Inter-hospital transfer of trauma patients in a developing country: A prospective descriptive study

Ivor W. Crandon, Hyacinth E. Harding, Eric W. Williams, Shamir O. Cawich

The Department of Surgery, Radiology, Anaesthesia and Intensive Care, The University Hospital of the West Indies, Mona, Kingston 7, Jamaica

The Department of Anaesthesia and Intensive Care, The University of the West Indies, Mona, Kingston 7, Jamaica

Emergency Medicine Division, Department of Surgery, Radiology, Anaesthesia and Intensive Care, The University of the West Indies, Mona, Kingston 7, Jamaica

The Department of Basic Medical Sciences, The University of the West Indies, Mona, Kingston 7, Jamaica

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Abstract

There is no standardised protocol for the transfer of injured patients in Jamaica, a process that is well known to be potentially hazardous. We undertook this study to evaluate the inter-hospital transfer process of injured patients in this developing country.

Materials and methods: A prospective descriptive analytical study of all consecutive patients transferred to the University Hospital of the West Indies from other hospitals was conducted over six months. Data were collected on specially designed proformas and analysed using SPSS version 10.0.

Results: Of 122 patients studied, 79.5% were male and the mean age was 27.8 ± 20.7 years. Most injuries resulted from road traffic accidents (40.2%), falls (27.1%) and assaults (26.2%). Several problems with the transfer process were identified. There was poor documentation of clinical parameters at referring institutions, with records of pulse rates in 13.1% (16/122), blood pressure in 9.8% (12/122), respiratory rate in 9.8% (12/122), Glasgow Coma Score in 10.6% (13/122) and pupillary reaction in 4.9% (6/122) of cases. Transfer arrangements were made by junior medical officers in 93.4% (114/122) of cases while consultants requested only 3.3% (4/122) of transfers. Public hospital ambulances transported 91.8% (112/122) of patients and 7.4% (9/122) were transported by helicopter. These vehicles were equipped with facilities for oxygen administration in 99.2% (121/122) of cases and sphygmomanometers in 91% (111/122) of cases, but functional capacity for suction was only present in 50% of vehicles. These critically ill patients were accompanied by physicians in only 11.5% (14/122) of cases, while 68.9% (84/122) were accompanied only by nurses.

Conclusions: The transfer of injured patients is not being performed in a manner consistent with modern medical practice. There is urgent need for implementation of a standardised protocol for the transfer of such patients in Jamaica.

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1. Introduction

In 2006, the Caribbean Epidemiology Centre reported that 23% of emergency room visits in Caribbean countries were trauma related. The incidence of trauma is particularly high in Jamaica, which has been reported to have the world's third highest homicide rate behind South Africa and Colombia.

In Jamaica, trauma patients are managed at hospitals of varying categories throughout the island. Patients with complex injuries are usually transferred to one of two tertiary centres in Kingston, the capital city. The University Hospital of the West Indies (UHWI) is the only tertiary referral centre that provides emergent public access to investigation facilities, including computed tomography and magnetic resonance imaging. Many critically ill trauma patients are often transferred to the UHWI from other institutions wide for investigation and management.

It is well known that inter-hospital patient transfer may be a hazardous process that exposes patients to numerous complications including hypoxia, hypotension, hypercarbia, convulsions, intracranial haematoma and neurological deterioration. Most countries follow existing guidelines to govern the safe transportation of injured patients but no such guidelines or referral systems exist in Jamaica, where trauma is a major public health problem. This exposes residents and visitors to a potentially serious risk in the event of an injury requiring inter-hospital transfer.

Preliminary studies of the inter-hospital transfer of injured patients in Jamaica have suggested that the transfer process may be
unsatisfactory.\textsuperscript{12,14,15} The aim of this study was to identify the extent of the problem as it related to all patients with injuries transferred to the UHWI, and to make recommendations for improvement of the transfer process, if required.

2. Materials and methods

Trauma victims arriving at the UHWI usually presented to the Emergency Department. Emergency room residents immediately assess all incoming patients and commence resuscitation following Advanced Trauma Life Support protocols (ATLS) of the American College of Surgeons. Once the patients are stabilized, they are transferred to the care of the specialist surgical teams for investigations and definitive management.

We prospectively evaluated all consecutive trauma patients who were transferred to the UHWI for admission or investigations over six months from June 1, 2006 to December 30, 2006. A single investigator independently assessed all patients upon arrival at the Emergency Department to determine their clinical status and assess the Glasgow Coma Score (GCS). The investigator then evaluated the transfer vehicle and interviewed accompanying transfer personnel to record information on the clinical status of the patients during transfer, details of the transfer process, training of the transfer personnel, adequacy of the transfer vehicle and its outfitted monitoring equipment. Data communicated to the UHWI from the referring hospitals were also collected from the transfer records.

These data were recorded in a Microsoft Excel worksheet and analysed using the Statistical Package for the Social Sciences (SPSS) version 10.0.

3. Results

During the study period, there were 122 patients transfers to the UHWI. There were 97 males and 25 females with a mean age of 27.8 ± 20.7 years.

Most of the patients sustained unintentional injuries, with road traffic accidents (40.2%) being the most common injury mechanism. The injury distribution is outlined in Table 1 and the organ systems affected are detailed in Table 2.

The time of injury was documented in only 19 (15.6%) of cases and referral time in only 11 (9.0%) of cases by the referring hospitals. Arrival times of patients were evenly distributed over the 24 h day with approximately half the patients (56.6%) arriving between 6 p.m. and 6 a.m. There was no consistent or particular increase in patient flow on the weekends.

The level of documentation at the referral hospitals was generally sub-optimal. A comparison of the documented clinical parameters at the referral and receiving hospitals is presented in Fig. 1 and Table 3.

At the referring institution, only 16 patients had recorded pulse rates and 12 had recorded blood pressures. No patient was recorded to have a systolic blood pressure <90 mmHg or a diastolic blood pressure <60 mmHg. Pupil size or reaction was only recorded in 6 (4.9%) patients, two of whom had non-reactive pupils.

At the receiving institution, 50 patients were tachycardic with pulse rates >100 beats/min. Ten patients were hypertensive with systolic blood pressures >90 mmHg while diastolic readings >60 mmHg occurred in 5 cases. Of 107 patients who had recorded pupillary size and responses, 3 had unequal pupils and 3 had non-reactive pupils.

There was a marked difference in documentation of the GCS between the hospitals (Table 3). At the referring institution, 13 patients had documentation of the total GCS as well as the individual eye opening, motor and verbal scores while only a total score was recorded in the remaining 11 patients. At the UHWI, the GCS was recorded in 120 (98.4%) patients, with the individual component scores recorded in 110 cases. Thirty-five patients had a GCS ≤ 8 but only 19 (54.3%) of these patients had airway protection with endotracheal intubation.

The request for patient transfer was made by an attending/consultant grade staff in only 4/122 (3.3%) of cases and by junior medical officers in 114 (93.4%) cases. The status of the referring officer was unknown in four cases.

Most patients were transported by roadways using public hospital ambulances in 112/122 (91.8%) and a private ambulance in 1/122 (0.8%) case. Helicopters were utilized for transportation in 9 (7.4%) of cases. There were facilities to measure blood pressure and pulse rates in 112/113 (99.1%) ambulances, but automated monitoring devices to measure blood pressure, heart rate and pulse oximetry were only present in one ambulance, that was privately operated (Table 4). Functional facilities for suctioning were only present in 50% of the ambulances.

During transfer, 14/122 (11.5%) patients were accompanied by physicians, 100/122 (82%) were accompanied by nurses as the senior medical personnel and 8/122 (6.6%) were accompanied by non-medical personnel only (Table 5). There were 19 patients transferred during the study period who had an endotracheal tube in situ. Of these, 4 (21.1%) were accompanied by an anaesthetist, 6 (31.6%) by non-anaesthetic trained physicians, 8 (42.1%) by registered nurses and 1 (5.3%) by a trained intensive care nurse.

Intravenous access and infusions in progress were present in 121/122 (99.2%) transferred patients. The majority received physiological solutions but hypotonic Dextrose in water was given to five patients (Table 6). Urethral catheters were present in 43 patients. Less than half of those transferred (38/122, 31.1%) had cervical immobilization (Table 7). Twenty-seven of 49 patients (55.1%) with a history of a road traffic accident had no cervical immobilization. Nine of the 11 patients with spinal injury had a hard collar, one a soft collar and one a sandbag immobilization.

4. Discussion

It has been established that Jamaica has a trauma epidemic.\textsuperscript{1,2,9,11} The problem has been worsening, particularly with
respect to road traffic accidents and gunshot wounds, despite the introduction of control measures including breathalyzer, seatbelt and helmet legislation and increased law enforcement efforts.

Most injured patients in Jamaica are transferred to the UHWI for definitive management or for investigations en route to one of the other tertiary care facilities. Emergency helicopter transfer is used to transport a few patients, incurring substantial public expense. The majority of patients are transferred by public ambulance with drivers who have no emergency medical technician training. The hazards of transferring seriously injured patients have been well documented and include hypoxia, hypotension, hypercarbia, convulsions, intracranial haematoma and neurological deterioration. Outcome may be adversely affected as a result of transfer process. It has been proven that the transfer of injured patients may be made safer by detailed attention to the transfer process. Most countries have implemented guidelines to govern the safe transportation of injured patients but no such guidelines exist in Jamaica. This exposes residents and visitors to a potentially serious risk in the event of an injury requiring inter-hospital transfer. In order to improve the safety of this process, policy makers should work toward the implementation of protocols to guide the transfer process in Jamaica. The existing international guidelines can be used as a template for these protocols.

These existing guidelines generally demand that a nominated consultant be available at the referring and receiving institutions; local policies should be agreed between the institutions involved; all patients must be thoroughly resuscitated and stabilized prior to transfer; patients with significantly depressed levels of consciousness should be intubated and ventilated for transfer; medical personnel should have at least two years of specialist experience; and mobile communication must exist between both units during transfer. Monitoring during transfer should be similar to that in an intensive care unit. In addition, the entire process should be the subject of education and audit and funding should be available at appropriate levels.

Our patient group was similar to other series with respect to the preponderance of young males, recognized internationally as a high-risk group. Their arrival did not follow a particular hourly or daily pattern in this study, contrary to popular belief. The causes of injury and the diagnoses reflect the usual pattern of injury in Jamaica where road traffic accidents are responsible for the majority of admitted trauma patients and head injuries.

Intentional injuries fully accounted for a quarter of those transferred, again a reflection of the modern Jamaican injury landscape.

The paucity of documentation of the patient’s clinical status and the time of injury, assessment and referral prior to dispatch was alarming, particularly in view of the fact that these were seriously ill patients. The fact that most were sent without an accompanying medical officer most likely reflects the unavailability of suitably qualified staff, especially from rural institutions. This is one area that policy makers can focus on to improve the status of patient care. By ensuring that appropriate measures (financing, available posts, etc.) are in place to attract suitably qualified physicians in emergency rooms at the smaller referral hospitals, we expect that the quality of patient care at these institutions should improve.

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**Table 3**

Comparison of medical documentation at transfer hospitals

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Referring hospital</th>
<th>Receiving hospital (UHWI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Documented n (%)</td>
<td>Documented n (%)</td>
</tr>
<tr>
<td>Pulse rate (beats per minute)</td>
<td>16 (13.1)</td>
<td>122 (100)</td>
</tr>
<tr>
<td>Blood pressure systolic (mmHg)</td>
<td>12 (9.8)</td>
<td>106 (86.9)</td>
</tr>
<tr>
<td>Blood pressure diastolic (mmHg)</td>
<td>12 (9.8)</td>
<td>106 (86.9)</td>
</tr>
<tr>
<td>Temperature (°F)</td>
<td>7 (7.6)</td>
<td>102 (83.6)</td>
</tr>
<tr>
<td>Respiratory rate (breaths/min)</td>
<td>12 (9.8)</td>
<td>121 (99.2)</td>
</tr>
<tr>
<td>Glasgow Coma Score</td>
<td>24 (19.7)</td>
<td>120 (98.4)</td>
</tr>
<tr>
<td>Pupil size (mm)</td>
<td>6 (4.9)</td>
<td>107 (87.7)</td>
</tr>
<tr>
<td>Oxygen saturation on room air</td>
<td>0</td>
<td>4 (4.4)</td>
</tr>
<tr>
<td>Oxygen saturation on oxygen</td>
<td>0</td>
<td>29 (23.8)</td>
</tr>
</tbody>
</table>

Fig. 1. Comparison of Glasgow Coma Scores.
Despite the fact that 35 patients had GCS scores ≤8, only half of them had airway protection in the form of endotracheal intubation, contrary to most modern recommendations.6–8 Twenty-seven patients with road traffic injuries were transported without any cervical immobilization, again contrary to guideline recommendations. Overall, only half the patients had cervical immobilization during the transfer process. The absence of these safety measures prior to and during transfer is grossly inappropriate and may again be reflective of the lack of suitably trained emergency department staff at these referral hospitals.

The medical fraternity has recognized this problem and have set out to improve training of emergency department staff island wide. Under the auspices of the Jamaican Chapter of the American College of Surgeons, an ATLS training faculty has been established locally.19 The local faculty commenced ATLS training courses approximately for five years prior to this study. As principles of inter-hospital transfer are an integral part of this course, it is hoped that these continued efforts will lead to an increase in the number of ATLS trained emergency department physicians, thereby improving the quality of patient care.

The large proportion of transfer arrangements made by junior staff is also in contravention of modern guidelines.6–8 The choice of intravenous resuscitation fluids and the prevalence of untreated tachycardia and hypotension speak volumes about the inadequacy of resuscitation in patients without spinal injuries. The implementation of transfer protocols will help in improving this aspect of care. Mandatory requirements that the transfer process be directly requested and supervised by senior staff should promote the implementation of adequate resuscitative measures prior to patient dispatch at referral hospitals.

Other irregularities were the state of equipment in the transfer vehicles and the training and experience of personnel involved in the transfer process. Some guidelines require a transport vehicle with facilities similar to a hospital ward capable of acute emergency care.6,7 While this may be impractical in our resource challenged environment, hospital vehicles used in the transport of injured patients are little more than a moving vehicle, ill-equipped for the purpose of transporting the sick in the safest possible manner.

Jamaica, the largest English-speaking island in the Caribbean, has no island wide public emergency medical service, a situation that demands attention. Documentation at the referring and receiving institutions, transfer arrangements, the level of training and expertise of accompanying personnel, the availability of equipment and monitoring on vehicles, cervical immobilization, endotracheal intubation and fluid administration are all matters of concern and are not consistent with modern practice.

This study should prompt a comprehensive assessment of the transfer of injured patients from injury sites as well as between hospitals so that specific interventions for the improvement of the transfer process may be planned and implemented. This could include the development and implementation of criteria for transfer, transfer methodology, efficiency and effectiveness, maximising limited resources. The implications for improvement in patient care and outcome could be considerable, particularly if this results in island-wide coverage. Involvement of the caregivers in the design and implementation of such a system is associated with a high level of voluntary compliance in its use.20

5. Conclusions

This study suggests that injured patients are not being transferred in a manner consistent with modern practice, with every effort directed at minimizing the known hazards of transfer and their deleterious effect on outcome.

A formal agreed protocol on transport of injured patients is urgently needed to improve the assessment, resuscitation and safe transfer of injured patients from sites of injury as well as between hospitals, in a manner that minimizes the known hazards of the transfer process.

Conflicts of interest
The authors have no conflicts of interest.

Funding
None.

Ethical approval
The study was deemed exempt from evaluation by the local ethics committee as it is an observational study and presents no identifying patient data.
Acknowledgments

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