Transfer of Head-injured Patients in Jamaica

Is there a Problem?

IW Crandon[1], H Harding[1], AH McDonald[1], CAR Bruce[1], D Fearon-Boothe[1], A Rhoden[1], N Meeks-Aitken[1]

ABSTRACT

Head-injured patients are often transferred to the University Hospital of the West Indies (UHWI) for tertiary care. There is no standardized, agreed protocol governing their transfer. During the three-year period January 1998 to December 2000, 144 head injured patients were transferred to the UHWI from other institutions. They were 70% male, had a mean age of 34 years and spent a mean of 13 days in hospital. Eighteen per cent were admitted to the Intensive Care Unit, where they spent a mean of nine days. On arrival, mean pulse rate was 92 ± 22 beats/minute, mean systolic blood pressure was 130 ± 27 mmHg and mean diastolic was 76 ± 19mmHg. Twenty-eight per cent of patients had a pulse rate above 100/min on arrival and 13.8% had systolic blood pressure below 60 mmHg. The Glasgow Coma Scale score was unrecorded at the referring institution in 70% of cases and by the receiving officers at the UHWI in 23% of cases. Intubation was done on only half of those who were eligible. Junior staff members initiated and carried out transfers whenever this was documented. The types of vehicles and monitoring equipment used could not be determined in most instances. Fifty-eight per cent of patients had minor head injuries, 12%, severe injury and 33%, associated injuries requiring a variety of surgical procedures by multiple specialties. Most patients (80.6%) were discharged home but 11.8% died in hospital. Transfer of head-injured patients, many with multiple injuries is not being performed in a manner consistent with modern medical practice. There is urgent need for implementation of a standardized protocol for the transfer of such patients in Jamaica.

Transferencia de Pacientes con Heridas de Cabeza en Jamaica:

¿Hay Problema?

IW Crandon[1], H Harding[1], AH McDonald[1], CAR Bruce[1], D Fearon-Boothe[1], A Rhoden[1], N Meeks-Aitken[1]

RESUMEN

Los pacientes con heridas en la cabeza son a menudo transferidos al Hospital Universitario de West Indies (UHWI) para su cuidado terciario. No existe ningún protocolo acordado en relación con las normas que deben regir la transferencia. En el trienio de enero de 1998 a diciembre 2000, 144 pacientes con heridas de cabeza, fueron transferidos al HUWI desde otras instituciones. El 70% de ellos eran varones de 34 años de edad promedio, y el período de permanencia en el hospital fue 13 días como promedio. El 18% fue ingresado en la Unidad de Cuidados Intensivos, donde permaneció un promedio de 9 días. Al llegar al hospital, su pulso medio era de 92 ± 22 pulsaciones/minuto, la presión arterial sistólica media era de 130 ± 27 mmHg, y la media diastólica de 76 ± 19 mmHg. El 28% de los pacientes tenía un ritmo de pulsaciones por encima de 100/min al momento del ingreso, y un 13.8% tenía la presión arterial sistólica por debajo de 60 mmHg. No había constancia de la aplicación de la Escala de Coma de Glasgow en las instituciones que remitieron a los pacientes en el 70% de los casos, ni por parte de los funcionarios médicos que recibieron a los pacientes en el HUWI en el 23% de los casos. La entubación se realizó solamente en la mitad de los pacientes elegibles. El personal subalterno inició y llevó a cabo las transferencias en todos los casos docu-mentados. En la mayor parte de los casos no fue posible determinar los tipos de vehículos ni el equipo de monitoreo

From: Department of Surgery, Radiology, Anaesthesia and Intensive Care[1], Faculty of Medical Sciences, The University of the West Indies, Kingston 7, Jamaica, West Indies.

Correspondence: Mr IW Crandon, Department of Surgery, Radiology, Anaesthesia and Intensive Care[1], Faculty of Medical Sciences. The University of the West Indies, Kingston 7, Jamaica, West Indies. Fax: (876) 970-4302, e-mail: ivor.crandon@uwimona.edu.jm

utilizados. El 58% por ciento de los pacientes presentaba heridas menores de la cabeza, el 12% tuvo heridas graves, y un 33% acudió con heridas asociadas que requerían diversos procedimientos quirúrgicos de múltiples especialidades. La mayoría de los pacientes (80.6%) regresó de alta a sus casas, pero el 11.8% murió en el hospital. La transferencia de pacien-tes con heridas en la cabeza – muchos de ellos con lesiones múltiples – no se está realizando de manera consistente con la práctica médica moderna. Se necesita implementar de modo urgente un protocolo de normativas que rijan la trans-ferencia de estos pacientes en Jamaica.

West Indian Med J 2005; 54 (4): 221

INTRODUCTION

Injuries are common in Jamaica (1–3) and were the second leading cause of hospitalization in 1996 (4) and accounted for 8.6% of all hospital discharges in 2001 and 2002 (5). Head injury is especially common and occurred in 35% of admitted injured patients (6). Its management is carried out at hospitals of different categories throughout the island. Patients with more complex injuries are usually transferred to one of the three tertiary centres in Kingston, including the University Hospital of the West Indies (UHWI) (7).

Jamaica has no formal guidelines governing the transfer of injured patients between hospitals, prompting the UHWI and the Ministry of Health to issue a policy statement concerning the transportation of injured patients for computed tomography scans at the UHWI (8). Public emergency medical services (EMS) for the road transportation of injured patients are available only in the towns of Lucea, Savanna-la-mar, Negril and Montego Bay, Jamaica's second largest city. The rest of the island is variably serviced by privately owned ambulances and to some extent, hospital ambulances. The drivers of privately owned ambulances are trained as First Responders and the attendants as basic Emergency Medical Technicians (EMT), similar to the public EMS personnel in the four areas mentioned above. Other public ambulance drivers have no EMT training. Most patients are transferred from rural institutions by road. Occasionally, transportation is provided by emergency helicopter at substantial public expense and on an *ad hoc* basis. There is no formal, agreed transfer protocol between UHWI and any other hospital. The impact that this has on injured patients island-wide is unknown. It is entirely conceivable that less than optimal outcome is visited on those patients who require transportation to a tertiary treatment centre in Kingston.

Guidelines for the transportation of head-injured patients have been published and are in common use in other countries (9, 10). British guidelines demand that a nominated consultant be available at the referring and receiving institutions, that local guidelines be agreed between the institutions involved, that all head-injured patients must be thoroughly resuscitated and stabilized prior to transfer, that patients with significantly depressed levels of consciousness be intubated and ventilated for transfer, that medical personnel should have at least two years of specialist experience, and that mobile communications exist between both units during transfer. Monitoring during transfer should be similar to that in an intensive care unit (ICU). In addition, the entire process should be the subject of education and audit, and funding should be available at appropriate levels (9, 10).

The transfer of head-injured patients within Jamaica has not been previously studied. The aim of this study was to determine with respect to head-injured patients transferred to the UHWI, the status of the medical officer requesting transfer, the training and experience of accompanying personnel, the transfer method, the patient's clinical status on arrival, diagnoses and outcome. By so doing, the objective was to identify the scope of the problem and form the basis for planning specific interventions for the improvement of the transfer process, if as suspected, this is required.

DESIGNS AND METHODS

This was a cross-sectional, descriptive study using a prospectively developed database, 'The Trauma Registry', which is administered and maintained by the Department of Surgery, Radiology, Anaesthesia and Intensive Care, The University of the West Indies. Specially trained research nurses on and during admission collect these data on specifically designed forms. Data are then transferred by these nurses to the Trauma!® Software programme (Cales & Associates). A head-injured patient was defined as one with a history or examination indicating trauma to the head or its contents. All head-injured patients who were transferred to the UHWI during the three-year period from January 1998 to December 2000 were identified from the Trauma Registry.

Descriptive statistics were obtained for the number, age, gender, status of the sending and receiving medical officers, transfer method, rank of the accompanying transfer personnel, clinical condition on arrival, length of hospital and ICU stay and outcome.

Results were expressed as frequencies or means with standard deviations as appropriate. Clinical status was assessed by the Glasgow Coma Scale (GCS) (11). Severity of injury was assessed by the Injury Severity Score (ISS) (12). Cardiovascular insufficiency was defined as a systolic blood pressure (sBP) of # 90 mmHg and/or a diastolic blood pressure (dBP) of # 60 mm Hg.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 10.0 for Windows software programme.

RESULTS

Of 144 transferred head-injured patients over the study period, 102 (70.8%) were males. Mean age was 34.0 ± 21.8 years with a range from 1 to 91 years. Intensive care unit admission was granted to 27 patients (18.8%). Mean hospital stay was 13.7 days with a range from one to 199 days. Mean stay in the ICU was 9.5 ± 9.3 days with a range of 1–34 days. Fifteen patients (10.4%) were intubated prior to transfer (Table 1).

The Glasgow Coma Scale (GCS) at the referring hospital was not recorded for 102 (70.8%) of those referred. The GCS was recorded for 111 (77.1%) of those received at the Accident and Emergency (A&E) department of the UHWI. Of these, 18 had severe head injuries with a GCS of eight or less and 72 had a normal GCS of 15 (Table 2). Mean Injury Severity Score was 11.0 for the 125 patients on whom this calculation was possible. Thirty-eight patients (26.4%) had an ISS of $ 15.

Table 1: Characteristics of transferred head-injured patients (n = 144)

Characteristic	Value (± SD)
% Males	70.8
Mean age (years)	34.0 ± 21.8
% Admitted to ICU	18.1
Mean hospital stay (days)	13.7 ± 26.6
Mean ICU stay (days)	9.5 ± 9.3
Arrived intubated	15

Table 2: Glasgow coma scale score of admitted patients

GCS Group	No	%
3–8	18	12.6
9–13	9	6.3
14–15	84	58.2
Unknown	33	22.9
Total	**144**	**100.0**

Where the grade of the referring officer was known, most patients were referred by junior medical officers (Table 3). The role of their supervisors in the decision making process could not be determined in this study.

The transferring vehicle was unknown in the majority of instances (Table 4), as was the case with the expertise of the accompanying personnel during transfer. Only in 11 instances was the rank of the accompanying personnel known and eight of these were nurses. Transfer distance ranged from five to 150 miles although transfer time between institutions could not be determined because of incomplete data.

Mean pulse rate on arrival was 92.1 ± 22.9/minute with a range of 52 – 190 minutes. Thirty patients had a pulse rate of over 100/min. Mean sBP on arrival was 130.0 ± 27.4 mm Hg with a range of 60 – 212 mm Hg. Mean dBP was 76.2 ± 18.8 mm Hg. with a range of 28–150 mm Hg. Cardiovascular insufficiency was evident in five and 15 patients respectively (Table 5). Arrival diastolic blood pressure was not recorded in 35 patients, systolic blood pressure unrecorded in 10 and the pulse rate unrecorded in 37 patients.

Table 3: Qualification status of medical officer requesting transfer at sending hospital

Medical officer grade	No of transfer requests	%
Consultant	1	0.7
Senior resident	3	2.1
Resident	9	6.3
Junior resident	39	27.1
Intern	9	6.3
Casualty officer	16	11.0
Grade unknown	67	46.5
Total	**144**	**100**

Table 4: Type of transfer vehicle used

Vehicle Description	No of transfers	%
Private ambulance service	3	2.1
Public hospital ambulance	5	3.5
Air ambulance	1	0.7
Helicopter	5	3.5
Other	22	15.2
Unknown	108	75.0
Total	**144**	**100**

Table 5: Cardiovascular status on arrival

Parameter	Value ± SD (range)
Mean pulse rate (PR) beats/min	92.1 ± 22.9 (52-190)
No of patients with PR >100/min	30
Mean systolic blood pressure (sBP)	130.0 ± 27.4 (60-212)
No of patients with sBP < 90mm Hg	5
Mean diastolic blood pressure (dBP)	76.2 ± 18.8 (28-150)
No of patients with dBP < 60mm Hg	15

Thirty-three per cent of patients had associated injuries, requiring a variety of surgical procedures by multiple specialties. Most patients (80.6%) were discharged home but 11.8% died in hospital and 5.6% were transferred to another medical service in the hospital (Table 6).

DISCUSSION

McDonald (3) and others (1, 2, 4, 6) have established that injury has reached epidemic proportions in Jamaica. While much has been written about the epidemiology of injury, little is recorded about the transfer of injured patients in Jamaica (7, 13). Tertiary care institutions in Jamaica are located in Kingston or Montego Bay, requiring transfer of seriously ill

Table 6: Outcome of transferred patients

Category	No of patients	%
Died	17	11.8
Home	116	80.6
Transfer to medical ward	8	5.6
Unknown	3	2.0
Total	**144**	**100**

patients from other hospitals, where initial assessment and resuscitation may have been done.

The transfer of head-injured patients carries a substantial risk of deleterious effects due to secondary factors including hypoxia, hypercarbia, hypotension, intracranial haematoma, epilepsy and infection (14–16), as well as spinal neurological deterioration from failure to immobilize the spine. Outcome may be considerably adversely affected as a result of the transfer process (14, 17).

The study population is typical of injured patients in Jamaica with respect to their age and gender but spent more time in hospital (13 days) than a similar group of injured patients studied previously (three days). This is not surprising given the more serious nature of injuries in transferred patients (6). Only 18% of patients were admitted to the ICU despite the fact that their coma scale scores and injury severity scores would suggest that at least twenty-five per cent of those transferred should have been admitted to the ICU. The frequent shortage of ICU beds and staff which sometimes prevent admission of deserving patients may have been a contributory factor (18). Only 15 patients were intubated prior to transfer despite the fact that there were 18 severe head injuries and nine moderate head injuries, all with depressed conscious levels. This is contrary to established guidelines which recommend intubation prior to transfer for all patients with depressed conscious levels (9).

A large proportion (58%) of transferred patients had GCS scores in the mild head injury range. While it is interesting to speculate that transfer may not have been necessary, it is possible that patients may have improved *en route* or had other serious injuries necessitating transfer.

Contravention of existing guidelines for the transfer of head-injured patients occurs when junior medical officers request transfers, when transport vehicles are ill-equipped and when transfer personnel lack training and experience. Many patients are transported by good Samaritans in vehicles poorly equipped for the transportation of injured patients. Considerable delay is common in the transportation of the sick from rural communities. Ambulances posted to rural hospital transport some patients but are usually ill-equipped, have no trained staff and provide little more than a moving vehicle. It was not possible to calculate the mean transfer time for this group of patients because the time of departure from the referring hospital was not known in the vast majority of instances. Kingston, the largest city in the English-speaking Caribbean, has no public emergency medical service. The effect of these factors on outcome is unknown but may reasonably be expected to be unfavourable.

The results in this study indicate that a number of patients have cardiovascular insufficiency on arrival at the UHWI, strongly suggestive of inadequate resuscitation prior to or during transfer. This has negative implications for critical cerebral perfusion pressure, particularly in these head-injured patients with potential or actually raised intracranial pressure. These factors have been proven to adversely affect outcome (14–16).

In this study, data on the type of transfer vehicle used, the equipment, training and experience of accompanying personnel and the rank of those arranging and receiving transferred patients were often not available due to incomplete data collection and recording. This prevented a more complete analysis of the inadequacies of the transfer process.

There is urgent need for discussion, agreement, adoption and implementation of a standardized protocol for the transfer of head injured patients in Jamaica. This study demonstrates that transfer of a large number of patients occurs, many with multiple injuries and suggests that this is not being done in a manner consistent with modern medical practice. It has been demonstrated that involvement of caregivers in the design and implementation of such a system can result in high levels of voluntary compliance with transfer protocols (19). Models exist from which local practice protocols can be decided (9, 10, 20–22). This study could be used to guide the creation of protocols and training programmes for doctors, nurses and other pre-hospital personnel. A prospective study will be needed to establish additional information concerning the transfer process in Jamaica. Improved efficiency and outcome may reasonably be expected to follow.

REFERENCES

1. Arscott-Mills S, Gordon G, McDonald A, Holder Y, Ward E. A profile of injuries in Jamaica. Inj Control Saf Promot 2002; **9:** 227–34.
2. Thompson DT, Ashley DV, Dockery-Brown CA, Binns A, Jolly CM, Jolly PE. Incidence of health crises in tourists visiting Jamaica, West Indies, 1998 to 2000. J Travel Med 2003; **10:** 79–86.
3. McDonald A, Duncan ND, Mitchell DIG, Fletcher PR. Trauma aetiology and cost in the Accident & Emergency Unit of the University Hospital of the West Indies. West Indian Med J 1999; **48:** 141–2.
4. Ward E, Durant T, Thompson M, Gordon G, Mitchell W, Ashley D. Violence-Related Injury Surveillance System: Implementing a hospital-based violence-related injury surveillance system – a background to the Jamaican experience. Inj Control Saf Promot 2002; **9:** 241–7.
5. Ministry of Health Hospital Monthly Statistical Reporting (HMSR) System 2001, 2002.
6. Crandon I, Carpenter R, McDonald A. Admissions for trauma at the University Hospital of the West Indies. A prospective study. West Indian Med J 1994; **43:** 117–20.
7. Hutson R. Inter-hospital Transfers (A review) Jamaica Emergency Medicine Association Seminar, UTECH – December 2002.
8. Section of Surgery, UHWI and Ministry of Health, Jamaica: Policy statement on transfer of patients for CT scans at UHWI 2003.
9. Working Party of the Neuroanaesthesia Society and Association of Anaesthetists. Recommendations for the transfer of patients with acute head injuries to Neurosurgical Units. London: Neuroanaesthesia Society of Great Britain and Ireland and the Association of

Anaesthetists of Great Britain and Ireland; 1996
10. Scottish Intercollegiate Guidelines Network: Early management of patients with a head injury. Royal College of Physicians of Edinburgh. August 2000.
11. Teasdale G, Jennett B. Assessment of coma and impaired consciousness. A practical scale. Lancet 1974; **2:** 81–4.
12. Baker SP, O'Neill B, Haddon W Jr, Long WB. The Injury Severity Score: a method for describing patients with multiple injuries and evaluating emergency care. J Trauma 1974; **14:** 187–96.
13. Hanna WJ, Grant-Lewis BE. Aeromedical evacuation of patients in Jamaica. West Indian Med J 1979; **28:** 209–18.
14. Gentleman D, Jennett B. Hazards of inter-hospital transfer of comatose head injured patients. Lancet 1981; **2:** 853–4.
15. Andrews PJ, Piper IR, Dearden NM, Miller JD. Secondary insults during intrahospital transport of head-injured patients. Lancet 1990; **10:** 327–30.
16. Miller JD, Becker DP. Secondary insults to the injured brain. JR Coll Edinb 1982; **27:** 292–8.
17. Gentleman D, Jennett B. Audit of transfer of unconscious head injured patients to a neurosurgical unit. Lancet 1990; **335:** 330–4.
18. Mitchell VT, Scarlett MD, Amata AO. Trauma admissions to the ICU of the University Hospital of the West Indies, Kingston, Jamaica. ITACCS Fall/Winter 2001.
19. Keaney J, Fitzpatrick MO, Beard D, Ritchie DA, Dunn LT. A standardized neurosurgical referral letter for the inter-hospital transfer of head injured patients. J Accid Emerg Med 2000; **17:** 257–60.
20. Parkins DRJ. Transportation of the injured: head injuries. Pre-hospital Immediate Care 1998; **2:** 25–6.
21. Interfacility transfer of injured patients: Guidelines for rural communities. American College of Surgeons Committee on Trauma 2002.
22. Gentleman D, Dearden M, Midsley S, Maclean D. Guidelines for the resuscitation and transfer of patients with serious head injury. Brit Med J 1993; **307:** 547–42.