

---

# Inter Hospital Transport of Critically Ill Patients: Problems and Pitfalls

D Crippen

---

## Citation

D Crippen. *Inter Hospital Transport of Critically Ill Patients: Problems and Pitfalls*. The Internet Journal of Anesthesiology. 1996 Volume 1 Number 4.

## Abstract

You are an intensivist and team leader for a "Critical Care Transportation Team", consisting of an ICU nurse, CCM physician and technologist. The team frequently goes out by helicopter to small outlying hospitals where medical disasters happen that they do not have the technology or expertise to deal with effectively. The team brings with it technology and expertise needed to stabilize disasters before transport to tertiary medical centers for definitive treatment. This expertise includes intubation, aggressive fluid, inotrope, vasopressor management and placement of portable intra-aortic balloon. However the team members all go home at 6 pm and must come in from home if called in the middle of the night. In addition, during bad weather, the helicopter does not fly and so the team must go by ground ambulance.

It is 0300 on a Friday night and you receive a panicky call from a small hospital approximately 70 miles from you requesting an immediate deployment of your CCM Transport Team. The patient is a 66 y/o female with a history of hypertension who came to their ED complaining of severe interscapular back pain and shortness of breath. CAT Scan shows what their radiologist considers to be a leaking thoracic aneurysm. They do not have the ability to deal with this and want the patient out of there post-haste. There is no nearby hospital capable of dealing with this either.

The bad news. Your area is socked in with hurricane-like storms. Flailing sheets of wind and rain, nonstop lightning. Obviously, there is no helicopter service. In the ED at the referring hospital, they have her on a nitropruside drip. They tell you that her blood pressure is 160 systolic and she continues to complain of back pain. When you inform them that the helicopter is kaput, they say they will put the patient in a local meat wagon ambulance and send her with one of their nurses to watch the nitropruside infusion.

They say they can have an ambulance there and the patient loaded in 15 minutes. The area is not served by an Interstate Highway. It is normally an hour drive (with lights and sirens) in good weather. It will probably take longer in bad weather. Total estimated time for their meat wagon to reach you from the time the decision is made to do it- about one and a half hours.

The benefit: Fastest possible transport time.

The risk: If serious complications en route, patient is at high risk that the Low-tech equipment and low-experience accompanying personnel will not be able to handle it.

An alternative possibility- call out the CCM Transport Team at 0300, have them come in to your hospital, gather their equipment, proceed to the scene by ground ambulance, stabilize the situation, then transport the patient back under the care of an experienced CCM physician and high tech modularized monitoring equipment, full range of treatment options.

The furthest CCM Team member lives about 30 minutes from the hospital. Once there consider another 15 minutes at least to get equipment mobilized and moved to the ambulance. It is about the same time-in-transit. So 45 minute mobilization time plus an hour and fifteen minutes transit time through the storm gives you a time to arrival of about 2 hours.

The benefit - You will be able to stabilize the patient and keep her stabilized during the trip back.

The risk-To get your high-tech and high-experience team to the scene will take 30 minutes longer than if they simply put the patient in a meat wagon and put the pedal to the metal.

They want to know if they should send or if you want to

send your team. What is your decision?

It has become almost a knee-jerk reflex to validate sending a specialty team for critically ill patients in outlying areas where stabilization pays dividends. So when helicopter service is available, it makes sense to combine the “golden hour” of trauma with the ability to stabilize and maintain on portable life support systems for a trip back to the tertiary center for definitive treatment.

Intuitively, rapid specialty team assisted inter-hospital transports of critically ill patients seem to be desirable in order to fit the expertise with the perceived need. Baxt<sup>(1)</sup> looked at the mortality rates of patients transferred to tertiary care hospitals by a standard ambulance versus a helicopter service. He also matched both groups for types of injury, trauma scores. Only patients transferred by air had an improvement in survival compared to that predicted. Interestingly, although the mortality of the group transferred by air was better, the time from injury to arrival at the hospital was an average of 23 minutes longer than the ground transferred group due to time spent at the scene stabilizing the patient. Moylan<sup>(2)</sup> compared aeromedical transports and ground transports, matching trauma scores, mechanism of injury and organ systems involved. There was a statistically significant survival advantage for air transported patients with trauma scores between 10 and 5. (82% versus 53% for ground transports). He also found that more therapeutic interventions by the helicopter team contributed to better outcome for the air transported group. These included endotracheal intubations, blood transfusions, larger volumes of electrolyte resuscitation and increased use of MAST trousers.

Moylan<sup>(3)</sup> in his review of aeromedical transportation, observed: “Reports presented in this review demonstrate clearly that the interval between the accident and arrival of the helicopter medical personnel at the scene of the accident or outlying hospital-not the speed with which the patient is delivered to the tertiary care facility-is the key factor in improving survival. Gore<sup>(4)</sup> reported establishing a physician staffed transport system specifically for the stabilization and transport of unstable patients with cardiac disease. He characterized 78% of these patients as “unstable”. Approximately one third of his transferred patients had life threatening complications during transfer, “the majority of which could not have been predicted”. The presence of a physician trained in critical care resulted in seemingly successful management of all but one of these life

threatening conditions. He discharged 74.5% home after tertiary level treatment.

However, it should be noted that most of these projections of need for on-site physician expertise relies heavily on speed of patient access by knowledgeable resuscitators. It is unknown whether it is best to “scoop and run” or “stay and play” when the potential arises for the patient to reach the referring hospital long before the physician can reach the patient at an outlying location. When the helicopter isn’t flying, it may take at 30 minutes to an hour longer just to get the team to the patient than if they sent the patient to the referral center. The patient is going to have to sit there for the additional time, then make the entire trip again, doubling or tripling the potentially unstable circumstances of the transport time.

In addition, data on whether physician presence on inter-hospital transports improve outcomes is murky? Himmelstein described substandard stabilization of 33 out of 103 patients who were at risk for life threatening complications in transit<sup>(5)</sup>. Schiff described substandard stabilization for 89% of 467 patients transferred from emergency departments to surrounding hospitals<sup>(6)</sup>. Schiff also reported a 40% higher death rate in patients transferred with inadequate stabilization versus non-transferred patients. However, most patients in these two series were transferred due to socio-financial considerations rather than for medical indications. West<sup>(7)</sup> reports inadequate stabilization on on trauma transports, and Olson<sup>(8)</sup> on critically ill medical/surgical patients. Olson also reports that a sizable number of inadequacies in their group were of an extremely basic nature. Mayer<sup>(9)</sup>, in his review of the literature, found between 24 and 70% of transferred patients are inadequately stabilized prior to transport<sup>(9)</sup>. There is no reason to imply that adequate paramedic protocols could not resolve this issue without direct physician intervention.

Much of the other debate in the literature has been in the form of subjective, retrospective assessments of various personnel as to whether or not physician presence might have been needed or useful<sup>(10,11)</sup>. Most of the current studies show that transportation medicine is relatively safe in that no harm comes to the patient as a result of the transport process. However, it seems obvious if enough expensive resources are brought to bear, almost any transport can be accomplished with safety to the patient. These studies don’t show that high technology critical care transports have a good cost benefit ratio, they simply demonstrate they are

relatively safe.

A more compelling question is: Would a physician accompanied critical care transport improve outcome and be much more cost effective than transports without a physician present but with physician input (ie: by portable cellular phone after assessment by an experienced ICU nurse)? The entire premise of physician accompanied transports rests on the supposition that life threatening exigencies cannot be predicted prior to transport and life saving procedures may be necessary during the transport can only effectively be performed by physicians. But physicians are rarely available for immediate transport “after hours”, dramatically increasing response times. Additionally, if rapid deployment is unavailable, tying up physician time on long ground ambulance trips detracts from their potential usefulness elsewhere.

The argument has been brought forth that the patient is safer in an outlying emergency department than on a transport with inadequate expertise. There is little objective data to support this. The person in charge in an outlying area doesn't know what to do for the patient, or is afraid to do anything; that's why they want the transport to occur. If the patient is in an emergency department, the attending physician probably has other patients to see and the ED nurses are busy with other patients as well. In an ACLS ambulance with experienced paramedic or critical care nurse accompaniment, the patient at least gets most supportive care they could access in an emergency department and is the focus of attention. God, in his wisdom, created paramedics and nurses in the image of physicians so that they could do 90% of physician duties in emergencies, and they tend to do them well.

As yet there is no convincing data that demonstrate the need

or cost effectiveness of physician accompaniment of most inter-hospital patients, especially when deployment and access times are delayed and extended. To maintain expensive physician assisted critical care transport teams for the relatively few runs where physicians might make a critical difference is probably not cost effective. In addition, there have been no objective measures of types of interventions a physician might be required to do, stratified by severity of illness scores. Until there is a randomized, prospective study of physician accompanied vs. unaccompanied transports, questions of appropriateness or cost effectiveness cannot be answered.

### References

1. Baxt, WG, The impact of a rotorcraft aeromedical emergency care service on trauma mortality. *JAMA* 1983;249:3047-3051.
2. Moylan J, Fitzpatrick, KT, Beyer AJ, et al: Factors improving survival in multisystem trauma patients. *Am Surg* 1988; 207:679-685.
3. Moylan J. Impact of Helicopters on trauma care and clinical results. *Ann Surgery* 1988, 208;6:673-678.
4. Gore, JM, Haffajee, CL, Goldberg, RJ, Evaluation of an emergency cardiac transport system. *Ann Emerg Med* 1983;12:675-678.
5. Himmelstein, DU Woolhandler, S, Harnly, M et al, Patient transfers: Medical practice as social triage. *Am J Pub Health* 1984; 74:494-497.
6. Schiff, RL, Ansell, DA, Schlosser, JE et al, Transfers to a public hospital. A prospective study of 467 patients. *N Engl J Med* 1986;314: 552-557.
7. West, JG, Trunkey, DD, Lim, RC: Systems of trauma care: a study of two counties. *Arch Surg* 1979;114:455-460.
8. Olson, CM, Jastremski, MS, Vilogi, JP et al, Stabilization of patients prior to interhospital transfer. *Am J Emerg Med* 1987; 5:33-39.
9. Mayer, TA: Interhospital transfer of emergency patients. *Am J Em Med*, Jan 1987 (5)1: 86-88.
10. Carraway, RP, Brewer, ME, Lewis, BR et al, (abstract) Why A physician? Aeromedical transport of the trauma victim. *J. Trauma* 1984: 680
11. Rhee, KJ, Burney, RE, Mackensie, JR et al, Is the flight physician needed in helicopter emergency medical services? (abstract) *J Trauma*. 1984: 681.

**Author Information**

**David Crippen, MD, FCCM**

Clinical Assistant Professor; Director, University of Pittsburgh Medical Center; St. Francis Medical Center