CHAPTER 9

LITTER EVACUATION

Section I. TYPES OF LITTERS

9-1. General

After patients are picked up in a forward area by litter bearers, they may be moved by surface or air assets to points as far to the rear as required by their medical condition. The patient who must be transported on a litter is referred to as a litter patient.

This paragraph implements STANAG 2040 and QSTAG 519.

9-2. Types of Litters

A litter may be prefabricated or may be improvised from available materials. The Armed Forces use several types of standard litters. This standardization allows a patient to travel in various vehicles on the same litter; thereby, minimizing the possibility of further injury and saving valuable time.

a. Standard Litters. Standard litters are prefabricated and may have accessories to be used with them.

(1) The standard collapsible litter is the most widely used (Figure 9-1). It folds along the long axis only.

(a) The basic components of the litter and their functions are provided below:

- Two straight, rigid, lightweight aluminum poles.
- A cover (bed) of cotton duck.
- Four wooden handles attached to the poles.
- Four stirrups (one bolted near the end of each pole). The stirrups support the litter when it is placed on the ground.
- Two spreader bars (one near each end of the litter). These bars are extended crosswise at the stirrups to hold the cover taut when the litter is open.
- Two litter securing straps (one attached to each pole at the stirrup bolts). These straps are used to secure the litter when it is closed.
- Accessories such as patient securing straps.

(b) Dimensions of the standard collapsible litters are as follows:

- Overall length is 90 inches.
- Overall width is 22 7/8 inches.
- Bed length is 72 inches.
- Bed width is 22 7/8 inches.
- Weight is 15 pounds.

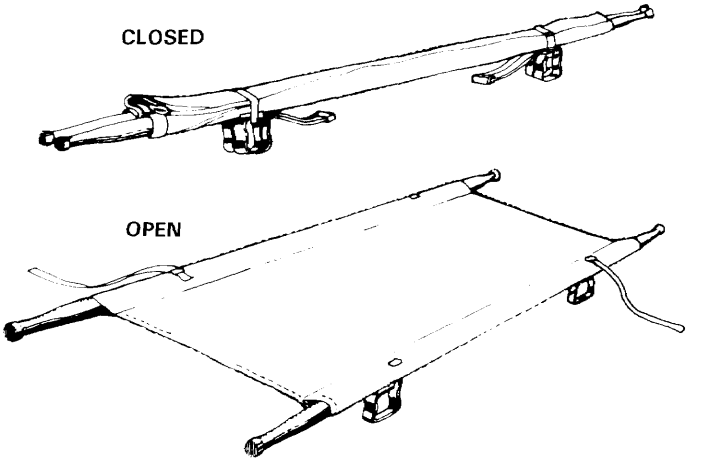

Figure 9-1. Standard collapsible litter.

(2) The patient securing strap (Figure 9-2) is used to hold the patient in position on the litter. It is designed to fit the straight and folding aluminum litters as well as other standard litters. It is available in quantities of four per litter. This strap can also be used with an improvised litter and as a patient restraint, if required. It is made from a 6-foot length of 2-inch webbing and a buckle with a locking device and spring.

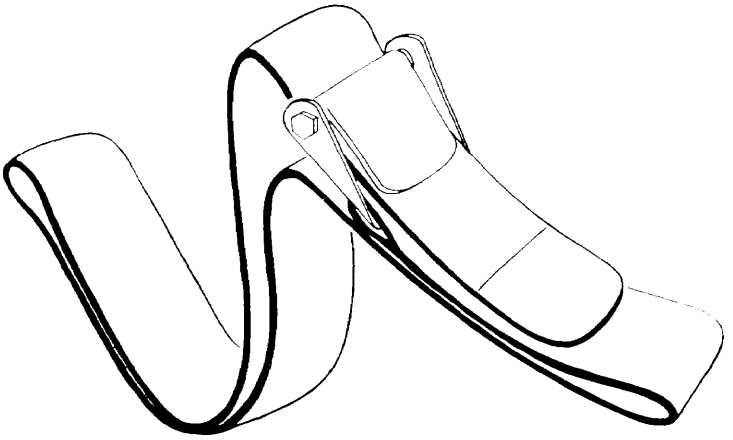

Figure 9-2. Patient securing strap.

(3) Another standard litter, with the same general dimensions when open, is the folding aluminum litter. It has folding lightweight aluminum poles (Figure 9-3). The poles can be folded to one-half their length when the litter is not in use.

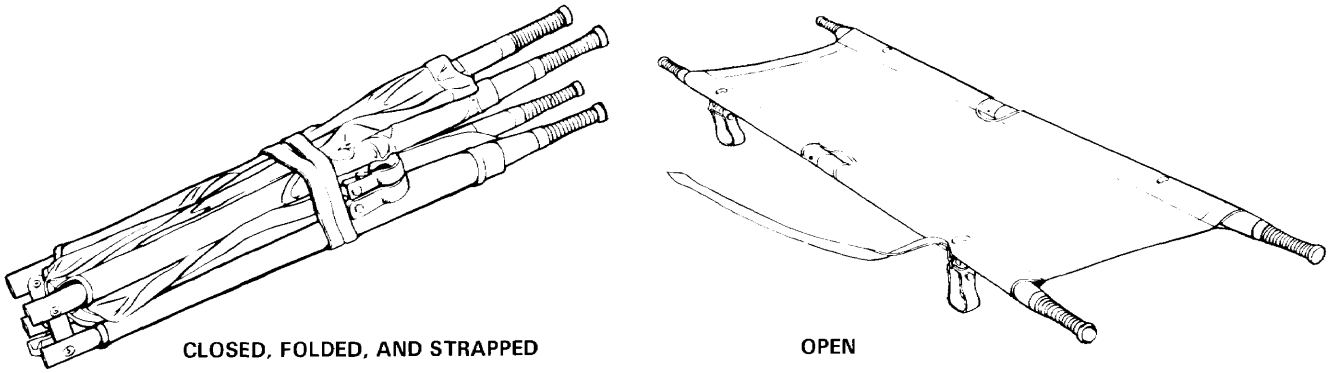

Figure 9-3. Folding aluminum litter.

(4) The poleless semirigid litter (Figure 9-4) is useful in evacuating patients from ships and in mountainous areas. It holds the patient securely in position and facilitates the movement of the patient in a vertical position. The dimensions of this litter are overall length, 83¾ inches; overall width, 22¾ inches; and its weight is 18¾ pounds. The basic components and their functions are—

- Semirigid cotton duck with wooden supports.
- Four webbing handles (two at each end). These straps can be used when the litter is carried by four bearers.
- Four loops. These loops are used to insert the poles for carrying.
- Headpiece. This is used to support the patient's head.
- Seven patient securing straps. These straps are used to secure the patient to the litter.

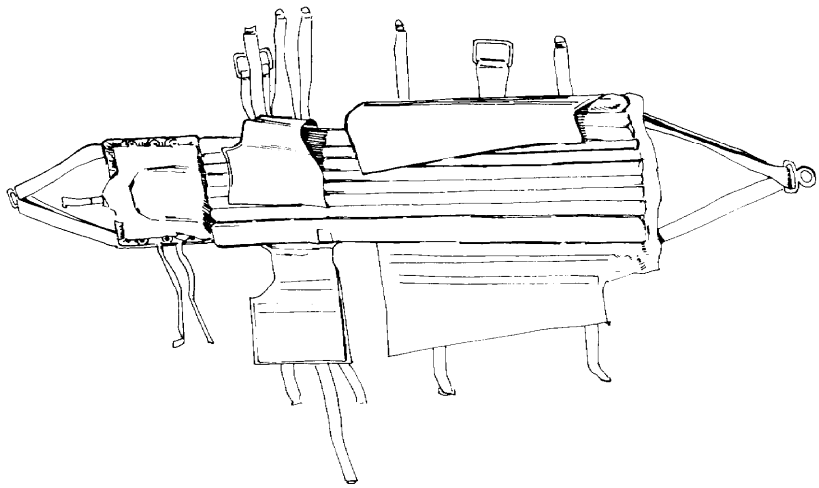

Figure 9-4. Poleless semirigid litter.

(5) The poleless nonrigid litter (Figure 9-5) can be folded and carried by the combat medic. It has folds into which improvised poles can be inserted for evacuation over long distances. It also has slings for hoisting, lowering, and carrying, and patient securing straps to secure the patient to the litter.

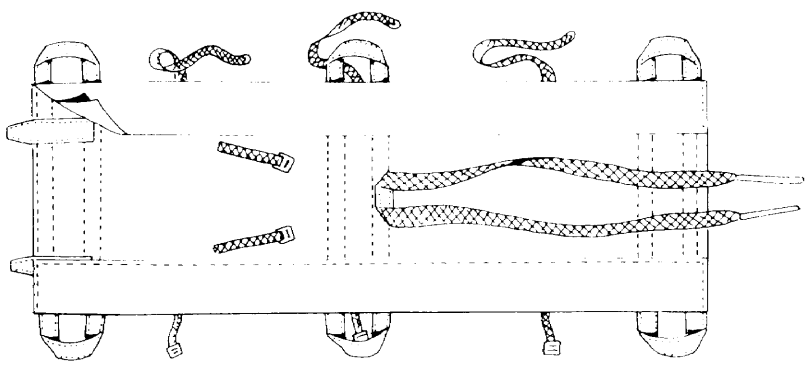

Figure 9-5. Poleless nonrigid litter.

(6) The Stokes litter (Figure 9-6) affords maximum security for the patient when the litter is tilted. (For additional information, refer to paragraph 11-32.) The basic components of the litter and their functions, and its dimensions are provided below.

- It is composed of a steel or aluminum tubular frame supporting a bed of wire mesh netting. It also has wooden support slats to support the patient's back.
- The lower half is divided into two compartments to accommodate the patient's legs.
- It has four webbing patient securing straps for use in securing the patients.
- It has ropes, cables, or steel rings which can be attached to the litter as required for vertical recoveries.
- Its dimensions are length, 84 inches; width, 23 inches; and weight, 31½ pounds.

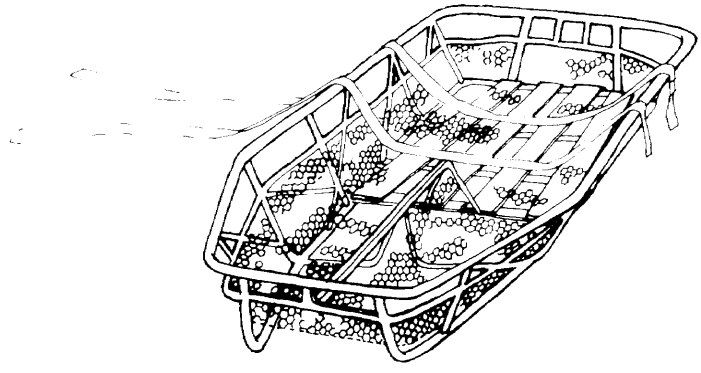

Figure 9-6. Stokes litter.

(7) The SKED litter (Figure 9-7) is a compact and lightweight transport system used to evacuate a patient over land. It may also be used to rescue a patient in the water. Detailed information on this system is contained in paragraphs 11-27 through 11-30.

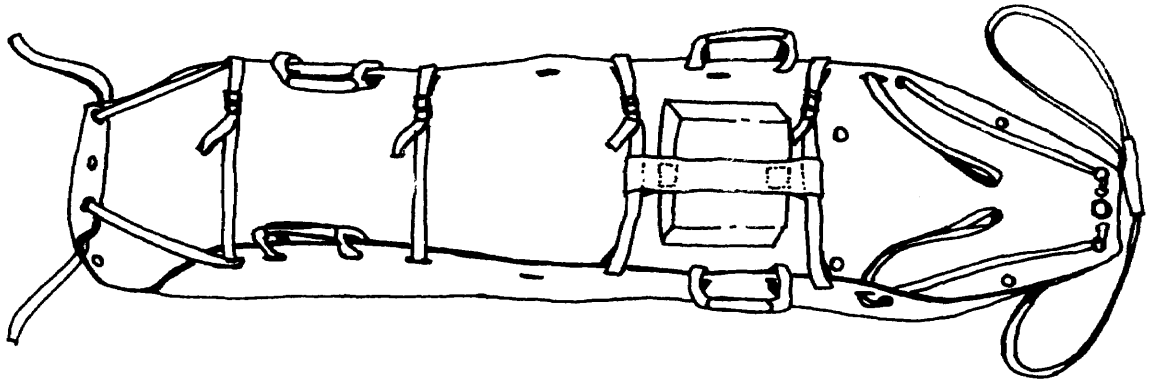

Figure 9-7. SKED litter.

b. Improvised Litters. Improvised litters are those made from various materials normally available in the forward area.

(1) There are times when a patient may have to be moved and a standard litter is not available. The distance may be too great for manual carries, or the patient may have an injury (such as a fractured neck, back, hip, or thigh) that would be aggravated by manual transportation. In these situations, litters can be improvised from materials at hand. Improvised litters must be as well constructed as possible to avoid the risk of dropping or further injuring the patient. Improvised litters are emergency measures and must be replaced by standard litters at the first opportunity.

(2) Many different types of litters can be improvised, depending upon the materials available. A satisfactory litter can be made by securing poles inside such items as a blanket (Figure 9-8), poncho, shelter half, tarpaulin, mattress cover, jacket, shirts (Figure 9-9), or bed ticks, bags, and sacks (Figure 9-10). Poles can be improvised from strong branches, tent poles, skis, lengths of pipe, and other objects. If objects for improvising poles are not available, a blanket, poncho, or similar item can be rolled from both sides toward the center so the rolls can be gripped for carrying a patient (Figure 9-11). Most flat-surface objects of suitable size can be used as litters. Such objects include doors, boards, window shutters, benches, ladders, cots, and chairs. If possible, these objects should be padded for patient comfort.

(a) To improvise a litter using a blanket and poles, the following steps should be used:

- Open the blanket and lay one pole lengthwise across the center; then fold the blanket over the pole.
- Place the second pole across the center of the folded blanket.
- Fold the free edges of the blanket over the second pole and across to the first pole.

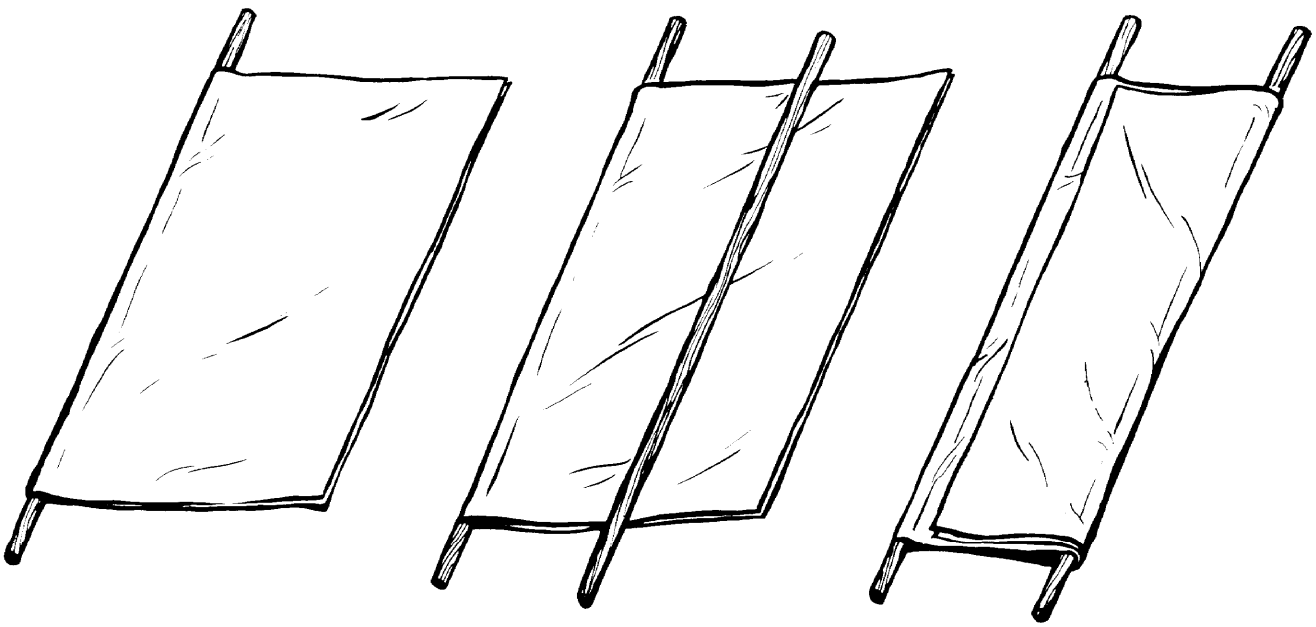

Figure 9-8. Litter made with blanket and poles.

(b) To improvise a litter using shirts or jackets, button the shirt or jacket and turn it inside out, leaving sleeves inside, then pass pole through the sleeves.

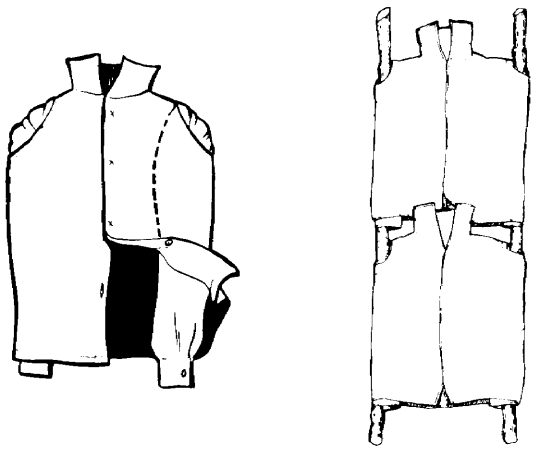

Figure 9-9. Litter improvised from jackets and poles.

(c) To improvise a litter from bed sacks and poles, rip open the corners of bed ticks, bags, or sacks; then pass the poles through them.

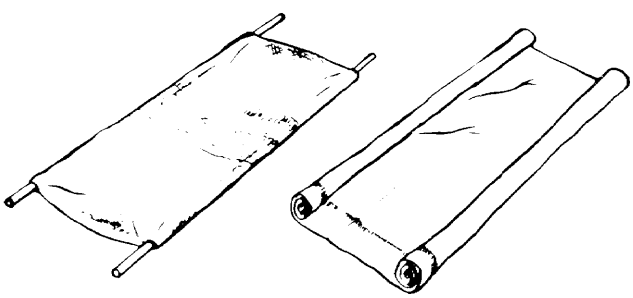

Figure 9-10. Litter improvised from bed sacks and poles.

(d) If no poles are available, roll a blanket, shelter half, tarpaulin, or similar item from both sides toward the center. Grip the rolls to carry the patient.

Figure 9-11. Rolled blanket used as litter.

9-3. Dressed Litter

A litter is dressed with one, two, or three blankets (Figures 9-12 through 9-14) to reduce the danger of shock and to afford warmth and comfort during transport. In an NBC environment, the litter should be dressed with an impermeable cover (rubber poncho or similar material). This cover is folded over the patient to prevent additional exposure to contaminants. If an impermeable cover is not available, a blanket can be used.

a. To dress a litter with one blanket (Figure 9-12), place the blanket diagonally over the litter. After the patient is placed on the litter, bring the sides of the blanket over the patient and tuck in the edges at his head and feet.

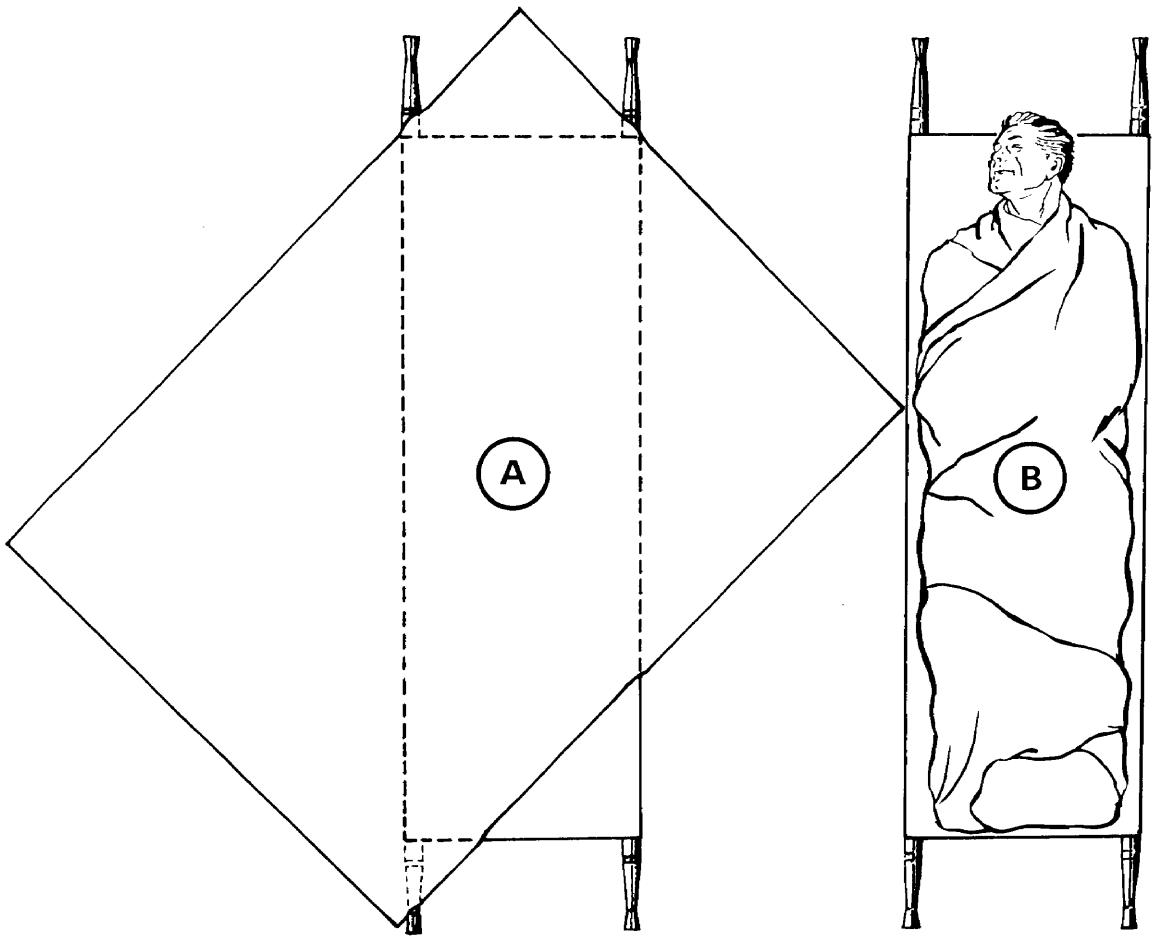

Figure 9-12. Dressing the litter with one blanket.

b. To dress a litter with two blankets (Figure 9-13), place the first blanket lengthwise across the litter with the blanket edge just beyond the head end of the litter. The second blanket is folded in thirds, lengthwise, and placed over the first blanket. Let the upper edge of the second blanket drop about 10 inches below the upper edge of the first one. Open the folds on the second blanket about 2 feet from the foot end. After the patient is placed on the litter, bring the bottom of the blanket up and over the patient's feet. Leave a small fold between his feet. Tuck the two folds closely over and around his feet and ankles. Finally, wrap the patient with one side and then the opposite side of the first blanket.

NOTE

If the patient to be placed on the litter is tall, the blanket should be placed lower on the litter.

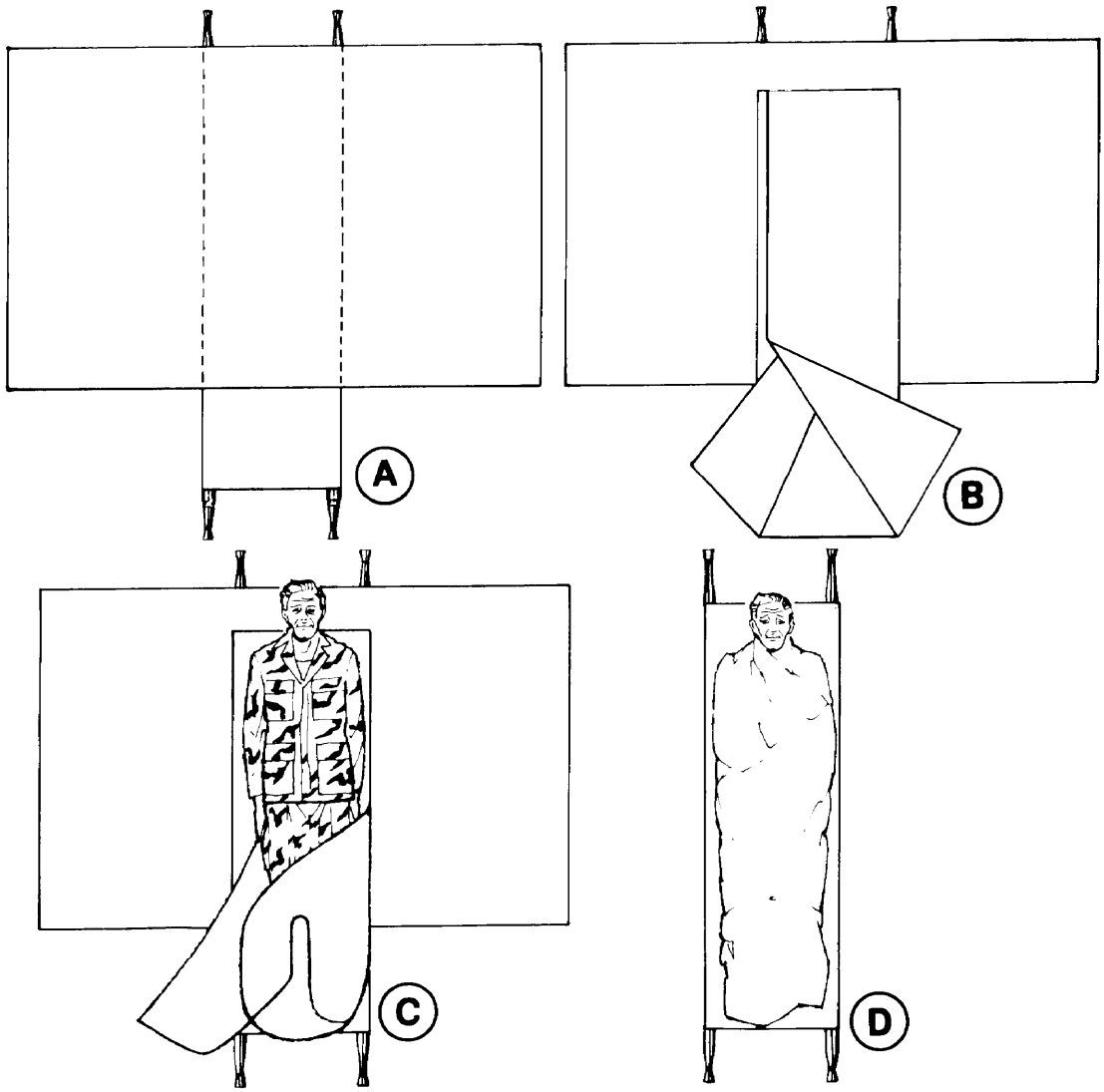

Figure 9-13. Dressing the litter with two blankets.

c. To dress a litter with three blankets (Figure 9-14), place the first blanket on the litter lengthwise so that one edge is even with the litter pole farthest from you. The upper end of the blanket is even with the head of the canvas. Fold the blanket back upon itself once, so that the folded edge is along the litter pole nearer you and the outer edge of the blanket overhangs the other pole. Place the second blanket lengthwise over the first one as described above, except start with the opposite litter pole so that the blanket overhang is on the opposite side of the first blanket. After the patient is placed on the litter, fold the third blanket once lengthwise and place it over the patient with one end under his chin. Fold the overhanging edges of the first two blankets over the third blanket and secure them in place with safety pins or patient securing straps.

NOTE

This method of dressing the litter gives four thicknesses of blanket over and under the patient. This provides additional warmth and will help in preventing shock.

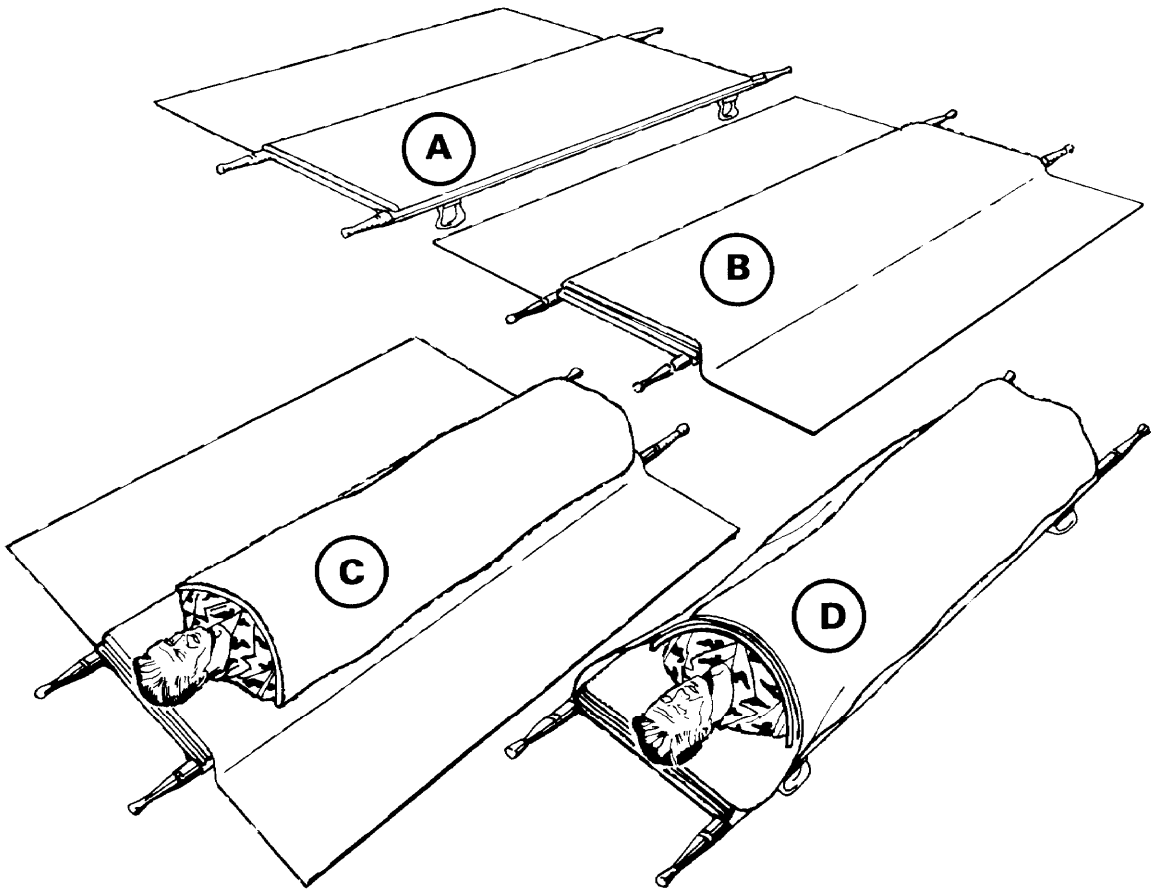

Figure 9-14. Dressing the litter with three blankets.

9-4. Using Patient Securing Straps

After the patient is placed on the dressed litter and covered, the patient securing straps are used to hold him in position. The number of straps and the body parts over which they should be placed depend upon the type of terrain over which the patient is to be carried (Figure 9-15).

- If only two straps are necessary, put one strap across the chest and one across the legs, just below the knees. Extend the straps under the litter and buckle them against the litter pole.

- If the terrain is rough, apply two additional straps. One is placed across the waist and the other acress the thighs. Again, extend them under the litter and buckle them against the litter pole.

- If the patient is being carried either up or down steep slopes, use the two additional straps to secure each thigh to the litter separately. Take one strap over one thigh, under the other thigh, then under the litter, and buckle it against the litter pole. Take the remaining strap and secure the opposite thigh in the same manner.

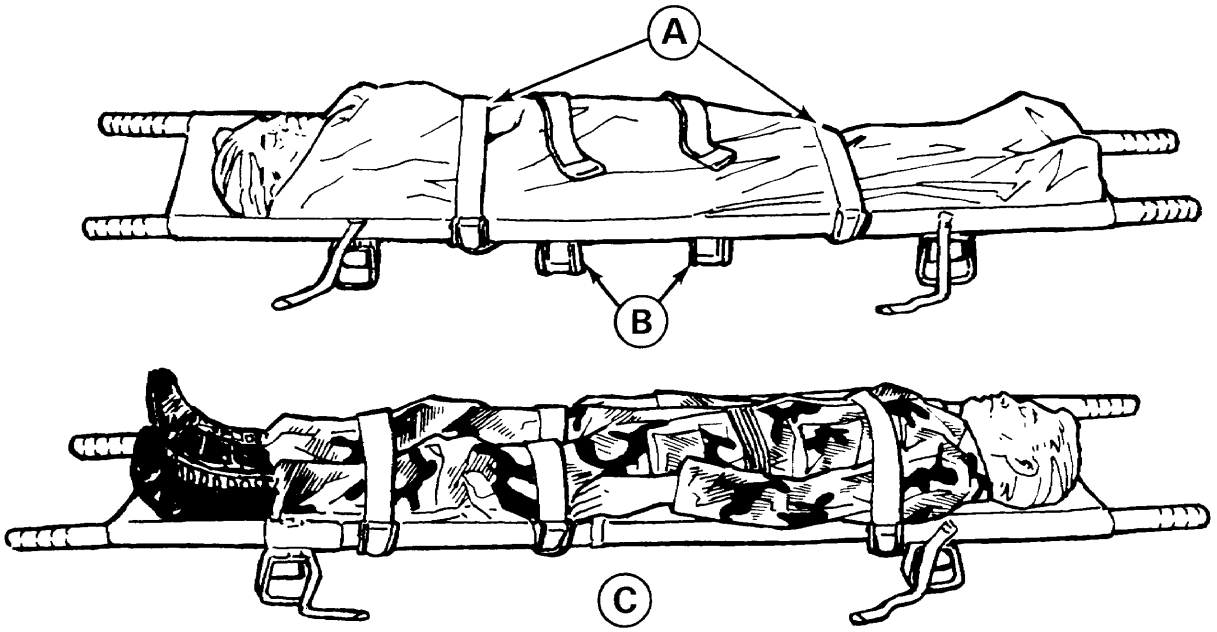

Figure 9-15. Using patient securing straps.

9-5. General Rules for Litter Bearers

In addition to the bearer rules addressed in paragraph 8-4, the following rules also apply:

a. In moving a patient, the litter bearers must make every movement deliberately and as gently as possible. The command STEADY should be used to prevent undue haste.

b. The rear bearers should watch the movements of the front bearers and time their movements accordingly to ensure a smooth and steady action.

c. The litter must be kept as level as possible at all times, particularly when crossing obstacles, such as ditches.

d. Normally, the patient should be carried on the litter feet first, except when going uphill or upstairs; his head should then be forward. If the patient has a fracture of a lower extremity, he should be carried uphill or upstairs feet first and downhill or downstairs head first to prevent the weight of the body from pressing upon the injured part.

e. When the patient is loaded on a litter, his individual equipment is carried by two of the bearers or placed on the litter.

9-6. Use of Spine Boards and the Kendricks Extrication Device

Spine boards and the KED aid in rescuing and immobilizing patients with known or suspected spinal fractures. Spine boards can be prefabricated from plywood or any suitable material {Figure 9-16).

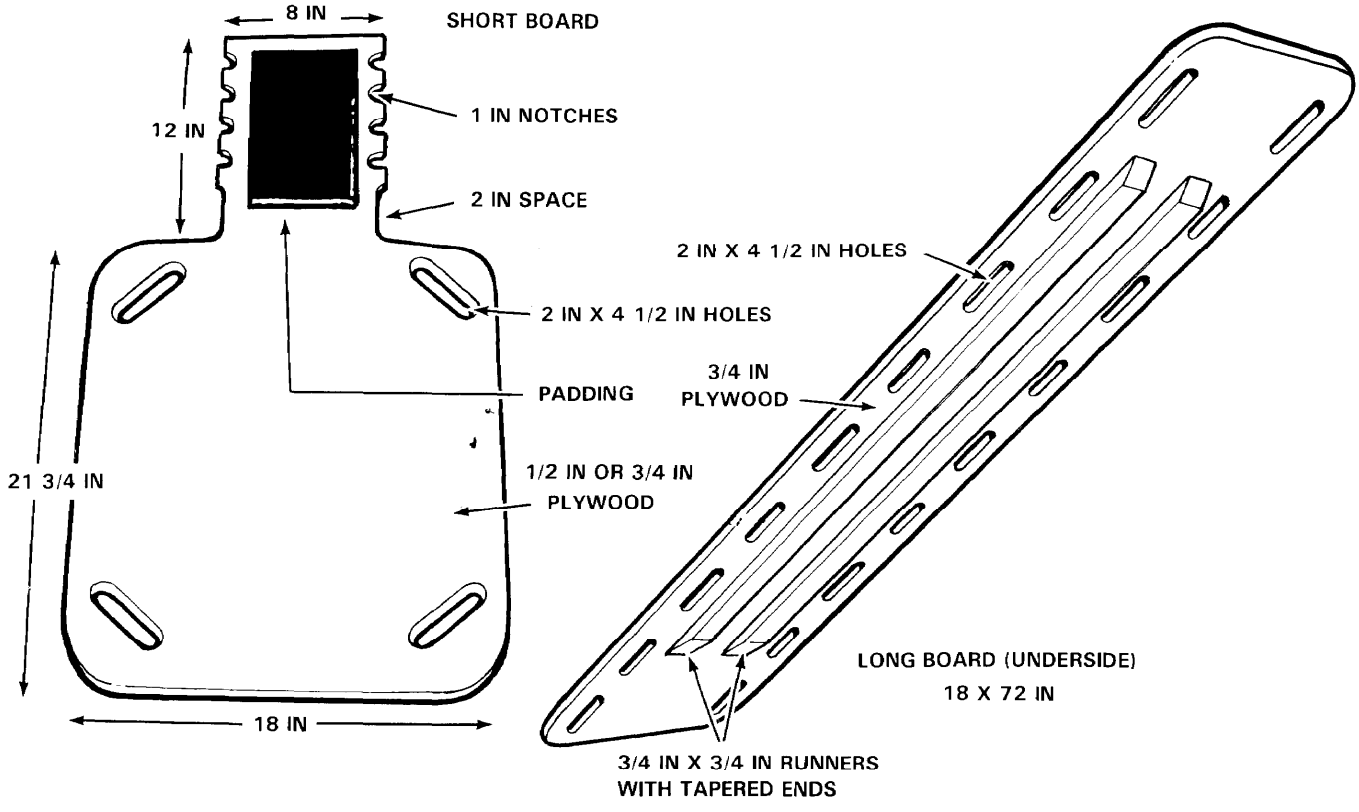

Figure 9-16. Prefabricated spine boards (short and long).

a. Short Spine Board. When a patient has a fracture or suspected fracture of the neck, the short spine board is applied from the waist up to immobilize the upper spine before moving him (Figure 9-17). The patient is then lifted onto a long spine board (c below). To apply the short spine board, the bearers assemble the required items: a short spine board, a cervical collar, two 6-foot patient securing straps, and a cravat. If an item is not available, the bearers should improvise it from any available material.

(1) Bearer number 1 places his hands on each side of the patient's head and jaws. He then applies slight upward traction to the neck while bearer number 2 inserts a cervical collar around the patient's neck.

(2) Bearer number 1 maintains a slight upward traction while bearer number 2 inserts the short spine board behind the patient's back, He then applies the cravat and the two patient securing straps (Figure 9-17) in the following order:

(a) Cravat. The center of the cravat is placed across the patient's forehead with the middle of the cravat covering the hairline. The ends are inserted into the bottom notches of the board and are tied in the back.

(b) First strap. The buckle of the first patient securing strap is placed in the patient's lap and the other end is passed through the lower hole in the board. It is brought up the back of the board, through the top hole, under the armpit, over the shoulder, and across the back of the board at the neck. The end is then attached to the second strap.

(c) Second strap. The second patient securing strap is buckled to the first one, letting the buckle rest on the side of the board at the neck. The other end of the second strap is passed over the shoulder, under the armpit, through the top hole in the board, down the back of the board, and through the lower hole. It is then taken across the patient's lap, where it is secured in place by buckling it to the first strap.

Figure 9-17. Application of short spine board.

NOTE

If available, bearer number 2 will apply a rigid cervical collar.

b. Kendricks Extrication Device. The KED (Figure 9-18) is a prefabricated flexible type of short spine board. It is useful in extricating a patient suspected of having spinal injuries, especially if the patient is in the sitting position.

(1) Bearer number 1 maintains cervical traction until the KED has been completely applied.

(2) Bearer number 2 applies a rigid cervical collar, places the KED behind the patient, puts a cushion behind the patient's head to align the KED, fastens the trunk straps, then the leg/hip straps, and then the forehead strap and chin strap.

(3) Bearer number 3 ties the hands of the patient together and places the patient on the long board.

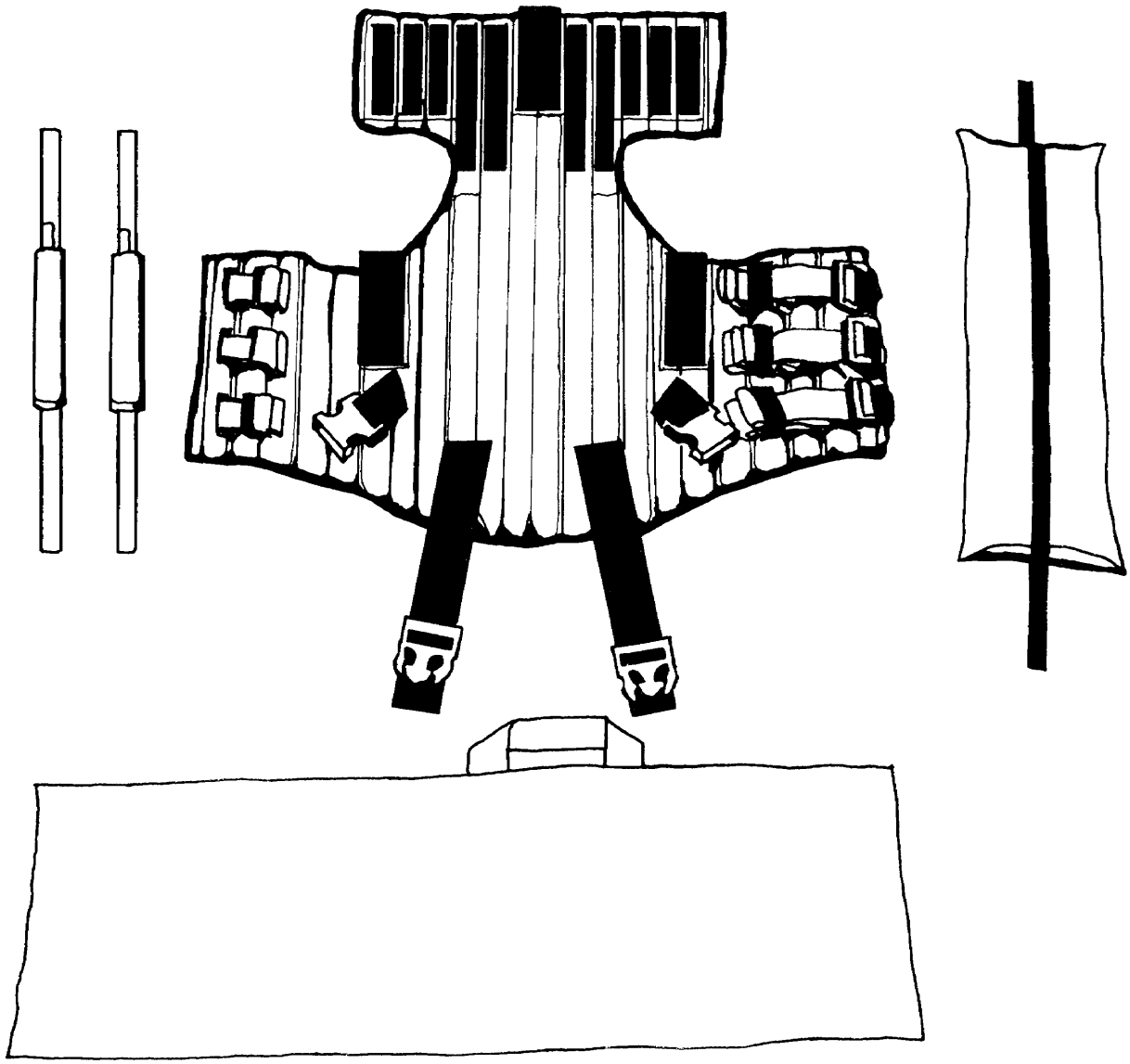

Figure 9-18 Kendricks Extrication Device.

c. Long Spine Board. When a patient has a fracture or suspected fracture of the back as well as the neck (*a* above), he is placed on a long spine board (Figures 9-19 and 9-21). To apply the long spine board, the bearers assemble the required items: a long spine board, four 6-foot patient securing straps, a cravat, and four pieces of padding. If an item is not available, the bearers should improvise it from any available material.

(1) The bearers place the spine board beside the patient. They align it with his body. They then place padding on the board at the points where the patient's neck, small of the back, knees, and ankles will rest.

(2) Bearer number 1 kneels at the patient's head. He places his hands on each side of the patient's head and jaws, immobilizing the head and neck and applying slight traction (Figure 9-19). Bearers numbers 2, 3, and 4 kneel on one side of the patient and place their hands on the opposite side at the patient's shoulder and waist, hip and thigh, knee and ankle (Figure 9-20).

Figure 9-19. Positioning of hands.

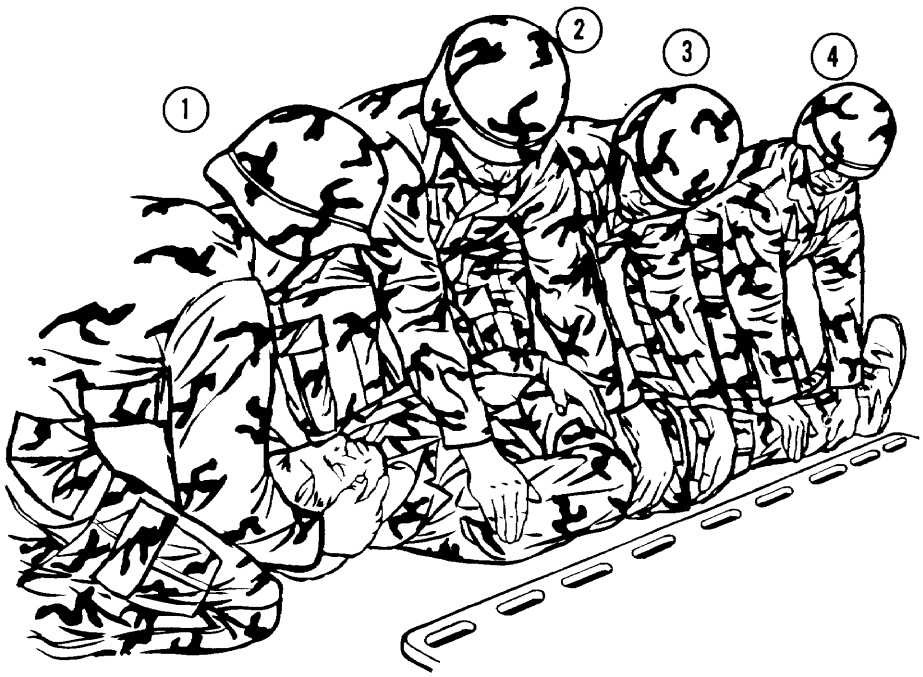

Figure 9-20. Positioning of litter bearers.

(3) Bearers numbers 2, 3, and 4 roll the patient's body slightly toward them as bearer number 1 turns the patient's head, keeping it in a straight line with the spine.

(4) Bearer number 3 reaches across the patient's body with one hand, grasps the board at the nearer edge and slides it against the patient. Bearer number 3, with the same hand, reaches across the board to the farther edge and holds the board in place. All the bearers then slowly roll the patient backward onto the board, keeping the head and spine in a straight line.

(5) While bearer number 1 continues to apply slight traction to the neck, bearers numbers 2, 3, and 4 immobilize the patient by applying the cravat and four patient securing straps (Figure 9-21) in the following order:

(a) Cravat. The center of the cravat is placed over the patient's forehead with the

middle of the cravat covering the hairline. The ends are then extended straight across and inserted through the nearest holes on each side of the board.

(b) First strap. One end of the first patient securing strap is inserted through the board hole near the chest, across the chest, and through the hole on the opposite side. It is then brought back across the arms and buckled to the other end of the strap. The buckle rests on the top of the board, not against the patient.

(c) Remaining straps. The three remaining straps are applied: one across the hips, one above the knees (not over the knee caps), and one above the ankles. One end of each strap is inserted through the board hole near the body part and buckled to the other end of the strap. The buckle rests on the top of the board, not against the patient.

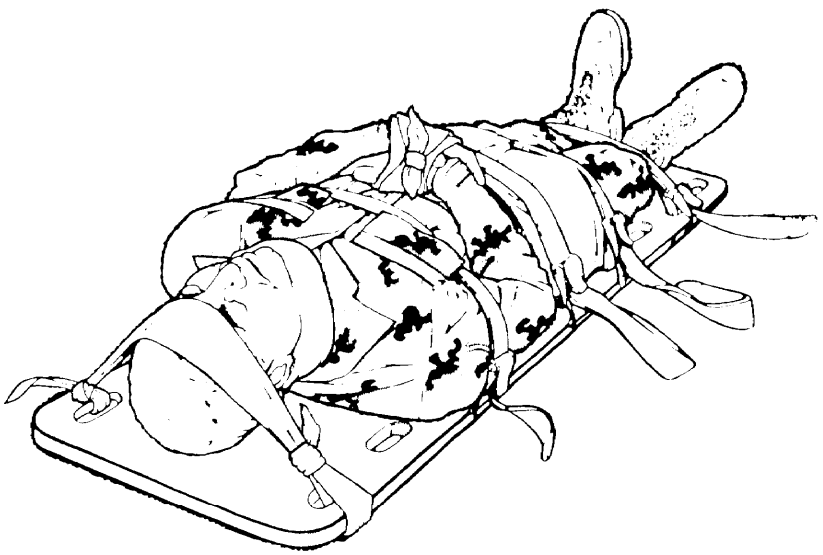

Figure 9-21. Patient secured on a long spine board.

9-7. Travois

A travois is a crude sled lashed to a horse or similar animal and dragged along the ground. It can also be lashed between two animals in single file and carried level. The sled is made from two long poles fastened together by two crossbars and a litter bed fastened to the poles and crossbars. The patient is secured on the litter bed. If the sled is pulled by only one animal, the bearers lift the dragging end from the ground when going uphill, fording streams, or crossing obstacles. To make a travois—

a. Cut two poles about 16-feet long (one pole should be 8- to 10-inches longer than the other). Ensure that the small ends are at least 2 inches in diameter. Then cut two crossbars which are about 3-feet long.

b. Lay the poles parallel to each other. They should be placed about 2 ½ feet apart with the larger ends to the front. If only one animal is used, let the smaller ends spread apart about 3 feet and have one of the small ends project 8 to 10 inches beyond the other one. This results in a rocking motion, rather than a jolting motion to the patient.

c. Notch the poles and the crossbars so that the poles can be connected with one crossbar about 6 feet from the front end and the other crossbar about 6 feet to the rear of the first one. Fit the notches in the crossbars and poles together and lace them securely in place.

d. Make a litter bed 6-feet long between the crossbars. This is done by fastening a blanket, canvas, or similar material securely to the poles and crossbars.

NOTE

A rope or strap may be stretched diagonally from pole-to-pole, letting it cross many times to form a base for an improvised bed. A litter or cot may also be fastened between the poles for the same purpose.

e. If only one animal is used, securely fasten the front ends of the poles to the saddle of the animal. Leave the other ends of the poles on the ground (Figure 9-22).

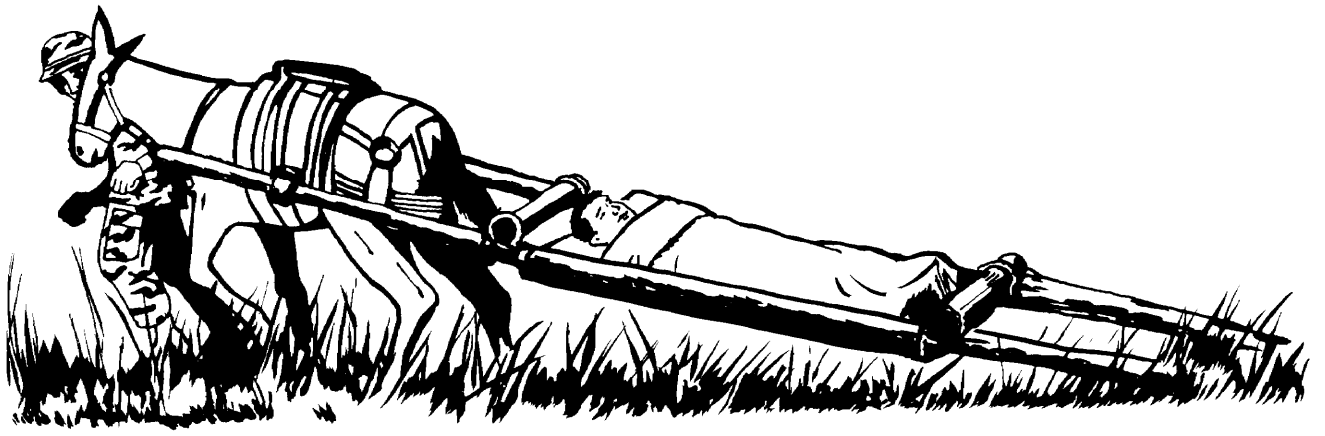

Figure 9-22. Travois used with only one animal.

f. If two animals are used, securely fasten the front ends of the poles to the saddle of the lead animal and the other end of the poles to the saddle of the animal which follows (Figure 9-23).

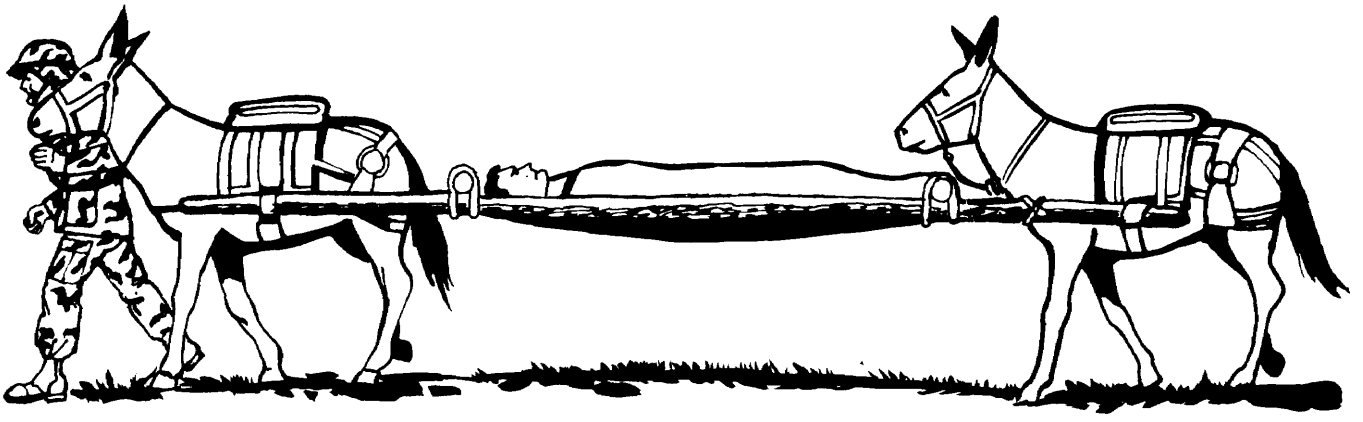

Figure 9-23. Travois used with two animals.

9-8. Packsaddle Litter

A packsaddle litter can be improvised by fitting a suitable litter onto the packsaddle of a mule or other animal (Figure 9-24). This technique is particularity useful in jungle and mountain areas where it may be necessary to carry a litter patient for a long distance.

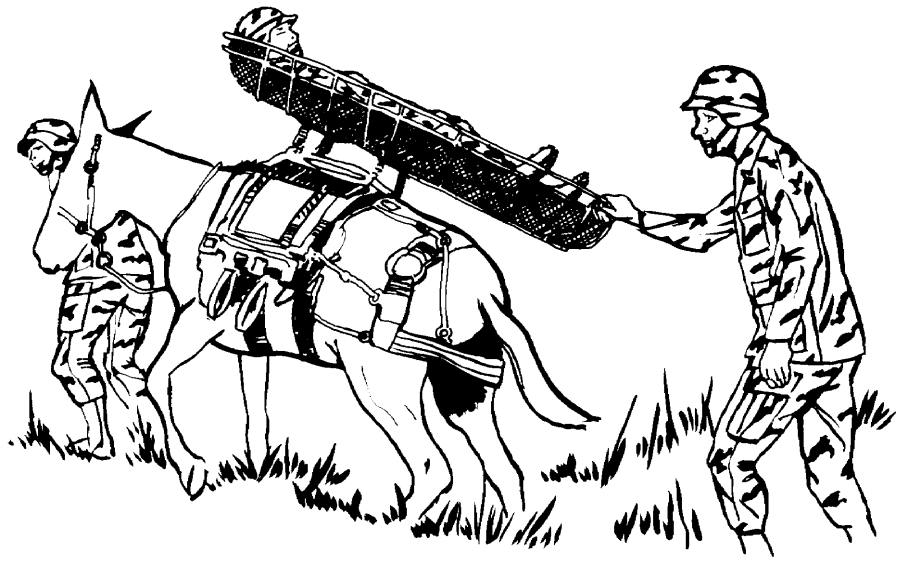

Figure 9-24. Packsaddle litter.

9-9. Litter Evacuation in Extreme Cold Weather Operations

Patient treatment and handling under conditions of extreme cold and deep snow equates to—

- Prompt collection of patients.
- Emergency medical treatment.
- Prevention of shock.
- Rapid evacuation to locations where they can be kept warm.

a. Emergency Medical Treatment. Treatment is limited to controlling hemorrhage, clearing the airway, preventing and treating infection, and splinting fractures. This treatment is modified depending on the weather, the type of clothing worn by the patient, and the judgment of the person giving the treatment.

b. Preventing Shock. Cold hastens the progress of shock and lessens the chances of recovery if a patient is exposed to a cold environment for any length of time. It is particularly important to guard against shock by conserving body heat. Therefore, at the earliest possible moment, patients must be placed in specially constructed evacuation bags. When evacuation bags are not available, arctic sleeping bags or other similar articles may be used.

9-10. Aids to Litter Evacuation in Extreme Cold Weather Operations

Litter evacuation is difficult under conditions of extreme cold and deep snow. Litter bearers are subject to excessive fatigue and possible cold injury. For this reason, litter aids which are either hand-drawn by litter bearers, animal-drawn, or vehicle-towed should be used whenever possible.

a. Litter Kit, Ski Sled. The litter kit, ski sled is used for converting a pair of skis and ski poles to a sled for transporting patients. It consists of one canvas platform, four brackets, two cross braces, two 2.13-meter and two 8.23-meter lengths of rope, and two patient securing straps.

b. Ski Adapters (Figure 9-25). Two ski adapters are attached to each of two skis; then the adapters are clamped onto the litter stirrups of a standard litter. With ropes attached to the converted litter, a litter patient can be easily pulled over the surface of the snow.

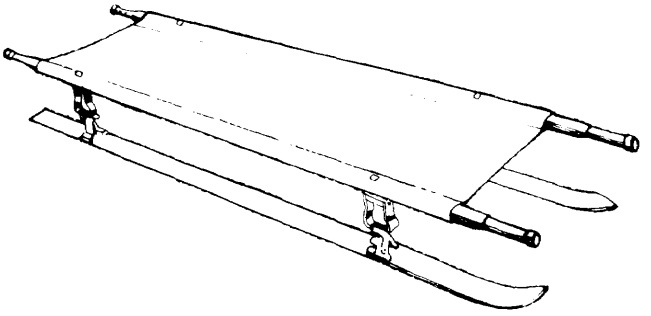

Figure 9-25. Ski adapters attached to skis and litter.

c. Ahkio (Figures 9-26). The Ahkio (Alaskan sled) is particularly useful where patients must be evacuated through deep snow.

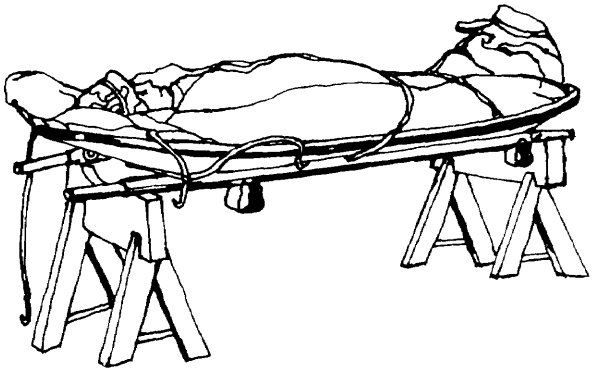

Figure 9-26. Patient placed on an Ahkio.

d. Evacuation Bag, Casualty. The casualty evacuation bag is issued in cold climates to keep the patient warm. It zips up to protect the entire patient. Blankets may also be used inside the evacuation bag for added protection.

9-11. Litter Evacuation in Mountain Operations

a. Personnel assigned to litter squads for mountain service must be trained in—

- Rock climbing.
- Use of ropes.
- Individual and unit movements at high altitudes.

b. Because of the conditions in mountain operations, a litter squad is normally increased from four to six men.

c. For additional information on medical evacuation over mountainous terrain, refer to paragraphs 5-2, 9-12 through 9-14, and 11-15.

9-12. Techniques for Litter Evacuation in Mountain Operations

The evacuation techniques used in mountain operations are well proven. They are, however, subject to improvement and should be modified as better methods of patient handling are developed. When evacuating a patient from mountainous areas—

a. Select the smoothest available route.

b. Keep the patient as warm as possible and avoid unnecessary handling.

c. Place the patient's helmet on his head for protection from falling rocks.

d. If the evacuation route is long and difficult to travel, a series of litter relay points or warming stations should be established. Warming stations, if established, should be staffed with medical personnel to permit proper treatment of shock, hemorrhage, or other emergency conditions.

e. If a patient develops new or increased signs of shock while being evacuated, he should be treated and retained at one of the warming stations until his condition permits further evacuation.

9-13. Types of Litters for Mountain Operations

There are four types of litters available for evacuation of casualties over rough mountain terrain. They are the standard collapsible litter (Figure 9-1); the poleless semirigid litter (Figure 9-4); the Stokes litter (Figure 9-6); and the SKED litter (Figure 9-7). When using the standard collapsible litter and patient securing straps are not available, it is necessary to secure a patient to the litter with a rope.

9-14. Methods of Litter Evacuation in Mountain Operations

Several litter evacuation methods that are adaptable to mountain terrain and climatic conditions are discussed.

a. Modified Travois (Descending) (Figure 9-27). This method is used when descending relatively smooth slopes. Considerable speed can be made on slopes and cliff faces which are 4- to 6-feet high. These areas can be passed without much difficulty.

(1) Two poles about 18-feet long and about 3 inches in diameter at the large end are cut. These poles are fastened to the litter stirrups. About 5 to 10 feet of these poles should extend beyond the litter to serve as runners.

(2) One bearer supports the foot of the litter by a rope sling and guides the litter downhill. Another bearer uses a rope to lower the patient and the litter. A third bearer assists the soldier holding the rope and relieves him at frequent intervals.

Figure 9-27. Modified travois (descending).

b. Modified Travois (Ascending Steep Slope (Figure 9-28). The litter is prepared as a modified travois.

(1) A thin sapling is passed through the litter stirrups at the head of the litter. The poles should extend about 18 inches on each side of the litter. The use of poles affords a more secure grip for the bearers at the head of the litter.

(2) Two bearers take their places at the head of the litter. A third bearer, using an improvised rope sling, takes his place at the foot of the litter.

(3) The fourth and fifth bearers take their positions along the rope extending from the head of the litter. The sixth bearer handles the end of the rope.

(4) At the command UP ROPE, the fourth, fifth, and sixth bearers pull on the rope while the first, second, and third bearers lift the litter and climb slowly. The bearers carrying the litter should not try to do all the work. They should allow themselves to be pulled up the slope as they hold the litter off the ground and climb. The position of the bearers should be rotated at each halt to lessen fatigue.

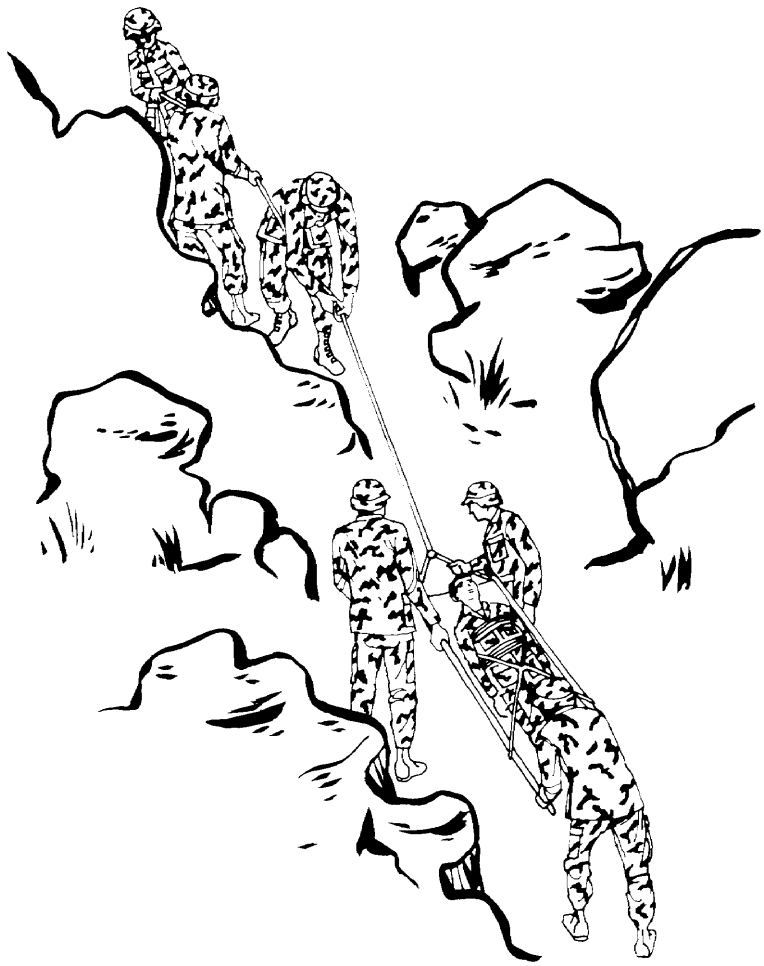

Figure 9-28. Modified travois (ascending steep slope).

c. Modified Travois (Descending Steep Slope) (Figure 9-29). In making a descent, the most direct passage should be taken. The litter is prepared as a modified travois.

(1) Two bearers hold the rope to assist in lowering the litter.

(2) Three bearers take positions at the litter: two at the head and one at the foot.

(3) The sixth bearer may assist with the foot of the litter, or he may precede the team to—

- Pick out a trail, thus preventing the squad from having to retrace its steps should there be a cliff ahead.
- Make the passage more negotiable by clearing away shrubs and vines.

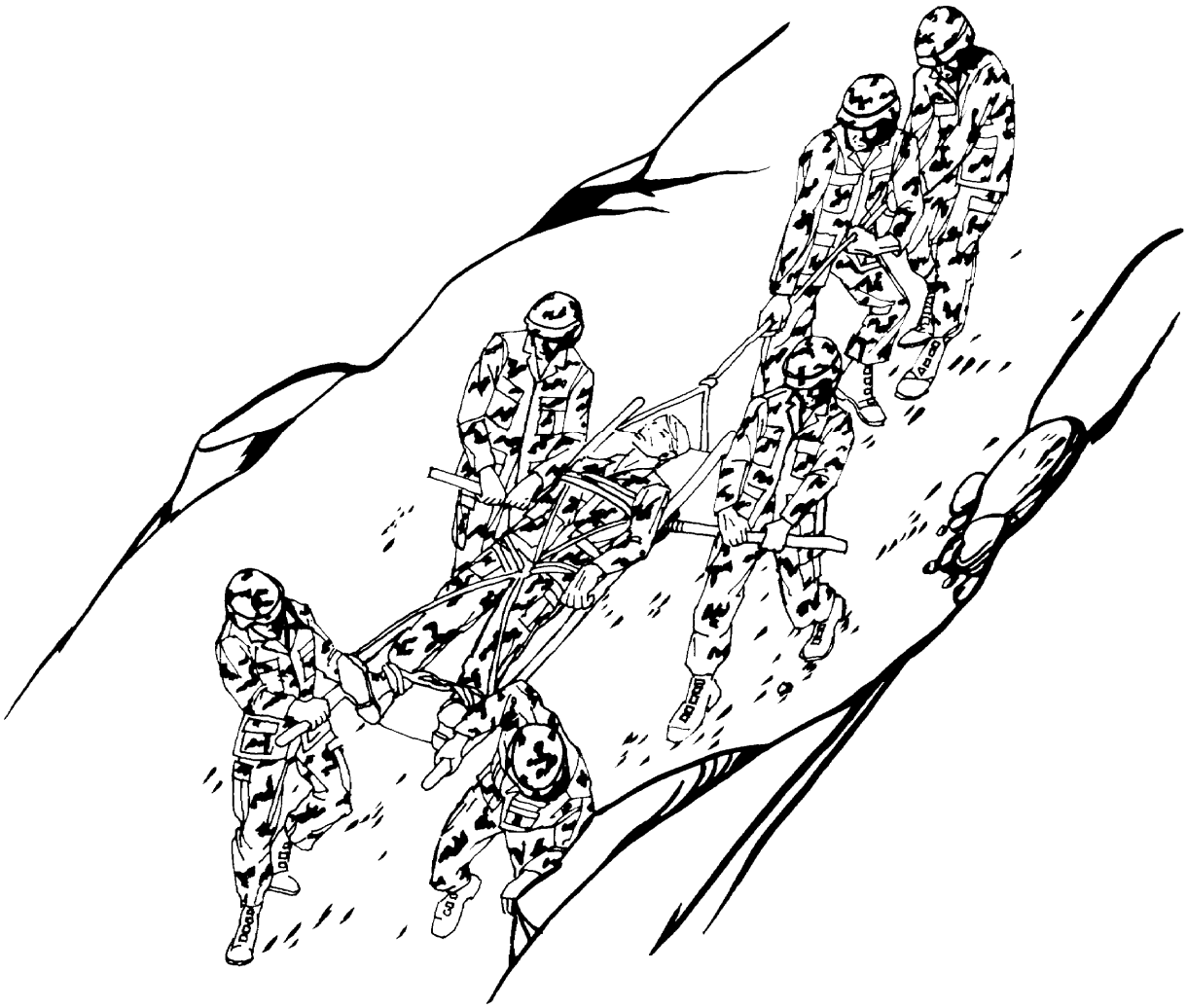

Figure 9-29. Modified travois (descending steep slope).

d. Modified Travois (Lowered from Cliff) (Figure 9-30). If a cliff is too extensive to bypass, the portion with the smoothest face is selected for descending. The litter is prepared as a modified travois. (If using a SKED litter, follow manufacturer's instructions for lacing the litter.)

(1) Notches are cut in the poles to provide an indentation for tying the ropes, thus preventing them from becoming frayed by the stone cliff.

(2) Ropes are lashed to the stirrups at the foot of the litter to serve as guys in keeping the litter from revolving.

(3) After one bearer secures the rope around a tree or large boulder, two bearers lower the litter over the cliff's edge.

(4) One bearer descends the cliff's face on a rope, moving parallel to the litter and assisting the litter over any projections.

(5) The two remaining bearers hold the guy ropes and guide the litter from the foot of the cliff. When the litter has almost reached the base of the cliff, they ease it to the ground.

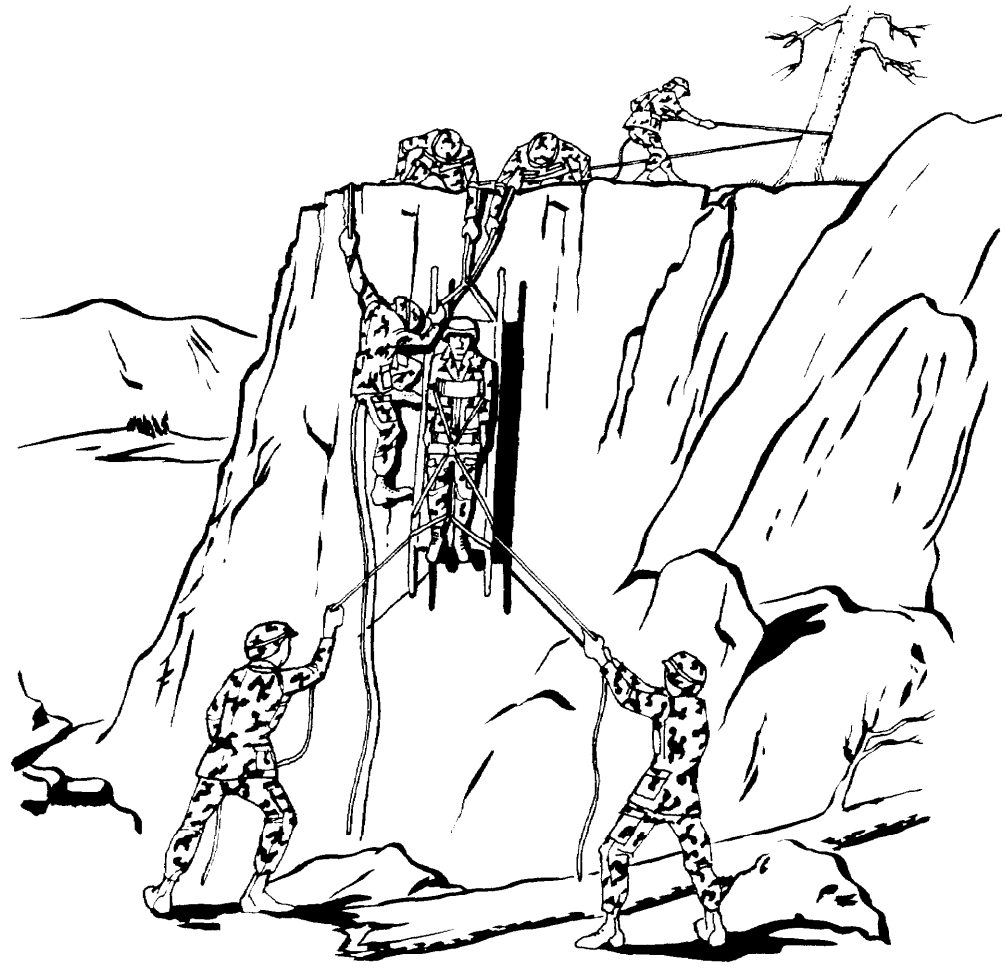

Figure 9-30. Modified travois (lowered from cliff).

9-15. Horizontal Hauling Line

The horizontal hauling line (Figure 9-31) is also a method of evacuation. It is addressed in a separate paragraph because of its complexity. The horizontal hauling line is used in those cases where a steep slope or cliff must be scaled and where, at the same time, there is an intervening obstacle such as a swiftly running mountain stream. It can also be used to span a chasm when a bridge has been demolished. This method should be used only where there will be a considerable number of patients (a warming station or collecting point) and should not be installed for the evacuation of only one or two patients. It can also be used to lower or to raise patients over obstacles. The installation and operation of the hauling line is addressed below.

- This apparatus is a continuous rope cableway secured by a system of snaplinks spanning a maximum of 1,000 feet between terminals. A slope of at least 10 degrees is required for proper operation.

- A Stokes litter containing the patient is suspended from the top of the cable at the upper terminal, and an empty litter is suspended from the bottom of the cable at the lower terminal.

- The litter patient at the upper terminal is lowered by gravity to the lower terminal. A relay line attached to the litter prevents it from rapidly and uncontrollably descending. At the same time, the empty litter at the lower terminal is raised to the upper terminal ready to receive the next patient.

- One bearer stands at the upper terminal to control the relay line and another bearer stands at the lower terminal ready to receive the patient.

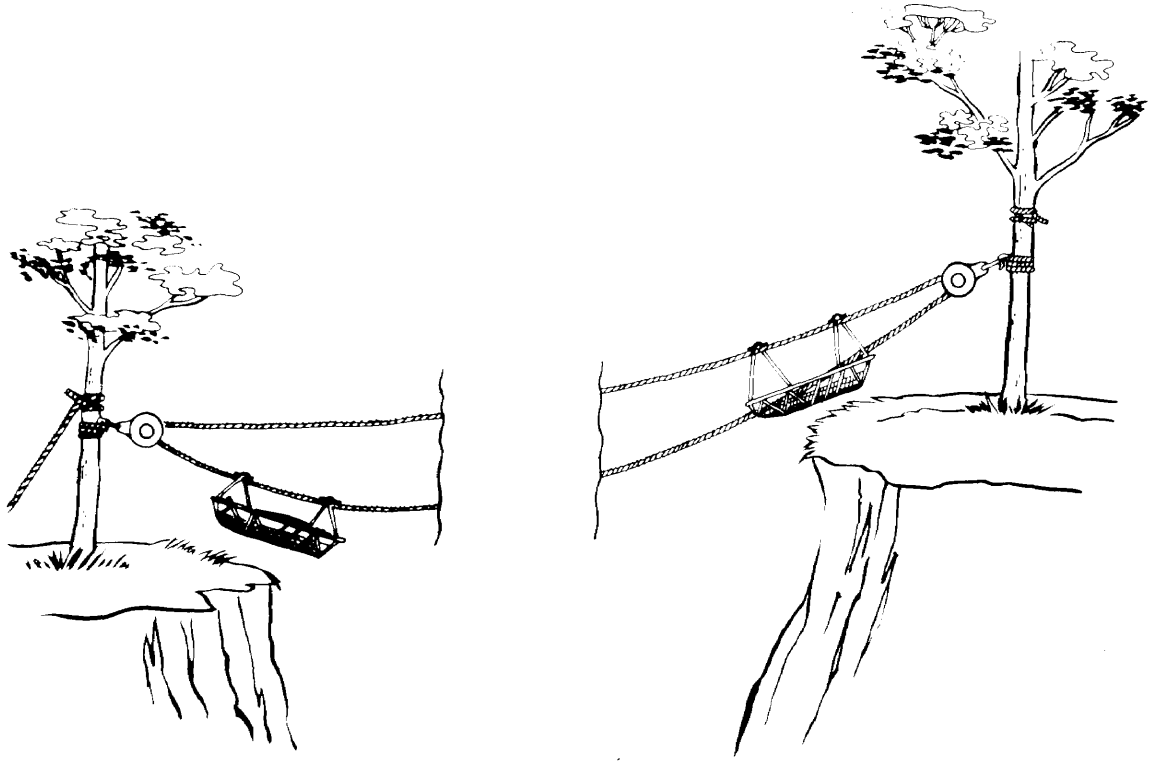

Figure 9-31. Evacuation by horizontal hauling line.

a. Installation. The horizontal hauling line is installed in four steps:

(1) By means of a bowline, secure a 10-centimeter manila rope to a tree far enough from the edge of the cliff (2 to 3 meters) to permit freedom of movement by the medical personnel.

(2) On the opposite side, pass the other end of the rope around another fixed point (tree, boulder, or vehicle), and make a transport knot to pull the rope as taut as necessary. All traverse ropes should have a certain amount of slack. When manila or sisal rope is used, a 5-percent sag should be allowed to avoid undue fatigue in the rope.

(3) To suspend the litter, place two snaplinks on the traverse rope and attach one long litter carrying strap to each. Attach an upper and lower retrieving rope to either the litter stirrup or to the respective snaplinks. In the latter case, the loose ends of each rope are tied together above the center of the litter so that, when drawn up or down, both snaplinks move simultaneously.

(4) After the patient has been secured to the litter, the litter is raised, and the litter carrying straps or suspension ropes are passed through the stirrups and fastened together or else secured to the opposite stirrup.

b. Operation. The horizontal hauling line is operated as follows:

(1) For the ascent, three men can easily raise the litter along the traverse by pulling on the upper retrieving rope. The pull should be steady and smooth in order to prevent jolting and swaying.

(2) For the descent, a gentle pull on the lower retrieving rope is enough to break the inertia and let gravity do the rest. During the descent, the men on the upper side should control the speed of the descent through their retrieving rope. It may be necessary to pull the patient the last few meters when the litter nears the low point of the slack in the traverse rope.

c. Refer to TC 90-6-1 for additional information on the construction of a horizontal hauling system.

Section II. PROCEDURES FOR LITTER EVACUATION TRAINING

9-16. General

To safely transport a patient by litter and to ensure litter bearers are not injured by using incorrect lifting procedures, training is required for litter bearers. This section provides the techniques and procedures necessary to accomplish litter evacuation.

9-17. Basic Guides for Training Litter Bearers

Litter bearers are normally grouped into squads of four to carry patients. For this reason, litter procedures for squads of four are effective in training individuals to be litter bearers. The following guides promote uniformity and accuracy in training methods:

- Several squads may be trained at the same time by one individual, or each squad may be instructed separately by an instructor or trained squad leader.

- For the initial training procedures, a litter without a patient on it can be used to simulate a loaded litter.

- For later training, some personnel can be designated as ''patients." These individuals should be frequently rotated with the ones carrying the litters so that all may participate in each phase of instruction.

- For more realistic training in the handling of the different types of injuries, "patients" may wear moulages, bandages, and splints to simulate actual wounds or injuries.

- The persons designated as "patients" may be positioned on the ground at suitable intervals near a line of litters, first with the head and later with the feet toward the litters. As the instruction progresses, their positions may be varied. Lastly, they may be dispersed or concealed to simulate positions that the wounded might occupy on a battlefield.

9-18. Litter Commands

Litter procedures are not to be considered precision drills; however, certain preparatory commands and commands of execution are used to facilitate instruction. A preparatory command states the movement or formation to be carried out and mentally prepares the individual for its execution. A command of execution tells when the command is to be carried out. The use of these commands in actual operations is not contemplated. For purposes of identification in the discussion of the different types of procedures, preparatory commands will be in lower case with initial capital letters and commands of execution will be in capital letters.

9-19. Formation for Instruction

First, align the trainees into four ranks; then give the commands to form litter squads. This is accomplished as follows:

a. The trainees count off from front to rear, one through four, thus forming the litter squads and designating each trainees's position in the litter squad by number. Each number carries with it specific responsibilities in the litter squad. The trainee designated number 1 is the squad leader.

b. The squad leaders count off from right to left, designating a number for each litter squad.

c. The formation is then opened to provide each squad adequate space for performance.

d. Since exceptional circumstances may make it necessary to use two-bearer litter squads, the instruction should include procedures for these reduced squads, using bearers 2 and 3 of the four-bearer squad.

9-20. Procedures to Procure, Ground, Open, Close, and Return the Litter

a. To Procure Litter. Upon the command of Procure, LITTER, the squad leader (bearer number 1) steps forward, goes to the source of supply, picks

up the litter, and returns to his original position covered by bearers numbers 2, 3, and 4.

(1) The closed litter is carried at high port except near helicopters where it is kept level with the ground to avoid contacting the rotor blades. At high port, the litter is carried diagonally across the body with the left wrist in front of the left shoulder and the right wrist near the right hip (Figure 9-32).

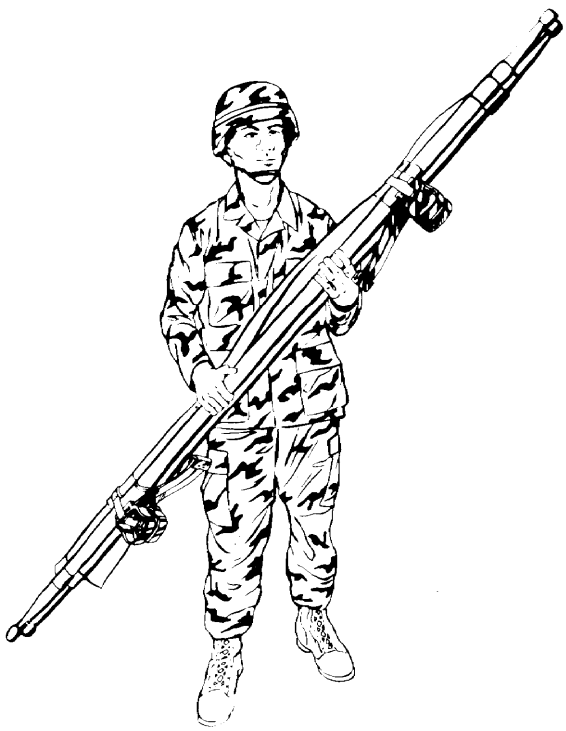

Figure 9-32. Carrying litter at high port.

(2) After bearer number 1 reurns to his original position in the squad, he holds the litter in an uprght position on his left side with the metal stirrups away from his body (Figure 9-33).

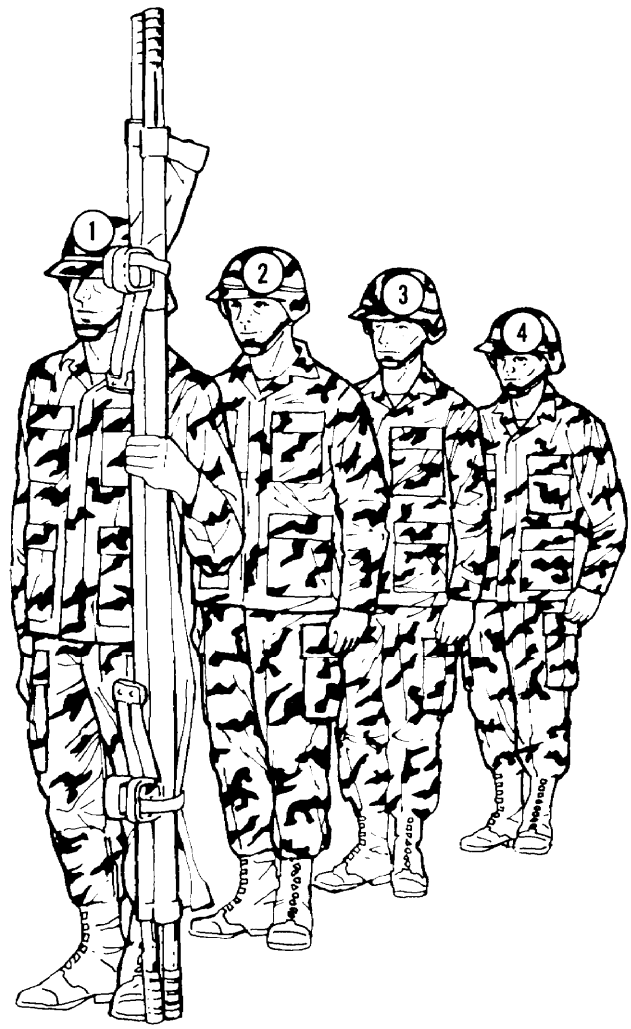

Figure 9-33. Litter squad with litter.

b. To Ground Litter. Upon command of Ground, LITTER, bearer number 1 lowers the litter to the ground. With the litter squad in formation, bearer number 1 places his left foot beside the litter handles, steps forward with his right foot, and lowers the litter to the ground so that it rests on the stirrups (Figure 9-34). Then upon command of Litter, POSTS, the other three bearers move into their positions at the sides of the litter. Bearer number 2 moves to the right front, bearer number 3 moves to the left rear, and bearer number 4 moves to the left front (Figure 9-35).

Figure 9-34. Grounding litter (step one).

Figure 9-35. Grounding litter (step two) (position of Litter, POSTS).

c. To Open Litter. Upon command of Open, LITTER, all bearers face the litter and execute the command. With all bearers facing the litter, bearers numbers 2 and 3 pick up the litter from the ground and support it, while bearers numbers 1 and 4 unfasten the litter straps. (Figures 9-36). Bearers numbers 2 and 3 extend the litter by pulling the handles apart with the canvas up. Then bearer number 2 lowers his end of the litter to the ground and bearer number 3 raises his end of the litter until it is in a vertical position. Using his foot, bearer number 3 extends the lower spreader bar to a locked position, reverses the litter, and extends the other spreader bar. Bearer number 3 then lowers the litter to the ground with the canvas in the up position (Figure 9-37).

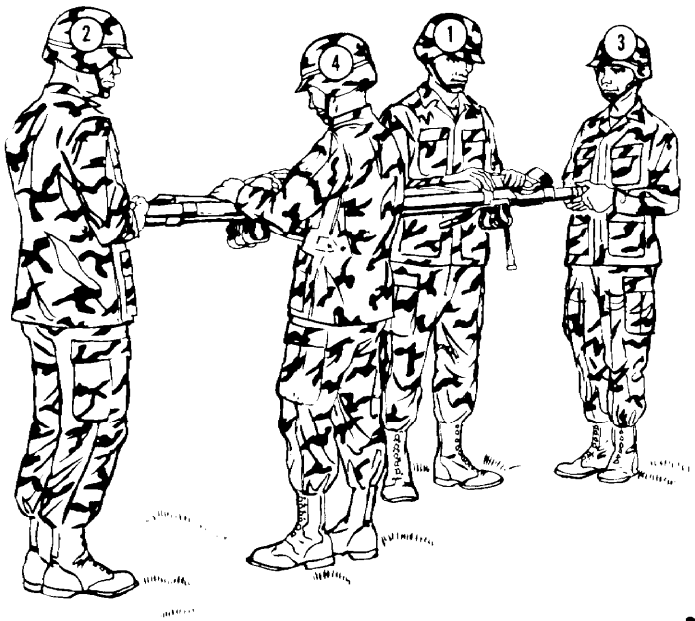

Figure 9-36. Opening litter (step one).

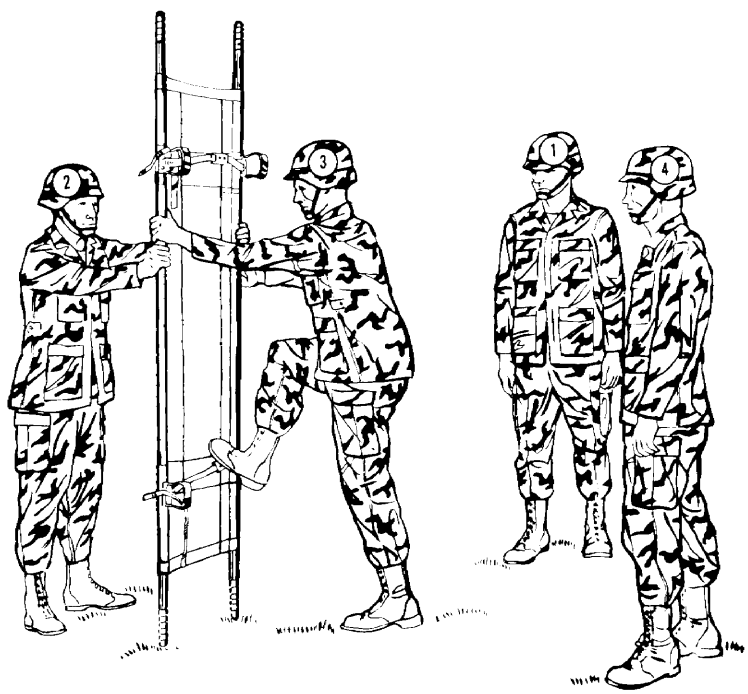

Figure 9-37. Opening litter (step two).

d. To Close Litter. Upon command of Close, LITTER, bearer number 2 supports the litter while bearer number 3 releases the spreader bars and turns the bars against the litter poles. Bearers numbers 2 and 3 then lift the litter, move the poles together, and support the litter. Bearers numbers 1 and 4 fold the canvas smoothly on top of the poles and secure the canvas and the poles in place with the litter straps.

e. To Return Litter. At the completion of the instruction and upon command of Return, LITTER, bearer number 1 returns the litter to supply.

9-21. Procedures for Loading a Patient onto a Litter

After the patient has been located, the general nature of his wounds determined, emergency treatment given, and the litter opened and positioned, the bearers load the patient onto the litter.

a. To Load a Litter (Four Bearers). Upon the following commands, the bearers position themselves, lift the patient, position the litter, and lower the patient onto the litter:

(1) At the command, Right (Left) Side, POSTS, the bearers take the following positions facing the patient: bearer number 2 at the right (left) ankle; bearer number 3 at the right (left) shoulder; bearers numbers 4 and 1 at the right and left hips, respectively (Figure 9-38).

(2) At the command, Lift, PATIENT, each bearer kneels on his knee that is nearest the patient's feet. Bearer number 2 passes his forearms under the patient's legs, carefully supporting any

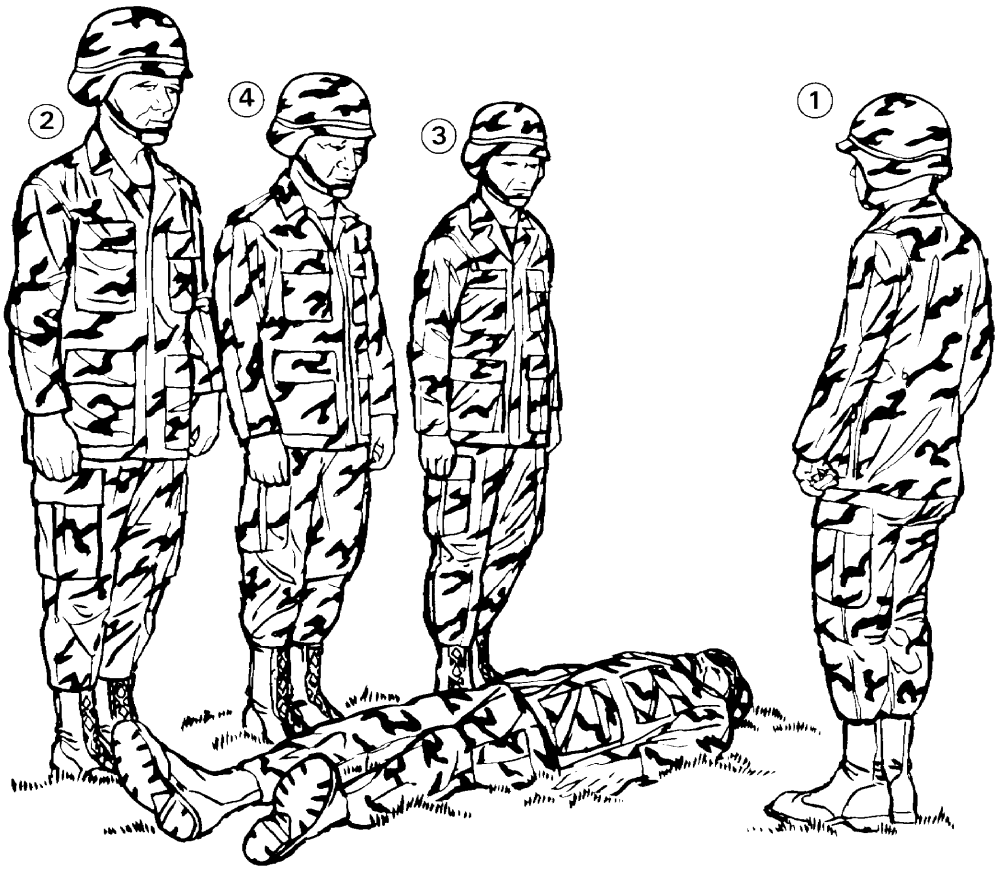

Figure 9-38. Squad at right side, POSTS.

fracture, if required. Bearers numbers 1 and 4 place their arms under the small of the patient's back and thighs without locking hands. Bearer number 3 passes one hand under the patient's neck to the farther armpit and uses the other hand to support the nearer shoulder. All bearers lift the patient slowly and carefully and place him upon the knees of the three bearers who are on the same side (Figure 9-39).

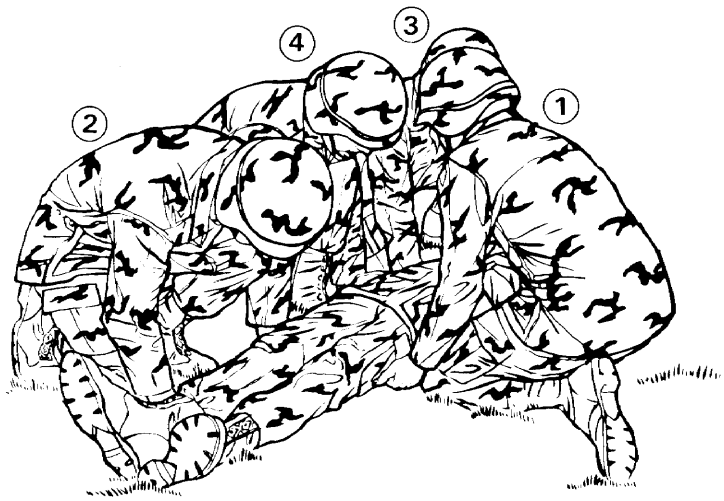

Figure 9-39. Lifting patient to load litter (step one).

(3) At the preparatory command Lower, bearer number 1 resumes his former kneeling position opposite the other three bearers and prepares to assist in lowering the patient. As soon as the patient is firmly supported on the knees of the three bearers, the bearer on the opposite side (bearer number 1) relinquishes his hold and reaches for the litter (Figure 9-40). He places the litter under the patient and against the ankles of the other bearers. At the command of execution, PATIENT, the patient is lowered gently onto the litter (Figure 9-41). Without further orders, all bearers rise and resume their positions at Litter, POSTS.

Figure 9-40. Lifting patient to load litter (step two).

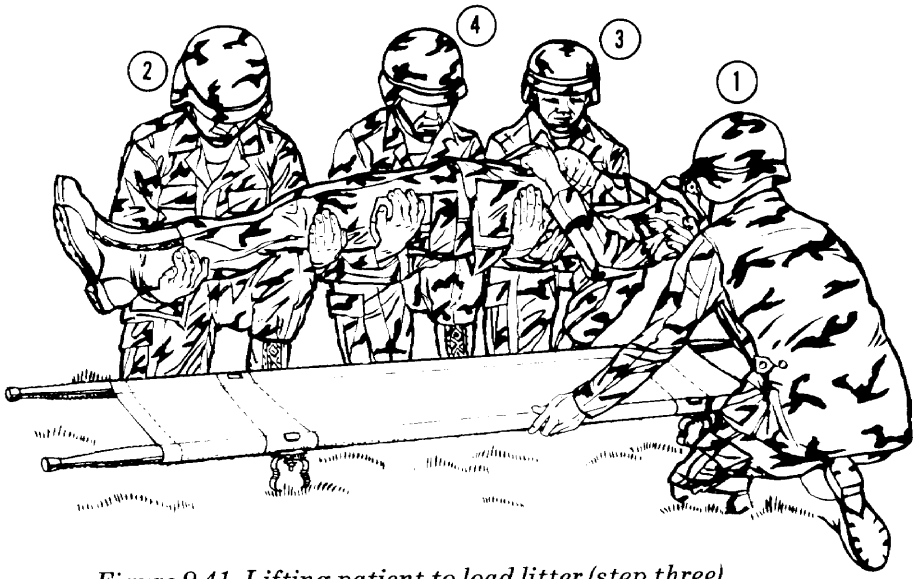

Figure 9-41. Lifting patient to load litter (step three).

b. To Load Litter (Three Bearers). In the absence of one man from the litter squad, bearers numbers 2 and 3 with the assistance of bearer number 1, lift the patient and lower him onto the litter. To lift the patient with three bearers, bearer number 2 places his arms under the legs and thighs of the patient. Bearer number 3 places his arms under the small of the back and shoulders of the patient. Bearer number 1, on the opposite side of the litter, places his arms under the patient's knees and back. The patient is supported on the knees of bearers numbers 2 and 3, while bearer number 1 places the litter in position (Figure 9-42). All three bearers lower the patient unto the litter (Figure 9-43). The procedures are performed upon the commands cited in paragraph *a* above.

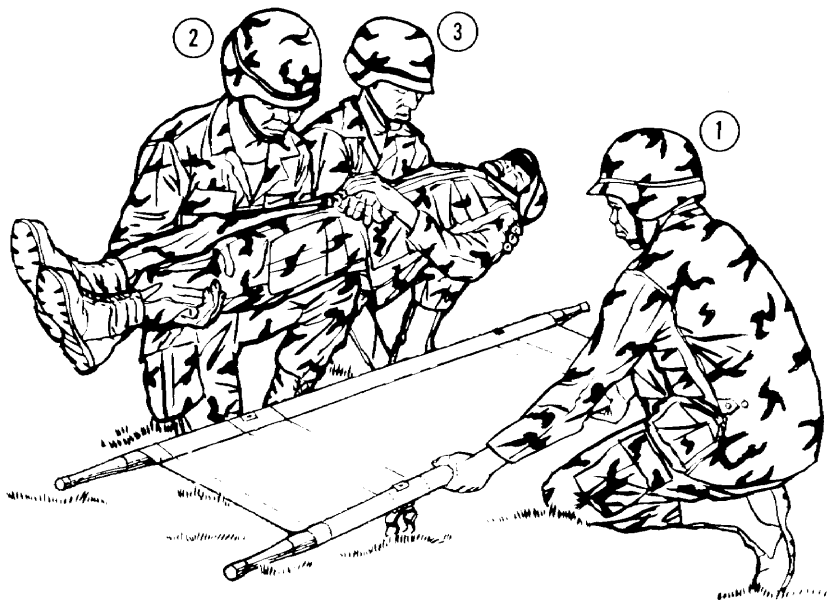

Figure 9-42. Lifting patient to load litter (three bearers).

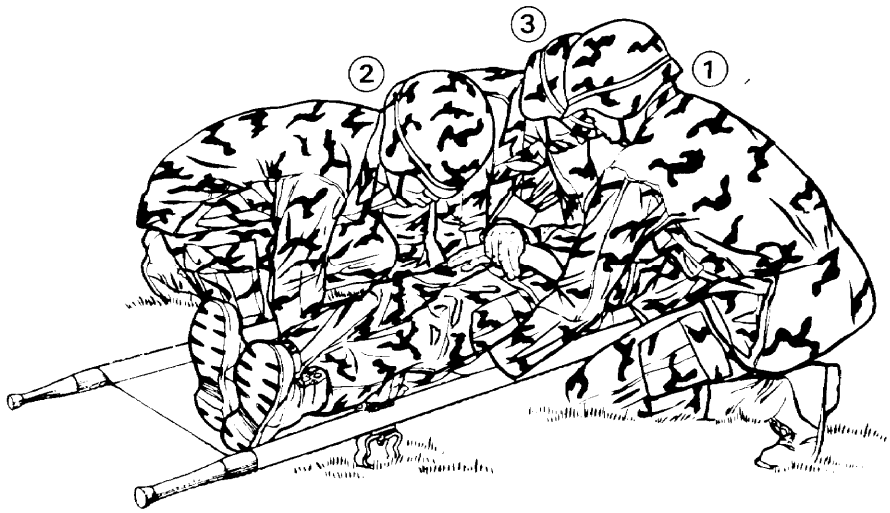

Figure 9-43. Lowering patient onto litter (three bearers).

c. To Load Litter (Two Bearers). The procedures for loading litters with the two bearers on the same side are illustrated in Figures 9-44 through 9-47.

(1) At the command to Right Side, POSTS, bearers numbers 1 and 2 take positions at the patient's right thigh and shoulder, respectively (Figure 9-44).

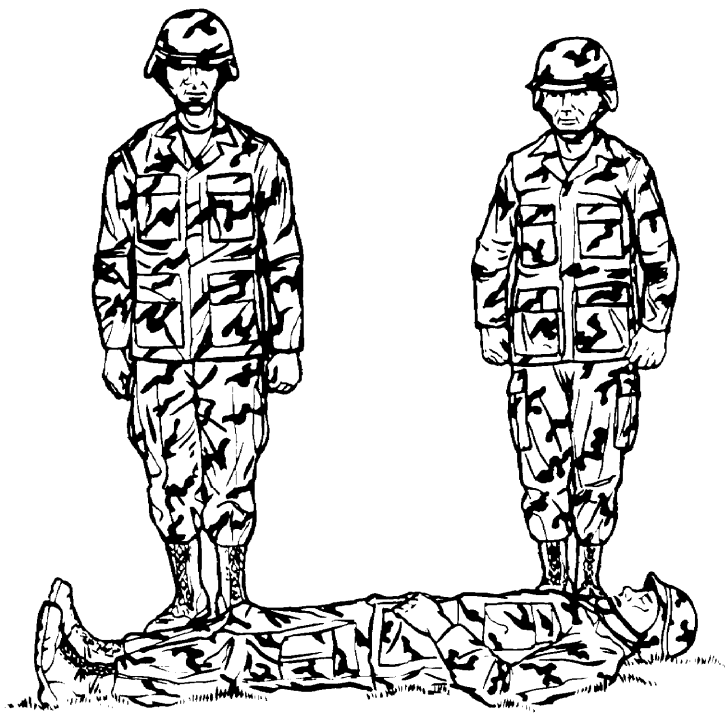

Figure 9-44. Two bearers at right side, POSTS.

(2) At the preparatory command, Lift, each bearer kneels on his knee nearer the patient's feet. Bearer number 1 passes his arms beneath the patient's hips and knees. Bearer number 2 passes his arms beneath the small of the patient's back (Figure 9-45).

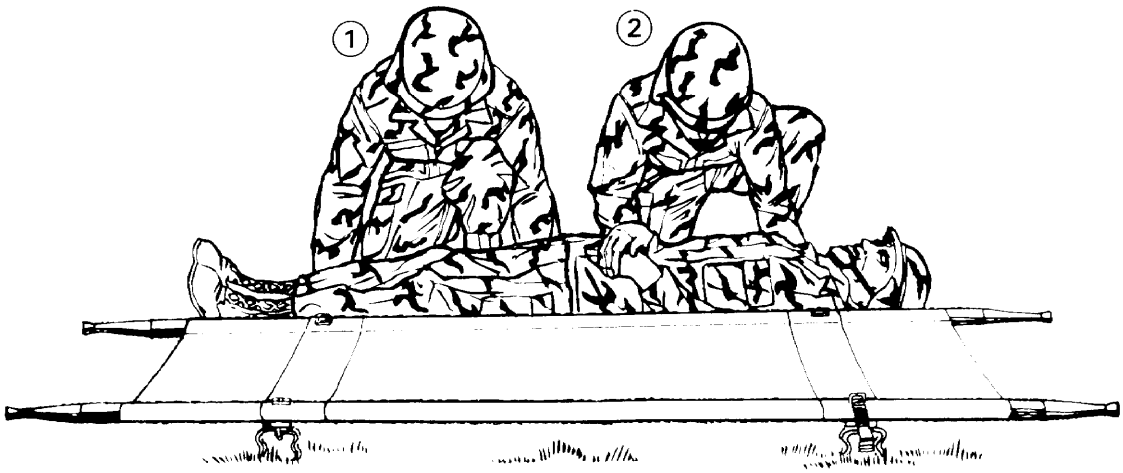

Figure 9-45. Lifting patient with two bearers on the same side (step one).

(3) At the command of execution, PATIENT, the bearers lift together, raising the patient upon their knees. Readjusting their hold, they rise to their feet and move as close as possible to the side of the litter (Figure 9-46).

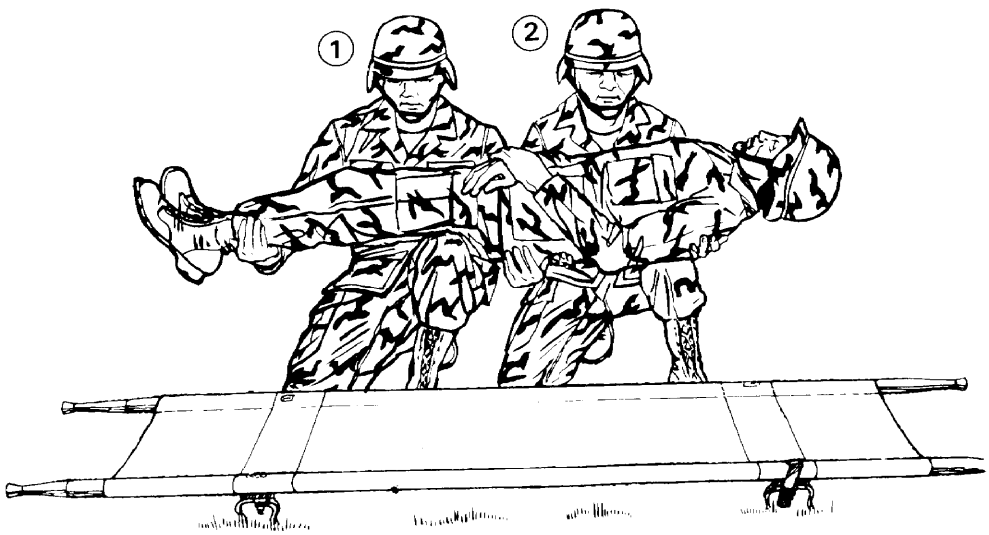

Figure 9-46. Lifting patient with two bearers on the same side (step two).

(4) At the preparatory command, Lower, the bearers kneel and place the patient on their knees. At the command of execution, PATIENT, the bearers gently place the patient onto the litter (Fgure 9-47). They then rise and resume the position of Litter, POSTS, without command.

Figure 9-47. Lowering patient onto litter with two bearers on the same side.

d. To Load Litter with Conscious Patient (Two Bearers). If the patient is conscious and able to hold onto the bearers, the following procedure is used:

(1) At the command, On Each Side, POSTS, bearers numbers 1 and 2 face the patient and take positions at the patient's right and left hips, respectively (Figure 9-48).

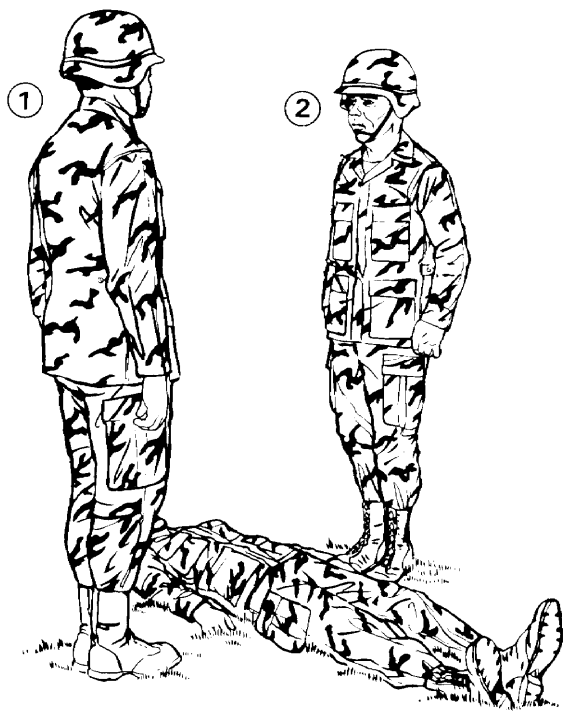

Figure 9-48. Two bearers, one on each side, POSTS.

(2) At the command of execution, PATIENT, the bearers lift the patient, both rising together, and carry him to the center of the litter (Figures 9-49 and 9-50).

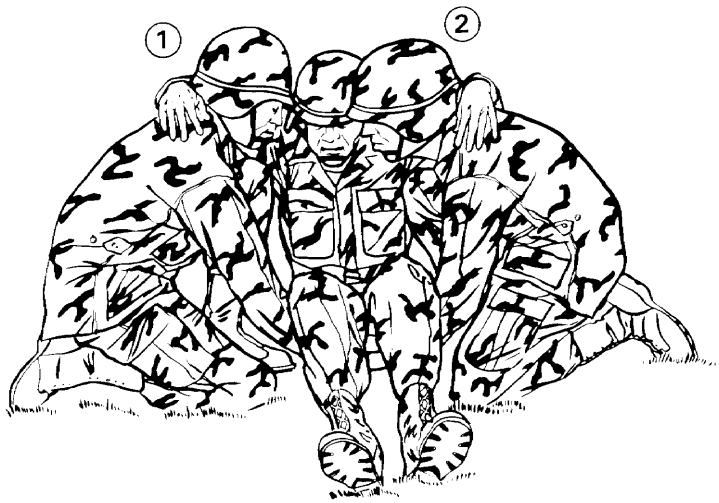

Figure 9-49. Lifting patient with two bearers, one on each side (step one).

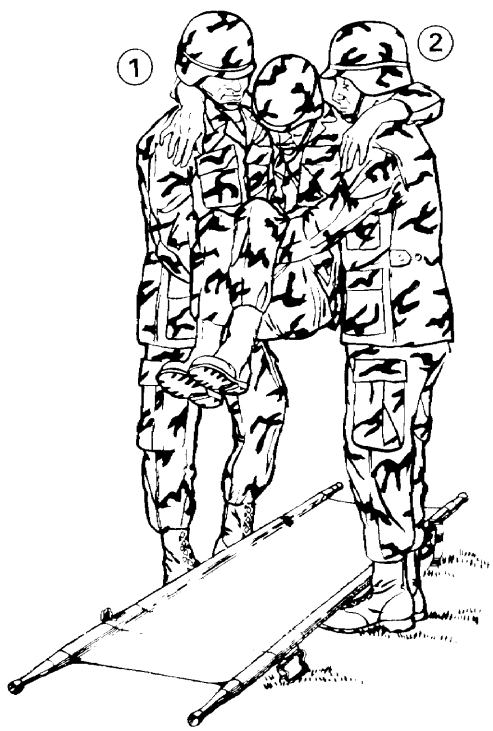

Figure 9-50. Lifting patient with two bearers, one on each side (step two).

(3) At the command, Lower, PATIENT, the bearers stoop and lower the patient onto the litter in a sitting position. The patient then releases his hold on the bearers' necks. Both bearers assist the patient to lie down. They then resume the position of Litter, POSTS, without commands (Figure 9-51).

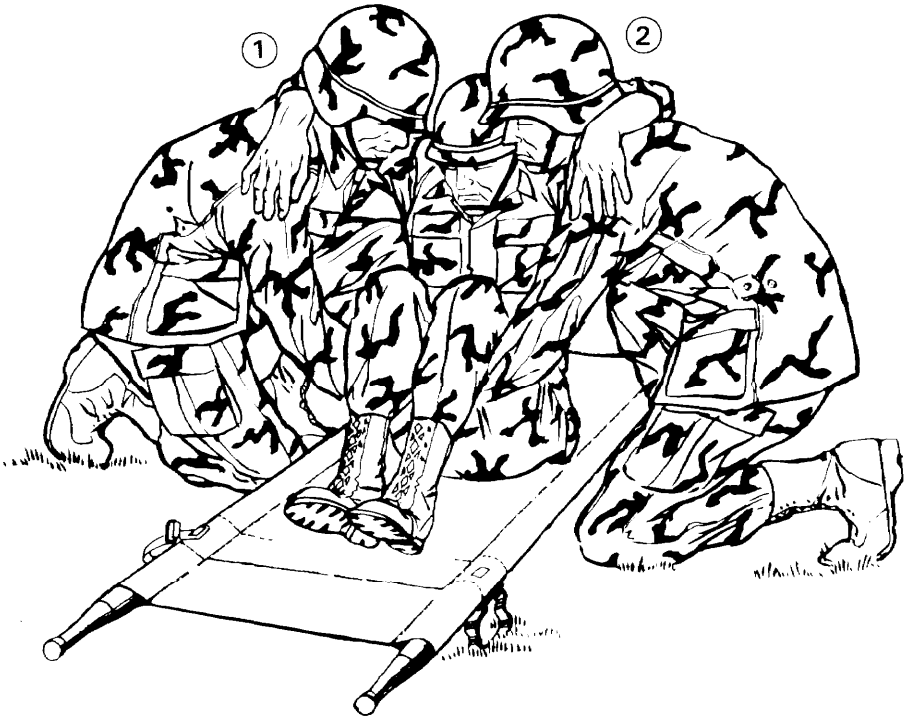

Figure 9-51. Lowering patient onto litter (two bearers, one on each side).

e. To Load Patient with Back Injury. To avoid aggravating the condition of a patient with an actual or suspected back injury, the bearers proceed as follows (Figure 9-52):

(1) Each bearer kneels on his knee nearer the patient's feet. (If the patient is unable to hold his arms in front of him, his wrists should be tied loosely before placing him on the litter. This will prevent injury to his arms.)

(2) Bearer number 1 places a blanket, coat, or jacket in a firm roll or in a position to support the arch of the patient's back. Bearer number 3 places one hand under the patient's head arid the other hand under his shoulders. Bearer number 4 places his hands under the small of the back and buttocks. Bearer number 2 places his hands under the thighs and calves. Bearer number 1 assists bearer number 4 in supporting the small of the patient's back.

(3) At the command, Lift, PATIENT, all bearers gently lift the patient off the ground about 8 inches. Bearers ensure that proper alignment is maintained. Bearer number 1 places the litter under the patient and adjusts the roll under the patient's back.

(4) At the command, Lower, PATIENT, the three bearers lean forward and with the aid of bearer number 1, lower the patient onto the litter.

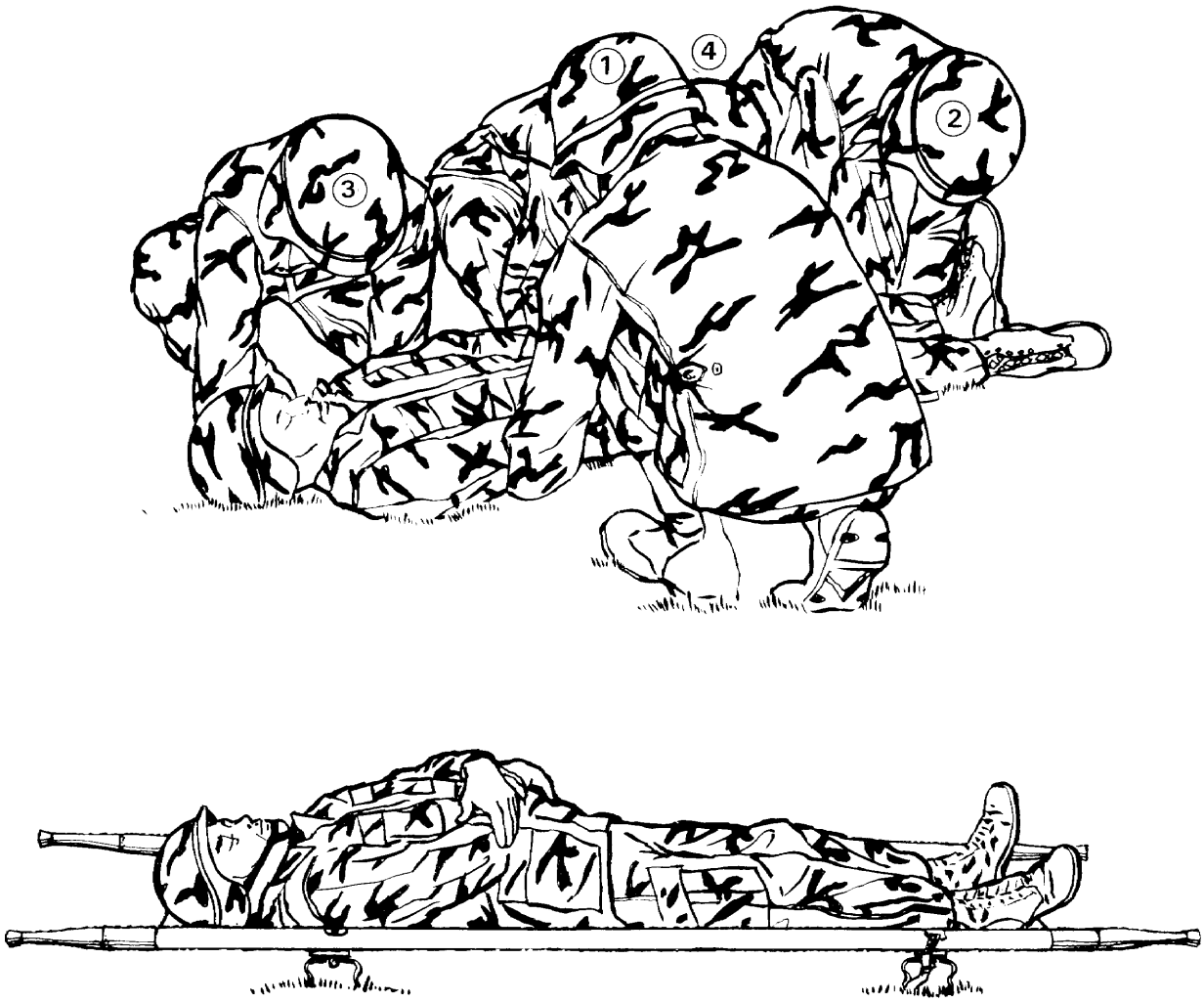

Figure 9-52. Lifting patient with back injury.

9-22. Procedures for Carrying a Loaded Litter

After the patient has been loaded onto the litter, the litter is lifted and carried as described below.

a. To Lift Loaded Litter. Resuming the position of Litter, POSTS, and facing in the direction of travel, the bearers lift the loaded litter upon the command Prepare to Lift, LIFT (Figure 9-53).

(1) At the preparatory command, Prepare to Lift, each bearer kneels on his knee closest to the litter. He grasps the litter handle with the hand nearest the litter and places his other hand on his raised knee.

(2) At the command of execution, LIFT, all bearers rise together keeping the litter level. When lifting, bearers should use leg muscles, not their back muscles.

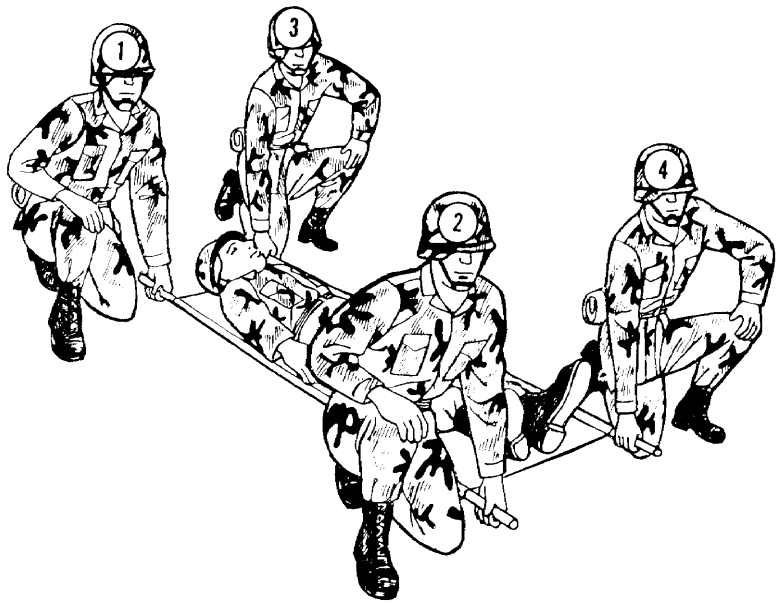

Figure 9-53. Lifting the loaded litter.

b. To Carry a Loaded Litter. The type of carry used in transporting a litter patient depends upon the type of terrain as well as the obstacles involved. It may be necessary to use several types of carries.

(1) After the bearers lift the loaded litter, they are in position for the four-man carry (Figure 9-54) which is used when the terrain is smooth and level. The command to proceed is Four-Man Carry, MOVE. With modifications, this carry is also used to pass under low obstacles.

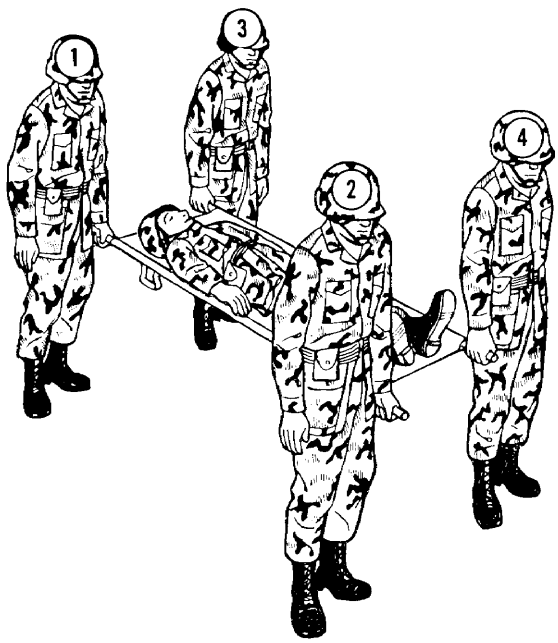

Figure 9-54. Four-man carry for smooth, level terrain.

(2) The command Two-Man Carry, MOVE, is given to enable the litter squad in a four-man carry to pass through or over narrow passages such as trails, bridges, gangplanks, and catwalks (Figure 9-55). After the litter bearers reach the end of such passages, they change back to the four-man carry. With modification, this carry can also be used to pass through such obstacles as culverts or tunnels. Both bearers carrying the litter face the patient and crawl on their knees through these obstacles. This requires one bearer to crawl backwards.

(a) With the litter squad in the position of the four-man carry, the preparatory command, Two-Man Carry, is given. Bearers numbers 2 and 3 change their holds on the litter handles to the other hand, step between the handles, and take the full support of the litter as bearers numbers 1 and 4 release their holds.

(b) Bearer number 1 steps one pace in front of the squad to lead, and bearer number 4 falls one pace to the rear to follow.

(c) At the command of execution, MOVE, the four bearers proceed through the passage.

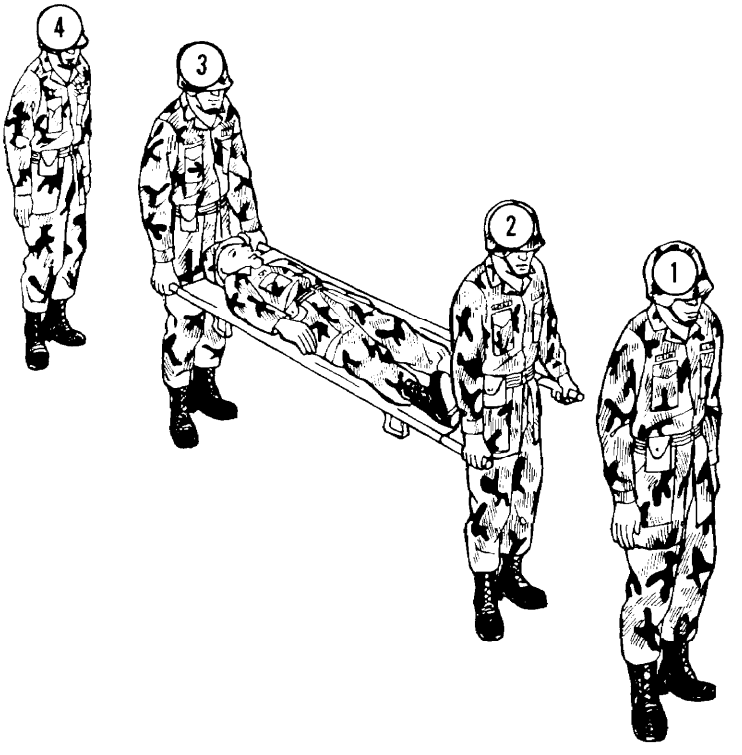

Figure 9-55. Two-man carry for narrow trails and passages.

(3) The command Litter Post Carry, MOVE, is given to enable the litter squad in a four-man carry to move over rough terrain (Figure 9-56).

(a) With the litter squad in position of the four-man carry, the preparatory command, Litter Post Carry, is given. Bearers numbers 2 and 3 step between the handles of the litter and take hold of the handles. Bearers numbers 1 and 4 then release their holds.

(b) Bearers numbers 1 and 4 move to the sides of the litter and grasp the litter poles.

(c) At the command of execution, MOVE, the four bearers proceed carefully over the rough terrain.

Figure 9-56. Litter post carry for rough terrain.

(4) Except when the patient has a fracture of a lower extremity, the litter is carried up hiil or upstairs with the patient's head forward. Therefore, before proceeding with the uphill carry, the litter must first be turned correctly. From the position of four-man carry (Figure 9-54), the litter squad first moves into the position of litter post carry (Figure 9-56); then the command Prepare to Rotate, ROTATE (Figure 9-57) is given and followed by command, Uphill (Upstairs) Carry, MOVE (Figure 9-58).

(a) With the litter squad in the position of litter post carry, the preparatory command, Prepare to Rotate, is given. Bearers numbers 2 and 3 release the litter handles and step one pace away, allowing bearers numbers 1 and 4 to support the litter at its sides.

(b) At the command of execution, ROTATE, bearers numbers 1 and 4 move 180 degrees counterclockwise, thus placing the patient's head in the direction of travel with bearer number 1 still on the patient's right side.

(c) As soon as bearers numbers 2 and 3 observe that the rotation has been completed, they resume their positions at the litter handles. The rotation of the litter places bearer number 2 at the patient's head.

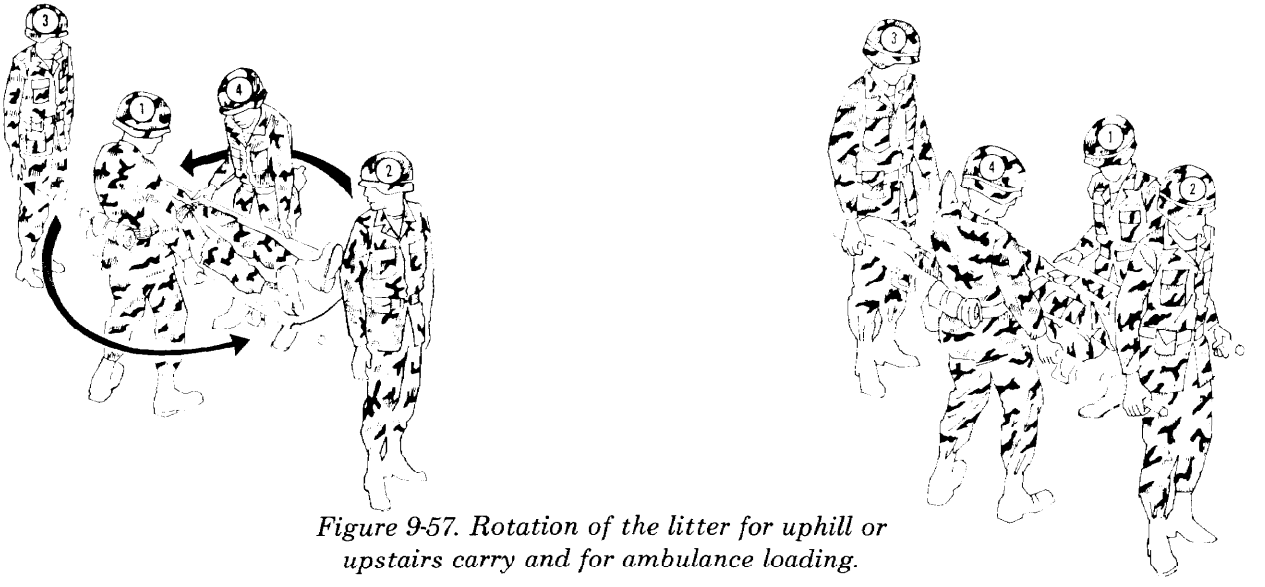

Figure 9-57. Rotation of the litter for uphill or upstairs carry and for ambulance loading.

(d) After the litter is rotated so that the patient's head is in the direction of travel, the squad halts.

(e) At the preparatory command, Uphill (Upstairs) Carry, bearer number 4 moves to the foot of the litter and takes hold of the litter handle released by bearer number 3. Bearer number 1 moves in front of the squad.

(f) At the command of execution, MOVE, the squad proceeds uphill (upstairs) with bearer number 1 preceding the squad. Bearers numbers 3 and 4 keep the litter level.

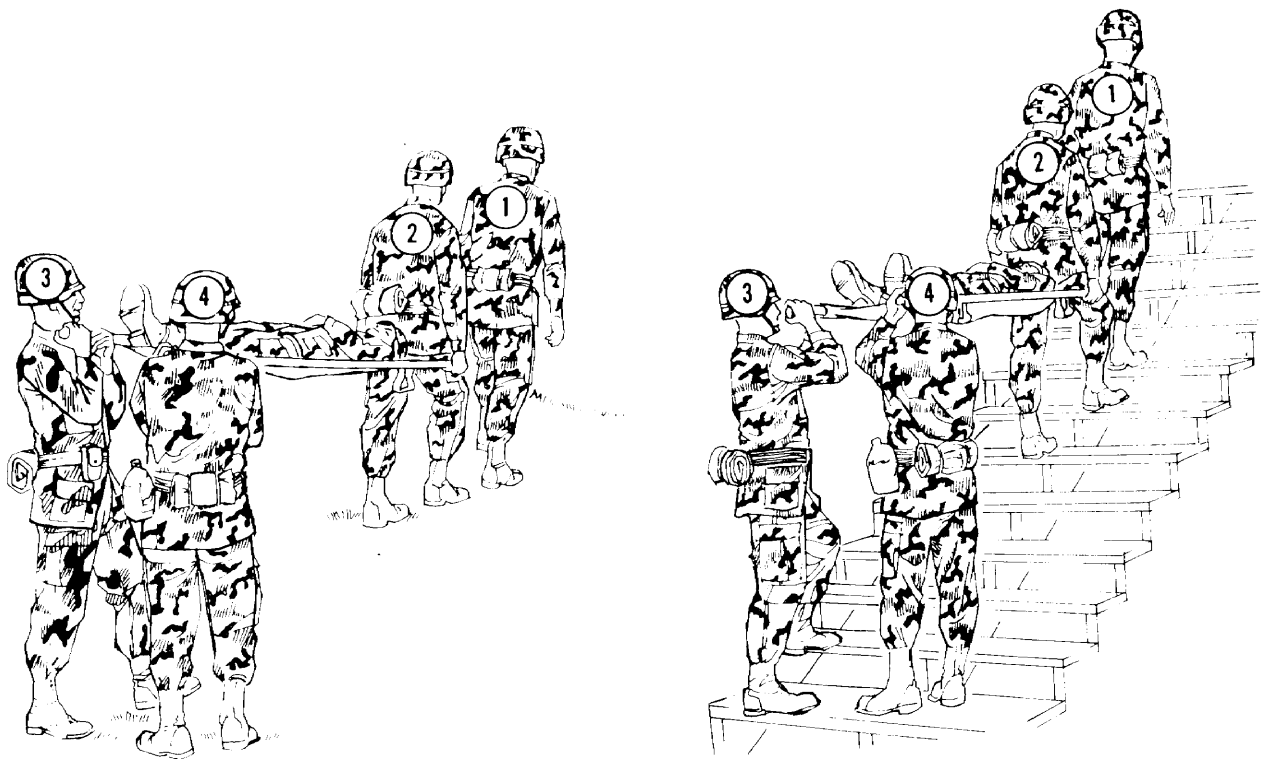

Figure 9-58. Uphill and upstairs carry.

(5) Except when the patient has a fracture of a lower extremity, the litter should be carried downhill or downstairs with the patient's feet forward. The command Downhill (Downstairs) Carry, MOVE (Figure 9-59) is given when the litter squad is in the position of four-man carry (Figure 9-54) or in the position of litter post carry (Figure 9-56) provided it has been used to rotate the loaded litter or to move it over rough terrain just prior to carrying it downhill (downstairs).

(a) With the litter squad in the position of the four-man carry, the preparatory command, Downhill (Downstairs) Carry, is given. Bearer number 3 takes the full support of the litter at the patient's head, and bearers numbers 2 and 4 remain in their positions at the patient's feet.

(b) Bearer number 1 moves to the front, facing the squad. He supports bearers

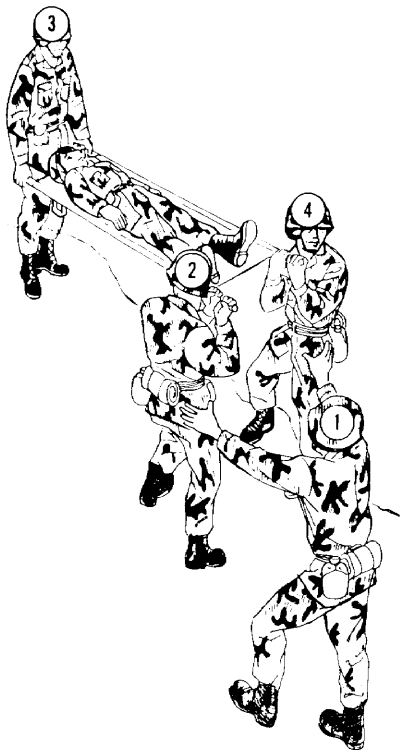

Figure 9-59. Downhill or downstairs carry.

numbers 2 and 4 and ensures that they keep the litter level as they move downhill (downstairs).

c. To Lower Loaded Litter. Before lowering the litter to the ground, the bearers resume the position of four-man carry. At the preparatory command Lower, LITTER, each bearer slowly kneels on the knee closer to the litter and gently places the litter on the ground. The squad then stands without command. For balance and support when lowering the litter, each bearer places his free hand on his other knee which remains in an upright position.

9-23. Procedures for Surmounting Obstacles

In litter transportation, bearers must be able to surmount various artificial and natural obstacles such as fences, high walls, deep trenches, wide streams, and stairwells with small landings. Specific commands for surmounting these obstacles are neither necessary nor feasible, as they must be given in conjunction with the commands for the appropriate litter carry. Common sense must also be used in adapting specific procedures to individual situations.

a. Litter Obstacle Course. A litter obstacle course is a useful training tool for surmounting obstacles and for the physical conditioning of bearers. An obstacle course can be constructed to simulate most types of natural and artificial obstructions that litter bearers are likely to meet. Where construction of such a course is impracticable, many obstacles can be simulated from existing facilities.

b. Methods for Surmounting Obstacles. A number of methods, as well as modifications in litter carries, which enable the litter squad to surmount various obstacles, are discussed below.

(1) *Surmounting a fence or low wall.*

(a) With the litter squad in the position of Litter Post, CARRY, bearer number 2 releases his grasp of the front handles at the patient's feet and crosses the obstacle, maintaining a low silhouette. Bearers numbers 1, 3, and 4 then advance the litter until bearer number 2 can resume his grip of the front handles (Figure 9-60).

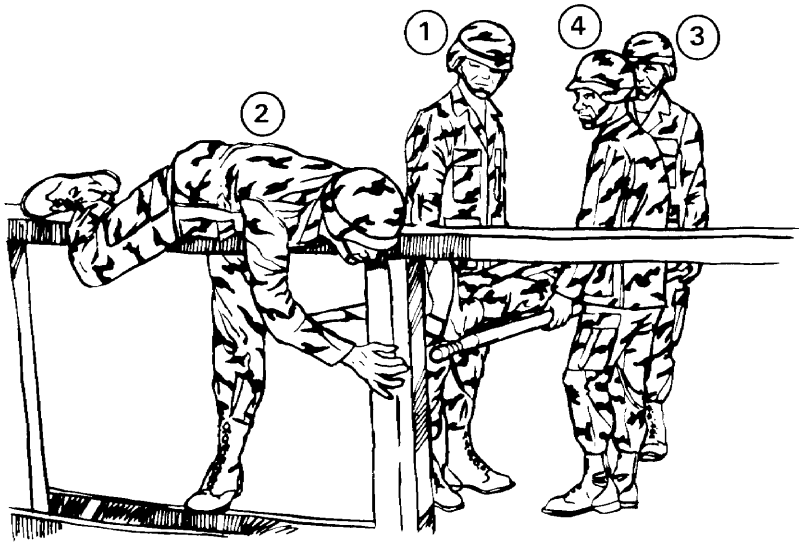

Figure 9-60. Surmounting a fence or low wall (step one).

(b) The litter is rested on the obstacle with the stirrups placed on the side of the obstacles in the direction of travel. Bearers numbers 2 and 3 support the litter by the front and rear handles, respectively, while bearers numbers 1 and 4 cross the obstacle maintaining a low silhouette. Having passed the obstacle, bearers number 1 and 4 grasp the litter poles near the rear handles held by bearer number 3. Bearer number 3 then releases his hold of the rear handles and crosses the obstacle, maintaining a low silhouette. Bearer number 3 resumes his grasp on the rear handles and bearers numbers 1 and 4 adjust the position of their holds (Figure 9-61).

NOTE

The litter should be lifted and not dragged across the top of the obstacle.

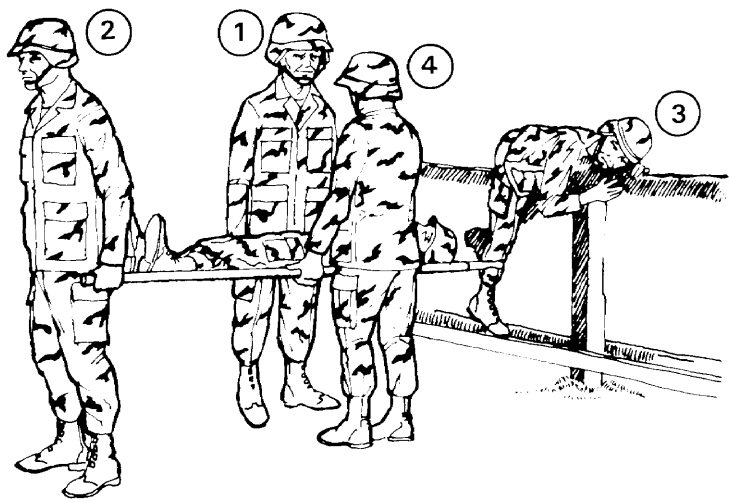

Figure 9-61. Surmounting a fence or low wall (step two).

(2) *Surmounting a high wall.* With the litter squad in the position of the four-man carry, the bearers turn and face each other. Together they raise the litter approximately chest high, step close to the litter, letting their bent elbows touch their chests. The front bearers place the front stirrups beyond the wall, scale the wall and drop to the other side. All four bearers move the litter forward until the rear stirrups are against the wall, taking care to avoid scraping the patients back. The rear bearers then scale the wall and drop to the other side and lift their end of the litter off the wall (Figure 9-62). The bearers then resume the four-man carry.

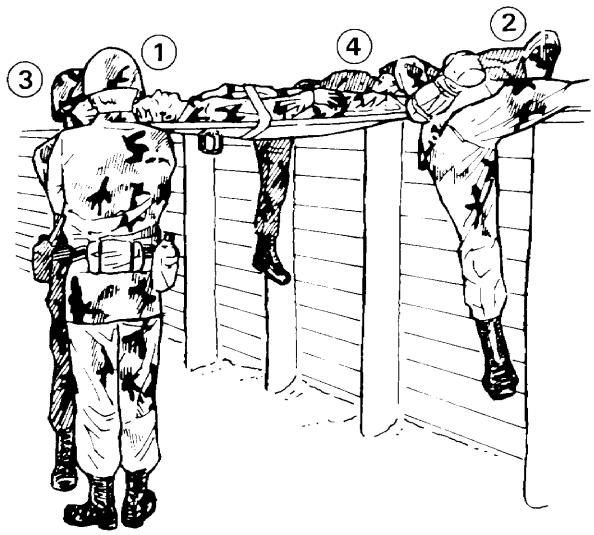

Figure 9-62. Surmounting a high wall.

(3) *Fording streams and crossing deep trenches.*

(a) With the litter squad in position for the four-man carry, the bearers turn and face each other, determining who is the taller of the two at each end of the litter. Together they raise the litter over their heads, keeping it level. If they are in trench, they lift the litter above the top of the trench (Figure 9-63).

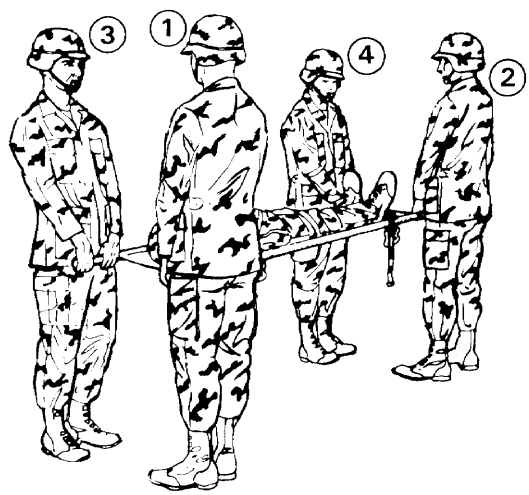

Figure 9-63. Fording streams and crossing deep trenches (overhead carry, step one).

(b) The taller bearer at each end of the litter moves between the handles, facing in the direction of travel and grasps the handles as close to the canvas as possible. The shorter bearer at each end moves under the litter, facing in the direction of travel and grasps the stirrups, which compensate for the differences in height. If all bearers are of equal height, the bearers under the litter grasp the litter poles to the side of the stirrups nearer the ends (Figure 9-64).

NOTE

Should the front bearer step into a hole as they proceed across the stream and release his hold, the other three bearers could keep the litter in position.

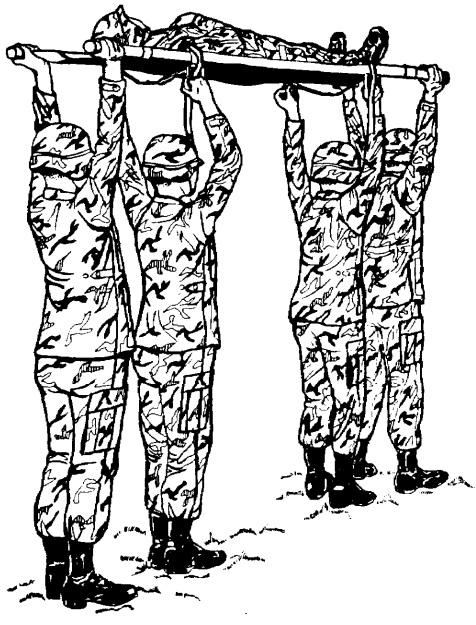

Figure 9-64. Fording streams and crossing deep trenches (overhead carry, step two).

(4) *Carrying a litter patient up a stairwell with small landings.* The steps for this procedure (Figure 9-65) are—

(a) The litter squad proceeds upstairs to the landing with bearers numbers 1 and 3 supporting the head of the litter and bearers numbers 2 and 4 supporting the foot of the litter.

(b) Upon arrival at the landing, bearer number 3 turns facing the head of the litter and supports it while bearer number 1 proceeds several steps up the next flight of stairs. Bearers numbers 2 and 4 raise the foot of the litter until bearer number 1 can grasp the handle released by bearer number 2. Bearer number 2 then moves to the side of the litter.

(c) With bearer number 2 helping bearer number 1 to support the litter, bearer number 1 grasps the handle released by bearer number 4.

(d) Bearer number 4 continues to help support the litter on the side as he moves up the stairs.

(e) Bearer number 4 assists bearer number 3 in carrying the head of the litter while bearer number 2 advances and assists bearer number 1 in carrying the foot of the litter to the next landing.

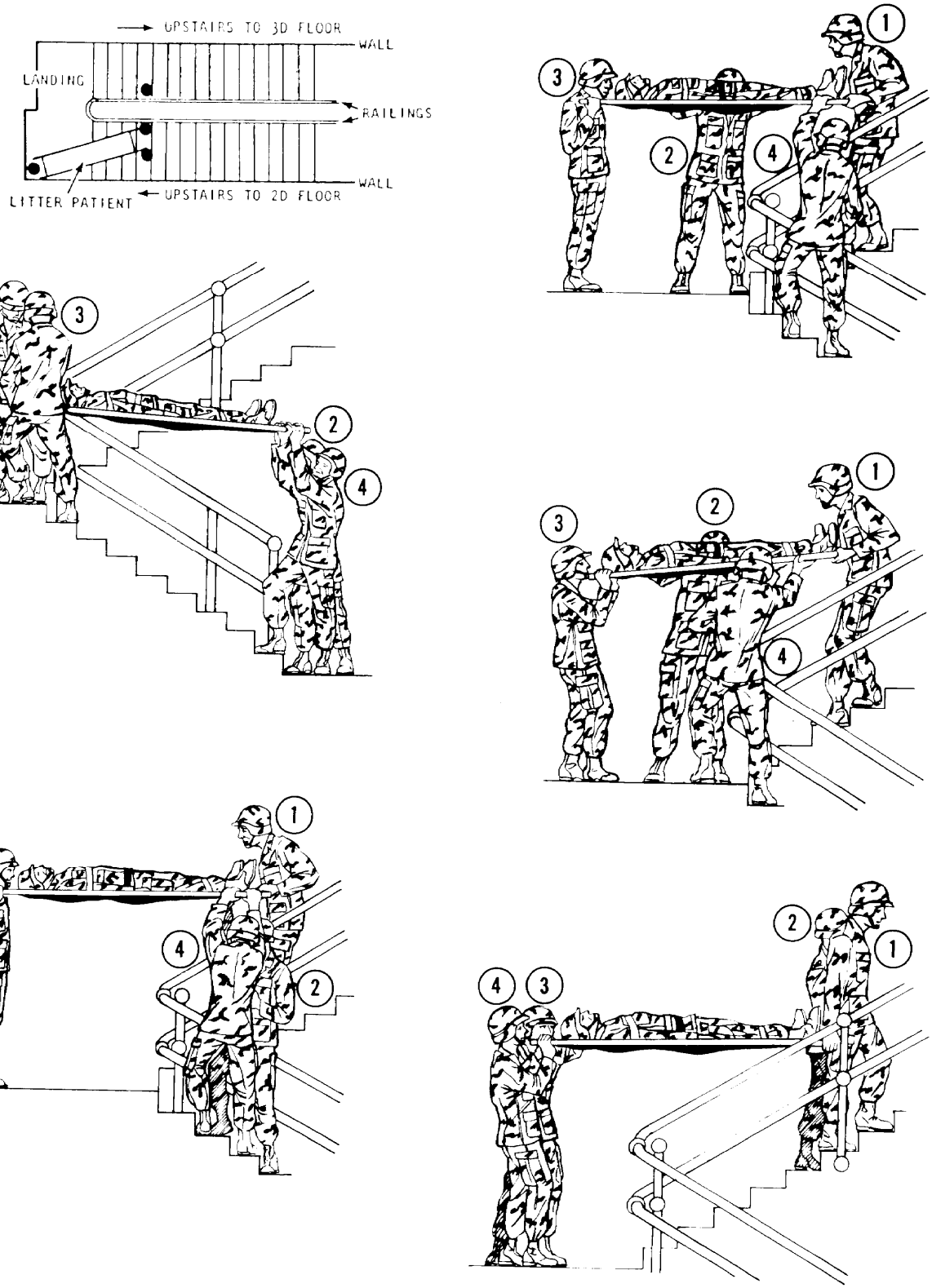

Figure 9-65. Carrying a litter patient up a stairwell with small landings.

(5) *Carrying a litter patient down a stairwell with a small landing.* The steps for this procedure (Figure 9-66) are—

(a) The litter squad proceeds down the steps to the first landing with bearers numbers 1 and 3 supporting the head of the litter and bearers numbers 2 and 4 supporting the foot of the litter.

(b) Upon arrival at the first landing, bearer number 4 turns and faces toward the litter and supports the foot of the litter while bearer number 3 supports the head of the litter. Bearers numbers 1 and 2 descend a few steps to the lower flight of stairs and receives the head of the litter from bearer number 3.

(c) Bearer number 3 moves to the foot of the litter to assist bearer number 4 while bearers numbers 1 and 2 support the head of the litter. They then move down the stairs to the next landing.

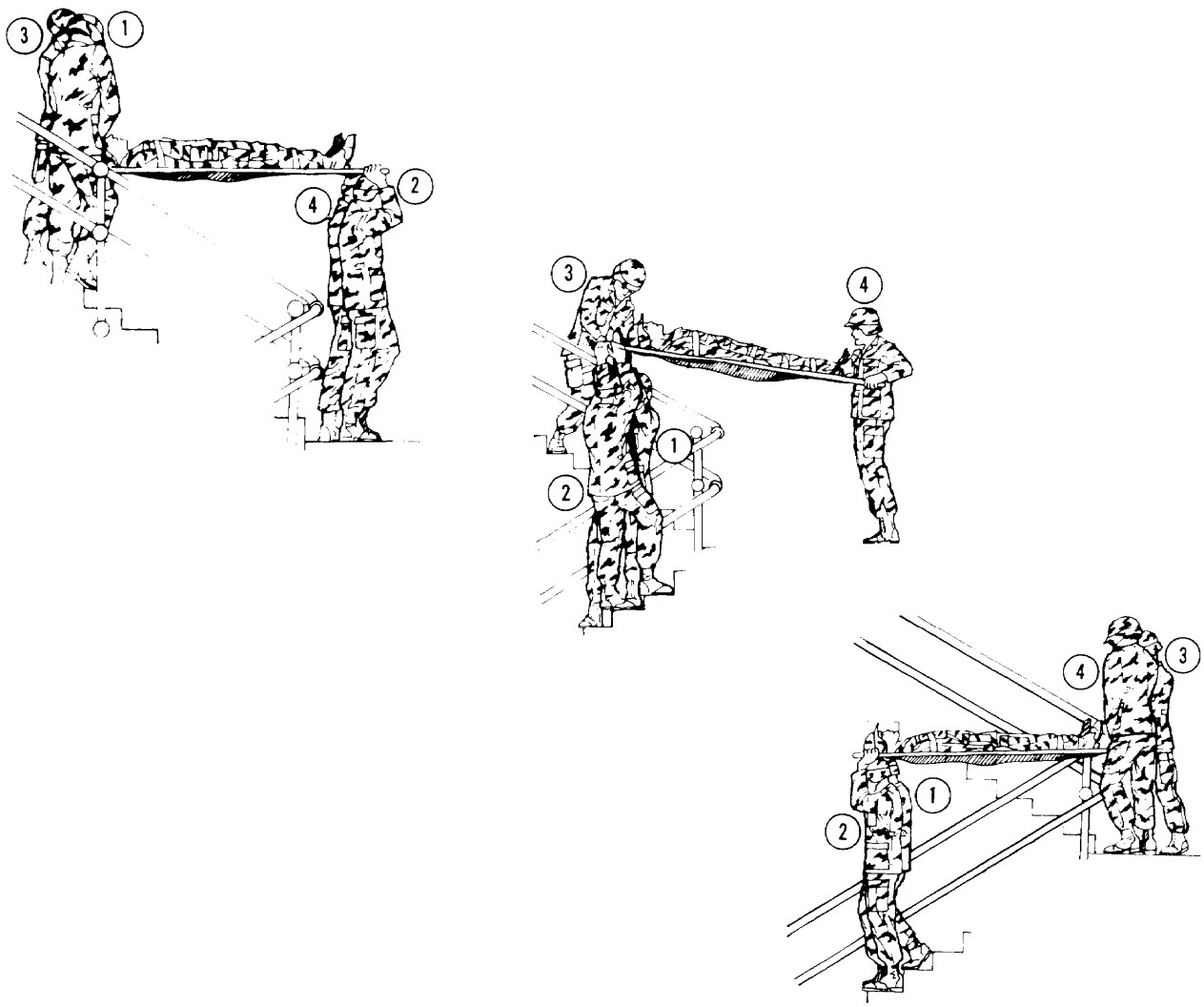

Figure 9-66. Carrying a litter patient down a stairwell with small landings.