicated Convalescents

a. The objectives are to provide interesting and meaningful activities to offset boredom, discouragement, and frustration; and to aid in restoring organic strength and vigor.

b. The specific values are as follows:

- (1) Because of the wide range of skills and movements in aquatic skills, it is possible to choose those that will best meet the needs of the patient.
- (2) The patient can use as much or as little energy as he possesses to do the skill. The more power applied, the greater the results (in most cases); however, it is not necessary to work at top speed in order to accomplish a certain skill. This implies that the patient can conserve his energy and still participate in the activity.
- (3) Patients usually have poor circulation and faulty elimination. Aquatic activities will tend to increase the circulation and assist in promoting better elimination.
- (4) As immersion is sedative in effect, it can often be used to induce sleep in those patients who experience difficulty in sleeping.
- (5) Success tends to produce a feeling of well-being which is a decided factor in the improvement of morale, and, indirectly, the physical condition of the patient. Aquatic skills are so arranged as to insure the success of any student.

c. Basic safety skills are required. It is imperative that all patients demonstrate their ability to perform these skills. If they are not able to perform them, the patients must be taught: mouth-breathing; breath-holding—face submerged; rhythmic breathing; prone float; back float; from front to back and back to front. If the patient is a

nonswimmer, he should be taught to swim. If he is a swimmer, his skills should be improved. Strokes on the back in which the arms are recovered below the surface tend to conserve energy and should be used during the initial class periods or until the patient develops enough strength to recover the arms above the surface.

d. Insure the safety of the swimmers at all times. Follow the advice of the physiatrist as to how long the patient should remain in the water. If no recommendations are given, watch for signs of chilling and remove patient from water at first sign. Provide rest periods and watch for signs of fatigue. Do not hesitate to use flotation device if necessary. The important factor is to get the patient into some kind of supervised aquatic activity.

73. Complicated Convalescents of a Temporary Nature (Orthopedic)

a. The objectives are to secure full use of the disabled part; to build or maintain organic strength and vigor; and to provide patient with diversional activities that will induce a happy frame of mind.

b. Specific values are as follows:

- (1) The water, which acts as a cushion, will decrease the weight of the submerged body part, eliminating some of the pain that usually accompanies movement against the force of gravity; a wider potential range of movement in the joints will result.
- (2) Water of the proper temperature tends to relax the muscles. As a result, the patient becomes capable of increased range of motion.
- (3) Standard swimming strokes and skills can be used to produce the desired motion (of limited, moderate, or maximum range) in every movable part of the body.
- (4) Development of body motion becomes secondary to an absorbing learning process.
- (5) The skills that are taught have a carry-over value, are therefore meaningful, and provide their own motivation in many instances.

c. Basic safety skills should be taught along with skills that will develop the motion desired. Start with those producing limited motion and progress to those producing maximum motion. Table VII lists some of the skills that can be taught. It will be noted that the movements have been broken down into limited, moderate, and maximum ranges.

d. Specific factors include the following rules:

- (1) Emphasize the mastery of the skill rather than the development of motion.
- (2) Start with limited motion unless advised to the contrary.

Table XIII. Aquatic Skills in Developing Joint Movements

Movements	Foot and ankle				Knee		Hips, back, and abdomen							Neck			Shoulder				Elbow			Wrist and fingers															
	Flexion	Extension	Eversion	Inversion	Flexion	Extension	Flexion	Hyperextension	Abduction	Adduction	Internal rotation	External rotation	Body flexion	Hyperextension of spine	Rotation of trunk	Flexion	Extension	Lateral flexion	Rotation	Flexion	Hyperextension	Abduction	Adduction	Internal rotation	External rotation	Flexion	Extension	Supination	Pronation	Hyperextension (W)	Flexion (W)	Radial flexion (W)	Ulnar flexion (W)	Abduction (F)	Adduction (F)	Flexion (F)	Extension (F)		
Range of motion																																							
1—Limited motion																																							
2—Moderate motion																																							
3—Maximum motion																																							
Wading (6'')						2																																	
Wading (knee)						1																																	
Wading (waist)						1																																	
Beginner's flutter kick (F)	1	1		1	2	1																																	
Beginner's flutter kick (B)						1																																	
Crawl kick (F)	2	2		1	1	1																																	
Crawl kick (B)	2	2		1	1	1																																	
Scissors kick (R)	3	3			3	3																																	
Scissors kick (L)	3	3			3	3																																	
Treading water (S. K.)	3	3			3	3																																	
Treading water (B)	2	2			2	2			3	2	3	3																											
Breast stroke kick	2	2	3		2	2			3	2	3	3																											
Bobbing	2	2			2	2																																	
Porpoise diving	2	2			1	1																																	
Squat diving					3	3							1																										
Diving (deck)	2	2																																					
Diving (board)	2	2			1																																		
Surface dive	2	2			2	2			2				2																										
Back crawl																																							
Elementary crawl																																							
Inverted breast																																							
Water walking																																							

- (3) Avoid spending too much time on one skill, thus producing undue fatigue.
- (4) Keep the fun in the activities; avoid long and tedious drills.
- (5) Provide objectives within the patient's reach.

74. Complicated Convalescents of a Permanent Nature (Amputees, Paralytics)

a. The objectives are to build or maintain organic strength and vigor; to teach the patient to swim with what he has left; and to introduce a form of activity in which the patient can participate, notwithstanding his disability, with little or no reduction in skill accomplishment.

b. Specific values include the following:

- (1) The lack of one or more limbs is not too important because in the water four limbs are not essential to locomotion.
- (2) Swimming can be done alone. Patients are not dependent on anybody else as they might be in baseball, basketball, etc.
- (3) Postural imbalance means very little because of the buoyant effect of the water. The patient who has lost one or more limbs can move without having to concern himself with balance.

c. Basic safety skills and the skills indicated in table VIII should be taught. This table is self-explanatory. Loss of limbs and paralysis have been treated in the same manner because the skills to be taught are comparable in both cases. It will be noted that there are five subdivisions. The basic stroke is so designated because it is the one that patients generally do best. The relief stroke should be taught if time permits; still others are not practicable and should not be taught.

d. Observe the following safety and teaching factors:

- (1) Teach patients how to turn over while swimming.
- (2) If stump is tender, a watertight protective device should be used.
- (3) Stay close to patient the first time he is in the water.
- (4) Provide platform or convenient resting surface for patients who have both legs off above knees.
- (5) Teach patient who has lost legs to recover the arms below the surface.
- (6) Patients who have lost both legs can do a variation of the side stroke by turning slightly to a prone position. In doing the breast stroke, the glide should be eliminated.
- (7) Teach patients the easiest method (for their condition) to get into and out of the pool.
- (8) Diving by patients who have lost both arms is dangerous and must not be encouraged.

75. Patients Permanently Disabled by a Sensory Condition (Blindness)

a. The objectives are to provide wholesome activities that are meaningful and enjoyable; to prove to the patient that swimming is within his scope of activity; and to aid in developing or maintaining organic strength and vigor.

b. The specific values are as follows:

- (1) The patient experiences a feeling of freedom while in the water; the danger of bumping into or falling over objects is minimized.
- (2) Blind people should lead as normal a life as possible; aquatic activities are a part of the normal life of eighty million Americans.
- (3) The mastery of skill inflates the ego of the participant and thus boosts his morale.
- (4) Many blind persons experience difficulty in getting enough exercise in their normal daily pursuits; and aquatic programs properly supervised will do much in developing and maintaining organic strength.

c. All the basic safety skills should be taught, followed by as many of the strokes and skills as the ability of the patient warrants, if a swimmer. If a nonswimmer, he should be taught how to swim.

d. In teaching, observe the following rules:

- (1) Speak to the patients in a normal voice (do not shout).
- (2) Allow the patient to serve himself whenever possible. However, at the beginning lead him around the outside of the swimming area as well as in the swimming areas (shallow water if nonswimmer, shallow and deep if a swimmer) so that he becomes familiar with the surroundings.
- (3) When guiding a patient, ask him to take your arm; walk a half step in front of him.
- (4) Allow patient to touch strange objects if they are to be used—side of pool, etc.
- (5) Make your explanations clear.
- (6) Guide the arms and legs of the patient if necessary to set a habit pattern.
- (7) If it is necessary to leave the patient for a few minutes, leave him in contact with the side of the pool, a chair, or other fixed object.
- (8) If you have to leave the patient, tell him that you are leaving.
- (9) Do not compare the progress made by one patient with that made by another.
- (10) Guide the patient over the same route (to and from locker room) time and time again so that he becomes familiar with the route.

Table XIV. Aquatic Skills for Patients Permanently Disabled

Condition	Swimming skills		Walking	Breath holding	Rhythmic breathing	Jellyfish float	Prone float	Prone glide	Kick glide (front)	Back float	Back glide	Kick glide (back)	Human stroke (A)	Finning	Winging	Elementary back stroke	Turning over	Changing directions	Breast stroke kick (F)	Breast stroke kick (B)	Scissors kick (R)	Scissors kick (L)	Side stroke	Side overarm	Trudgen	Trudgen crawl	American crawl	Back crawl	Inverted breast stroke	Breast stroke	Diving (deck)	Diving (board)	Jumping into water (S)	Jumping into water (D)	Feet-first surface dive	Head-first surface dive	Underwater swimming	Sculling	
	1	2	3	4	5	3	3	3	3	3	3	3	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	2	2	5	5	3	3	3	3	3	3
1—Basic stroke			5	5	3	3	3	3	5	3	3	5	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	4	2	2	5	5	3	3	3	3	3
2—Relief stroke			3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
3—Should be taught			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
4—Might be taught			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
5—Not practicable			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
			5	5	3	3	3	3	5	3	3	5	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
Both legs paralyzed.....			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
One leg paralyzed.....			3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
Both legs amp. b. k.....			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
One leg amp. b. k.....			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
Both legs amp. a. k.....			5	5	3	3	3	3	3	3	3	5	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
One leg amp. a. k.....			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	4	4	4	4	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
One leg amp. a. k. and one leg amp. b. k.....			5	5	3	3	3	3	3	3	3	3	3	3	3	1	1	3	5	5	5	5	4	4	4	4	4	4	4	4	2	2	4	4	3	3	3	3	3
Both arms paralyzed.....			3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	2	2	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
One arm paralyzed.....			3	3	3	3	3	3	3	3	3	3	3	3	3	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
Both arms amp. b. e.....			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
One arm amp. b. e.....			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
Both arms amp. a. e.....			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
One arm amp. a. e.....			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
One arm amp. a. e. and one arm amp. b. e.....			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
Arm and leg amp. same side.....			4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3
Arm and leg amp. opp. side.....			4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3

- 1—Basic stroke
2—Relief stroke
3—Should be taught
4—Might be taught
5—Not practicable

Condition

76. Psychiatric Patients

a. Objectives of the program are to release nervous and mental tension and to induce sedation; to reactivate the mental powers of patients through planned and enjoyable activities; to enable patients to regain their self-confidence through mastery of new skills; and to aid in developing and maintaining organic strength and vigor.

b. Specific values are the following:

- (1) Many patients have difficulty in relaxing and sleeping. Water of proper temperature has a tendency to relax the nerve and produce sedation.
- (2) In many instances swimming will help the patient to recall some of the experiences of his childhood and thus aid in his recovery.
- (3) Because swimming movements are exact, the mastery of the skill indicates that progress is being made in the control of the nerves and muscles; this progress is apparent to both the instructor and patient.
- (4) Aquatic activities provide an opportunity for the patient to participate individually or in a group, with the skills so arranged that his slightest improvement can be magnified to assume the proportions of a major achievement.

c. Teaching should include basic safety skills and any stroke or skill that the patient is able to master.

d. Observe the following rules in teaching:

- (1) Watch each patient for signs of extreme emotional unbalance.
- (2) *Lead* patients rather than *drive* them into activities. Use the progression method of teaching.
- (3) When speaking to the patients use a calm, well-controlled voice.
- (4) Precede all formal instruction by a recreational period designed to furnish fun and use up excess energy.
- (5) Be firm but understanding.
- (6) Work in water with the patients.
- (7) Nonswimmers as a rule will not participate in the aquatic program unless urged to do so.
- (8) Always finish formal instruction with something that patients can do successfully.
- (9) Recreational activities (games) are popular, but they must be of low organization.
- (10) Individual instruction is usually best when attempting to develop a specific skill.
- (11) Take nothing for granted. Explain what you want done.
- (12) Develop healthy fatigue but be alert for signs of undue weariness.

APPENDIX I

KEY TO MUSCLE ACTIONS

1. General

Actions of the muscles is indicated by functional groups. Each group has an abbreviated code designation which will identify the name of the group.

a. The tables of muscles are arranged in the following order: neck, trunk, scapular and shoulder girdle generally, arm and shoulder, forearm and elbow, wrist, hand and fingers, thigh and hip, leg and knee, ankle, foot and toes. Muscles of no concern to physical reconditioning, such as muscles of the face and head, are omitted.

b. It should be remembered that many partite muscles (muscles made up of more than one part, each of which can contract independently) work by parts, not all of the muscle always contracting at the same time. Examples are: pectoralis major (upper and lower parts frequently work separately); quadriceps extensor (rectus femoris does not contract if knee is extended with leg moving backward); serratus anterior (if whole muscle contracts, scapula is abducted; if only lower part contracts, scapula is rotated outward); trapezius (parts land 2, attaching to the clavicle and acromion respectively, works as one unit; part 3 works as an abductor, while part 4 pulls scapula downward and assists in external rotation); and the triceps, where the long head frequently acts independently of the medial and lateral heads.

c. The fact that the antagonistic muscles always function at the same time that the agonists (muscles in active contraction) contract is often forgotten. Due to the reciprocal innervation and the antagonist relaxes in harmony with the shortening of the agonist and "takes up the slack" when the agonist is lengthening, if that lengthening is due to eccentric contraction (contraction while lengthening) of the agonist. Hence, it should be kept in mind that an injured muscle acting in the role of antagonist *is* in action when its antagonist counterpart is being exercised. For example: when an individual is performing the "curl" exercise with a dumbbell, where the forearm flexors are being actively exercised both during the upward movement (concentric contraction) and the downward movement (eccentric contraction), the triceps which is the antagonist to these forearm flexors is being contracted very gently at the same time. These antagonists

contract very lightly and are not named in the muscle actions in connection with each exercise in the manual. In cases of very early healing of a severed or injured muscle, the exercises of antagonists may well be the first step toward reconditioning this injured muscle.

Key to code

ab.....	abdomen	l.....	leg (lower)
abd.....	abduct or abductor	n.....	neck
add.....	adduct or adductor	out.....	outer, outward
ar.....	arm	pa.....	palm
bkw.....	back or backward	po.....	thumb (pollux)
ch.....	chest	pro.....	pronation
de.....	depress	ra.....	raise
ex.....	extend	ret.....	retraction, retract
expr.....	expiration	ro.....	rotate, rotation
fi.....	finger or fingers	sa.....	sagittal
fi ₂	index finger	sb.....	side bend
fi ₅	little finger, etc.	sc.....	scapula
fl.....	flex	sdw.....	sideward
fo.....	forearm	sh.....	shoulder
ft.....	foot	sup.....	supinate, supination
fwd.....	forward	th.....	thigh
H.....	hand	tn.....	tension
hor.....	horizontal	to.....	toes
in.....	internal, inward	tr.....	trunk
insp.....	inspiration	up.....	upward
kn.....	knee	wr.....	wrist

2. Neck

a. Neck—Flexors (Code: n fl).

Muscles on both sides work together.

- (1) Platysma.
- (2) Sternocleido-mastoid.
- (3) Scaleni (scalenus anterior, scalenus medius and scalenus posterior).
- (4) Longus colli.
- (5) Longus capitis.
- (6) "Hyoid Flexors": Muscles attached by hyoid bone above and below.
 - (a) Above:
 - Mylo-hyoid.
 - Genio-hyoid.
 - (b) Below:
 - Thyro and sterno-thyroid.
 - Sterno-hyoid.
 - Omo-hyoid.
- (7) Rectus capitis anterior.
- (8) Rectus capitis lateralis.

b. Neck—Extensors (Code: n ex).

Muscles on both sides work together.

- (1) Trapezius 1 and 2 (if scapulae are fixed).
- (2) Splenius cervicis et capitis.
- (3) Semispinalis cervicis et capitis.
- (4) Multifidi.
- (5) Longissimus cervicis et capitis.
- (6) Iliocostalis cervicis.
- (7) Spinalis cervicis.
- (8) Interspinales.
- (9) Intertransversarii (primarily for side bending, but since attachments are behind articular surfaces, they also act as extensors).
- (10) Obliquus capitis superior.
- (11) Obliquus capitis inferior.
- (12) Rectus capitis posterior major.
- (13) Rectus capitis posterior minor.
- (14) Levator scapulae (if scapulae are fixed).

c. Neck—Side Benders (Code: n sb).

Muscles bend neck to same side (one side only). All flexors and extensors except longus colli, interspinales, and spinales cervicis.

d. Neck—Rotators (Code: n ro).

- (1) Muscles rotating neck to same side.
 - (a) Splenius cervicis et capitis.
 - (b) Semispinalis capitis.
 - (c) Longissimus capitis.
 - (d) Iliocostalis cervicis.
 - (e) Omohyoid.
- (2) Muscles rotating neck to opposite side.
 - (a) Trapezius 1 and 2 (clavicular and acromial parts).
 - (b) Multifidi.
 - (c) Semispinalis cervicis.
 - (d) Sterno-cleido-mastoid.
 - (e) Scaleni (scalenus anterior, scalenus medius and scalenus posterior (slight rotary motion)).

3. Trunk

a. Trunk—Flexors (Not Neck) (Code: tr fl).

- (1) Rectus abdominis (both sides together).
- (2) External oblique (both sides together).
- (3) Internal oblique (both sides together).

b. Trunk—Abdominal Retraction (Code: tr ab ret).

Transversus abdominis.

c. Trunk—Extensors (Not Neck) (Code: tr ex).

Muscles of both sides work together.

- (1) Longissimus dorsi.
- (2) Ilio-costalis lumborum et dorsi.
- (3) Spinalis dorsi.
- (4) Interspinales.
- (5) Intertransversarii (primarily side benders, but because transverse processes are behind the articulations, they also act as extensors).
- (6) Rotators of back (both sides working together).
 - (a) Semispinalis dorsi.
 - (b) Multifidi.
 - (c) Rotatores.

Note. These trunk extensors are frequently grouped under the general term of "sacrospinales," or under the older and more functional term of "erector spinae." The texts differ as to just which muscles are included under these terms. The terms may be used to designate this group of extensors when used only for simple extension of the trunk. When used otherwise, as in rotation or side bending, the individual muscles should be named.

d. Trunk Side Benders (Not Neck) (Code: tr sb).

To same side if against resistance; to opposite side if to resist gravity only.

- (1) External oblique.
- (2) Internal oblique.
- (3) Rectus abdominis (one side).
- (4) Quadratus lumborum.
- (5) Longissimus dorsi.
- (6) Iliocostalis lumborum et dorsi.
- (7) Semispinalis dorsi.
- (8) Multifidi.
- (9) Rotatores.
- (10) Intertransversarii.
- (11) Serratus posterior superior.
- (12) Serratus posterior inferior.
- (13) External intercostals.
- (14) Internal intercostals.

e. Trunk—Rotators (Code: tr ro).

- (1) Rotators to opposite side.
 - (a) External oblique.
 - (b) Semispinalis dorsi.
 - (c) Multifidi.
 - (d) Rotatores.
- (2) Rotation to same side.
 - (a) Internal oblique.
 - (b) Longissimus dorsi.
 - (c) Iliocostalis lumborum et dorsi.

4. Muscles of Respiration

a. Inspiration (Code: Insp).

- (1) Diaphragm.
- (2) External intercostals.
- (3) Internal intercostals (Front part, attached to costal cartilages).
- (4) Serratus posterior superior.
- (5) Levatores costarum.
- (6) Scalenus anterior.
- (7) Scalenus medius.
- (8) Scalenus posterior.
- (9) Sterno-cleido-mastoid (in forced breathing).

b. Expiration (Code: expr).

- (1) Internal intercostals (part between ribs).
- (2) Transversus thoracis.
- (3) Serratus posterior inferior.
- (4) Quadratus lumborum (in forced exhalation).
- (5) Rectus abdominis (in forced exhalation).
- (6) External oblique (in forced exhalation).
- (7) Internal oblique (in forced exhalation).
- (8) Iliocostalis lumborum et dorsi (in forced exhalation).
- (9) Longissimus dorsi.
- (10) Gravity.
- (11) Elasticity of lungs.

5. Chest

a. Chest Raise (Code: ch ra).

- (1) Serratus posterior superior.
- (2) Levatores costarum.
- (3) Scalenus anterior.
- (4) Scalenus medius.
- (5) Scalenus posterior.
- (6) Sterno-cleido-mastoid (if head is fixed).

b. Chest Depress (Code: ch de).

- (1) Transversus thoracis.
- (2) Serratus posterior inferior.
- (3) Quadratus lumborum.
- (4) Rectus abdominis.
- (5) External oblique.
- (6) Internal oblique.
- (7) Iliocostalis lumborum et dorsi.

6. Shoulder Girdle

a. *Muscles that Raise the Scapula* (Code: ra sc).

- (1) Levator scapulae.
- (2) Trapezius 1 and 2.
- (3) Rhomboids, major and minor.
- (4) Omohyoid (slight).
- (5) Sterno-cleido-mastoid (not sternal portion)—slight.

b. *Muscles that Depress the Scapula* (Code: de sc).

- (1) Trapezius 4 (lowest part of trapezius).
- (2) Subclavius.
- (3) Pectoralis minor.

Indirectly by action on arm:

- (4) Latissimus dorsi.
- (5) Pectoralis major.

c. *Muscles that Abduct Scapula* (Code: abd sc).

- (1) Serratus anterior (all).
- (2) Pectoralis minor.

Indirectly, by action on arm:

- (3) Pectoralis major.

d. *Muscles that Rotate Scapula Outward* (Code: out ro sc).

- (1) Trapezius 1, 2 and 4.
- (2) Serratus anterior, lower fibers.

e. *Muscles that Adduct Scapula* (Code: add sc).

- (1) Rhomboids, major and minor.
- (2) Trapezius 3 (central portion of trapezius).
- (3) Levator scapulae (slight).

Indirectly, through action on arm:

- (4) Latissimus dorsi.

Note. Difference between action of these muscles in adduction and in internal rotation is in original positions of the scapulae, and in actions of guiding muscles; e. g., the trapezius 1 and 2, the pectoralis minor.

f. *Muscles that Rotate Scapula Inward from Outward* (Code: in ro sc).

- (1) Rhomboids, major and minor.
- (2) Trapezius 3.
- (3) Levator scapulae (slight).
- (4) Latissimus dorsi (through action on arms).

7. Movements of Arm on Shoulder

All movements are accompanied by fixation or active movement of scapular muscles. The operator should also analyze the accompanying scapular movement.

a. *Movement of Arm Down to Forward* (Code: ar fwd ra).

- (1) Coracobrachialis.
- (2) Deltoid, anterior and middle.

- (3) Biceps (elbow fixed straight by medial and lateral heads of triceps and by anconeus).

Note. Movement accompanied by one-third outward rotation of scapulae.

b. Movement of Arm from Downward to Forward and Inward (Diagonally Across Chest) (Code: ar fwd inw ra).

- (1) Coracobrachialis.
- (2) Deltoid, anterior.
- (3) Biceps, short head (slight) (elbow fixed straight by medial and lateral heads of triceps and by anconeus).
- (4) Pectoralis major.

Note. Movement accompanied by extreme abduction and partial outward rotation of scapulae.

c. Movement of Arm from Forward to Up (Code: ar fwd to up).

(1), (2), and (3) of *a* above, plus extreme outward rotation of scapulae and scapular elevation.

d. Movement of Arm from Forward Inward to Up (Code: ar fwd inw to up).

- (1) Coracobrachialis.
- (2) Deltoid, anterior and middle.
- (3) Biceps.
- (4) Pectoralis major, upper fibers only (only after arms are above the horizontal).

Note. Movement accompanied by extreme outward rotation and elevation of scapulae.

e. Movement of Arm from Downward to Sideward (Code: ar sdw ra).

- (1) Deltoid.
- (2) Supraspinatus.

Note. Movement accompanied by one-half outward rotation of scapula and elevation of scapulae.

- (3) Pectoralis major, upper fibers (only after arms are slightly above side horizontal).

f. Movement of Arm from Sideward to Upward (Code: ar sdw to up).

- (1) Deltoid.
- (2) Supraspinatus.
- (3) Pectoralis major, upper fibers.

Note. Movement accompanied by extreme outward rotation and elevation of scapulae.

g. Movement of Arm from Downward to Backward (Code: ar bkw).

- (1) Deltoid, posterior and middle (middle deltoid keeps arm from being raised toward sagittal plane).
- (2) Latissimus dorsi.

(3) Teres major.

Note. This movement is accompanied by adduction of scapulae.

h. Movement of Arm from Downward to Backward and Inward (Diagonally Behind Back) (Code: ar bkw in ra).

- (1) Deltoid, posterior.
- (2) Latissimus dorsi.
- (3) Teres major.

Note. This movement is accompanied by extreme adduction of scapulae.

i. Movement of Arm from Upward to Forward Against Resistance (Code: ar up to fwd).

- (1) Latissimus dorsi.
- (2) Teres major.
- (3) Pectoralis major.
- (4) Triceps, long head (elbow straight).

Note. Accompanied by internal rotation of scapula. Upward to downward not against resistance, same muscles as in forward to upward, but in eccentric contraction.

j. Movement of Arm from Upward to Forward Inward Against Resistance (Code: ar up to fwd in).

- (1) Pectoralis major—upper fibers.
- (2) Coracobrachialis.
- (3) Biceps, short head (Elbow fixed straight by medial and lateral heads of triceps and by anconeus).
- (4) Deltoid anterior.

Note. Upward to forward inward NOT against resistance, same muscles as in forward inward to upward, but in eccentric contraction.

k. Movement of Arm from Forward to Downward Against Resistance (Code: ar fwd to dwn).

- (1) Latissimus dorsi.
- (2) Teres major.
- (3) Pectoralis major (first part of movement).
- (4) Deltoid, posterior.
- (5) Triceps, long head (elbow straight).

Note. Accompanied by internal rotation of scapulae. Forward to downward not against resistance, same muscles as in downward to forward, but in eccentric contraction.

l. Movement of Arm from Upward to Sideward Against Resistance (Code: ar up to sdw).

- (1) Latissimus dorsi.
- (2) Teres major.
- (3) Pectoralis major.
- (4) Triceps, head, long, (elbow straight).

Note. Accompanied by internal rotation and depression of the scapulae.

Upward to sideward not against resistance, same muscles as in sideward to upward, but in eccentric contraction.

m. Movement of Arms from Sideward to Downward Against Resistance (Code: ar sdw to dwn).

Same muscles as upward to sideward plus subscapularis (slight) sideward to downward NOT against resistance, same muscles as in downward to sideward, but in eccentric contraction.

n. Movements of Arms from Forward to Sideward (and Backward) (Code: ar fwd to sdw).

(1) Deltoid posterior (middle deltoid fixed).

(2) Infraspinatus { These muscles abduct in horizontal plane
(3) Teres minor { only. External rotation is controlled by
subscapularis.

(4) Triceps, long head (elbow straight).

Note. Accompanied by extreme adduction of scapulae with or without internal rotation. Elevators of scapulae hold scapulae up.

o. Movement of Arms from Sideward to Backward in Horizontal Plane (Code: ar sdw to bkw).

Same muscles as from forward to side.

p. Movement of Arm from Sideward to Forward (Code: ar sdw to fwd).

(1) Pectoralis major.

(2) Deltoid, anterior (middle deltoid fixed).

(3) Coracobrachialis.

(4) Biceps, short head (elbow fixed by medial and lateral heads of triceps and by anconeus).

Note. Accompanied by abduction and external rotation of scapulae.

8. Movements of Arm in Rotation

a. External Rotation (Code: ar ext ro).

(1) Teres minor.

(2) Infraspinatus (not when arm is forward or upward).

(3) Deltoid, posterior (when arm is down or sideward).

b. Internal Rotation (Code: ar inw ro).

(1) Subscapularis.

(2) Deltoid, anterior.

(3) Pectoralis major.

(4) Latissimus dorsi.

(5) Teres major.

(6) Supraspinatus (when arm is upward).

9. Forearm

a. Flexion of Forearm at Elbow (Code: fo fl).

(1) Biceps.

- (2) Brachialis.
- (3) Pronator teres.
- (4) Brachioradialis.
- b. *Extension of Forearm at Elbow* (Code: fo ex).
 - (1) Triceps.
 - (2) Anconeus.
- c. *Pronation* (Code: fo pro).
 - (1) Pronator teres.
 - (2) Pronator quadratus.
 - (3) Brachioradialis (to midpoint).
- d. *Supination* (Code: fo sup).
 - (1) Supinator.
 - (2) Biceps.
 - (3) Brachioradialis (to midpoint).

10. Hand

- a. *Flexion* (Code: h fl).
 - (1) Flexor carpi radialis.
 - (2) Flexor carpi ulnaris.
 - (3) Palmaris longus.
- Indirectly:
 - (4) Flexor digitorum sublimis.
 - (5) Flexor digitorum profundus.
- b. *Extension* (Code: h ex).
 - (1) Extensor carpi radialis longus.
 - (2) Extensor carpi radialis brevis.
 - (3) Extensor carpi ulnaris.
- Indirectly:
 - (4) Extensor digitorum communis.
 - (5) Extensor digiti quinti proprius.
- c. *Abduction (Radial Side)* (Code: h abd).
 - (1) Flexor carpi radialis.
 - (2) Extensor carpi radialis longus.
 - (3) Extensor carpi radialis.
 - (4) Abductor pollicis longus.
 - (5) Extensor pollicis brevis.
- d. *Adduction (to Ulnar Side)* (Code: h add).
 - (1) Flexor carpi ulnaris.
 - (2) Extensor carpi ulnaris.

11. Movements of Fingers and Palm

- a. *Palm (Tension)* (Code: pa tn).
 - (1) Palmaris longus.
 - (2) Palmaris brevis.

b. Fingers, Flexion (Code: fi fl).

- (1) Flexor digitorum sublimis.
- (2) Flexor digitorum profundus.

c. Fingers, Extension (Code: fi ex).

Extensor digitorum communis.

d. Thumb, Flexion (Code: po fl).

- (1) Flexor pollicis longus.
- (2) Flexor pollicis brevis.
- (3) Opponens pollicis.

e. Thumb, Extension (Code: po ex).

- (1) Extensor pollicis longus.
- (2) Extensor pollicis brevis.

f. Thumb, Abduction (Code: po abd).

- (1) Abductor pollicis longus.
- (2) Abductor pollicis brevis.

g. Thumb, Adduction (Code: po add).

- (1) Adductor pollicis obliquus.
- (2) Adductor pollicis transversus.
- (3) Opponens pollicis.

h. Extensor, First Finger (Code: fi₂ ex).

Extensor indicis.

i. Flexor, Fifth Finger (Code: fi₅ fl).

- (1) Flexor digiti quinti brevis.
- (2) Opponens digiti quinti.

j. Extensor, Fifth Finger (Code: fi₅ ex).

Extensor digiti quinti.

k. Abductor, Fifth Finger (Code: fi₅ abd).

Abductor quinti digiti.

l. General (No Code).

- (1) Lumbricales (flex proximal phalanges and extend second and third phalanges of fingers 2, 3, 4 and 5).
- (2) Palmar interossei (adduct fingers 2, 4, and 5 toward finger 3).
- (3) Dorsal interossei (abduct fingers 2, 4, and 5 from finger 3).

12. Muscles Pelvis to Leg

a. Thigh Flexors (Code: th fl).

- (1) Psoas major.
- (2) Iliacus.
- (3) Pectineus (to about 45° forward of downward. Also adducts).
- (4) Tensor fasciae latae (also abducts).
- (5) Sartorius.
- (6) Rectus femoris.
- (7) Adductor longus (slight).

- (8) Adductor brevis (slight).
- (9) Gracilis (when thigh is partially flexed).
- b. *Thigh Extensors* (Code: th ex).
 - (1) Gluteus maximus.
 - (2) Biceps femoris.
 - (3) Semitendinosus
 - (4) Semimembranosus
 - (5) Adductor magnus (only when thigh is flexed).

Note. The thigh cannot be extended (or raised backward) much beyond the vertical line, so far as the action at the hip is concerned, because the backward motion is stopped by the ilio-femoral ligament. When the thigh is raised beyond that point, the movement is primarily due to the forward rotation of the pelvis.

c. *Thigh Abduction* (Code: th abd).

- (1) Gluteus medius.
- (2) Gluteus minimus.
- (3) Tensor fasciae latae (also flexes).

When THIGH IS FORWARD THE following external rotators also abduct:

- (4) Obturator externus.
- (5) Gemellus superior et inferior.
- (6) Obturator internus.
- (7) Piriformis.
- (8) Quadratus femoris.

Also the:

- (9) Gluteus medius, rear fibers.
- (10) Gluteus minimus, rear fibers.

d. *Thigh Adduction* (Code: th add).

- (1) Adductor longus.
- (2) Adductor brevis.
- (3) Adductor magnus.
- (4) Gracillis.
- (5) Pectineus (also flexes).
- (6) Gluteus maximus (lower fibers).

e. *Thigh—External Rotation* (Code: th out ro).

- (1) Gemellus superior et inferior.
- (2) Obturator externus.
- (3) Obturator internus.
- (4) Quadratus femoris.
- (5) Piriformis.
- (6) Gluteus maximus, lower fibers.
- (7) Gluteus medius, posterior fibers.
- (8) Gluteus minimus, posterior fibers.
- (9) Sartorius (Especially when thigh is forward and knee bent).
- (10) Pectineus (slight, in extension only).

- (11) Adductor brevis
 - (12) Adductor longus
 - (13) Biceps femoris
- } Slight.

f. Thigh—Internal Rotation (Code: th in ro).

- (1) Tensor fasciae latae.
 - (2) Gluteus minimus
 - (3) Gluteus medius
 - (4) Ilio-psoas, slight, in extension only.
- } Anterior fibers.

13. Movements of Lower Leg

a. Flexion of Lower Leg at Knee (Code: 1 fl).

- (1) Biceps femoris.
 - (2) Semitendinosus.
 - (3) Semimembranosus.
 - (4) Gracilis
 - (5) Sartorius
 - (6) Gastrocnemius.
 - (7) Popliteus.
 - (8) Plantaris.
- } When knee is partly bent.

b. Extension of Lower Leg at Knee (Code: 1 ex).

- (1) Vastus lateralis.
- (2) Vastus intermedius.
- (3) Vastus medialis.
- (4) Rectus femoris (only when thigh is not being extended).

c. External Rotation of Lower Leg at Knee (Only When Knee is bent) (Code: 1 out ro).

Biceps.

d. Internal Rotation of Lower Leg at Knee (Only When Knee is bent) (Code: 1 in ro).

- (1) Semimembranosus.
- (2) Semitendinosus.
- (3) Gracilis.
- (4) Sartorius.
- (5) Popliteus.

14. Movements of Foot and Ankle

a. Flexion of Foot (Code: ft fl).

- (1) Tibialis anterior.
- (2) Extensor Digitorum longus.
- (3) Extensor hallucis longus.
- (4) Peroneus tertius.

b. Extension of the Foot (Code: ft ex).

- (1) Gastrocnemius.
- (2) Soleus.

- (3) Plantaris.
- (4) Tibialis posterior.
- (5) Flexor digitorum longus.
- (6) Flexor hallucis longus.
- (7) Peroneus longus.
- (8) Peroneus brevis.
- c. *Pronation (Eversion) of Foot* (Code: ft pro).
 - (1) Peroneus longus.
 - (2) Peroneus brevis.
 - (3) Peroneus tertius.
- d. *Supination (Inversion) of Foot* (Code: ft sup).
 - (1) Tibialis anterior.
 - (2) Tibialis posterior.
 - (3) Flexor hallucis longus.
 - (4) Flexor digitorum longus.
- e. *Flexion of Toes* (Code: to fl).
 - (1) Flexor digitorum longus.
 - (2) Flexor hallucis longus.
 - (3) Flexor digitorum brevis.
 - (4) Quadratus plantae.
 - (5) Flexor hallucis brevis.
 - (6) Flexor digiti quinti brevis.
 - (7) Lumbricales.
- f. *Extension of Toes* (Code: to ex).
 - (1) Extensor digitorum longus.
 - (2) Extensor digitorum brevis.
 - (3) Extensor hallucis longus.
 - (4) Extensor hallucis brevis.
- g. *Abduction of Toes* (Code: to abd).
 - (1) Abductor hallucis.
 - (2) Abductor digiti quinti.
 - (3) Dorsal interossei except first.
- h. *Adduction of Toes* (Code: to add).
 - (1) Adductor hallucis.
 - (a) Transverse head.
 - (b) Oblique head.
 - (2) Plantar interossei.
 - (3) Dorsal interosseus, first.

APPENDIX II

GLOSSARY

AE.....	Amputation above elbow.
AK.....	Amputation above knee.
Abduction.....	The act of drawing away from the median line. Usually applies to raising the arm or leg sidewise.
BE.....	Amputation below elbow.
BK.....	Amputation below knee.
Active exercise.....	An exercise in which patient performs movements required without assistance.
Adduction.....	The act of drawing toward a center or median line; opposite of abduction.
Alternate exercise.....	An exercise to be performed by patient if exercise in prescribed series cannot be performed because of disability or inclement weather.
Ambulant patient.....	Patient who is not confined to bed but who still requires daily definitive medical treatment.
Antagonist.....	A muscle which acts in opposition to the action of another muscle.
Anterior.....	Situated in front of or in the forward part of.
Assistive exercise.....	An exercise in which patient performs movements required, with assistance of instructor or mechanical aids.
Atrophy.....	A defect or failure of nutrition manifested as a wasting away or diminution in the size of the cell, tissue, organ, or part.
Bed patient.....	Patient who is confined to bed or who, by nature of his disability, must take exercises in bed.
Cadence.....	A rhythmical calling of numbers by which various exercises are performed.
Calisthenics.....	A system of light exercises for promoting strength and grace of carriage.

Cardiac	Referring or pertaining to the heart.
Carpal	Refers to wrist; example: Carpal bones mean wrist bones.
Cartilage	Gristle or white elastic substance attached to joint surface of bones.
Catatonia	A form of schizophrenia characterized by negativistic reactions, phases of stupor or excitement, and impulsive or stereotyped behavior.
Cervical	Refers to neck: Examples: cervical vertebra or neck vertebra.
Circumduction	The active or passive circular movement of a limb or of the eye.
Clonus	Spasm in which rigidity and relaxation succeed each other.
Conditioning exercise ---	An exercise prescribed to increase musculo-cardio-respiratory endurance and general strength within certain limits.
Contracture	A shortening or distortion. It may be permanent as from shrinkage of muscle or scars; or spasmodic, from a sudden stimulus.
Contusion	Bruise; may refer to any tissue—brain, muscle, or bone, for example.
Convalescent patient ---	A patient who is in the stage of recovery from disease or injury.
Dorsiflexion	Flexion or bending as of toes, toward the dorsum.
Edema	Swelling of tissues because of presence of abnormally large amounts of fluid.
Efferent	Carrying impulses away from the brain.
Etiology	The study of causes of disease.
Eversion	To turn outward (opposite).
Exercise tolerance	The amount of exercise which may be performed without deleterious results.
Extension	A movement which results in the straightening of a limb.
Fascia	A sheet or band of tissue which invests and connects the muscles.
Fatigue	Weariness, usually from over-exertion.
Fibrosis	The formation of fibrous tissue; fibroid degeneration.
Flaccid	Weak, lax, or soft.
Flexion	The act of bending.
Gait	Manner of running, walking, or moving the feet.

Gluteal-----	Pertaining to the buttocks.
Guarded movements----	Movements in exercise done slowly and through limited range of motion only to the point of pain.
Hallucination-----	A sense perception not founded upon objective reality.
Heavy resistance exercises.	Exercises performed against maximum load (resistance usually applied by iron weights—dumbbells or barbells).
Hemiplegia-----	Paralysis of one side of the body.
Horizontal-----	Parallel to the horizon; on a level.
Humerus-----	The long bone of the upper arm.
Hydrotherapy-----	The use of water in treating disease and injury.
Hyper-----	A prefix signifying above, beyond, or excessive.
Hypersensitivity-----	A state of altered reactivity in which the body reacts to a foreign agent more strongly than is normal.
Hypo-----	A prefix denoting a lack or deficiency; also a position under or beneath.
Hypochondriac-----	Pertaining to morbid anxiety about the health, often associated with a simulated disease and more or less pronounced melancholia.
Hysteria-----	A psychoneurosis, the symptoms of which are based on conversion and which is characterized by lack of control over acts and emotions, by morbid self-consciousness, by anxiety, by exaggeration of the effect of sensory impressions and by simulation of various disorders.
Ilium-----	Wide upper portion of the innominate bone.
Inferior-----	Situated below. Under.
Insertion-----	Point where muscle attaches to a bone.
Innervation-----	The supply of nervous energy to a part.
Inversion-----	A turning inward; opposite of eversion.
Isometric contraction---	A muscle contraction without joint movement; a static contraction.
Isotonic-----	A muscle contraction with joint movement.
Kyphosis-----	An abnormal backward curve of thoracic spine (round back or hump shoulders).
Lateral-----	Pertains to the side (relationship of position from the midline).
Lateral flexion-----	Bend to the side (side bending).

Ligament	A tough fibrous band which connects bones or supports viscera.
Lordosis	Curvature of spinal column with a forward convexity.
Low organized games	Games which may be played within a group with minimum amount of organization.
Medial	Toward the midline.
Melañcholia	A form of insanity marked by a depressed and painful emotional state with abnormal inhibition of mental and bodily activity.
Metacarpal	Long bones of the hand between the fingers and carpal bones.
Metatarsal	Long bones of the foot between the toes and tarsal bones.
Motor	A muscle, nerve, or center that effects or produces movement.
Motor area	The brain center that initiates motor activities.
Myo	A prefix denoting some relation to a muscle or muscles.
Nerve	Many nerve fibers bound together in bundles of various sizes.
Orthopedics	That branch of medicine which deals with the correction of deformities and with the treatment of chronic diseases of the joints and spine.
Os	Bone (Latin).
Osteology	The study of the bone.
Overload principle	Strength of muscle is built most rapidly by so loading the muscle that movement is possible only by contraction of a maximum number of muscle fibers.
Para	A prefix meaning beside.
Paralysis	Loss or impairment of motion of a part because of damage to the nerve or muscle tissue.
Paranoia	A chronic, slowly progressive mental disorder (personality disorder) characterized by the development of ambitions or suspicions into systematized delusions which are built up in a logical form.
Paraplegia	Paralysis of the legs and lower part of the body, both motion and sensation being affected.

Passive exercise-----	An exercise in which the movement is performed mechanically by an operator; the patient not assisting nor offering resistance to the movement.
Plantar flexion-----	Bending the ankle so that the toes are moved downward.
Posterior-----	Situated in back of or in the dorsal part of.
Prognosis-----	A forecast as to the probable result of an attack or disease; the prospect as to recovery from a disease.
Progressive exercise-----	A gradual and continuous series of exercises planned to start with the patient's present capabilities and working up to maximum development.
Pronation-----	The act of turning the palm of the hand downward.
Prone position-----	Lying so that the face and abdomen are in line with or upon the floor or ground.
Prosthesis-----	(1) The replacement of an absent part by an artificial one. (2) An artificial part, such as an eye, leg or denture.
Proximal-----	Nearest the origin, center or head; opposite of distal.
Psychoneurosis-----	Mental disorder which is of psychogenic origin but presents the essential symptoms of functional nervous disease, as hysteria, neurasthenia or psychasthenia.
Psychosis-----	The deeper, more far-reaching and prolonged behavior disorders such as dementia praecox and manic-depressive psychosis.
Reflex-----	The sum total of any particular involuntary activity.
Relaxation-----	A lessening of tension.
Remedial exercise-----	Exercises prescribed in disease or injury.
Resistive exercise-----	An exercise in which the patient offers resistance to manual or mechanical movements.
Rotation-----	The process of turning, on an axis; movement of a body about its axis.
Sagittal-----	Median or middle, as sagittal plane; running in an anteroposterior direction.
Scoliosis-----	An abnormal lateral curvature of the vertebral column.

Shoulder girdle-----	Bony frame within the body in which the arm is attached (clavicle and scapula).
Spasm-----	A sudden, violent, involuntary contraction of a muscle or group of muscles.
Stretch reflex-----	The reflex action by which muscle tone is increased by stretching.
Superior-----	Higher, having a higher situation.
Supine position-----	Lying on the back with face upward.
Synergist-----	A body part which acts in concert with another.
Tarsal-----	Any bone of the tarsus or ankle.
Tendon-----	The fibrous cord of connective tissue in which the fibers of a muscle end and by which the muscle is attached to a bone or other structure. A "leader."
Thorax-----	The chest; the part of the body between the neck and the abdomen.
Tissue-----	A collection of similarly specialized cells united in performance of a particular function.
Tone-----	The normal degree of vigor and tension in muscles.
Transverse-----	Lying or being across, as a transverse muscle.
Tonus-----	A condition of tension in a muscle which exists independently of voluntary innervation. (<i>See</i> Tone.)
Ventral-----	Abdominal side of the body.
Vertebra-----	Bone of spinal column.
Vertical-----	Perpendicular to the horizontal plane. Plumb.
Volar-----	Pertaining to the palm of the hand or the sole of the foot.

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