Surgical and Intensive Care needs of Head-injured Patients Transferred to the University Hospital of the West Indies

HE Harding-Goldson, IW Crandon, AH McDonald, R Augier, D Fearon-Boothe, A Rhoden, N Meeks-Aitken

ABSTRACT

A cross-sectional, descriptive study utilizing data collected in the 'Trauma Registry' of the Department of Surgery, Radiology, Anaesthesia and Intensive Care at the University Hospital of the West Indies (UHWI) was undertaken to document injury severity, surgical requirements and intensive care needs of head-injured patients transferred to the UHWI over a three-year period. Of 144 patients studied, the majority (71%) were young males. Overall, injury tended to be mild. Twenty-three patients (16.0%) had severe head injury and 27 patients (18.8%) were admitted to the intensive care unit. Concussion with (33%) or without (36%) skull fracture was the commonest neurological admission diagnosis. Associated non-neurological injuries in 33% were primarily fractures. Fifty-six patients (39%) re-quired surgical intervention. Craniotomies and open reduction and internal fixation of fractures were the commonest procedures. The majority of patients (79.2%) were discharged home; 56 (39%) made a good Glasgow outcome score recovery. Seventeen patients (11.8%) died in hospital. As most of the transferred patients with head injuries in this study had only mild injury, most commonly concussions, and their prognosis was good, we recommend that appropriate educational and training programmes and transfer policies be implemented to minimize inappropriate transfers.

Necesidades Quirúrgicas y de Cuidados Intensivos de los Pacientes con Lesiones Cefálicas Transferidos al Hospital Universitario de West Indies

HE Harding-Goldson, IW Crandon, AH McDonald, R Augier, D Fearon-Boothe, A Rhoden, N Meeks-Aitken

RESUMEN

Se llevó a cabo un estudio transversal descriptivo utilizando datos tomados del "Registro de traumas" del Departamento de Cirugía, Radiología, Anestesia y Cuidados Intensivos en el Hospital Universitario de West Indies (HUWI), a fin de documentar la severidad de la lesión, los requerimientos quirúrgicos y las necesidades de cuidado intensivo de pacientes con lesiones cefálicas transferidos al HUWI durante un período de más de tres años. De 144 pacientes estudiados, la mayor parte (71%) eran varones jóvenes. En general, las lesiones tendían a ser leves. Veintitrés pacientes (16.0%) tuvieron lesiones cefálicas severas, y 27 pacientes (18.8%) fueron ingresados a la unidad de cuidados intensivos. Concusión con fractura del cráneo (33%) o sin fractura del cráneo (36%) fue el diagnóstico neurológico más común para el ingreso. Las lesiones no neurológicas asociadas en 33% fueron principalmente fracturas. Cincuenta y seis pacientes (39%) necesitaron intervención quirúrgica. Las craniotomías así como la reducción abierta y la fijación interna de fracturas, fueron los procedimientos más comunes. La mayoría de los pacientes (79.2%) fueron dados de alta; 56 (39%) tuvo una buena recuperación según la puntuación de la escala de Glasgow para la evolución clínica. Diecisiete pacientes (11.8%) murieron en el hospital. Como que la mayor parte de los pacientes transferidos con lesiones de cabeza en este estudio tuvieron solo lesiones leves – por lo general concusiones – y puesto que su prognosis era buena, recomendamos que se implementen programas adecuados de educación y entrenamiento, así como políticas de transferencia apropiadas, a fin de minimizar las transferencias inadecuadas.

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INTRODUCTION

Traumatic brain injury has been termed a 'silent global epidemic' (1, 2). In Jamaica, several studies have established that injury has reached epidemic proportions (3–7). The University Hospital of the West Indies (UHWI) is one of three neurosurgical referral centres in Jamaica and thus head-in-

From: Department of Surgery, Radiology, Anaesthesia and Intensive Care, The University of the West Indies, Kingston 7, Jamaica, West Indies.

Correspondence: Dr H Harding-Goldson, Section of Anaesthesia and Intensive Care. Department of Surgery, Radiology, Anaesthesia and Intensive Care. The University of the West Indies, Kingston 7, Jamaica, West Indies. Fax: (876) 977-6160, E-mail: hyacinth.harding-goldson@uwimona.edu.jm

jured patients are frequently transferred to the UHWI for tertiary care, particularly those suffering from severe injuries or multiple trauma. These transferred patients often need specialized therapeutic interventions, including intensive care, emergency surgery and multidisciplinary management.

Currently, Jamaica has a cadre of 28 intensive care unit (ICU) beds for a population of 2.6 million. These are located in four institutions, three of which are in the capital city, Kingston. The actual bed availability varies due to nursing staff and equipment shortages and currently only 18 are functional (8). The average daily requirement of adult intensive-care beds has been calculated to be 21 for a population of 500 000; for high-dependency beds the requirement is said to be 43 (9). Applied to Jamaica's stated population, this would translate into a requirement of 105 intensive care and 215 high dependency beds. The current cadre of 28 intensive care beds and no high-dependency beds is thus inadequate to meet the needs of Jamaica's population (8).

The indications for ICU management of head injury have been previously defined and are widely practiced (10–12). However, despite the provision of intensive care, traumatic brain injury is associated with significant mortality and morbidity and correlates not only with the primary injury but also the severity of secondary insults (13, 14). As such this study has been undertaken to document injury severity, the surgical requirements and ICU needs of head-injured patients transferred to the UHWI in an effort to identify the magnitude of the problem, the resource requirements, and make recommendations on intervention strategies and policy implementation that may direct their management along evidence based guidelines.

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 of the UWI. 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 prospectively collected data in the trauma registry. Additional information was collected from the patients' medical records. A head-injured patient was defined as one with a history or examination indicating trauma to the head or its contents.

Descriptive statistics were obtained for the number, age, gender, clinical status, neurological admission diagnosis/injuries, types of operations, ICU admission, length of hospital and ICU stay, outcome and disposal.

Data were expressed as frequencies or means with standard deviations as appropriate. Clinical status on admission was assessed by the injury severity score (ISS) (15) and the Glasgow coma score (GCS) (16). Outcome was assessed using the Glasgow outcome score (GOS) (17) and also categorized as discharged home, died or transferred to another hospital service.

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

RESULTS

Over the study period, 144 patients were transferred to the UHWI with a primary diagnosis of head injury. Seventy-one per cent (102) were males. The mean age ± SD was 34.0 ± 21.8 years with a range from 1 to 91 years.

Mean ISS was 11.9 (range 1–50) and 58.2% sustained mild head injury (Table1). Severe head injuries (GCS # 8) were documented in 23 patients (16.0%) but only 15 had their airway secured and controlled ventilation instituted prior to transfer. Intensive Care Unit admission was granted to 27 patients (18.8%). Mean hospital stay was 13.7 days with a range of 1–199 days. Mean stay in the ICU was 9.5 ± 9.3 days with a range of 1–34 days.

Table 1: Severity of head injury in transferred patients

Head Injury (GCS)	No of patients	%
Mild (14–15)	84	58.2
Moderate (9–13)	9	6.3
Severe (3–8)	23	16.0
Unknown	28	19.5
Total	**144**	**100**

The commonest neurological admission diagnoses were concussions excluding skull fracture (36%), fractured skull (33%) and intracranial haemorrhage (16.7%) (Table 2).

Table 2: Neurological clinical diagnoses

Primary admission diagnosis	No of instances (%)
Concussion (excluding skull fracture)	52 (36.1)
Skull Fracture	48 (33.3)
Intracranial haemorrhage	24 (16.7)
Cerebral laceration/contusion	9 (6.3)
Other intracranial injury	51 (35.4)

Non-neurological injuries were predominantly fractures (46%), open wounds (25.2%) and contusions (15.5%) (Table 3).

Fifty-six patients (39%) required surgical intervention. Craniotomies and open reduction and internal fixation of facial and limb fractures were the commonest procedures performed in 13 patients each (Table 4). Thoracotomy and exploratory laparotomy were necessary in only one and four patients respectively.

The majority of patients (79.2%) were discharged home but 11.8% died in hospital and 5.6% were transferred to another medical service in the hospital (Table 5). Fifty-six of those discharged were considered to have made a good recovery grade on the GOS.

Table 3: Associated non-neurological injuries

Injuries	No of Instances (%)
Fractures	90 (46.4)
– Lower limbs	41 (28.5)
– Upper limbs	20 (13.9)
– Ribs/sternum	15 (10.4)
– Pelvis	10 (6.9)
– Vertebral column	4 (2.8)
Open wounds (face, trunk, limbs)	49 (25.2)
Contusions (face, trunk, limbs)	30 (15.5)
Intra-thoracic injury	19 (9.8)
Intra-abdominal injury	6 (3.1)

Table 4: Types of surgical procedures performed

Surgical procedure (n = 56 patients)	Number
Craniotomy (including elevation of skull fracture) ± Intracranial pressure monitor insertion	13
Open reduction and internal fixation of fractures (facial/limbs)	13
Exploratory laparotomy	4
– Liver repair (2)	
Insertion chest drain only	4
Tracheostomy +gastrostomy only	2
Exploratory thoracotomy only	1
Debridement compound fracture only	1
Cervical spinal fusion only	1
Closed reduction fracture only	1
Eye surgery only	2
Suture skin/subcutaneous tissue only	14
Total	**56**

Table 5: Outcome of transferred patients

Category	No of patients (%)
Home	114 (79.2)
Died	17 (11.8)
Transferred to another service	8 (5.6)
Unknown	5 (3.4)
Total	**144 (100)**

DISCUSSION

As with other studies (3, 5–7), head injuries were commonest in young males. This correlates with their preponderance in job/industrial related injuries, motor vehicle accidents, sporting accidents and interpersonal violence.

Most of the transferees had only low injury severity scores and over a half sustained only mild head injury. Seventy per cent had concussion only. Such transfers with its attendant risks (18–20) and cost were probably inappropriate as these patients did not require specific neurosurgical intervention and could probably have been managed by the referring institutions. However, the lack of appropriate radiodiagnostic equipment at the latter to confirm or rule out more sinister lesions probably determined the decision to transfer the patient. Another contributor was probably the lack of formal policy and procedure guidelines specifying the criteria and conditions of transfer of head-injured patients in Jamaica.

The need for establishing and promulgating appropriate guidelines was also borne out by the fact that only 15 patients (10.4%) received adequate airway protection and controlled ventilation prior to transfer although 23 patients had a GCS # 8. The latter should have received this minimum standard of care as outlined in the 2000 Brain Trauma Foundation Guidelines for management of severe head injury in adults (11). Inadequate expertise of the referring and accompanying personnel and/or inadequate staffing may also have been contributory. Specific educational outreach programmes designed to address these issues may be expected to improve clinical practice.

The commonest neurological admission diagnoses of concussions and intracranial haemorrhage and those of non-neurological injuries being predominantly fractures of the extremities were expected with the acceleration and deceleration forces of trauma (21) and defensive movements of the body.

All patients with severe head injury were admitted to the ICU. This would suggest that the number of ICU beds is adequate to meet this need. However, Augier *et al* have shown that emergency admissions are facilitated by use of additional physical space in the post-anaesthesia care unit and the utilization of nurses working overtime (8). This is done at the expense of elective surgical admissions whose surgeries thus become postponed until an ICU bed becomes available. In the study by Wittenberg *et al* (22), 35% of their head-injured patients were admitted to an intensive care unit, twice as many as in this study. However, the severity of the head injuries as indicated by GCS was not documented in that study and so comparisons are limited.

Both ICU and hospital stay for this group of patients were longer than those for non-craniocerebral trauma (5, 7) in keeping with other studies indicating that the management of these patients incurs significant cost (23). Many patients have more than one organ system involved and thus require multi-specialty care.

In this study, most of the patients only suffered mild injury and so outcome was generally good. Most patients (79.2%) were discharged home with half having made a good recovery grade on the GOS. Mortality was 11.8% and it has been advocated that patient survival rates are higher in specialized Neurosurgical Intensive Care Units (NICU) (24–26). In the study by Elf *et al* (25), 6% of the patients died and only two (1.3%) died as a direct result of their head injury. When mortality during pre-neurosurgical intensive care and that following the introduction of basic neurosurgical intensive care were compared, it had decreased from 40% to 27% and then to 2.8% with the development of specialized NICUs. This probably resulted from the implementation of an organized secondary insult programme focused on the importance of avoiding secondary brain damage together with a standardized treatment protocol system. The availability of full

time intensivists and larger specialized NICUs were also associated with decreased mortality. However, it must be highlighted that because of the high mortality and morbidity of severely head-injured patients and their relatively long recuperation time, the benefits of intensive care therapy may not be evident until months or years after rehabilitation.

Surgical and intensive care facilities at the UHWI are already challenged by the internal workload generated through the hospital's accident and emergency (A&E) department as well as comprehensive elective services available in other departments. Patients who are transferred to the UHWI add to the already overburdened situation. Unpredictability in emergency surgical caseload represents a potentially reducible source of stress on surgical and ICU needs at the UHWI. Head-injured patients who are transferred may thus not receive the care for which they may be transferred and which they deserve when the ICU is full (8).

It is suspected that an urgent need exists for increased intensive care beds and nursing staff as well as increased operating time to treat transferred patients if those who are already in-patients at the UHWI or scheduled electively are not to suffer.

The results of this study indicate that only a third of transferred head-injured patients required surgical intervention and one-fifth required ICU care. Most had concussions only, with a good prognosis, suggesting that many may have been transferred inappropriately. No formal transfer policy regarding head-injured patients exists at this time. The authors recommend the formulation, adoption and promulgation of such a policy to eliminate unnecessary transfers, to guide appropriate transfer of those who have severe head injury (airway protection and controlled ventilation) and who are more likely to benefit from the exercise. They also recommend the establishment of trauma education programmes and training specifically directed at accurate neurological assessment and initiation of immediate neurotrauma care at referring institutions. Administrators and government must be lobbied to address inadequate staffing issues and provide improved availability of radiodiagnostic equipment and expertise if those patients with moderate to severe head injury are not to be compromised.

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