

**NURSING OUTCOME STANDARDS FOR  
POLYTRAUMA PATIENTS WITH  
TRAUMATIC BRAIN INJURIES IN  
THE MAFIKENG DISTRICT**

**SALAMINAH S. MOLOKO**

**THESIS FOR THE FULFILLMENT OF THE DEGREE**

**OF**

**MAGISTER CURATIONIS**

**IN**

**PROFESSIONAL NURSING**

**IN THE**

**FACULTY OF HEALTH SCIENCES**

**AT THE**

**UNIVERSITY OF STELLENBOSCH**

**SUPERVISOR: DR T. VAN DER MERWE**

**JUNE 2001**

# ***DECLARATION***

I, THE UNDERSIGNED, HEREBY DELCARE THAT THE WORK CONTAINED IN THIS THESIS IS MY OWN ORIGINAL WORK AND HAS NOT PREVIOUSLY, IN ITS ENTIRETY OR IN PART, BEEN SUBMITTED AT ANY UNIVERSITY FOR A DEGREE.

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# SUMMARY

In trauma the priority is given to identifying the life-threatening injuries and immediately implementing treatment (Demetriades, 1993:3). Severe trauma resuscitation and assessment often have to be carried out simultaneously to detect and treat conditions that are rapidly fatal if not attended to immediately and according to priority. Urgent priorities in trauma management include maintaining a clear and patent airway to facilitate respiration and cervical spine protection by avoiding rough manipulation of the head and neck by supporting the neck with a neck immobiliser. Any external bleeding has to be controlled by applying direct pressure to the wound. Cardiovascular problems, for example shock or myocardial infarction, respiratory problems and hypoxia which are detrimental, particularly in the case of head injury, should be excluded. A detailed head-to-toe examination which includes the head, neck, chest, abdomen, back, musculo-skeletal system, rectum and vagina has to be performed.

For the head-injured patient, correct any condition, which may complicate the existing head injury, for example hypoxia, shock, pneumothorax and fractures of long bones or pelvis. Implement the A (airway), B (breathing), C (circulation), D (disability, neurological and drugs) and E (environment) for structured management of the patient.

Muller's, (1996) two-phase model was utilised to formulate and validate nursing outcome standards. In phase one literature was explored to develop provisional standards on polytrauma patients with traumatic brain injuries. In phase two the provisional standards were validated by experts (doctors and nurses) in critical care, trauma and emergency nursing including nurses and a doctor working in the casualty department of a provincial hospital in Mafikeng. Final standards were formulated and adapted accordingly.

## II.

Standards for the management of a polytrauma patient with traumatic brain injuries included:

- A safe environment for patients, nurses and doctors
- Primary survey in casualty department which includes the maintenance of airway, breathing, circulation, disability/ neurological, drugs and exposure
- The secondary survey that includes the head to toe examination, definitive orthopaedic care and stabilisation before transfer to the intensive care unit

A standard on all relevant equipment which might be needed in case the patient goes into cardiac arrest on the way to the intensive care unit, was also formulated. The standard on documentation included the primary and secondary survey in the casualty department, transport to the intensive care unit, activities and the condition of the patient. The final standards dealt with the accurate handing over of the patient to the intensive care personnel.

The following recommendations were made:

- Implement the outcome standard by means of a quality improvement programme through a top-down approach.
- Provide training: Nurses and doctors have an obligation to render quality care, therefore they have the right to be trained in emergency procedures.
- All registered nurses working in the casualty or emergency departments should be trained in at least Basic Life Support (CPR), Advanced Cardiac Life Support (ACLS), Advanced Paediatric Life Support (APLS) and Advanced Trauma Life Support (ATLS) while waiting to be sent for the trauma-nursing course.
- Improve infection control measures in the casualty department
- Emergency drugs must always be available.
- Improve the on-call system.
- Formulate a policy on sharing of the equipment by both casualty and ICU staff.
- Motivate for the necessary equipment.



- Implement procedures for debriefing of staff, the evaluation of actions during resuscitation and implement measures for psychological support of the family.
- For further research, implement and test a training programme whereby nurses can formulate their own standards.
- Evaluate whether the standards have improved the quality of trauma care, and develop standards for ICU nursing of the brain injured patient and the rehabilitation of polytrauma patients with traumatic brain injuries

The uniqueness of the study lies in the fact that no formal outcomes standard for trauma patients with traumatic brain injuries have been developed in any of the North West Provincial hospitals.

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## IV

# OPSOMMING

Die identifisering van lewensbedreigende beserings en die onmiddellike implementering van behandeling, is in trauma 'n eerste prioriteit (Demetriades, 1993: 3). Resussitasie en die beraming van erge traumagevalle noodsaak in baie gevalle, gelyktydige hantering. Sou hierdie hantering nie gelyktydig en onmiddellik volgens prioriteit plaasvind nie, kan dit noodlottige gevolge inhou. Belangrike prioriteite in traumabehandeling sluit in, die instandhouding van 'n patente lugweg om asemhaling te onderhou asook die beskerming van die servikale rugmurgkolom, deur die ruwe manipulasie van die kop en nek te vermy deur die implementering van 'n nek-immobiliseerder. Kardiovaskulêre probleme, byvoorbeeld skok of miokardiale infarsie, asook respiratoriese probleme wat lewensbedreigend vir die pasiënt met 'n hoofbeseering is, moet uitgesluit word. 'n Gedetailleerde van kop-tot-tone ondersoek, wat die kop, nek, borskas, abdomen, rug, muskulo-sketale stelsel, rektum en vagina insluit, moet uitgevoer word.

In die pasiënt met hoofbeseerings moet enige toestand byvoorbeeld frakture van die langbene of die pelvis, skok of 'n pneumothorax, eers behandel word. Implementeer die A (lugweg – “airway”), B (asemhaling – “breathing”), C (sirkulasie – “circulation”), D (gestremdheid – “disability”, neurologies- “neurological” en drogerye-“drugs”) en E (omgewing – “environment”) vir die gestruktureerde behandeling van die pasiënt.

Die twee fase model van Muller (1996) is gebruik vir die formulering en validering van die verpleeguitkomsstandaarde. In fase een is die literatuur verken om die voorlopige standaard vir polytrauma pasiënte met traumatiese breinbeseerings te ontwikkel. In fase twee is die voorlopige standaard gevalideer deur kundiges (dokters en verpleegkundiges) in kritieke sorg, trauma en noodverpleging. Die verpleegkundiges en dokter wat werksaam is in die ongevalle-eenheid van 'n plaaslike provinsiale hospitaal in Mafikeng is ook ingesluit. Finale standaard is geformuleer en dienoreenkomstig aanvaar.



Die standaard vir die politrauma pasiënt met traumatiese breinbeserings, sluit in:

- 'n Veilige omgewing vir pasiënte, verpleegkundiges en dokters.
- Die primêre beraming in ongevallen ten opsigte van instandhouding van die lugweg, asemhaling, sirkulasie, gestremdheid, drogerie en blootstelling.
- Die sekondêre beraming: wat behels die kop-tot-tone ondersoek.
- Definitiewe ortopediese behandeling en stabilisering voor oorplasing na die intensiewe-sorg-eenheid.

'n Standaard met betrekking tot die nodige toerusting wat benodig mag word tydens 'n hart stilstand, oppad na die intensiewe-sorg-eenheid, is ook geformuleer. Die standaard ten opsigte van dokumentasie sluit die primêre, en sekondêre beraming, vervoer na die intensiewe-sorg-eenheid, aktiwiteite en toestand van die pasiënt, in. Die finale standaard is gebaseer op die oorhandiging van die pasiënt aan die intensiewe-sorg-personeel.

Die volgende aanbevelings word gemaak:

- Implementeer die uitkomsstandaarde deur middel van 'n gehalteverbeteringsprogram deur gebruik te maak van 'n "top-down" benadering.
- Voorsien opleiding: Verpleegkundiges en dokters het 'n verpligting om gehaltesorg te lewer, hulle het dus 'n reg om onderrig te ontvang in noodprosedures, en verder het die pasiënt die reg op gehalter noodbehandeling.
- Alle geregistreerde verpleegkundiges wat in die ongevallen en die noodafdeling werk, behoort opgelei word in ten minste basiese lewensondersteuning (CPR), Gevorderde Trauma Lewens Ondersteuning (ACLS), Gevorderde Pediatriese

lewensondersteuning (APLS) en Gevorderde Trauma lewensondersteuning (ATLS), terwyl gewag word om die trauma verpleegkundigekursus te deurloop.

- Verbeter infeksiebeheermaatreëls in ongevallen.
- Noodmedikasie moet ten alle tye beskikbaar wees.
- Verbeter die op-roepstelsel (“on call”).
- Formuleer ‘n beleid oor die gesamentlike gebruik van toerusting deur beide ongevallen- en intensiewe-sorg-eenheid-personeel.
- Motiveer vir die nodige toerusting.
- Implementeer prosedures om personeel to te laat vir ontlonting (debriefing), die evaluering van aksies tydens die resusitasie prosedure en implementeer metodes vir die sielkundige ondersteuning van die familie.
- Ten opsigte van verdere navorsing behoort ‘n opleidingsprogram geïmplementeer en getoets te word met betrekking tot verpleegkundiges wat hulle eie standarde will formuleer.
- Evalueer of die standarde die gehalte van traumasorg verbeter het en ontwikkel standarde vir intensiewe-sorg-verpleging van die breinbeseerde pasiënt asook die rehabilitasie van politrauma pasiënte met traumatise breinbeseering.

Die unieke bydra van die studie word gevind in die feit dat daar nog geen geformaliseerde uitkomstandaarde vir traumapasiënte met breinbeseerings in enige van die Noord Wes Provinsie se hospitale ontwikkel is nie.



# DEDICATION

**This study is dedicated to the memory of my late mother, Jolina Moloko who passed away before she could enjoy the fruits of her labour.  
Thank you mom for making me what I am today.**

*My sincere thanks goes to the following:*

*Dr. T.J. van der Merwe, for being both my supervisor and friend.*

*My family - Ben, Gnaphe, Leruo, my brother, sisters and their support.*

*The National Research Foundation (NRF) for the financial support towards this research, which is gratefully acknowledged.*

*The Faculty of Agric Science and Technology for granting me a bursary.*

*My friends, Morapeli, Jana, Vuyiswa, Kaleco, Leruo, Ntsho, Ntsho, Roseline for their support during crucial times in the course of my studies.*

*My neighbours, Mr. And Mrs. Molebane for taking care of my dog in my absence.*

*Mrs. Lisky Nomba for her continued support.*

*The Nursing Science Department staff for supporting me.*

*Christna Gouws, Christine Hough, Annah Kyabonene and Sney for their excellent typing expertise.*

*Mrs. M. Ledibane, Tille van Tonder and Mrs. Hartel for language editing.*

*The Matieleng Provincial Hospital Management and Casualty staff for allowing me to conduct my study in the hospital and for their generous contribution.*

*Finally, Sunette and Hein for allowing me to share the warmth of their home with them.*

VII

# ACKNOWLEDGEMENTS

I thank the Almighty God for giving me life and the strength throughout my years of study

*My sincere thanks goes to the following:*

*Dr. T.D. van der Merwe, for being both my supervisor and my parent*

*My family - Ben, Onneile, Leruo, my brother, sisters and their families for their support.*

*The National Research Foundation (NRF) for the financial assistance given towards this research, which is gratefully acknowledged.*

*The Faculty of Agric Science and Technology for giving me a research grant*

*My friends, Morapedi, Jane, Vuyelwa, Keleco, Lizzy, Noko, Margaret, Majaja and Roseline for their support during crucial times in the course of my studies.*

*My neighbours, Mr. And Mrs. Moletsane for taking care of my house during my absence.*

*Mrs. Lisky Nombe for her continued support.*

*The Nursing Science Department staff for supporting me.*

*Chrisna Gouws, Christine Hough, Annah Kgaboesele and Suny Lou for their excellent typing expertise.*

*Mrs. M. Ledibane, Tillie van Tonder and Mrs. Hartel for language editing.*

*The Mafikeng Provincial Hospital Management and Casualty staff for allowing me to conduct my study in the hospital and for their generous contribution.*

*Finally, Sunette and Hein for allowing me to share the warmth of their mom with them.*



# CONTENTS

in the Matieland district

1.1 Introduction

1.2 Problem Statement

Acknowledgements

Summary of Research

Opsomming

Table of contents

List of tables

List of figures

List of annexure

1.7 Operational Definitions

1.8 Ethical Considerations

1.9 Research Methodology

1.9.1 Introduction

1.9.2 Research Design

Page

I

I

IV

VIII-XX IX, X

XI, XIII

XIII

XIV

10

11

12

13

13

13

<b>CHAPTER 1: Overview of the study: Nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district</b>	<b>1</b>
1.1 Introduction	1
1.2 Problem Statement	4
1.3 Research Question	8
1.4 Goal of Research	8
1.5 Research Model	9
1.6 The Paradigmatic perspective of the study	9
1.6.1 Meta-Theoretical Assumptions	9
1.6.2 Theoretical Assumptions	10
1.6.3 Methodological Assumptions	10
1.7 Operational Definitions	11
1.8 Ethical Considerations	12
1.9 Research Methodology	13
1.9.1 Introduction	13
1.9.2 Research Design	13



1.9.3	Population and Sample	14
1.9.3.1	Target Population	14
1.9.3.2	Sample	14
1.9.4	Data Gathering	15
1.9.5	Data Analysis	15
1.10	Trustworthiness	16
1.11	Strategies of Reasoning	18
1.12	Arrangement of Chapters	18
1.13	Summary	18
<b>CHAPTER 2:</b>	<b>Research Methodology: Nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district</b>	<b>19</b>
2.1	Introduction	19
2.2	Goal of the Research	20
2.3	The Research Model	20
2.3.1	Assessing ability to maintain a safe environment	25

2.3.2	Assessment of breathing	25
2.3.3	Assessing communicating skills	25
2.3.4	Assessing mobility	26
2.3.5	Control of temperature	26
2.3.6	Assessing eliminating habits	26
2.3.7	Assessing the working and playing routines	26
2.3.8	Assessing personal cleansing habits	26
2.3.9	Expressing sexuality	27
2.3.10	Assessing eating and drinking	27
2.3.11	Assessing sleeping routines	27
2.3.12	Assessing the needs of the dying	27
2.4	Research Design	32
2.4.1	Qualitative Approach	33
2.4.2	Explorative and Descriptive Design of the study	33
2.4.3	Population and Sample	36
2.4.4	Convenience sample	37

2.4.5	Data gathering and Data analysis	37
2.4.6	Trustworthiness	38
2.4.6.1	Credibility	39
2.4.6.2	Transferability	39
2.4.6.3	Consistency and Dependability	40
2.4.6.4	Confirmability	40
2.5	Ethical Consideration	40
2.6	Summary	41
<b>CHAPTER 3:</b>	<b>The literature study for the development of nursing outcome standards for polytrauma patients with traumatic brain injuries</b>	<b>42</b>
3.1	Introduction	42
3.2	Phases of the study	43
3.3	Literature study	44
3.3.1	Anatomy of the nervous system according to Ahrens and Prentice (1998: 351)	44



3.3.2	Head injuries	53
3.3.3	The structure and function of bones and the pathophysiology	64
3.3.4	Scoring systems in trauma	65
3.3.5	Commonly seen injuries	68
3.3.6	Transporting polytrauma patients with traumatic brain injuries from the accident scene to the emergency department	74
3.3.7	Management of the polytrauma patient with traumatic brain injuries during transportation from the accident scene to the casualty/emergency department	77
3.3.8	Management of polytrauma patients at casualty department	81
3.3.9	Management of the head injury patient	85
3.3.10	The head to toe examination (secondary survey)	88
3.3.11	Transporting the polytrauma patient with traumatic brain injuries from casualty to the intensive care unit	89
3.3.12	Standards and Standard development	92
3.4	Provisional outcomes standards for polytrauma patients with brain injuries	97
3.5	Summary	111

<b>CHAPTER 4:</b>	<b>Results: Validation of the nursing outcome standards for polytrauma patients with traumatic brain injuries</b>	<b>112</b>
4.1	Introduction	112
4.2	Goal of the study	113
4.3	Results: Quantification Phase (phase two)	113
4.4	Final Outcome Standards for the polytrauma patient with brain injuries	154
4.4.1	Resuscitation in the casualty department	154
4.4.2	Transport to the Intensive Care Unit	167
4.4.3	Psychological	169
4.5	Limitations of the Study	183
4.6	Summary	183
<b>CHAPTER 5:</b>	<b>Conclusion, Recommendations and Summary</b>	<b>185</b>
5.1	Introduction	185
5.2	Goal of the Research	186
5.3	Conclusions	187
5.4	Recommendations	189

5.4.1	Training	189
5.4.2	Quality Improvement	189
5.4.3	Structural Changes	190
5.4.4	General	190
5.5	Future Research	191
5.6	Summary	191
6.	References	194



# LIST OF TABLES

Table 1.1	Strategies to ensure trustworthiness (Krefting, 1991: 215)	17
Table 2.1	Phases of the research	34
Table 3.1	The 12 Cranial Nerves (Guyton, 1992: 459 – 464)	52
Table 3.2	Classification of head injury according to the morphology (ATLS, 1997: 188)	55
Table 3.3	Potential fluid loss from various injuries (Vasquez et al, 1992: 410 – 415)	65
Table 3.4	The Glasgow Coma Scale (ATLS, 1997: 190)	66
Table 3.5	Revised Trauma Score (RTS) (Demetriades, 1993: 92)	67
Table 3.6	Commonly seen injuries in the adult trauma patient (Kidd & Wagner; 1997:704)	73-74

## XVII

Table 3.7	Complications & Physiologic changes during Inter-hospital Transport (Hatt et al, 1992: 569)	89
Table 3.8	Pupil Responses in Head Injured Patients (ATLS, 1997: 200)	91
Table 3.9	Mason's (1994: 5 – 59) Steps in Standard Formulation	94
Table 3.10	Criteria in the Formulation of Clinical Nursing Standards (Van der Merwe, 1994)	96
Table 4.1	Summary of all the Respondents' biographical data	114
Table 4.2	Biographical data of respondent one	115
Table 4.3	Biographical data of respondent two	119
Table 4.4	Biographical data of respondent three	124
Table 4.5	Biographical data of respondent four	131
Table 4.6	Recommendations	132-134
Table 4.7	Biographical data of respondent five	134
Table 4.8	Biographical data of respondent six	135
Table 4.9	Biographical data of respondent seven	138
Table 4.10	Biographical data of respondent eight	139

## XVIII

Table 4.11	Biographical data of respondent nine	143
Table 4.12	Biographical data of respondent ten	148
Table 4.13	Biographical data of respondent eleven	152
Table 4.14	Biographical data of respondent twelve	152
Table 4.15	Nursing Assessment and Actions for Specific Procedures for Polytrauma Patients	172-180
Table 4.16	Neurologic Status (Vasques et al, 1992: 158)	181
Table 4.17	Medical Therapies for the head injured patient (ATLS, 1997: 202 – 203)	182



# LIST OF FIGURES

Figure 2.1	The research model (Botes, 1998)	22
Figure 2.2	A model for nursing based on a model of living, individualising nursing as a dynamic process, using Roper et al (1996: 60) as a conceptual framework	29
Annexure B		
Annexure C	Universal basic life support algorithm (CPR)	215

# LIST OF ANNEXURE

Annexure A:	Cricothyroidotomy (Demetriades: 1993: 79; Chan, Winston, Terada and Parson's 1998: 191)	199
Annexure B:	Provisional Nursing Outcome Standards for polytrauma patients with traumatic brain injuries in the Mafikeng district	200
Annexure C:	Universal basic life support algorithm (CPR)	215

# Chapter 1

## OVERVIEW OF THE STUDY: NURSING OUTCOME STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES IN THE MAFIKENG DISTRICT

### 1.1 INTRODUCTION

“Head injuries are a common cause of morbidity and mortality in the polytrauma patients and a large percentage of the deaths associated with polytrauma can be attributed to head injury and its complications, namely cerebral haemorrhage, respiratory failure and cerebral oedema” (Sacks & Katz 1989: 1). Reduction of morbidity and mortality of these patients could be reduced by pre-hospital care approach, proper transportation and hospital care. This has been achieved by the introduction of the helicopter evacuation system and the use of skilled emergency technicians in the larger metropolitan areas of South Africa. The receiving facilities should also be well-equipped and staffed with trauma trained nurses and doctors.

According to Trask (In Grenvik, Atres, Holbrook & Schoemaker, 2000: 273) mortality from multiple injuries follows a trimodal distribution, which has been identified as three distinct peaks or phases. The first peak occurs within the first hour and describes the fatal injuries for which provision of immediate care is minimally effective. Injuries identified in this peak include laceration to the brain or major blood vessels and cardiac rupture. Patients in this phase usually do not reach the hospital alive and more than 50% of all trauma deaths occur in the first phase.

The second phase/peak occurs from one to four hours and includes patients for whom immediate definitive medical treatment may be life saving. Hall, Schmidt and Wood, (1992: 693) support the idea that the second peak occurs from minutes to



approximately one hour and includes life-threatening injuries such as tension pneumothorax, haemopneumothorax and cardiac tamponade. Prevention of death in this peak is the primary goal of an effective regional trauma care system. The third peak according to Trask (In Grenvik et al, 2000: 273) occurs over one to five weeks from sepsis and multiple organ failure as the cause of death for patients in this category. This peak can be affected by the intervention during the second phase.

The multiple injured patient has by definition multiple problems and according to Driscoll and Skinner (1994: 34) management of these patients requires a team approach. The team has to be organised and should work in a well-equipped resuscitation room. Driscoll et al (1994) further state that the overall management of the patient is the responsibility of the team leader who should not participate in the practical procedures, but should organise the team, assimilate the clinical findings and physical measurements and devise immediate and definitive plans for management.

The receiving hospital will always be notified of the prospective patient, whose condition and major injuries will be noted to assist in preparation for resuscitation. Once the receiving casualty department has been informed, the team will start to prepare for the resuscitation. According to Scott (1995: 6) primary treatment of an injured patient covers a continuum from the accident to recovery and includes the accident, pre-hospital care, resuscitation, stabilisation, supportive care, rehabilitation and re-integration.

In this study nursing outcome standards for polytrauma patients with traumatic brain injuries are to be developed, described and validated. This will focus only on resuscitation at the casualty department and during transport to the intensive care unit.

If the patient is to receive quality trauma nursing, nursing outcomes should be standardised and implemented effectively. Quality, according to the Oxford dictionary, is striving towards a degree of excellence. If quality nursing is to be implemented, the professional nurse has to implement an effective resuscitation protocol / standard and one of the requirements of standards is a multi-professional

team approach. Outcomes describe patient states and are expected to be influenced by an intervention. Management at casualty departments and transport to the ICU require nursing outcomes so as to guide those who give care.

According to Muller, (1998: 242) quality improvement is a formal process in which standards are set, work performance monitored and evaluated against the set standards to maintain quality care. Muller, (1996: 68) further explains that standards of good care refer to excellence and have different characteristics, namely accessibility, appropriateness, acceptability, equity and efficiency.

In this study these standards refer to the interventions which the individual with polytrauma and traumatic brain injuries requires, for example, the casualty department has to be accessible and be accepted by people. There has to be equity in offering the care without discrimination, effectiveness and efficiency, which is the ultimate care which is given to the patients.

To enhance the learning process, the nursing actions for the traumatic brain injured patient with polytrauma injuries should be written down as specific outcomes. Outcomes describe patient states and are expected to be influenced by an intervention. Patient states that are assessed but do not follow an intervention, are not outcomes (Johnson & Maas, 1997: 21).

Resuscitation at casualty and transport to the intensive care unit requires nursing outcomes so as to guide those who give care. This study, therefore, sets out to formulate, validate and communicate nursing outcome standards for polytrauma patients with traumatic brain injuries and will only include resuscitation in the casualty department and transport to the intensive care unit.



## 1.2 PROBLEM STATEMENT

Mafikeng district is a semi-rural area in the North West Province. It is 25 km from the Botswana border,  $\pm 72$  km from Lichtenburg,  $\pm 63$  km from Zeerust and  $\pm 160$  km from Vryburg. The referring hospitals in Pretoria are Ga-rankuwa, Muelmed and Military Hospital, those in Johannesburg are, Lesedi Clinic, and Garden City Clinic, and they are all between 300 and 325 km away from Mafikeng. The local private hospital in Mafikeng where patients are sent for Computer Tomography scanning is six (6) km away from the local provincial hospital in the Mafikeng district. Since all the referring hospitals are a distance from Mafikeng, it is imperative that nurses be knowledgeable in the nursing management of trauma and neurological patients.

It is a well-known fact in South Africa that the statistics for motor vehicle accidents leading to trauma and death are of the highest in the world. Trauma in South Africa "accounts for more deaths, more years of life lost, and more financial loss to the country in those under forty years of age, than other diseases combined" (Boffard in v.d. Merwe, Kuit, Schmollgruber & Dalgety, 1995:1)

Motor vehicle accidents are common in this area of the Province as the modes of transport are taxis, buses, and some private cars which are often involved in accidents leading to trauma or injuries. The local emergency/ambulance services assist in managing the injured on the scene and transport patients to the nearest hospital for further management at the casualty department. This is one of the reasons for upgrading the casualty department at the provincial hospital in Mafikeng.

When the emergency service people arrive on the scene, and patients can communicate their medical insurance to establish their status, then private patients are referred to the private hospital. The rest are transported to the provincial hospital for trauma management. Uncommunicative private patients are initially sent to the local provincial hospital for stabilisation and will later be transferred to the local private hospital in Mafikeng.



The study was conducted at the local provincial hospital because the majority of patients do not have medical insurances. This hospital is also used as a referral hospital in the province. The researcher also accompanied student nurses at this hospital where they undergo practical training for trauma and neurological conditions. Between January and December 2000, 15454 patients were seen at the casualty department of which 6317 were surgical, 6871 medical, 1438 gynaecological, 828 orthopaedic and 7322 patients were admitted. Of the total of 528 motor vehicle accidents, 264 patients were admitted, 17 patients were transferred to Ga-rankuwa Hospital, Muelmed Hospital, Military Hospital, Lesedi Clinic and Garden City Clinic from the intensive care unit. In the casualty department, two patients died and 14 of the 57 patients died in the intensive care unit.

It is clear from the above statistics that nurses working in the casualty department, nurse fewer polytrauma patients with traumatic brain injuries than any of the other categories. Nursing guidelines in the form of nursing outcome standards for polytrauma patients with traumatic brain injuries will facilitate effective (quality) nursing in this casualty department. Thus nurses are more oriented to basic nursing procedures than the advance nursing procedures for polytrauma and brain injuries.

The local provincial hospital has a bed occupancy of 376, with a casualty department which is being upgraded to a trauma centre. There are seven registered nurses working in the casualty department and one registered nurse is currently attending a trauma course in a hospital in Johannesburg.

The following equipment can be found in the casualty department: four (4) defibrillator machines, three (3) ECG machines, two (2) cardiac monitors, five (5) small dinamap machines and the emergency trolley with emergency drugs. The casualty department has a big reception area and a glass cubicle for clerks. There is a resuscitation room, seven (7) cubicles, partitioned with curtains for privacy, oxygen and suction outlets in each cubicle, a mini theatre, where minor operations are performed and a suturing room. The X-Ray department is situated between the casualty department and the intensive care unit, which makes accessing X-Ray facilities easy, though problems are experienced at night when the radiologist on call has to be called from home. The

intensive care unit is situated next to the X-Ray department and the operating room. It is connected to the X-Ray department and the operating room by means of a corridor. The intensive care unit has 10 registered nurses, four (4) have intensive care training and four are always on night duty. It is a seven (7) bedded unit with the following equipment: six (6) adult and two (2) paediatric ventilators, one (1) defibrillator machine, seven (7) cardiac monitors, one (1) ECG machine, 12 infuser pumps, two (2) arterial blood gas analyser machines, one (1) emergency trolley, one (1) blood warmer and two (2) inflatable mattresses.

Craniotomies are not performed at this hospital and patients who require this treatment are sent to other hospitals as mentioned above. This requires nurses to be able to assess clinical signs of brain lesions, for example haematomas, after injury and to be able to report to the doctor as quickly as possible. One doctor runs the casualty department during the day and there is one doctor on call at night. These doctors have to rotate monthly and most of them are on internship. Nurses sometimes attend to the patient first and have the responsibility of identifying unacceptable clinical signs, which need immediate intervention. The nurses in the casualty department do not have trauma training except for one registered nurse who is attending a trauma course in Johannesburg.

With both the doctor and the nurses being inexperienced with regard to the treatment of polytrauma patients with traumatic brain injuries, nursing guidelines, in the form of outcome standards, should facilitate effective polytrauma nursing. "The knowledge and skills of today's nurse are far more complex than was provided for in the basic training especially if the training was completed several years ago. To remain clinically skilled is not an optional extra for nurses anymore but in the current job market, evidence of current practical skills will become a prerequisite."(v.d. Merwe et al, 1995: iv)

Mangan (in v.d.Merwe et al, 1995:iv) states that "perhaps for some it will allow the opportunity to admit it only to themselves that there are some areas of nursing of which they do not have much grasp. This is not something that any professional nurse needs to feel ashamed of. In many ways it is only the true professional that can



acknowledge areas of knowledge in which he or she is rusty. However, once a deficit has been acknowledged, there is a responsibility to do something about it.”

South Africa is in the era of accreditation of hospitals and this is taking place in the private as well as in the public sector and an accreditation programme necessitates an internal quality improvement programme. The basis of the quality improvement programme is found in the formulation of standards which can be management or clinical in orientation. The formulation of the clinical standards for management of polytrauma patients with traumatic brain injuries, can serve a dual purpose: (i) providing guidelines in the facilitation of trauma nursing; (ii) providing standards for a nursing quality improvement programme. “We therefore owe it not only to our patients, but also to our country and ourselves that we make the best use of our facilities and our expertise to deliver health care as effectively and cost effectively as possible. This can only be done by setting standards, ensuring (not assuring) the quality and striving to improve upon them” (Boffard in v.d Merwe et al, 1995:i)

Polytrauma patients with traumatic brain injuries and all other patients admitted to the casualty department require quality-nursing care. What is quality nursing then? According to the Oxford Dictionary quality implies a degree of excellence. The South African Nursing Council defines nursing as “a caring profession which enables and supports the patient ill or well at all stages of life, to achieve and maintain health or where it is not possible, cares for the patient so that he/she lives in dignity until death”. Accompaniment is fundamental to all nursing and nursing is practised by persons registered/enrolled in terms of the Nursing Act no 50 of 1978 as amended with regulations and rules stipulated in the Act (v.d Merwe, 1994: 6)

Quality nursing is therefore “the optimisation of this definition, that is, comprehensive, individualised nursing with scientific based nursing actions. It is an established expected level of performance, which is continually evaluated and remediated. This necessitates the implementation of a specific quality improvement programme to meet the needs of the nursing service” (v.d. Merwe, 1994:6)

The formulation of specific standards is one of the steps in the formal process of quality improvement and reflects the view of the nursing service on quality as well as accepted criteria for excellence. Quality nursing implies that the registered nurse is professionally responsible and accountable for the quality of the nursing care being rendered (v.d. Merwe et al, 1995:5)

From the above information the research question can be asked, "What should the contents of nursing outcome standards for polytrauma patients with traumatic brain injuries be?" This study is therefore aimed at exploring information on the management of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit.

### **1.3 RESEARCH QUESTION**

From the above information the following question arises:

What should the contents of nursing outcome standards for polytrauma patients with traumatic brain injuries be?

### **1.4 GOAL OF THE RESEARCH**

The goal of the research is to formulate nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district and this will be achieved through the following objectives:

- To explore the literature and determine the contents of nursing outcome standards on resuscitation of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit,
- To formulate nursing outcome standards on the management of polytrauma patients with traumatic brain injuries, that is, resuscitation in casualty and during transport, to the intensive care unit,
- To validate the nursing outcome standards of care used for polytrauma patients with traumatic brain injuries, and
- To communicate findings to the relevant stakeholders.



## 1.5 RESEARCH MODEL

In this study the researcher will utilise Botes' Research Model (1998). This model is practice orientated and specifies that all research should return to the practical situation.

This model for research is based on the relationship between the nursing practice, nursing science and philosophy of nursing.

The nursing outcome standards for polytrauma patients with traumatic brain injuries are required in the following orders: -

- Third order involves commitment and the nurses are guided by their philosophy, which is usually influenced by the nursing practice in the first order.
- The second order indicates the nursing science research and theory development and in this study it will be applied according to Muller's (1996) two phases of standard development.
- First order involves the nurse's interaction with the environment during the nursing care of polytrauma patients with traumatic brain injuries (Botes, 1998: 3).

## 1.6 THE PARADIGMATIC PERSPECTIVE OF THE STUDY

The paradigmatic perspective of the study includes the meta-theoretical, theoretical and methodological assumptions (Botes, 1998: 7).

### 1.6.1 *Meta-Theoretical Assumptions*

According to Botes, (1998: 4), nursing focuses on a person, his/her health and interaction with the environment.

The researcher supports Muller (1996: 11) when she states that, according to the Christian philosophy, "God is central and human kind is created by God to His image". Due to the nature of his creation in the image of God, man is to be cared for and be loved. Patients with polytrauma and head injuries are to be cared for at the casualty/ trauma unit, to reduce suffering and to preserve life.

### 1.6.2 Theoretical assumptions

The researcher will apply Roper, Logan & Tierney's model (1996: 35) for nursing, also described in Aggleton and Chalmers (2000: 45 - 61) where activities of living are considered as the main component of the model for nursing. According to Roper, et al (1996:35) the activities of living are the focus of the model because they are central to our view of nursing and characterise the person who is central to the model. The model further explains priorities among the activities of living with the activity of breathing being of prime importance because it is essential for all the other activities of living and for life itself.

According to Roper et al (1996: 376) there are factors influencing the activities of living and these are "environmental, biological, sociological, politico-economic and psychological."

### 1.6.3 Methodological assumptions

The researcher has no preference about the type of research method to be used. Due to the exploration and descriptive essence of the research, the two phases of standard development will be applied. The central methodologic assumption will be based on the functional reasoning approach by Botes (1998: 4), which emphasises that research must be applicable to practice and it must be useful. The researcher in this study aims to improve quality in nursing care by formulating and validating outcome standards to be used for patients with polytrauma and traumatic brain injuries during management at casualty department and transport to the Intensive Care Unit.



## 1.7 OPERATIONAL DEFINITIONS

Operational definitions in this study will include:

### NURSING

Nursing in this study means the emergency care, which will be given to the patient in the casualty department and during transport to the intensive care unit.

### STANDARD

A Standard is a written description of the expected or desired level of performance by the casualty nurse in the management of polytrauma patients with traumatic brain injuries in the casualty department (Astrop, Van der Merwe & Muller, 1996: 2).

### OUTCOME

An Outcome standard is the expected change in the patient's health status after she/he has received care and needs to be designed so that health professionals receive information concerning the patient's progress towards the outcomes (Mason, 1984: 34).

### TRAUMATIC BRAIN INJURIES

Any traumatic damage to the head resulting from penetration of the skull or from too rapid acceleration or deceleration of the brain within the skull. Blood vessels and nerves are torn, bleeding, edema and ischaemia may result (Mosby's Dictionary, 1986: 511).

### RESUSCITATION

"The process of sustaining the vital functions of a person in respiratory or cardiac failure while reviving him or her, using techniques of artificial respiration and cardiac massage, correcting acid-base imbalance and treating the course of failure" (Mosby's Dictionary, 1986: 985).

## GLASGOW COMA SCALE

"A quick practical and standardised system for assessing the degree of conscious impairment in the critically ill and for predicting the duration and ultimate outcome of coma. The system involves three determinants: eye opening, verbal response, and motor response, all of which are evaluated independently according to a rank order that indicates the level of consciousness and degree of dysfunction (Mosby's Dictionary, 1986: 487). The Glasgow Coma Scale is a score out of 15.

## MODERATE BRAIN INJURY

When an individual has an extended period of post traumatic amnesia which lasts for 30 minutes but less than 24 hours: it is indicated by the Glasgow Coma Scale of 9 - 12 out of 15 (Mosby's Dictionary, 1986: 487).

## SEVERE BRAIN INJURY

When an individual is in a coma or posttraumatic amnesia, which exceeds 24 hours. It is indicated by a Glasgow Coma Scale of 3 - 8 out of 15.

## POLYTRAUMA

In this study polytrauma will mean patients with multiple injuries from trauma involving several organs / structures of the body.

## VALIDATION

Make valid or ratify.

## 1.8 ETHICAL CONSIDERATIONS

Ethical considerations will be maintained as follows:

- Participation will be voluntary.
- Human rights of the participants will be respected throughout the study. The following authorities will be contacted and permission for conducting the study requested: A letter requesting permission to undertake the study will be sent to



the Deputy Director- General, Department of Health, North-West Province and the Manager of the Local Provincial Hospital in the Mafikeng district.

- Informed verbal consent will be obtained from all the registered nurses and doctors working in the casualty department at the local provincial hospital, those on day and night duty, including seven experts in trauma nursing who will assist with the validation of formulated nursing outcome standards.
- Respondents taking part in the study will be informed of their freedom to withdraw from the study at anytime if they so wish, but the success of the study depends on their participation.
- The subjects will be provided with the objectives of the study.

## **1.9 RESEARCH METHODOLOGY**

The research methodology will include an introduction, research design, data analysis, population and sample, data gathering, data analysis and trustworthiness.

### ***1.9.1 Introduction***

In order to maintain and improve quality nursing for patients with polytrauma and traumatic brain injuries, the study focuses on the formulation of nursing outcome standards, which will consist of two phases, namely the developmental and the validation phases (Muller, 1996: 69). The process will be achieved by using an exploratory and descriptive design, with a qualitative orientation.

### ***1.9.2 Research Design***

The design of this study is both explorative and descriptive in nature. The researcher will gather new information from literature on formulation of outcome standards and provide in-depth, factual and truthful descriptions on outcome standards for polytrauma patients with traumatic brain injuries, namely resuscitation at the casualty department and transport to the intensive care unit (Mouton, 1996: 102).

The description and formulation, including validation of nursing outcome standards, will be based on the conceptual framework of Roper, Logan and Tierney (1996: 33), which is based on the model of living.

The study will consist of the following two phases:

- **Phase one:** which will explore the literature and formulate the outcome standards of polytrauma patients with traumatic brain injuries.
- **Phase two:** will consist of the validation of outcome standards of polytrauma patients with traumatic brain injuries.

### 1.9.3 Population and Sample

Population and Sample will be described according to the target population and the sample chosen.

#### *1.9.3.1 Target Population*

The population of the study will include all registered nurses and doctors working in the casualty department of a local hospital. Experts in critical care, trauma nursing, emergency care and standard formulation will also be included in the study for the validation phase (phase two).

#### *1.9.3.2 Sample*

A purposive sample will be chosen of all registered nurses who have worked in the casualty department for three years or more, including the doctor who will be working in the casualty department during the month of the interview, because doctors have to rotate departments monthly.

A convenient sample will be chosen from experts in critical care, trauma nursing, emergency care and standard formulation in the Western Cape where the researcher is studying.



#### 1.9.4 Data gathering

The study will include the following two major phases, which will structure the research:

- Phase one will explore the literature and include the conceptual framework for the formulation of provisional standards.
- Phase two will be on the validation of the nursing outcome standards. According to Johnson (1996: 10), during the validation, specialists should be selected on the basis of their academic qualifications, knowledge and experience and validation of outcome standards should take place with the help of structured questionnaires on the outcome standards. In this study experts in trauma nursing, emergency nursing, critical care and standard formulation will be used to validate formulated standards.

#### 1.9.5 Data Analysis

Data analysis will be done according to the following two phases:

##### Phase One

Data will be analysed according to two phases. In phase one provisional nursing outcome standards will be formulated from the literature review.

##### Phase Two

Expert opinions will be used to validate provisional standards and this will be done in this phase whereby a four point Likert scale will be used to validate the standards. Standards with a 3,5 content validity will be acceptable for each standard. The experts will be chosen on the basis of their expertise, academic qualifications and experience in critical care, emergency nursing, trauma nursing and standard formulation. These experts will be from public and private hospitals and a university.

## 1.10 TRUSTWORTHINESS

The researcher will use Guba's model of Trustworthiness because it is "comparatively well-developed conceptually and has been used by qualitative researchers, particularly nurses and educators in analysis of their research activities." According to Krefting, (1991: 215), the reliability and validity in qualitative research are replaced by credibility, accuracy of presentation and authority of the writer.

Guba's model is based on the identification of four aspects of trustworthiness that are related to both quantitative and qualitative studies. See table 1.1 for application.



**TABLE 1.1**  
**STRATEGIES TO ENSURE TRUSTWORTHINESS**

STRATEGY	CRITERIA	APPLICABILITY
Credibility	Prolonged and varied field experience: prolonged engagement	The researcher will spend more time at the setting for rapport and will also interview subjects after building rapport with them.
	Triangulation	Data collection: literature interview & observations.
	Authority of the researcher	As a lecturer the researcher has been practising in the field of critical care nursing.
	Structural coherence	Management in the casualty department and transport to the ICU
Transferability	Fittingness	Nursing outcome standards could be utilised in casualty and by the ICU personnel.
Dependability	Dependability audit	Field notes to facilitate understanding of the data. Experts in the field of research and in standard formulation will be asked to check the provisional standards.
Conformability	Triangulation	Documentation and literature for interpretations to support the analysis and interpretation of findings. A team of experts in the field of research and standard formulation will be asked to help with validation of standards.

## 1.11 STRATEGIES OF REASONING

Strategies of reasoning will include inductive and deductive reasoning.

The researcher will utilise the literature to establish research standards on resuscitation in the casualty department and transport to the ICU. The clinical experts will validate the provisional standards inductively according to their clinical experience.

## 1.12 ARRANGEMENT OF CHAPTERS

The outline of the study will be done according to the following chapters:

- Chapter one - Overview of the study
- Chapter two - Research methodology
- Chapter three - Literature study and formulation of provisional standards
- Chapter four - Results: Validation of the nursing outcome standards for polytrauma patients with traumatic brain injuries
- Chapter five - Conclusion, recommendations and summary

## 1.13 SUMMARY

An overview of the research to be followed was described in chapter One. Botes", (1998) research model and phases one and two of Muller's, (1996: 69) three phase research model were utilized with Roper, Logan and Tierney's, (1996: 33) model of living being used as a conceptual framework.

The research methodology will be described in chapter Two.



# Chapter 2

## RESEARCH METHODOLOGY: NURSING OUTCOME STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES IN THE MAFIKENG DISTRICT

### 2.1 INTRODUCTION

Patients who have sustained trauma need care at the accident scene, during transport and at the hospital. This has to be facilitated by means of nursing outcome standards to improve patient care and resolve identified problems. These standards can be utilised to evaluate the quality of care given during the primary and secondary assessment at the hospital and management during transport to the intensive care unit (ICU).

This chapter will describe the research methodology for developing nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district.

The study is qualitative and explorative in nature and will utilise the Botes, (1998: 2) research model. This model describes three orders: the first order in this study will describe the field of research, the second, the research methodology and the third, the meta-theoretical, theoretical and methodological assumptions which refer to the researcher's beliefs, conceptual framework to be used and the research methods to be used when describing care of polytrauma patients with traumatic brain injuries.

The two phases will be used to explore, describe, formulate and validate the nursing outcome standards for polytrauma patients with traumatic brain injuries.



## 2.2 GOAL OF THE RESEARCH

The goal of the research is to formulate nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district and this will be achieved through the following objectives:

- To explore the literature and determine the contents of nursing outcome standards on resuscitation of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit,
- To formulate nursing outcome standards on the management of polytrauma patients with traumatic brain injuries, that is resuscitation in casualty and during transport, to the intensive care unit,
- To validate the nursing outcome standards of care used for polytrauma patients with traumatic brain injuries, and
- To communicate findings to the relevant stakeholders

## 2.3 THE RESEARCH MODEL

The Botes (1998: 26) (See figure 2.1) research model consists of the following three interacting orders.

- **The first order** consists of the field of research, which, in this study, refers to the Mafikeng district in the North-West Province near the Botswana border. People make use of taxis, buses and private cars to travel to their destinations and sometimes get involved in road traffic accidents, which leave them with injuries that require emergency assistance. The area is semi-rural and has one provincial hospital and one private hospital. Most people utilise the provincial hospital because they do not belong to, or cannot afford medical insurances.

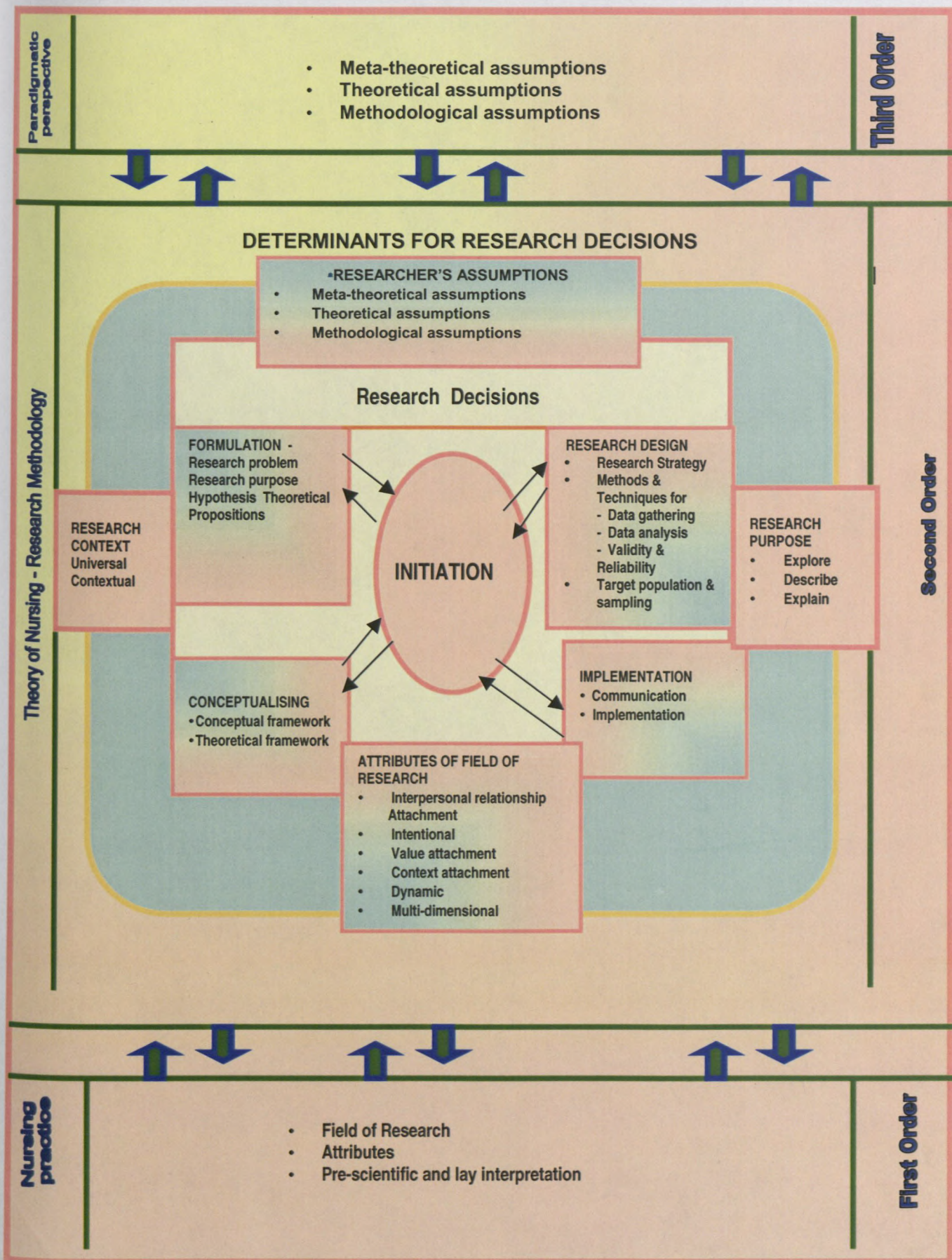
The registered nurses working at the local hospital are trained in general nursing, midwifery, community health and some have training in psychiatric nursing. Those who have trauma nursing experience or emergency courses are exceptions. These registered nurses are regularly given in-service training on basic life support, but they feel that this is not enough.

This situation has prompted the researcher to explore information on primary and secondary assessment at the receiving casualty department and transport to the intensive care unit in order to continuously improve and enhance the knowledge of the nurses working in the casualty department.

- **The second order** entails the research design in which the two phases of the study will be described. It further entails the researcher's assumptions about characteristics of the research field and the research context.
  
- **The third order** in this study refers to the assumptions of the researcher according to the methodological, metatheoretical and theoretical assumptions.



**FIGURE 2.1**  
**THE RESEARCH MODEL (BOTES, 1998)**





#### a) METHODOLOGICAL ASSUMPTIONS

The researcher has no preference about the type of research method to be used. Due to the exploration and descriptive essence of the research, the two phases of standard development will be applied. The central methodological assumption will be based on the functional reasoning approach by Botes (1998: 4) which emphasises that research be applicable to practice and be useful.

#### b) METATHEORETICAL ASSUMPTIONS

The researcher believes that the metatheoretical assumptions will influence research decisions throughout the study. She believes in Christianity and sees the individual as a holistic human being, who can be influenced by factors in the immediate environment. Each individual has the right to quality emergency nursing care.

#### c) THEORETICAL ASSUMPTIONS

The theoretical assumptions will include the Roper et al (1996: 33) model of living and the researcher's personal and professional experience as indicated below:

- Researcher's personal professional experience

The researcher has taken part in the resuscitation of polytrauma patients with traumatic brain injuries when she worked in a trauma unit. The process involved the resuscitation team which comprised registered nurses and doctors. Each team member had a role to play and those who were not taking part in the process would assist with reception and treatment of other patients in the unit. In order to avoid confusion, the emergency care would only involve people who would take part in the resuscitation. All categories of people in the team knew their roles in order to facilitate the smooth running of the resuscitation. Primary and secondary surveys of the trauma patients were done in the trauma unit, splints applied, wounds sutured and dressed, relevant injured structures x-rayed. After stabilising the patient, the doctor and two other team members would transport the patient to the intensive care unit, observing

him/her throughout until they reached the intensive care unit, and handed the patient over to the ICU team for further management.

The researcher has twenty years' experience in nursing and holds a Diploma in Intensive Care. The researcher has also worked in the trauma unit of an academic hospital in Johannesburg during her intensive care training. She has been lecturing in general nursing science with a component of critical and trauma care nursing at first and third year levels. She does the accompaniment of these students at a local provincial hospital in Mafikeng, which has the casualty department.

During the intensive care training the researcher had the opportunity of managing polytrauma patients with traumatic brain injuries, and realised that they needed good resuscitation in the emergency unit and also management in the trauma ward.

The theoretical assumption forms the framework in the research. The researcher will apply the Roper et al, (1996: 74) model of living in combination with her personal experience as part of the conceptual framework, in the exploration, development and description of the nursing outcome standards for polytrauma patients with traumatic brain injuries. This conceptual framework influences the delivery of nursing care to all polytrauma patients with traumatic brain injuries who are to be assessed and resuscitated to prevent further damage and to preserve life. Roper et al, (1996: 41) asserts that "accident, disability arising from a person's physical, psychological or social environment may move the individual from a state of relative independence to one of relative dependence".

Roper, Logan and Tierney's, (1996) conceptual framework has been used in this study. Individualised nursing is implemented and it includes assessing, planning, implementing and evaluating as indicated in figure 2.2.

Assessment in this study includes assessment of the environment and life threatening conditions. Assessment of the environment should be done to identify hazards such as traffic, fire, or even uncooperative bystanders. Henry et al, (1992: 48) and Proehl, (1993: 2) indicate that no one should continue to the next step of assessment until



interventions for life threatening conditions have been implemented. According to Roper et al, (1996: 53) biographic and health data should be obtained, if possible, and this is supported by Grant et al, (1982: 42) who says that on arrival at the scene you should identify yourself, ask to help, quickly look for clues, gain information from the patient if conscious, or from bystanders and note possible mechanism of injury.

The second part of assessment focuses on the person's activities of living, which will be assessed during primary assessment of a polytrauma patient with traumatic brain injuries. Using the twelve activities of living by Roper et al, (1996), the assessment will be done as follows:

### 2.3.1 Assessing ability to maintain a safe environment

Emergency personnel including nurses should assess the area for hazards and for any possible clues as to the cause of injury. In the casualty department a safe environment will include nurses skilled in trauma management, use of equipment and implementation of infection control measures.

### 2.3.2 Assessment of breathing

Proehl, (1993: 2) indicates that airway patency should be assessed, simultaneously maintaining cervical spine immobilisation with minimal stabilisation. This should be assessed by looking for chest rise and fall and by listening and feeling for air movement from the nose and mouth and if the airway is obstructed, to ensure a clear airway by chin lift manoeuvre.

### 2.3.3 Assessing Communicating skills

People who are involved in motor vehicle accidents and have sustained multiple injuries which at times include brain injuries, cannot communicate or may not be able to communicate due to shock or the extent of their injuries. According to Roper et al, (1996:55) nurses and emergency personnel should develop ways of



communicating with these patients using verbal or non-verbal communication. This will help health providers to identify patients' problems easily.

#### 2.3.4 Assessing mobility.

Roper et al, (1996: 55) indicates that a person should be assessed for any mobility problems, which might be due to fractures. During assessment determine whether the patient will need some assistance.

#### 2.3.5 Control of temperature

Injured people may present cold, flushed skin, excessive perspiration, shivering or excessive cold or hot hands and skin showing hypothermia or hyperthermia due to failure of the heat regulating centre in the hypothalamus.

#### 2.3.6 Assessing eliminating habits

Roper et al, (1996: 55) states that it is important to assess the elimination pattern of a patient, because in multiple injuries, organs like the kidneys or bladder might be injured, affecting the urinary elimination pattern. Patients should be assessed for an elimination pattern for faecal matter especially if the colon is perforated.

#### 2.3.7 Assessing the working and playing routines

The occupational history of the patient might give a clue as to the cause of the accident, especially if one is working under severe pressure at work and is highly strung. People who drive day and night without rest, can easily be involved in accidents.

#### 2.3.8 Assessing personal cleansing habits

Not all activities will be applicable after the injury but the patient will be assisted throughout until he / she gains the strength to bathe himself / herself. Immediately

after the injury, patients may be dependent on health care givers for some activities because of injuries.

### 2.3.9 Expressing sexuality

According to Roper et al, (1996: 55) it is important to observe how people express their sexuality in terms of clothing, talking etc. and this has to be respected by emergency and nursing personnel. It might not be expressed immediately, especially in a multi-trauma patient, but can be observed later when the patient is recuperating in hospital.

### 2.3.10 Assessing eating and drinking

Multiple injured patients should not eat or take in any fluids at the scene in case of possible impending surgery. An infusion can be put up at the scene, especially if the patient has lost blood and is shocked, in order to keep veins open, thus facilitating resuscitation, and correcting fluid imbalance.

### 2.3.11 Assessing sleeping routines

Sleep is required by all patients with trauma to promote rest. Roper et al, (1996: 56) asserts that nurses should learn the importance of sleep and be able to promote sleep during their nursing care.

### 2.3.12 Assessing the needs of the dying

Polytrauma patients with traumatic brain injuries are likely to develop other problems which might complicate their recovery and lead to death. During their care of patients nurses should assess whether or not they are ready to talk about death.

Henry et al, (1992: 725 - 726) states that patients wearing red tags are described as persons requiring immediate care within an hour. These are patients with respiratory problems, severe haemorrhage, open wounds or abdominal wounds, severe head

injuries and shock. The prognosis of these patients might be leading to death if not treated within an hour. Nurses and emergency personnel should be able to identify these patients and give them immediate care.

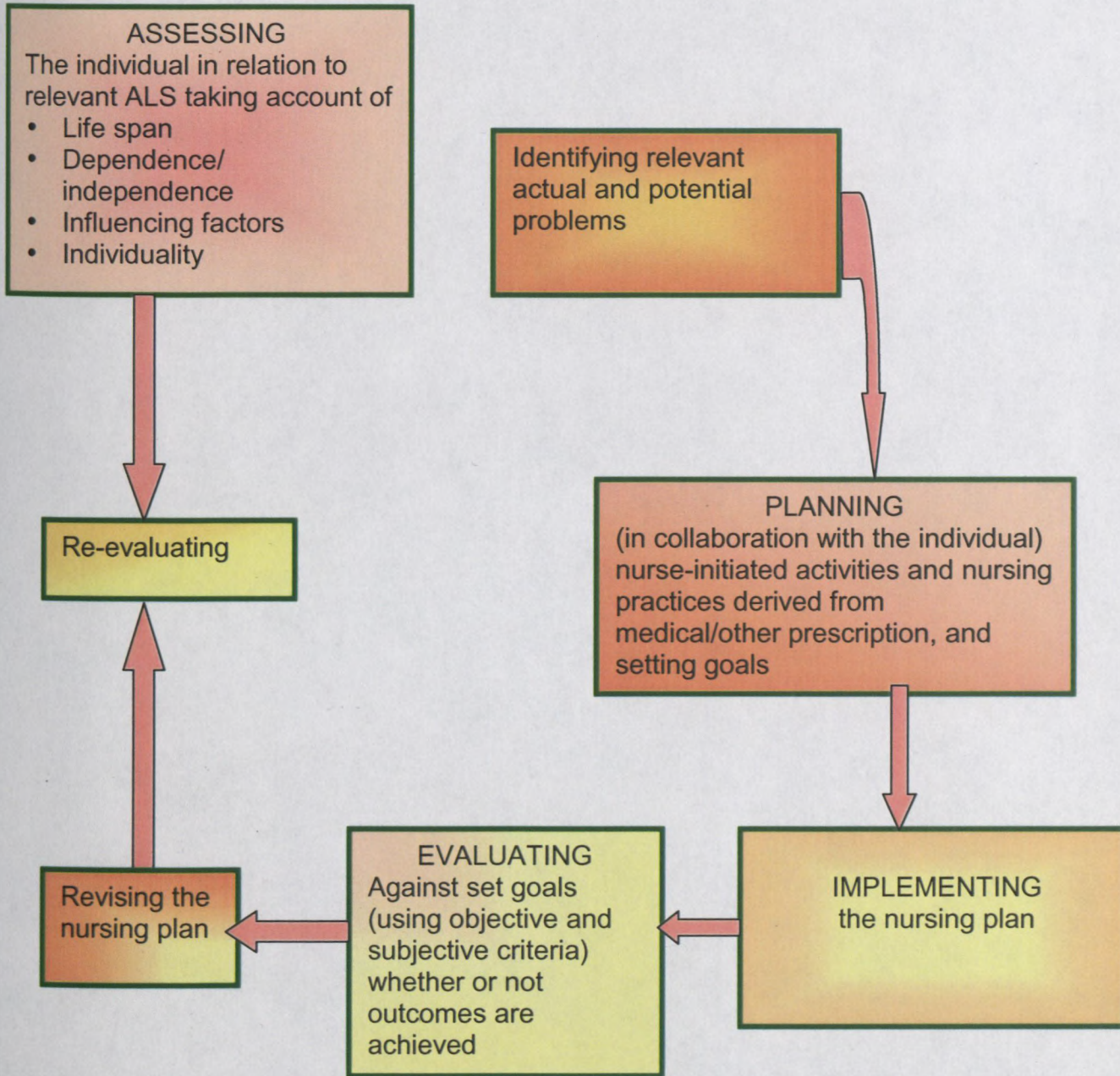
ET AL (1996: 59) AS A CONCEPTUAL FRAMEWORK

This model of living will help with the assessment, planning, intervention and evaluation of individual polytrauma patients with traumatic brain injuries, as indicated in figure 2.2 below:





**FIGURE 2.2**  
**A MODEL FOR NURSING BASED ON A MODEL OF LIVING,**  
**INDIVIDUALISING NURSING AS A DYNAMIC PROCESS, USING ROPER**  
**ET AL (1996: 60) AS A CONCEPTUAL FRAMEWORK.**





- Activities of living (Roper et al, 1996: 33)

Although the 12 activities of living are relevant to nursing, not all are necessarily relevant to all patients at the same time. This is supported by Roper et al, (1996: 37) who states that some of the activities of living may not be relevant during a period of critical illness or trauma, for example expressing sexuality or worrying about personal appearance. Aggleton and Chalmers, (2000: 52) assert that while acknowledging that assessment data should be gathered as soon as possible, in some instances it may be several hours before detailed information is available. They also recognise that in emergency situations priority will be given to the need for certain information, for example mechanism of injury and other emergency information. This conceptual framework focuses on the life span, dependence / independence continuum and factors influencing the activities of living.

- Life span

The individual begins living at conception and ends life at death. As individuals engage in the process of living, their positions on the lifespan influence their capacity for independence. The polytrauma patient with traumatic brain injury needs emergency treatment to prevent complications which should be prioritised according to identified needs.

- The dependence / independence continuum

The dependence / independence continuum is affected by predictable and unpredictable factors. Polytrauma causes the patient to be on the dependence side of the continuum, hence a need for more knowledge on management of polytrauma patients in order to assist them to be on the independence side of the continuum.

## ❖ The activities of living

In this model, individuals are seen engaging in 12 basic activities which are also applicable to polytrauma patients with traumatic brain injuries. These, according to Roper et al, (1996 : 65 - 395) are :

- Maintaining a safe environment which will include a safe environment in the casualty department and on the way to the intensive care unit.
- Breathing is essential for all body cells to provide oxygen. All other activities of living are entirely dependent on breathing, so trauma patients need to be assisted and managed properly in order to sustain breathing.
- Communication is one of the patient's basic rights and the patient and family should be informed regarding the patient's condition after injury and during nursing care.
- Eating and drinking - human life cannot be sustained for long without eating and drinking but this will not be applicable immediately after injury, as patients are still being stabilised.
- Elimination, personal cleansing, dressing and controlling body temperature are to be performed according to the nurse's scope of practice and basic nursing activities. If the polytrauma patient is not able to perform these, nurses/doctors are to assist.
- Working and playing activities are compromised during trauma injuries as the patient is in a compromised physical state, hence these activities are of low priority during this stage.
- Mobilisation is not possible but can only be ensured after the polytrauma brain injured patient has been stabilised.



- Sleeping is compromised in the polytrauma brain injured patient and the nurse/doctor has to ensure that the patient gets enough sleep and rest.
- The polytrauma and brain injured patient has the right to die with dignity and respect. It is the duty of all nurses and doctors who are engaged in trauma management to do their utmost to save and preserve life and to care for those who are dying, allowing them to die in dignity.

#### ❖ **Factors influencing activities of living**

In this study each activity is influenced by the following aspects:

Physical, physiological, socio-cultural, environmental and politico-economic. According to Roper et al, (1996: 24-31) this is seen when the environment becomes hazardous, leading to an individual being injured for instance in a road traffic accident. The individual becomes affected and physically disabled and unable to control his/her body temperature, communication, breathing and eating. The socio-cultural aspect of the individual may also affect his/her recovery, as in some religions, for example, individuals belonging to the Jehovah's Witness denomination are not allowed to have blood transfusions, which is regarded as a life saving process in trauma. Thus the life of an individual may be affected due to his/her beliefs. The receiving casualty department in the Mafikeng district is still seen as not well staffed with doctors and nurses who are trauma trained, and this will affect individuals who require trauma services in the area.

## **2.4 RESEARCH DESIGN**

The research design will be described according to the factors outlined below, namely, qualitative approach, explorative and descriptive design, population and sample, data gathering, and data analysis, ethical considerations and trustworthiness.

### 2.4.1 Qualitative Approach

According to Burns and Grove, (1995: 395) qualitative research is conducted in order to generate knowledge concerned with discovery. Inductive and deductive reasoning predominate in these studies. Burns and Grove, (1995: 393) further explain that qualitative research is a means of exploring the depth, richness and complexity inherent in the phenomena. This is supported by Hardy and Mulhall, (1994: 59) who state that qualitative research is people-centred and frequently provides rich descriptions of an area of human behaviour.

Nieswiadomy, (1990: 48), further states that qualitative data is concerned with in-depth descriptions of people or events and data collected through such methods, as unstructured interviews and participant's observation is used. In this study the researcher will explore extensive literature related to the formulation of nursing outcome standards for polytrauma patients with traumatic brain injuries. This will facilitate the process of maintaining quality patient care during primary assessment in the casualty department and management during transport to the Intensive Care Unit.

Respondents will also be interviewed to determine the standards used during the primary and secondary surveys, in the casualty department and during transport of polytrauma patients with traumatic brain injuries to the ICU. An expert in nursing standards will be used to analyse items listed as the nursing outcome standards for polytrauma patients with traumatic brain injuries for appropriateness.

### 2.4.2 Explorative and Descriptive Design of the Study

"Explorative research is a preliminary study designed to develop or refine hypotheses or to test and refine the data collection methods" (Polit & Hungler, 1991: 644).

"Descriptive research is the study that has as its main objective the accurate portrayal of the characteristics of persons, situations or groups and the frequency with which certain phenomenon occur" (Polit & Hungler, 1991: 643).



The study is exploratory in nature because the initial step will be the development of new knowledge on how nursing outcome standards are formulated, described and validated to facilitate quality promotion of all patients with polytrauma and traumatic brain injuries.

An expert in nursing standards will be used to analyse whether items listed as the nursing outcome standards for polytrauma patients with traumatic brain injuries, are appropriate to monitor patient care standards. Respondents at casualty will also be interviewed to determine the standards used during the primary and secondary assessment at the casualty department and transportation to the ICU.

The model on how standards are formulated, will guide a team of experts, who have knowledge of trauma nursing in standards formulation and to assess nursing outcome standards formulated for polytrauma patients with traumatic brain injuries. Experts will have critical debates to validate the standards and come to a consensus.

This study is divided into two phases according to the Three Phase Model (Muller, 1996: 69) as indicated in table 2.1 below. The testing phase (phase three) of this model will not be implemented in this study.

**TABLE 2.1**  
**PHASES OF THE RESEARCH**

<b>PHASE ONE: DEVELOPMENT</b>	<b>PHASE TWO: VALIDATION</b>
- Explore Literature	- Use information in phase one
- Conceptual framework for provisional standards	- Explore experts' opinion
- Formulate provisional standards	- Validation of nursing outcome standards
	- Communicate final standards



The two phases of the study are further explained as follows:

**a) PHASE ONE: the developmental phase**

Phase one, the development phase, will consist of the exploration, description and formulation of nursing outcome standards for polytrauma patients with traumatic brain injuries, focusing on resuscitation at the casualty department and management during transport to the intensive care unit.

Literature will be reviewed to explore more information on resuscitation in the casualty department and transport of polytrauma patients with traumatic brain injuries to the ICU. Roper et al's, (1996: 33) conceptual framework on activities of living will be used as a guideline for the recognition and development of nursing outcome standards, because the model focuses on the prevention of potential problems, comforting the patient and enables the patient to carry out activities of living independently. The model also helps care givers to provide a high standard of care to patients, by giving them guidelines according to activities of living priorities.

**b) PHASE TWO: validation phase (quantification phase)**

Phase two, the quantification phase, includes the validation of nursing outcome standards. In this phase, assessment of polytrauma patients with traumatic brain injuries will be guided by nursing outcome standards focused on resuscitation in the casualty department and management en route to the intensive care unit, as validated by experts.

Information obtained in phase one will be used as a framework for validating nursing outcome standards for polytrauma patients with traumatic brain injuries. Experts will be expected to refine and further develop or expand on the provisional standards to ensure content validity (Muller, 1996: 70).

Experts in the field of nursing, especially critical care or trauma nursing, and in standard formulation will be selected on the basis of their academic qualifications, knowledge and experience to validate the information obtained in phase one. Following the debate, the standards will be quantified; the content validity of all standards will be graded by the validator on the four-point Likert scale as follows:

- |   |   |  |
|---|---|--|
| 1 | = | not relevant   |
| 2 | = | standard not clear and /or relevance doubtful                      |
| 3 | = | standard relevant but requires reformulation                       |
| 4 | = | standard relevant acceptable and well formulated Muller (1996: 70) |

### 2.4.3 Population and Sample

The population and sample of the study will be described as follows:

- Population

The population of the study will include all registered nurses working in the casualty department of the local provincial hospital, that is, the registered nurses and doctors on day and night duty, and four nurses and two doctors, specialists in trauma and emergency care working in the Western Cape. The supervisor for the study will also be included as a specialist in critical care and standards formulation.

- Sampling

A purposive sample of all registered nurses working in the casualty department who have worked in the department for three years or more, including the doctor, who will be assigned to work in the casualty department for the month of the interview, has been chosen to give their opinion on the provisional standards used in casualty for resuscitation of polytrauma patients with traumatic brain injuries. At the local provincial hospital, the following personnel participated voluntarily in the study: four nurses and one doctor (the fourth nurse is currently pursuing the trauma nursing course).



#### 2.4.4 Convenience sample

The researcher is currently studying at a university in the Western Cape and therefore decided to choose a convenience sample of the experts from the area. Lynn (1986: 383) proposes that a minimum of three experts is required to validate standards and the researcher decided to choose the first three hospitals that will accommodate the researcher during the month of January 2001. The trauma clinical nurse experts came from these hospitals. A critical care nurse expert with vast experience of working on the ambulances, and who has experience in writing outcome standards, was also included. The total convenience population sample for the experts in the Western Cape was as follows:

- Three trauma clinical nurse specialists working in the private sector
- One critical care nurse specialist with trauma experience on the ambulances and in outcome standards
- Two trauma doctors, one working in a private hospital and one in a public hospital
- One academic nurse acting as a consultant in critical care and standards formulation

#### Criteria for inclusion

- Qualification or experience in trauma nursing.
- Minimum of five years in trauma nursing
- For the doctors: current experience and a qualification in trauma medical care

#### 2.4.5 Data Gathering and Data Analysis

Data gathering and data analysis will be done simultaneously according to the two phases (see table 2.1).



Literature will be explored and provisional outcome standards will be formulated in phase one. In phase two the registered nurses and doctors will validate the outcome standards and field notes will be taken regarding resuscitation in casualty and during transport to the ICU.

Transcription will be done verbatim to collect data and a literature control will be carried out again to gather more information on the resuscitation in the casualty department and transport to the intensive care unit. The results of the opinions of the nurses and doctors and literature control will be used during the second phase of the study, which is validation of formulated standards of polytrauma patients with traumatic brain injuries according to the primary and secondary survey assessment and transport to the ICU.

Validity will be achieved from the general consensus which will be reached by the experts on the expected criteria. Experts will utilise the four point Likert scale to validate the provisional standards in the second phase and an average of a 3,5 content, validity index will be acceptable.

The expert team will consist of seven people on the basis of their academic qualifications and experience in critical care, trauma nursing, emergency care and standard formulation.

#### 2.4.6 Trustworthiness

Guba's (1981) model for assessing qualitative research will be used in assessing the trustworthiness of this study. This is based on the identification of four aspects of trustworthiness namely credibility, transferability, dependability and confirmability Krefting, (1991: 125). Applicability of this model is done in table 1.1 in chapter one. Validity and reliability in quantitative research is replaced by trustworthiness in qualitative research.

The four aspects of trustworthiness are as follows:

#### 2.4.6.1 Credibility

Credibility refers to techniques and activities to enhance credibility, which are, prolonged involvement, continuing observation and triangulation.

Prolonged involvement is evidenced by the researchers' involvement in critical care and trauma nursing. The researcher will, through her experience in trauma nursing and critical care nursing, identify and develop outcome standards for polytrauma patients with traumatic brain injuries during resuscitation and transport to the ICU.

The process of truth value will be achieved during phase one, where the researcher will be describing the nursing outcome standards for polytrauma patients with traumatic brain injuries. Literature will be explored to add to the complete understanding of the concepts (Krefting, 1991: 219).

Triangulation as part of credibility will be done by means of the literature review, the two-phase standard formulation method and experts validation. (Coetzee & Muller, 1995: 21). Data will be collected by means of a literature review and experts in trauma care and nursing standards will be used to assess and validate the standards formulated. (Coetzee & Muller, 1995: 21).

The researcher has been practising in critical care and will be supervised by a supervisor with extensive experience in critical care and standards development. The focus of the study will be on resuscitation in casualty, and during transport to the ICU.

#### 2.4.6.2 Transferability

Transferability in this study refers to fittingness. The researcher meets the criteria when the findings fit into contexts outside the study situation. The nursing outcome standards are specifically for nurses, but could be utilised by emergency health care workers.



#### 2.4.6.3 Consistency and Dependability

In this study dependability relates to consistency of findings which will rely on the literature control to gain more insight into the formulation of nursing outcome standards and field notes to facilitate understanding nursing outcome standards for polytrauma patients with traumatic brain injuries.

#### 2.4.6.4 Confirmability

This focuses on neutrality and confirmability in this study, which will be ensured by a team of experts in the field of research and standard formulation to help with validation of these standards. According to Krefting, (1991: 218) field notes should be documented by the researcher to ensure that the researcher is part of the research and not separate from it.

### 2.5 ETHICAL CONSIDERATIONS

Informed voluntary consent will be obtained from respondents who will take part in the study. Participation will be voluntary and respondents will be informed that the success of the study depends on their participation.

Participants will be assured that they will not be harmed and that the researcher will be supervised by a competent researcher/supervisor throughout the study. Permission will also be obtained from the Department of Health and the manager of the local provincial hospital.

The researcher will describe the nature of the study, the benefit that will be incurred and that there will be no physical or psychological discomfort. For the outcome standards to be implemented, acknowledgement has to be given to individuals who have given input on the validation. If respondents do not wish their names to be published, these will be omitted from the standards.



## 2.6 SUMMARY

Botes', (1998) research model was utilised in this chapter and it described the three orders of the model. The methodology was described according to the two phases. The literature study will then follow in the next chapter to describe and explore the contents of the nursing outcome standards for polytrauma patients with traumatic brain injuries further.

### 3.1 INTRODUCTION

Polytrauma patients require immediate care to reduce the risk of injuries/complications and mortality. This will allow for the implementation of protocols on nursing outcome standards for polytrauma patients with traumatic injuries. This chapter will focus on the formulation of nursing outcome standards which will be implemented in the casualty department and during transportation to the intensive care unit (ICU) as part of quality improvement outbreak below.

According to Hall, Schmidt and Wood, (1992: 693) and Trank et al. (2000: 273), mortality from multiple injuries follows a bimodal distribution. The first peak represents death occurring at the scene of the accident and is the result of such injuries as cardiac rupture or disruption of the major arterial blood vessels and severe brain injury that is incompatible with life. Death from such injuries occurs within minutes of trauma.

The second peak occurs from minutes to approximately one hour and is due to death from life threatening injuries such as tension pneumothorax, cardiac tamponade, cardiac contusion, myocardial infarction and haemopneumothorax. Hall et al. (1992: 694) asserts that this is the period during which appropriate resuscitative measures could affect the outcome significantly.

The third peak occurs from complications of the injury, such as sepsis or multiple organ failure, and the type of intervention can affect this peak significantly during the second phase (Hall et al, 1992: 693; Trank in Grenvik et al, 2000: 273).

# Chapter 3

## THE LITERATURE STUDY FOR THE DEVELOPMENT OF NURSING OUTCOME STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES

### 3.1 INTRODUCTION

Polytrauma patients require immediate care to prevent further injuries/complications and mortality. This will only be achieved by the implementation of protocols on nursing outcome standards for polytrauma patients with traumatic injuries. This chapter will form the basis for the formulation of nursing outcome standards which will facilitate proper management in the casualty department and during transportation to the intensive care unit (ICU) as part of quality improvement outlined below.

According to Hall, Schmidt and Wood, (1992: 693) and Trask (In Grenvik et al, 2000: 273), mortality from multiple injuries follows a trimodal distribution. The first peak represents death occurring at the scene of the accident and arises as a result of such injuries as cardiac rupture or disruption of the major intra-thoracic vessels and severe brain injury that is incompatible with life. Death from such injuries occurs within minutes of trauma.

The second peak occurs from minutes to approximately one hour and this occurs from life threatening injuries such as tension pneumothorax, cardiac tamponade, cardiac contusion, myocardial infarction and haemopneumothorax. Hall et al, (1992: 694) asserts that this is the period during which appropriate resuscitative measures could affect the outcome significantly.

The third peak occurs from complications of the injury, such as sepsis or multiple organ failure, and the type of intervention can affect this peak significantly during the second phase (Hall et al, 1992: 693; Trask In Grenvik et al, 2000: 273).

Multiple trauma patients are likely to reach institutions where the second phase, as well as management of complications arising, will be adhered to in terms of priorities. Hall et al (1992: 693) further explains that blunt trauma from motor vehicle accidents is the most frequent cause of injuries in general and that this type of impact usually result in injuries to many different parts of the body simultaneously. Head and neck injuries are common, followed by limbs, chest, external, facial and abdominal injuries (Hall et al, 1992: 693; Trask In Grenvik et al, 2000: 273).

## **3.2 PHASES OF THE STUDY**

### **PHASE ONE**

Phase one will achieve the following objectives:

- To explore the literature to determine the contents of nursing outcome standards for polytrauma patients with traumatic brain injuries
- To formulate the provisional nursing outcome standards for resuscitation in the casualty department and the transport to the ICU

**This phase will be dealt within this chapter.**

### **PHASE TWO**

Phase two will achieve the following objectives:

- To validate the nursing outcome standards for polytrauma with traumatic brain injuries
- To communicate the validated nursing outcome standards for polytrauma patients with traumatic brain injuries to the relevant stakeholders

In this chapter the researcher will apply the Roper, Logan & Tierney, (1996) model for nursing based on a model of living, which will serve as the conceptual framework for the outcome standards. According to Roper et al, (1996: 142) activities of living are the focus of the model because it is central to the view of nursing and characterises the person who is central to the model. The model further explains priorities among



the activities of living with the activity of breathing being of prime importance, because it is essential for all activities of living and for life itself. The twelve activities of living will be prioritised according to the primary and secondary assessments at the casualty department and during transportation to the intensive care unit.

### 3.3 LITERATURE STUDY

The literature study will be described in the following context: a brief description of the anatomy, physiology and pathophysiology of the nervous and musculoskeletal system. The primary survey, secondary survey and the management of polytrauma and head injured patient will form the major part of the literature study. Quality improvement in trauma will include the development of standards, i.e., process, structure and outcome standards.

Trauma is a broad and complex subject and for the purposes of this study, it is defined as injury to bones, joints and soft tissue or injury to more than one body system, which is termed polytrauma (Driscoll & Skinner, 1994: 34). Health care workers managing patients with trauma must have knowledge of anatomy, physiology and pathophysiology, which might have been caused by the traumatic event. This knowledge will assist in the management of patients to prevent further complications and reduce mortality.

#### 3.3.1. Anatomy of the nervous system according to Ahrens and Prentice (1998: 351)

This will include extracerebral structures and the central nervous system as follows:

##### a) Extracerebral Structures

Extracerebral structures include the scalp, skull and meninges.

## Scalp

According to Ahrens and Prentice (1998: 351) and Alspach (1991: 315) the “SCA” refers to the single layer of skin, cutaneous and adipose tissue which contains blood vessels. These vessels cannot contract hence a scalp laceration bleeds more than an identical cut elsewhere on the body. The “L” refers to the dense fibrous ligament – like layer called apponeurotica, it helps to absorb the forces of external trauma, it is dense, freely movable and consists of fibrous fibre tissue that covers the skull.

## Skull

The anatomy will be briefly described according to the extracerebral structures, the central nervous system. Ahrens and Prentice, (1998: 351) further state that the skull is comprised of bones fused to form a solid non-distensible unit. It is hollow and has a volume of 1400 ml – 1500 ml. It protects the brain without being heavy because of the spongy layer it has. According to Alspach, (1991: 315) the skull consists of bones frontal, parietal, temporal, occipital and has three depressions in the base of the skull.

## Meninges

Ahrens and Prentice, (1998: 352) assert that the three membranes covering the entire brain surface and the spinal cord below are the meninges. These are the pia mater, arachnoid and dura mater.

### b) Central Nervous System

The brain fills up the cranial vault. The brain parts are the cerebrum, diencephalon, midbrain, pons, medulla oblongata and cerebellum. The functions and structures of brain parts are to be well known in order to assist in management of the pathophysiology which might be caused by trauma.



### c) Brain Volume

The brain is composed of neurons and glial cells. The brain volume consists mainly of water (80 percent), the greater part, of which is intracellular. The brain volume remains constant due to the blood-brain barrier.

The blood-brain barrier is a network of cells and membranes in the brain capillaries. This barrier is selective in terms of membrane permeability and molecular size of the substance attempting to enter the cerebral circulation. The blood-brain barrier is able to select which substances enter the cerebral circulation and which substances are prohibited from entering the parenchymal cerebral vasculature. The blood-brain barrier is permeable to water, oxygen, lipid-soluble compounds, and carbon dioxide and slightly permeable to the electrolytes. Most drugs are prevented from crossing the blood-brain barrier, but it depends on their molecular composition. The blood-brain barrier can be physically disrupted by trauma or functionally impaired by metabolic abnormalities, such as drug overdoses. The result is an exit of fluid from the intravascular space into the extravascular space of the brain tissue (Kidd & Wagner, 1997: 321).

### d) Circulation and Formation of Cerebrospinal Fluid (CSF)

The cerebrospinal fluid (CSF) has to be produced and reabsorbed. Any blockage to the absorption of the cerebrospinal fluid will lead to hydrocephalus and some neurological disorders. It is therefore important to describe how the cerebrospinal fluid (CSF) is produced and absorbed so as to control the intracranial pressure. Ahrens and Prentice (1998: 357) assert that there are four ventricles involved in the cerebrospinal fluid system. These are the two large lateral ventricles, which are located in the cerebral hemisphere and which are connected to the third ventricle via the intraventricular foramen or the foramen of Munro.

The cerebral aqueduct of Sylvius is found on the floor of the third ventricle and passes down through the brain stem of the fourth ventricle. The fourth ventricle is continuous with the central canal of the spinal chord plexus. Cerebrospinal fluid is a clear,



colourless liquid consisting of proteins, glucose and a large amount of sodium chloride. The foramen of Munro allows the cerebrospinal fluid to leave the lateral ventricles and flow into the third ventricle. Obstruction at this point will produce hydrocephalus. Ahrens and Prentice, (1998: 357) further explain that from the third ventricle the CSF flows through the aqueduct of Sylvius into the fourth ventricle. The foramina of Luschka and magendie direct the CSF from the fourth ventricle into the cisterns and subarachnoid space.

After circulating over the entire brain and spinal cord, the CSF is reabsorbed by the arachnoid villi in dural sinuses and by bodies found in the superior sagittal sinus.

The CSF cushions the brain and spinal cord to protect them from colliding with the cranium and vertebrae in response to moving forces. It also reduces the gravitational weight of the brain. If the pressure increases in the vault, more CSF will be absorbed and/or pushed into the spinal canal in an attempt to maintain normal pressure. The normal CSF is 125 – 150ml in the ventricles with 25 – 35ml/hr of CSF being produced in 24 hours. The CSF also helps in the exchange of nutrients and waste material between the blood and the central nervous system cells.

#### e) Cerebral Blood Supply

Ahrens and Prentice, (1998: 358) assert that the, “brain receives blood from two arterial systems, the internal carotid arteries, the vertebral arteries and the Circle of Willis which provides adequate circulation through its anastomosis”. The anterior (carotid arteries) and the posterior (vertebrobasilar) arteries connect to form the circle of Willis, the major blood supply to the brain. The carotid system provides most of the brain’s hemispheric circulation. The vertebrobasilar system provides circulation to under-surfaces of the hemispheres, the brainstem and the cerebellum (Kidd & Wagner, 1997: 347).

The cerebral blood supply consists of the external cerebral blood supply and the internal cerebral blood supply as follows:

- The external cerebral blood supply

According to Ahrens and Prentice, (1998: 358) the external carotid arteries branch and form the occipital, temporal and maxillary arteries. Occipital arteries supply posterior fossa, the temporal arteries supply the temporal region of the brain and the middle meningeal arteries supply the meninges.

- The internal cerebral blood supply

The internal cerebral blood supply occurs through the circle of Willis to supply the internal parts of the brain. Veins run parallel with many arteries for drainage of blood.

- Cerebral blood volume

Cerebral blood volume is dependent on central blood flow (CBF). If CBF is increased, so too is cerebral blood volume. Cerebral blood flow is dependent upon cerebral perfusion pressure (CPP), which is defined as the pressure gradient necessary to supply adequate amounts of blood to the brain. It is the difference between mean arterial pressure (MAP) and intra-cranial pressure (ICP).

$$\text{CPP} = \text{MAP} - \text{ICP}$$

The normal CPP is between 80 to 100 mm Hg and must be at least 50 mm Hg to provide minimal blood flow to the brain. A CPP of 30 mm Hg or less is incompatible with life and results in neuronal hypoxia and cell death. Autoregulation is a compensatory mechanism that keeps cerebral blood flow (CBF) constant by maintaining an adequate CPP. Autoregulation works by automatic constriction or dilation of cerebral blood vessels in response to either change in systemic arterial pressure or blood levels of carbon dioxide and oxygen. When systemic pressure rises, the vessels constrict to protect the brain from blood engorgement and to protect



cerebral tissues from the full impact of the systemic pressure. When systemic pressure falls, the reverse occurs. Cerebral vessels dilate in an attempt to increase the cerebral blood flow (CBF). This compensatory mechanism is termed pressure regulation.

Constriction or dilation of cerebral vessels in response to blood levels or carbon dioxide and oxygen is termed metabolic or chemical regulation. Vessels dilate in response to hyperapnea, or elevated carbon dioxide levels greater than 6kPa and constrict in response to lowered levels of carbon dioxide (less than 3kPa will decrease the cerebral blood flow (CBF) to one half of normal value). Blood oxygen levels affect the diameter of cerebral vessels but are not as potent a stimulus as in carbon dioxide. Vessels dilate in response to decreased oxygen levels (less than 6 kPa). Oxygen levels greater than 80 mm Hg will decrease CBF slightly (Kidd & Wagner, 1997: 322).

The Monro-Kellie hypothesis states that the cranial vault is rigid and fixed and is made up of three components: the brain, the cerebral blood volume and Cerebro Spinal Fluid (CSF). Brain volume is controlled by the blood-brain barrier and cerebral blood volume is controlled by the cerebral blood flow (CBF).

Of the three components, Cerebro Spinal Fluid (CSF) is displaced most easily and rapidly and is the first reciprocal response to increase in intracranial volume (Kidd & Wagner, 1997: 321).

#### f) Cerebral Oxygenation

The brain is unable to store oxygen or glucose and must have a continuous supply to meet the metabolic needs of the brain. Cerebral metabolism varies regionally, with some areas of the brain being more metabolically active than others at any given time. Cerebral blood flow varies regionally as well. The brain attempts to match metabolism by locally increasing or decreasing CBF as needed. This localised matching of CBF with metabolism is achieved through the process of autoregulation. When CBF is inadequate to meet the brain's metabolic needs, a state of mismatching occurs and ischaemia results. Because the brain is unable to store oxygen or glucose, aerobic



metabolism can no longer be supported and the brain is forced to switch to anaerobic metabolism. Aerobic metabolism utilizes oxygen and glucose to manufacture ATP. ATP is the primary energy source for cells and supports many cellular functions. The end product of aerobic metabolism is 38 molecules of ATP and carbon dioxide. When the cells are inadequately perfused and in a state of ischaemia, the cells must manufacture ATP through anaerobic metabolism. Anaerobic metabolism does not utilize oxygen and must rely on glucose. The end product is only two (2) molecules of ATP and lactate. Carbon dioxide, the end product of aerobic metabolism, readily crosses the blood-brain barrier and is reabsorbed. However, the lactate molecule does not cross the blood-brain barrier and accumulates, resulting in cerebral acidosis. Cerebral acidosis causes cerebral vasodilation, which upsets the state of equilibrium in the cranial vault (Kidd & Wagner, 1997: 323 – 324).

Due to the brain's attempt to match CBF with cerebral metabolism, CBF is a most important variable when addressing cerebral oxygenation. Oligaemic cerebral hypoxia occurs when CBF is too low and unable to support cerebral metabolism; it may be secondary to anything that decreases CBF, such as cerebral edema, low cardiac output, or vasoconstriction. When CBF is higher than the metabolic needs of the brain, a state of hyperaemia exists, also known as "luxury perfusion". Patients with this condition have progressive vasodilation, increased cerebral blood volume and eventual loss of autoregulation, all of which contribute to increased intracranial pressure (ICP). Both oligoemia and hyperaemia have been described as pathophysiologic changes that occur following brain injury. Treatment of oligoemia and hyperaemia is aimed at maximizing cerebral oxygenation, by either increasing or decreasing CBF (Kidd & Wagner, 1997: 323 – 324).

Maintaining adequate cerebral oxygenation is of the utmost importance to support metabolism. Every effort should be made to avoid episodes of hypoxia or hypotension. Studies demonstrate that even transient episodes of hypoxia or hypotension have a negative impact on patient outcome. To monitor the level of cerebral ischaemia and the effect of interventions to promote cerebral oxygenation, jugular venous oxygen saturation (SjvO<sub>2</sub>) can be measured (Kidd & Wagner, 1997: 323).

### g) Components of the Nervous Tissue

There are two types of cells in the brain, neurons and neuroglia. The neuron is the functioning unit of the nervous system and its function is to transmit impulses. Neurons that transmit impulses to the spinal cord or brain are afferent sensory neurons. Those transmitting impulses away from the brain or spinal cord are called efferent motor neurons. Interneurons transmit impulses from the sensory neurons to motor neurons (Ahrens & Prentice, 1998: 359; and Alspach, 1991: 332).

The nervous system comprises the following:

- The peripheral nervous system

The peripheral nerves, the spinal nerves and the cranial nerves form the peripheral nervous system. There are 31 pairs of spinal nerves and 12 pairs of cranial nerves. There are eight cervical, twelve thoracic, five lumbar, five sacral and one coccygeal spinal pair of ganglia (Ahrens & Prentice, 1998: 360).

- Spinal nerve fibres

There are four types of nerve fibres composing the spinal nerves and these are described below:

- Motor fibres originate in the ventral horn of the spinal cord with efferent fibres relaying motor impulses from central nervous system to peripheral skeletal muscles.
- Sensory fibres pass through the dorsal posterior horn of the spinal cord with afferent fibres relaying sensory impulses from organ and muscles to the central nervous system.
- Meningeal fibres transmit sensory and vasomotor innervation to the spinal meninges.



- Cranial nerves

Twelve pairs of cranial nerves complete the peripheral nervous system. Three pairs of cranial nerves are totally sensory, five pairs are totally motor and four pairs are combined sensori motor (Ahrens & Prentice, 1998: 360). Table 3.1 depicts the 12 cranial nerves and their functions.

### TABLE 3.1

#### THE 12 CRANIAL NERVES (GUYTON, 1992: 459 – 464)

Number	Nerve	Function
I	Olfactory	Smell
II	Optic	Vision
III	Oculomotor	Extra ocular movement of eyes
IV	Troclear	Extra ocular movement of eyes
V	Trigeminal	Sensation to ophthalmic branch, maxillary and mandible
VI	Abducens	Extra ocular movement of eyes
VII	Facial	Taste, sensation, facial muscles, saliva, tears
VIII	Acoustic	Hearing and equilibrium
IX	Glossopharangeal	Taste, sensation, gag, swallow, secretory, carotid reflex
X	Vagus	<ul style="list-style-type: none"> <li>• Sensation (ear), phonation, swallow, involuntary activity of visceral muscles of heart, lungs and digestive tract</li> <li>• Carotid reflex</li> <li>• Autonomic activity of respiratory tract, digestive tract, peristalsis and secretion for organs</li> <li>• Swallowing and phonation</li> </ul>
XI	Spinal accessory	<ul style="list-style-type: none"> <li>• Turn head and shrug shoulders</li> <li>• Movement of tongue, swallowing</li> </ul>
XII	Hypoglossal	<ul style="list-style-type: none"> <li>• Phonation</li> </ul>



## h) The Autonomic Nervous System: Cranial nerves and functions

According to Ahrens and Prentice, (1998: 361) the sympathetic nervous system and the parasympathetic nervous system together form the autonomic nervous system. The sympathetic nervous system releases norepinephrine, which stimulates and prepares our bodies for fight or flight. Norepinephrine and epinephrine are categorised as adrenergic chemicals.

The parasympathetic nervous system releases accetylcholine, which is categorised as a cholinergic chemical. The parasympathetic system is an antagonist to the sympathetic system and mediates or slows body responses when the "fight, fright or flight" situation no longer exists.

### 3.3.2 Head injuries

Head injuries will be described according to the classification and types discussed below:

#### a) Classification

The American College of Surgeons (ATLS, 1997: 188 - 189) classifies head injuries (cranio-cerebral injuries) according to the mechanism, severity and morphology.

- Mechanism

The mechanism of injury may be blunt or penetrating. Blunt head injuries are associated with motor vehicle accidents, falls and blunt assaults. Gunshot and stab wounds will result in penetrating head injuries. According to (Feliciano, Moore and Mattox, 1996: 268) head injuries occur most often on Fridays, Saturday and Sundays. Alcohol or drug use is a contributing factor in more than 50% of all cases of severe head injuries.



- Severity of injury

The Glasgow Coma Score (GCS) is used to quantify the neurological findings in patients with head injuries. "Coma is defined as the inability to obey commands, utter words and open the eyes. Patients who open their eyes spontaneously, obey commands and are oriented, score a total of 15 points on the GCS, whereas flaccid patients who do not open their eyes or talk, score a minimum of 3 points. (See Table 3.4, Glasgow Coma Scale.) No single score within the range of 3 to 15 points defines the cut-off point for coma. However, 90 % of all patients with a score of 8 or less, and none of those with a score of 9 or more, are found to be in a coma according to the preceding definition. Therefore, a **Glasgow Coma Score of 8 or less has become the generally accepted definition of coma.** The distinction between patients with severe head injury and those with mild to moderate head injury is more problematic. Somewhat arbitrarily, head-injured patients with a GCS of 9 to 13 have been categorized as "moderate," and those with a GCS of 14 to 15 have been designated as "mild". Note that in assessing the GCS, **it is important to use the BEST motor response in calculating the score.** However, one must record the response on both sides of the body" (ATLS, 1997: 188).

- Morphology of injury

Patients who deteriorate rapidly, that is neurologically or haemodynamically, may be taken to surgery without a computed tomography (CT) scan, but CT scanning enhances the management of head injury. Morphologically head injuries may be considered under the headings: skull fractures and intra-cranial lesions (see table 3.1).



TABLE 3.2

**CLASSIFICATION OF HEAD INJURIES ACCORDING TO THE MORPHOLOGY  
(ATLS, 1997: 188)**

Skull Fractures	Intracranial Lesions
Vault - linear vs. stellate - depressed / non-depressed - open / closed	Focal - epidural - subdural - intracerebral
Basilar - with / without CSF leak - with / without leakage - nerve palsy	Diffuse - mild concussion - classic concussion - diffuse axonal injury

## b) Types

In South Africa transportation-related events and falls cause most injuries (50%). Sport related events and violence also account for a portion of cranio-cerebral injuries. These injuries account for the following pathophysiology (McCance & Hauther, 1998: 513) that will be briefly described below:

- Focal brain injury

It is specific and grossly observable brain lesion, with cortical contusions, epidural haemorrhage, subdural haematoma and intracerebral haematoma. Damage results from compression of the skull at the point of impact and rebound effect. The focal injury may be coup or contracoup. Brain edema forms around and in damaged neural tissues contributing to the increasing intracranial pressure (McCance & Hauther, 1998: 513). Contusions are found more commonly on the frontal lobes, particularly at the poles and along the inferior orbital surfaces in the



anterior poles and along the inferior surface. They result in changes in attention, memory, executive attention function and affect emotions and behaviour. Haemorrhagic contusions may coalesce into a large, confluent intracranial haematoma.

- Epidural haematoma

It represents 1 to 2 % of major head injuries and can occur in all age groups. An artery is a source of bleeding in 85 % of cases and 15 % result from injury to the meningeal vein or dural sinus. The resulting shift of the temporal lobe medially precipitates uncal and hippocampal gyrus herniation through the tentorial notch. Extradural haemorrhage into frontal area can also lead to herniation of the posterior fossa contents through the foramen magnum (McCance & Hauther, 1998: 513; ATLS, 1997: 190; Feliciano et al, 1998: 268).

- Subdural haematomas

Tearing of the bridging veins is the major cause of rapidly developing and sub acutely developing subdural haematomas. These subdural haematomas act as expanding masses, giving rise to increased intracranial pressure that eventually compresses the bleeding vessels. The displacement of brain tissue can result in a herniation syndrome. The chronic subdural haematoma is formed when the existing subdural space is filled with a liquefied blood clot (McCance & Hauther, 1998: 514; ATLS, 1997: 190 -192).

- Intracerebral haematomas

These haematomas may occur in the hemispheric white matter. Penetrating injury or shearing forces traumatise small blood vessels. The intra-cerebral haematoma then acts as an expanding mass, resulting in increased intracranial pressure and compression of the brain tissues with resultant edema.

Open trauma produces discrete injuries and includes compound fractures and missile injuries. The intra cranial bleeding occurs into the permanent cavity and may cause the cavity to expand. Edema in and around the injured brain tissue rapidly develops leading to increased intra-cranial pressure (McCance & Hauther, 1998: 515; ATLS, 1997: 190 – 192).

- Mild concussion

According to McCance & Hauther (1998: 516) and ATLS (1997: 192) mild concussion involves temporary axonal disturbances. Cerebral cortical dysfunction related to attention and memory systems results, but consciousness is not lost.

- Classic cerebral concussion (Grade IV)

McCance & Hauther (1998: 516) and ATLS (1997: 192) further explain that classic cerebral concussion involves diffuse cerebral disconnection from the brain stem. This is evidenced by immediate loss of consciousness, which lasts less than six hours with post- traumatic amnesia. Diffuse axonal injury produces prolonged traumatic coma lasting more than six hours because of axonal disruptions.

- Diffuse head injury

It results from a shaking effect. Rotational acceleration produces strains and distortions within the brain. Shearing, tearing or stretching of nerve fibres with subsequent axonal damage results, leaving patients with profound neurological deficits.

Diffuse axonal brain injury is associated with increased intra vascular blood within the brain, vasodilation and increased cerebral blood volume (McCance & Hauther, 1998: 516; ATLS, 1997: 192).



### c) Increased Intracranial Pressure

Increased intracranial pressure (IICP) is a devastating complication associated with many situations including head injury, stroke, intracranial haemorrhage, and cerebral hypoxia. Normally, intracranial pressure (ICP) remains fairly constant (some fluctuations are noted with respiration, changes in blood pressure); hence the cranial tissue is protected from injury. Because the space within the cranial cavity cannot expand, the IICP causes compression of the brain tissue. If uncontrolled, this increased pressure leads to herniation of the brain and eventually to death. Management of IICP includes monitoring for signs of increasing ICP and intervening promptly to control elevations in pressure.

Head injury is caused by either direct trauma, in which the head is either struck by a moving object or the moving head strikes a stationary object, or by indirect trauma such as hyperextension or hyperflexion of the neck. The brain impacts with the skull encasing it and sustains damage to the tissue itself or to the blood vessels, causing bleeding and edema (Vasquez, Lazaer & Larson, 1992: 155).

### d) Clinical assessment

The clinical assessment will be done according to arousal and content, and the in-depth clinical assessment (Hickey, 1992).

- Arousal and Content

The level of responsiveness is the most important factor in the neurologic assessment. The arousal component is assessed first. The first step is to determine what stimulus will arouse the patient, usually by calling the name. If the patient does not respond, shake the arm or shoulder gently. If no response is elicited, proceed from light pain to deeper pain. Always start with the least noxious stimulus and then proceed to a more intense stimulus if necessary. An example of light pain to deeper pain is shaking the arm, to exerting nailbed pressure.

Two things are assessed:

1. Is the patient responsive to verbal stimuli?
2. Does the patient exhibit purposeful movement?

Purposeful movement, such as removing the stimulus or withdrawing from the stimuli, indicates functioning of sensory pathways. Abnormal posturing in response to a noxious stimulus indicates a dysfunction of either the cerebral hemispheres or the brainstem. Decorticate posturing (abnormal flexion) indicates cerebral hemispheric dysfunction. Decerebrate posturing (abnormal extension) indicates brainstem dysfunction and is a more ominous sign. Patients with restrained extremities must be unrestrained when assessing the motor response.

Noting behaviour assesses the content of responsiveness. The patient should be assessed for orientation and should know his/her name and where he/she is. The patient is considered disoriented if unable to answer the questions correctly. Testing for orientation also assesses short-term memory. Orientation can be assessed only if the patient is able to respond verbally.

After orientation is assessed, the ability to follow commands will be assessed. Ask the patient to stick out the tongue or hold up two fingers. This will tell whether the patient is awake enough to respond and also whether he or she is aware enough to interpret and carry out the commands.

Noting any restlessness, irritability or combativeness assesses behavioural changes. Hypoxia, hypoglycaemia, drug use, pain or increased ICP can cause such behavioural indicators. The last component of content that is assessed is verbal response. Assessment of speech provides information about the function of the relationship between the speech centres in the cerebrum and the cranial nerves and can help localise the area of dysfunction. The patient's speech pattern should be assessed for clarity. Is it clear or slurred and garbled? This may indicate drug use, metabolic disturbance or cranial nerve injuries. Content of speech should be assessed for use of appropriate or inappropriate words. Confused patients may use inappropriate



words. Patients with cranial nerve dysfunction will usually not give inappropriate responses, although the speech pattern may be slurred. Patients may experience receptive or expressive aphasia. Inability to understand written or spoken words is receptive aphasia. Inability to write or use language appropriately is expressive aphasia.

The level of responsiveness is the most important part of neurological assessment, of which arousal is assessed first. For patients who are not in a state of wakefulness, it would be pointless to start off by assessing content. Arousal is assessed by evaluating how many stimuli, if any, are needed for the patient to respond and what type of motor responses the patient exhibits. Content is assessed by evaluating behaviour and behavioural changes, ability to follow commands and verbal response.

- In-depth Clinical Assessment

Beyond the clinical assessment of arousal and content, a more in-depth neurological assessment includes pupillary reactions, vital signs and assessment of cranial nerve reflexes.

- Pupillary Reactions

Pupillary reactions provide information about the location of some lesions. Pupils should be assessed for size, symmetry, shape and reaction to light.

A unilateral brain lesion can be ruled out if the pupils are equal in size. Non-reactive pupils in the mid-position indicate damage to the midbrain. Pupils that are non-reactive to light and pinpoint, indicate a pons lesion or opiate drug overdose. Pupils that are small but reactive to light may indicate a bilateral injury to the thalamus or hypothalamus or metabolic coma. A unilaterally dilated and fixed pupil may indicate compression of the oculomotor nerve (cranial nerve III). When both pupils are dilated and non-reactive (fixed), emergency action is required. It may be caused by severe anoxia or ischaemia. Remember that atropine-like drugs cause the pupils to dilate and this must be ruled out (see also table 3.8).

## - Vital Signs

Vital signs are important indicators in the unresponsive patient. Vital signs should be assessed not only individually but also in relationship to each other. Unfortunately, changes in the vital signs occur in the late stages of increased ICP and neurologic deterioration. Cushing's triad is a specific change in the vital signs and is evidenced by:

1. An increase in the systolic blood pressure
2. A widening pulse pressure and
3. Bradycardia

Waiting until this triad of symptoms occurs before intervening can result in irreversible damage.

## - Respiration

The respiratory pattern provides the most valuable information because it can be correlated with the anatomic level of dysfunction. Respiratory rhythm and pattern are controlled by the medulla. Respiration should be assessed for rate and rhythm and should be counted for one full minute before stimulating the patient. Some of the more commonly described abnormal respiratory patterns found in the neurologically impaired patients are discussed in the following paragraphs (Vasquez, Lazear & Larson (1992: 155 – 160).

Cheyne-Stokes pattern indicates a bilateral lesion in the cerebral hemispheres, cerebellum, midbrain, or, in rare circumstances, upper pons and may be due to cerebral infarction or metabolic diseases. This respiratory pattern is evidenced by a rhythmic waxing and waning in the depth of the respiration, followed by a period of apnea.

Central neurogenic hyperventilation indicates a lesion in the low midbrain or upper pons and may be due to infarction or ischaemia of the midbrain or pons, anoxia or tumours of the midbrain. This pattern is evidenced by respirations that have an



increased depth, are rapid (>24) and are regular. Apneustic breathing indicates a lesion in the mid or low pons that may be due to infarction of the pons or severe meningitis. This pattern is evidenced by prolonged inspiration, with a pause at the point where the respiration is at its peak, lasting for two to three seconds. This may alternate with an expiratory pause.

Cluster breathing indicates a lesion in the low pons or upper medulla that may be due to a tumour or infarction of the medulla. This pattern is described as clusters of irregular breathing with periods of apnea that occur at irregular intervals.

Ataxic breathing indicates a lesion in the medulla that may be due to cerebella or pons bleeding, tumours of the cerebrum, or severe meningitis. These respirations are completely irregular, with deep and shallow random breaths and pauses.

Abnormal respiratory patterns also may be caused by acidosis, respiratory alkalosis, electrolyte imbalances, anxiety, pulmonary processes, or drugs, especially narcotics and anaesthetic agents that depress the respiratory centre.

#### - Heart Rate

Assess the pulse/heart rate for rate, rhythm and quality. Increased heart rate may indicate poor cerebral oxygenation. Decreased heart rate is present in the late stages of increased ICP, in which case the quality will be bounding.

#### - Blood Pressure

The medulla regulates blood pressure and is based on input from chemoreceptors and pressor receptors, which is regulated by the medulla. An important response to ischaemia is known as the Cushing reflex. This response is activated when pressure in the CSF system rises to a point where it equals or exceeds arterial blood pressure. In response to this increase in pressure, the systolic blood pressure rises to a level slightly higher than that of the CSF, which permits CBF to continue.

## - Temperature

The temperature regulation centre is in the hypothalamus, which regulates body heat via afferent impulses. Causes of hypothermia are spinal shock, metabolic coma, drug overdose, especially depressants and destructive lesions of the brainstem or hypothalamus. Causes of hyperthermia are central nervous (CNS) infection, subarachnoid haemorrhage, hypothalamic lesions, or haemorrhage of the hypothalamus or brainstem. Temperature may fluctuate widely and may exceed 40 °C. Hypothermia must be treated vigorously because of the increased metabolic demands placed on the body and brain, resulting in an increase in carbon dioxide.

## - Cranial Nerve Reflexes

The unresponsive patient should be assessed for the presence of intact protective reflexes and if reflexes are absent or decreased, measures should be taken to protect the patient from injury. The protective reflexes include:

1. Corneal reflex
2. Gag reflexes
3. Swallow reflexes and
4. Cough reflexes.

Check the corneal reflex by touching the cornea with a wisp of cotton. The eye will blink rapidly if the reflex is intact. Check the gag reflex by touching the posterior tongue with a tongue blade. The patient will gag if intact. The cough and gag reflexes can be checked when suctioning the intubated patient.

Two other reflexes that are used to determine the integrity of the brainstem are the oculo-vestibular and oculocephalic reflexes. These reflexes involve cranial nerves III (oculomotor), IV (trochlear), VI (abducens) and VIII (acoustic). The awakened patient will be able to perform a full range of eye movements. Ask the patient to look upward, downward, outward, inward, medially this is also known as extraocular eye movements (EOMs). Deficits in eye movements usually indicate a cranial nerve



dysfunction of one or more of the above cranial nerves. In the unresponsive patient, voluntary eye movement is lost and the patient is unable to perform (EOMs).

Results of oculocephalic or oculovestibular testing must be interpreted with caution. Many pharmacological agents, such as ototoxic drugs, neuromuscular blockers and ethyl alcohol may depress these reflexes. Nurses do not perform these tests.

### 3.3.3 The Structure and Function of Bones and the Pathophysiology

According to Hall et al, (1992: 693) and Demetriades, (1993: 92) trauma to limbs and chest follows head and neck trauma. This is an indication of a need to describe the structure, function and the pathophysiology of bones briefly. The description and explanation of structure, function and pathophysiology will assist in the formulation of nursing outcome standards for polytrauma patients with traumatic brain injuries focussing on the primary and secondary assessment, in casualty department and transport to the ICU.

McCance & Hauther, (1998: 1405) indicate that bones give form to the body, support tissues and permit movement by providing points of attachment for muscles. Bones also protect many of the body's vital organs, for example bones of the skull, thorax and pelvis are hard exterior shields that protect the brain, heart, lungs, reproductive system and urinary organs. The marrow cavities within certain bones serve as sites of blood cell formation including storage of essential minerals. Bones support and protect the body organs and if there is a break in the continuity of the bone tissue, the structure and the function of the bone will change. McCance & Hauther, (1998: 1431) further assert that when a bone is broken, the periosteum and the blood vessels in the cortex, marrow and surrounding soft tissue are disrupted. Bleeding occurs from the damaged ends of the bone and from the neighbouring soft tissues. A clot or a haematoma forms within the medullary canal between the fractured ends of the bone and beneath the periosteum and bone tissue immediately adjacent to the fracture, dies.



The necrotic tissue stimulates an intense inflammatory response characterised by vasodilation, exudation of plasma and leukocytes and infiltration by inflammatory leukocytes and mast cells. Vascular tissue invades the fractured area from surrounding soft tissue and marrow cavity within 48 hours and the blood flow to the entire bone is increased. Bone forming cells are activated and as the process of repair continues, remodelling occurs during which the necessary callus is resorbed and trabeculae are formed along lines of stress. See table 3.3 for potential fluid loss from various injuries.

**TABLE 3.3**  
**POTENTIAL FLUID LOSS FROM VARIOUS INJURIES**  
**(VASQUEZ ET AL, 1992: 410 – 415)**

<b>Blood loss from fractures</b>	<b>Localised injury without evidence of fracture or frank bleeding</b>
Pelvis 3 – 8 units Tibia – Fibula 1 – 3 units Femur 3 – 6 units	Arms/ankle up to 1 unit Chest, abdomen up to 2,5 units Pelvis, thighs up to 2,5 units Leg up to 1,5 units

### 3.3.4 Scoring Systems in Trauma

The Glasgow Coma Scale and the Revised Trauma Score will be described below:

- The Glasgow Coma Scale

According to Vasquez et al (1992: 159) and ATLS (1997: 190) polytrauma patients with traumatic brain injuries need to be assessed by using the Glasgow coma scale to monitor their level of consciousness. The Glasgow coma scale is



based upon eye opening, verbal and motor responses. The responsiveness of the patient can be expressed by illumination of figures with the lowest score being three and the highest score being fifteen. See table 3.4.

**TABLE 3.4**  
**THE GLASGOW COMA SCALE (ATLS, 1997: 190)**

<b>EYES</b>	<b>SCORE</b>
Open spontaneously	4
Open to speech	3
Open to pain	2
No response	1
<b>MOTOR (BEST MOTOR RESPONSE)</b>	
Obeys commands	6
Localises pain	5
Flexion withdrawal	4
Flexion	3
Extension	2
No response	1
<b>VERBAL (BEST VERBAL RESPONSE)</b>	
Orientated	5
Confused	4
Inappropriate words	3
Incomprehensible words	2
No response / silent	1
<b>TOTAL</b>	<b>15</b>

Hall et al, (1992: 697) believes that one should first determine whether the patient responds appropriately to all commands and is completely oriented. A second level is whether the patient responds to voice alone. A third level is indicated by responsiveness to pain and the fourth level is unresponsiveness to stimuli. This is performed in conjunction with the status of the pupils and any lateralizing sign should be noted in the initial evaluation of the patient. Any change in any of the mentioned parameters should necessitate further investigation. Respiration, pulse and blood pressure are to be checked to determine the baseline data.



The severity of the traumatic injuries has to be assessed and scored to estimate the severity of trauma. According to Demetriades, (1992: 92) and ATLS, (1997: 190), there are physiological scoring systems that measure the degree of physiological derangement and the anatomical damage. These are assessed through the Glasgow Coma Scale as discussed and the Revised Trauma Score, which is used in South Africa.

- The Revised Trauma Score

Demetriades, (1993: 92) states that the Revised Trauma Score measures the degree of physiological derangement on the basis of coded measurements of systolic blood pressure, respiratory rate and Glasgow coma scale. The coded value is multiplied by a weighting factor and the sum of the three values gives the revised trauma score. See table 3.5 below

**TABLE 3.5**

**REVISED TRAUMA SCORE (RTS) (Demetriades, 1992 : 92)**

<b>CODED VALUE X W EIGHT + SCORE</b>		
<b>Systolic pressure</b>		
>89	4	
76 – 89	3	
50 – 75	2	X 0.7329 =
1 – 49	1	
01		
<b>Respiratory rate</b>		
10 – 29	14	
>29	3	
6 – 9	2	X 0.2908 =
1 – 5	1	
0	0	
<b>Glasgow Coma Scale</b>		
13 – 15	4	
9 – 12	3	
6 – 8	2	X 0.9368 =
4 – 5	1	
3	0	



### 3.3.5 Commonly seen injuries

Commonly seen injuries will be described according to chest, abdominal and maxillofacial trauma.

#### a) Chest Injuries

- Mechanism of injury

Chest trauma is always associated with polytrauma in which blunt trauma and penetrating trauma occur from motor vehicle crashes, falls, assault and crush injuries (Prentice & Ahrens, 1994: 28).

- Assessment of chest injuries

Initial assessment begins with the airway, breathing and circulation (ABCs) (Carrol, 1999: 3). Prentice and Ahrens (1994: 28) assert that all life threatening injuries are to be identified and treated and then followed by the secondary survey. The chest wall is palpated for signs of crepitus subcutaneous emphysema and auscultated for diminished breath sounds. Assess acchymosis and contusion of the thorax, palpate each rib, assess for splinting of the chest and signs of seat belt marks because these will restrict tidal volumes and prevent adequate cough (Carrol, 1999: 4).

Prentice and Ahrens, (1994: 29) further indicate that a flail chest is the most serious of the chest wall injuries and it can be observed on spontaneous breathing during inspection.

Rib fractures are associated with pneumothorax, haemothorax, pulmonary, contusion and flail chest. Pulmonary contusion should be suspected in fractured ribs, flail chest, haemothorax or pneumothorax, external bruising and fractured scapula. Look for signs of distress, for example nasal flaring, cyanosis, anxiety and tachypnea. Check neck veins for distension, indicating cardiac tamponade (Prentice & Ahrens, 1994: 30;

Carrol, 1999: 5). In chest wounds, place occlusive gauze, taped on three sides only, over the wound to allow air to escape during exhalation to prevent a pneumothorax.

Lane – Reticker, (1993: 4) asserts that chest evaluation is important in abdominal trauma, because tears in the diaphragm may allow abdominal organs to enter the chest (Carrol, 1999: 5) assert that one should palpate the area above the sternal notch to determine if the trachea is midline. If not, the patient may have a neck injury, or tension-pneumothorax. Note the temperature of the skin. If cool and clammy, the patient may be shocked. Warm skin indicates good perfusion, if sweating profusely, the patient may be experiencing severe pain. Assess for liver injuries, which are associated with right lower rib fractures. Sternal fractures may be associated with heart and great vessel injury. No sandbags or rib belts should be used, as this may induce hyperventilation, atelectasis and pneumonia. For a pneumothorax, prepare for immediate decompression. Never put an occlusive dressing over an open sucking chest wound, which indicates that the patient has an “open” pneumothorax, air is venting to the outside. Covering the wound will convert it into the more deadly closed pneumothorax. Instead tape a dry, sterile dressing on three sides to allow pressure to be vented out of the gauze (Carrol, 1999: 7).

#### b) Abdominal Injuries

Lane-Reticker, (1993: 56), Plaisier and Jacobs, (1993: 56) assert that when a patient has abdominal trauma, priority has to be given to assess and stabilise the patient's airway, breathing circulation and cervical column. Shock has to be anticipated and warmed intravenous fluids are to be administered. The following actions have to be implemented: Administer oxygen, connect the patient to the cardiac monitor, collect blood for cross match, and if the patient is bleeding profusely, administer blood group O. Collect blood for gas analysis and monitor urine output.

Plaisier and Jacobs, (1993: 56) & Watchtel, (1994: 39) indicate that medical history should be obtained from the patient or other sources for example the crew of the ambulance. A history of passing blood in urine and stool or vomiting blood or passing



blood through the vaginal orifice, which is not related to menstrual cycle, after the injury is significant.

Use "ample" when collecting history for example:

A = allergies

M = medications

P = past illnesses

L = last meal

E = events or environment related injury

Inspection of the abdomen must be done anteriorly and posteriorly to assess for lacerations, abrasions, penetrating wounds, ecchymosis of the flank (Grey Turner sign).

Auscultate the abdomen for bowel sounds and bruits. Involuntary muscle guarding is a reliable sign of peritoneal irritation. Cullen's sign indicates haemoperitoneum. Watchel, (1994: 90) further asserts a need for a rectal examination in bowel perforation. The position of the prostate gland has to be assessed, i.e. if it is high and free-floating. Watchel, (1994: 41) explains that if a nasogastric tube is inserted and it drains bloody aspirate, that is a confirmatory sign of trauma, though clear fluid does not rule out an injury. Insertion of an urethral catheter should be preceded by a rectal examination to rule out pelvic injuries.

Penetrating injuries to the small intestines may result into massive haemorrhage and blood on the finger after digital examination of the rectum may be diagnostic of left colon injury.

According to Plaisier and Jacobs, (1993:64) wounds on the buttocks and the perineum, abdominal pain after colonoscopy or a patient with a pelvic fracture must raise suspicion of rectal injury.

Lane-Reticker, (1993: 4) assert that inability to palpate the prostate gland suggests an urethral tear, loss of sphincter tone suggests a neurological injury and intra-abdominal

blood suggests injury to the gastro-intestinal tract. Prolapse of the rectum may occur with pelvic fracture. Blood on the urethral, or scrotal haematoma suggest a urethral tear. The vagina may be lacerated and a vaginal examination may reveal a pelvic fracture.

- Mechanism of injury in abdominal trauma

According to Reticker-Lane, (1993: 1) blunt trauma is most often the result of motor vehicle crashes but industrial accidents and falls can also contribute to these injuries. Plaisier and Jacobs, (1993: 53) support the idea by indicating that energy applied to the torso with sufficient force to disrupt the integrity of the torso wall or the internal organs can result in severe injury. These forces can be of a blunt or penetrating nature.

Blunt trauma is most likely to injure the spleen, liver and kidney; mesenteric injuries and hollow viscus perforation are associated with improper seat belt use. Patients who do not wear seat belts may be ejected from the vehicle and are likely to suffer even more serious injuries (Lane-Reticker, 1993: 2; Plaisier & Jacobs, 1993: 2).

According to Plaisier and Jacobs, (1993: 2) a unique set of injuries has emerged since the introduction of automobile seat belts and these are known as seat belt syndrome, in which peculiar injuries have been detected for example soft tissue injuries of the abdomen and chest walls; injuries to hollow abdominal viscera and mesentery injuries to the cervical and thoracic spine, and fracture of the bony thorax.

c) Maxillofacial trauma mechanism of injury

This follows motor vehicle crashes, motorbike accidents, assault and falls. According to McLeod and Sunderland, (1996: 1) in cases arising from road traffic accidents, alcohol consumption may be implicated and any evidence of such has to be recorded in notes. Maxillo-facial injuries may occur in isolation or in association with other injuries. If a patient is brought to the emergency department with maxillo facial injuries, the principles of controlling airway and cervical spine and of maintaining



breathing and circulation should be observed. These injuries rarely result in significant blood loss and if there is any sign of shock, suspect an associated injury at other sites. An assessment of the facial injuries should be carried out at the earliest opportunity to facilitate proper management of the patient.

- Facial abrasions and lacerations

McLeod and Sunderland, (1996: 2) assert that facial abrasions must be carefully debrided to avoid "tattooing", a condition which is easier to prevent than to treat. The effective way to debride abrasions is to scrub carefully with a nailbrush and antiseptic solution under local anaesthetic, but a more extensive area will require debridement under general anaesthesia.

McLeod and Sunderland, (1996: 2) further state that it is important to exclude the presence of foreign bodies, injury to the underlying bone and facial nerve weakness, before closing any facial laceration. When closing facial lacerations, line up parts of the laceration which fit together and use them as the corner-stones of the final repair. Use monofilament 5/0 or 6/0. Lacerations affecting apertines (eyelid or the vermilion border of lips) are best seen by the physician. Laceration of the chin is often associated with fractures of the mandibular symphysis or condyle, with degloving injury of the mandibular buccal sulcus.

- Intra-oral Laceration

According to McLeod and Sunderland, (1996: 2) many intra-oral lacerations will heal without treatment and those that need suturing should be sutured using reabsorbable suture material but ensure that there are no fragments of tooth or foreign body embedded in the laceration. Full thickness lacerations should be closed in three layers starting from within.

Degloving injuries of the mandible are seen when the chin hits soft ground and the mandible rolls over the soft tissues causing the mucosa to tear. The bone may show



and it may become difficult to close the wound. These are often left to heal by secondary intention (McLeod & Sunderland, 1996: 3).

Tongue lacerations may also need suturing to prevent bleeding and this will require a suture with sufficient strength for example 2/0.

- Condylar and Mandibular fractures

MacLeod and Sunderland, (1996: 3) further assert that condylar fractures are often missed and they present with the following features, swelling and tenderness in the temporomandibular region, decreased movement of the condylar head, premature contact of the posterior teeth of the affected side and deviation of the affected side on opening, occasionally with bleeding from the external auditory meatus or the middle ear in which otorrhea may be seen. When there is a fracture of the body of the mandible, suspect condylar fractures. Mandibular fractures present with pain especially if the jaw is moved, swelling and bleeding in the mouth. There is the danger of airway obstruction if there are bilateral fractures in the symphyseal region which is common in head injured patients who cannot maintain their own airways. These patients should be referred to a specialist promptly.

Table 3.6 gives the commonly seen injuries in the adult trauma patient along with the mechanism of injury.

**TABLE 3.6**  
**COMMONLY SEEN INJURIES IN THE ADULT TRAUMA PATIENT**  
**(KIDD & WAGNER, 1997: 704)**

<b>Mechanism of Injury</b>	<b>Potential Area Affected</b>
Pedestrian hit by motor vehicle • Adult (Waddell's triad)	<ul style="list-style-type: none"> <li>• Fractures (#S) of femur, tibia, fibula on side of impact</li> <li>• Ligamentary damage to impacted knee</li> <li>• Mild contra-lateral head injury</li> </ul>
Unrestrained driver	<ul style="list-style-type: none"> <li>• Head and/or facial injuries</li> <li>• #S of ribs, sternum with cardiac and pulmonary injuries</li> <li>• Cervical spine #S</li> </ul>



Restrained front seat passenger	<ul style="list-style-type: none"> <li>• Injuries to laryngotrachea, spleen, liver, small bowel</li> <li>• Posterior-dislocation to hip</li> <li>• Femur #S</li> <li>• Head and/or facial injury</li> <li>• Laryngotracheal injuries</li> <li>• Posterior #S-dislocation of femoral head</li> <li>• Femur and patellar #S</li> </ul>
Restrained driver (lap and shoulder harness)	<ul style="list-style-type: none"> <li>• Contusions of structures underlying harness (pulmonary, small bowel)</li> </ul>
Restrained passenger (lap belt only)	<ul style="list-style-type: none"> <li>• Flexion/distraction #S: lumbar vertebrae (L1 – L4), duodenal injuries, cervical spine injuries</li> </ul>
Fall injuries	<ul style="list-style-type: none"> <li>• Compressed #S of lumbosacral spine</li> <li>• Calcaneous #S</li> <li>• #S of radius, ulna, patella</li> </ul>
Vehicular ejection (injury risk increase by 30 %)	<ul style="list-style-type: none"> <li>• Multiple injuries: head and cervical spine</li> </ul>
Low velocity impalement	<ul style="list-style-type: none"> <li>• Local tissue or organ disruption with little or no cavitation</li> </ul>
High velocity missile, short missile path	<ul style="list-style-type: none"> <li>• Entrance wound bigger than missile calibre</li> <li>• Large rugged exit wound with cavitation</li> </ul>
High velocity missile, long missile path	<ul style="list-style-type: none"> <li>• Entrance wound bigger than missile calibre</li> <li>• Exit wound slightly than or equal to missile calibre</li> <li>• Extensive cavitation</li> <li>• Deep structures damaged</li> </ul>
High velocity missile hitting bone or teeth	<ul style="list-style-type: none"> <li>• Entry wound bigger than missile calibre</li> <li>• Possibly no exit wound with missile fragmentation</li> <li>• Secondary missile injury in unpredictable erratic pattern</li> </ul>

### 3.3.6 Transporting polytrauma patients with traumatic brain injuries from the accident scene to the emergency department

Transporting patients or the injured from the accident scene should be given full attention, as when transporting a patient from casualty to the ICU, because, as much as patients are injured, they deserve proper transport and proper handling. Poor transporting mechanisms will cause problems of physiological changes to the already injured patient, or may lead to other accidents, thus aggravating the conditions even further. This section will elaborate further on the care that should be given to the



patient en route to the hospital and the physiological changes that may occur during transportation of polytrauma patients with traumatic brain injuries.

Before transporting patients from the scene, extreme care is also required when handling patients who are injured and require immobilisation. Rough and careless handling of the injured person could result in paralysis.

a) Physiological changes during ground transport

During transportation of the patient to the hospital, there are some physiological changes that may need attention of the emergency service personnel so as not to aggravate the condition. Walden, Boyd and Dimopoulos, (1998: 45) indicate that factors like motion, noise vibration, odours, temperature, position change / proprioception, visual disturbances, the driver's experience, road condition and tyre pressure may cause some physiological changes in an injured patient on the way to the hospital.

During transportation of patients, there is an increased probability of morbidity and mortality due to the physiological changes occurring during transit. Walden et al, (1998: 48) supports this by indicating that transport effects causes respiratory embarrassment and hence increases the myocardial oxygen consumption and may contribute to in transit morbidity or mortality.

- Motion

According to Walden et al, (1998: 45) acceleration and deceleration vary not only within time periods, but also according to open road and city driving. The negative deceleration and positive acceleration forces produced by these two forces affect the orientation to reality and physiological functions of the body and this is further influenced by the body's supine position. The physiological effects caused by the movement of the ambulance are elastic retractions of the lungs, increased intra-abdominal pressure and abdominal muscle tension.



- Noise

According to Walden et al, (1998: 45) engine noises, road noises from the other road users, e.g. hooting, exhaust pipe noises, equipment alarms and two-way radios, have been seen to be causing physiological embarrassment, leading to confusion because of hyper stimulation of the brain.

- Odours

Odours also may upset the brain. This is further explained by Walden et al, (1998: 47) that odours are a necessary stimulation for a patient with head injury, but if the odours are extreme, this may upset the brain. These road odours that may upset a critically ill patient, are fuel fumes, soiled linen, unsealed equipment and air fresheners.

- Temperature

Temperature has been indicated as having some effect on the blood pressure and Walden et al, (1998: 47) further states that temperature in the ambulance needs to be controlled because hypothermia will decrease blood pressure and hence increase respiration and the oxygen consumption. Hypothermia will decrease diastolic blood pressure and increase systolic pressure and respiration, which may result in respiratory alkalosis. Heat tends to increase the acuity of the Olfactory sense and motion sickness causes a sensation of heat (flushing), which when combined with nauseating odours, will cause vomiting.

- Visual Senses

Walden et al, (1998: 47) states that in most ambulances the windows in the patient compartment are obscured, which means that the patient is unable to obtain visual references. The patient may experience confusion in orientation to position, place and time, again upsetting the brain.

- Vibration

Vibration of the ambulance can also have some effect on the physiology of the body. This is further supported by Walden et al, (1998: 47) who contend that tyre treads, inflation pressure, dysfunctional shock absorbers, incorrect driving techniques and poor road conditions may aggravate the patient's condition; so attention has to be given to driving techniques to avoid undue movement of the patient and proper tyre conditions have to be maintained.

- Position

Anxiety may increase the physiological changes, including psychomatic responses. This is further supported by Walden et al, (1998: 47) who indicate that, patients should be loaded feet first instead of head first, to enable them to see where they are going. This will reduce anxiety.

### 3.3.7 Management of the polytrauma patient with traumatic brain injuries during transportation from the accident scene to the casualty/emergency department

Patients are to be handled as a unit when removed from the accident scene and according to Knottenbelt, (1994: 957) the emergency personnel has to be able to prioritise patients with certain injuries over others and are expected to act accordingly.

Drivers of ambulances are permitted by the law to certain exemptions while operating an ambulance, but the driver is still responsible for maintaining control of the vehicle at all times. Henry and Stapleton, (1992: 12) further support the idea by indicating that the driver should be familiar with the best possible routes in the area. They should know traffic patterns at certain times of the day and alternative routes to take, in the event of the original route being obstructed.



Not all injured patients enjoy the swaying and the siren of the ambulance. This is supported by Henry and Stapleton, (1992: 12) who state that the safe and appropriate transport of patients is another aspect of emergency vehicle operation and most patients do not benefit from a frantic ride to the hospital with flashing lights and siren blaring.

Rescuers will first have to assess the area before moving or attending to the patient. This idea is supported by Grant and Stapleton, (1986: 507) who indicate that at times people will work under difficult conditions like working in darkness, in rain and cold, but will be expected to provide on-the-spot care.

a) Actions during transport of patient to hospital

According to Grant and Stapleton, (1986: 531) the following steps are required to care for a person en route to a hospital:

**STEP 1:** Continue to provide emergency care as required

Maintain an open airway, resuscitate, provide emotional support and update findings

**STEP 2:** Compile additional patient information

Compiling information during the trip to the hospital also helps the patient not to focus on his/her problems.

**STEP 3:** Continue monitoring vital signs

Keep on checking vital signs and record changes that may indicate shock if the patient's blood pressure drops or changes.

**STEP 4:** Radio patient information to the hospital

The patient's information and condition as well as the distance to/from the hospital should be communicated to the hospital, if possible.

**STEP 5:** Check bandages

During transit check bandages again in the ambulance, adjust them if loose, repack soaked bandages to control bleeding. Loosen bandages for fingers and toes if these show or become blue tinged.

**STEP 6:** Check splints

Check if splints have not shifted and make adjustments if necessary. Ensure that circulation and nerve functions are not impaired. Check distal pulse, capillary refill, skin temperature, colour and neurological activity, muscle strength and reflexes.

**STEP 7:** Collect vomitus if the patient becomes nauseated and vomits

Collect vomitus from the patient, place an emesis bag on the mouth or suction the vomitus. Record the type, colour, smell and consistency of vomitus and save for the emergency personnel at the casualty department.

**STEP 8:** Talk to the patient, but control emotions

Continued information is often soothing to a frightened individual. So one is to uphold professional ethics by not being judgemental.

**STEP 9:** Advise the driver of any change in condition

If the condition of the patient deteriorates, the driver will have to accelerate, but if one feels that the road is not smooth enough, the driver can be asked to decelerate.



**STEP 10:** Cardiopulmonary resuscitation (CPR)

If the patient goes into cardiac arrest, have the driver stop the ambulance and initiate CPR quickly and, if possible, make the department aware of the cardiac arrest.

**b) Transferring the patient to the care of an emergency department**

According to Grant and Stapleton, (1986: 536) the following steps should be followed when handling patients over to the casualty department staff:

**STEP 1:** First check what is to be done with the patient

If the department is busy, leave the patient with someone to check on what is to be done for him/her. Continue with emergency care until someone assumes responsibility.

**STEP 2:** Assist members at the emergency department as required

Remain in the area, even if the emergency department people have taken over.

**STEP 3:** Transfer patient's information

As soon as you are free from patient care activities, transfer the patient's information. Give both verbal and written reports and report any changes which have occurred on the way.

**STEP 4:** Transfer the patient's personal effects

Transfer the patient's personal effects to a responsible emergency department staff member and request written receipt.

## STEP 5: Obtain your release from the hospital

Ask the emergency department people if you can be released or whether they will need more information.

### 3.3.8 Management of polytrauma patients at casualty department

According to Jordan, (2000: 1) the primary assessment is the basis for all emergent interventions delivered in the care of patients who have been injured. The general assessment process should not continue until all life-threatening deviations have been found and treated.

This section describes management of polytrauma patients with traumatic brain injuries, which starts with handing over of patients by the emergency personnel or the nurses who were called to the scene of the accident. An overview of the resuscitation of the patient/s at the casualty department will be indicated and this, according to Driscoll and Skinner, (1994: 34) focuses on the following:

Airway and cervical spine control, breathing, circulation and haemorrhage control, dysfunctions of the central nervous system and exposure.

During management one should always assume that the spine has been damaged, so the neck must not be moved. Driscoll and Skinner, (1994: 34) assert that the rigid neck collar should be kept on the patient, unless examining the neck. Driscoll and Skinner, (1994) further state that the emergency personnel should resuscitate the patient and stabilise the vital signs, determine the extent of the injuries before transporting the patient to casualty department.

#### a) Responsibilities of members of the trauma team at casualty

The responsibilities are divided according to the team leader, anaesthetist, other doctors, nursing staff and radiographers.



- Team leader

The team leader has to do primary and secondary surveys, co-ordinate the team effort, take overall responsibility for a patient while in the trauma or emergency department.

- Anaesthetist

The anaesthetist has to do airway control, ventilation and check fluid balance.

- Other doctors

They are responsible for other procedures, e.g. chest drain insertion, removal of clothes, catheterisation.

- Nurses

According to Driscoll and Skinner, (1994: 34) nurse no 1 (one) will write down the event as the primary survey is being done and also indicates the time for each activity. The first nurse will record vital signs, nurse 2 (two) will stabilise the head in position to prevent further injuries and nurse 3 (three) will clean wounds, measure vital signs, help with administration of drugs and connect the cardiac monitor.

- Radiographers

Will take specific radiographs of cervical spine, chest and pelvis.

b) Interventions for the primary and secondary survey in casualty

These interventions will include airway management, breathing, circulation, dysfunction of the nervous system and exposure (ATLS, 1997: 180 - 200).

- Airway Management

According to Driscoll and Skinner, (1994: 35; ATLS) and ATLS (1997: 180 - 200) an assessor has to talk to the patient to see if he/she will answer and if she/he answers, it means the airway is patent and the brain is well perfused. If there is no reply, open the patient's mouth and remove any liquid/secretions or vomitus by suctioning the airway. Open the airway by using chin lift manoeuvre. Remove false teeth and any other solid foreign objects with Magills forceps. Use cuffed endotracheal tube for ventilation because mask ventilation may distend the abdomen. Always maintain stability of the neck to prevent further injuries; orotracheal intubation is recommended instead of nasotracheal intubation. Every patient with multiple injuries should receive 100 % oxygen and one should check for position of the tracheal swelling and venous distension.

- Breathing

According to Driscoll and Skinner, (1994: 35) and ATLS (1997: 180 - 200) one should ensure that both sides of the chest are being ventilated by inspecting for adequate movement and auscultation for breath sounds and also over the epigastrium to ensure that the stomach is not ventilated. Respiration rate, depth rhythm should also be checked to rule out any damage to the respiratory system, especially lungs, ribs and diaphragm.

- Circulation

Driscoll and Skinner, (1994: 35) further believe that major haemorrhage should be controlled with direct pressure. The patient's pulse and blood pressure are to be recorded and the cardiac monitor must be attached to the patient for continuous monitoring of the heart. According to Jordan, (2000: 12) venous access has to be used to collect blood samples, haemoglobin and hematocrit, type and cross match, and for crystalloid and colloid replacement, including medications.



The patient has to be assessed for a pulse and if the pulse is absent, Jordan, (2000: 13) believes that one has to perform cardiopulmonary resuscitation (CPR) and monitor oxygen saturation by pulse oximetry. Jordan, (2000: 13) further states that if the patient does not respond, defibrillation has to be performed until the patient's pulse is back.

Driscoll and Skinner, (1994: 35) further state that two intravenous lines should be inserted peripherally and if not possible, a cut down must be performed. Blood gases should be checked and a central line be inserted for measuring central venous pressure.

The urinary output will be low for stressed patients due to trauma, so it has to be monitored. This is further supported by Jordan, (2000: 13) who states that vital signs, level of consciousness and including the urinary output, which may be altered due to trauma, are to be checked.

Many patients tend to be shocked due to trauma and Driscoll et al, (1994: 35) believes that an anti-shock garment has proved to be useful in shocked patients, particularly those suspected of having fractures of the pelvis.

- Dysfunction of the central nervous system

Jordan, (2000: 13) Driscoll and Skinner, (1994: 35) state that the injured patient should be given supplemental oxygen continuously and assess the possible causes of loss of consciousness. The two authors further indicate assessing the pupils, motor response and verbal responses in detail, making a rapid assessment of the brain and spinal cord. This should include assessing the causes of decreased levels of consciousness, e.g. drugs, alcohol, cerebral edema, trauma, or an underlying disease process.

The head should always be kept midline to avoid further injury of the neck or spine if there is any minor/major injury and all medications should be administered as required.

- Exposure

Driscoll and Skinner, (1994: 35) assert that the resuscitation room should be warm and the patient's clothing should be removed by cutting with a pair of scissors, to allow easy removal and proper examination.

### 3.3.9 Management of the head injured patient

Management should be done according to mild head injury (GCS 13/15), moderate head injury (GCS 9/12) and severe head injury (GCS 3 - 8/15) (ATLS, 1997: 193 - 196).

#### i) Mild head injury patient

Patient is awake and may be orientated with a GCS of 14/15. Obtain the following:

- Biographical data, that is name, age, sex, race and occupation
- Mechanism of injury
- Time of injury
- Loss of consciousness immediate post-injury
- Subsequent level of alertness
- Amnesia: retrograde, antegrade
- Headaches mild, moderate, severe
- Seizures
- Vomiting on the scene
- Confusion / disorientation

Then do a general examination to exclude systemic injuries

- Do a limited neurological examination (GCS and pupillary reactions)
- Obtain x-rays, C-spine and other as indicated



- Collect blood for blood-alcohol level and urine toxicology screen and for blood screening
- CT scan of the head in all patients must be obtained, except completely asymptomatic and neurologically normal patients.

Admit the patient to hospital when no CT scanner is available, or there is an abnormal CT scan, penetrating head injury, history of deteriorating loss of consciousness, moderate to severe intoxication, a skull fracture, CSF leak, significant associated injuries, if there is no reliable companion at home, or the patient is unable to return promptly and if amnesia is present in the patient.

Discharge the patient from hospital if he/she does not meet any of the criteria for admission. The need to return if any problems develop is discussed and a "warning sheet" is issued. Schedule a follow-up visit within one week.

The "warning sheet" should contain warnings on drowsiness, nausea or vomiting, convulsions, bleeding or watery discharge from nose or ears, headaches, weakness or loss in limbs, confusion or strange behaviour, different pupil sizes, strange eye movements, or any visual disturbances. Check for a slow or rapid pulse and breathing problems. The patient should not drink alcohol or take strong sedatives or pain relievers stronger than what the doctor supplied, or take medicines containing aspirin, because these will mask neurological deficits, which are to be noted and observed as aspirin may lead to some gastric ulceration.

## ii) Moderate head injury patient

The patient may be confused, but can follow simple commands with a GCS of 9 - 13/15. The initial examination is the same as for the mild head injury, ensuring cardio-pulmonary stability before neurological assessment. Obtain a CT scan and admit for observation.

These patients are not routinely intubated, but precautions should be taken to protect the airway. If the patient lapses into a coma, he/she is treated as a severe head injury.

### iii) Severe head injured patient

The patient is unable to follow simple commands, due to impaired consciousness with a GCS of 3 - 8/15. Assess and manage the patient according to the airway (A), breathing (B), circulation (C), disability (neurological) (D) and environment/exposure (E). This includes the primary survey with resuscitation and the secondary survey with management of trauma that will influence the outcome of the ABC. After the primary and secondary survey has been done, the neurological re-evaluation will be commenced. This will include the GCS, pupil reactions, Doll's eye test and cold caloric test. Medical management can include diuretic osmotics, anticonvulsants and moderate hyperventilation. Diagnostic tests to be done include CT scan on all patients, an air ventriculogram and an angiogram and skull X-Ray.

All comatosed, head-injured patients will undergo resuscitation (ABCDEs) upon arrival in the emergency department (ED) or the casualty department.

As soon as the blood pressure (BP) is normalised, a mini-neurological exam is performed (GCS and pupillary reaction). If the BP cannot be normalised, the neurological exam is still performed and the hypotension recorded. If the patient's systolic blood pressure (SBP) cannot be brought up to  $> 100$  mm HG despite aggressive fluid resuscitation, the priority is to establish the cause of the hypotension, with the neurosurgical evaluation taking second priority. In such cases the patient undergoes a diagnostic peritoneal lavage (DPL) or ultrasound in the ED and may need to go directly to the operating room (OR) for a celiotomy. CT scan of the head is obtained after the celiotomy. If there is clinical evidence of an intracranial mass, an air ventriculogram, exploratory burr holes, or craniotomy may be undertaken in the OR while the celiotomy is being performed.



If the patient's systolic BP (SBP) is > 100 mm Hg after resuscitation and the patient has clinical evidence of a possible intracranial mass (unequal pupils, asymmetric motor exam), the first priority is to obtain a CT head scan. A DPL or ultrasound may be performed in the ED or CT scan area, but the patient's neurological evaluation or treatment should not be delayed.

### 3.3.10 The head to toe examination (secondary survey)

Patients with head injuries often sustain multiple trauma. According to ATLS, (1997: 198) "in one series of severely head injured patients, more than 50 % had additional major systemic injuries requiring care by other specialists e.g. long bone fractures, maxillary or mandibula fractures, chest injuries, abdominal and spinal injuries". These patients require a primary and secondary survey to be done as outlined before. The secondary survey will include:

An examination from head to toe, starting with the scalp, skull, eyes, face, ears, nose, neck, trachea, distended neck veins, chest and thorax posteriorly, assess for c-spine turning the patient carefully, then assess the abdomen, perform rectal and vaginal examination, examine arms and legs and palpate all long bones, carry out spinal column test for sensory and motor defects e.g. priapism, test faecal residue and urine for blood. X-ray suspected areas and keep all the patient's valuables safe. Now the patient is ready to be transferred to the ICU. Refer to table 4.15 for detailed secondary assessment.

3.3.11 Transporting the polytrauma patient with traumatic brain injuries from casualty to the intensive care unit

TABLE 3.7

COMPLICATIONS & PHYSIOLOGICAL CHANGES DURING INTER-HOSPITAL TRANSPORT (HALL ET AL, 1992: 569)

- ◆ Airway obstruction
- ◆ Extubation
- ◆ Deterioration in ABG
- ◆ Respiratory arrest
- ◆ Dysrhythmias
- ◆ Hypotension
- ◆ Hypertension
- ◆ Cardiac arrest
- ◆ Bleeding
- ◆ Loss of vascular catheters
- ◆ Pain, discomfort
- ◆ Hypothermia
- ◆ Gastric aspiration
- ◆ Missed medications

Table 3.7 gives an outline of the complications and physiological changes, which may occur during transport, and it is thus important to implement a systematic approach to patient transport. Hall et al, (1992: 569 - 571) advocates the following elements:

i) Transport decision

As with all procedures, the safest transport is one that does not take place at all. As the patient cannot be nursed effectively in the emergency room or the casualty department and it is thus necessary to transport the patient to ICU for optimal care, the patient can only be moved once stabilised.



ii) Personnel accompanying the patient

During transport, personnel accompanying the patient must be capable of initiating a response to deterioration in the patient's condition in the same way and degree as a patient in the casualty department. The minimum requirement for patient orderlies is training in Basic Life Support. Professionals accompanying the critically ill should be proficient in Advanced Cardiac Life Support (ACLS) techniques and a sufficient number of staff must handle potential problems.

Documentation is an integral part of transport. A systematic evaluation of each patient should be done prior to transport and documented accordingly. An assessment of the relative stability of the patient should also be included. The term "stable" denotes that the patient has not exhibited any recent changes in condition or is likely to do so. Plan and take the shortest route to the Intensive Care Unit (ICU).

(iii) Equipment

The monitoring equipment and supporting devices must meet the needs of the patient and be compatible with movement, must be shock resistant and have a power supply (battery or line). The patient must not be used as a "table", as this can cause damage to the equipment. The standard resuscitation drugs should accompany the patient. A portable "crash box" containing the essential drugs should be made up, checked regularly and must accompany the patient.

**TABLE 3.8**  
**PUPIL RESPONSES IN HEAD INJURED PATIENTS**  
**(ATLS, 1997: 200)**

<b>Pupil reaction</b>	<b>Response to light</b>	<b>Cause</b>
<ul style="list-style-type: none"> <li>• Unilaterally dilated</li> </ul>	<ul style="list-style-type: none"> <li>• Sluggish or fixed</li> </ul>	<ul style="list-style-type: none"> <li>• 3<sup>rd</sup> Nerve compression by brain mass lesion</li> </ul>
<ul style="list-style-type: none"> <li>• Bilaterally dilated</li> </ul>	<ul style="list-style-type: none"> <li>• Sluggish or fixed</li> </ul>	<ul style="list-style-type: none"> <li>• 3<sup>rd</sup> Nerve compression</li> <li>• Inadequate brain perfusion</li> </ul>
<ul style="list-style-type: none"> <li>• Unilaterally dilated or equal</li> </ul>	<ul style="list-style-type: none"> <li>• Cross-reactive</li> </ul>	<ul style="list-style-type: none"> <li>• 3<sup>rd</sup> Nerve injury</li> <li>• Brain mass lesion</li> </ul>
<ul style="list-style-type: none"> <li>• Bilaterally constricted</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to determine</li> </ul>	<ul style="list-style-type: none"> <li>• Drugs</li> <li>• Metabolic causes</li> <li>• Pontine lesion</li> </ul>
<ul style="list-style-type: none"> <li>• Unilaterally constricted</li> </ul>	<ul style="list-style-type: none"> <li>• Preserved</li> </ul>	<ul style="list-style-type: none"> <li>• Injured sympathetic pathway</li> </ul>

Table 3.8 gives a summary of the pupil responses as part of the neurological assessment to be done as part of the secondary survey.



### 3.3.12 Standards and standard development

Management of polytrauma patients with traumatic brain injuries requires quality nursing care, which is in compliance with standards of care. According to Mason, (1994: 1) health professionals require a system for assessing, planning, implementing and evaluating health care that guarantees positive outcomes for every patient and these include the process, content (structure) and outcome standards that define quality of care.

Sale, (1990: 3) defines quality as a degree of excellence and may be interpreted as a formal guarantee of excellence, which assures patients of an acceptable standard of care. Therefore, nurses cannot measure quality of care unless it has been described in measurable terms.

According to Muller, (1999: 242) quality improvement is a formal process when standards are set and work performance is monitored and evaluated against the set standards, standards to maintain quality care have to be formulated to manage patients in the casualty department and during transport to the ICU.

Therefore, this section will define and describe standards and how outcome standards will be formulated as part of quality improvement in the management of polytrauma patients with traumatic brain injuries.

Mason, (1994: 1) defines a standard as a valid definition of the quality of health care and in order to guarantee quality, every standard must be valid. There are three types of standards and these are process, content (structure) and outcome standards.

According to Mason, (1994: 3) process standards define the quality of health care that is implemented. These are interventions, observations and principles that must be carried out to guarantee positive outcomes for patients. Content / structure standards – define the substance of health care that is communicated to others and the substance of nurses' decisions, Mason, (1994: 3).

Outcome standards define the expected change in the patient's health status and environment after receiving care and the extent of the patient's satisfaction with health care. Outcome standards describe the absence of negative outcomes, as well as the presence of positive outcomes (Mason, 1994: 3). See table 3.9 for the steps in standard formulation.



**TABLE 3.9**  
**MASON'S (1994: 5 - 59) STEPS IN STANDARD FORMULATION**

STEPS	PROCESS STANDARDS AND ACTIONS	OUTCOME STANDARDS AND ACTIONS	CONTENT/ STRUCTURE STANDARDS AND ACTIONS
1	Select a procedure	Identify the procedure	Define the patient's health condition
2	List the goals of the procedure	Identify the goals of the procedure	Identify the goals of data collection
3	Identify the steps in the procedure essential in achieving the goals	Identify positive outcomes that are expected to occur	Identify the items of data collection
4	List pertinent observations and specify when each of the steps should occur	Identify the negative outcomes that can be prevented	Combine the content standards in a logical order
5	Observations in the procedure need to be done	Specify when you expect each outcome to occur	Establish the validity of the standards
6	Combine steps in a logical order	Clarify the description of the expected outcomes	
7	Eliminate suggestions and rationale from the standards you have written	Combine the outcome standards in a logical order	
8	Establish the validity of the process standards	Establish the validity of the outcome standards	

According to Muller, (1996: 69) a standard is a written description of the devised level of performance, containing the characteristics associated with excellence for measuring and evaluating actual performance or service delivery. It is also an approved statement of something against which measurement can be made and serves as a basis of comparison.

Muller, (1996: 69) further supports Mason, (1994: 1 – 5) on the issue of three types of standards, structure, process and outcome. Structure standards refer to the support system required for health services to be delivered and apply to the human, financial and physical resources to be utilised. Process standards describe how specific actions should be performed and thus apply to how we do activities that constitute care, service or management. Outcome standards relate to the objectives that were achieved and address the results both clinical and non-clinical of what we do with the things we have.

Coetzee and Muller, (1995: 18) further define a standard as a descriptive statement of the expected level of work performance that can be evaluated. Astrop, Van der Merwe and Muller, (1996: 3) further explain that standards are classified according to structure, process and outcome. Structure includes all structured elements needed to implement a standard safely. Process reflects the scientific manner in which the nurse performs the action, whilst outcomes reflect the intention in both the structure and process standards.

According to Van der Merwe, (1994: 132) clinical standards are divided into structure, process and outcome standards. The structure standard will include a definition, standard statement, objectives, a prescription, staff allocation and equipment to be used. The process standard starts with an action word; actions are in a chronological order according to the objectives in the structure standard. Patient safety is a criteria included in the infection control aspect. Safety measures implemented and research form the basis of the validity of the contents. Actions in the process standard are also evaluated for cost effectiveness. Process standards are written in the present tense, are positive and written in understandable correct language with a yes/no answer to the evaluated activities. The outcome standard is a positive statement according to



the objectives and in the present tense. Van der Merwe, (2000) further states that with the current quality improvement movement in South Africa and outcomes based education, clinical standards should start with an outcome first, followed by the structure standard and then the process standards. The structure and process standards will include the criteria for the outcome standard. See table 3.10 for the criteria in the formulation of clinical standards.

**TABLE 3.10**  
**CRITERIA IN THE FORMULATION OF CLINICAL NURSING STANDARDS**  
**(VAN DER MERWE, 1994)**

<b>OUTCOME</b>	<b>STRUCTURE</b>	<b>PROCESS</b>
<p><i>According to objectives</i></p> <p><i>Broad statement</i></p> <p><i>Present tense</i></p> <p><i>Positive format</i></p>	<ul style="list-style-type: none"> <li>• <i>Definition</i></li> <li>• <i>Objectives</i></li> <li>• <i>Scope of Practice (Nurse)</i></li> <li>• <i>Prescription</i></li> <li>• <i>Staff allocation</i></li> <li>• <i>Equipment</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Start with a verb (action word)</i></li> <li>• <i>Actions are chronological</i></li> <li>• <i>According to objectives</i></li> <li>• <i>Patient's safety</i></li> <li>• <i>Infection control</i></li> <li>• <i>Research (at least 3 references)</i></li> <li>• <i>Cost effective</i></li> <li>• <i>Present tense</i></li> <li>• <i>Positive format</i></li> <li>• <i>Understandable correct language</i></li> <li>• <i>Acknowledgement</i></li> <li>• <i>Validity</i></li> <li>• <i>Date</i></li> </ul>

### 3.4 PROVISIONAL OUTCOME STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES

The literature on polytrauma patients with traumatic brain injuries and standards has been utilised to formulate the outcome standards inductively and deductively. Standards formulated were on management in the casualty department and transport to the ICU. Standards are described according to outcome and process.

#### A. Management in casualty / trauma unit

##### Outcome Standard

Injuries are identified

##### Process Standards

- Obtain history from relatives or paramedics
- Identify injuries and implement treatment according to priorities
- Perform a quick primary survey
  - Wash hands
  - Don gloves
  - Greet patient to determine responsiveness
  - If unresponsive, check for any medic alert medallions
- Focus the primary survey and resuscitation on
  - Airway and cervical spine control
  - Breathing
  - Circulation and haemorrhage
  - Start with CPR if unresponsive (see Annexure C)



## **Outcome Standard**

Maintaining a clear and patent airway with protection of the spinal column.

## **Process standards / criteria**

- Clear the oropharynx of blood, mucous and foreign bodies.
- Do not move or over-extend the neck, as the patient might have a spinal injury.
- Lift the angle of the jaw to prevent the tongue from falling back and obstructing the airway.
- Choose the correct length of oropharyngeal tube if the patient is unconscious. Talk to the patient; if she/he replies, then the brain is perfused adequately.
- Select the correct size of endotracheal tube size eight for males and seven for females or based on the size of the patient's small finger, irrespective of age.
- Open the mouth and remove any liquid or foreign material with a rigid suction catheter.
- Remove solid material with Magill forceps.
- Apply cricoid pressure during intubation to prevent aspiration.
- Keep applying the pressure till the balloon of the tube has been inflated.
- Ensure that the tube is in the correct place.
- Keep a rigid cervical collar on the patient unless you are examining the neck, so as to stabilise the cervical spine.
- Keep the patient in the supine position after intubation.
- Prepare the patient for cricothyroidotomy in the event of massive facial damage/trauma to maintain and secure the airway.
- Avoid ventilating the patient with a mask, because that may distend the stomach with air and induce vomiting.
- Monitor the patient continuously once he/she is intubated, i.e. check any change in vital signs and oxygen saturation
- Administer 100 % oxygen according to priority.
- Check the neck for swelling; the position of the trachea may shift due to tension pneumothorax.

- Do not suture or pack any sucking wound before thoracostomy tube is inserted for fear of tension pneumothorax.
- Prepare for insertion of intercostal drain:
  - Obtain chest X-Ray
  - Prepare intercostal drain tray
  - Implement infection control principles
  - Assist with insertion of the drain
- Immobilise any flail segment with elastoplast
- Collect blood for arterial blood gas analysis

### **Outcome Standard**

Patient breathes effectively and breathing is normal.

### **Process standards / criteria**

- Ensure that both sides of chest are being ventilated by inspecting for adequate movement of the chest.
- Auscultate for breathing sounds and listen particularly in the axilla for ventilation of the periphery of the lung and also over the epigastrium to ensure that the stomach is not ventilated.
- Count respiration rate, rhythm and depth
- If the patient is not breathing, perform CPR (See Annexure C)

### **Outcome Standard**

Maintain a good cardiac output and well-perfused tissues through control of haemorrhage.



### **Process standards / criteria**

- Check and record the patient's
  - Pulse (femoral or carotid)
  - Blood pressure
  - Temperature
- Perform CPR, if pulse is absent (See Annexure C)
- Control any external bleeding by applying direct pressure over the wounds
- Prevent further haemorrhage from fracture sites by adequate splinting / packing and gentle handling.
- Collect blood for grouping and cross match, full blood count, urea & electrolytes.
- Replace blood (warmed) volume by peripheral intravenous line.
- Use ante cubital fossae, which are usually the best.
- Assist with the insertion of a central line for measuring central venous pressure and arterial blood pressure.
- Do not over infuse clear fluids (maximum 2L crystalloid or 1L colloid) e.g. Ringers lactate and plasma, dextran or hemacel, Knottenbelt, (1994: 959).
- Insert an indwelling urinary catheter.
- Monitor urinary output: normal 0,5ml/kg/hr or 50ml/hr.

### **Outcome standard**

The neurological status of the patient is continuously monitored.

### **Process standards / criteria**

- Immobilise the spinal column during the entire resuscitation.
- Perform CPR if the patient has cardio-respiratory arrest.
- Assess airway, breathing and circulation and intubate the patient if he/she loses consciousness.

- Correct any hypotension, hypoxia or brain edema to minimise secondary damage to the brain.
- Elevate the head 30° to assist the brain perfusion.
- Look for any signs of intracranial haematoma or brain stem compression, that is, neck stiffness
  - Pyrexia
  - Photophobia
  - Headache
  - Vital signs
- Assess for dilation of the pupils due to compression of the 3<sup>rd</sup> nerve.
- Assess for depressed level of consciousness due to compression of the reticulo formation.
- Ask the patient to wiggle tongue.
- Assess for amnesia.
- Ask patient to squeeze your finger.
- Assess for confusion.
- Perform a neurological assessment using the:
  - Glasgow Coma Scale (See Table 3.4)
  - Revised Trauma Score (See Table 3.5)

### **Outcome Standard**

The patient will be free from hypothermia.

### **Process standards / criteria**

- Ensure a warm environment.
- Warm fluids at body temperature before administration.
- Cover patient adequately (guard against hyperthermia or hypothermia)



### **Outcome Standard**

Patient's / client's fractures are stabilised.

### **Process standards / criteria**

- Assess the patient for all signs of fractures.
- Splint all fractures adequately to reduce pain, decrease bleeding and minimise neuro-vascular damage.
- Maintain an adequate fluid balance to correct shock.
- Maintain effective immobilisation of the affected limbs to prevent further blood loss and injury as per doctor's prescription.

### **Outcome Standard**

The patient will be assessed systematically maintaining log-rolling to visualise the back.

### **Process standard / criteria**

- Support the back and neck – log-rolling.
- Remove tight clothes, if necessary.
- Limit movement of the patient.
- Do not over-expose the patient.
- Insure that the patient has a cervical brace in position.
- Assess the back for any injuries maintaining log-rolling.

## **B. Transport to the Intensive Care Unit**

### **Outcome Standard**

Nursing personnel to be familiar with the route.

### **Process standards/ criteria**

- Know the route and be familiar with the best possible routes to the ICU.
- Know hospital traffic patterns at certain times of the day and alternate routes to take in the event of original route being obstructed.

### **Outcome Standard**

Patient to maintain a clear and patent airway after suctioning and removing foreign material in the airway.

### **Process standards / criteria**

- Keep the airway clear and patent by suctioning secretions from the airway.
- Ensure that the endotracheal tube is in the correct position.
- Keep the patient in the supine position when intubated and lateral position when not intubated.
- Support and keep the patient's neck in good position to prevent further injury.
- Administer 100% oxygen if the patient is distressed, according to doctor's prescription.
- Assess the neck for oedema.
- Assess the trachea position, which may shift due to injury / complications.
- Check the neck for swelling, which may indicate increasing pressure on the upper respiratory system.
- Monitor the patient continuously by checking vital signs and oxygen saturation



**Outcome Standard**

The client / patient will maintain effective breathing

**Process standard**

- Ensure that both sides of the chest are being ventilated by inspecting for adequate movement of the chest.
- Keep on auscultation for breath sounds and listen to the axilla for ventilation of the periphery of the lungs and also over the epigastrium to ensure that the stomach is not ventilated.
- Count the respiration rate, depth and rhythm.
- Implement corrective actions.

**Outcome Standards**

Maintain good cardiac output and well-perfused tissues through control of bleeding.

**Process standards / criteria**

- Assess and record pulse and blood pressure.
- Perform CPR when pulse is absent.(See Annexure C)
- Assess bleeding continuously and repack the wound if still bleeding.
- Check infusion fluids:
  - flow
  - rate
- Monitor any fluid, blood, crystalloid or colloid:
  - for proper infusion
  - prevent over infusion
- Maintain effective splinting of fractures and control of bleeding wounds.
- Ensure gentle handling of patient's fractures.

**Outcome Standards**

The patient's neurological status is continuously assessed

**Process standards/ criteria**

- Keep the patient's spinal column immobilised with the neck support from the collar.
- Elevate the head 30° to allow the brain to be well perfused.
- Assess the patient for restlessness, which may indicate raised intra-cranial pressure.
- Assess the patient for headache and photophobia.
- Assess the pupil dilation and reactions to light.
- Assess pupil size.
- Assess level of consciousness which may be depressed due to compression of the Reticulo formation system.
- Assess ears for leakage of CSF.

**Outcome Standard**

Splints and bandages

**Process Standards**

- Assess fractures for further bleeding and repack the wounds.
- Do not apply a tight pressure bandage to prevent compartment syndrome.

**Outcome Standard**

Prevention of hypothermia

**Process Standards/ criteria**

- Cover the oropharynx of unconscious by occluding



**Process standards / criteria**

- Provide warm environment en route to ICU.
- Cover the patient adequately.
- Administer warm fluids.

**Outcome Standard**

Provide safety precautions for the patient by applying safety straps and security transport equipment.

**Process standards / criterion**

- Ensure that the patient is safely secured on the stretcher to prevent falling.
- Remove all loose equipment that can be a danger to the patient en route to ICU.
- Talk to the patient to alleviate anxiety.

**Outcome Standard**

Institute measures to prevent physiological problems in transit

**Process standards / criteria**

- Talk to the patient to alleviate fears and anxiety.

**Outcome Standard**

The patient maintains a clear and patent airway.

**Process Standards/ criteria**

- Clear the oropharynx of secretions by suctioning.

- Do not move or over-extend the neck if the patient has neck or spinal injury to prevent further injuries.
- Ensure that the tube is in the right position if the patient is intubated.
- Keep the patient in the supine position if intubated and lateral position if not intubated.
- Administer oxygen 100 % continuously if the patient is distressed and depending on the result of the arterial blood analysis.
- Assess the neck for swelling which occurs due to trauma.
- Assess the position of the trachea that may also shift due to injury.
- Assess for neck veins distension.

### **Outcome Standard**

The patient maintains good and effective breathing with normal respiration.

### **Process Standards/criteria**

- Ensure that both sides of chest are ventilated by inspecting for adequate movement of the chest.
- Auscultate for breath sounds and air entry in both lungs.
- Count respiration rate, depth and rhythm.
- Perform CPR if the patient stops breathing.(See Annexure C)

### **Outcome Standard**

Maintain a good cardiac output and well-perfused tissues through control of haemorrhage.

### **Process Standards/criteria**

- Assess pulse and blood pressure.
- Perform CPR if pulse is absent.



- Assess for external bleeding and repack the wounds if still bleeding.
- Check the rate of flow of infusion fluids.
- Use a dial-a-flow because it is easy to manage.
- Assess urinary output that should be not less than 50ml/h in adults, because that indicates poor renal or tissue perfusion.

### **Outcome Standard**

Relevant equipment is available for use during transport.

### **Process Standards/ criteria**

- Use the following equipment, if needed, during transport: oxygen cylinder, pulse oximeter, mask, ambubag, combined monitors/defibrillators. Do not use glass bottles that may break. Extra fluids, e.g. blood, an infusion pump with spare battery, rigid sharps container. Intravenous drugs required must be drawn up and labelled before hand, laryngoscope, endo-tracheal tubes and intravenous cannulas.
- Do not use the patient as a table, by placing any equipment on his/her legs, as that may cause severe discomfort and expensive equipment might be thrown on the floor by a violent patient having a seizure. Put equipment on the shelf beneath the bed or provide a separate trolley.
- Mount the monitors and support devices that are in use to an appropriate surface on the bed.
- Ensure that the equipment collected is functioning well and any substitutions must be reported prior to transport.

### **Outcome Standard**

Measures to prevent abnormal physiological changes are instituted.

### **Process Standards/criteria**

- Avoiding speeding the trolley unnecessarily, because that might upset the brain and increase intra-cranial pressure.
- Talk to the patient to reduce anxiety.
- Avoid using the noisy route, which will over-stimulate the patient's brain.
- Maintain good visual sense by not covering the patient's eyes and face during transport, because this will lead to disorientation and increase intra-cranial pressure.
- Avoid odours that may also over-stimulate the brain and cause some brain problems e.g. odours from soiled linen and air fresheners, Walden, (1998: 47).
- Avoid hypothermia, as it will cause decrease in blood pressure and respiration leading to increased oxygen consumption.
- Avoid hyperthermia, as it will decrease diastolic blood pressure than systolic pressure, increasing pulse pressure and respiration, which may result in respiratory alkalosis, Walden, (1998: 47). Heat tends to increase the acuity of the olfactory sense and motion sickness causes a sensation of heat, which when combined with nauseating odours, will cause vomiting.
- Lower the nasogastric tube, urinary and/or supra-pubic catheter bags to avoid back flow.
- Secure intravenous lines to avoid their being dislodged and causing bleeding from the veins.

### **Outcome Standard**

Cardio-pulmonary resuscitation is performed if the patient goes into a cardiac arrest on the way to Intensive Care Unit.

### **Process Standards/criteria**

- Perform CPR if the patient arrests on the way to intensive care unit. (See Annexure C).



- Ensure that personnel accompanying patient can initiate a response in case of a change in condition, e.g. cardiac arrest.
- Follow hospital policy on who should accompany the patient to intensive care unit, e.g. doctor, trauma ICU trained nurse or experienced trauma ICU nurse, porter or extra nurse and a doctor.

### **Outcome Standard**

Infection Control principles are implemented.

### **Process Standards/criteria**

- Wash hands with soap and dry well before transporting the patient
- Use eye protection if a patient is coughing.
- Use apron during transit to protect yourself.
- Use clean linen for the patient.
- Use rigid walled container for sharps.
- Keep nails short to prevent nosocomial infection.

### **Outcome Standard**

Events and patient's responses are accurately documented during transit

### **Process Standards/criteria**

- Record any replacement of fluids.
- Record any information if possible from the patient if he/she is able to talk.

### **Outcome Standard**

The patient's report to be handed over to the ICU personnel.

## **Process Standards/criteria**

Give full report about the following:

- Diagnosis
- Condition of the patient, including resuscitation report, if any.
- All blood results.
- X-ray.
- All types of fluids administered
- Drugs/medication administered and their effects.

### **3.5 SUMMARY**

The literature on anatomy, physiology and pathophysiology, which are commonly involved in multiple trauma patients, has been briefly described. Exploration of the literature further described the primary and secondary survey and management of the polytrauma patients with traumatic brain injuries in the casualty department and during transport to the ICU. The definition of standards, the steps in standards formulation and the criteria in the formulation of standards have also been reviewed.

Provisional outcome standards for the polytrauma patient with traumatic brain injuries have been formulated and, according to the literature, should include methods to stabilise the patient during the primary and secondary survey.

Chapter four will deal with the second phase of the research that is the validation of the provisional outcome standards and communication of the validated standards.



# Chapter 4

## RESULTS: VALIDATION OF THE NURSING OUTCOME STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES

### 4.1 INTRODUCTION

Trauma is the number one killer in the first four decades of life and the third cause of death in all age groups. The morbidity and mortality of trauma are directly influenced by the care delivered. Death from trauma occurs in a trimodal distribution. Firstly, death occurs within seconds to minutes after injury, as a result of lacerations to the brain, brain stem, high spinal cord, heart and great vessels. Secondly, death occurs minutes to hours later (the "golden hour") from untreated subdural or epidural hematomas, hemopneumothorax, ruptured spleen, liver lacerations, fractured femurs and multiple injuries associated with significant blood loss. Later, days to weeks after injury, death occurs from sepsis and multi-system failure (Vasquez et al, 1992: 407; Trask In Grenvic et al, 2000: 273).

Trauma is often a tragic event leading to loss of life or severe disability due to the severity of the injury. According to Knottenbelt (1994: 957) it is important that receiving hospitals have trauma or emergency units to ensure that life-saving care is given to the trauma patient at the earliest possible time. Knottenbelt (1994: 957) further states that it is of little use to improve the pre-hospital care if the receiving facilities are poorly staffed and ill-equipped. It is even worse if death occurs from manageable injuries that could not be treated within the first hour of the injury.

This chapter will outline the quantified nursing outcome standards that should be followed in the casualty department during resuscitation, so as to achieve the ideal treatment and monitoring of polytrauma patients with traumatic brain injuries.

## **4.2 GOAL OF THE STUDY**

The goal of the research is to formulate nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district. This will be achieved through the following objectives:

- To explore the literature and determine the contents of nursing outcome standards on resuscitation of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit
- To formulate nursing outcome standards on the management of polytrauma patients with traumatic brain injuries, that is resuscitation in casualty and during transport, to the intensive care unit
- To validate the nursing outcome standards of care used for polytrauma patients with traumatic brain injuries
- To communicate findings to the relevant stakeholders.

## **4.3 RESULTS: QUANTIFICATION PHASE (PHASE TWO)**

This phase will describe the quantification or validation of the provisional outcome standards for polytrauma patients with traumatic brain injuries, according to respondents' biographical data and verbatim comments. Respondents are chosen according to their expertise and experience as described in 2.4.3. According to Lynn (1986: 383) a minimum of three experts are required to validate a standard. Seven experts were identified in the Western Cape. This was convenient for the researcher, as she is a student at a university in the Western Cape. Muller (1995: 20) suggests that professionals at "grass roots" level should also validate the standards. Therefore, four registered nurses and a doctor at the local hospital were included and validation was done according to a four point Likert grading, with one as the lowest score and four the highest.



**TABLE 4.1**  
**SUMMARY OF ALL THE RESPONDENTS' BIOGRAPHICAL DATA**

Respondent	Nurse or Doctor	Trauma qualification / Experience
One	Registered nurse	Trauma qualification 10 + years
Two	Registered nurse	Trauma qualification 9 years experience
Three	Medical doctor	Trauma qualification Has extensive years of experience
Four	Registered nurse	9 years trauma experience
Five	Registered nurse	ATLS + 16 years experience
Six	Medical doctor	Trauma qualification + 10 Years experience
Seven	Registered nurse & Lecturer	Trauma + standards consultant
Eight	Medical doctor	Has just entered into grade/service in 1999
Nine	Registered nurse	Trauma nursing course trainee
Ten	Chief Professional Nurse	In charge of ICU and casualty
Eleven	Registered Nurse	Works in casualty
Twelve	Registered Nurse	Works in casualty

Table 4.1 gives us a summary of all the respondents' biographical data.

RESPONDENT ONE:

BIOGRAPHICAL DATA IS DEPICTED IN TABLE 4.2:

**TABLE 4.2**  
**BIOGRAPHICAL DATA OF RESPONDENT ONE**

- |  |
|--|
| <ul style="list-style-type: none"> <li>▪ A registered nurse with midwifery specialisation</li> <li>▪ Did trauma course in 1984.</li> <li>▪ Worked in Intensive Care Unit up to 1992.</li> <li>▪ Did ICU course in 1993.</li> <li>▪ Trauma Unit in-charge from 1996 to date.</li> <li>▪ Works in a private hospital in the Western Cape.</li> </ul> |
|--|

RESPONDENT ONE'S VERBATIM COMMENTS ON NURSING OUTCOME STANDARDS

Table 4.2 gives the biographical data of respondent one.

Standards acceptable, but implement the following changes:

- If you have knowledge of the type of patient coming in, prepare for resuscitation.
- Put on protective gear.
- Allocate registered nurses as follows:

SISTER ONE: IF AVAILABLE

RESUSCITATION LEADER

- Responsible for 2<sup>nd</sup> intravenous line
- airway oxygen
  - ambubag
  - intubation
  - suction
  - ventilation
- C-spine control
- NG tube insertion
- 2<sup>nd</sup> intravenous line with infusion pump
- Check central venous pressure
- Open packs, intercostal drains, thoracotomy, etc.

SISTER TWO:

- Simultaneously perform a quick secondary survey
- Attach monitors
- Defibrillator preparation
- Check electrocardiogram (ECG)
- Keep the intravenous lines open
- Collect blood specimens as prescribed. Take blood for full blood count, urea and electrolyte and blood for compatibility.
- Administer drugs as prescribed
- Insert the urine catheter
- Record vital signs
- Monitor intravenous fluids
- Check haemoglobin content

• Maintain cardiac output, as this might not be well understood, involve a lot of maintaining good blood pressure.

• Systolic pressure must remain 90 mmHg or above.



### SISTER THREE: IF AVAILABLE

- Responsible for 2<sup>nd</sup> intravenous line
- Document all activities / interventions
- Check HB and HGT (haemoglucose test)
- May also be a runner

NB: Should there be only two staff members on duty and the department is busy or having two resuscitations to be managed, push emergency button which goes off in cardiac coronary unit. Staff member will be sent to work either in the examination area or in the resuscitation area.

Please note that these procedures are to be adapted to suit the situation.

- Prepare simple standards to be read
- Simultaneously perform a quick secondary survey to pick up injuries
- Have somebody documenting activities, drugs and their effects, Glasgow Coma Scale, eye opening response to pain and movement of limbs.
  - Vital signs
  - Temperature
  - Respiration
  - Pulse
  - Blood pressure
- Continuously check if the endotracheal is in situ.
- Indicate in the standards where the cricoid is and how to press it.

### OUTCOME STANDARD

- Maintain cardiac output; as this might not be well understood, replace it by maintaining good blood pressure.
- Systolic pressure must remain 90 mmHg or above.

- Insert the indwelling catheter only after rectal examination and exclusion of the prostate and urethral injuries, as the catheter can be inserted into the pelvis.
- After intubation, insert nasogastric tube.
- Test urine for blood.
- Perform finger prick for Haemoglobin and HGT – haemo Glucose test.

NB: Intubate any patient with a Glasgow Coma Scale of 8 or below.

- All normal values of blood results to be stuck on the wall.
- Develop criteria for hypotension and hypoxia.
- Drugs commonly administered:
  - Morphine for pain
  - Dormicum for sedation
  - DF 118 for pain
  - Epanutin for seizures
  - Valium as a tranquilizer
- Standard X-Ray to be done
  - C- Spine
  - Pelvis
  - Chest

#### TRANSPORTING THE PATIENT TO THE INTENSIVE CARE UNIT

- What are you going to need if the parameters change?
- Plan the route.
- Collect all the basic equipment for resuscitation.

## ADDITIONAL COMMENTS FROM RESPONDENT ONE

The first respondent believes that the researcher's nursing outcome standards in Chapter three will be acceptable only with the addition of the comments mentioned above. The mark allocated according to the Likert scale is three (3).

The researcher's standards will be acceptable if the suggested additions are added to the standards, i.e. a three on the Likert Scale, was allocated.

## RESPONDENT TWO:

BIOGRAPHICAL DATA IS DEPICTED IN TABLE 4.3:

**TABLE 4.3**  
**BIOGRAPHICAL DATA OF RESPONDENT TWO**

- Works in a private hospital in the Western Cape.
- Did trauma nursing in 1992.
- Worked for two years in an academic hospital in Pretoria, 1993 – 1994.
- 1996 – Worked in a Private Hospital Trauma unit in Pretoria.
- In charge of trauma unit in a private hospital in the Western Cape.

## WARD/UNIT INFORMATION

- 1200 – 1500 patients are seen per month.
- Types of patients seen are polytrauma patients from motor vehicle accidents, gunshots, assaults, falls, chest pains, insect stings, headache and back injuries.
- Once there is an accident or injured patients are expected, the hospital trauma unit is notified.



- Whoever brings the patient to the hospital, i.e. paramedics, should have a form of activities done for admission.
- There is a trauma-experienced doctor on duty in the unit for 24 hours.
- Sisters who should take part in the resuscitation:
  - Sister One – to take the report from the crew.
  - Sister Two – to take care of breathing and circulation, e.g. arrest bleeding.
  - Sister Three – has to be a runner.

#### VALIDATION COMMENTS

- Find out about the mechanism of the injury.
- Have head block for query head injury.
- Connect patient to ventilator if intubated.
- Perform head to toe examination to check for injuries. Collect blood for full blood count to check haemoglobin content.
- Check blood gases.
- Check or collect blood for other tests, e.g. urea and electrolytes.
- Put up an arterial line depending on the patient's condition.
- Put up a central venous pressure line.
- Insert a urinary catheter to be able to check the amount of urine per hour and test the urine.
- Insert a nasogastric tube, to prevent vomiting and aspiration.
- X-ray suspected areas; this should be done in the resuscitation room.
- Collect equipment for intercostal drain.
- If there is a need for sonar, contact X-Ray department for C.T. Scan, the patient must always be accompanied by a registered nurse.
- Connect the patient to a portable monitor.
- Suctioning is done in the trauma unit before the patient is sent to the ward or intensive care unit.
- Fractures are splinted at the trauma unit.
- Ventilated patients are to be sedated. Common drugs used in the unit:
  - Dormicum

- Morphine through the Ivac pump
- Mannitol
- An anti-tetanus for lock jaw
- Give oxygen 100 %
- Stretchers have no straps but only cotsides.
- "Pad slide" is also used to lift patients.
- "Mast suite" is no longer used, rather use "pelvic grip"
- Fluids - have emergency blood stocked in the fridge
  - give warm fluids
  - give Ringers Lactate depending on the observations, e.g. low blood pressure.
- All patients must be out of the unit within an hour of arrival.
- Ensure that all safety equipment is in place.
- Always keep head block in position.
- Put on gloves throughout procedure.
- Put on plastic apron for protection.
- Put on mask made from plastic.
- Put on lead aprons.
- Check the patient's level of consciousness using Glasgow Coma Scale.
- Suction the patient's mouth and put in a quedal airway.
- The resuscitation room and emergency trolley are checked twice in 24 hours and after use.
- Always have a doctor or sister who can intubate.
- If the patient is not intubated, do not hyperextend the neck.
- Endotracheal tube 1.5 size is suitable for most patients.
- Use specific endotracheal tube without a curve for children.
- Secure ET tube with a tape.
- Check ET tube's position on x-ray.
- Have the suction tube ready and insert a nasogastric tube immediately.
- Test the ET tube before inserting it by checking the bulb for proper inflation.
- Provide the patient with a soft collar.

- No cricothyroidotomy should be done in casualty, as one needs to be experienced to do it.
- Oxygen mask is not necessary if the patient is intubated. Rather use an ambubag to bag the patient.
- Monitor the patient continuously:
  - Central venous pressure
  - Haemoglobin
  - Haemo glucose test
  - Blood pressure
- 100 % oxygen should be lowered after checking blood gas results.
- Remove all jewellery from neck and check for wounds and contusions.
- Keep bleeding wounds packed.
- Monitor every blood loss, oxygen saturation.
- Assess patient for cold and clammy skin, pallor and drop in blood pressure.
- Collect blood for full blood count and sometimes enzymes.
- If a myocardial infarction is suspected, the patient is sent to catheterisation lab from the unit.

#### COMMENTS ON OUTCOME STANDARDS

- When the patient arrives – stabilise him/her.
- After inserting the urinary catheter, keep it on free drainage.
- Suture all wounds and apply dressings.
- Apply pressure bandages.
- Monitor CVP.
- Check the monitor continuously.
- Apply chloromycetin ointment in the eyes to prevent eye infection.
- Auscultate lungs
  - the apex
  - base
  - laterally



- Check the patient / monitor for dysrhythmias with hypovolemic shock.
- Check the electro cardiogram on the monitor.
- Check rectal temperature, especially if the patient has subnormal temperature that can initiate dysrhythmias.
- Check the patient for neurological observations, especially if the patient vomited on the scene or showing some neurological disorders, such as headache. Use Glasgow Coma Scale.
- Give intravenous fluids continuously.
- Check peripheral pulses.
- Replace blood through the CVP line, because it has sets with big lumen.
- Test urine for blood, especially in blunt abdominal trauma.
- Assess the patient for hypothermia and if hypothermic, use "bair hugger" or space blanket.

#### FOR FRACTURES

- Check pulses, including peripheral pulses and capillary filling.
- Use hard neck collar.
- Keep the patient in the Fowler's position.
- The use of RTS (Revised Trauma Score) is done only on the road.
- The assessment of neck oedema is done in intensive care unit.
- Trachea position-check X-Ray to confirm position.
- While transferring, remove auscultation and other observations.
- Rather do that before transferring the patient, but keep the patient on a monitor, ventilator or bag the patient.
- Check the carotid pulse for 10 seconds.
- Check the monitor to rule out dysrhythmias.
- Wounds are to be sutured in casualty.
- Check the CVP readings for over infusion.

## FOR STANDARD ON NEUROLOGICAL PARAMETERS

- Sedate the patient if restless only after the initial neurological assessment has been done.
- Check patient, using Glasgow Coma Scale.
- Use a tight pressure to control bleeding.
- Check pulses.
- When transferring a patient, pull cot's sides up.
- Connect the monitor to the stand.
- Sometimes patients are given Valium, Mannitol and Kefsol.
- Dormicum and Hynomidate as a relaxant.
- Talk to the patient if he/she is not intubated.

## FINAL VALIDATION COMMENTS

The researcher's standards will be acceptable if the suggested additions are added to the standards, that is a three on the Likert Scale, was allocated.

## RESPONDENT THREE:

### BIOGRAPHICAL DATA OF RESPONDENT THREE

**TABLE 4.4**

#### **BIOGRAPHICAL DATA OF RESPONDENT THREE**

- A medical practitioner in the Western Cape.
- Has extensive experience in trauma medicine.
- Trauma qualification and experience done in Cape Town.
- Practices as a general surgeon (majoring in trauma medicine) in a university hospital.
- Lectures at the Ambulance Training College in Cape Town.

## VALIDATION COMMENTS

### OUTCOME STANDARDS: INJURIES ARE IDENTIFIED

Remove "Injuries are identified", start by:

#### OUTCOME STANDARD

- Universal precautions are utilised effectively.
- Primary survey performed.
- Life threatening injuries identified and addressed.

COMMENT: Standard will be accepted with the suggested changes.

#### PROCESS STANDARDS

- Identify injuries and implement treatment according to priorities (accepted).
- Perform a quick primary survey.
- Remove "wash hands and don gloves" and replace by "implement universal precautions".
- Greet the patient to determine responsiveness. If unresponsive, check for any medic alert medallions. This is part of the secondary survey.
- Focus the primary survey and resuscitation on airway and cervical spine control, breathing, circulation and haemorrhage.
- Obtain ample history from relative or paramedics on allergies, medication, previous medical history, last mealtime and events of the injury (AMPLE).
- Perform environmental control.
- Start with CPR if unresponsive.



## OUTCOME STANDARD: ADD: AIRWAY

- Maintain a clear and patent airway with protection of the spinal column – accepted.

## PROCESS STANDARDS / CRITERIA

- Bullet 1 – 5 : accepted
- Bullet no. 6, phrase as : Open the mouth and remove any liquid or foreign material with a rigid suction catheter (Yankauer type).
- Bullet 7 – 10 : accepted
- Bullet no. 7, add : When the collar is off, the head needs to be stabilised by in line support by a second team member.
- Bullet 12 – 18 : accepted
- Bullet no. 19, add : If no indication for urgent pre-x-ray drainage.
- Bullet 20-21 : Not of proven benefit. Not recommended by any international authorities at present.

OUTCOME STANDARD : add “Breathing”, Breathe effectively and breathing is normal: standard accepted.

- Bullet 1 : accepted
- Bullet 2 : Add check position of the tracheal deviation away from tension pneumothorax = indication for urgent ICD.
- Bullet 3 & 4 : accepted
- Bullet 5 : Add: Ensure that the patient is not overventilated CO2 not <4,5kPa.

OUTCOME STANDARD: Add Circulation.

Maintain a good cardiac output and well-perfused tissues through control of haemorrhage, add, and optimising volume replenishment.

- Bullet 1 – 5 : accepted
- Bullet 6 : Add: Initially crystalloid, then blood or (synthetic) colloid.
- Bullet 7 – 8 : accepted
- Bullet 9 : Replaced by 6
- Bullet 10 : Insert an indwelling urinary catheter (NB: Add: Per rectal exam required first in males).
- Bullet 11 : accepted
- Bullet 12 : Insert oropharyngeal tube or nasogastric tube.

OUTCOME STANDARD: Add: Disability

The neurological status of the patient is continuously monitored: accepted.

- Bullet 1 – 4 : accepted
- Bullet 5 : Look for signs of raised intracranial pressure or brain stem compression
- Neck stiffness – add, not in trauma patient: C-spine fracture
  - Pyrexia – add later sign
- Bullet 6 – 11 : accepted
- Bullet 12 : acceptable, but suggest to look for head injuries in 1997 ATLS manual.

Bullet 1 – 2 : accepted

OUTCOME STANDARD: Add: Environmental control

The patient will be free from hypothermia: standard accepted.

Bullet 1 – 3 : accepted

OUTCOME STANDARD

Patient / clients fractures are stabilised

Comment: More to after secondary survey

Bullet 1 – 5 : accepted

1. OUTCOME STANDARD: Add: SECONDARY SURVEY – Standard acceptable

The patient will be assessed systematically maintaining log-rolling to visualise the back.

Bullet 1 : Add, examine and identify all (head to toe exam).

Bullet 1 – 5 : accepted

Bullet 6 : Add: provide a definitive care phase before transferring the patient to ICU.

2. TRANSPORT TO THE INTENSIVE CARE UNIT

OUTCOME STANDARD : Nursing Personnel to be familiar with the route: Standard acceptable.

Bullet 1 – 2 : accepted



- OUTCOME STANDARD : Patient to maintain a clear and patent airway  
after suctioning and removing foreign material in the airway: Standard acceptable.
- Bullet 1 – 9 : accepted
- OUTCOME STANDARD : The client will maintain effective breathing:  
Standard acceptable.
- Bullet 1 – 4 : accepted
- OUTCOME STANDARD : Maintain an effective cardiac output and well perfused tissues through control of bleeding:  
Standard accepted.
- Bullet 1 – 3 : accepted
- Bullet 3 : Not accepted, because surgeon should have addressed major bleeding before transport.
- Bullet 4 – 5 : accepted
- Bullet 6 : Not accepted, because the patient should have had definitive ortho care at this point.
- Bullet 7 : accepted
- OUTCOME STANDARD : The patient's neurological status is continuously assessed: Standard accepted.
- Bullet 1 : Not accepted, because spinal injury should have been excluded by this point.
- Bullet 2 – 8 : accepted

OUTCOME STANDARD : Splints and bandages: Standard accepted.

Bullet 1 – 2 : accepted

OUTCOME STANDARD : Prevention of hypothermia: Standard accepted.

Bullet 1 – 3 : accepted

OUTCOME STANDARD : Provide safety precautions for the patients by applying safety straps and securing transport equipment: Standard accepted.

Bullet 1 – 3 : accepted

OUTCOME STANDARD : Institute measures to prevent physiological problems in transit: Standard accepted.

Bullet 1 – 2 : accepted

OUTCOME STANDARD : Document accurate transport events or responses of the patient: Standard accepted.

Bullet 1 – 5 : accepted

#### VALIDATION COMMENTS

The researcher has to add the suggested additions and the standards will be acceptable. Obtained a three (3) on the Likert scale.

**RESPONDENT FOUR:****BIOGRAPHICAL DATA OF RESPONDENT FOUR**

**TABLE 4.5**  
**BIOGRAPHICAL DATA OF RESPONDENT FOUR**

- Works in a private hospital in the Western Cape.
- Has B.Cur.
- Has Advanced Cardiac Life Support (ACLS) certificate.
- B Cur Hons Intensive Care.
- Experience in Trauma and Resuscitation for two years.
- Experience with Paramedics on Road for 7 years.



Table 4.6 gives the recommendations as suggested by respondent four.

**TABLE 4.6**  
**RECOMMENDATIONS**

<b>Ensure adequate airway and adequate ventilation</b>	
Respiratory PO <sub>2</sub> = 10-14kpa PCO <sub>2</sub> = 3.5-4 (+/- 4 2Kpa) PH = 7.35 – 7.45 Rate of 12-16 (Hyperventilation may be necessary if PCO <sub>2</sub> high). Peep = 2.5cmH <sub>2</sub> O for pt with lung pathology – ICP monitoring VITAL	<ul style="list-style-type: none"> <li>▪ Maintain C-spine immobilization at all times, leave patient packaged as brought in by ambulance personnel, or one person needs to be dedicated to in-line C-spine control.</li> <li>▪ Open airway (jaw thrust) clear airway by suctioning.</li> <li>▪ Assess breathing status of patient; observe rate, rhythm and pattern of respiration.</li> <li>▪ If adequate apply oxygen by facemask.</li> <li>▪ Connect pulse oximeter.</li> <li>▪ If breathing is inadequate ventilate patient with "ambu" bag and oropharyngeal airway, using cricoid pressure until ready, intubate, and ventilate on SIMV, no peep, ensure sufficient oxygenation.</li> <li>▪ Listen bilaterally for any airway obstructions or breathing abnormalities.</li> <li>▪ Check that trachea is central, if not, suspect tension pneumothorax and perform needle decompression immediately.</li> <li>▪ Observe for cyanosis.</li> <li>▪ Suction if necessary to remove secretions for a maximum time of 15 seconds, but always preoxygenate the patient first to prevent hypoxia.</li> <li>▪ Look for signs of neurogenic pulmonary oedema give O<sub>2</sub> stat.</li> </ul>
<b>Ensure adequate circulation</b>	
Cardiovascular SBP of 90-150mmHg Pulse = 60-100bpm MAP of +/- 90mmHg CVP = 5 - 12mmHg Hct = 0.3-0.35 Temp = 35.0-37.5C	<ul style="list-style-type: none"> <li>▪ Check for pulses, carotid, radial and femoral.</li> <li>▪ If no pulses, begin CPR.</li> <li>▪ Connect patient to a cardiac monitor.</li> <li>▪ Check blood pressure regularly, set automatic BP for every 3-5 minutes.</li> <li>▪ Insert bilateral large-bore lines in the patient (usually antecubital fossa) for polytrauma patient. Regulate fluid flow according to patient's status.</li> <li>▪ Perform ward Hb and HGT stat.</li> <li>▪ Initiate warm fluids with Ringers Lactate x 2 litres, if patient is severely shocked consider colloids such as Haemocell if Hb is satisfactory or emergency blood if Hb is low or patient actively bleeding.</li> <li>▪ Keep patient warm as much as possible.</li> <li>▪ Apply direct pressure to all external bleeding.</li> </ul>
<b>Diagnose all life threatening conditions and treat</b>	
	<ul style="list-style-type: none"> <li>▪ If level of consciousness is 10/15, now consider intubating.</li> <li>▪ If level of consciousness is less than 8/15, intubate.</li> <li>▪ If tension pneumothorax, pneumothorax or hemothorax was diagnosed now put in chest drain</li> <li>▪ If threatened limb was found and identified – apply traction and see if that does not result in return of pulse and circulation to the distal area.</li> </ul>

Expose patient	
	<ul style="list-style-type: none"> <li>▪ Remove all clothes and keep C-Spine immobilization.</li> <li>▪ Log roll patient to left and right to prevent any missed injuries.</li> <li>▪ Perform rectal examination, only if high riding prostate present = C/I for insertion of urinary catheter.</li> <li>▪ Insert rectal temperature probe if not contra-indicated.</li> </ul>
Perform full secondary survey	
Head:	<ul style="list-style-type: none"> <li>▪ Assess GCS and revised trauma score.</li> <li>▪ Look for ecchymosis around the eye, or behind the ears - base skull fracture.</li> <li>▪ Assess nose and ears for presence of cerebrospinal fluid.</li> <li>▪ Examine pupils, their reaction to light and width.</li> <li>▪ Look at mucous membranes.</li> <li>▪ Any abnormal smells, identify/check for ketosis indicating DKA (Diabetic Keto Acidosis) or severe intoxication.</li> <li>▪ Never place pt in trendelenberg position during resuscitation.</li> <li>▪ Only sedate patient if uncooperative on a ventilator.</li> <li>▪ Keep patient calm and constantly reassured.</li> <li>▪ Treat seizures with Diazepam as they occur.</li> <li>▪ Give intravenous Epanutin to prevent seizures, if prescribed by doctor.</li> <li>▪ Give non-sedative pain relief.</li> </ul>
Neck Trachea central	<ul style="list-style-type: none"> <li>▪ Keep neck in neutral position.</li> <li>▪ Ensure trachea is still central.</li> <li>▪ Look for distended or collapsed jugular veins.</li> <li>▪ Gently feel over the C-Spine for gross deformity.</li> <li>▪ Order C-Spine x-ray.</li> </ul>
Chest Equal bilateral chest movement	<ul style="list-style-type: none"> <li>▪ Listen again for breath sounds.</li> <li>▪ Look if chest is rising bilaterally the same.</li> <li>▪ Look for drainage in intercostal bottle if one was inserted.</li> <li>▪ Percuss the chest and assess for emphysema.</li> <li>▪ Perform 12 lead ECG if blunt chest trauma was present.</li> <li>▪ Chest x-ray. (To check ET tube position and others).</li> </ul>
Abdomen Soft and not distended	<ul style="list-style-type: none"> <li>▪ Feel abdomen tender and soft or distended and rigid.</li> <li>▪ Is positive rebound present?</li> <li>▪ Listen for bowel sounds.</li> <li>▪ Do abdominal girth if time permits, prepare for possible diagnostic peritoneal lavage for doctor.</li> </ul>
Pelvis Urine output > 0.5ml/kg/hr	<ul style="list-style-type: none"> <li>▪ Feel for a pelvic fracture</li> <li>▪ Feel for femoral pulses bilaterally and compare to strength of carotid pulses.</li> <li>▪ Insert urinary catheter. (Rectal examination must have been done to exclude contra-indications of inserting urinary catheter).</li> <li>▪ Test urine – dipstix for blood specifically &amp; pregnancy test in females</li> <li>▪ Pelvic x-ray.</li> </ul>
Arms and legs	<ul style="list-style-type: none"> <li>▪ Check bilateral pulses.</li> <li>▪ Perform ABG.</li> <li>▪ Take bloods for FBC, U&amp;E and creatinine, blood cross match.</li> </ul>



	<ul style="list-style-type: none"> <li>▪ Check capillary refill.</li> <li>▪ Decide if patient needs theatre / CT scan stat, if not</li> <li>▪ Splint any fractures / place cast on etc.</li> <li>▪ Suture any wounds that need to be sutured.</li> <li>▪ Other x-rays as necessary.</li> </ul>
Psychological aspect of patient	<ul style="list-style-type: none"> <li>▪ Be as honest as possible with patient.</li> <li>▪ Talk to patient and explain all procedures.</li> <li>▪ Remain calm and listen to patient's worries and needs.</li> <li>▪ Be empathic towards patient.</li> </ul>
Safety of patient	<ul style="list-style-type: none"> <li>▪ Ensure that bed-sides are always up on the bed.</li> <li>▪ Ensure that monitor alarms have been set at appropriate values for the current patient in the resuscitation unit.</li> <li>▪ Never leave patient alone without a well-trained medical person who is capable of resuscitation.</li> <li>▪ Keep all valuables and lock them up in appropriate area.</li> </ul>
Family	<ul style="list-style-type: none"> <li>▪ Keep family informed as much as possible.</li> <li>▪ Arrange that someone is there to receive family, make tea and keep them company in a quiet place during the resuscitation.</li> <li>▪ When the patient is stable, go out to the family with the doctor and support family.</li> <li>▪ Allow them to come and see the patient if circumstances permit.</li> </ul>

#### VALIDATION COMMENTS

The researcher's standards will be acceptable with additions done as suggested. A mark of three (3) was allocated, according to the Likert scale.

#### RESPONDENT FIVE:

#### BIOGRAPHICAL DATA OF RESPONDENT NO. FIVE

**TABLE 4.7**  
**BIOGRAPHICAL DATA OF RESPONDENT FIVE**

She has the following qualifications:

- Diploma in Intensive Care Nursing.
- Diploma in Community Health.
- Diploma in Nursing Administration.
- Diploma in Nursing Education.
- Has ATLS Certificate.



She spent  $\pm$  8 years working in the Intensive Care Unit. Time spent in Casualty  $\pm$  12 years. Worked for South African Defence Force. Worked at H.F. Verwoerd Hospital: Spinal Unit. Worked for Flight for Life  $\pm$  5 years. Started Trauma Course in Johannesburg – 1986. Worked for 4 years with Ambulance Training School in Johannesburg. Sister in Charge of Major Trauma Unit (private hospital) in Cape Town 1991 to date.

The researcher's standards will be acceptable with additions done as suggested. A mark of three (3) was allocated, according to the Likert scale.

### RESPONDENT SIX:

#### BIOGRAPHICAL DATA OF RESPONDENT SIX

**TABLE 4.8**  
**BIOGRAPHICAL DATA OF RESPONDENT SIX**

<ul style="list-style-type: none"> <li>▪ Medical practitioner trained at Wits.</li> <li>▪ Has been an Instructor for ATLS for 10 years Instructor for APLS, PALS and ACLS.</li> <li>▪ Has worked in Medicine. for 8 years</li> <li>▪ Currently working in a Cape Town Private Hospital.</li> <li>▪ Working in Accident and Emergency Unit and Major Trauma Unit.</li> </ul>
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VALIDATION COMMENTS ON ALL STANDARDS FROM BOTH RESPONDENTS  
FIVE AND SIX

Interventions at Casualty

- Include a full secondary survey for all patients.
- Provide all of your standards in a chronological order.
- Have an outcome of the area and structure of the casualty.
- Have outcomes for these patients at casualty i.e.
  - No. of outcome interventions.
  - Monitoring standards.
  - Include standards for disposal.
- Have a flow chart of all standards as an annexure.
- Structure all your standards according to the algorithms.
- Build in a standard on Glasgow Coma Scale in your standards.
- Add use laryngeal masks and combitubes.
- Cricothyroidotomy needle is a must for inclusion in the standards.
- Add, "Assess patient for hypotension which might have occurred from head injury".
- Add, "Assess patient for hypoxia".
  - Go back to airway assessment.
  - Check O<sub>2</sub> saturation.
  - Check capillary refilling.
  - Check blood gas analysis.
- Brain edema – explain what you regard as brain edema.

TRANSPORT TO ICU

- Explain criteria for checking
  - Pulse
  - Blood pressure
  - Pupillary signs

- Be able to predict what you may require on the way to the intensive care unit.
- Put your finger on the pulse continuously for assessment.
- Inform I.C.U. personnel that the patient is on the way and if the patient may require intercostal drainage system.
- Transport the patient on portable monitor and ventilator.
- Have a standard on how to bag a patient with its process standards.
- For hypothermia
  - Cover the patient
  - Provide a warm area / environment
- RTS – Revised Trauma Score is not helpful because it is affected by many factors but insight behind it only useful.
- Keep an outcome on physiological changes.
- Maintain some equipment for casualty and I.C.U. for cost effectiveness.
- Common drugs used in casualty
  - Adrenaline given together with oxygen.
- Work as a team to follow a process during resuscitation.
- If a patient dies.
- Check the standards.
- Have a debriefing standard added to your standards.

For practice in the Casualty Department

- Practice on mannikin once a month to improve skills on resuscitation.
- For intake and output: write all the output standards clearly.
- For dirty wounds: give antibiotics to prevent sepsis.

#### FINAL VALIDATION COMMENTS OF RESPONDENTS FIVE AND SIX

The researcher's standards will be acceptable with additions done as suggested. A mark of three (3) was allocated, according to the Likert scale.



RESPONDENT SEVEN:

## BIOGRAPHICAL DATA OF RESPONDENT SEVEN

**TABLE 4.9**  
**BIOGRAPHICAL DATA OF RESPONDENT SEVEN**

<ul style="list-style-type: none"> <li>▪ Works in a higher education institution.</li> <li>▪ Lectures in the intensive care course, trauma nursing to the third year students and infection control nursing, that is, the theory and clinical practice.</li> <li>▪ Acts as a consultant to the trauma and emergency nurses of Johannesburg, in infection control, quality improvement and specifically clinical standards.</li> <li>▪ Responsible for the listing of the trauma course at a hospital in Gauteng 1993.</li> </ul>
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VALIDATION COMMENTS

- Include all the aspects of "holistic" nursing in your outcomes.
- Standard infection control measures must be part of all clinical standards.
- Patient and staff safety must be ensured.
- Evaluate all actions after completion of the resuscitation procedure.
- Ensure that debriefing completes the procedure.
- A three on the Likert scale was given for these outcomes.

QUALIFICATIONS

- Doctorate in nursing with a thesis on the formulation of clinical standards.
- Registered nurse, midwife, community health nurse, administrator, tutor and intensive care nurse.
- Editor of two books and several articles on standards
- Infection control consultant.

The researcher's standards will be acceptable with additions done as suggested.

A mark of three (3) was allocated, according to the Likert scale.

RESPONDENT EIGHT:

## BIOGRAPHICAL DATA OF RESPONDENT EIGHT

**TABLE 4.10**  
**BIOGRAPHICAL DATA OF RESPONDENT EIGHT**

- |   |
|---|
| <ul style="list-style-type: none"> <li>▪ Medical practitioner, qualified in 1999.</li> <li>▪ Has one year, five months' experience.</li> <li>▪ Works in a casualty department in the local hospital.</li> <br/> <li>▪ The department handles only trauma patients, but during the weekends and after hours they handle all types of patients.</li> <li>▪ The atmosphere in casualty is warm and people working there appear to be enjoying their work.</li> </ul> |
|---|

RESPONDENT'S VERBATIM COMMENTS

- Injuries are identified

Process standards accepted, except the following:

- Gloves are sometimes not available at casualty.
- Checking medic alert medallions not always done.
- Hands not always washed in an emergency.

- Maintaining a clear and patent airway with protection of spinal column

Process standards accepted, except:

- Cricothyriodotomy not commonly done.
- Avoid ventilating the patient with a mask, because that may distend the abdomen: not relevant.
- Obtaining a chest x-ray not always done – difficult after hours.
- Elastoplast not used for immobilising flail chest, use bandages.
- Blood for arterial blood gases only collected in ICU.

- Breathes effectively and breathing is normal

- All process standards accepted.

- Maintain a good cardiac output and well perfused tissues through control of haemorrhage

- Process standards accepted, except:

- Temperature not always checked.
- Replacing blood volume by peripheral intravenous line only done in the ward or ICU.
- Assist with the insertion of a central pressure and arterial blood gases – seldom done but having subclavian catheters.

- The neurological status of the patient is continuously monitored

- All process standards accepted.

- The patient will be free from hypothermia

Process standard accepted, except:

- Warming fluids before administration – not always done.

- Patient's / client's fractures are stabilised

All process standards accepted.

- The patient will be assessed systematically maintaining log-rolling to visualise the back

All process standards accepted.

- Transportation of patient to ICU

“Nursing personnel to be familiar with the route” to be added. All process standards accepted with the changes.



- Patient to maintain a clear and patent airway after suctioning and removing foreign material in the airway  
Process standards, accepted:
  - Oxygen 100 % not commonly given to patient will depend on the condition of the patient.
  - Assess neck for oedema/swelling, to be done during the first assessment.
- The client/patient will maintain effective breathing.  
All not accepted for performance during transport to the ICU.
- Maintain good cardiac output and well perfused tissues through control of bleeding  
All process standards accepted for transport to ICU.
- The patient's neurological status is continuously assessed  
Process standards accepted, except:
  - Assess patient for headache and photophobia, especially if ventilated during transport.
  - Assess the pupils for dilation and reaction to light, assessing pupil size, especially if a patient is ventilated; also not accepted for transport
- Splints and bandages  
All process standards not accepted, because that will be done in casualty.
- Prevention of hypothermia  
All process standards accepted.
- Provide safety precautions for the patients by applying safety strap and security transport equipment
  - Ensure that the patient is safely secured on the stretcher to prevent falling – not always done.

- Remove all loose equipment which can be a danger to the patient – to be done before transporting patient.
- Institute measures to prevent physiological problems in transit  
Process standards accepted, except talking to the patient always.
- The patient maintains a clear and patent airway  
All process standards accepted.
- The patient maintains good effective breathing with normal respiration  
All process standards accepted.
- Maintain good cardiac output and well perfused tissues through control of haemorrhage  
All process standards accepted.
- Relevant equipment is available for use during transport  
All process standards accepted.
- Cardio-pulmonary resuscitation is performed if patient arrests on the way to ICU  
All process standards accepted.
- Infection control principles are implemented  
Only one standard accepted:
  - Use clean linen for the patient.

The following standards not accepted:

- Eye protection not always done.
- Use of aprons not done.
- Rigid walled container for sharps not available.

- Events and patient's responses are accurately documented  
All process standards accepted.
- The patient's report to be handed over to the ICU personnel  
All process standards accepted.

The researcher's standards have been accepted with changes effected as recommended. A mark of three (3) is allocated on Likert scale.

### RESPONDENT NINE:

#### BIOGRAPHICAL DATA OF RESPONDENT NINE

**TABLE 4.11**  
**BIOGRAPHICAL DATA OF RESPONDENT NINE**

- A registered nurse, passed diploma in Comprehensive Course in 1990.
- Worked in all departments in the local hospital i.e medical, surgical, paediatric, casualty and intensive care unit.
- Worked in casualty department for five years.
- Worked for eight months in intensive care unit.
- From February 2001, doing Trauma and Emergency Nursing course in one of the hospitals in Johannesburg.

### RESPONDENT'S VERBATIM COMMENTS

Injuries are identified

- Process standards accepted, but ensure safety of patient and the nurse first before starting to attend to airway breathing, circulation.
- Add disability and drugs.



- Maintaining a clear and patent airway with protection of the spinal column.

Process standards accepted, with the following changes or additions:

- Start with positioning of the patient, e.g. head tilt, and chin lift manoeuvre and jaw thrust.
- Check standard, bullet 5 and 6 repetition.
- Magill forceps to be used to hold tongue when intubating patient.
- Ensure that the tube is in the correct position by giving oxygen per endotracheal tube and assessing chest movement.
- Perform cricothyroidotomy in the event of massive facial damage/trauma to maintain and secure the airway and or tracheostomy.
- Administer 100 % oxygen according to priority using ambubag.
- Sometimes intercostal drain is inserted even without chest x-ray.
- Immobilise flail segment with crepe bandage, not elastoplast.
- Monitor oxygen, saturation using pulse oximetre or check O<sub>2</sub> saturation on monitor.

- Breathe effectively and breathing is normal

Process standards accepted, with the following changes:

Checking pulse, start first with radial pulse.

Minimise handling of affected fractured site.

Collect blood for grouping, crossmatch and full blood count depending on the patient's condition.

Use anti cubital fossae, which are useful if a patient, is unconscious, because patient will not bend the arm and obstruct the flow.

Add arterial line to be initiated for arterial blood pressure.

Infusion of fluids should depend on the protocol for casualty.

Monitor urinary output: normal 0.5 ml to 1 ml add to 1 ml/kg/hr.

- Neurological status of the patient is continuously monitored

Process standards accepted, with the following additions:

- Assess for depressed level of consciousness due to brain oedema.
- Remove standard bullet 8 – 12, replace with Glasgow Coma Scale and revised trauma score to be used.

- The patient will be free from hypothermia

All process standards accepted.

- The patient will be assessed systematically maintaining log-rolling to visualise the back

Process standards accepted, with the following changes:

- Remove if necessary.

- Transportation to ICU

Nursing personnel to be familiar with the route. Standards accepted, but with the following changes: add nearest route to ICU.

- Patient to maintain a clear and patent airway after suctioning and removing foreign material in the airway

Process standards accepted, with the following changes:

- Ensure that the endotracheal tube is in the correct position by checking if the tube is correctly inflated.
- Support and keep the patient's neck in good position to prevent further injury add with collar in situ.
- Administer 100 % oxygen according to (ABG's) arterial blood gases results.
- Check if there is repetition in checking the neck for oedema.

- Maintain good cardiac output and well perfused tissues through control of bleeding

Process standards accepted with the following changes:

- Remove check fluids, add use dial-a-flow to monitor any fluid blood or crystalloid or colloid.

- The patient's neurological status is continuously assessed

Process standards accepted with the following changes:

- Remove standards bullet 4,5, and 6 not to be done during transportation.
- Remove compression of the reticulo formation system add brain oedema.
- Assess ears for leakage of CSF add the nostrils.

- Splints and bandages

Process standard accepted, with the following changes:

- Bandages not to be too tight.

- Prevention of hypothermia

Process standards accepted, with the following addition:

- Add "use blankets for warming patients".

- The patient maintains a clear and patent airway

Process standards accepted, with the following changes:

- Add "use ambubag" on standard bullet 5.
- Remove standard bullet: 7 it is repetition

- The patient maintains good and effective breathing with normal respiration

All process standards have been repeated - check them again.

- Maintain a good cardiac output and well perfused tissues through control of haemorrhage

All standards repeated.



- Relevant equipment is available for use during transport  
Process standards accepted, with the following changes:  
Add "if possible" to standard bullet 3.
- Measures to prevent physiological changes are instituted  
All process standards accepted.
- Cardio-pulmonary resuscitation is performed if the patient arrests on the way to ICU  
All process standards accepted.
- Infection control principles are implemented  
All process standards accepted.
- Events and patients responses are accurately documented during transit  
All process standards accepted.
- The patient's report to be handed over to the ICU personnel  
All standards accepted.

The researcher's standards have been accepted with changes effected as recommended. A mark of three (3) is allocated on Likert scale.

RESPONDENT TEN:

## BIOGRAPHICAL DATA OF RESPONDENT TEN

**TABLE 4.12**  
**BIOGRAPHICAL DATA OF RESPONDENT TEN**

- Chief professional nurse. Has a diploma in General Nursing Science, obtained 1983.
- Obtained Diploma in Midwifery :1986.
- Passed Intensive Care 1991.
- Obtained a B.A Cur with Unisa 1999.
- Has advanced diploma in Health Service Management 1999.
- MBA in progress from 2000 to date.
- Has 14 years experience in ICU.
- In charge of casualty department 1999 to date.

RESPONDENT'S VERBATIM COMMENTS

Injuries are identified

Process standards accepted, except donning gloves, because sometimes not available.

- Maintaining a clear and patent airway with protection of the spinal column.

All process standards accepted, except bullet number 14, i.e. rigid cervical collar not commonly used; the collar with soft but firm material is used in casualty.

- Collect blood for arterial blood gases only done in ICU.

- Breathes effectively and breathing is normal

All standards accepted.

- Maintain a good cardiac output and well perfused tissues through control of haemorrhage

Process standards accepted, except bullet one – Radial pulse to be checked also.

- Assist with the insertion of a central line for measuring central venous pressure and arterial blood pressure is seldom done.

- The neurological status of the patient is continuously maintained

Process standards accepted except:

- Elevate the head 30° to assist the brain perfusion not commonly done in casualty.
- Ask patient to wiggle tongue – not commonly done.
- Revised trauma score not used.

- The patient will be free from hypothermia

Process standards accepted, except:

- Warming fluids before administration not done.

- Patient's / client's fractures are stabilised

All process standards accepted.

- The patient will be assessed systematically using log-rolling to visualise the back

All process standards accepted.

- Transport to the Intensive Care Unit.

- Nursing personnel to be familiar with the route

All process standards accepted.



- Patient to maintain a clear and patent airway after suctioning and removing foreign material in the airway  
All process standards accepted.
- The client will maintain effective breathing  
All process standards accepted.
- Maintain good cardiac output and well perfused tissues through control of bleeding  
All process standards accepted.
- The patient's neurological status is continuously assessed  
All process standards accepted.
- Splints and bandages  
All process standards accepted.
- Prevention of hypothermia  
All process standards accepted, except
  - Administration of warm fluids not done.
- Provide safety precautions for the patient by applying safety straps and securing transport equipment  
All process standards accepted.
- Institute measures to prevent physiological problems in transit  
All process standards accepted.
- The patient maintains a clear and patent airway  
All process standards accepted.

- The patient maintains good and effective breathing with normal respiration  
All standards accepted.
- Maintain a good cardiac output and well perfused tissues through control of haemorrhage  
Process standards accepted, except
  - Assessing urinary output which should be not less than 50 ml/h in adults not done during transport.
- Relevant equipment is available for use during transport  
All process standards accepted.
- Measures to prevent physiological changes are instituted  
All process standards accepted.
- Cardio-pulmonary resuscitation is performed if the patient arrests on the way to the ICU  
All process standards accepted.
- Infection control principles are implemented  
Process standards accepted, except:
  - Hands are usually not washed before transporting the patient.
  - Eye protection is not used.
- Events and patient's responses are accurately documented during transit  
All process standards accepted.
- The patient's report to be handed over to the ICU personnel  
All process standards accepted.

The researcher's standards have been accepted with changes effected as recommended. A mark of three (3) is allocated on Likert scale.

RESPONDENT ELEVEN:

## BIOGRAPHICAL DATA OF RESPONDENT ELEVEN

**TABLE 4.13**  
**BIOGRAPHICAL DATA OF RESPONDENT ELEVEN**

- Professional nurse.
- Has a diploma in General Nursing Science, completed 1985.
- Has a Diploma in Midwifery
- Has worked in other departments in the local hospital
- Has more than 3 years experience in casualty

The researcher's standards have been accepted with changes effected as recommended. A mark of three (3) is allocated on Likert scale.

RESPONDENT TWELVE:

## BIOGRAPHICAL DATA OF RESPONDENT TWELVE

**TABLE 4.14**  
**BIOGRAPHICAL DATA OF RESPONDENT TWELVE**

- Has a Diploma in General Nursing Science
- Has more than 5 years experience in casualty

## VALIDATION COMMENTS FOR BOTH RESPONDENTS ELEVEN AND TWELVE

Standards accepted, except the following:

- Washing of hands and donning gloves not always done in emergencies
- Use of ante cubital fossae – this area is not commonly used



- Immobilise any flail segment with elastoplast - this is not done, crepe bandage is used for immobilising flail chest
- Hands not washed before transporting patients
- Eye protection not used.

#### 4.4.1. Resuscitation in the Casualty Department

Resuscitation in the casualty includes the environment, equipment and staff surveys.

##### A. ENVIRONMENT

###### Outcome Standard Number One: Safe Environment

Statement: A safe environment is provided for patients. This includes at least the following:

##### STRUCTURE STANDARDS / CRITERIA

- Fully functional emergency trolley and emergency drugs
- Equipment for the administration of oxygen
- Blood pressure monitoring equipment
- Cardiac monitor
- Defibrillator
- Pulse oximeter
- Intravenous therapy and central venous pressure monitoring equipment and stocks
- Neck immobilisers
- Equipment and stocks for the
  - insertion of an arterial line

#### **4.4 FINAL OUTCOME STANDARDS FOR THE POLYTRAUMA PATIENT WITH BRAIN INJURIES**

After implementing the recommendations of all the experts, the standards obtained an average of 3,5 on the Likert scale. The final outcome standards for the polytrauma patient with brain injuries will be described according to the resuscitation in the casualty department, transport to the ICU and psychological aspect.

##### **4.4.1. Resuscitation in the Casualty Department**

Resuscitation in the casualty includes the environment, primary and secondary surveys.

#### **A. ENVIRONMENT**

##### **Outcome Standard Number One: Safe Environment**

**Statement:** A safe environment is provided for patient, family and staff with at least the following:

##### **STRUCTURE STANDARDS / CRITERIA**

- Fully functional emergency trolley and emergency drugs
- Equipment for the administration of oxygen
- Blood pressure monitoring equipment
- Cardiac monitor
- Defibrillator
- Pulse oximeter
- Intravenous therapy and central venous pressure monitoring, equipment and stocks
- Neck immobilisers
- Equipment and stocks for the
  - insertion of an arterial line

- obtaining arterial blood gas(ABG) samples
- analysing ABG's
- Crystalloids, for example Ringer's Lactate and Plasmalyte B
- Colloids: Low titre Rh negative blood
  - Red labelled blood
- Micro-filters
- Endotracheal intubation equipment and stocks
- A mechanical ventilator
- Suction apparatus and catheters
- Equipment for the insertion and maintenance of
  - underwater drainage systems (intercostal)
  - tracheostomy
  - a cricothyrotomy
  - treatment of a tension pneumothorax
  - indwelling urinary catheterisation
  - supra-pubic catheterisation
  - naso-gastric tube insertion
- Equipment for capillary glucose estimation (Glucometer)
- Equipment for neurological observations:
  - penlight torch
  - patella hammer
- Drugs for sedation, pain, convulsions
- Stocks and equipment for wound care, splints
- Pelvic grip
- Pad slide
- Halter traction or sand bags
- Standard infection control measures protective gear (masks, gloves, goggles, plastic aprons) liquid soap, paper towels, rigid walled container ("Sharps container")
- Patient documentation for
  - records



- clothes
- valuable safekeeping
- Trolley with cotsides
- Family and visitors' area

These structure standards are applicable to all the outcome standards unless otherwise indicated.

### **PROCESS STANDARDS / CRITERIA**

- Wash hands and dry well.
- Check that all emergency drugs are available.
- Check that all equipment in the resuscitation area is in working order at the beginning of each shift – it is the responsibility of all nursing staff in the area.
- Ensure that the resuscitation area is adequately stocked for any type of resuscitation – it is the responsibility of all nursing staff in the area.
- Allocate nursing staff according to:
  - A - airway
  - B - breathing
  - C - circulation
  - D - drugs and neurodisability
  - E - exposure/environment
- Check if resuscitation area is warm, without drafts.
- Ensure that equipment and stocks are available for the implementation of standard infection control measures.

When admitting patient:

- Wash hands
- Don protective gear
- Obtain history from patient, family, ambulance, crew or significant others, regarding mechanism of injury, include the following:

- A - allergies
- M - medication
- P - previous medical history
- L - last meal time
- E - events of injury

- Assess patient's level of consciousness according to:

- A - alert
- V - verbal response
- P - pain response
- U - unresponsive

## **B. PRIMARY SURVEY**

**Outcome Standard Number One: Injuries are identified**

**Statement: Life threatening injuries are identified with at least the following:**

### **PROCESS STANDARDS / CRITERIA**

- Wash hands
- Don gloves and protective apparel
- Perform a quick primary survey
- Greet patient to determine responsiveness
- If unresponsive, check for any medic alert medallions
- Focus the primary survey and resuscitation on
  - Airway and cervical spine control
  - Breathing
  - Circulation and haemorrhage
- Start with CPR if unresponsive. See annexure C for CPR
- Identify and treat life threatening injuries:
  - airway obstruction
  - tension / open pneumothorax

- massive haemothorax
- flail chest
- bleeding and bleeding fractures
- shock
- open and closed head injuries
- distinguish between a mass brain lesion and pathologic entities
- In mass brain lesions assess:
  - pupils
  - vital signs
- Instigate emergency care for brain mass lesions
- See outcome standard number five for neurological assessment and treatment

### **Outcome Standard Number Two: Airway**

**Statement: A clear and patent airway with protection of the spinal column is maintained with at least the following:**

#### **PROCESS STANDARDS / CRITERIA**

- Clear the oropharynx of blood, mucous and foreign bodies.
- Do not move or overextend the neck, as the patient might have a spinal injury.
- Lift the angle of the jaw to prevent the tongue from falling back and obstructing the airway.
- Choose the correct length oropharyngeal tube if the patient is unconscious.
- Talk to the patient; if they reply, the brain is perfused adequately.
- Collect the correct size of the endotracheal tube, size eight for males and seven for females or the size of the patient's small finger, irrespective of age.
- Open the mouth and remove any liquid or foreign material with a rigid suction catheter (Yankauer type).
- Remove solid material with Magill forceps and use to hold the tongue.
- Apply cricoid pressure during intubation to prevent aspiration.
- Keep applying the pressure until the balloon of the tube has been inflated.



- Ensure that the tube is in the correct place.
- Keep a rigid cervical collar on the patient, unless you are examining the neck, to stabilise the cervical spine.
- When removing the collar, a second member manually stabilises the neck.
- Keep the patient in the supine position after intubation.
- Perform a cricothyroidotomy in the event of massive facial damage/trauma to maintain and secure the airway.
- Avoid ventilating the patient with a mask, because this may cause gastric distension and induce vomiting.
- Monitor the patient continuously once intubated.
- Administer 100 % oxygen according to priority.
- Check the neck for swelling, the position of the trachea which may shift due to trauma and venous distension.
- Do not suture or pack any sucking wound before thoracostomy tube is inserted for fear of tension pneumothorax.
- Prepare for insertion of intercostal drain:
  - obtain chest x-ray (if no indication for urgent pre x-ray chest drainage).
  - do x-ray of all affected areas.
  - prepare intercostal drain tray.
  - implement infection control principles.
  - assist with insertion of the drain.
- Monitor oxygen saturation using pulse oximeter or on the cardiac monitor.
- Collect and analyse blood for an arterial blood gas analysis.

**Outcome Standard Number Three: Breathing**

**Statement:** The patient breathes effectively by implementing at least the following:

**PROCESS STANDARDS / CRITERIA**

- Count respiration rate, rhythm and depth.
- Assess and treat respiratory distress and other life threatening injuries (see table 4.15).
- If the patient is not breathing, perform CPR. (See Annexure C)
- Ensure patient is not hyperventilated (PaCO<sub>2</sub> normal 35 - 45 kPa).

**Outcome Standard Number Four: Circulation**

**Statement:** The patient maintains a good cardiac output and well-perfused tissues through control of haemorrhage, as well as optimising volume replenishment with at least the following:

- Check and record the patient's:
  - Pulse (femoral or carotid)
  - Blood pressure
  - Temperature
- Perform CPR if pulse is absent
- Control any external bleeding by applying direct pressure over the wounds.
- Prevent further haemorrhage from fracture sites, including skull fractures by effective cleansing / packing and gentle handling.
- Collect blood for grouping and cross match, full blood count, urea and electrolytes.
- Replace blood (warmed) volume by peripheral intravenous line.
- Use crystalloid initially, then blood or synthetic colloid.

- Use ante cubital fossae which are usually the best, if the patient is intubated.
- Assist with the insertion of a central line for measuring central venous pressure and arterial line for arterial blood pressure.
- Insert an indwelling urinary catheter.  
NB: perform a rectal examination in males before insertion of urinary catheter.
- Monitor urinary output: normal 0,5 ml – 1 ml/kg/hr or 50ml/hr.
- Insert an oral or naso-gastric tube.

### **Outcome Standard Number Five: Disability / Neurological**

**Statement: The neurological status of the patient is optimised by at least the following:**

#### **PROCESS STANDARDS / CRITERIA**

- Immobilise the spinal column during the entire resuscitation.
- Assess for depressed level of consciousness using the:
  - Glasgow Coma Scale
  - Revised Trauma Score
- Assess for dilation, reaction to light and size of the pupils
- Provide supplemental oxygen
- Distinguish between a mild (GCS 14/15) moderate (9-13/15 GCS) and severe (GCS 3-8/15) head injury.

#### **Disability/ Neurological status**

- Perform a subjective assessment of the patient according to:
- **Regard the following as acceptable criteria**
  - No history of loss of consciousness
  - No history of head trauma /injury
  - No sudden onset of headache



- No history of amnesia

- Perform an objective assessment of the patient according to:

**Level of consciousness using “AVPU scale”**

A = Alert, awake, responsive to voice, oriented to person time or place

V = verbal, responds to voice but not fully oriented to person time, or place

P = Pain, does not respond to voice but responds to painful stimuli

U = Unresponsive, does not respond to voice or pain

Regard the following as unacceptable and require immediate intervention

- Perform a subjective assessment of the patient according to:
  - History of loss of consciousness
  - Head trauma/injury
  - Sudden onset of headache
- Perform an objective assessment according to:
  - Altered level of consciousness
  - Pupillary assessment: unequal, blown, irregular shape, reaction to light slow or absent
- Assess the patient according to “AMPLE Scale”
  - A = Allergies
  - M = medication
  - P = previous medical history
  - L = last meal time
  - E = events of injury
- Identify clinical signs of mass lesions immediately that is a:

**SUBDURAL HAEMATOMA**

- Increasing signs of intracranial pressure ie. decreasing level of consciousness
- Ipsilateral oculomotor paralysis with contralateral hemiparesis/
- Hemiplegia ( may cause ipsilateral hemiparesis)
- Extraocular eye movement paralysis

- A conscious patient usually has a headache
- Irritability
- Confusion depending on the extent of the injury
- The patient may lapse into a coma (Glasgow Coma Score may decrease)

### **EPIDURAL HAEMATOMA/EXTRA DURAL HAEMATOMA**

- Observe the following clinical signs which the patient may present with:
  - Short period of unconsciousness then awakens and is quiet lucid
  - Rapid deterioration in level of consciousness
  - Pupil dilation and eye movement paralysis on the same side as the haematoma
  - Hemiparesis on the opposite side or seizures may also occur
  - Signs of increasing intracranial pressure which develops due to arterial bleeding (bradypnea, widening pulse pressure and tachycardia)
  - Deterioration which may occur rapidly showing signs of increasing intracranial pressure and tentorial herniation
  - Cardiovascular and respiratory instability should signal a need for Computer Tomography Scanning to rule out the epidural haematoma

### **INTRACEREBRAL HAEMATOMA**

- Observe the patient for the clinical signs similar to those of the subdural and epidural haematoma
- Identify hemiplegia which is more common than hemiparesis
- Administer appropriate medication, e.g. Mannitol, Lasix, anticonvulsants (see table 4.17)
- Hyperventilate patient moderately, not  $<3,5$  kPa
- Correct any hypotension, hypoxia, or brain edema to minimise secondary damage to the brain.

- Elevate the head 30 ° to assist the brain perfusion.
- Assess for possible causes of decreased level of consciousness: drugs, alcohol, cerebral oedema, trauma, underlying disease process, e.g. osteoporosis
- Keep head midline.
- See table 4.16 for Neurological Status.
- Accompany patient to Computer Tomography scan (moderate – severe head injury).

### **Outcome Standard Number Six: Environmental control**

**Statement:** The patient will be free from hypothermia with at least the following:

#### **PROCESS STANDARDS / CRITERIA**

- Ensure a warm environment.
- Warm fluids before administration.
- Cover patient adequately.

### **Outcome Standard Number Seven: Documentation**

**Statement:** All events and procedures during the primary survey of the patient are documented, with at least the following:

#### **PROCESS STANDARD / CRITERIA**

- Document primary survey activities:

- history
- patient's condition
- drugs



- vital signs
- medical actions
- nursing actions
- fluids

### **C. SECONDARY SURVEY**

#### **Outcome Standard Number One: Head to toe examination**

**Statement: The patient will be assessed systematically maintaining log-rolling with at least the following:**

#### **PROCESS STANDARDS / CRITERIA**

- Examine and identify all injuries (head to toe examination include vaginal and rectal examination).
- Support the back and neck when log-rolling the patient.
- Remove all clothes.
- Cover patient appropriately.
- Limit movement of the patient.
- Do not allow the patient to get cold by over-exposure.
- Assess the back for any injuries while maintaining log-rolling.
- See table 4.15, 4.16 for details.

#### **Outcome Standard Number Two:**

**Statement: The patient's fracture(s) are stabilised with at least the following implemented:**

#### **PROCESS STANDARDS / CRITERIA**

- Assess the patient for all signs of fractures.

- Splint and treat all fractures adequately to reduce pain, decrease bleeding and minimise neuro-vascular damage.
- Maintain an adequate fluid balance to correct shock.
- Maintain effective immobilisation of the affected limbs to prevent further blood loss and injury as per doctor's prescription.
- Give analgesics and sedatives after neurological examination has been performed.
- Ensure that all major bleeders have been addressed prior to transport.
- Ensure that spinal injury has been excluded.
- Ensure definitive orthopaedic care before transport.

### **Outcome Standard Number Three: Documentation**

**Statement: All events and procedures performed during the secondary survey are documented with at least the following:**

#### **PROCESS STANDARDS / CRITERIA**

- Document secondary survey activities:
  - head to toe examination findings
  - drugs
  - patient's condition
  - vital signs
  - nursing actions
  - fluids given
  - medical actions

#### 4.4.2. Transport to the Intensive Care Unit

##### Outcome Standard Number One: Transport

**Statement:** The stable patient is safely transported to the ICU with at least the following:

##### STRUCTURE STANDARDS / CRITERIA

- Equipment:
  - O<sub>2</sub> cylinder
  - pulse oximeter
  - mask, valve bag ("Ambubag")
  - cardiac monitor
  - defibrillator
  - no glass bottles
  - extra fluids
  - infusion pump(s) or "Dial-a-flow"
  - "Sharps container"
  - Intravenous drugs
  - laryngoscope
  - Intravenous cannulae
  - trolley with cot sides
  
- Staff allocation: Registered nurse skilled in CPR
  - Medical doctor
  - Porter/Orderly with a minimum qualification of Basic Life Support



**PROCESS STANDARDS / CRITERIA**

- Ensure that patient is stabilised before transfer.
- Ensure that all equipment is functional.
- Don standard infection control measures, gloves, plastic aprons, masks and goggles.
- Provide safety precautions for the patient by applying cot sides.
- Know the route and be familiar with the best possible routes to the ICU.
- Know hospital traffic patterns at certain times of the day and alternate routes to take in the event of original route being obstructed.
- Monitor the patient condition continuously.
- Do not use the patient as a table.
- Mount the monitors and support devices that are in use to an appropriate surface on the bed.
- Administer 100 % oxygen by bag valve mask "Ambubag" or use portable ventilator.
- Avoid speeding the trolley unnecessarily, because that might upset the brain and increase intra-cranial pressure.
- Avoid using the noisy route, which will over-stimulate the patient's brain.
- Maintain good visual sense by not covering the patient's face during transport, as this will lead to disorientation and increase intra-cranial pressure.
- Avoid odours, because this may also over-stimulate the brain and cause confusion. e.g. odours from soiled linen and air fresheners.
- Lower the nasogastric tube, urinary and or supra-pubic catheter bags to avoid back flow.
- Secure intravenous lines to avoid being dislodged and causing bleeding from the blood vessels.

## **Outcome Standard Number Two: Handing over the report to the Intensive Care personnel**

**Statement:** All events and procedures performed during primary and secondary and transport are discussed and patient handed over.

### **PROCESS STANDARDS / CRITERIA**

- Give full report on the following:
  - history of the patient
  - patient's condition
  - drugs used and effects
  - vital signs
  - fluids administered and fluid loss
  - nursing actions and
  - medical actions and orders
  - all procedures

### **4.4.3. PSYCHOLOGICAL ASPECT**

#### **Outcome Standard Number One: Family support**

**Statement:** The patient's family will be informed and reassured during the resuscitation and transport to the ICU

### **STRUCTURE STANDARDS / CRITERIA**

- Visitors lounge
- Staff allocation: Registered nurse or doctor

**PROCESS STANDARD / CRITERIA**

- Allocate a registered nurse to explain events to family.
- Ask the housekeeper / auxillary nurse / significant other to supply tea to the family.
- After completion of the resuscitation, ask the doctor to explain the events to the family.
- Provide the family with a phone number if they need help for whatever reason.
- Contact the minister of religion to come and support the family.
- Explain visiting times in ICU.
- Allow family to see patient any time if condition is deteriorating.

**Outcome Standard Number Two: Debriefing**

**Statement: After completion of the resuscitation procedure, successfully or unsuccessfully, all health care staff involved will be debriefed with at least the following:**

**STRUCTURE STANDARD / CRITERIA**

- Private room
- Staff allocation:
  - Religious Minister
  - Psychologist or counsellor

**PROCESS STANDARD / CRITERIA**

- Ensure that all staff attend the debriefing session.
- Ask health personnel to vent their feelings regarding the success or failure of the resuscitation.
- Ask for recommendations to improve on nursing actions.
- Provide follow-up sessions if necessary.
- Provide phone numbers if staff want contact to vent feelings.



- Document actions taken.
- Explain visiting times in ICU.
- Supply ICU telephone number.

**Compiled by** : S.S. Moloko

**Date** : May 2001

**Acknowledgements:**

Ms R. Snygans; Trauma Nurse Specialist

Mrs D. Verkuyk; Trauma Nurse Specialist

Mrs M. Fourie; Trauma Nurse Specialist

Dr B. Bonner; Trauma Doctor Specialist

Dr T. Hardcastle; Trauma Doctor Specialist

Dr T. van der Merwe; Standard Consultant and Infection Control  
Nurse

Dr O. Molebatsi; Medical Practitioner

Ms M. Motlhabane; Prof. Nurse, Trauma Nurse Trainee

Mrs D. Motsemme; In charge of Casualty department & I.C.U.;  
Critical Care Nurse

Miss D. Lesolle; Professional Nurse

Mr R. Loabile; Professional Nurse



<ul style="list-style-type: none"> <li>- Possible cardiac involvement</li> <li>- Hemoptysis assess for associated pulmonary contusion.</li> <li>- Feel for crepitus and tenderness in conscious patients</li> </ul> <p><b>b) Pneumothorax</b></p> <ul style="list-style-type: none"> <li>- Assess for: <ul style="list-style-type: none"> <li>- Dyspnea</li> <li>- Tachypnea</li> <li>- Cyanosis</li> <li>- Absent or diminished breath sounds</li> <li>- Hyper-resonance to percussion</li> <li>- Difficulty in manual ventilation of the patient</li> </ul> </li> </ul> <p><b>c) Tension pneumothorax</b></p> <ul style="list-style-type: none"> <li>- Assess for signs of pneumothorax plus <ul style="list-style-type: none"> <li>• Restlessness</li> <li>• Deviated trachea to unaffected side</li> <li>• Decreased blood pressure</li> <li>• Increased peak airway pressures</li> <li>• Signs of shock</li> </ul> </li> </ul> <p><b>d) Haemothorax</b></p> <ul style="list-style-type: none"> <li>- Assess for moderate bleeding (up to 1,500ml) will cause, <ul style="list-style-type: none"> <li>• Dyspnea</li> <li>• Dullness to percussion</li> <li>• Decreased breath sounds</li> <li>• Signs of shock</li> <li>• Severe bleeding (greater than 1,500ml) will cause signs of shock</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Assess lung sounds frequently</li> <li>- Evaluate arterial blood gas results</li> <li>- Continue to evaluate for new or recurrent pneumothoraces</li> <li>- Consider transfusion to replace blood loss with hemothoraces</li> <li>- Measure compliance and peak airway pressures if ventilated.</li> </ul>
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- Decreased blood pressure
- Cyanosis should be suspected with unexplained shock

#### e) Tracheobronchial injuries

- Suspect with 1<sup>st</sup> rib fracture
- Subcutaneous emphysema
- Bronchopleural fistula or
- Persistent pneumothoraces
- Assess for signs of
  - Respiratory distress
  - Pneumothorax
  - Hamman's sign (crunching sound with each heartbeat)

#### f) Diaphragmatic injuries

- Assess for peritoneal lavage fluid exiting chest tube
- Difficulty in placing NG tube
- Hear bowel sounds in chest
- Observe for signs of respiratory and cardiac distress
- Observe chest x-ray for solid or air-lifted viscus above diaphragm

### CARDIOVASCULAR

#### a) Pericardial tamponade

- Assess for:
  - Beck's triad (falling systolic BP, distant heart sounds, elevated neck veins)
  - Pulsus paradoxus
  - Signs of severe shock out of proportion to estimated blood loss.

- Insert naso-gastric tube and prepare for surgery.

- Monitor ECG continuously for at least 24 hours
- Monitor for signs of developing cardiac tamponade.
- Assist with pericardiocentesis as needed

<p><b>b) Cardiac contusion</b></p> <p>- Assess for:</p> <ul style="list-style-type: none"> <li>• ECG changes</li> <li>• Cardiac enzyme elevations</li> <li>• Friction rub</li> <li>• New murmur</li> <li>• Dysrhythmias, tachycardia, angina-like or pericardial pain</li> <li>• Tamponade or shock</li> </ul> <p><b>c) Aortic injuries</b></p> <ul style="list-style-type: none"> <li>• Suspect with 1<sup>st</sup> rib fracture or sternal fracture</li> <li>• Observe for:</li> <li>• Widened mediastinum on CXR</li> <li>• Difference in pulse amplitude between right and left extremities</li> <li>• Systolic murmur over precordium or infrascapular areas</li> <li>• Patient may complain of dysphagia back pain</li> </ul> <p>Assess, intervene, reassess &amp; reintervene until ABC is stabilised.</p>	<ul style="list-style-type: none"> <li>- Cardiac contusion: treat as a patient with MI</li> <li>- Institute anticoagulant therapy as ordered if danger of mural thrombi exists; if new murmur is due to VSD or valve damage ABC may be required until surgical correction possible.</li> </ul> <p>Aortic injuries: - Control BP and prepare for surgery</p>
<p>Assess neurologic status</p> <ul style="list-style-type: none"> <li>• Calculate the GCS</li> <li>• Check cranial nerve function (See table 4.15)</li> <li>• Evaluate neurovascular function and pulses distal to injury</li> <li>• Evaluate reflexes:</li> </ul> <p>* knee jerk</p>	<ul style="list-style-type: none"> <li>• Maintain a urine output <math>\frac{1}{2}</math> - 1 ml/kg/ in adults &amp; 1- 2 ml/kg/hrs infants</li> <li>• Monitor for signs of shock: <ul style="list-style-type: none"> <li>- Tachycardia</li> <li>- Level of consciousness</li> <li>- Capillary refill</li> <li>- Maintain Hb, HCT &amp; Coagulation studies within normal limits.</li> <li>- See table 4.17 for the medical therapies for the head injured patient</li> </ul> </li> </ul>

<ul style="list-style-type: none"> <li>* Babinsky's sign</li> <li>* clonus</li> <li>* if unconscious (GCS of &lt; 8) do</li> <li>* oculovestibular (ice caloric test)</li> <li>• Assess for oculocephalic (doll's eyes) to test brain stem function</li> </ul>	
<p>Undress the patient and completely examine the front and back</p> <p><b>HEAD</b></p> <p><b>a) Scalp</b></p> <ul style="list-style-type: none"> <li>• Palpate posterior to anterior</li> <li>• Check for lacerations, swellings and depressions</li> </ul> <p><b>b) Skull fractures</b></p> <ul style="list-style-type: none"> <li>- Palpate for fractures</li> <li>- Observe for hematomas, leakage of CSF or blood</li> <li>- battle's sign</li> <li>- raccoon eyes</li> <li>- cranial nerve dysfunction</li> </ul> <p><b>c) Intracranial Haemorrhage</b></p> <ul style="list-style-type: none"> <li>- Assess for: <ul style="list-style-type: none"> <li>• signs of increased ICP, pupillary changes,</li> <li>• changing respiratory patterns</li> <li>• abnormal posturing</li> <li>• presence of seizure activity</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Arrest haemorrhage on scalp by applying pressure on bleeding wounds.</li> </ul> <ul style="list-style-type: none"> <li>- Provide high-flow oxygen to correct hypoventilation</li> <li>- Calculate Glasgow Coma Scale score.</li> <li>- Institute measures to control ICP for example avoid over-stimulation of patient when suctioning the airway</li> </ul>



<p><b>d) Spinal cord</b></p> <ul style="list-style-type: none"> <li>- Observe for respiratory insufficiency</li> <li>- Evaluate sensorimotor function (testing should progress from area of deficit to neurologically intact area)</li> <li>- Observe for signs of neurogenic shock</li> <li>- Observe for onset of automatic dysreflexia with lesions</li> <li>- Assess bowel and bladder function</li> <li>- Monitor temperature</li> <li>- Assess for spasticity</li> <li>- Priapism</li> <li>- Decreased motor power and sensation below lesion</li> <li>- Hypotension with relative bradycardia</li> <li>- Decreased anal sphincter tone</li> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>- Support ABC's; to prevent further damage by maintaining immobilisation.</li> <li>- Treat spinal shock as ordered</li> <li>- Eliminate stimuli causing autonomic dysreflexia</li> <li>- Avoid temperature fluctuations</li> <li>- Protect areas of anaesthesia from skin breakdown</li> <li>- Pad and protect, the patient with muscle spasm</li> <li>- Treat spasm with firm hand pressure at insertion site of the muscle in spasm</li> <li>- Administer muscle relaxants as ordered.</li> <li>- Provide psychological support</li> </ul>
<p><b>ABDOMINAL</b></p> <p><b>a) General</b></p> <ul style="list-style-type: none"> <li>- Assess for signs of peritonitis, bruising</li> <li>• Abdominal wall rigidity</li> <li>• Guarding, tenderness</li> <li>• Generalised pain</li> <li>• Wounds</li> <li>• Lacerations</li> <li>• Abdominal distention</li> <li>• Loss of bowel sounds</li> </ul> <p><b>b) Splenic injuries</b></p> <ul style="list-style-type: none"> <li>- Assess for signs of peritonitis</li> <li>- Left upper quadrant pain</li> <li>- Syncope Kerr's sign (pain in left shoulder when in the Tendelenburg position)</li> </ul>	<ul style="list-style-type: none"> <li>- Insert Naso-gastric (NG) tube</li> <li>- Maintain patency of NG tube</li> <li>- Measure abdominal girth, daily monitor</li> <li>- Monitor lab results for falling <ul style="list-style-type: none"> <li>• Hematocrit</li> <li>• Elevated amylase</li> <li>• Elevated WBC and altered coagulation studies</li> </ul> </li> <li>• Cover any exposed bowel with sterile pack soaked in normal saline</li> <li>• Explore any lacerations</li> <li>• Altered coagulation studies</li> </ul> <p>Splenic injuries: Monitor suspected injuries for at least 24 hour including,</p> <ul style="list-style-type: none"> <li>• Vital signs</li> <li>• Hematocrit</li> </ul>

<ul style="list-style-type: none"> <li>- Do no palpate or percuss spleen with suspected injury</li> </ul> <p><b>c) Liver injuries</b></p> <p>Assess for signs of:</p> <ul style="list-style-type: none"> <li>- Peritoneal irritations</li> <li>- Hematobriia</li> <li>- Elevated liver enzymes</li> <li>- Jaundice</li> <li>- Anemia</li> <li>- Low platelet count</li> <li>- Note signs of liver obstruction evidenced by</li> <li>- Congestion of spleen, intestines, esophagus</li> </ul> <p><b>d) Small bowel injury</b></p> <ul style="list-style-type: none"> <li>- Assess for <ul style="list-style-type: none"> <li>• periumbilical pain,</li> <li>• pain radiating to shoulders</li> <li>• Testicular pain in males</li> <li>• Signs of peritonitis</li> </ul> </li> <li>- Monitor results lab for <ul style="list-style-type: none"> <li>• Elevated WBC</li> <li>• Elevated serum, and urine amylase (indicating an associated pancreatic injury)</li> <li>• Free air in the abdomen on x-ray</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Abdominal girth and serial PCT scans following splenectomy, administer polyvalent pneumococcal vaccine as ordered.</li> </ul> <ul style="list-style-type: none"> <li>- Liver injuries : Rule out DIC</li> <li>- Monitor medications detoxified by the liver</li> <li>- Monitor serum ammonia levels, prothrombin time</li> <li>- Administer albumin, vitamin K, lactulose, magnesium sulfate, neomycin sulfate as ordered.</li> </ul> <ul style="list-style-type: none"> <li>- Large and small bowel injuries: Maintain nasogastric tube patency</li> <li>- Care for temporary or permanent ostomy</li> <li>- Maintain adequate nutrition</li> <li>- Normalise fluid and electrolyte balance</li> </ul>
<p><b>e) Large bowel injury</b></p> <ul style="list-style-type: none"> <li>- Evaluate peritoneal lavage fluid for</li> </ul>	

<p>evidence of blood or fecal material</p> <ul style="list-style-type: none"> <li>- Observe for signs of</li> <li>• peritoneal irritation,</li> <li>• rectal bleeding,</li> <li>• free peritoneal air on x-ray</li> </ul>	
<p><b>f) Pancreatic injury</b></p> <ul style="list-style-type: none"> <li>- Assess for signs of</li> <li>• Peritoneal irritation</li> <li>• Fever</li> <li>• Elevated serum and urine amylase</li> <li>• Observe for Grey Turner's sign (Flank area ecchymosis)</li> </ul>	<p>Pancreatic injuries: Postoperatively</p> <ul style="list-style-type: none"> <li>- Assess for</li> <li>• Pseudocyst pain, fever, ileus, nausea and vomiting, anorexia and</li> <li>• Possibly a palpable mass</li> <li>- Prevent skin excoriation</li> <li>- Monitor blood glucose levels</li> </ul>
<p><b>g) Renal injuries</b></p> <ul style="list-style-type: none"> <li>- Observe for bruising over flank or ribs</li> <li>- Assess for flank pain or tenderness, mass over kidneys, hematuria</li> </ul> <p><b>h) Bladder rupture and urethral damage</b></p> <ul style="list-style-type: none"> <li>- Clinical manifestations include dysuria or inability to void, hematuria, lower abdominal pain</li> </ul>	<ul style="list-style-type: none"> <li>- Renal injuries: Do not insert a Foley catheter if blood is present at the meatus</li> <li>- Monitor for hematuria, fever, persistent pain over the kidneys, leukocytosis</li> <li>- Ruptured bladder: Maintain patency of cystostomy tube or Foley catheter post bladder repair.</li> <li>- Monitor for development of hypertension secondary to renal artery thrombosis and angiotensin/renin release</li> <li>- Perform rectal or vaginal examination before inserting urinal catheter.</li> </ul>



**ORTHOPAEDIC**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>- Observe for changes in length, shape, alignment, stability and mortality of involved extremity, evaluate neurovascular status of tissues distal to injury.</li> <li>- Presence of distal pulses does not rule out injury</li> <li>- Compare with the opposite limb, note skin color</li> <li>- Capillary refill, edema, temperature, presence of bruit and pain</li> <li>- Monitor for onset of fat emboli syndrome, pulmonary emboli, compartment syndrome</li> <li>- Assess for acidosis and hyperkalemia with crush injuries</li> <li>- Observe for dislocations</li> <li>- Palpate bones for crepitus and instability</li> </ul> | <ul style="list-style-type: none"> <li>- Promote progressive mobility and ambulation</li> <li>- Inspect skin and assess neurovascular status frequently</li> <li>- Provide diligent skin and pin care</li> <li>- Evaluate for acidosis and hyperkalemia with crush injuries</li> <li>- Ensure adequate hydration and nutrition, especially protein, calcium, vitamins A, C, and D</li> <li>- Provide treatment for deformities</li> <li>- Check peripheral pulses</li> <li>- Collect swab from compound fractures for microbiological analysis</li> <li>- Splint all fractures and control haemorrhage</li> </ul> |
|---|---|

Table 4.16 gives the interpretation of the neurological observations to be done when assessing the polytrauma patient with brain injuries.

**TABLE 4.16**  
**NEUROLOGICAL STATUS (VASQUES ET AL, 1992: 158)**

OBSERVATION	INTERPRETATION
CONSCIOUSNESS	Variation is due to impairment of RAS (reticular activating system)
MENTATION	Alterations in thinking and memory and emotional lability are due to impairment of cortex, temporal lobe and limbic system.
LANGUAGE	Dependent on integration of frontal, temporal, parietal and occipital lobes, disruption of this will cause language disturbances
MOTOR	General body movement is a function of pyramidal, extrapyramidal and cerebellar structures and the cortex Disturbances may result in paresis, spasticity (increased tone), flaccidity (decreased tone), inco-ordination, difficult with gait Deep tendon reflexes (DTR's) may be hypo- or hyperactive Presence of Babinski reflex indicates pyramidal tract damage Decorticate posturing indicates damage between cortex and brain stem and causes flexion of upper extremities Decerebrate posturing usually indicates brain-stem damage and is more serious than decorticate posturing, it causes internal rotation of upper extremities and external rotation of lower extremities
EXPRESSION	Facial asymmetry results from dysfunction of cranial nerve VII
SPEECH	Results from integration of language centers with motor production of speech, cranial nerves VII, IX, X, XII are involved  Dysphasia indicates poor motor functioning of these nerves
SENSATION	Sensation of pain, temperature, touch, and proprioception are integrated functions of several brain and spinal cord tracts
SWALLOWING/GAG REFLEXES	Function of cranial nerves VII, IX, X, XII
EYE SIGNS	Check for symmetry, reaction, dilated, fixed pupils indicate uncal herniation, bilateral pinpoint pupils without reaction indicate damage to pons.
PUPILS	
EXTRAOCULAR MOVEMENTS	An alert patient should follow examiner's finger in all ranges (testing of cranial nerves III, IV, VI) In patients with decreased levels of consciousness, either of the following tests may be used Doll's eye manoeuvre: Rotate patient's head to side. Normal response – eyes go opposite direction of head. Abnormal response – eyes stay midline i.e. absent doll's eyes. Caloric response (usually done by doctor), ice water is injected into ear. Normal response – nystagmus beating away from stimulus. Abnormal response – no response, eyes stay midline.

Table 4.17 gives a summary of the medical therapies to be implemented after the resuscitation, of the head injured patient. Drugs for example mannitol, furosemide, barbiturates and anti-convulsants should be given after consultation with the neurosurgeon (ATLS, 1997: 202 - 203).

**TABLE 4.17**  
**MEDICAL THERAPIES FOR THE HEAD INJURED PATIENT (ATLS, 1997: 202 - 203)**

Medical Therapy	Actions
Intravenous fluids	<ul style="list-style-type: none"> <li>• Don't use hypotonic fluids</li> <li>• Don't use glucose containing fluids</li> <li>• Use Normal Saline / Ringer's lactate</li> <li>• Monitor NaCl levels</li> </ul>
Hyperventilation	<ul style="list-style-type: none"> <li>• Use cautiously</li> <li>• Keep PCO<sub>2</sub> at 4kPa or above acceptable between 3,3 – 4 kPa</li> <li>• Don't hyperventilate if PCO<sub>2</sub> less 3,3 kPa</li> </ul>
Mannitol	<ul style="list-style-type: none"> <li>• Use a 20 % solution</li> <li>• Use a 1g/kg intravenous bolus</li> <li>• Don't administer if patient hypotensive</li> <li>• Use when reactive pupils dilate or Bilaterally dilated Non-reactive pupils Not hypotensive</li> <li>• Consult neurosurgeon</li> </ul>
Furosemide	<ul style="list-style-type: none"> <li>• Use with Mannitol</li> <li>• Consult neurosurgeon</li> </ul>
Steroids	<ul style="list-style-type: none"> <li>• Consult neurosurgeon</li> </ul>
Barbiturates	<ul style="list-style-type: none"> <li>• Don't use in presence of hypotension</li> <li>• Don't use in acute resuscitative phase</li> </ul>
Anti convulsants	<ul style="list-style-type: none"> <li>• Use phenytoin or phenobarbital</li> <li>• Can stop prophylaxis after one week depending on the patients' progress</li> <li>• Control seizures with diazepam</li> </ul>



#### **4.5 LIMITATIONS OF THE STUDY**

The following limitations were identified:

- It was not easy for the researcher to get the checklist completed by the nurses at the local provincial hospital in Mafikeng; because they were always busy and said they were short -staffed.
- The study was only conducted at the local provincial hospital in Mafikeng with the exclusion of the local private hospital, which might have given different results.
- No one at the local hospital has a trauma or emergency nursing course, except the chief professional nurse in charge of the casualty department and the intensive care unit who has an intensive care course qualification. This explains why all the standards were accepted with minimum changes.
- All the experts in trauma and trauma nursing, critical care, emergency nursing and standard formulation were chosen from the Western Cape where the researcher is studying, because there are no trauma, critical care, emergency nursing and standard formulation experts in the area where the researcher conducted the study.

#### **4.6 SUMMARY**

The conclusion was that in a comatose patient, the airway must be secured and maintained by endotracheal intubation. The patient must be moderately hyperventilated to reverse hypercarbia. Shock must be aggressively treated and the cause identified. Treat hypovolemia with Ringer's lactate or normal saline and avoid hypovolemia and overhydration. The goal in resuscitating the head-injured patient is to achieve an euvolemic state (ATLS, 1997: 205).

According to respondents heading trauma units, every polytrauma patient must be fully resuscitated and the patient should go to the resuscitation area, on the grounds of mechanism of injury and the potential risk of serious complications. Before the arrival of the patient, the doctor must be notified and a complete resuscitation should commence immediately. This should be done according to the nursing outcome standards as outlined in the protocols.

This chapter outlines the quantification phase. All the respondents' verbatim comments on the nursing outcome standards for polytrauma patients with traumatic brain injuries included their biographical data. Specific biographical data will show their experience in trauma and how they resuscitated polytrauma patients with traumatic brain injuries in their trauma units.

In chapter five the conclusions, recommendations, items for future research and summary for the study will be given.

# Chapter 5

## CONCLUSION, RECOMMENDATIONS AND SUMMARY

### 5.1 INTRODUCTION

This chapter will give an overview of what was done in the previous chapters. It will include the conclusions, recommendations and items for future research.

Severely head-injured patients with a Glasgow Coma Score of 8 or less are by definition in coma and require both airway protection and intensive care therapy to treat intracranial pressure. The moderately head-injured patient (9–13 Glasgow Coma Score) also requires intensive therapy to prevent complications. Nursing outcome standards for management of the above-mentioned patients have been formulated and validated and they are to be implemented in casualty to improve quality of care.

Chapter one provided an overview of the study, its significance and objectives. Chapter two explained the research methodology which was followed to achieve the objectives. Muller's, (1996) two-phase model was used to structure the research.

Phase one addressed the literature review, to determine and describe the contents of nursing outcome standards on resuscitation of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit with formulation of provisional standards in chapter three.

Phase two of the research was implemented when local nurses and a doctor, including experts in emergency care, trauma, critical care and standard



formulation, validated the provisional standards in chapter four, thereafter the final standards were formulated.

## 5.2 GOAL OF RESEARCH

The goal of the research was to formulate nursing outcome standards for polytrauma patients with traumatic brain injuries in the Mafikeng district and this was achieved through the following objectives:

- Exploration of the literature and determining the contents of nursing outcome standards on resuscitation of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit,
- Formulation of nursing outcome standards on the management of polytrauma patients with traumatic brain injuries, that is, resuscitation in casualty and during transport to the intensive care unit,
- Validation of the nursing outcome standards of care used for polytrauma patients with traumatic brain injuries,
- Communication of findings to the relevant stakeholders.

The above-mentioned objectives were achieved as follows:

Literature was explored in chapter three to determine the contents of nursing outcome standards on resuscitation of polytrauma patients with traumatic brain injuries in the casualty department and during transport to the intensive care unit.

The second objective was achieved when the provisional nursing outcome standards on the management of the polytrauma patient with traumatic brain injuries and transport to ICU, were formulated in chapter three. The activities of living model (Angleton & Chalmers, 2000:45-61) was utilised to identify all aspects

to be included in the formulation of the provisional nursing outcome standards for polytrauma patients with traumatic brain injuries. For application (See 2.3 Theoretical Assumptions. Phase one of Muller's (1995) model was used to achieve the first, the second and the third objectives of the research.

The validation of the nursing outcome standards used for polytrauma patients with traumatic brain injuries was achieved in chapter four. The nurses and a doctor working in the casualty department of the local provincial hospital and experts in trauma care, including two medical doctors working in critical care and emergency nursing in the Western Cape where the researcher is studying, validated the provisional standards. Final standards were formulated after validation of provisional standards. To achieve the last objective, the validated standards were communicated to the relevant stakeholders. Final copies of the study will be sent to:

- The management of the local provincial hospital in Mafikeng where the study was conducted
- The casualty department where the study was conducted
- The Department of Health
- The library department of the university at which the researcher is studying
- The supervisor of the study
- The library department of the institution where the researcher is working

The results will also be published and seminars will be conducted to communicate findings to similar hospitals.

### 5.3 CONCLUSIONS

**Statement one:** All provisional outcome standards for polytrauma patients with brain injuries were accepted with recommended changes and allocated a mark of three (3) on the Likert scale. Validation comments were implemented and communicated and a final average of 3,5 was given by the respondents.

**Statement two:** The nursing staff of the local hospital did not really know how to evaluate/validate the outcome standards, a situation which can be ascribed to the lack of knowledge regarding standard formulation, trauma and emergency care.

**Statement three:** the experts on trauma nursing and medical management gave valuable inputs. These were included in the final standards

**Statement four:** The doctor in the local hospital determined that the quality of trauma management depended on the level of skill of the personnel available in the casualty department. According to him, community service doctors who are fairly competent in the execution of their duties, man this sector of the hospital.

**Statement five:** The backup system for medical personnel is inadequate, as the telephone systems are not always functional.

**Statement six:** Some of the equipment and stocks are not always available, for example emergency drugs; a glucometer and standard infection control measures.

**Statement seven:** Patients with suspected pelvic fractures or other fractures are transported in a wheelchair.

**Statement eight:** Support staff e.g. radiographers are not always available after hours.

**Statement nine:** Nursing staff at the local hospital are not aware that standard infection control measures form part of the management of the polytrauma patient with brain injuries.



## 5.4 RECOMMENDATIONS

The following recommendations are made with regard to training, quality improvement, structural changes and general recommendations.

### 5.4.1 Training

The constitution of the country advocates the rights of the patient/client to get quality emergency care and this can only be rendered if the emergency equipment is available and nursing and medical staff are being trained in emergency care.

- All registered nurses working in the casualty department are to be trained in ACLS (Advanced Cardiac Life Support), APLS (Advanced Paediatric Life Support) and ATLS (Advanced Trauma Life Support) while waiting to be sent for the Trauma Nursing Course.
- All professional and support staff should be trained in CPR for emergency situations.
- Introduce a training programme on the formulation of nursing standards.

### 5.4.2 Quality Improvement

- Implement the outcome standards as part of a quality improvement programme.
- For the implementation of the standards as part of the quality improvement programme, a top-down approach from management is essential; that is management involvement, including support staff, nursing staff and doctors.
- It is recommended that casualty department staff, Quality Improvement Consultant, the Nursing Staff from the local Nursing College and the University be involved in the formulation of nursing outcome standards
- Copies of the standards should be laminated and displayed on the wall in the casualty department.

### 5.4.3 Structural Changes

It is recommended that the following suggestions/ recommendations regarding equipment, drugs and infection control measures be included.

- Equipment

- Formulate and communicate a policy on sharing of equipment for the casualty department and ICU, e.g. transporting a patient with the ICU bed or ward bed with cot sides instead of wheelchairs, as it is not acceptable to transport any polytrauma patient to the intensive care unit in a wheelchair.
- Motivate for more equipment, e.g. the pelvic grip, pad slide, cardiac monitors and a fluid warmer- this can be shared by ICU and casualty staff.
- A video recorder, television and a video camera can be utilised to evaluate the actions taken during the resuscitation in the casualty department.
- Order more gloves and infusion fluids.

- Drugs

- All emergency drugs must be readily available in the casualty department.

- Infection Control Measures

Improve infection control measures. The following must be readily available in casualty:

- Protective gear, gloves, masks, goggles, apron (plastic) and a rigid walled container.
- Involve the infection control nurse or consult with an infection control consultant.

### 5.4.4 General

- Implement procedures for debriefing of staff and evaluation of actions after every resuscitation.

- Utilise the local Religious Ministers, Psychologists, Psychiatrists or Social Workers.
- Implement measures for psychological support of the family.

## **5.5 FUTURE RESEARCH**

The following recommendations are made for future research:

- Implement and test a training programme whereby nurses can formulate their own standards.
- Evaluate whether the standards have improved the quality of trauma care.
- Develop standards for ICU nursing of the polytrauma brain injured patient and the rehabilitation of polytrauma patients with traumatic brain injuries.
- Adapt and implement standards in similar rural hospitals and test them

## **5.6 SUMMARY**

In trauma the priority is given to identifying the life-threatening injuries and immediately implementing treatment (Demetriades, 1993:3). Severe trauma resuscitation and assessment often have to be carried out simultaneously to detect and treat conditions that are rapidly fatal if not attended to immediately and according to priority. Urgent priorities in trauma management include maintaining a clear and patent airway to facilitate respiration and cervical spine protection by avoiding rough manipulation of the head and neck by supporting the neck with neck immobilisers. Any external bleeding has to be controlled by applying direct pressure to the wound. All cardiovascular problems, for example shock or myocardial infarction, should be excluded. Neuro-surgical problems, for example hypoxia and brain oedema, should be corrected first because hypoxia is related to respiratory problems and it is a detrimental factor in head injured patients. A



detailed head-to-toe examination has to be performed, which includes the head, neck, chest, abdomen, back, musculo-skeletal system, rectum and vagina.

In the case of the head-injured patient, correct any condition, which may complicate the existing head injury, for example fractures of long bones or pelvis, shock or a pneumothorax. Implement the A (airway), B (breathing), C (circulation), D (disability, neurological and drugs) and E (environment) for structured management of the patient.

Muller's, (1996) two-phase model was utilised to formulate and validate nursing outcome standards. In phase one literature was explored to develop provisional standards on polytrauma patients with traumatic brain injuries. In phase two the provisional standards were validated by experts (doctors and nurses) in critical care, trauma and emergency nursing which included nurses and a doctor working in the casualty department of a provincial hospital in Mafikeng. Final standards were formulated and adapted accordingly.

Standards for the management of a polytrauma patient with traumatic brain injuries included:

- A safe environment for patients, nurses and doctors
- Primary survey in casualty department which includes the maintenance of airway, breathing, circulation, disability, drugs and exposure
- The secondary survey that includes the head to toe examination, definitive orthopaedic care and stabilisation before transfer to the intensive care unit

A standard on all relevant equipment which might be needed in case the patient goes into cardiac arrest on the way to the intensive care unit, was also formulated. The standard on documentation included the primary and secondary surveys in the casualty department, transport to the intensive care unit, activities and the condition of the patient. The final standards dealt with the accurate handing over of the patient to the intensive care personnel.

The following recommendations were made:

- Implement the outcome standard by means of a quality improvement programme through a top-down approach.
- Provide training: Nurses and doctors have an obligation to render quality care, therefore they have the right to be trained in emergency procedures.
- All registered nurses working in casualty or emergency department should be trained in at least Basic Life Support (CPR), Advanced Cardiac Life Support (ACLS), Advanced Paediatric Life Support (APLS) and Advanced Trauma Life Support (ATLS) while waiting to be sent for the trauma-nursing course.
- Improve infection control measures in the casualty department
- Emergency drugs must always be available.
- Improve the on-call system.
- Formulate a policy on sharing of the equipment by both casualty and ICU staff.
- Motivate for the necessary equipment.
- Implement procedures for debriefing of staff and evaluation of actions during resuscitation and implement measures for psychological support of the family.
- For further research, implement and test a training programme whereby nurses can formulate their own standards.
- Evaluate whether standards have improved quality of trauma care.
- Develop standards for ICU nursing of the brain injured patient and the rehabilitation of polytrauma patients with traumatic brain injuries



## 6. REFERENCES

- Aggleton, P. & Chalmers, H. 2000. Nursing Models and Nursing Practice. Great Britain: Creative Print and Design (Wales), Ebb Vale.
- Ahrens, T & Prentice, D. 1998: Critical Care Certification. Preparation, Review and Practice Exams. Stanford: Appleton & Lange.
- Alspach, J.C. & Stappleton, E.R. 1992: EMT. Pre-hospital Care. Philadelphia: W.B. Saunders.
- American College of Surgeons 1997: Advanced Trauma Life Support. Student Manual. USA: W.B. Saunders & Co.
- Astrop, A.; van der Merwe, T. & Muller, M. 1996. Standards for the Management of swabs, needles and instruments in the operating theatre. Curationis, Vol 19, no. 4. December 3-6
- Botes, A.C. 1993: A model for Research in Nursing. Johannesburg: Unpublished D Cur Thesis, Rand Afrikaans University.
- Botes, A.C. 1998: A model for Research in Nursing Johannesburg: Rand Afrikaans University.
- Burns, M & Grove, S.K. 1995: Understanding Nursing Research. Philadelphia: W.B. Saunders Company.
- Carrol, P. 1999: Chest Injuries. (Mechanism of chest trauma for nurses) R.M., Jan. v.62il, p36 (6)
- Chan, E.D., Winston, B.W., & Terada, L.S. 1998. Bedside Critical Care Manual. Philadelphia: Hanley & Belfus, Inc.



Coetzee, L. & Muller, M. 1995. Standards for Nursing Agencies. Rau Cur vol. No. 1

Demetriades, D. 1993. A Guide to the management of trauma. Johannesburg: Baraqwanath and University of Witwatersrand

Driscoll, P. & Skinner, D. 1994: Major Trauma: Initial assessment and management. Nursing RSA Verpleeging vol. 9 no. 4.

Feliciano, D.V., Moore, E.E. & Mattox, M.D. 1996: Trauma. Stamford: Appleton & Lange.

Glanze, W.D. Anderson, L.E. Urdang L & Swallow, H.H. 1986: Mosby's Medical and Nursing Dictionary. St Louis: The C.V. Mosby Company.

Grant, H.D. Murray, R.H. & Bergeron, 1986: Emergency Care: USA: Prentice/Hall International Inc.

Guyton, A.C. 1992: Human Physiology and Mechanisms of Disease. Philadelphia: W.B. Saunders Company

Hall, J.B. Schimdt, G.A. & Wood, L.D.H. 1992: Principles of Critical Care. New York: MC Graw - Hill, Inc. Health Profession. Division.

Hardey, M. & Mulhall, A. 1994: Nursing Research Theory and Practice. London: Chapman & Hall.

Henry, M.C. and Stapleton, E.R. 1992: EMT. Prehospital Care. Philadelphia: W.B. Saunders

Hickey, J. 1992: The clinical practice of neurologic and neurosurgical nursing. Philadelphia: J.B. Lippincott

- Johnson, M. 1996: Standarde vir Neonatale Intensiewesorg Verpleeging. Johannesburg; RAU, M CUR Unpublished.
- Johnson, M. & Maas, M. 1997. Nursing Outcomes Classification (NOC) St. Louis: Mosby.
- Kidd, P.S. & Wagner, D.M. 1997: High Acuity Nursing. Stamford: Appleton and Lange
- Knottenbelt, T.D. 1994: Pre-hospital Care: Modern Concepts. Trauma and Emergency Medicine. January / February, 957 – 960.
- Krefting, L. 1991: Rigor in Qualitative Research: The Assessment of Trustworthiness. American Journal of occupational Therapy, volume 45 no. 3 214 – 222.
- Lane-Reticker, A. 1993: Assessment of the injured abdomen. Top Emergency Medicine, 15(1) 1 – 7. Aspen Publishers.
- Mason, E.J. 1994: How to write meaningful standards. New York: John Wiley and Sons.
- McCance, K.L. & Huether, S.E. 1998: Pathophysiology. The biologic basis for disease in Adults and Children. 3<sup>rd</sup> edition. St. Louis: Mosby
- McLeod, S. & Sunderland, T. 1996: Maxillofacial Trauma. Student BMJ. June Vol 4 Issue 41, P. 183, 4p, 36w.
- Mouton, J. 1996: Understanding Social Research. Pretoria: Van & Schaik Publishers.

- Muller, M.E. 1996: Nursing Dynamics. Durban: Heinemann.
- Muller, M.E. 1996: Quality Improvement in Health Care – A Fundamental Analysis and South African Perspective. Curations. Vol. 19, no. 4, December
- Neff, J.A. & Kidd, P.S. 1997: Trauma Nursing. The Art and Science. St. Louis: Mosby Year Book.
- Nieswiadomy, R.M. 1990: Foundations of Nursing Research. Norwalk: Appleton & Lange.
- Plaisier, B.R & Jacobs, M.L. 1993: Management of Penetrating Abdominal Trauma. Top Emergency Medicine is (1): 51 – 57 Aspen Publishers.
- Polit, D.F. & Hungler, B.P. 1991: Nursing Research Principle and Methods. Philadelphia: J.B. Lippincott
- Prentice, D. & Ahrens T. 1994: Pulmonary Complications of Trauma. Critical Care Nurse Quarterly. 17 (2) 24 – 23. Aspen Publishers Inc.
- Proehl, J. 1992: Emergency Adult Procedures. USA: Mosby
- Roper, N. Logan, W.E. & Tierney, A.J. 1996: The Elements of Nursing: A model for nursing based on a model of living. Tokyo: Churchill Livingstone.
- Sacks, R. & Katz, L. 1989: Pre-hospital care of head injured. Journal of Accident and Emergency Medicine. March /April.
- Sale, D. 1990. Essentials of Nursing Management Quality Assurance: London: Macmillan



- Scott, J. 1995: Professional Development. Trauma. The role of the nurse.  
Nursing Times. November, 15 Vol. 91 no. 45
- Trask, K.L. 2000: Trauma: Epidemiology of trauma. In Grenvik, A., Ayres, S.M.  
Holbrook, P.R. & Shoemaker, W.C. Editors, Critical Care. 4<sup>th</sup> Edition.  
Toronto: W.B. Saunders
- Van Der Merwe, T. & Muller, M. 1997: Formulation of Nursing Standards.  
Curationis. September 4 – 8.
- Van der Merwe, T. 1994: A Model for the Development of Nursing Standards.  
Johannesburg: RAU. Unpublished Doctoral thesis.
- Van der Merwe, T., Kuit J., Schmollgruber S. & Dalgety Y. 1994: Trauma and  
Emergency Standards. Johannesburg: Johannesburg Hospital Printing  
Dept.
- Vasques, M. Lazear, S.E. & Larson E.L. 1992: Critical Care Nursing. London: W  
B Saunders
- Wachtel, T. 1994: Critical Care Concepts in the Management of Abdominal  
Trauma. Critical Care Nurse Quarterly 17 (2) 34 – 50. Aspen Publishers  
Inc.
- Walden, J.R.C., Boyd, S.T. & Dimopoulos, G.E. 1998: Considerations of some  
physiological effects and equipment dynamics of ground transport of  
patients. Trauma and Emergency Medicine. August / September.

## **ANNEXURE A**

### **CRICOTHYROIDOTOMY (Demetriades: 1993: 79; Chan, Winston, Terada and Parsons 1998: 191)**

#### **DEFINITION**

An initial vertical or horizontal incision through the skin over the cricothyroid membrane.

#### **INDICATION**

It is performed in airway obstruction where immediate relief is required.

**Standard:** A patent and clear airway is maintained with the following:

#### **Structure Standards**

- Scalpel blade with handle
- Endotracheal tube or tracheostomy tube
- A disinfectant to clean the area

#### **Process Standards**

- Make a vertical or horizontal incision through the skin over the cricothyroid membrane
- Incise horizontally through the membrane
- Insert scapel handle into the incision and rotate 90 ° to open the airway
- Insert an endotracheal tube, tracheostomy tube or any rigid cannula of appropriate size
- It should be replaced by a formal tracheostomy at the earliest time, because of the danger of subglottis stenosis.

## ANNEXURE B

### PROVISIONAL NURSING OUTCOME STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES, IN THE MAFIKENG DISTRICT

#### INSTRUCTIONS

Please go through the checklist (provisional outcome standards). Use the key below to allocate a score to each standard. Additional comments about any section may be written on the sheet provided. Do not write your name.

#### KEY

- |   |   |   |
|---|---|---|
| 1 | = | Not relevant                                      |
| 2 | = | Standard not clear / or relevance doubtful        |
| 3 | = | Standard relevant but requires reformulation      |
| 4 | = | Standard relevant, acceptable and well formulated |

Please give me your biographical data as follows:

- \* Registered nurse or medical doctor
- \* Qualifications
- \* Trauma experience
- \* Type of hospital (private or public)



## PROCESS STANDARDS FOR POLYTRAUMA PATIENTS WITH TRAUMATIC BRAIN INJURIES

(Driscoll (1994 :34) Knottenbelt (1994 : 958) Dimetriades (1993 : 3-4) Van der Merwe, Kuit, Schmollgruber & Dalgety (1995) and Proehl (1993 )

	1	2	3	4
<b>1. Management in casualty/trauma unit</b>				
<b>Outcome Standard</b>				
Injuries are identified.				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Obtain history from relatives or paramedics.</li> <li>• Identify injuries and implement treatment according to priorities.</li> <li>• Perform a quick primary survey.</li> <li>• - wash hands</li> <li>• - don gloves</li> <li>• - greet patient to determine responsiveness</li> <li>• - if unresponsive, check for any medic alert medallions</li> <li>• Focus the primary survey and resuscitation on</li> <li>• - airway and cervical spine control</li> <li>• - breathing</li> <li>• - circulation and haemorrhage</li> <li>• - start with CPR if unresponsive. (See Annexure C for CPR)</li> </ul>				
<b>Outcome Standard</b>				
<ul style="list-style-type: none"> <li>• Maintaining a clear and patent airway with protection of the spinal column.</li> </ul>				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Clear the oropharynx of blood, mucous and foreign bodies.</li> <li>• Do not move or over-extend the neck, the patient might have a spinal injury.</li> <li>• Lift the angle of the jaw to prevent the tongue from falling back and obstructing the airway.</li> </ul>				

	1	2	3	4
<ul style="list-style-type: none"> <li>• Choose the correct length of the oropharyngeal tube.</li> <li>• Talk to the patient, if she/he replies, the brain is perfused adequately.</li> <li>• Select the correct size of the endotracheal tube, size eight for males and seven for females based on the size of the patient's small finger irrespective of age.</li> <li>• Open the mouth and remove any liquid or foreign material with a rigid suction catheter.</li> <li>• Remove, solid material with Magill forceps.</li> <li>• Apply cricoid pressure during intubation to prevent aspiration.</li> <li>• Keep applying the pressure till the balloon of the tube has been inflated.</li> <li>• Ensure that the tube is in the correct place.</li> <li>• Keep a rigid cervical collar on the patient unless you are examining the neck, this is to stabilise the cervical spine.</li> <li>• Keep the patient in the supine position after intubation.</li> <li>• Prepare the patient for cricothyroidotomy in the event of massive facial damage/trauma to maintain and secure the airway.</li> <li>• Avoid ventilating the patient with a mask because that may distend the stomach with air and induce vomiting.</li> <li>• Monitor the patient's vital signs, temperature, pulse, respiration, blood pressure and oxygen saturation continuously once he/she is intubated.</li> <li>• Administer 100 % oxygen according to priority.</li> <li>• Check the neck for swelling, the position of the trachea which may shift due to trauma.</li> </ul>				

	1	2	3	4
<ul style="list-style-type: none"> <li>• Do not suture or pack any sucking wound before thoracostomy tube is inserted for fear of tension pneumothorax.</li> <li>• Prepare for insertion of intercostal drain:               <ul style="list-style-type: none"> <li>• - obtain chest X-Ray.</li> <li>• - prepare intercostal drain tray</li> <li>• - implement infection control principles</li> <li>• - assist with insertion of the drain</li> </ul> </li> <li>• Immobilise any flail segment with elastoplast.</li> <li>• Collect blood for arterial blood gas analysis</li> </ul>				
<b>Outcome Standard</b>				
Breathes effectively and breathing is normal.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Ensure that both sides of chest are being ventilated by inspecting for adequate movement of the chest.</li> <li>• Auscultate for breathing sounds and listen particularly in the axilla for ventilation of the periphery of the lung and also over the epigastrium to ensure that the stomach is not ventilated.</li> <li>• Count respiration rate, rhythm and depth</li> <li>• If the patient is not breathing perform CPR. (See Annexure C).</li> </ul>				
<b>Outcome Standard</b>				
Maintain a good cardiac output and well perfused tissues through control of haemorrhage.				



	1	2	3	4
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Check and record the patient's           <ul style="list-style-type: none"> <li>* Pulse (femoral or carotid)</li> <li>* Blood pressure</li> <li>* Temperature</li> </ul> </li> <li>• Perform CPR. If pulse is absent. (See Annexure C).</li> <li>• Control any external bleeding by applying direct pressure over the wounds.</li> <li>• Prevent further haemorrhage from fracture sites by adequate splinting / packing and gentle handling</li> <li>• Collect blood for grouping and cross match, full blood count, and urea &amp; electrolytes</li> <li>• Replace blood (warmed) volume by peripheral intravenous line</li> <li>• Use ante cubital fossae which are usually the best.</li> <li>• Assist with the insertion of a central line for measuring central venous pressure and arterial blood pressure</li> <li>• Do not over infuse clear fluids. (maximum 2L crystalloid or 1L colloid, eg. Ringers lactate and plasma, dextron or hemacel. Knottenbelt (1994 : 959).</li> <li>• Insert an indwelling urinary cathether</li> <li>• Monitor urinary output: normal 0,5ml/kg/hr or 50ml/hr.</li> </ul>				
<b>Outcome Standard</b>				
The neurological status of the patient is continuously monitored.				

	1	2	3	4
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Immobilise the spinal column during the entire resuscitation.</li> <li>• Perform CPR if the patient has lost consciousness. (See Annexure C).</li> <li>• Correct any hypotension, hypoxia, or brain edema to minimise secondary damage to the brain.</li> <li>• Elevate the head 30<sup>o</sup> to assist the brain perfusion.</li> <li>• Look for any signs of intracranial haematoma or brain stem compression that is:- neck stiffness pyrexia photophobia headache change in vital signs</li> <li>• Assess for dilation of the pupils due to compression of the 3<sup>rd</sup> nerve.</li> <li>• Assess for depressed level of consciousness due to compression of the reticulo formation.</li> <li>• Ask the patient to wiggle tongue.</li> <li>• Assess for amnesia</li> <li>• Ask patient to squeeze your finger.</li> <li>• Assess for confusion.</li> <li>• Perform a neurological assessment using the: <ul style="list-style-type: none"> <li>* Glasgow Coma Scale (See Table3.4)</li> <li>* Revised Trauma Score (See Table 3.5)</li> </ul> </li> </ul>				
<b>Outcome Standard</b>				
The patient will be free from hypothermia.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Ensure a warm environment</li> <li>• Warm fluids before administration at body temperature</li> <li>• Cover patient adequately</li> </ul>				
<b>Outcome Standard</b>				
Patient / client's fractures are stabilised.				

	1	2	3	4
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>Assess the patient for all signs of fractures.</li> <li>Splint all fractures adequately to reduce pain, decrease bleeding and minimise neuro-vascular damage.</li> <li>Maintain an adequate fluid balance to correct shock.</li> <li>Maintain effective immobilisation of the affected limbs to prevent further blood loss and injury as per doctor's prescription.</li> </ul>				
<b>Outcome Standard</b>				
The patient will be assessed systematically maintaining log-rolling to visualise the back.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>Support the back and neck, log-rolling with a firm neck collar in place</li> <li>Remove tight clothes if necessary.</li> <li>Limit movement of the patient.</li> <li>Do not allow the patient to get cold by over-exposing him/her.</li> <li>Assess the back for any injuries maintaining log-rolling with a firm neck collar in place.</li> </ul>				
<b>Process Standards for polytrauma patients with traumatic brain injuries</b>				
<b>2) Transport to the Intensive Care Unit</b>				
<b>Outcome Standard</b>				
Nursing personnel to be familiar with the route.				



	1	2	3	4
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Know the route and be familiar with the best possible route to the ICU.</li> <li>• Know hospital traffic patterns.</li> </ul>				
<b>Outcome Standard</b>				
Patient to maintain a clear and patent airway after suctioning and removing foreign material in the airway.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Keep the airway clear and patent by suctioning secretions from the airway.</li> <li>• Ensure that the endotracheal tube is in the correct position.</li> <li>• Keep the patient in the supine position when intubated and lateral position when not intubated.</li> <li>• Support and keep the patient's neck in good position to prevent further injury.</li> <li>• Administer 100% oxygen if the patient is distressed according to doctor's prescription.</li> <li>• Assess the neck for oedema.</li> <li>• Assess the trachea position which may shift due to injury / complications.</li> <li>• Check the neck for swelling which may indicate increasing pressure on the upper respiratory system.</li> <li>• Monitor the patient's vital signs continuously.</li> </ul>				
<b>Outcome Standard</b>				
The client/patient will maintain effective breathing.				

	1	2	3	4
<b>Process Standard</b>				
<ul style="list-style-type: none"> <li>• Ensure that both sides of the chest are being ventilated by inspecting for adequate, movement of the chest.</li> </ul>				
<ul style="list-style-type: none"> <li>• Keep on auscultating for breath sounds and listen to the axilla for ventilation of the periphery of the lungs and also over the epigastrium to ensure that the stomach is not ventilated.</li> <li>• Count the respiration rate, depth and rhythm.</li> <li>• Implement corrective actions (See CPR Annexure C).</li> </ul>				
<b>Outcome Standard</b>				
Maintain good cardiac output and well perfused tissues through control of bleeding.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Assess and record pulse and blood pressure.</li> <li>• Perform CPR when pulse is absent</li> <li>• Assess bleeding continuously and repack the wound if still bleeding</li> <li>• Check infusion fluids: <ul style="list-style-type: none"> <li>• - flow</li> <li>• - rate</li> </ul> </li> <li>• Monitor any fluid blood, crystalloid or colloid <ul style="list-style-type: none"> <li>• - for proper infusion</li> <li>• - prevent over infusion</li> </ul> </li> <li>• Maintain effective splinting of fractures and control of bleeding wounds.</li> <li>• Ensure gentle handling of patient's fractures.</li> </ul>				
<b>Outcome Standard</b>				
The patient's neurological status is continuously assessed				

	1	2	3	4
<b>Process Standard</b>				
<ul style="list-style-type: none"> <li>• Keep the patient's spinal column immobilised with the neck support from the collar.</li> <li>• Elevate the head 30° to allow the brain to be well perfused.</li> <li>• Assess the patient for restlessness which may indicate raised intra-cranial pressure.</li> <li>• Assess the patient for headache and photophobia.</li> <li>• Assess the pupil dilation and reactions to light.</li> <li>• Assess pupil size.</li> <li>• Assess level of consciousness which may be depressed due to compression of the reticulo formation system.</li> <li>• Assess ears for leakage of CSF.</li> </ul>				
<b>Outcome Standard</b>				
Splints and bandages				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Assess fractures for further bleeding and repack the wounds.</li> <li>• Do not apply a tight pressure bandage to prevent compartment syndrome.</li> </ul>				
<b>Outcome Standard</b>				
Prevention of hypothermia.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Provide warm environment en route to ICU.</li> <li>• Cover the patient adequately</li> <li>• Administer warm fluids.</li> </ul>				



	1	2	3	4
<b>Outcome Standard</b>				
Provide safety precautions for the patient by applying safety straps and securing transport equipment.				
<b>Process Standards/ Criterion</b>				
<ul style="list-style-type: none"> <li>• Ensure that the patient is safely secured on the stretcher to prevent falling.</li> <li>• Remove all loose equipment which can be a danger to the patient en route to ICU.</li> <li>• Talk to the patient, to alleviate anxiety.</li> </ul>				
<b>Outcome Standard</b>				
Institute measures to prevent physiological problems in transit.				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Talk to the patient to alleviate fears and anxiety.</li> </ul>				
<b>Outcome Standard</b>				
The patient maintains a clear and patent airway.				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Clear the oropharynx of secretions by suctioning.</li> <li>• Do not move or over-extend the neck if the patient has neck or spinal injury to prevent further injuries.</li> <li>• Ensure that the tube is in the right position if the patient is intubated.</li> <li>• Keep the patient in the supine position if intubated and lateral position if not intubated.</li> <li>• Administer oxygen 100 % continuously if the patient is distressed and depending on the result of the arterial blood analysis.</li> <li>• Assess the neck for swelling which occurs due to trauma.</li> </ul>				

	1	2	3	4
<ul style="list-style-type: none"> <li>Assess the position of the trachea which may also shift due to injury.</li> <li>Assess neck distension of the veins which may be due to hypotension.</li> </ul>				
<b>Outcome Standard</b>				
The patient maintains good and effective breathing with normal respiration				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>Ensure that both sides of chest are ventilated, by inspecting for adequate movement of the chest.</li> <li>Auscultate for breath sounds and air entry both lungs.</li> <li>Count respiration rate, depth and rhythm.</li> </ul>				
<ul style="list-style-type: none"> <li>Perform CPR if the patients stops breathing. (See Annexure C)</li> </ul>				
<b>Outcome Standard</b>				
Maintain a good cardiac output and well perfused tissues through control of haemorrhage.				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>Assess pulse and blood pressure.</li> <li>Perform CPR if pulse is absent.</li> <li>Assess for external bleeding and repack the wounds if still bleeding.</li> <li>Check the rate of flow of infusion fluids.</li> <li>Use a dial-a-flow because it is easy to manage.</li> <li>Assess urinary output which should be not less than 50ml/h in adults because that indicates poor renal or tissue perfusion.</li> </ul>				
<b>Outcome Standard</b>				
Relevant equipment is available for use during transport.				

	1	2	3	4
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Use the following equipment, if needed during transport, oxygen cylinder, pulse oximeter, mask, ambubag, combined monitors/defibrillators. Do not use glass bottles, they may break. Extra fluids, eg. blood, an infusion pump with spare battery, rigid sharps container. Intravenous drugs required must be drawn up and labelled before hand, laryngoscope, endo-tracheal tubes and Intravenous cannulas.</li> <li>• Do not use the patient as a table, i.e. no equipment should be placed on the patients legs because that might cause severe discomfort, and again expensive equipment might be thrown on the floor by a patient having a violent seizure.</li> <li>• Put equipment on the shelf beneath the bed or provide a separate trolley.</li> <li>• Mount the monitors and support devices that are in use to an appropriate surface on the bed.</li> <li>• Ensure that the equipment collected is functioning well and any substitutions must be reported prior to transport.</li> </ul>				
<b>Outcome Standard</b>				
Measures to prevent complications arising from physiological changes are instituted				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Avoid speeding the trolley unnecessarily because that might upset the brain and increase intra-cranial pressure.</li> <li>• Talk to the patient to reduce anxiety.</li> <li>• Avoid using the noisy route which will over-stimulate the patients brain.</li> <li>• Maintain good visual sense by not covering the patient's eyes and face during transport because this will lead to disorientation and increase intra-cranial pressure.</li> <li>• Avoid odours because they may also over-stimulate the brain and cause some brain problems e.g odours from soiled linen and air freshners Walden (1998: 47).</li> <li>• Avoid hypothermia because it will cause decrease blood pressure and respiration leading to increased oxygen consumption.</li> </ul>				



	1	2	3	4
<ul style="list-style-type: none"> <li>• Avoid hyperthermia because it will decrease diastolic blood pressure Walden (1998: 47). Heat tends to increase the acuity of the olfactory sense and motion sickness causes a sensation of heat which when combined with nauseating odours will cause vomiting.</li> <li>• Lower the nasogastric tube, urinary and or supra-pubic catheter bags to avoid back flow.</li> <li>• Secure intravenous lines to avoid their being dislodged and causing bleeding from the veins.</li> </ul>				
<b>Outcome Standard</b>				
Cardio-pulmonary resuscitation is performed if the patient goes into cardiac arrest on the way to Intensive Care Unit. (See Annexure C)				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Perform CPR if the patient arrests on the way to intensive care unit. (See Annexure C)</li> <li>• Ensure that personnel accompanying patient can initiate a response in case of a change in condition eg. cardiac arrest.</li> <li>• Follow hospital policy on who should accompany the patient to intensive care unit eg. doctor, trauma ICU trained nurse or experience trauma ICU nurse, porter and or extra nurse and a doctor.</li> </ul>				
<b>Outcome Standard</b>				
Infection control principles are implemented.				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>• Wash hands with soap and dry well before transporting the patient.</li> <li>• Use eye protection, if a patient is coughing.</li> <li>• Use apron during transit to protect yourself.</li> <li>• Use clean linen for the patient.</li> <li>• Use rigid-walled container for sharps.</li> <li>• Keep short nails to prevent nosocomial infection.</li> </ul>				

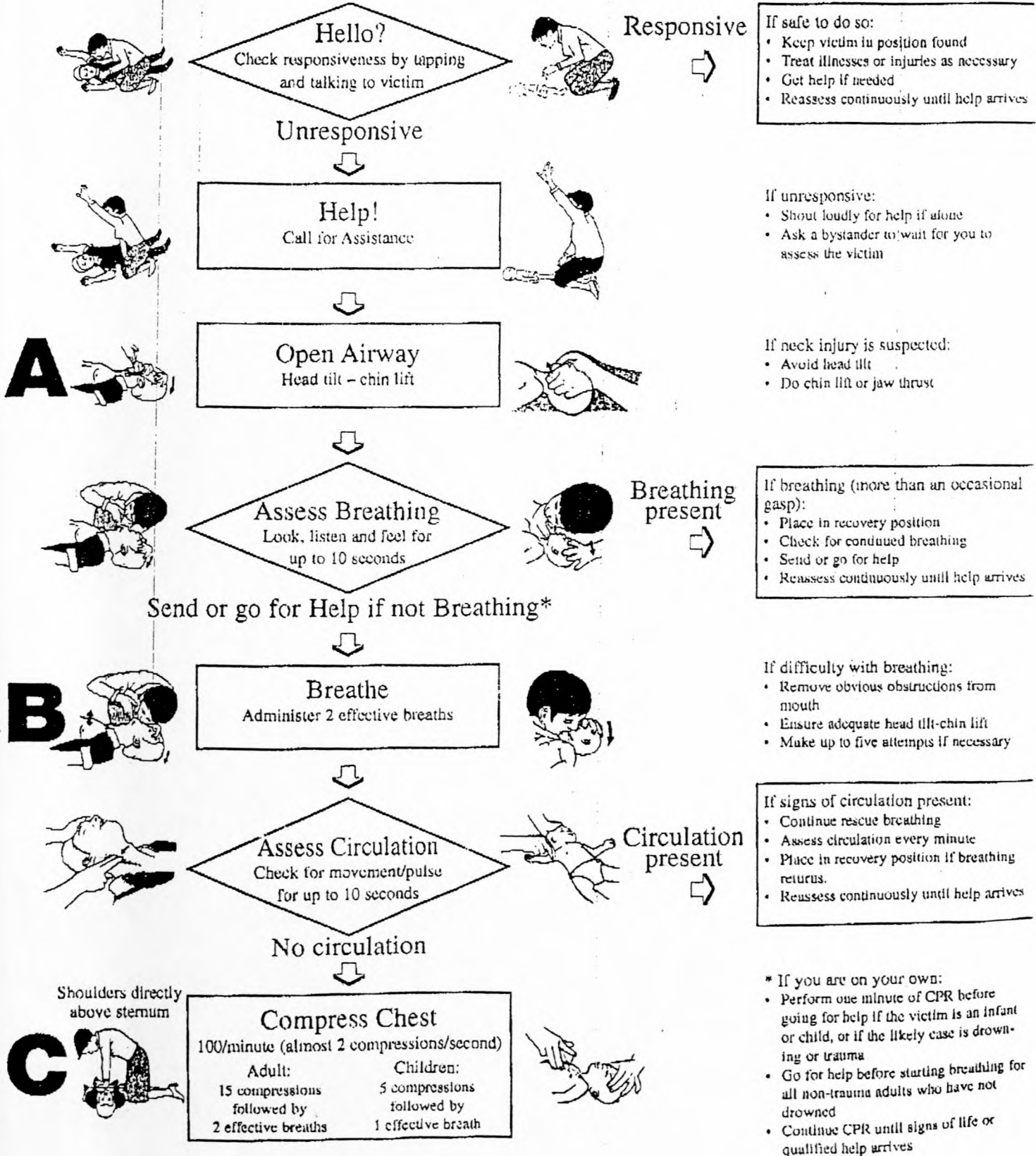
	1	2	3	4
<b>Outcome Standard</b>				
<ul style="list-style-type: none"> <li>Events and patient's responses are accurately documented during transit</li> </ul>				
<b>Process Standards</b>				
<ul style="list-style-type: none"> <li>Record any replacement of the fluids.</li> <li>Record any information if possible from the patient if he/she is able to talk.</li> </ul>				
<b>Outcome Standard</b>				
The patient's report to be handed over to the ICU personnel.				
<b>Process Standards</b>				
<p>Give full report about the following:</p> <ul style="list-style-type: none"> <li>Diagnosis</li> <li>Condition of the patient including resuscitation report if any.</li> <li>All blood results</li> <li>X-ray.</li> <li>All types of fluids administered</li> <li>Drugs/medication administered and their effects.</li> </ul>				

# Universal Basic Life Support Algorithm



If victim appears to be in need of help, adopt a SAFE approach:

S = Shout for assistance  
A = Approach with care  
F = Free from dangers  
E = Evaluate the victim







moloko\_nursing\_2001



