

Transport management of the critically ill. *Outcome of study with recommendations*

*Farouk M. Messahel, DA, FRCA,
Ali S. Al-Qahtani, DLO, KSUF.*

Transfer of critically ill patients is a frequent occurrence at the hospitals with limited facilities. Such patients require inter-hospital transfer for specialized services (diagnostic or therapeutic). Those patients are at high risk for complications during transfer. Our establishment is a secondary care hospital situated on the main highway between Riyadh, Kingdom of Saudi Arabia (KSA) and Southern region (Khamis Mushayt and Abha) of KSA. The distance by road in each direction is approximately 700 kilometers for Riyadh and 400 kilometers for Khamis Mushayt and 400 kilometers for Abha. All hospitals along that route do not have neurosurgical service, diagnostic cardiac laboratory, open heart surgery or burn and plastic units. This retrospective study was conducted to audit the hospital process of inter-hospital transfer, to highlight the depth of the problem experienced by referring hospitals in remote areas and present findings to health care policy makers for consideration for future expansion of health services in the region. The records of critically ill patients admitted to the intensive care unit (ICU) from August 1998 until the end of July 2003 were reviewed. The hospital has an operational protocol for the transport of the critically ill patient drawn up from well established international guidelines with modifications to suit local conditions.¹ When a diagnostic or therapeutic facility is unavailable within our locality, contact with the referral hospital starts usually by faxing a medical report. Our hospital has a fleet of ambulances composed of 2 mobile ICU and 3 ordinary ambulances. A transport team composed of an anesthetist, a paramedic and an experienced nurse usually accompany the patient depending on the severity of the condition. To avoid possible delays or complications during transport, a checklist containing essential steps prior to transfer was followed. All patients accepted in the hospitals in Riyadh, KSA were transferred by medivac, while those transferred to Southern region were transported either by medivac or ambulance depending on their medical condition. It takes 5-6 hours for the ambulance to reach the hospitals in the Asir region, KSA (Khamis and Abha). The ambulance crew was provided with mobile phone.

There were 1495 patients admitted to the ICU during the period of the study, 55 of them were transferred to other centers. They constituted 3.7%

of the total admissions. The male to female ratio was 1.1:1 (29 males and 26 females), with an average age of 50.6 years (range 4 months-92 years). One-third of them (18 patients) were mechanically ventilated during the transport. **Table I** shows detail of patients transferred. Two patients died during transport (3.6% of total transferred) aged 55 and 6-year-old. A third patient showed rapid oxygen desaturation due to the presence of dissipated blood clot inside the tracheal tube, the latter was replaced. Five times the ambulance cool air-condition was not functioning. Twice the ambulance was involved in collision with other traffic. There were no human injuries but one ICU ambulance was taken off service. One of the main and persistent problem we encountered in the majority of the cases was the situation of no response to our initial request for transfer. There is a multitude problems facing the safe and efficient inter-hospital transport of the critically ill patient. These include the transport means, the transport team and equipment needed to keep the critically ill patient stable during transport. Aeromedical transport was found to be superior to ground transport.² The helicopter has an important role to play in the inter-hospital transport, but there is no benefit if the distance by road is less than 30 minutes or beyond 300 kilometers or when helicopter flight time exceeds one hour. Here, the fixed-wing aircraft can overcome the delays inherent in transferring patients between hospitals and airports. In our situation, a helicopter is the most suitable mean of transport. It can be used in transporting critically ill patients to the airport where the medivac lands, thus avoiding the traffic problems, which the ambulance encounter during the one hour journey to the airport. In addition, it can be used in transporting acutely ill patients and trauma victims from the scene of the incident to the hospital (primary transport). Our hospital has already a landing space for 2 helicopters. Meticulous resuscitation and stabilization of the patient before transport is the key in avoiding complications during the journey.³ Our transport team is well trained and experienced in transporting critically ill patients. In fact, we run a one day course related to this subject, which is recognized by the Saudi Council for Health Specialties. There is evidence that the use of dedicated transport teams improves the outcome of critically ill patients transferred between hospitals.⁴ Nevertheless, adverse events during inter-hospital transport of the critically ill still happening. They may be equipment related or due to physiologic deteriorations connected to critical illness. However, death during transport is a rare event.⁵ In our study, 2 gravely ill patients, one adult and one child, died during transport. With the ever increasing population in

Table 1 - Details of 55 patients transferred to specialized hospitals.

| Transfer by specialty | n | Ventilated | Method of transport | | Referral center in the Kingdom of Saudi Arabia | Outcome |
|-----------------------|----|------------|---------------------|-----------|--|-------------------------------------|
| | | | Medivac | Ambulance | | |
| Neurosurgical | 13 | 13 | 9 | 4 | Riyadh, Khamis Mushayt | Died 1, Reintubated 1 Arrived 11 |
| Cardiology | 25 | 4 | 13 | 12 | Riyadh, Khamis Mushayt | Arrived |
| Renal | 4 | none | - | 4 | Wadi MOH*, Khamis Mushayt | Arrived |
| Pediatrics | 3 | 1 | 2 | 1 | Riyadh, Abha ACH | Died 1, Arrived 2 |
| Hepatic | 1 | no | 1 | - | Riyadh | Arrived |
| Gastrointestinal | 3 | none | 1 | 2 | Riyadh, Wadi MOH* Khamis Mushayt | Arrived |
| Medical | 2 | none | 1 | 1 | Khamis Mushayt | Arrived |
| Orthopedic | 1 | no | - | 1 | Wadi MOH* | Arrived |
| Ear, Nose, Throat | 1 | no | 1 | - | Riyadh | Arrived |
| Gunshot wounds | 2 | no | 2 | - | Riyadh | Arrived |

*patients referred include renal for hemodialysis and non-eligible civilians. MOH - Ministry of Health

the region, together with the creation of new major projects and with the tremendous rise in the amount of road traffic especially at the start and end of public holidays, the suggestion of having a trauma center on the highway between Riyadh and Southern region of KSA has become a necessity. A cardiac center is another requisition. Two dedicated helicopters must be readily available. The establishment of such centers will make inter-hospital transfer of patients a rarity. Collecting patients from the place of the accidents is the primary role of the helicopter. In the majority of cases, we experienced delays in responding to our first contact with all referral hospitals. To speed up the process of responding to referral requests, we suggest that referral hospitals appoint a named consultant available 24 hours a day to receive requests for transfer, to arrange with the concerned service the acceptance or non-acceptance of the case, and to reply to the referring hospital without delay.

In conclusion, our hospital has an adequate facilities for the transport of the critically ill patients. Our aim is to provide essential service to the critically ill patients. But lack of early response from referral hospitals hinders the quality of management and poses real threat in terms of mortality and morbidity. The need for specialized services in the area, particularly neurosurgical and cardiac, is timely due. Providing these centers with

2 helicopters will speed up the process of patients' transfer especially from site of incidents and avoid hazards of road traffic and severity of regional climate.

Received 31st August 2003. Accepted for publication in final form 15th December 2003.

From the Department of Anesthesia and Intensive Care (Messahel) and the Department of Surgery (Al-Qahtani), Armed Forces Hospital, Wadi Al-Dawasir, Kingdom of Saudi Arabia. Address correspondence and reprint requests to Dr. Farouk M. Messahel, Department of Anesthesia and Intensive Care, Armed Forces Hospital, PO Box 228, Wadi Al-Dawasir 11991, Kingdom of Saudi Arabia. Tel. +966 (1) 7841065. Fax. +966 (1) 7840049. E-mail: fjmessahel@doctors.org.uk

References

1. The Intensive Care Society of the UK. Guidelines for the transport of the critically ill adult. Standards and Guidelines. London (UK): The Intensive Care Society of the UK; 2002.
2. Moylan J, Fitzpatrick KT, Beyer AJ 3rd, Georgiade S. Factors improving survival in multisystem trauma patients. *Am Surg* 1988; 207: 679-685.
3. Runcie CJ. Resuscitation, stabilization and preparation for transport. In: Morton NF, Pollack MM, Wallace PGM, Editors. *Stabilisation and Transport of the Critically Ill*. London (UK): Churchill Livingstone; 1997. p. 93.
4. McGinn GH, Mackenzie RF, Donnelly JA, Smith EA, Runcie CJ. Interhospital transfer of the critically ill trauma patient: the potential role of a specialist transport team in a trauma system. *J Accident Emerg Med* 1996; 13: 90-92.
5. Barry PW, Ralston C. Adverse events occurring during interhospital transfer of the critically ill. *Arch Dis Child* 1994; 71: 8-11.