PROFILE OF CARE GIVEN TO PATIENTS WITH BLUNT CHEST INJURIES WITHIN THE FIRST 48 HOURS

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ABSTRACT

This study was conducted in the trauma unit of a large academic hospital in Johannesburg, South Africa. The study aimed at describing the nature of care that patients with blunt chest injuries received during the first 48 hours after injury. A descriptive survey was chosen using retrospective and prospective record review to obtain data. The sample comprised 60 records of patients who were admitted to the hospital due to blunt chest injuries between January 1997 and June 1998. Descriptive statistics were used to present and analyse data. The study showed that: (i) Blunt chest trauma victims received a thorough initial assessment and care. No missed injuries were identified on subsequent assessment; (ii) More than half of the patients spent over one hour in the accident/emergency department before admission to the trauma ward or intensive care unit (ICU); (iii) Motor vehicle accidents (MVA) were the commonest cause of injury while pedestrian vehicle accidents (PVA) were often fatal; (iv) Nurses are good providers of care but poor in prescribing and documenting care; (v) Pain assessment and psychosocial care was often neglected; (vi) Less than half the patients developed complications during the first 48 hours; pain and pneumonia being the most common complications encountered.

"Twenty-five percent (25%) of all trauma deaths result from blunt chest injuries"

INTRODUCTION

Blunt chest injuries are a cause of high mortality and morbidity in victims of motor vehicle accidents, crush injuries, falls from height, sport injuries and assault. Twenty-five percent (25%) of all trauma deaths result from blunt chest injuries (Linton, 1990).

According to Robertson and Redmond (1994), there are three peaks in general trauma deaths. First, is the 50% deaths that occur within 30 minutes of the trauma event due to brainstem injury or intrathoracic injuries. The second peak is the 30% deaths that occur within 4 hours due to airway obstruction or loss of intravascular volume. Twenty-five percent (25%) of these deaths can be prevented by rapid definitive therapy which may involve surgery or intensive care. The third peak is the 20% trauma deaths that occur within a few days due to sepsis, multiple organ failure or acute respiratory distress syndrome. These deaths can be reduced by rapid prehospital evacuation, aggressive resuscitation and early surgical intervention or intensive care.

As in general trauma, the emphasis in blunt chest injuries is on swift prehospital evacuation following the accident and prompt treatment on arrival in the hospital. On arrival in the trauma unit, a rapid assessment is done to identify all injuries. Life- threatening injuries and sequella are identified and treated. Further deterioration of the patient's condition is prevented by the commencement of definitive therapy.

PROBLEM STATEMENT

Blunt chest trauma accounts for 70-80% of all chest injuries due to motor vehicle accidents. These injuries may be life-threatening when associated with other injuries (Oh, 1990). If mortality and morbidity are to be minimized, swift assessment and resuscitation must be carried out simultaneously. The trauma leader must know his/her priorities as respiratory and circulatory resuscitation will take precedence over everything else. It is generally recognized that the care the patient receives during the first few hours following injury will determine the recovery outcome (Robertson & Redmond, 1994). Several factors may confound the assessment and treatment of patients with blunt chest injuries which then impact negatively on recovery outcomes. The concept of the first "golden hour" in general trauma holds the key to success in the management of blunt chest injuries. Precious time may be lost due to delayed prehospital evacuation of the injured patient. Those patients who are not in obvious pain or who have no external signs of injury may not receive im-

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mediate attention upon arrival in the trauma unit. Time- wasting may lead to the development of complications that are avoidable. Furthermore, the initial presentation of blunt chest injuries may be misleading. Pain and muscle splinting may obscure underlying injury leading to under assessment. On the other hand, concealed injuries may be missed on initial assessment due to reduced pain sensation or these injuries may not be radiologically evident (Pitcher & Beale, 1995, Price & Cho, 1995). Concealed injuries should always be anticipated particularly in patients who have been involved in high speed accidents.

The literature indicates that concealed injuries, delay in initiating definitive therapy and complications may cause significant mortality following blunt chest injuries. While a fair amount of study has been done in other countries, there is limited research on this subject in South Africa, especially in the field of nursing. Hence, the purpose of this study was to describe the profile care given to patients with blunt chest injuries during the first 48 hours.

OBJECTIVES

The objectives of the study were to:

- determine the incidence of blunt chest injuries
- describe the initial assessment of patients with blunt chest injuries.
- determine the specific mechanisms and nature of chest injuries
- identify the patient outcomes within 48 hours of admission.

LITERATURE REVIEW

In order to facilitate the management of blunt chest injuries, the American College of Surgeons Trauma Committee has divided these injuries into two groups. (Schwartz, Cayten, Mangelsen, Mayer & Hanke, 1992) First, are the immediate life-threatening injuries which include airway obstruction, tension pneumothorax, open pneumothorax, massive haemothorax, flail chest, aortic disruption and cardiac tamponade. The second group are the relatively life-threatening injuries such as pulmonary contusion, diaphragmatic rupture, tracheobronchial tears, oesophageal perforation and myocardial contusion. Fifty percent (50%) of all chest trauma deaths have been known to be due to injury to the lungs and pleurae (Moore, Mattox & Feliciano, 1988; Schwartz *et al,* 1992).

According to the studies by the American College of Surgeons, it was found that 50% of all blunt chest injuries involve the chest wall, 26% involve the lungs, 25% involve haemothorax, 20% involve pneumothorax and 21% miscellaneous. Twenty-five percent (25%) of all patients with chest injuries experience complications that may eventually lead to death. These studies further suggest that with preventive strategies and early surgical intervention, 30 - 70% of mortality could be eliminated (Schwartz *et al,* 1992).

Although most blunt chest injuries may be severe, less than 10-15% of the victims require surgical intervention. Most of the blunt chest injuries can be treated conservatively by applying the fundamental principles of trauma management such as oxygenation, pain control, fluid volume replacement, chest tube thoracostomy and controlled ventilation (Robertson & Redmond, 1994). The immediate priorities of managing patients with blunt chest injuries are:

- Airway and oxygenation: Clear the airway of blood, mucus or foreign body. If the patient is breathing spontaneously, give oxygen by face mask at a rate of 8-10 l/min that gives 40 - 60%. If the patient cannot maintain his/her own airway, or is severely hypoxaemic, intubation and assisted ventilation must be done.
- Pneumothorax: Tension pneumothorax is an emergency. Decompression may be done by inserting a wide bore needle into the pleural space at the anterior or mid axillary line, 4th intercostal space. However, the standard treatment is by inserting an intercostal tube under sterile conditions.
- Cardiac tamponade: May be suspected in a patient exhibiting hypotension with raised venous pressure. Tension pneumothorax and heart failure must be ruled out. Emergency treatment is by needle aspiration under continuos ECG monitoring. Where necessary, an emergency room thoracotomy must be done for decompression.
- Gastric decompression: Gastric distension carries the risk of regurgitation, vomiting and aspiration especially in patients with associated head injuries. A nasogastric tube should be passed in all cases of severe blunt chest injuries.
- Pain relief: Pain is controlled in the early stages by low dose narcotic analgesic such as morphine 2-5 mg. High doses of narcotic analgesics may depress respiration. Effective pain relief often relieves respiratory distress in patients with rib or sternal fractures.
- Mechanical ventilation: Mechanical ventilation may be considered after the initial management in the case of severe hypoxaemia or hypercarbia, significant head injury, gross flail chest and respiratory distress.

NURSING MANAGEMENT

After the initial stabilisation at the accident and emergency (A & E) department and/or surgical intervention, the patient should be transferred to the trauma intensive care unit (ICU) or trauma ward for intensive therapy. The nurse takes responsibility to provide holistic care and to constantly monitor the patient's progress through the acute phase until discharge. Nursing management also involves collaboration with health care team members and to co-ordinate patient care. With good nursing management, the potential complications of blunt chest injuries in the first 48 hours can be anticipated and prevented and the recovery outcomes are improved. The patient management in the ICU depends on the severity of injury and alteration in clinical status. The priorities are to stabilize the airway, breathing and circulation. A record of baseline observations is done for heart rate and rhythm, blood pressure, central venous pressure, respiration, ventilator settings, temperature and neurological status (Adam & Osborne, 1997).

When the patient's condition has been stabilized, a full nursing assessment is done. All nursing diagnoses and interventions are documented to note a deviation from the baseline. Specific observations for blunt chest injured patients include:

- Respiratory rate and depth: Note the quality of respiration, use of accessory muscles, respiratory rates above 24 per minute or less than 6 per minute and oxygen saturation below 90% by oximetry.
- Chest movements and air entry: Check symmetry of the chest and equal air entry in all lobes. Be alert to patients who may be having underlying respiratory disease.
- Respiratory pattern: Note respiratory patterns that may be indicative of central nervous injury such as Cheyne-Stokes respiration.
- Skin: Examine the skin for bruises. lacerations, and abrasions which may indicate underlying injury. The colour and temperature are checked for perfusion status. Also feel for subcutaneous emphysema which may be indicative of barotrauma or injury to the airways and oesophagus.
- Pain: Ask the patient for the presence of pain and rate it on a pain scoring scale from zero to ten (0-10) to describe the intensity. Provide adequate pain relief by low dose narcotic analgesic such as morphine, intercostal nerve block or epidural analgesic (Adam & Osborne, 1997; Demetriades, 1993). A patient with adequate pain relief will breathe more

deeply, cooperate with physiotherapy and clear secretions more effectively.

• Psychological: Trauma is a sudden event which does not allow the patient and family time to adapt to the situation. Therefore, high stress levels and anxiety may be experienced. Anxiety may even be higher in intubated and ventilated patients in the ICU due to the inability to talk.

METHODOLOGY

A cross sectional descriptive survey was utilized in which data were obtained from patients' records. A checklist was used to capture patient data.

Population and Sample

The population comprised all patients with blunt chest injuries who were admitted to the Trauma Unit of an academic hospital in Johannesburg over a period of 18 months. A total of 148 subjects were identified from the admission registers to be eligible for the study. The study population was divided into Group 1 (patients admitted between 1/1/1997 and 31/12/1997) and Group 2 (patients admitted between 1/1/1998 and 30/6/1998) to ensure a proportional sample. The sample consisted of 60 patient records ; 40 records selected from Group 1 by means of systematic random sampling and 20 from Group 2 by convenience sampling. Exclusion criteria were age below 18 years, death on arrival and penetrating chest injuries.

Data Collection

Data were collected by retrospective and concurrent record review over a period of 3 months. Based on a thorough literature review, a checklist was developed to facilitate data collection. The checklist was used to record patient data in the following sequence:

Biographical data.

• Initial assessment at the Accident and Emergency department (A & E).

• Subsequent assessment and management in the trauma intensive care unit/ward.

• Documented medical and nursing care.

• Patient outcomes at the end of 48 hours.

Validity and reliability

The checklist to record data was developed based on review of recent literature and the trauma unit protocols. The checklist was judged by two consultants in the Trauma Unit. Valuable suggestions that were given were included. Reliability and validity were assessed by piloting the checklist. The researcher was the only instrument for data collection and therefore consistency was assured.

Pilot study

A pilot study was conducted to determine the reliability of patient records as a source of data. The checklist was pretested for validity of items on three records of patients. Amendments were made as indicated in the piiot study.

Ethical considerations

Permission to conduct this study was obtained from the University Committee for Research on Human Subjects and the Postgraduate committee, the hospital superintendent and the Head of the Trauma Unit. For concurrent record review, a patient information sheet was used to secure verbal consent from patients. To ensure anonymity, records were identified by hospital number and then coded to protect the identity of patients and the health professionals involved in their care.

Data analysis

Data were coded and analysed by computer. Narrative and descriptive statistics such as frequencies and percentages were used to present the data. Where applicable the Chi square statistic was applied. Significance level was set at less than 0,05.

RESULTS

Biographical data

Based on the statistics from the admission registers of the Trauma unit, blunt chest injuries constituted 8% of all injuries. The majority of the victims (63%) were between 18-47 years. Males were more affected (62%) as compared to females (38%).

Initial assessment

Table 1: Time spent in the A & E department (n=60)

Time spent in hours	f	%
0-1	6	10
1-2	17	28
2-3	6	10
3-4	6	10
>4	9	15
Not determined	16	27
TOTAL	60	100

Table 2: Specific chest injuries (n=60)

Type of injury	f	%
Haemothorax	19	32
Pneumothorax	22	37
Myocardial contusion	2	3
Perforated oesophagus	1	2
Pulmonary contusion	6	10
Ruptured diaphragm	2	3
Fractured ribs	41	68
Flail chest	5	8
Fractured clavicle	11	18
Sternal injury	5	8
Aspiration	2	3

The time of injury was recorded in only 15% of records which made it difficult to determine the prehospital evacuation time. The time of arrival in the A & E department was recorded in 75% of cases. It was noted that the remaining 25% constituted those patients who did not require resuscitation. More than a third of the patients (38%) spent less than 2 hours in the accident and emergency department before admission to ICU/ward or theatre. In 27% of the records, the time spent in A & E, could not be determined since the arrival or leaving the A & E was not recorded. (Table 1). It was observed that those who were severely injured received prompt attention than those who were less severely injured.

Motor vehicle accidents (MVA) accounted for the majority of the injuries (57%). Other mechanisms of injuries were pedestrian vehicle accidents (23%), falls (8%), crush injuries, (2%) and assault (5%). Others such as train accidents and stormed by a bull accounted for 5% of blunt chest trauma. A variety of blunt chest injuries were observed. Rib fractures, pneumo and haemothoraces were the most common (68%, 37% and 32% respectively) while 2% was attributed to perforated oesophagus. (Table 2)

Since blunt chest injuries indicate radiation of force, 70% of patients were found to have associated injuries including head (37%) , abdominal (10%), skeletal (48%), urogenital (3%) and soft tissue injuries (7%).

Table 3: Complications from Blunt Chest Injuries (n=25)

Complications	f	%
Pain	7	12
Atelectasis	2	3
Infection	3	5
Pneumonia	6	10
Pleural effusion	1	2
Respiratory failure	4	7
Arrhythmia	1	2
Cardiac arrest	5	8
Hypotension	5	8
Persistent pneumothorax	3	5
Pulmonary oedema	1	2
ARDS	1	2

Documented medical and nursing care

The types of treatment prescribed, depended on the specific injury. Generally, the treatment modalities included intercostal drain (67%); antibiotics (55%); inotropes (8%); analgesics (91%); tetanus toxoid (20%); oxygen by face mask(15%); laparotomy (10%); cardioversion (2%); urethral repair (2%); and cardio-pulmonary resuscitation (7%). Upon admission to the ICU/Ward, 45% required mechanical ventilation; 3% with CPAP. Analysis of nursing documentation indicated that patient assessment was systematically done most of the time (83%). However, there was lack of evidence on the use of written nursing care plans in most of the records. (98%). Assessment of vital data was adequately done however, pain assessment was documented in only 10% of records. Although most of the patients (91%) received analgesia, the pain scoring scale was not routinely utilized. The psychosocial needs of the patients were least met. Talking to patients was documented in 63% of the records, patient education in only 3%, and reassuring the patient in 2% of records. Reassuring the relatives was not documented in any of the files.

Patient outcomes

In 25 patients (42%) various complications occurred within 48 hours following blunt chest injury. Pain (12%) and pneumonia (10%), were the most common complications. Of the 25 patients who developed complications, 10 had more than one complication. (Table 3).

At the end of 48 hours, 67% of the patients were still in the units of initial admission, 8% of the patients had died and 10% had been discharged home. (Table 4)

Table 4: Final outcome at 48 hours (n=60)

Outcome	f	%
Still in initial unit	40	67
Transferred to specialized unit	7	12
Transferred to general ward	2	3
Death	5	8
Discharged home	6	10
TOTAL	60	100

DISCUSSION AND CONCLUSION

Blunt chest injuries have been recognised as a cause of significant mortality and morbidity. Young people are most affected and males in particular, as they are more likely to be involved in high risk behaviour which predisposes them to injury. Motor vehicle accidents are the commonest cause of blunt chest injury. Pedestrian vehicle accident (PVA) contribute to a high fatality rate due to the severity of injuries that are caused. Wearing seatbelts is compulsory according to the Road Traffic Act (Act No. 29 of 1989). This study found that of the 35 patients who were injured in MVA, only 5 (14%) were wearing seatbelts.

Time is a crucial factor in trauma care. It was observed that the time of injury was documented in only 15% of the records. It was therefore difficult to determine the pre-hospital evacuation time. As stated by McCabe (1996) and Mirvis and Young (1992), survival after initial trauma is directly related to the severity of injury and the time in which treatment is given. More than half (33 patients) spent less than two hours in the A & E department, however there was no significant increase in the development of complications in relation to the time spent in the A & E department (p = 0,487). The mortality and morbidity from blunt chest injuries may be influenced by pre-existing conditions and associated injuries. Pre-existing factors and conditions such as smoking, hypertension, TB, HIV, diabetes and drug abuse may raise morbidity significantly (p= 0.032).Associated head injuries may cause considerable morbidity (p= 0.0052) and mortality (p= 0.014). All five patients who died had associated head injuries and were involved in pedestrian vehicle accidents. Associated skeletal injuries may cause significant morbidity and prolonged hospitalization (p= 0.023).

Various treatment modalities and surgical interventions were prescribed. Forty patients (67%) had an intercostal drain inserted due to a pneumothorax or a haemothorax. Antibiotics were prescribed in the case of 33 patients (55%).Nine of these patients received antibiotics due to infection or pneumonia while the other 24 received antibiotics as prophylaxis. However, prophylactic use of antibiotics in blunt chest injuries is controversial (Wilson & Walt, 1996). Adequate analgesia has been found to relieve pain and improve respiratory functions (Oh, 1990). Six patients (10%) who had associated abdominal injury required urgent laparotomy which revealed injury to the liver, spleen or diaphragm. Twenty-nine patients (48%) had associated skeletal injuries especially to the long bones and pelvis. These patients were treated either by open or closed reduction or traction. It must be noted that each patient required specific treatment depending on the type of injuries and progress.

Less than half the patients (45%) required mechanical ventilation. The choice of mechanical ventilation depended on the ability to maintain the airway, severity of injury, clinical assessment and blood gases.

Almost half the patients (47%) experienced varying degrees of anaemia. The anaemia could be associated with actual blood loss (Robertson & Redmond 1994). It can be speculated that trauma itself may be a cause of haemolysis which may occur in the reticuloendothelial cells of the lungs.

Patient assessment by nurses was well documented in the trauma ICU. Documentation of nursing care was least done in the Trauma ward and evidence of written care plans was lacking. Since there was less documentation of nursing care

in the Trauma ward than ICU, it can be assumed that the patients in the Trauma ICU and ward are likely to receive differential levels of care though the injuries may be similar. The administration of medications and transfusions was well documented.

Assessment of gastrointestinal needs was infrequently documented. A possible explanation for this could be that the nurses do not see prescribing for nutritional needs as part of their responsibility or that they lack ability to do an adequate nutritional assessment. Nutritional needs were often documented in nursing notes only when these were prescribed in medical notes.

Psychosocial needs of the patient and family received the least attention. Since their mortality and morbidity is not obvious, psychosocial needs tend to be given low priority, hence jeopardising holistic patient care. These findings are consistent with a study by McCabe (1996) who found that information to and support of relatives is an issue that is often neglected in trauma care. A Spanish study by Zazpe, Margall, Otano, Perochena and Asiain (1997), on meeting the needs of relatives of ICU patients, found that although physical needs are generally met, there are certain aspects of information and comfort of the ICU environment that are least met.

The final outcomes of blunt chest injuries at 48 hours were positive. Less than half of the patients (42%) experienced complications while six patients (10%) had been discharged home. The pattern of complications in the first 48 hours is similar to that found in the literature (Baldt, Bankier, German, Poschl, Skerbensky & Herold, 1995). Pain and pneumonia were the commonest complications while pulmonary contusion and flail chest were found to cause more complications than other blunt chest injuries.

RECOMMENDATIONS

- Accurate documentation of time of injury, arrival and leaving the A & E department must be done to facilitate quality control and research activity in the Trauma Unit.
- Adequate attention must be given to psychosocial and spiritual care of patients and families with increased curricular emphasis on psychosocial nursing.
- A comparative study should be done to determine the levels of care that patients with similar blunt chest injuries receive in the Trauma ICU as opposed to the trauma ward.

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