1. On occasions especially jungle and mountainous country or in the deserts, roads either do not exist or are so poor that mechanical transport cannot be brought forward to evacuate casualties.

2. In such circumstances, mules can be used to carry the casualties. For this purpose Animal Transport (AT) Battalion ASC with the mountain brigade are utilised. The Q staff at the formation HQ allocate the animals based on the threat perception, and the medical appreciation made for the formation by the ADMS. The animals report to the Field Ambulances for deployment. There are two types of mules:
   (a) Mule General Service (GS)
   (b) Mule Mountain Artillery (MA)

3. Only the mule (GS) is used for casualty evacuation by AT. The saddle used in these mules is called a Hamilton Saddle. It has four sockets at the four corners into which four metal uprights fit (Fig 16.1). The tops of the uprights are fitted broad a web belt, which can be opened by means of a buckle. Connecting the two front uprights is a leather covered metal cross bar by which the patients can support himself. The animal is lead by its driver.

4. To load the patient first open the buckle of the belt, assist or lift the patient onto the saddle and then secure the buckle. If necessary the uprights can be fixed after the patient has mounted. (Fig 16.2)

5. **Limitation of evacuation of casualty by animal transport.** Casualty evacuation by animal transport has the following limitations:
   (a) Only conscious and sitting patients can be evacuated.
   (b) Serious or lying cases cannot be evacuated.
   (c) The walking movements of the animal make the patients very uncomfortable. Animal transport hence cannot be used for long distances.
   (d) The maintenance of these units, only for evacuation of casualties is very costly.

6. The AT battalion does not maintain camels or elephants for casualty evacuation.
CHAPTER IV

LESSON 17

IMPROVISATION OF STRETCHERS

1. Necessity is the mother of invention. When a stretcher is not available, and when there is a patient to be carried improvisation may have to be resorted to. This improvisation may be carried using the equipment carried by the soldier, in the unit, or with material available locally.

2. Some examples of improvised stretchers is given in the following paragraphs. The list is by no means complete. Many types of improvisations can be made with little bit of imagination. For example stretcher poles can be improvised from wooden / metal tent poles, bamboos, strong sticks. The support could be improvised using blankets, ground sheets coat parkas, empty gunny sacks, tarpaulins, pugrees ropes, split bamboo and so on.

3. The improvised stretcher must be tested for its strength before loading a patient onto it. During carriage the stretcher should be frequently examined to ensure it is still secure.

4. **Improvised stretcher using one blanket and two poles.** (Fig 17.1). The following technique is used:-
   (a) Spread the blanket on the ground
   (b) Place two poles on it lengthwise so that they divide it into three equal parts.
   (c) Fold one side of the blanket over it under the pole. Fold the other side of the blanket over it and tuck it under the other pole.
   (d) Fold both ends of the blanket over two or three times in the same way as rolling up a shirt sleeve.
   (e) Tie a cross bar (if available) between the poles at both ends.

5. **Improvised stretcher using one ground sheet and two poles.** (Fig 17.2) The following technique is used:-
   (a) Lay the ground sheet on the ground and place the two poles lengthwise on it, about 25cm (the length of the soldiers boot approximately) from either side.
   (b) Pass a “line bedding” or a telephone cable through the eyelets on both sides and join them together.
   (c) Turn the stretcher over and tie cross bars on the poles at either end.
   (d) Test the stretcher.
6. **Improvised stretcher using two empty gunny bags and two poles.**
(Fig 17.3) The following technique is used:-
(a) Take two empty gunny bags and cut holes in the bottom comers.
(b) Lay the bags lengthwise on the ground, open ends together within the mouth of one bag projecting slightly into the mouth of the other.
(c) Pass the poles through the holes in the bags
(d) Tie cross bars to the poles
Test the stretcher at either ends.

7. **Improvised stretcher using rope or pugree and two poles.** (Fig 17.4) The following technique is used:-
(a) Take two poles and tie cross bars at the either end
(b) Bind one or two pugrees or ropes over two poles so as to form a lattice in, in the space between the cross bars.
(c) Test the stretcher

8. **Improvised stretcher using split bamboo pieces and two poles.** (Fig 17.5) The following technique is used:-
(a) Take two poles and lay them on the ground about two feet apart.
(b) Tie on a series of cross bars made from equal lengths of split bamboo or similar material.
(c) Test the stretcher.

9. **Improvised stretcher using belts or anklets and two poles.** Similarly five belts (one of each stretcher bearer and one of the casualty), (Fig 17.6) nine anklets (two of each stretcher bearer and one of the casualty) forming a lattice with a set of three anklets each, (Fig 17.7) or four line beddings (Fig 17.8) and two jackets (Fig 17.9) can be used to form improvised stretcher with two poles.
CHAPTER V

LESSON 18

CARRIAGE OF WOUNDED WITHOUT STRETCHERS

1. On certain occasions it may not be possible to transport a casualty by stretchers, as for example, when enough stretchers are not available, when the casualty is inaccessible position or for tactical reasons. The patients must then be lifted manually by one, or two soldiers.

2. Various methods of hand carriage will be dealt with in this chapter. These methods are not suitable for carriage of a casualty over long distances. These methods are uncomfortable for the casualty and tiring for the person(s) carrying the casualty.

Casualty Carriage by One Person

3. Fireman’s Lift and Carry for a Conscious Casualty. For a casualty who is unable to walk on his own, the following technique will be used:-

   (a) The soldier wears his weapon in the front along with the weapon of the injured soldier in the front keeping the barrels to his right as depicted (Fig 18.1).
   (b) The soldier may continue to wear his haversack as usual or fix it on his belt along with the haversack of the casualty.
   (c) The soldier helps the casualty to upright position temporarily and grasps the casualty’s left wrist with his left hand.
   (d) The soldier bends down placing his right shoulder under the casualty’s lower abdomen (Fig 18.2). He puts his right arm under the casualty’s legs and then pulls the casualty over his shoulders grasping the casualty’s right wrist with his right hand (Fig 18.3).
   (e) The soldier adjusts the casualty on his shoulder such that his one arm is free.

4. Fireman’s Lift and Carry for an Unconscious Casualty. The following technique will be used:-

   (a) The soldier wears his weapon in the front along with the weapon of the injured soldier in the front keeping the barrels to his right as depicted (Fig 18.1).
   (b) The soldier may continue to wear his haversack as usual or fix it on his belt along with the haversack of the casualty.
   (c) The soldier positions himself at the head end of the unconscious casualty lying on his back (Fig 18.4).
(b) The soldier then places his hands under the casualty’s armpits and lifts him to a semi standing position (Fig 18.5)
(c) The soldier then manoeuvres himself in front of the casualty, grasps the casualty’s left arm with his left hand and applies his right shoulder to the casualty’s abdomen (Fig 18.6) He then passes his right arm under the casualty’s crotch and pulls the casualty on his shoulder and stands adjusting the casualty on his shoulder (Fig 18.7).

5. **Back lift and Carry.** The patient must be conscious and able to stand at least on one leg. The following technique will be used:-
   (a) The soldier wears his weapon in the front along with the weapon of the injured soldier in the front keeping the barrels to his right as depicted (Fig 18.1).
   (b) The soldier fixes his haversack on his belt along with the haversack of the casualty. This to ensure that the back lift is not too uncomfortable for the soldier as well as the casualty.
   (c) The soldier helps the casualty to stand temporarily
   (d) The soldier then takes up position back to back and gets the casualty to stretch out his arms sideways.
   (e) The soldier bends down, puts his hands under the casualty’s forearms to grip his upper arms.
   (f) The soldier then bends forwards, pulling the casualty on his back, straightens his legs carries him for a short distance (Fig 18.8)

6. **Neck Drag.** This is a useful method for extraction an unconscious person from a dangerous or restricted position by one person. The following technique will be used:-
   (a) The soldier rolls the patient on his back
   (b) Button up the cuff of sleeve of one hand with that of the other, or tie the patients wrists gently with a handkerchief / rope
   (c) The soldier shortens his own belt, kneels astride the casualty, and and fastens his belt with that of the casualty. He pulls the casualty’s arm over his (soldier’s) head, and takes the weight of the casualty on his neck and his back.
   (d) The soldier then crawls away, pulling the casualty along him for a short distance. (Fig 18.9)

7. **Pick-a-back.** This method is suitable to evacuate a casualty who is conscious and wounded in one leg. It is not suitable for wounds of the thigh. The following technique will be used:-
   (a) The casualty is assisted to stand up.
   (b) The soldier while standing on the casualty’s side, holds casualty’s left arm with his left hand, (Fig 18.10) turns his back on the casualty and by slightly bending down and pulling the casualty ( left arm with his left hand, and the right arm with his right hand) over his shoulders assists the patient to mount astride his back. (Fig 18.11)
(c) The soldier then holds the casualty’s wrists while passing his own hands under the casualty’s thighs. The patient supports himself by holding on to the soldier’s shoulders. (Fig 18.12)

8. **Human crutch.** The soldier stands at the injured side of the casualty. He assists the patient by putting his arms around the waist and grasping the clothing at his hip. The inner hand of the casualty is brought around the neck of the soldier who holds it with his free hand. (Fig 18.13) The injured foot of the casualty is supported on the dorsum of the soldiers foot while walking.

**Casualty Carriage by Two Persons**

9. **Two Hand Carriage.** This method is suitable for a conscious casualty. The following technique will be used:-
   (a) The soldiers wear their weapon across on the back. (Fig 18.14)
   (b) Two soldiers sit kneeling position facing each other. They hold their front arms and grasp the sling of the rifle of the opposite soldier for a good grip (Fig 18.15). Their front arms are supported by their front knees (Fig 18.14) The casualty sits on the front arms, while he is supported by the rear arms of the soldiers holding each others rifle sling. The casualty (conscious) holds the soldiers shoulder for support, one of them carrying the casualty’s weapon as well. (Fig 18.16). The casualty can be carried for a short distance with this technique.

10. **Three Hand Carriage.** This method is suitable for a conscious casualty who has been wounded in one leg or thigh with the following technique:-
    (a) Two soldiers help the casualty stand up on his uninjured leg.
    (b) The soldiers form a three hand seat. (Fig 18.17)
    (c) The soldier standing on the patients injured side will only use the inner hand in making the seat, leaving the outer hand free to support the patients injured limb. (Fig 18.18)

11. **Four Hand Carriage.** This method is suitable for a conscious casualty. Two soldiers form the four hands seat with the following technique:-
    (a) The soldiers grasp each others wrists (Fig 18.19)
    (b) The casualty lowers himself on the hand seat so made holding the shoulders of the soldiers to additionally support himself.
    (c) The casualty is carried for a short distance.

12. **Fore and aft hand lift and carry.** This method is suitable for a conscious as well as an unconscious casualty. Two soldiers are required to evacuate the casualty. The following technique will be used:-
    (a) One soldier separates the patients legs, then stands between them top bend down and grasp the casualty under his knees (Fig 18.20).
(b) The other soldier takes up position behind the casualty and after raising his trunk passes his hands under the patient's armpits and grasps his wrists. (Fig 18.21) They then carry the casualty for a short distance.

13. All the above methods of carriage of casualties without stretchers can actually be taught during physical training/games periods.
CHAPTER VI

LESSON 19

AIR EVACUATION OF CASUALTIES

Principles of Air Evacuation

1. Speedy removal of the sick and the wounded from the battle field is a military necessity. Conventional modes of transport such as mules, ambulances etc. are ineffective where natural hazards of transporting casualties across hundreds of miles of sea, desert or jungle covered mountainous country have to be overcome. The only mode of transport which can ignore these natural obstacles is the aircraft. By local arrangement between medical; authorities and the air staff, aircraft taking supplies forward bring back to base a load of casualties. “Freight forward and casualties back” became the slogan of transport commands of the Allies Air force during World War II which is true even today.

Advantages

2. The advantages of air evacuation of casualties are as follows:-

(a) Keeps lines of communication free
(b) Tactical necessity to remove non-effective expeditiously.
(c) Boosts morale
(d) Speed
(e) Comfort
(f) Medical
   (i) Early institution of definitive treatment.
   (ii) Saving of skilled manpower
(g) Economical
(h) Safe

Disadvantages

3. The disadvantages of air evacuation of casualties are as follows:-

(a) Only feasible when air superiority has been established.
(b) Requires adequate airfields/ helipads
(c) Cancellation of sorties due to restriction of weather or other operational reason.
Planning: Air Evacuation of Casualties in Operational Scenario

4. The following planning aspects are important:

(a) Coordination between medical staff at Command HQ with the Army Aviation branch and GS (Ops/ Air)

(b) Fitting in evacuation plan vis-à-vis disposition of Field Medical Units

(c) Air evacuation of casualties in the field is in two parts:
(i) Battle front to forward Air Field – By helicopters.
(ii) Forward airfield to Base – Medium / Heavy aircraft.

(d) Demanding of aircraft.

(i) **Action by Field Formations in forward areas.** Estimate casualties from various areas before operations and inform GS (Ops/Air) and Aviation branch at Command Headquarter through usual staff channels well in advance. They in turn will coordinate the requirement with the respective Air Force Commands.

(ii) **Procedure in Forward Areas.** In the event of occurrence of a casualty the RMO of a field unit will inform the unit OC/CO, who in turn will inform the GS branch in formation headquarter on telephone/RT. At the formation HQ the ADMS vets the necessity of the casualty air evacuation. He confirms if the casualty is fit to travel by air and if it will travel lying / sitting. He then informs the requirement to the Army Aviation branch and GS (Ops/ Air). The Army Aviation takes on the mission if it is within their capability. If not appropriate helicopter / fixed wing aircraft is requisitioned from Advance HQ of the Air force Command by the Army Aviation branch / GS (ops / Air)

(iii) **Sequence of Action.** Demands for casualty air evacuation till the Division level and the Area level are all dealt by GS (Ops) branch. Demands are routed up the formation by two channels, the Medical channel and the GS channel. The aircraft / helicopters are allocated normally at the Command level and in some exceptional cases at the Corps level. The ADMS / DDMS at the Command level classify the casualties as sitting / lying requiring special precautions as in the case of spinal / head injuries, IHD etc. and whether a medical attendant and special equipment e.g., oxygen / suction is to be carried. The Army Aviation branch / GS (Ops / Air) at the Command HQ decide if the mission is within the capability of the
Army Aviation helicopters or Air Force helicopters / aircraft are required. Besides the casualty carrying capability of the aircraft, the site of the casualty and the proximity of the site to the casualty air evacuation assets helps in decision if the mission will be taken on by the Army Aviation or the Air Force. Being a mission of mercy all demands are accepted and processed on telephone and followed up by signal for regularisation later. The Army Aviation branch while detailing the helicopters give details of the casualties and the precautions to be taken besides special equipment to be carried if required, to the pilots. Similar briefing is given by the Air Force to their pilots when detailing them on such missions. As per the international norms, aircraft carrying casualties get priority in landing. They are allowed to file their flight path in the air on RT and do not require any clearance before take off as is the case with all other flights. All reports and returns are acceptable by all the formation HQ after the casualty evacuation is carried out.

(iv) While the demand for casualty air evacuation is being forwarded to the next higher formation, the nearest Aviation unit / commanding officer (CO) or the Chief operations officer (COO) of the Air Force base is to be informed; especially if it is known that the casualty evacuation asset will be provided by that unit / base. Time is of vital importance to save lives. Therefore besides activating the nearest helipad the medical unit at the destination must also be informed to be ready to receive the casualty.

(v) Each Aviation unit/ Air Force base keeps adequate air effort reserve for casualty evacuation in yearly allocation, based on past experience. Extra effort if required is released immediately by the Army HQ / Air HQ

Responsibility of the Indian Air Force

5. The Indian Air Force is responsible for the medical treatment and the general care of all the patients carried in the IAF aircraft from the time of their being received for aeromedical evacuation by the IAF medical authorities on or near the airfield of first emplaning, to the time they leave the IAF Medical Unit / Station Medical Centre on or near the destination air field.

6. The following will be the responsibility of the SMO/MO:-

(a) Briefing Army Medical Units in despatch and reception of casualties.
(b) Reception of casualties at the airfield.
(c) Sorting and classification of casualties for evacuation i.e., eye injuries, head injuries to be flown to special treatment centres.
(d) Holding of 15-20 casualties for 24-48 hours.
(e) Medical Attention
   (i) Resuscitation and urgent Medical / Surgical aid
   (ii) Nursing care
(f) Loading of casualties in the aircraft.
(g) Provide medical assistants for in-flight nursing.
(h) Unloading of casualties.

7. In the case of forward air bases having no CAEU, the duties of the OC CAEU will be performed by the local SMO/MO of the emplaning base subject to the extent feasible, with the existing resources. The SMO/ MO should have a good communication system, viz, direct communication between the affected unit and field medical units on the one hand and the aircraft on the other. This ensures that time taken to load and clear the aircraft is reduced to the minimum.

8. The CAEU will follow the advancing Army and will operate from new airfields as they become available for own forces in the form of advance air supply centres.

Air Evacuation of Casualties in Non Operational Scenario

9. The circumstances under which casualties are air evacuated in a non operational scenario are as follows:-
   
   (a) From forward areas to base hospitals.

   (b) Special flights on payment (to be made by the state government in case of disasters) as “Errands of Mercy” or as a life saving measure in case of serious illness/injury or a natural calamity may be authorised by the Chief of the Air Staff in case of Armed Forces Personnel and their families and civilians paid out of defence estimates under para 9(b) of AFI 49/71 as amended.

   (c) Special flights on payment as “errands of mercy” or as life saving measure in case of serious illness, serious injury or natural calamity may also be authorised by the COAS in case of the families of the Armed Forces personnel as well as civilians personnel of defence service and their families. Lady members of the Armed Forces may travel on authorised duty. Para 9(b) of Appendix `B' to AI 25/91 refers.

   (d) When considered necessary by the OC hospital/ MO in charge of a hospital, the use of a civil aircraft may be authorised under para 109(a) of
Travel Regulation (Revised edition 1991) for the move of the officer cadet, a soldier, a sailor or an airman or non combatant (enrolled) from one hospital to another within Indian limits, for urgent medical treatment with a view of preserving his life, provided free conveyance is otherwise admissible and that a service aircraft is either not available or is less economical. As per para (b) of Rule 109 of TR, defence civilians in receipt of field service concessions and who are entitled to free medical treatment from military sources will also be entitled to be moved free by air in terms of and subject to the conditions laid down in para (a) of Rule 109 of TR.

10. **Procedure for demand for Airlifts for the purpose of para 9 (d)**. The Army, Navy, Air Force Hospital/Medical authorities are to forward their demands for such airlifts through proper channel (Through DDMS and G channels in the case of the Army, ) to the Air Force Command concerned giving the following details which are required for a proper appreciation of the necessity of Air evacuation and the suitability of the case(s):

(a) Reason of the airlift
(b) Nature, history and detailed medical condition of the case(s)
(c) If attendant or special nursing equipment or facilities are required for the airlift.

11. The demand is to be approved by the SASO of the Air Force Command in consultation with the PMO. If difficulty is experienced in providing an airlift or when special sanction is required to be given by the Air HQ, a reference is to be to Air HQ [DCAS or DGMS (Air)]

**Standard Operating Procedure for Evacuation of Casualties by air**

12. As soon as casualty occurs, and the MO in charge will opine on the necessity of evacuation of the casualty by air, and the following action will be taken:-

(a) He will inform his CO and the BM of the Brigade about the fact. The BM in turn will inform the HQ of the Area of occurrence of the casualty and the need of casualty air evacuation including the following details:-

(i) Location from
(ii) Location to
(iii) Nearest helipads
(v) Name and the unit of the casualty
(vi) Diagnosis of the casualty
(vii) Nature of casualty i.e., lying / sitting
(viii) The likely time the casualty will reach the helipad
(b) HQ Area will process sanction for air evacuation of casualty on telephone with HQ Command GS (Avn) and the medical branch. The DDMS HQ Area, AF Station and R&O flight will be informed by the BM of the brigade in which the casualty occurs.

(c) Simultaneously a signal will be addressed by the BM of the concerned brigade to the receiving medical unit. A copy of the signal will be endorsed to the following:-

(i) Command (Avn)
(ii) Command GS (Ops)
(iii) Command (Med)
(iv) HQ Area (Med)
(v) HQ Area (A)
(vi) HQ Area GS (Ops)
(vii) Nearest R&O flight
(viii) Nearest helicopter unit
(ix) Nearest MH / medical unit where the casualty is to be evacuated.

(d) DDMS Area will vet the need of air evacuation for the casualty and inform Command (Med).

(e) The signal in para 12 (c) will contain the following information:-

(i) No Rank Name of and unit of the casualty
(ii) Nature brief history, diagnosis and medical condition of the casualty.
(iii) Reasons for air evacuation
(iv) Lying or sitting
(v) Date, time when casualty will be available for evacuation at the helipad
(vi) Name of helipad
(vii) Destination hospital / airfield
(viii) Latest time by which casualty is required to be evacuated
(ix) Whether MO or any special equipment required for evacuation
(x) Altitude restrictions if any
(xi) Local weather condition
(xii) Whether sick attendant will accompany

(f) On receipt of information regarding the ETA of the helicopter the indenting unit will be the casualty ready at the nearest designated helipad. When possible all relevant medical documents will be kept ready and handed over to the MO or the medical attendant accompanying the casualty. All arrangements to receive the helicopter will also be made.
(g) Delay in execution of casualty air evacuation. In case the helicopter does not arrive in time, and the casualty is still waiting for air evacuation, intimation to this effect will be forwarded to BM Brigade so that the helicopter demand could be expedited. However, if due to persistent bad weather, at times, the helicopter cannot arrive in time, and the casualty may have to be evacuated by other means. In such situation the indented unit will inform the BM brigade that the helicopter is no longer required who in turn will inform the helicopter unit, the R&O flight Command (Avn) and HQ Area (A) to cancel the demand. Further the following will also be informed about the cancellation of the demand:-

(i) Command (GS ops)
(ii) Command (Med)
(iii) HQ Area (GS ops)
(iv) HQ Area (Med)
(v) Receiving MH / Medical unit as the case may be

(h) Para Military Forces. In the case of paramilitary forces the Government may issue sanction from time to time. During the validity of such sanction, procedure for demanding air evacuation as enumerated above will be applicable.

(j) Other Civilians and civilian expeditions. Demands for casualty air evacuation of categories of these persons will be projected through ‘G’ staff channels. In such cases concurrence of Air HQ is necessary. Once approved by the Air HQ subordinate AF units will take suitable action to evacuate the casualties.

(k) Report/ Returns. After completion of the casualty air evacuation, the indented unit will forward a report to the respective brigade HQ which in turn will inform Area HQ accordingly.

Classification of Patients

13. The patients are classified as follows:-

(a) Class 1 – Neuropsychiatric patients.
   (i) Class 1A – Severe psychiatric patients. Locked ward psychiatric patients requiring the use of restraint apparatus, sedation and close supervision at all times.
   (ii) Class 1B – Psychiatric patients of intermediate severity. Locked ward psychiatric patients normally not requiring the use of restraint apparatus but who react badly to air travel, or who may commit acts which are likely to endanger themselves or the safety of aircraft and its occupants.
(iii) Class 1C - Open ward psychiatric patients. Psychiatric patients, who are cooperative, and who have proved reliable under observation.

(b) Class 2 – Stretcher patients. (other than psychiatric)
   (i) Class 2A – Immobile stretcher patients. Patients unable to move about on their own volition under any circumstances
   (ii) Class 2B – Mobile stretcher patients. Patients able to move about on their own volition in an emergency.

(c) Class 3 - Walking patients (other than psychiatric). Walking patients other than psychiatric who require minor attention enroute.

(d) Class 4 – Troops class. Walking patients other than psychiatric who require no medical treatment and are physically able to travel unattended.

Carriage of Neuropsychiatric Patients

14. The following factors will be considered:-

   (a) Neuropsychiatric patients are to be under observation long enough to establish if they are amenable to ordinary nursing discipline or some other form of control may be needed during flight.

   (b) The CO of the dispatching medical unit will classify the casualties in accordance with para 11 above, on the advise of the responsible specialist in psychiatry not more than 3 days prior to emplaning.

   (c) Where necessary neuropsychiatric patients are to be kept adequately sedated before and during the flight and equipment for restraint is to be carried for each class 1A and class 1 B patient.

Carriage of Class 2-A patients

15. Class 2A patients are to be allotted stretcher positions which are most accessible for unloading in an emergency.

In-Flight Nursing

16. The following procedure is to be adopted:-

   (a) Patients carried in IAF aircraft are to be nursed by trained Medical Assistants/ Nursing Assistants, except under the following circumstances:-
(i) In aircraft where space provision precludes the possibility of carrying a medical attendant.

(ii) Where Medical Assistant / Nursing Assistant cannot be made available.

(b) A service Medical Officer is to accompany patient when the despatching medical authority or SMO/PMO concerned is of the opinion that the clinical condition of any patient(s) warrants it.

(c) The responsibility of arranging in flight nursing team rests with the medical authority at the emplaning airfield. In case of “errands of mercy” involving heavy aircraft the SMO/PMO Command concerned or the DGMS (Air) Air Headquarters in the case of flights ordered by Air HQ

Responsibility for determination of fitness for air evacuation of patients

17. The responsibility for determination of fitness for air evacuation of patients rests with the medical authority at the emplaning airfield preferably the SMO

18. The fitness for air travel of the patients will be determined by the Authorised Medical Attendant (AMA) / RMO/MO in the remote areas where Air Force Medical authorities are not available or not in a position to examine the patient(s).

19. Cases normally considered unfit for travel by air could also be evacuated from remote areas where survival otherwise is most unlikely. All efforts will be made to ensure that there is no risk to the lives of the crew and the aircraft. This may involve use of sedatives / restraints on the patient or waiting for an opportune moment in which the aircraft is capable to operate for evacuation of the patient. The task therefore will be undertaken with consent of the captain of the aircraft detailed for the casualty air evacuation.

20. Personal effects. The senior member of the in flight nursing team will be responsible for the safe custody of the personal effects of the patients who are unable to do so themselves.

Priorities for Evacuation.

21. When large number of patients need to be transported by the order in which they are called forward is to be based on the following scale of priorities :-
(a) Priority 1. - Patients whose transfer by quickest possible means is necessary as a life saving measure, or to avoid serious permanent disability.

(b) Priority 2. - Patients whose condition is likely to be adversely affected unless they are speedily evacuated or who need early specialised treatment not available locally.

(c) Priority 3. - Patients whose immediate treatment requirements are within the power of local medical units, but whose progress would benefit from movement by air rather than by surface transport.

(d) Priority 4. - Patients for whom movement by air is a matter of convenience rather than medical requirement.

22. The priorities given above also indicate the degree of urgency to be applied in the management of aero-medical evacuation of individual patients.

Medical Arrangements in the Field

23. The following actions are undertaken:-

(a) Action by dispatching hospital / field unit
   (i) CO informs SMO/MO/ each day the number of patients required to be air evacuated.
   (ii) Depending upon the availability of aircraft, patients are despatched to the air field accompanied by a Medical officer / nursing assistant A nominal roll showing the number rank name diagnosis etc. accompanies the patients.
   (iii) Patients and documents are handed over to the SMO/MO.

(b) Action by Forward Air Field (Duties of SMO/MO)
   (i) Receive patients from hospitals / field units
   (ii) Examine patients to ensure fitness for air travel; remember limitation of weather in flight plan.
   (iii) Brief Captain of aircraft with regards to altitude limitations, if any, to be observed.
   (iv) Before loading ensure that stretcher carrying gear is in position for carrying lying cases, sufficient water for drinking and washing is carried out in the aircraft. Blankets
are available, oxygen supply is serviceable and that lap straps are available for sitting cases.
(v) Loading of patients
(vi) If patients are detained due to postponement or late arrival of aircraft, provide food, comforts and treatment.

(c) Action by Base Airfield (Receiving Airfield). The following actions will be undertaken:-
(i) ATC officer based at base airfield on receipt of ETA of aircraft passes information to the SMO AF Station and to the hospital.
(ii) On arrival of the aircraft, Air force MO arranges for unloading patients and loading into hospital ambulance. Equivalent number of stretchers and blankets are sent by the hospital to be returned on the aircraft to the despatching hospital.
(iii) The nominal roll and hospital documents are obtained from the Captain of Aircraft / Flight Medical Assistants and handed over with the patients to the local Armed Forces Hospital.

(d) Action by Receiving Hospital
(i) On receipt of information from SMO/ATCO Air Force hospital despatches Ambulances to airfield to reach before ETA of the aircraft.
(ii) Equal number of blankets and stretchers which accompany the patients are sent with the ambulances for returning to the despatching hospitals.

Medical Documentation

24. The patients are to be accompanied by all relevant medical documents i.e., medical case sheet and connected documents. The documents are to be given to the medical authorities responsible for in-flight nursing. A separate report in duplicate for each patient is also to be handed over showing details of the following:-
(a) Patients condition including classification and priority of evacuation.
(b) In–flight nursing required.

25. The in-flight nursing personnel will add to this report, notes on in-flight condition and any treatment if given. The original copy of this report is to be forwarded with the case sheet and connected documents to the receiving medical unit; the duplicate being retained by the IAF medical authority responsible for in flight nursing.
Medical Equipment for in-flight nursing.

26. The despatching medical authority will ensure that all medical and allied requirements for in-flight nursing are met with, for instance the stretchers (unless these do not fit in the aircraft), bed sheets and blankets etc. Replacement of items despatched may be sought subsequently through administrative channels. This replacement will be made on priority.

27. The SMO will ensure that arrangements are made for disinfection /decontamination of the aircraft soiled clothing and equipment at the deplaning airfield when an infectious/ contaminated case(s) is/are evacuated.

28. The medical officer of the despatching agency in the remote areas will arrange for all medical and allied equipment and suitable attendant for in-flight nursing if required. Replacement of the items sent along with the patient may be sought subsequently through administrative channels. This replacement will be made on priority.

29. Similarly to minimise disturbance to the patients, they are to be emplaned with stretchers and appropriate linen by the despatching hospital/medical unit.

30. Despatching hospital will also prepare 6 copies of nominal roll of patients giving the following information:

<table>
<thead>
<tr>
<th>No</th>
<th>Rank</th>
<th>Name</th>
<th>Unit</th>
<th>Diagnosis</th>
<th>Lying/Sitting</th>
<th>Diet restriction</th>
<th>Treatment to be given</th>
</tr>
</thead>
</table>

31. The distribution of the copies is as follows:
   (a) Copy No 1 – ADMS (Army)
   (b) Copy No 2 – to file
   (c) Copy No 3 – Retained by Air force MO at emplaning airfield
   (d) Copy No 4 – Carried by Flight Medical Assistants to deplaning airfield.
   (e) Copy No 5 – Retained by Air Force MO at deplaning airfield.
   (f) Copy No 6 – Sent to the receiving hospital.

Medical care of Patients

32. The patients nominated for aeromedical evacuation are to be assessed for their fitness for carriage by air by an IAF medical officer, usually the local SMO who will also be responsible for their reception, care sorting and loading on evacuating aircraft. The patients are not to be loaded until the captain of the aircraft confirms the time of takeoff. The Medical officer in charge will also brief the senior member of the in-flight nursing team and arrange for the despatch of patients to the receiving hospital / medical unit.
Pre-flight procedures

33. The SMO will brief the captain of the aircraft about the following aspects:-
   (a) Height restriction if required on medical grounds or degree of pressurisation when available.
   (b) Intermediate stops if required
   (c) Precautions to be taken in the transportation of the seriously injured/ infectious/ contaminated or a neuropsychiatric cases.
   (d) Appropriate medical echelon, to which, the casualty has to be evacuated.

34. Further, the SMO at the despatching airfield will be responsible for the following:-
   (a) In-flight medical/nursing equipment, clothing and stores (including oxygen) and diet are provided for patients
   (b) Adequately preparation and briefing of the patients
   (c) Preparation of the loading plan
   (d) Those suitable arrangements are made at the intermediate and destination airfields for the reception and care of the patients.
   (e) Determination of fitness for air evacuation.

35. Loading. While planning loading the following will be considered:-
   (a) Patients needing most attention during flight are installed at convenient heights above the cabin floor, where possible.
   (b) The least mobile patients are deplaned first.

36. In-Flight discipline. The patients are to obey all orders given by or on behalf of the captain of the aircraft or senior member.

Returns

37. Receiving hospitals in their monthly bed state to the DDMS (Army) mention number of patients received by air.

38. Air Force MO at deplaning airfields submits a nominal roll of patients received by air to PMO Command who keeps a record of all cases.

Recoveries

39. Recoveries of Army Aviation (Cheetah/Chetak) is Rs 79,000/- per flying hour. In addition detention (waiting) charges are also to be realised @ 50% of the above rates. Dead time is chargeable at full rates. The recoveries are to be deposited in cash / MRO with the unit undertaking the mission, before the mission commences. This is done for all non entitled categories of patients.
SELECTION OF PATIENTS FOR EVACUATION BY AIR

1. Selection of Patients for Evacuation by Air. There are no contraindications for air evacuation of casualties. A patient who is fit to be moved is fit for air evacuation. Severely wounded/ injured casualties in the field who can be made fit to be moved by resuscitation, can be safely transported by air. However, with patients suffering from certain pathophysiological conditions special precautions are to be taken because some casualty air evacuation assets like the helicopters used for casualty evacuation are un-pressurised aircraft. Medical officers must be aware of the clinical entities that could be adversely affected by flight conditions such as lowered barometric pressure and lowered partial pressure of oxygen.

2. Medical conditions adversely affected by decreased barometric pressure are as follows:

   (a) Gastro-intestinal tract conditions. Patients with such conditions as a strangulated hernia, intestinal obstruction, acute appendicitis, diverticulitis, ulceration and weakening of walls as in peptic ulcer, enteric / amoebic and tuberculous ulcers located in GI tract are potential risks. Patients having undergone GI surgery with suturing in the gut are also at risk as the air trapped in the gut tends to expand. The flight attendant should have rectal and gastric tubes in his kit for use, if necessary.

   (b) Chest Conditions. In pneumothorax, any trapped air in the pleural cavity tends to expand and cause further collapse of the lung on the affected side. This may even cause mediastinal shift and respiratory embarrassment. With penetrating injuries of the chest, tension pneumothorax may develop. The external chest wound must always be strapped with Vaseline (airtight) gauze dressing. Patients with tuberculosis should be provided with gauze masks to collect spray of discharge during coughing. Use of oxygen in these cases is beneficial. A lidded spittoon must be provided for collection of the sputum.

   (c) Cranial (Head) Injuries. In skull fractures with leak outside of clear / blood stained CSF entry of air in the cranium, may result through the same route. This trapped air would expand on gaining altitude. This would led to compression of the brain tissue further with attendant risks.

   (d) ENT conditions. Patients with acute Eustachian catarrh acute otitis media, acute and chronic sinusitis will experience great discomfort. Decongestants must be used before and during the evacuation.
(e) **Pregnancy.** Air transportation should be avoided in the last trimester especially if the person is prone to motion sickness. Gas expansion in the abdomen, nausea, vomiting retching increase the irritability of the uterus.

3. Medical conditions adversely affected by decreased partial pressure of oxygen are as follows:

   (a) **Respiratory conditions.** Accent to high attitudes may accentuate hypoxia. Such patients should be administered oxygen during the flight. For fracture of the ribs strapping of the chest may be resorted to.

   (b) **Cardiovascular conditions.** Decompensating hypertensive heart disease, recent coronary occlusion, or angina pectoris should be air evacuated in emergency only in pressurised cabins. Oxygen must be administered during the flight to such patients as well as those of severe anaemia.

   (c) **Eye conditions.** In injury air may be present in the globe, which may expand on gaining altitude increasing intraocular tension. Such patients must be flown low in pressurised cabins. They must be administered oxygen when flown above 4000 feet. The eye casualties should be evacuated as lying casualties on a stretcher.
Casualty Carrying Capacity of Available Casualty Evacuation Assets

1. The casualty carrying capacity of various assets in use in Air Force currently is as per the following table:

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Stretcher</th>
<th>Sitting</th>
<th>Or Sitting</th>
<th>Med Asst</th>
<th>Total Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEETAH</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>CHETAK</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>MI 8</td>
<td>12</td>
<td>24</td>
<td>1</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>MI 17</td>
<td>12</td>
<td>24</td>
<td>1</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Avro</td>
<td>21</td>
<td>0</td>
<td>40</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>MI 26</td>
<td>60</td>
<td>82</td>
<td>3</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>AN12</td>
<td>60</td>
<td>18</td>
<td>76</td>
<td>2</td>
<td>78</td>
</tr>
<tr>
<td>AN 32</td>
<td>24</td>
<td>50</td>
<td>3</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>IL 76</td>
<td>72</td>
<td>38</td>
<td>225</td>
<td>4</td>
<td>114</td>
</tr>
<tr>
<td>Version I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IL 76</td>
<td>80</td>
<td>7</td>
<td>225</td>
<td>3</td>
<td>90</td>
</tr>
<tr>
<td>Version II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IL 76</td>
<td>32</td>
<td>12</td>
<td>225</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>Version III</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. The Cheetah and the Chetak are used for Search and Rescue (SAR) missions. The Chetak helicopter earmarked for search and rescue duties must carry two stretcher light weight universal (Fig 1.3) along with bed sheet blanket and a pillow. There is a provision to fit the second stretcher equipped similarly at short notice. This is necessary because the stretchers used by the Army units (stretcher light weight folding) are at least 2.25 m long whereas the breadth of the cabin of Chetak aircraft is 180 cm. Therefore it will fit in the helicopter with difficulty as the helicopter doors usually slide shut. By opening a safety screw the doors of the helicopter can be opened upwards, to accommodate say the stretcher light weight folding the handles of which then jut out through openings in the doors (Fig. 21.1)
3. Stretching carriage of patients is often a matter of expediency and the method will involve application of commonsense and improvisations depend upon the exigencies of circumstances. Nevertheless there should always be an element of discipline in the procedure from the point of view of the safety to personnel, patients and aircraft. An outline of a stretcher drill has been discussed which should be regularly practiced so as to become natural under operational conditions and to modify the carriage of patients to suit the circumstances and resources.

4. Generally, the patients for air evacuation are brought in a MT ambulance. They are taken charge of by a stretcher squad who remove the stretcher from ambulance with the patient and then transfer the casualties onto stretcher light weight universal which are afterwards loaded into aircraft and secured. The sequence is the other way round on reaching destination. Essentially there are five steps involved from the time of unloading the patient from MT ambulance to the loading of patient in aircraft.

   (a) **Step I. Stretcher bearer formation**: The squad consists of four stretcher bearers. The men will turn right, break off and fall in the double, on the left. The men will number from left to right (i.e. 1, 2, 3 & 4). No 3&4 bearers will step back 3 spaces to the right to cover No 1 & 2 bearers respectively thus forming the stretcher squad. No 1 will be in charge of the squad. He will stand at the head end of the stretcher on left side (in relation to patient's position). No 2 will be at the head end of the stretcher on right side, No.3 at the foot end on the left and No 4 at the foot end on the right.

   (b) **Step II. Preparation of the aircraft stretcher**: On the order “Prepare Aircraft Stretcher”, No 2 and 4 will lead out in the file and march by the shortest distance to aircraft to bring the aircraft stretcher. On arriving at the stretcher, the bearers stop, grasp both handles of the stretcher with right hand and rise, holding it at the full extent of their arms. No 2 bearer takes the front and the No 4 the rear handle. They place the stretcher on ground and prepare it for receiving the patients. After completion they rejoin the squad.
(c) **Step III.** The Casualty is placed on the stretcher, lifted along with the blanket / bed sheet from the ambulance stretcher mark II.

(d) **Step IV.** The stretcher bearers enter the aircraft and place the stretcher on the stanchion / medical uprights, the outer handle being fixed in the clamps, and the inner handles are placed in the loops of the litter straps (medical bands).

(c) **Step V.** The patient is strapped onto the stretcher.

5. The technique of unloading a lying patient from an aircraft and loading him onto the ambulance will be in the reverse sequence. The following points are to be noted:

   (i) The number of individuals a team of stretcher bearers may vary and the procedure can be modified suitably to facilitate the handling of the stretchers to endure smoothness and speed.

   (ii) Always consult the “standard operating procedure” (SOP) for the particular aircraft in connection with loading and unloading of casualties.

**Important Precautions**

6. The following precautions will be observed:

   (a) At no time should any person / vehicle go near the propellers of exhaust of the engine in case of fixed wing aircraft.

   (b) The ambulance should always be marshalled and backed up to the side or rear loading entrance of the aircraft (as the case may be).

   (c) There should be sufficient space for turn around of a stretcher between the ambulance and the aircraft.

   (d) The ambulance wheel must be choked.

   (e) Too many hands and too much haste hamper smooth operations.

   (f) The ambulance will be unloaded in the following manner:

   (i) Right Lower

   (ii) Left lower

   (iii) Right upper

   (iv) Left upper
(g) The Priority of evacuation will be I, II, IV and III. The patient to be unloaded last will be loaded first. The patient of urgent priority will be loaded last and unloaded first.

(h) Patients in need of in-flight resuscitation / change of dressing are loaded preferably in the middle tier and on the proper side so that the required part is easily accessible during flight.

(j) All sitting patients should fasten seat belts.

GENERAL PRINCIPLES OF STRETCHER SUPPORT FITMENTS

7. Nearly all transport aircraft in Indian Air Force can carry casualties. As far as lying cases are concerned, they are carried on stretchers fitted into aircraft in rows and tiers.

8. Basically, a stretcher is suspended and held fast by means of its four handles. On the inner wall of fuselage, there are latches/clamps provided for locking the outer handles of the stretchers (Fig 22.1). To support inner handles a vertical linear webbing is provided with loops into which the corresponding stretcher handle are fastened with the help of buckled belts (Fig 22.4). These litter straps are normally removable and can be fixed on to the roof and floor of aircraft cabin when required and tension of the straps as well as the level of the loops adjusted.

9. Minor variations may occur in different aircraft. Stretcher bearers should be familiar with individual stretcher support fitments of the respective aircraft.

LOADING/UNLOADING OF CASUALTIES

10. Carriage of casualties as well as their loading and unloading is facilitated by a proper knowledge of the aircraft’s carrying capacity for both sitting and lying cases. The speed, altitude and endurance of the aircraft also have a direct bearing on casualty air evacuation specifically in terms of local terrain, nature & number of casualties and the distance to the referral medical facility. Aeromedical considerations of pressurisation, oxygen equipment and facilities for in-flight nursing are also to be borne in mind. It is therefore imperative to requisition an appropriate aircraft keeping in views operational considerations, such that patients are transported with ease, comfort and as speedily as possible. Loading and unloading of patients as well as proper positioning and fitment of stretchers within aircraft are also important aspects of air evacuation of various aircrafts in use in the IAF for casualty air evacuation and the loading/unloading procedure for each specific aircraft are given as appendices to this chapter.
11. Alouette/Chetak Helicopter (Fig 22.3) can carry a maximum of 4 sitting or 2 lying casualties (with one medical attendant). (Fig 22.4)

(a) Sitting: Sitting casualties are accommodated on the four seats in the rear. (Fig 22.3)

(b) Lying: Lying patients are accommodated on two stretchers fitted at the rear in double tier and the sick attendant will be seated on the third seat adjacent to co-pilot. (Fig 22.4)

12. Loading: The first loading is done on the upper tier. The stretcher rests on the frame as well as on the bracket fitted to the cabin bulk head (Fig 22.5). Both door of the helicopter are first opened. The casualty is carried by the attendants head first from the starboard (right) side and the stretcher placed on the bracket (Fig 22.6). In the same manner, the second stretcher is then put in position on the cabin floor. The nursing attendant’s seat is turned towards the patient after both the stretchers have been fitted. (Fig 22.4) such that he is close to the faces of the casualties which are positioned in the port (left) side of the helicopter.

13. Unloading: After unstrapping the patients, the stretcher on the cabin floor is off loaded first and then the upper one.

14. Sequence of loading of casualties. The following sequence will be followed:

(a) More serious patient is to be loaded on the top stretcher.

(b) Place the upper stretcher on the floor panel side rails

(c) Raise the stretcher and engage the rear bar in the rear clamps

(d) Holding the stretcher by the forward handles, position the upper part of the front support.

(e) Engage the forward bar of the stretcher in the front support saddle fitting.

(f) Close the rear clamps

(g) Slide the lower litter along the guide rail below the upper litter, until it engages in the locating plates.

RESTRICTED
(h) Whenever possible the lower litter patient should be placed “head to port” (left side) side of the helicopter.

(j) Buckle the straps over the patients and tighten moderately.

(k) Hang such medical treatment equipment as may be necessary on swivel snap hooks.

(l) Release the rear door lower catches and hinge the door upwards, slide them forward, finally lowering them so that the stretcher handles fit into the recesses provided in the door panels.

(m) Lock the rear doors. After closing and locking the rear doors the mechanic must ascertain that the knurled guide pins of the lower catches are fully engaged in their holes.

(n) A safety device makes it impossible to open the helicopter doors upwards. It may be necessary to open the doors upwards in the ambulance mode when the handles of the stretchers are longer than the width of the cabin of the aircraft. The safety device includes a screw which must be removed if the doors are required to open upwards. The mechanic must ensure that the knurled pin of the lower catches is correctly positioned.
15. Cheetah helicopter is very versatile.

(a) **Sitting cases** : Three sitting cases are carried in the rear seat. (Fig 22.7)

(b) **Lying cases** : The stretcher in cheetah helicopter is placed along the longitudinal axis. The co-pilot seat is removed to accommodate the stretcher on a bracket. This alteration often tasks time. In an emergency a lying casualty can be carried over short inhospitable terrain reclining on the floor with the casualty’s head in the lap of the medical attendant. (Fig 22.8)
17. MI-8 (Fig 22.10) and MI-17 helicopter have similar capacities for carrying passengers or casualties both lying and sitting as follows:

| Sitting or Lying | 23 (12 (+2 sitting) without internal auxiliary tank) | 15 (06 (+4 sitting) with internal auxiliary tank) |

18. **Sitting Cases.** The port (left) side of the cargo compartment has ten and the starboard (right) side has 11 metallic bucket seats. Two seats are provided at the clamp shell door (Fig 22.11). Eight seats are removed when internal auxiliary tank is required to be fitted for longer endurance.

19. **Lying Cases.** Stretcher are fitted in two rows, port (left) and the starboard (right). Each row has two columns of three tiers (Fig 22.12). The bucket seats are removed, stretcher support pillars on the sides and stretcher support straps in the aisle are fitted.

**Stretcher support fittings**

20. **Stretch Support Pillars.** There are four support pillars on each side. Each pillar has three brackets for supporting handle of the stretcher facing the side wall. These brackets are spring loaded and can be opened by a small lever.

21. **Stretcher Support Straps.** There are four straps for each row. These straps are fitted vertically in the aisle of the cargo compartment. Each strap has three belts with buckles for supporting the other side handles of the stretcher.

**Loading**

22. The sitting patients can board the aircraft from the front door or the rear door but lying patients can only be loaded from the rear door. The order of loading is as follows:

(a) Right fore column - Top tier  
(b) Left fore column - Top tier  
(c) Right fore column - Middle tier  
(d) Left fore column - Middle tier  
(e) Right fore column - Bottom tier  
(f) Left fore column - Bottom tier

23. The right and left aft columns are loaded in similar order.
Unloading

24. The unloading is carried out in the reverse order as follows:-
   (a) Left aft column - Bottom tier
   (b) Right aft column - Bottom tier
   (c) Left aft column - Middle tier
   (d) Right aft column - Middle tier
   (e) Left aft column - Top tier
   (f) Right aft column - Top tier

25. The left and right fore columns are then unloaded in the similar order.
LOADING / UNLOADING OF CASUALTIES – MI-26 HELICOPTERS

26. MI-26 helicopters can carry 60 lying or 82 sitting passengers

27. Sitting Cases. There are 25 folding seats provided on the port (left) side and the starboard (right) side of the cargo compartment. In addition there are two central rows with sixteen seats in the cabin facing the port (left) and the starboard side which are required to be removed for the fixing of central row of stretchers.

28. Lying cases. Stretchers are fitted in four rows. Each row has four columns of four tiers except port row where the foremost column is missing due to the front door on port side of the aircraft.

29. Stretcher support Fittings. There are metal frames which can be fitted in the aircraft. These frames have a vertical pillar on one side with clamps to support one side of the stretcher handles and a nylon strap with loops to support other side of the stretcher handles. For the central two rows, the central pillars are common for rows on either side.

30. Loading of casualties. The sitting patients can board the aircraft from the front door or the rear door but lying patients are always loaded from the rear door. The principle of loading is from the front to the back in a row and from top to bottom in each column. The patients can be loaded simultaneously in two rows i.e., first and second row in the port half, and third and fourth row in the starboard half of the cargo compartment. As a matter of practice after loading the patients in a column the facing column of the opposite row is loaded.

31. Unloading. The unloading is carried out in the reverse order. The principle of unloading is from rear to the front in a row and from bottom to top in each column.

32. Special Instructions. Patients needing in-flight treatment must be placed at second or third tier positions for proper nursing care. Top and bottom tier positions are not comfortable for intense in-flight nursing.
LOADING / UNLOADING OF CASUALTIES – AN 32 (SUTLEJ) AIRCRAFT

33. AN-32 (Sutlej) (Fig 22.13) aircraft can carry 24 lying cases with three attendants or 50 sitting cases/passengers

34. Sitting Cases. There are 50 folding seats provided on the port (left) side and the starboard (right) side of the aircraft. (Fig 22.14) The endurance of the aircraft is only four hours while carrying 50 sitting cases. A toilet can also be attached. (Fig 22.15)

35. Lying cases. For lying cases stretchers are fitted in two rows port and starboard side of the cargo compartment. Each row has four columns of stretchers.

36. Stretcher support Fittings. There are two metal uprights and two medical bands for each stretcher column which can be fitted in the aircraft. The medical uprights are steel pipes fitted vertically in the aircraft. (Fig 22.16) There are three clasps to support one side of the stretcher handles. The medical bands are nylon straps which extend from the roof to the floor of the aircraft. Each medical band has a loop belt to support the other side handles of the stretchers. (Fig 22.17)

37. Loading of casualties. The sitting patients can board the aircraft from the front door or the rear (clamp shell) door of the aircraft. The lying patients are always loaded from the rear door. The order of loading is given as below:-

(a) Right first column - Top to bottom
(b) Left first column - Top to bottom
(c) Right second column - Top to bottom
(d) Left second column - Top to bottom
(e) Right third column - Top to bottom
(f) Left third column - Top to bottom
(g) Right fourth column - Top to bottom
(h) Left fourth column - Top to bottom

38. Unloading. The unloading is carried out in the reverse order. The principle of unloading is from rear to the front in a row and from bottom to top in each column.

39. Special Instructions. Patients needing in-flight treatment must be placed at second or third tier positions for proper nursing care. Top and bottom tier positions are not comfortable for intense in-flight nursing.
LOADING / UNLOADING OF CASUALTIES – IL 76 (GAJRAJ) AIRCRAFT

40. Aircraft versions. There are three versions of IL-76 (Gajraj) aircraft (Fig 22.18)

(a) Version I – In this aircraft 72 lying cases, 38 sitting cases and 4 medical attendants can be carried (total 114)
(b) Version II – In this aircraft 80 lying cases, 7 sitting cases and 3 medical attendants can be carried (total 90)
(c) Version III – In this aircraft 32 lying cases, 12 sitting cases and 1 medical attendants can be carried (total 45)

41. Stretcher support fittings. The cargo compartment is cavernous (Fig 22.19) Six sections of stanchions are fitted for supporting the stretchers. A section of stanchions is formed by two central stanchions, two side stanchions and two beams with belts (Fig 22.20). The stanchions have the spring loaded clamps for supporting one side of the handle of stretcher (Fig 22.21, 22.22). The straps have loops with belts for supporting the other side handles of the stretcher.

42. Sitting cases. The sitting cases are loaded from the front door or the rear door. It is always convenient to load the patient from the rear door due to gentle slope of the ramp. The seats are metallic on port and starboard sides and in the central rows. (Fig 22.19)

43. Lying cases. The lying cases can only be carried after fitment of stanchions (frames). The stretchers are fitted in three rows. Row one is towards the port side wall of the cargo compartment. The second and third rows are side by side with a space between first and second row (Fig 22.20). Each row has six columns of stretchers in four tiers. With this arrangement, all the seats on the starboard side and some seats on port side can be utilised for sitting patients or passengers.

44. Loading/unloading of casualties. The principle of loading is front to back, column and top to bottom tier. The third row is loaded at the last following the same principles. The unloading is done in the reverse order of loading.

45. Special Instructions. Patients needing in-flight treatment must be placed at second or third tier positions for proper nursing care. Top and bottom tier positions are not comfortable for intense in-flight nursing.

46. Safety belt for the sick. Safety belts are provided for securing the patients to the stretcher. These safety belts are two longitudinal and two lateral Capron bands. (Fig 22.20)

47. An emergency surgery table can be provided in the fore side (Fig 22.23)
<table>
<thead>
<tr>
<th>Factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Lying –1 (+1 attendant) Co-pilot seat has to be removed to accommodate a stretcher</td>
</tr>
<tr>
<td>Speed</td>
<td>113 Kmph</td>
</tr>
<tr>
<td>Altitude</td>
<td>23000 feet (8 Km approx)</td>
</tr>
<tr>
<td>Endurance</td>
<td>2h 45 min at ea level 3h 30 min at 16000 feet (5 Km approx)</td>
</tr>
<tr>
<td>Variant</td>
<td>Skid landing gear only</td>
</tr>
<tr>
<td>Oxygen equipment</td>
<td>Portable oxygen bottles</td>
</tr>
<tr>
<td>Merits</td>
<td>Same as Chetak Ideal for high altitude casualty evacuation above 17000 feet</td>
</tr>
<tr>
<td>Limitations</td>
<td>Engine cannot be switched off above 19000 feet Removal and fitment of co-pilot seat is time consuming process and hence the aircraft is not ideally suited for evacuation of a lying casualty</td>
</tr>
<tr>
<td>Pressurisation</td>
<td>Not pressurised</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Lying -3  Sitting -3  In addition one medical attendant in both cases</td>
</tr>
<tr>
<td>Speed</td>
<td>113 Kmph</td>
</tr>
<tr>
<td>Altitude</td>
<td>210000 feet (7 Km approx) service ceiling</td>
</tr>
<tr>
<td>Endurance</td>
<td>2h 55 min with full load at sea level</td>
</tr>
<tr>
<td>Flying</td>
<td>Day and night by VMC</td>
</tr>
<tr>
<td>Winching operations</td>
<td>Winching possible</td>
</tr>
<tr>
<td>Crew</td>
<td>One or two pilots</td>
</tr>
<tr>
<td>Oxygen equipment</td>
<td>Portable oxygen bottle type 5M and with mask type 6M Oxygen supply lasts for 3h when in use.</td>
</tr>
<tr>
<td>Merits</td>
<td>Suited for casualty evacuation The aircraft can land in snow or water with skis and float type landing gear respectively</td>
</tr>
<tr>
<td>Limitations</td>
<td>Altitude ceiling is 21000 feet for flight and 165000 for starting the helicopter.</td>
</tr>
<tr>
<td>Pressurisation</td>
<td>Not pressurised</td>
</tr>
</tbody>
</table>
### TECHNICAL INFORMATION MI-8 and Mi-17 HELICOPTERS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td><strong>Factor</strong></td>
</tr>
<tr>
<td>Lying –12 (+ 2 sitting)</td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td>Sitting -23</td>
<td>With internal auxiliary tank fitment</td>
</tr>
<tr>
<td></td>
<td>Lying - 6 (+4 sitting)</td>
</tr>
<tr>
<td></td>
<td>Sitting - 15</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>386 Kmph</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>13000 feet (4.5 Km approx) service ceiling</td>
</tr>
<tr>
<td><strong>Endurance</strong></td>
<td>With auxiliary tank – 3 h 15 min</td>
</tr>
<tr>
<td><strong>Flying</strong></td>
<td>Day and night by VMC</td>
</tr>
<tr>
<td><strong>Winching operations</strong></td>
<td>Winching possible</td>
</tr>
<tr>
<td></td>
<td>Length of cable – 40m</td>
</tr>
<tr>
<td></td>
<td>Haulage capacity – 150 Kg or one man</td>
</tr>
<tr>
<td><strong>Crew</strong></td>
<td>Two pilots one flight engineer and one gunner</td>
</tr>
<tr>
<td><strong>Oxygen equipment</strong></td>
<td>Portable oxygen which is continuous flow type.</td>
</tr>
<tr>
<td></td>
<td>The oxygen lasts for 45 min on automatic mode and 10-15 min on emergency mode.</td>
</tr>
<tr>
<td></td>
<td>4-5 sets of oxygen equipment can be carried. Each set has 3 cylinders.</td>
</tr>
<tr>
<td><strong>Helipad dimensions</strong></td>
<td>Sea level to 1500m – 35m x 75m</td>
</tr>
<tr>
<td></td>
<td>1500m to 2500m - 35m x 1000m</td>
</tr>
<tr>
<td></td>
<td>2500m to ceiling – 35m x 150 m</td>
</tr>
<tr>
<td><strong>Pressurisation</strong></td>
<td>Not pressurised</td>
</tr>
</tbody>
</table>

### TECHNICAL INFORMATION MI-26 HELICOPTERS

<table>
<thead>
<tr>
<th>Factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td><strong>Factor</strong></td>
</tr>
<tr>
<td>Lying –60</td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td>Sitting -82</td>
<td>With internal auxiliary tank fitment</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>300 Kmph</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>13000 feet (4.5 Km approx) service ceiling</td>
</tr>
<tr>
<td><strong>Endurance</strong></td>
<td>3 h 30 min</td>
</tr>
<tr>
<td><strong>Winching operations</strong></td>
<td>Winching possible</td>
</tr>
<tr>
<td><strong>Crew</strong></td>
<td>Two pilots, one Navigator, one Flight Engineer and one Gunner</td>
</tr>
<tr>
<td><strong>Oxygen equipment</strong></td>
<td>Portable oxygen equipment. (Oxygen globes fitments for 20 oxygen globes)</td>
</tr>
<tr>
<td><strong>Pressurisation</strong></td>
<td>Only crew cabin pressurised</td>
</tr>
</tbody>
</table>
### Technical Information IL-76 (Gajraj) Heavy Transport Aircraft

<table>
<thead>
<tr>
<th>Factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>225 fully armed combatant passengers. When aircraft is used in air ambulance mode it has the following capacity:-</td>
</tr>
<tr>
<td></td>
<td>(a) Version I - Lying – 72</td>
</tr>
<tr>
<td></td>
<td>Sitting – 38</td>
</tr>
<tr>
<td></td>
<td>Medical attendant – 4</td>
</tr>
<tr>
<td></td>
<td>Total – 114</td>
</tr>
<tr>
<td></td>
<td>(b) Version II – Lying – 80</td>
</tr>
<tr>
<td></td>
<td>Sitting – 07</td>
</tr>
<tr>
<td></td>
<td>Medical attendant – 3</td>
</tr>
<tr>
<td></td>
<td>Total – 90</td>
</tr>
<tr>
<td></td>
<td>(c) Version III – Lying – 32</td>
</tr>
<tr>
<td></td>
<td>Sitting – 12</td>
</tr>
<tr>
<td></td>
<td>Medical attendant – 1</td>
</tr>
<tr>
<td></td>
<td>Total – 45</td>
</tr>
<tr>
<td>Speed</td>
<td>750 Kmph</td>
</tr>
<tr>
<td>Altitude</td>
<td>36000 feet (12 Km approx) service ceiling</td>
</tr>
<tr>
<td>Endurance</td>
<td>10 h</td>
</tr>
<tr>
<td>Oxygen equipment</td>
<td>Provision of oxygen supply to all patients exists in the aircraft. Portable oxygen equipment is also available</td>
</tr>
<tr>
<td>Pressurisation</td>
<td>Aircraft fully pressurized</td>
</tr>
<tr>
<td>Range</td>
<td>10,000 Km</td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATION OF STRETCHER LIGHT WEIGHT UNIVERSAL

1. The stretcher which is used in the air force has the following specifications:

(a) It is a collapsible stretcher fabricated out of light weight aluminium alloy tubular poles (Fig 22.24). The stretcher can be fitted in most of the current transport aircraft and helicopters in IAF. The stretcher can also be transferred from motor evacuation mode to air evacuation mode and vice versa without a change of stretcher,. This will save time and ensure easy and comfortable handling of the patients during evacuation.

(b) Detailed specifications:

<table>
<thead>
<tr>
<th>Ser No</th>
<th>Factor</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Length of stretcher</td>
<td>225.0 cm</td>
</tr>
<tr>
<td>2</td>
<td>Width of stretcher</td>
<td>58.8 cm</td>
</tr>
<tr>
<td>3</td>
<td>Length of canvas</td>
<td>179.0 cm</td>
</tr>
<tr>
<td>4</td>
<td>Outer diameter of stretcher poles</td>
<td>36.0 cm</td>
</tr>
<tr>
<td>5</td>
<td>Thickness of stretcher poles</td>
<td>3.15 cm</td>
</tr>
<tr>
<td>6</td>
<td>Height of stretcher</td>
<td>15.0 cm</td>
</tr>
<tr>
<td>7</td>
<td>Weight of stretcher (approx)</td>
<td>8 Kg</td>
</tr>
</tbody>
</table>
CARRIAGE OF SPECIAL TYPES OF CASUALTIES

1. As a general rule, casualty on a stretcher will be carried feet foremost, except, when climbing a step accent, (including stairs), loading an ambulance, vehicle or within hospitals.

2. Normally a patient will be placed on his back on the stretcher with his pack or haversack under his head as a pillow (if it is not contra-indicated, say as in “shock”). The following types of wounds require special position for carriage on stretchers:

   (a) Fracture of the cervical, dorsal or lumbar spine. Placing a hard (or even soft) cervical collar if indicated may help prevent untoward movement of the cervical spine.

      (i) Orthoscoop stretcher. (Fig 1.5) Ideally the casualty should be evacuated on this stretcher. The casualty should be log-rolled onto a blanket if necessary. The two blades of the stretcher are separated. One blade is placed adjacent to the casualty on either side and the blades gently clipped on. The casualty automatically comes on the stretcher. The casualty is strapped.

      (ii) Non-spinal Service/ Modern or Improvised stretchers. The casualty should be carried in the position it was found, in supine position if the casualty is found lying on its back, or prone position if the casualty is lying prone / semi prone. This is to avoid giving the casualty any particular position, and thereby exposing him to unnecessary abnormal movements to the (suspected) unstable spine. The casualty should be log rolled onto a blanket and the blanket placed on the stretcher keeping it taut. The sides of the patient should be immobilised with light sand packs / pillows.

      (iii) Suspected Fracture of Cervical Spine Without a Cervical Collar and Orhtoscoop Stretcher. Situation may arise when the cervical collar or Orthoscoop stretcher may not be available. In such situations the casualty should be log-rolled onto a blanket and loaded onto a stretcher keeping the blanket taut. One soldier should keep the head steady with head slightly extended. A strap made from folded triangular / wide bandage which should be passed under the chin and the end secured to the runners on either side. (Fig 23.1) small sand packs should be placed on either side of the head.
(iv) **Abdominal wounds.** Such war wounds may involve, haemorrhage from the vessels, rupture of the solid / hollow viscera, and spilling out of the intestines. The casualty is likely to be in "shock". The intestines should be wrapped in a sterile / clean cloth soaked in saline/ warm water). The casualty should be transported supine (Fig 23.2)/ on his side with hips and knees flexed.

(v) **Chest Wounds.** Casualties with such wounds should be evacuated lying on the injured side (Fig 23.3). This way any flail segment gets “fixed”. Such a positions enables the casualty to cough up blood/ secretions easily as well.

(vi) **Wounds of the Face.** The casualty should be placed face downwards with his head projecting over the end of the canvas. His forehead should be supported by a broad bandage/ belt tied between the handles of the poles. The object of this is to prevent danger of suffocating from loss of control of tongue or haemorrhage. (Fig 23.4)

(vii) **Head wounds.** The injured part must not press against any part of the stretcher. Unconscious casualties must be placed prone to prevent choking. Such casualties may also be evacuated with the head turned to one side provided concomitant cervical spinal injury has been ruled out. (Fig 23.5)
CHAPTER VIII

LESSON 24

CARRIAGE OF CASUALTIES OVER OBSTACLES

1. **Evacuation of Casualties Over Obstacles.** No attempt should be made to carry a casualty over an obstacle if it can be avoided. It must be ensured that the patient is strapped well to the stretcher. Should the stretcher not have built-in straps, straps can be devised using the casualty’s belt or any cloth or a triangular bandage. The natural obstacles encountered in the field are as follows:

   - A high wall like rock face or a fence
   - A ditch or a ravine
   - Water obstacle.

2. **Crossing a Wall or a Fence.** As soon as a wall or a fence is reached, the front handles of the stretcher should be rested on the wall or the fence (if possible) and the stretcher maintained in position by the stretcher bearers in the rear, the bearers in the front crossing the wall. All the bearers lift the stretcher together and move it forward until the rear handles can be rested on the wall and level maintained by the bearers in the front. The rear bearers then cross the wall and the carriage of the stretcher is resumed.

3. **Crossing a Ditch or a Ravine.** On arrival at the ditch, the stretcher will be lowered as near the edge as possible. The two bearers at the front end of the stretcher descend into the ditch. All four assistants, lifting together descend into the ditch. All four assistants, lifting together move the stretcher forward, until the rear handles can be rested on the near edge of the ditch. The rear bearers now enter the ditch. Again all working together, the stretcher is lifted until the front handles are resting on the far side. By similar movements the stretcher is lifted out of the ditch on the far side and the march is resumed.

4. **Water obstacle.** On occasions a casualty may have to be carried across an formidable stream or a fast flowing hill stream or lakes or ponds which may necessitate a long time consuming detour. On such occasions some of the older cumbersome methods are mentioned in passing. They may be used as a last resort. These are as follows:

   - **Flying Fox.** This is used to convey a casualty over a canal, or a stream about a width of about 45 metres. (Fig 24.1)

   - **Aerial Ropeway.** More of it is used to convey casualties over longer distances e.g., from one hill feature to another (Fig 24.2)
(c) Burma Bridge. It is used to carry casualties over deep ravines or nalas (Fig 24.3).

(d) Ferries. The Engineers can establish a Ferry to cross a water obstacle (Fig 24.4). Improvised ferries can also be made to cross short calm water obstacles, with the following (not without risk):

(i) Stretchers and tarpaulins
(ii) Empty jerricans
(iii) Bamboos and logs of wood tied together, and such other types.

5. The Engineers’ services can be requisitioned in making bridges over the obstacles. The casualties however will be very apprehensive when they are evacuated using such means as the Flying Fox or the Aerial ropeways. Inflatable rubber ding / any other type of float may be provided by the Engineers for crossing the obstacle.
Aim

1. The aim of this lesson is to bring out the peculiarities of mountainous and High Altitude Areas, and special methods, equipments and modern techniques used for evacuation of casualties here.

General

2. Effects of Cold. Shock is aggravated by exposure to cold. The stretcher bearers will ensure that the casualty is suitably wrapped in blanket(s). If casualty evacuation bags are available they will be used. The patients sleeping bag may be used alone or if required to keep the casualty additionally warm. Body parts of casualties with cold injuries should be kept dry and warm with dry woollen socks and suitable gloves. Casualties with frostbite on the feet will be evacuated on stretchers.

3. Effects of Altitude. The altitudes at which the troops may have to be deployed may range from 8000 to 23000 feet with winter temperatures ranging from minus 35º C to minus 55 ºC in some regions. The rarefied atmosphere of high altitude present low oxygen tension which causes early fatigue on exertion. Hypobaric hypoxia, low environment humidity and high solar ultra violet radiation compound the hardship faced by the troops. A satisfactory acclimatization schedule exists for hypobaric hypoxia. Due to the fatigue factor specialised stretcher like the basket stretcher are to be used for casualty evacuation in the snow. Also modern equipment like the snow mobiles could also be used for casualty evacuation.

Difficulties in Progression.

4. The evacuation of casualties in mountainous terrain presents multiple problems. In additional to the task of carrying a casualty to the nearest medical aid post, there is imposed difficulty of evacuation of casualty over rough terrain and inhospitable weather conditions.

5. The proportion of stretcher wounded to walking wounded is increased in mountainous terrain since even a slightly wounded individual may find it extremely difficult to climb or descend over the rugged terrain. Because of this
added exertion and increased pain, it may be necessary to transport a casualty by stretcher who would normally be able to return to the medical aid post by himself.

6. In cold weather and in high altitude areas, speed of evacuation is vital as there is marked increase in the possibility of shock among battle casualties when injuries occur in extreme cold weather conditions.

7. Special consideration must be given to the conservation of manpower. Stretcher hauls must be kept as short as permitted by tactical situation and physical capability of the stretcher bearers. A Stretcher-bearer team is not capable of carrying a casualty over mountainous terrain and high altitude for the same distance as over flat territory.

**Principles of Evacuation**

8. The following principles must be adhered to while evacuating the casualties in the mountainous and high altitude areas:—

   (a) Select the shortest (established) available route.
   (b) Avoid unnecessary handling of the casualty.
   (c) Evacuate the casualty earliest and by fastest means.
   (d) Protect the casualty from aggravation of injury while evacuation

**Pre-requisites of Evacuation of Casualties**

9. **Techniques.** Personal involved in evacuation of casualty must be aware of the technique of evacuation of casualty from difficult portion of the rock/ cliffs chimney/ narrow gorge and inaccessible areas. More often the chances are that the casualty may be lying off the road axis where neither a helicopter can reach nor a vehicle can ply. In such a situation the personal where neither the helicopter can reach nor the vehicle can ply. In such situation the personnel present at the site have to do the evacuation till the nearest communication center. The extricating the casualty out of the difficult area need special techniques and equipment. Therefore the knowledge of technique of evacuation and handling of casualty assume significance.

10. **Equipment.** Evacuation of casualty can be facilitated if the troops operating in such inhospitable terrain are equipped with suitable equipment. Units and subunits must be equipped with casualty evacuation equipment depending upon the terrain and the mode of transport available for casualty evacuation.

11. **Training.** Apart from this the troops must also be trained enough to handle the equipment with ease to provide maximum comfort to the casualty.
Peculiarities of Casualty Evacuation in the Mountains

12. Wind Chill Factor. The injury is further aggravated by wind chill factor in terms of injury turning into frostbite, hypothermia, and pneumonia. It also makes the patient uncomfortable and psychologically he feels that the pain is unbearable. This adds to overall deterioration in the condition of the casualty.

13. Anxiety/Phobia. Even through the injury may not be serious but the environment around him makes him feel as though he is unlikely to make it to the hospital considering the hazard of evacuation and the distances involved.

14. Mode of Evacuation. Poor communication system in high altitude and mountainous terrain limits the options of evacuation by fastest means. At times the chain is too long and casualty has to be evacuated by more than one agency e.g., stretcher-bearer, mule, vehicle, boat, helicopter. Handing by so many agencies often irritates and make the casualty uncomfortable.

15. Isolation. Injury separates the soldier from his buddy and subunit that gives him feeling of isolation.

Points to Be Kept in Mind

16. Before the casualty is evacuated to the RAP following points must be kept in mind to ensure that the condition of the casualty is prevented from further deterioration due to prevailing conditions:-

   (a) Prevention from Exposure to Cold. Wrap up the casualty in a survival blanket or warm clothing/sleeping bag/rescue bag.

   (b) Protection from Rain/Snow and Hail. Casualty must be protected from getting wet by providing him the waterproof and wind proof outer layer. Endeavour should be made to cover his entire body and no part should be exposed.

   (c) Resources. The resources for evacuation of casualties must be earmarked and make available based on the knowledge of the type of terrain and weather conditions,

   (e) Location of Medical Aid Post. Consideration the distance and the degree of difficulty in evacuation, the location of Medical Aid Posts (MAPs) must be sited in a manner that the casualty is given medical aid at the earliest possible time. Preferably it should be in the chain of evacuation.
Extrication of casualty from the Cliff/Crevasse/Rock

16. Methods adopted to extricate the casualty to a safe place are enumerated below:-

(a) **Devil Lift.** This technique is used when the casualty is stuck in a wide chimney and crevasse. The idea is to lift the casualty straight in the centre so that rock and ice on either side do not aggravate the injury. This is also useful when there is a need to extricate the dead body stuck deep inside the crevasse or gorge. The details of the methods used are as under (Fig 25.1):-

(i) **Preparation of Bases.** Prepare two normal rock/ice bases on either side of the crevasse or the chimney. The side towards which the casualty is to be evacuated will have the base with N method and the casualty is accordingly anchored with the rope and pulley. At the end of the rope three to four rescuers will anchor the rope with the help of Jummar. These Jummars will be subsequently used for pulling the casualty by the rescuers. On the other side, the rope will be anchored with the help of a descender and the rope is locked at the time of the extrication of the casualty. This end will act as a safety belay to the casualty and will only become active when the casualty is to be finally pulled to the side it is desired to be taken out (Figs 25.2, 25.3 and 25.4)

(ii) **Rescue Activity.** Endeavour is to lift the casualty in the center to avoid being rubbed or crushed on either side of the rock/ice. Once the casualty is properly anchored, the leader of the rescue party will constantly keep a watch over the casualty to prevent blind pulling. He will keep directing the party to stop or start. If need be a rescuer will be lowered to guide the casualty side ways if there are chances of the casualty getting stuck in a crack or boulder. Thereafter the rescuers will commence pulling of the casualty with a smooth pull to prevent jerks. Once the casualty if lifted in the center out of the crevasse or chimney (Fig25.5) the rescuer who is sitting on the other side with the locked rope will slowly release the rope from the descender and the three rescuers on the other side will slowly pull the casualty with help of the Jummars. The moment casualty has reached the desired side the rope being locked by Jummar will be anchored and the three rescuers will lift the casualty out of the crack and place at a safe place for further evacuation. Thereafter the actions are same as explained above.
(iii) **Equipment.** The items required for the casualty evacuation by devil lift is as under:-

(aa) Carabineer - 05
(ab) Jummars - 05
(ac) Pulley - 02
(ad) Descender - 02
(ae) Slings - 02
(af) Ropes - 02

(b) **Hauling Line Method.** This is a simple method when casualty is to be lifted over the river, horizontally, vertically or lowering from height to a lower slope. Depending upon the availability of the anchors two anchors are made on either side of the river or slope. Methods of making the bases are similar to that of Devil lift. The ropes on either side are locked and should be as tight as possible. Endeavour should be to ensure that there is no slack on the rope. Once the bases are ready and rope is tied as either side thereafter the casualty is either put in a UT 2000 stretcher/Alpine Basket. With the help of straps the casualty is strapped to the stretcher. The stretcher is thereafter placed on the fixed rope with the help of two pulleys and a rope should be given on either side so that the stretcher can be pulled or released carefully. If the casualty is being pulled upward or downward the stretcher rope will be anchored with the help of the Girigir or Jummar for controlled ascent or descent. On reaching the far bank the stretcher is taken out of the fixed rope and placed at safe place for further evacuation.

(c) **Single Pulley Single Jummar.** If the casualty is not too deep, in the crevasse or chimney, the casualty can be pulled out by a simple method using a belay rope and a single pulley and single Jummar.

(d) **Double Pulley Double Jummar.** When the casualty is comparatively deeper and added safety is required, two pullies and two Jumars are required to extricate the casualty.

(e) **UT 2000 Sledge.** UT 2000 is the modern stretcher (Fig 25.6) which weights 7 kg, it is detachable in two part which weights 3.5 kg each and can be taken as rucksack on the back (Fig 25.7). Accessories available with UT 2000 are as follows:-

(i) **Vacuum Immobiliser.** It immobilises the casualty, in conditions like limb fracture and head injuries.

(ii) **Attachment for Helicopter Winch Evacuation.** This attachment is useful under the circumstances when helicopter cannot land but can winch up the casualty under slung.
(iii) **Ski Sledges.** These are especially used when the casualty is required to be evacuated over the snow surface. Maximum three skiers are needed to evacuated the casualty.

(f) **Preparation of the Casualty in UT 2000.** (Fig 25.8)

(i) Assemble the UT 2000 with the help of locking device.
(ii) Place the casualty over vacuum immobiliser/sleeping bag/survival blanket/normal blanket depending on the condition of the patient and which ever is available.
(iii) Now, place the casualties over UT 2000 and strap up the casualty with the help of straps attached and ensure that the casualty should be in a comfortable position.
(iv) Now, the case is ready for the final evacuation (Fig 25.9).

(g) **Alpine Basket.** This is used when stretcher UT 2000 or other modern stretchers are not available. It is an improvised method of making a casualty evacuation bag. The following procedure is used to make an Alpine Basket:-

(i) About 100 to 150 feet multipurpose/climbing rope is required.
(ii) Fold the rope into two layers and lay it on the ground in a zigzag manner at least 08 to 10 folds depending on the height of the casualty.
(iii) Place the mattress/Blanket over the rope.
(iv) Place the casualty over the Blanket with some hard sheet below the head and neck.
(v) Fold the Blanket/ Mattress over the case from both the side.
(vi) Start tying the rope, so that the casualty can be wrapped up in the Blanket and after putting the knot near the umbilicus, put the carabineer as this place this place so that it can be anchored for evacuation by Helicopter/Hauling line/Rope way method (Fig 25.10 and Fig 25.11).

17. **Evacuation of Casualty from Steep Cliff.** Situation may arise when casualty may be required to be brought down over a steep cliff/overhang/slope. The method which would be adopted are as under ;-
(a) **Piggy Black Method.** In this method casualty is tied on the back of a fellow rescuer. Initial preparation of making bases is same. (Fig 25.2, 25.3 and 25.4). Thereafter the rescuer and the casualty are belayed down by another rescuer. The rescuer who is carrying the casualty will use a descender for controlled descent. This method is generally used when the casualty is conscious and can balance himself on his colleague’s back.

(b) **Rope Way.** Preparation of bases is same. (Fig 25.2, 25.3 and 25.4). The rescue party prepares two bases, one on top and another at the bottom. Thereafter a single or double ropeway is fixed with the already prepared bases. Ropes making the ropeways are tightened with the help of a pulley. Once the ropeway is ready UT 2000 is placed on the ropeway tied on both the ends with ropes to pull and break (Belay). This way casualty can be lowered over a rock, across gorge or a river (Fig 25.12) and can even be vertically lifted up.

(c) **Baby Carriage.** Preparation of bases is same (Fig 25.2, 25.3 and 25.4). The casualty is anchored with a belay rope and thereafter the rescuer and casualty is fixed to each other’s harness with the help of a carabiner. So that the casualty and rescuer are not separated when descending over a steep rock/overhang. To control the descent of the casualty rope breaker (Girigiri) is used by the rescuer. The rescuer keeps releasing the lever of Girigiri and at the same time rappel in the same speed as of the descent of the casualty. Wherever, the rescuer is tried, he locks the lever of the Girigiri and can halt and relax on the steep rock. The casualty can be brought down by this method tied in a harness or even in the alpine in the basket. (Fig 25.13 and 25.14)

18. **Helicopter Evacuation.** UT 2000/ Stretcher will be placed and anchored to prevent rocking. If the space does not permit the casualty can be winched up as well. Attachment slings for winching will be attached with UT 2000 and Casualty fully secured once the helicopter is hovering overhead the casualty on UT 2000/Alpine Basket will be attached with the anchor/rope and attached with the helicopter. Care must be taken that helicopter gains the height gradually. Do not allow swinging of the stretcher so that the patient does not swing sideways. Helicopter should gain the speed gradually and with the uniform speed. In this mode wherever there is a suitable place for landing the casualty can be placed inside. Under sling method will only be resorted if helicopter cannot land or enemy is located close by.

19. **Ski Sledge.** On snow when there are no other means of transportation ski sledges will be made use of. (Fig 25.15) Once the casualty is placed over the UT 2000 two skiers can evacuate the casualty as shown. The leading skier is a guide and rear skiers are the controllers.
20. **Mechanical Transport Evacuation.** Once the Casualty is brought to the road head the casualty should be transferred to the vehicle from ski sledge or other mode of casualty evacuation. No special preparation is required for this purpose since all the ambulances are equipped for handling the casualties. The following specialist vehicles can be used for transportation of casualties over the snow.

(a) **Over Snow Vehicle.** Over Snow Vehicle (OSV) (Fig 25.16) has a snow clearing blade which is in 3 parts and interlinked by hydraulic linkages and can be moved from cabin by Driver. The crew and passengers cabin are centrally heated, the window screen and all other glasses(window and doors) & rear view mirror are laminated and have electrical cords for heating the glass which melts fresh snow falling on glass. It can be driven in normal areas at 20 kmph and in snow bound areas at 10 kmph. The passengers cabin can be used for carriage of casualties as follows :-

- (aa) Sitting - 16-18
- (ab) Lying - 04
- (ac) Combination - Sitting 8 and Lying 2

(b) **Snow scooter.** One or two sitting casualties can be carried

**Conclusion**

21. Casualty evacuation from High Altitude /Mountainous /Rock /Snow bound area is a difficult and challenging task. However, technical skills and knowledge of evacuation methods can save invaluable lives of the comrades in arms.
CARRIAGE OF CASUALTIES IN COUNTER INSURGENCY OPERATIONS

General

1. Carriage of casualties in a counter insurgency operational environment will be affected by the following:-

(a) **Modus Operandi of Insurgents, Militants.** The insurgents may use following methods of operations:-
   (i) Laying one or more ambushes.
   (ii) Sabotage & Subversion.
   (iii) Attack on isolated and lightly held posts of security forces.
   (vi) Attack to kill senior officials of security forces.

(b) **Pattern of Deployment of Security Forces.** The counter insurgency forces would generally be deployed in under developed areas in plains, jungles, riverine or mountainous terrain.

(c) **Threat of ambush or Improvised Explosive Devices (IEDs).** IED blast along the road may force vehicles to travel in convoys with armed escorts and prior road opening or sanitisation are essential prerequisites before permitting move on that road stretch.

(d) **The conduct of operations.** The operations would generally be conducted at coy level at short notice, though at times a larger force may also be deployed for specific mission. These may involve the following:-

   (i) Cordon & search.
   (ii) Patrolling, ambush & raids.
   (iii) Search & destroy operations, special missions or flushing out operations.
   (iv) Road opening, area sanitation and convoy protection.
   (i) Security of vital installations, areas or VIPs.
   (vi) Area domination, spot check/mobile check post, security of own area and quick reaction operations.
   (vii) Seek encounter or counter infiltration operations.
   (viii) Civic action programs to win over the hearts and minds of the civilian population.
Factors Affecting Carriage of Casualties.

2. Carriage of casualties will be influenced by the following characteristics:-

- (a) Unrecognisable Enemy.
- (c) Use of variable tactics and area of operations by insurgents.
- (d) Restricted level of combat.
- (f) Initiative always being with the insurgents
- (j) Number of casualties.
- (k) Type of casualties.

3. Dispersion and methodology of ops of security forces demands a meticulously planned casualty carriage plan to ensure effectiveness with the following:

- (a) Flexibility.
- (b) Mobility.
- (c) Quick reaction capability.
- (d) Co-ordination and co-operation with the users.
- (e) Arrangements for adequate rest and recoup for medical and para medical staff.

Carriage of Casualties.

4. Anti national elements (ANE) may not resort to pitched battle. Hence, medical assistance can generally be given at the site of injury after some time. To reduce the incidence of Killed in Action (KIA) as a percentage of total casualties, the policy of scoop & scoot will have to be adopted.

- (a) **Surface evacuation of casualties.** This would in certain situation require specialised vehicles like the mine protected vehicle (MPV) (Fig 26.1 and 26.2) This vehicle is bullet proof and can withstand the impact of IEDs and land mines to a great extent. In an emergency it can carry five lying casualties placed on orthoscoop stretchers (Fig 26.3) or 12 sitting casualties (Fig 26.4)

- (b) **Air evacuation of casualties.** High risk casualties may have to be evacuated directly to nearest military/Base Hosp by suitable rotary / fixed wing aircraft.
Nuclear Warfare

1. In nuclear warfare the main problems encountered in evacuation of casualties are as follows:-

   (a) The large number of casualties occurring at a time.
   (b) The danger to the stretcher bearers from ionising radiation.
   (c) Allotment of priorities for evacuation.
   (d) Decontamination of casualties.
   (e) Modes and means of transportation of casualties after first aid.
   (f) Need of protective shelter with the medical units.

2. From figures based on bombings in Japan, it is estimated that, a nuclear bomb directed at a major centre of population and industry, will cause 50,000 deaths and 50,000 wounded. This would cause serious demoralising effect. To evacuate these casualties to the treatment centres that survive the nuclear attack, would require large number of well trained, disciplined and physically fit stretcher bearers. Such medical units which are in the vicinity and survive the nuclear attack will have to evacuate the casualties on new chain of evacuation which will be based on area and degree of brunt damage borne.

3. Great majority of casualties from a nuclear attack would be due to blast and burn injuries. It is estimated that only 15% casualties would be due to ionising radiation. Monitoring squads would declare a particular area safe. Only then would the stretcher bearer squads enter the area. Yet they will be exposed to risk of ionising radiation from contaminated casualties. They will therefore have to wear personal protective clothing, gloves and footwear as well as respirators. These will however hamper their movements and reduce their efficiency. NCOs of the squads may be provided with personal monitoring instruments. The need for intensive training and physical fitness is of great importance. Rapid movement should be planned in complete disregard of hitherto exaggerated “radiation hazard.”

4. In a nuclear airburst, the following effects occur:-
   (a) Blast effect - the area within 1 km radius has severe blast effect, the next 1.4 km has severe damage, and the area beyond 2.4 km has little damage.
(b) Thermal effect – The inner zone of 2 km radius all persons would die due to heat, burns, blast and fires. Next 2.1 km would have 50 % persons having deep burns.

(c) Radiation effect – Inner zone of 1.4 km would have exposure to 1000-8000 rads (3000-8000 rads – immediate incapacitation death in 4-6 days; > 8000 rads exposure – immediate incapacitation, death in 1-2 days). The zone of next 1 km will have exposure less than 1000 rads (upto 650 rads – incapacitation in 2-4 hours, death in weeks.

5. Casualties with a reasonable chance of survival should be evacuated first. Valuable effort should not be spent on moribund patients. The prioritisation for NBC casualties are as follows:

   (a) Priority I - Patients needing immediate care
   (b) Priority II - Patients whose surgical treatment could be delayed
   (c) Priority III - Patients whose treatment could be on extended delayed basis
   (d) Priority IV - Moribund patients

Biological warfare

6. Various types of microbes are used for causing disease in man and animals. Problems that will arise in the evacuation of the biological warfare casualties, will be the same as are encountered in carriage of known infectious diseases.

Chemical warfare

7. The stretcher bearers will have to be efficient in adjustment of NBC clothing, equipment and in stretcher exercises.

   (a) The stretcher bearers should practice mock casualty evacuation with patients labelled as to indicate:
       (i) Wounds which will not interfere with the adjustment of the respirator.
       (ii) Wounds which will interfere with the respirator; head, chest or abdominal wounds.
       (iii) Gas casualties
       (iv) Contaminated clothing or equipment in addition to (i) (ii) or (iii) above.

   (b) The instructor will indicate gased areas or gas attacks.

   (c) The bearers will wear NBC Suit with respirator in “alert” position
(d) Bearers will be instructed on the urgency of need of protecting themselves and the patients from gas and contaminated material, and preventing the contamination of the stretchers and the blankets. Contaminated gloves should be removed as soon as possible and hands treated with decontaminating agent, before clean gloves are worn.

(e) No 1 bearer will be responsible for protecting the patient from gas. A respirator will be placed on the patients face, and adjusted. No 3 will render first aid.

(f) The respirators will be immediately when the gas is detected. No word of command will be given. When possible the squads will carry the patients out of the gas areas as soon as possible. The patients condition may be assessed the following:-
   (i) Colour of his ear
   (ii) The movement of his chest and breathing sounds heard at the outlet valve.
   (iii) Pulse at the neck/ wrist

8. Instructions for loading the stretchers. On reaching the patient the squad will proceed as follows:-

   (a) If gas is present, respirators will be adjusted.
   (b) If gas is not present:-
      (i) Patient unable to adjust his face piece. No 1 bearer will adjust the patients face piece. The patient will continue to wear the face piece until exposed to the risk of gas attack.
      (ii) Patient able to adjust the face piece. No 1 bearer will remove the casualty’s face piece from his haversack and place it on his chest so that he can rapidly obtain protection from gas.

   (c) When the casualty’s clothing and equipment is contaminated by blister agents:-
      (i) No 1 bearer will examine the casualty and decide how far it is essential to remove the clothing / cut out the contaminated areas. The casualty should also not be unnecessarily exposed to the weather conditions which may increase the danger of shock
      (ii) Nos 1 and 3 bearers will remove the contaminated areas of the clothing, and apply anti blister agents
      (iii) No 2 bearer will cover the stretcher with additional anti-chemical cape / canopy and so protect it from contaminants from patients clothing.
      (iv) The casualty will be placed on the stretcher.
      (v) No 2 will cover the casualty and his equipment with the patients anti- gas cape.
(vi) No 3 bearer will place the contaminated clothing and equipment at the foot end of the stretcher.

Special cases

(d) Casualties with head injuries. In many conditions dressing of the head can be held in place by the face piece or the head harness without interfering with the gas protection. Unnecessary dressings and bandages will not be applied. Should there be a point of leakage, it should be blocked by additional dressings outside the face piece. The danger of suffocation from bleeding / tongue falling back must be taken care of. The casualty is carried with head turned to one side.

(e) Casualties with wounds of the chest or abdomen. The danger of suffocation from bleeding / tongue falling back must be taken care of. The casualty is carried with head turned to one side.

(g) Casualties from choking agents. These casualties if wearing respirators will be carried in the same manner as those with chest or abdominal wounds.

9. Instructions for unloading of the stretchers when the casualty is contaminated. The stretcher will be lowered. Contaminated clothing or equipment will be placed in a receptacle allotted for this purpose. No 1 bearer will be responsible for patients valuables, and personal effects. Nos 2, 3 and 4 will pass their hands between the stretcher and the anti chemical cape and lift the patient on to their knees with the assistance of No 1 bearer.

10. Casualty bags. Enough number of casualty bags are required to be made available to the medical units for the evacuation of the casualties after treatment, to prevent re-exposure while crossing contaminated areas while evacuating the casualties.