**Chapter 3
Interfacility transportation**

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**Introduction**

Interfacility transport commonly refers to the transportation of a patient from one acute care setting to another. EMS personnel are frequently challenged with taking a patient to the “closest” versus the “most appropriate” receiving hospital and sometimes after initial work-up/treatment the patient needs to be transferred to another facility for further care. Additionally, patients may self-present to hospitals that are ill-equipped to provide necessary services and thus must be transferred. Reasons for transfer vary, but are often due to the need for specialized services based on a patient’s medical condition or mechanism of injury.

This chapter will address issues related to interfacility transports. Specifically, the focus will be on the level of care during transport, potential risks of interfacility transport, legal issues surrounding transport decisions, specific medical indications for transport to specialized facilities, and medical oversight for interfacility transport.

**Level of care**

The sending physician is responsible for choosing the appropriate transport personnel, vehicle, and equipment. The patient’s condition, actual needs, and potential needs for care are essential for the sending physician to consider. The transporting service and the receiving facility also have some responsibility to ensure the transport is carried out in the best interests of the patient. Level of care determination needs to take into account human resource needs, economic considerations, space limitations, and legal requirements [1,2].

When deciding on the level of care for the transport of a given patient, the sending physician must consider a number of things before making a final determination. He or she must think about what resources are available for the entire service area and the implications of using a resource that may be needed elsewhere. The availability of personnel and vehicles must play an important role in the decision-making process. The more advanced training and experience a transport team has, the more likely they are to be a limited resource, leading to prolonged response times to the sending facility. In a rural area, sending the town’s only ambulance on an interfacility transport that will take hours may result in a serious degradation of available EMS for that period of time. Weather delays can affect personnel and vehicle availability. In addition to taking into account the total transport time, it is important to consider the out-of-hospital time. For example, one might have a BLS ambulance immediately available that will take the patient to the desired receiving facility with a 1-hour transport time; however, a critical care air transport team may have a 45-minute delay in getting to the patient but be able to perform the transport in 20 minutes, resulting in an increase in total transport time by 5 minutes but a decrease in out-of-hospital time by 40 minutes. In certain situations the total transport time is the most important factor and in others limiting the out-of-hospital time can have the most profound effect on the patient.

**Personnel**

Composition of the team should be based on the patient’s needs. It can vary from non-medically trained transport personnel to specialty trained critical care transport teams. Whatever personnel are chosen should be able to handle all anticipated needs of the patient en route. They must possess the necessary critical thinking skills, procedural competence, and out-of-hospital care experience to effectively evaluate and care for the patient.

All personnel involved in the interfacility transportation of patients must be able to adapt to a variety of situations. They must be able to work as a team, improvise when needed, and perform with limited resources. Crew members who are not regularly involved in out-of-hospital care, such as emergency department and intensive care unit nurses, must get adequate orientation and training so they can be comfortable in the unique situations that EMS professionals face every day. While the scope of practice of EMS providers is discussed elsewhere in this text, the following briefly reviews these concepts as they uniquely relate to interfacility transport.

**Non-medical**

Non-medical personnel can range from relatives or friends of the patient to cab drivers to police officers. While this is relatively rare, there are circumstances in which the patient simply needs to go from one location to another and will have no anticipated medical needs while en route.

**Basic Life Support**

Emergency medical technicians can perform the majority of low-acuity interfacility transports as the patients are often stable and have few anticipated medical needs and only require basic routine monitoring.

**Advanced Life Support**

Paramedics conduct most interfacility transports, as they are able to perform routine and advanced monitoring, administer many medications, and intervene in emergency situations.

**Critical care**

Critical care teams are often made up of specially trained paramedics and nurses. They are able to provide advanced and invasive monitoring, administer an expanded list of medications and therapies, and have refined critical thinking skills.

**Specialty care**

Specialty care teams are often made up of critical care teams who have training specific to a group of patients, such as pediatric, neonatal, obstetric, burn, extracorporeal membrane oxygenation (ECMO), intraaortic balloon pump (IABP). These teams sometimes also include other health care professionals such as respiratory care therapists, physicians, and perfusionists.

**Vehicle**

Several types of vehicles can be used to transport patients between facilities. In choosing the most appropriate vehicle, one must consider speed, space availability, equipment needed, weather, distance, cost, and other factors [1,2].

**Private vehicle**

While private vehicles are rarely used for interfacility transports, they serve an important role in moving patients who are not expected to require any medical monitoring or interventions while en route from one facility to another.

* **Example**: a pediatric patient with a fractured radius being transferred from a single-coverage community hospital ED to a children’s hospital ED for reduction and splinting under sedation. As long as his injured arm is neurovascularly intact, his parents can safely transport him in their private vehicle.
* **Advantage**s: not waiting on medical personnel, inexpensive, keeps the patient with his or her family/friends.
* **Disadvantages**: no trained personnel or medical equipment are available if the patient experiences a decline in status.

**Cab**

* **Example**: an adult patient who presents with metal shavings in her eye that could not be removed at the community hospital and needs to be transferred to a facility with an ophthalmologist available. The patient cannot drive her private vehicle because her vision is impaired, but can safely be transported by a cab as she is not expected to require any medical intervention or specialized equipment while en route.
* **Advantages**: not waiting on medical personnel, inexpensive.
* **Disadvantages**: no trained personnel or medical equipment are available if the patient experiences a decline in status.

**Wheelchair/stretcher van**

* **Example**: a patient 1 week out from a stroke who is being transferred from the inpatient neurology service to an acute inpatient rehabilitation facility for intensive physical, occupational, and speech therapy. The patient is bed-bound so must travel on a stretcher, but is not expected to require any medical intervention or specialized monitoring while en route.
* **Advantages**: not waiting on medical personnel, typically readily available, inexpensive.
* **Disadvantages**: no trained personnel or medical equipment are available if the patient experiences a decline in status.

**Ground ambulance**

* **Example**: a patient with a muffled voice presents to a community hospital and is found to have a peritonsillar abscess that needs to be drained by an otolaryngologist so she is transferred to the academic medical center 4 miles away. While the patient is not experiencing any airway compromise at this time, there is a fair chance her condition could change en route, so an Advanced Life Support crew that can manage potential airway emergencies must accompany her.
* **Advantages**: there is a decent amount of space for the EMS professionals to care for the patient, typically more readily available than aircraft, less expensive than aircraft.
* **Disadvantages**: travels at speeds much slower than aircraft, may take a limited resource from a rural community and prevent that resource from responding to 9-1-1 emergency calls.

**Rotor-wing aircraft (helicopter)**

* **Example**: a patient who presents to a rural critical access hospital after a motor vehicle collision, requiring intubation on arrival for airway protection, and is found to have a traumatic subarachnoid hemorrhage so needs to be transferred to a trauma center for further evaluation and treatment. The patient is critically ill and the time to the trauma center needs to be as short as possible, while ensuring that the personnel transporting the patient are able to manage a ventilator, monitor for signs of increased intracranial pressure, and offer appropriate interventions.
* **Advantages**: very fast travel speed, typically staffed with the most advanced personnel, typically equipped with specialized and advanced equipment.
* **Disadvantages**: expensive, can be severely limited by weather, significant space limitations.

**Fixed-wing aircraft (airplane)**

* **Example**: a 10-year-old boy with cystic fibrosis was on vacation with his family when he developed respiratory distress and on presentation to the local ED, he was found to have multilobar pneumonia and needed transfer to his pediatric transplant center 300 miles away for lung transplantation. He requires a highly specialized transport team and medical equipment and given the long distance he needs to travel, fixed-wing transport is the best option.
* **Advantages**: very fast travel speed, can travel long distances, typically staffed with the most advanced personnel, typically equipped with specialized and advanced equipment, fewer space restrictions than in a rotor-wing aircraft.
* **Disadvantages**: expensive, somewhat limited by weather, has associated ground transports to and from an airport on both ends.

**Hazards associated with interfacility transportation**

The hazards associated with interfacility transport are similar to those experienced in scene response. Specific details about the hazards of each mode of transport are discussed in the Air Medical Services (Volume 2, [Chapter 2](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c02.xhtml)) and Ambulance Safety and Crashes (Volume 2, [Chapter 22](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c22.xhtml)) chapters.

The routine use of lights and sirens in interfacility transports is inappropriate, though there are select cases in which this may be needed, perhaps in the case of a STEMI patient being transported from a small community hospital to a tertiary facility for cath lab intervention. Prior to any interfacility transport, the patient should be stabilized to the extent that the referring hospital is capable. If the patient is expected to have a decline in airway status then it should be managed while the patient is in the sending facility where there are more people around with more equipment and resources available to work in an environment that has significantly more physical space than a transport vehicle. There are times when the risk outweighs the benefit and the interfacility transport should not be completed.

## Legal considerations in interfacility transportation

Local and state legal issues vary from region to region. In general, the laws applicable to EMS were not written with the nuances of interfacility transfers in mind. Instead, they were crafted to apply to EMS response to a scene and the subsequent patient delivery to a hospital. Some state EMS regulations make no mention of interfacility transport whatsoever, while others are more inclusive.

Laws and regulations that were written with interfacility transfers in mind may not always keep up with changing medical science, medical economics, the vast expansion of air medical services availability, and evolving federal law. Some specific questions have arisen that have not been fully answered. If a patient is to be moved from a hospital in one state to a referral center in another state, what are the licensing requirements for the medical crew, medical oversight physicians, and vehicle? When a transport team does not include a physician, when do observation and protocol-directed therapy turn into diagnosis and medical treatment? When has the transport team crossed the line and practiced medicine without appropriate protocols and medical oversight? If a patient loses signs of life during a transport, can he or she be pronounced dead? Does the pronouncement have to be done by a physician? Can the direct medical oversight physician make the pronouncement without seeing the patient? What is the time and location of death? Does the resuscitation need to be continued until the vehicle reaches the final destination? As a practical matter, most services find it more expedient to continue a fruitless resuscitation than to try to pronounce a patient dead while en route.

Knowledge of the Emergency Medical Treatment and Active Labor Act (EMTALA) is essential for those involved in interfacility transportation (for further details, refer to Volume 2, [Chapter 16](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c16.xhtml)). It is the responsibility of the sending physician and the sending facility to be sure they have met all of the requirements of EMTALA prior to transferring the patient. They must perform a medical screening examination to determine if the patient is stable or in active labor. If the patient is unstable or in active labor then the hospital is obligated to provide care (regardless of the patient’s ability to pay) until stability has been achieved or active labor has resolved.

If the hospital is unable to provide the necessary care, then the sending personnel must find a facility that can provide that care and arrange transfer. The hospital can legally transfer an unstable patient or a patient in active labor under the following conditions: the patient requests the transfer, after being fully informed about the risks and benefits of the transfer; the sending hospital is unable to provide a service that the patient urgently needs; the hospital has found a hospital that can provide the needed care and explicitly agrees to accept the patient; and the patient consents to the transfer after being informed of the risks and benefits of the transfer. The transferring service should be sure to bring all associated paperwork with the patient, including the transfer paperwork with explicit statements about the reason for the transfer and the name of the accepting facility and its accepting representative (typically a physician, although there is no actual requirement for the accepting staff member to be a physician; a burn unit charge nurse may be designated by the hospital as authorized to accept burn transfers, for example), the patient’s medical record, any imaging studies completed (whenever possible the actual images should be transported with the patient), and results of any laboratory studies [3–5].

## Indications for interfacility transportation

There are a variety of indications for interfacility transport, ranging from need for specialized services to insurance repatriation to patient request. The health care system is evolving into a network of regionalized medical resources to provide specialized care (see Volume 2, [Chapter 12](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/Vol2/c12.xhtml)). Patients are most often taken from smaller hospital with limited resources to larger tertiary or quaternary care centers. In 2006, the Institute of Medicine report on emergency medical care contained a recurring recommendation for regionalization of emergency care for specific situations and patient needs [6]. Some transfers are integral to the system design and as the health care system in the United States becomes increasingly regionalized and coordinated, efficient interfacility transport by EMS is becoming integral in the provision of specialized care in regionalized centers of excellence.

### Specific conditions

There are several medical conditions in which interfacility transports are particularly common. These conditions share elements of requiring significant resources and staff with highly specialized training and equipment. Trauma systems are the first and most common regionalized systems in the country, but many other systems are also used or are currently being developed, including systems for cardiac, neurological, burn, maternal-fetal, and pediatric patients.

#### Trauma

The underlying theory of trauma system design is a focus on expertise, experience, and commitment. All EMS systems put considerable design effort into ensuring that patients requiring a trauma center will be appropriately triaged from the scene of the injury. Most of these systems provide for considerable overtriage. Thus, there should be many more patients with minor injuries transported to a trauma center than seriously injured patients taken to a hospital that is not a trauma center. Nonetheless, trauma patients are one of the largest groups of patients requiring interfacility transport. There are three main reasons for this: even a sophisticated triage system will still miss some patients with subtle injuries; some patients will find their way to the initial hospital outside the EMS system; in many rural areas the trauma system is designed with the expectation that many patients will be transported from a lower-level hospital to a higher-level hospital. In many of these systems a small hospital performs initial stabilization and retriage.

Timeliness is usually the most important factor in the interfacility transport of trauma patients because the major killers of trauma victims are shock and brain injury [7–10]. The goal of the transport is to bring the patient to definitive intervention before shock or neurological injury becomes irreversible. Sometimes the transport team provides some procedure that the local hospital personnel are unable to perform such as intubation, intravenous access, intraosseous access, thoracostomy, or cricothyrotomy. The ideal trauma system will designate the receiving hospital and transport system ahead of time. The system expectations should also be clear to the sending hospital, the receiving hospital, and the transport team so that the patient is prepared for transport before arrival of the team and minimal time is lost during transition from the sending hospital to the transport team.

#### Cardiac

A large and growing number of cardiac patients are transferred between hospitals. Many patients are transferred to designated heart centers early in the clinical course of myocardial infarction. Systems have been successfully described and must be in place locally to minimize time from recognition to reperfusion by speeding initial diagnosis, providing appropriate initial interventions, expediting transfer, and avoiding delays [11–18]. With advance planning, ST-elevation myocardial infarction patients in shock can be safely and efficiently transferred to percutaneous coronary intervention centers with appropriate care en route [19]. As there are technological advances in the life-saving devices used, interfacility transport teams need to be trained to handle patients who are being supported on ventricular assist devices, temporary pacemakers, ECMO, IABP, and other interventions rarely encountered by most medical professionals.

#### Neurological

The same general factors that relate to interfacility transport of cardiac patients can be considered when discussing the issues of interfacility transport of patients with acute neurological disease, such as stroke. A subpopulation of both of these groups may benefit from reperfusion therapies that are time dependent and may require specialized interventions that are not available at the sending facility. NAEMSP updated its position statement on the role of EMS in the management of acute stroke in 2007, and the associated resource document outlines the issues regarding the integration of EMS with stroke centers and the need for secondary interfacility transport to stroke centers [20–22].

Recommendations have been made regarding the development of stroke centers and the triage of a subset of stroke patients to these centers for time-dependent treatments [23]. The literature is evolving, but there appears to be a subset of patients who do better when treated at stroke centers, and a subset of patients who benefit from treatments aimed at immediate reperfusion.

When a stroke patient may be eligible for reperfusion therapy but requires transfer to receive it, all the time required for transfer must be considered in order to decide whether or not a window of opportunity will still exist. The time to arrange transfer, for the transporting agency to respond and complete the transfer, and for evaluation and decision making at the receiving facility should be considered. Because of all these factors contributing to the overall times, many systems are being designed so initial testing and imaging can be performed at the small referring hospitals with remote decision-making support so that reperfusion therapy can be started prior to the patient leaving for the receiving facility. Once a patient is outside the time window for interventions aimed at reperfusing the brain, interfacility transport to a stroke center may still be beneficial but usually does not need to be accomplished urgently.

#### Burns

Compared to other injuries, complications from burns usually progress more slowly. Burn centers have special expertise in wound healing and infection prevention. In the hours immediately following a burn, the main life threats are loss of intravascular volume and concomitant injury, among which are inhalation burn injuries to the airway, trauma, and poisonings. If inhalation burns seem likely, early intubation is prudent. A rare but dramatic complication is a sudden airway obstruction due to swelling after seemingly normal breathing. A moving vehicle is a difficult place to monitor for stridor and then intubate through a swollen airway, so if there are any signs of impending airway compromise it is most prudent for the airway to be handled at the sending facility.

Carbon monoxide and cyanide are the most common poisons associated with burns. Cyanide works very quickly so it is unlikely to be an issue by the time a patient is ready for interfacility transfer. Carbon monoxide poisoning should ideally be treated with hyperbaric oxygen therapy, but in its absence it should be treated by providing high concentrations of oxygen at the local hospital and during transport. Significant increases in altitude during flight can be problematic for these patients and should be considered when the sending physician is choosing the type of transport vehicle. Calculations of fluid requirements depend on the careful estimation of burn size, measurement of urine volume and concentration, and hemodynamic monitoring. The transporting personnel should ensure the patient has a Foley catheter for continuous monitoring during transport. Sterile dressings help keep burns clean and reduce pain.

#### Spinal trauma

Spinal cord injuries are frequently associated with additional trauma, and these patients are initially managed as other trauma victims. Following stabilization, these patients may benefit from the experienced treatment and rehabilitation services available at spinal cord centers. Transfer is rarely time critical. Transfer arrangements will usually be determined by safety, convenience, cost, and mechanical stability. Depending on the nature of the injury and the time since injury, the main consideration may be preventing movement and extension of the injury. In cases of high cervical lesions the team should be proficient in airway management. Many otherwise stable spine-injured patients may be safely transported by BLS ambulance.

#### Obstetric

Almost all obstetric (OB) transfers are for the fetus. Some anticipated transfers for scheduled procedures could be done by private vehicle. Many transfers are for unanticipated conditions such as premature labor, preeclampsia, and placenta previa. Federal EMTALA laws define any woman in active labor as unstable [24]. These patients can be transferred only when the expected benefits outweigh the risks of transfer. Premature infants delivered at neonatal centers are more likely to survive than similar infants delivered at other hospitals. Few systems proceed with transfer unless en route delivery is unlikely because few teams are expert at care of both the mother and the fetus, and there is rarely the physical space for both a high-risk OB and neonatal transport team to travel together. The most reliable indication that delivery will occur soon is cervical dilation of greater than 4 cm [25]. Fetal distress generally warrants cesarean section prior to transport.

As en route time is critical, transport by helicopter transport is often the preferred method. Ideally, OB transfers are made in a vehicle with enough space and personnel to deliver intensive care to a newly delivered infant and to attend to the mother. Prior to managing OB patients in an out-of-hospital setting, the crews should be trained to handle the relatively large number of possible problems and complications that can occur in rapid succession.

#### Pediatric and neonatal

As outlined above, even under the best of circumstances some mothers will deliver premature infants at hospitals without the equipment or trained personnel to care for them. Neonates require a disproportionate number of interfacility transfers, but some older children will also require transport. Many community hospitals can care for a child with uncomplicated illnesses or injuries; however, a much smaller number of hospitals are prepared to care for children with seizures, sepsis, or other severe forms of shock, and even fewer are prepared to perform surgical interventions or deal with metabolic and developmental conditions. Neonatal and pediatric patients require very specialized equipment and caregivers who are specially trained to take care of their unique needs. The current standard of care is to bring critically sick children to specialty centers designed to care for them. The American Academy of Pediatrics has published transport guidelines based on expert consensus [26–30].

## Medical oversight of interfacility transport

The sending facility and sending physician bear the responsibility for determining the receiving facility, the mode of transport, the personnel to perform the transport, and the required equipment. The medical oversight physician for the transporting service plays a vital role in ensuring that the referring physician has the information needed to make the best choices in terms of the level of care. Many physicians in the community are not familiar with the various EMS agencies, resources, personnel, vehicle options, level of care, and capabilities that are available to them. It is the job of the EMS medical director of the transport service to educate community physicians so they can make informed decisions when the need for interfacility transfer arises.

Medical oversight of interfacility transport can be complicated if a system or plan is not established in advance. Many interfacility transports are routine and uncomplicated yet when critical patients are involved, complex medical decision making and advanced therapies will likely be needed. Patients may require multiple medications with profound effects and potential interactions. They may need ventilator management, airway interventions, invasive hemodynamic monitoring, and maintenance of ongoing technologically sophisticated care. Understanding the risk/benefit ratio for interventions, or whether to transport at all, requires an in-depth knowledge of personnel and equipment issues in the out-of-hospital environment, as well as capabilities at both the referring and receiving facilities.

Some services have multiple physicians involved as medical directors or to provide direct medical oversight during interfacility transport. It is essential that these physicians have knowledge of the protocols, the level of training and competence of all personnel, the transport equipment, and the medication formulary carried on the transport. While many services use emergency physicians from a selected ED, it is difficult to ensure that all individuals are knowledgeable about the nuances specific to each individual interfacility transport. Whoever is providing medical oversight should have expertise in the management of patients in the out-of-hospital setting and emergency care, as well as access to experts in pediatric and adult critical care, neonatology, ventilator management, trauma care, stroke care, and cardiac emergency care.

Most transports need only limited direct medical oversight and more extensive audit and review later on. If policies and procedures were not followed, review should determine if the circumstances were quite unusual, remedial education is needed, or the policies need improvement. There is little downside to having physicians from multiple specialties involved with this form of indirect medical oversight. It may also be useful to have the participation of a multidisciplinary group of other involved parties, such as other EMS services, nursing personnel from sending and receiving facilities, and referring and accepting physicians, to help with the review process. Indirect medical oversight is often well suited to correct system problems associated with inappropriate transfers, delays in transport, or inadequate stabilization by referring hospitals. Indirect medical oversight should offer in-depth and deliberative analysis and recommendations to all participants involved. This should be well integrated into a quality improvement process [31–33].

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