

Putting It All Together

This chapter “puts it all together,” the process of air medical transport of patients. From pre-planning and making the decision to transport a patient by air, to the final transfer of patient care at the receiving facility, the air medical escort will acquire an understanding of the entire process and his/her role in the overall success of air medical missions.

Learning Objectives

Upon completion of this chapter, the students should be able to:

- ▶ Discuss how to “package” patients for air medical transport.
- ▶ Describe the three stages of flight.
- ▶ List the tasks involved in each stage of flight in an air medical mission.
- ▶ List 14 important questions air medical escorts should answer during preplanning.
- ▶ Explain five logistical considerations in loading and unloading patients in stretchers onto light aircraft.
- ▶ List seven factors involved in transfer of patient care.

Preparation of Patients for Air Medical Transports

Decision to Transport by Air

There are no absolute contraindications to air evacuation. There also are no patients for whom flight is completely safe, but in many areas there is no reasonable alternative. Transferring physicians weigh the speed and comfort of air transportation against its potential harm. Once the decision to fly a patient has been made, an aircraft must be selected. It may be better for a patient to wait at a rural clinic for a more suitable aircraft than to hastily put him or her on a local air taxi with minimal medical equipment and personnel with little air transport experience.

Transferring and receiving physicians must communicate clearly about the patient's condition, medical needs and available resources.

Pre-Flight Assessments

The importance of transferring patient information cannot be overstated. Baseline data is essential to planning the air evacuation. Even if the patient is stable, changes prior to arrival and/or en route can occur. Provisions to address these changes can be based upon the initial assessment and the usual course of the illness or injury. Information from the initial assessment will assist the receiving facility prepare for the patient. At the very least it may prevent unnecessary repetition of diagnostic tests.

Preplanning is even more important once the patient and escort are airborne.

After listening to the pre-transport report, the air medical escort usually performs a thorough exam of the patient before the flight. This allows the escort to find any changes that may have occurred in the patient's condition, as well as establishing the patient's baseline for the rest of the flight. A good practice is to start from scratch and examine all systems. Circumstances occasionally require that this be done in an ambulance or on-scene. However, it is best to examine the patient at the hospital and/or clinic.

Packaging

“Packaging” is the term used in air medical transports for preparing the patient for a flight. A well-packaged patient can receive optimal care, since packaging includes considering both real and potential needs of the patient during transport. Proper packaging facilitates:

- Patient comfort.
- Patient safety.
- The provision of ongoing medical care.

Packaging is aided by a checklist and by anticipating the patient’s needs. The checklist can be individualized for each organization. To assist in developing a checklist, the following questions should be considered:

- Will the patient need oxygen during the flight? Is there sufficient oxygen for the entire flight and ground transport? Is hypoxia a major concern with this patient?
- Does the patient have a secure airway? Will escorts be able to get to the patient’s head during the flight to maintain an airway? Is there a possibility that a bag-valve-mask will be needed en route? Is it accessible? Does intubation need to be considered prior to flight?
- Can the patient be positioned in any way to assist breathing (e.g. sitting)? Will it be possible to place the patient in the aircraft in that position? Could seat belts and other patient restraints interfere with the patient’s ability to breathe?
- If the patient is likely to vomit, can medication be given prior to the flight?
- Will there be problems in rolling the patient in case of vomiting? Are plastic bags available as an emesis container? Is adequate suction available?
- If the patient is immobilized, is the immobilization secure enough so the patient can be rolled without the spine shifting in order to clear the airway? Are the straps securing the patient to the bed or Stokes litter (not to the backboard) accessible for quick release?

- If the patient is hypovolemic, is the IV site secure? Would it be a good idea to have a back up IV site? Are there enough IV fluids onboard? Are there enough supplies to start another IV should it be necessary? Can the IV be protected from freezing? If it is very cold, will it be possible to saline lock the IV during the transfer to the aircraft? Should blood be onboard?
- If the patient is hypovolemic, should PASG/MAST pants be put on the patient, ready to be inflated when needed?
- Does the patient have conditions or injuries that could deteriorate from gas expansion at altitude? Altitude limitations based on patient condition should be discussed with the pilot. Can this aircraft be flown at this altitude and/or cabin altitude? Does this affect the load carrying capacity of the aircraft?
- Is there any equipment, (e.g. PASG/MAST, air splints etc.) being used on the patient that will be influenced by gas expansion?
- Is there a potential that special procedures like needle decompression of a tension pneumothorax will need to be performed? Has this been discussed with the medical control or the receiving physician? Are the supplies available to decompress a tension pneumothorax, should it be necessary?
- Will G-forces on take-off influence this patient? What is the best way to position the patient in the aircraft?
- If a Foley catheter is indicated, can it be placed before the flight?
- Does the patient agree to transport?

This list of questions and discussion focuses on using small or dedicated aircraft. Much of it holds true for larger commercial aircraft as well. If a patient will be transported on a larger commercial aircraft, early communication with the air carrier is essential, especially if specialized equipment like a Stokes litter or oxygen will be needed during the flight. As noted in Chapter 4, airlines supply all oxygen used on their aircraft.

Stages of Flight

Edward McNeil in *Airborne Care of the Ill and Injured* notes that most adverse incidents during air medical transfer involve loading and unloading. Recommendations from McNeil and experienced Alaskan air medical escorts are listed below:

Enplaning (Loading)

Prior to lifting and moving patients, escorts have several duties. They need to:

- Position the ground ambulance as close to the aircraft entrance as is convenient and safe. Ambulances should never back up without a person guiding the driver. They should never touch the aircraft.
- Keep the patient inside the ambulance until he or she can be loaded onto the aircraft. This will keep the patient warm, dry and protected from outside noise.
- Consult pilots about the procedure they wish to use for loading. Every air medical service has its own procedures for loading and unloading patients. Consultation should occur during the planning stage.
- Brief those who will assist with the loading. Patients should be briefed as well so they know what to expect. Loading requires a minimum of four people. More people may be needed in some situations. Overweight patients, stairs, door angles, and high lifts can tax even a large, strong crewmember. The pilots and/or medical crew should direct assistants during the loading procedure.
- Disconnect equipment, such as electronic patient monitoring equipment, that is unnecessary during the loading process whenever possible.

A number of logistics are important to take into account when loading patients who are on stretchers. Some apply to a particular aircraft. The King Air and the Conquest's doorsills (bottom of the door) are about 42 inches off the ground and the door is about 26 inches wide, unless the aircraft has been modified with a cargo door.

- Lifting a patient to this height is awkward and puts a strain on arm muscles and backs. There is the potential for injury in this situation.
- Stretchers need to be tilted to get into the plane. Strapping patients securely to the stretcher is essential. Patients can help in loading by keeping their limbs close to their bodies during this process.
- Some aircraft have a hoist or loading ramp system that makes it easier to load patients.

In general, lifting a loaded stretcher to shoulder height is difficult. Doing this at odd angles and controlling side-to-side roll at the same time is even more challenging.

It is important for one person to take charge and “talk through” the process when the time comes to actually load the patient. Either the pilot or air medical escort can do this.

- The person with the most air medical transportation experience may be the best person to direct the loading process.
- The pilot may know the best method for loading the particular aircraft.

There are general steps that should be followed when loading patients onto light aircraft. The steps are:

- One end of the stretcher should be lifted up and handed to the person (or two people) who is onboard the aircraft. **No one** should climb the steps of a light aircraft carrying the weight of a patient on a stretcher. This can place an unacceptable load on the stairs and prevent the door from closing.
- Avoid placing any weight on the steps until the attendant on board takes the main stretcher weight. Only one handler can be on the steps at a time.
- The attendants at the head hold the majority of the patient’s body weight. The attendants at the feet maintain the stretcher as close to a horizontal position as possible and prevent lateral tipping.
- Flashlights may be needed to help see during loading and unloading if it is dark outside and the aircraft engines are not operating. Inverter power to run electronic equipment may not be available until the engines have been started.

Once the patient is loaded:

- The litter or bed must be secured to the aircraft in an approved manner.
- The patient should be reassessed. Breath sounds will be almost impossible to hear once the engines are started.
- IVs must be checked.
- Oxygen should be started if needed during the flight.
- Monitors need to be positioned so they will be secure and visible during flight.
- Any equipment and supplies that might be needed during flight must be placed so they are readily accessible and secured in position.

Other passengers, such as family members, can be loaded after the patient is onboard. Luggage and the escort's supplies can be loaded at this time.

Helpers should be thanked after the patient is loaded. Pilots generally prefer ground crews to stand by, at a safe distance, until the plane has taken off successfully.

The final check before advising the pilot that he or she can start the engines involves:

- Completing any ongoing patient assessment and rechecking vital signs.
- Checking that the oxygen is secure.
- Checking that the equipment is secure.
- Monitoring the IV and adjusting flow rates as needed.
- Accounting for copies of the patient's reports, lab work and x-rays.
- Giving the safety briefing for the patient, family members and any other passengers.

The pilot should close the aircraft door, unless the medical escort is qualified to do so. The air medical escort advises pilots when they are ready for the engines to be started.

Take-Off

G-forces during take-off will depend upon the speed of the aircraft and the angle of ascent. If the stretcher has any slack, it will shift toward the rear of the aircraft. Even an inch of shifting downward may startle the patient. If the aircraft does a “G-force turn” (a sharp bank) leaving the airstrip, patients may vomit. Access to their heads is important at this time. The patient may need help maintaining an airway. However, escorts must remain secured during takeoff and ascent.

Some patients have conditions like cardiac problems that are sensitive to G-forces. Escorts should request that pilots use the lowest G-force take-off possible for these patients. Depending upon the length of the airstrip and the surrounding area, pilots may have the option of a “low and slow” take-off and ascent.

Descent and Deplaning (Unloading)

Descent and landing are busy times for the pilots on the flight deck. They are talking to air traffic control and looking for other aircraft in the area of the airport. Pilots must make many adjustments to the trim of the aircraft. FAA rules require that pilots not be disturbed while making the approach and landing. Normally, in pressurized aircraft, this rule applies under 10,000 feet in altitude.

During final approach, all flight crewmembers should be seated and have their seat belts securely fastened.

Preparations for transportation from the airport to the receiving facility should begin early to save time. This planning helps to ensure that ground transportation is available upon arrival.

Escorts have responsibilities when the aircraft is descending. The following steps should be taken:

- Check equipment stowage and tie-downs early in descent to ensure the equipment is properly secured.
- Make sure that patients are re-secured, if any straps have been loosened during the flight.
- Stay alert to the condition of the patient. Be prepared to assist the patients should they vomit or experience ear or sinus

discomfort. Vomiting can result from turbulence. Pressure changes can cause sinus and ear discomfort.

- Complete medical charting before landing to avoid delays in transfer. The brief period of seat restriction during the final approach is convenient but may be a short and late opportunity to do this.

The process of unloading the stretcher is similar to loading the stretcher, but done in reverse. One person is in charge and guides others on the steps involved in the transfer.

The ground ambulance crew needs to be briefed on the condition of the patient and the potential need for rapid ground transportation. At least one member of the air transport team needs to accompany the patient to the receiving hospital. Care during the transport is usually a coordinated effort.

Transfer of Care

The transfer of care involves a number of factors.

- A verbal report is called from the transferring facility to the receiving facility. The report should help the receiving facility prepare for the patient's arrival.
- The patient must be turned over to an appropriate medical provider, generally this is of equal or greater level of care.
- The receiving facility representatives should receive paperwork from the transferring facility, written notes from the flight team, and a verbal report. It is essential that information about any treatments performed in flight be clearly understood and clearly charted in the escort's written report in case any questions arise later.
- The patient's belongings should be left at the receiving facility and the transfer documented.
- Equipment belonging to the air medical crew should be removed from the patient and be returned to the flight crew unless it cannot be removed prior to diagnostic tests or patient stabilization (e.g. removing a cervical collar prior to x-rays) measures have been taken. Any equipment that must be left

behind should be well labeled with the air medical service and/or transferring facility's identification.

Finishing Up

After every flight, the air medical crew should restock the aircraft and replace any missing or used supplies and equipment. This includes plugging in equipment so the batteries are recharged for the next mission.

Summary

There are many details involved in the physical process of an air medical flight. Air medical escorts should participate in preplanning for medical missions when possible. Once the decision to transfer a specific patient is made, and the flight accepted, the air medical escort must perform a preflight assessment, package the patient for transfer, assist in the loading and unloading of the patient, and provide quality medical care for the duration of the flight. Upon arrival at the receiving facility, patient care must be transferred to the responsible parties. Finally, this must be carefully documented and the plane restocked and returned to service. By knowing these logistical details and following them during flight, escorts make the largest contribution towards delivering high quality patient care.