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THE COMPREHENSIVE CARE OF THE MODERATE AND SEVERELY HEAD INJURED PATIENT

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A thesis submitted to the Faculty of Medicine,
University of the Witwatersrand, Johannesburg,
in fulfilment of the requirements for the degree of Doctor of Philosophy.

Johannesburg 1987.

DECLARATION

I declare that this thesis is my own, unaided work. It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

Nadine Abelson

Nadine Michele Abelson

25th day of June, 1987.

DEDICATION

I dedicate this work to :

My **PATIENTS,**

PARENTS - Harry and Hilda Abelson

and

PERSONAL ASSISTANT - Miriam Rose Brener.

Without their support and encouragement, this could never be.

To dig deep is to search for the purpose of improvement. It is the end in itself, not the means that is important. To the comprehensive care of the moderate and severely head injured patient I dedicate this effort.

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ABBREVIATIONS

A.N.A.	American Nurses' Association
b.i.d.	Twice a day
cal/s.	Calorie/calories
C.N.S.	Central nervous system
C.P.P.	Cerebral perfusion pressure
C.S.F. (CSF)	Cerebrospinal fluid
C.V.P.	Central venous pressure
G.C.S.	Glasgow Coma Scale
G.O.S.	Glasgow Outcome Scale
hr/s.	Hour/Hours
I.C.P.	Intracranial pressure
I.C.P.M.	Intracranial pressure monitoring
I.C.H.	Intracranial haematoma
I.V.	Intravenous
Instit.	Institution
L	Left
M.A.B.P.	Mean arterial blood pressure
M.I.C.P.	Mean intracranial pressure
n.d.	No date stated in reference
n.s.	Not stated

Mechanism of injury:

M.V.A.	Motor vehicle accident
M.B.A.	Motorcycle accident
P.V.A.	Pedestrian vehicle accident
R.T.A.	Road traffic accident
Ml. / Mls.	Millilitre/s

Personnel category:

Comb	Combined
Dr	Doctor
E.N.	Enrolled Nurse
Multi	Muldisciplinary
N/A	Nursing Assistant
N.P.S.	Neuropsychologist
OT	Occupational therapy/therapist
P.E.N.	Pupil Enrolled Nurse
R/N	Registered Nurse
ST/N	Student Nurse
S.T.	Speech therapist
S.W.	Social worker
P.S.	Psychologist
P.T.A.	Post traumatic amnesia
P.T.C.	Post traumatic concussion syndrome
p.r.n.	As necessary
q 2hr	Every two hours

R	Right
S.A.	Republic of South Africa
S.A.N.A.	South African Nursing Association
S.A.N.C.	South African Nursing Council

Schedule name:

P.A.	Patient assessment:
N.O.	Neurological observations:
L.O.C. (LOC)	Level of consciousness
Pl	Pupils
Li	Limbs
C.S.F. (CSF)	Cerebrospinal fluid leak
S.A. (SA)	Seizure activity
H	Headache
N & V	Nausea and vomiting
V.D.	Visual disturbances
V.S.	Vital signs:
BP	Blood pressure
P	Pulse
R	Respiration
T	Temperature
PC	Patient care:
E	Eye care
B	Bronchial toilet
O	Oropharyngeal care
U	Urogenital care
C.o.P (CoP)	Change of position
P.I.	Patient independence:
Com I (C 1)	Communication I - Patient
Com II (C 11)	Communication II - Family
Mob (MOB)	Mobility
Ex (EX)	Exercise therapy
M&S:	Motivation and stimulation (overall):
G	General
A	Activity
R	Therapeutic use of radio
T	Therapeutic use of tape recorder
TV	Therapeutic use of television
P.o.I (PoI)	Promotion of independence

S.I.C.U.	Surgical intensive care unit
U.K.	United Kingdom
U.S.A.	United States of America
WHO	World Health Organisation

Symbols:

≤	Equal to or less than
≥	Equal to or more than
↑	Increase
↓	Decrease
<	Less than
>	More than
√	Applicable
8/15	Eight out of fifteen

GLOSSARY

Terms are defined as used in this study.

BRAIN DAMAGE

" ... characterised clinically by reduced responsiveness, amounting to coma when sufficiently severe. Responsiveness has three components - arousal, activity and awareness." (Jennett, 1979: 197)

CLOSED HEAD INJURY

" ... if the scalp is not damaged over the site of the fracture this is a closed injury." (Purchese, 1977: 190)

"... continuity of the scalp and mucous membranes... is maintained." (Davis & Mason, 1979: 102)

COMA

" ... inability to obey commands, to utter recognisable words, or to open the eyes." (Jennett, et al., 1977: 292)

COMPREHENSIVE CARE

Comprehensive care refers to the management of the patient from time of injury until ultimate recovery or peaceful death and includes preventive, promotive, curative and rehabilitative health care, based on a multidisciplinary approach to the patient.

CRITERION

"A criterion is the name of a value-free variable believed or known to be a relevant indicator of the quality of care." (Bloch, 1977: 22)

EVALUATION

"A process by which information is gathered as a basis for improvement." (Wandelt & Stewart, 1975: 97)

"Evaluation must be objective, subjective judgement must be eliminated." (Wandelt & Ager, 1974: 43)

EXTENT OF CARE

"The relative intensity of performance of activities as measured against pre-set criteria." (Lloyd, 1984: 10)

The extent of care refers to the range of activities that should be performed per prescribed care modality. An examination of the extent to which the prescribed intervention expressed as 'YES' (undertaken) and 'NO' (not undertaken) is performed.

FREQUENCY OF CARE

The "number of repetitions in given time ...." (Sykes, 1982: 393)

Frequency of care refers to the regularity with which modalities of prescribed nursing intervention are undertaken. An examination of the frequency of performance, the occurrence, recurrence or omission of prescribed actions (Lloyd, 1984: 52).

MEASUREMENT

"a comparison of a single phenomenon with a standard of measurement, the recorded number or symbol that represents the magnitude of the phenomenon in terms of magnitude of the standard of measurement." (Wandelt, Wandelt & Stewart, 1975: 97)

The actual objective score obtained (Schmadl, 1979).

MINOR HEAD INJURY

" ... history of unconsciousness of 20 minutes or less, a Glasgow Coma Scale score of 13 to 15, and hospitalisation not exceeding 48 hours."
" ... laceration of the scalp and face that clearly do not affect the brain." (Rimel, et al., 1981a: 221)

Post traumatic amnesia of less than 24 hours (Jennett, et al., 1977).

MODALITY OF CARE

The term used for the various aspects of comprehensive care (such as assessment of LEVEL OF CONSCIOUSNESS, BRONCHIAL TOILET and COMMUNICATION-1) that are described throughout the research.

MODERATE HEAD INJURY

Glasgow Coma Scale score of 9-12 out of 15. (Rimel, et al., n.d.: 2)

NORM OF CARE

The norm of care refers to the level with which current practice relates to pre-set criteria. An assessment of the degree to which normative practice equates with standards of practice on a scale of 5 → 0 (Bloch, 1977: 26; Schmadl, 1979: 464).

OPEN HEAD INJURY

" ... Open if brain is exposed, i.e. the scalp, the skull and the dura have been breached at one point." (Purchese, 1977: 190)

PATIENT CARE STANDARDS

The patient care standards refer to the modalities and frequency of care that should be prescribed in order to ensure safe, therapeutic nursing excellence. They are patient specific and are based on the individual needs of the patient.

"Standards of care set as a minimum baseline for professional practice and protect the public against less-than-quality care." (Dirschel, 1986: 27)

POST TRAUMATIC AMNESIA

" ... the time from injury to recovery of full orientation to time, place, and person." (Habermann, 1982: 220)

QUALITY CARE

Quality care refers to excellence of care (Lloyd, 1984: 14/2/4). Sound, good practice based on scientifically based criteria, standards and norms of practice. The quality of care refers to the character, type and nature of the care (Lloyd, 1984). For the purpose of this research it is the sum of the prescription, the frequency, the extent, the norm and the weighted norm of care received by the moderate and severely head injured patient.

REHABILITATION

"Rehabilitation is a compendium of many components - medical treatment, physical treatment, functional assessment, retraining and resettlement" (Nichols, 1975: 541) allowing the disabled person " ... to achieve the greatest possible efficiency in his physical, emotional, social and economic functions." (Brunner & Suddarth, 1974: 3)

RESEARCH MODULE

A set of research instruments designed to assess the quality of care received by the moderate and severely head injured patient.

SEVERE HEAD INJURY

"Glasgow Coma Scale score of 8 or less following non-surgical resuscitation or deterioration to a score of 8 or less within 48 hours after head injury." (Marshall, et al., 1983: 276)

TABLE OF CONTENTS

PAGE

ABSTRACT
DECLARATION (i)
DEDICATION (ii)
ACKNOWLEDGEMENTS (iii)
LIST OF ABBREVIATIONS (iv)
GLOSSARY (vi)
TABLE OF CONTENTS
LIST OF TABLES
LIST OF FIGURES
LIST OF APPENDICES

PART I INTRODUCTION

CHAPTER 1 INTRODUCTION 1

CHAPTER 2 STATEMENTS 7

CHAPTER 3 LITERATURE REVIEW 10

1. Epidemiology of head injuries. 10
2. Quality of comprehensive care. 16
3. The multidisciplinary team approach to comprehensive health care. 18
4. The medical management of head injuries. 23
5. Nursing. 39
6. Assuring nursing quality. 57
7. Sequalae of brain trauma 76
8. Recovery. 79
9. Rehabilitation. 85

PART II RESEARCH METHODOLOGY

CHAPTER 4 RESEARCH METHODS 111

1. Introduction. 111
2. Gaining access to the research site/s. 114
3. Evaluation of facilities for the comprehensive care and rehabilitation of head injured patients: 115
3.1 Legislation concerning the comprehensive care of head injured patients. 115
3.2 Visits to special centres. 115
3.3 The assessment of head injury facilities. 116
4. The survey of epidemiological data. 119
5. The selection of the patient group for inclusion in the section of the study concerned with patient recovery and the quality of care received by the moderate and severely head injured patient. 121
6. Research methodologies employed to gather information pertaining to the patients included in the study: 124
6.1 Assessment of patient - Day of admission. 124

6.2	Assessment of patient - Day of observation.	125
6.3	Patient dependency rating.	127
6.4	Letter of introduction.	127
6.5	Consent form.	127
6.6	Assessment of the pre-injury status of the patient and family knowledge.	128
6.7	Patient recovery:	129
6.7.1	Patient recovery record.	129
6.7.2	Post-injury assessment of the patient.	130
a.	Post-injury assessment.	130
b.	Assessment of present status of patient.	135
7.	The study of quality assurance and the comprehensive care of the head injured patient:	136
7.1	Situational analysis.	137
7.2	Methodology for concurrent auditing:	139
7.2.1	Selection of topic.	139
7.2.2	The selection of aspects relevant to the comprehensive care of the moderate and severely head injured patient:	139
a.	The aspects of comprehensive care.	139
b.	Evaluating the quality of care received:	145
(i)	Evaluating the prescription and frequency of care received.	145
(ii)	Patient care standards.	148
(iii)	Evaluating the extent, norm and weighted norm of care received.	148
7.2.3	Establishing criteria for measuring the extent, norm and weighted norm of care received by the moderate and severely head injured patient.	149
7.2.4	Compiling standards of practice:	153
a.	Compiling standards of practice to measure the norm and weighted norm of care.	153
b.	Compiling individual patient care standards.	155
7.2.5	Construction of the tools for use in the quality assurance study.	156
7.2.6	Quantification of factors comprising the tool.	161
7.2.7	Reliability and validity testing of instrument.	163
7.2.8	Scoring of care.	164
7.2.9	Expected compliance.	174
7.2.10	The use of the schedules.	174
7.2.11	Statistical analysis.	175
7.2.12	Implementation of the concurrent audit.	176
7.2.13	The quality assurance module.	181
7.3	Assessment of knowledge and clinical experience of unit staff	183
7.3.1	Unit personnel questionnaires.	183
7.3.2	Assessment of the education of student nurses.	185

PART III RESULTS

CHAPTER 5 PRESENTATION AND DISCUSSION OF FINDINGS 186

1.	Facilities for the comprehensive care of the moderate and severely head injured patient:	188
1.1	An overview of facilities available for the comprehensive management of head injured patients.	190
1.1.1	Head injury unit.	191
1.1.2	Rehabilitation facilities.	200
2.	Epidemiological findings relating to head injury:	210
2.1	Epidemiology of head injuries.	210
2.2	Epidemiology of patient group.	219
3.	Selection of sample.	222
4.	Patient status:	223
4.1	Description of patients on day of admission.	223
4.2	Description of patients on day of observation.	233

4.3	Patient dependency rating.	242
4.4	Patient care standards.	243
4.5	Assessment of the pre-injury status of the patients and family knowledge.	245
4.6	Patient recovery.	253
5.	Quality assurance:	281
5.1	Situational analysis.	281
5.2	Evaluating the quality of care received by the moderate and severely head injured patient:	287
5.2.1	The prescription of modalities of care received.	288
5.2.2	Overview.	294
5.2.3	Evaluation of the frequency of care received.	299
5.2.4	Evaluation of the quality of care received by moderate and severely head injured patients in terms of the extent, norm and weighted norm of care received.	307
a.	The overall percentage of care received.	307
b.	The extent of care received.	314
c.	The norm and weighted norm of care received.	320
5.2.5	Quality control.	342
5.2.6	Discussion of items in terms of the norm of care ratings.	345
5.2.7	Comment on the quality assurance module.	364
5.3	Assessment of the clinical knowledge and experience of staff caring for head injured patients.	372

CHAPTER 6	NURSING ETHICS	388
CHAPTER 7	RÉSUMÉ OF THE RESEARCH FINDINGS	396
PART IV	EVALUATION, CONCLUSIONS AND RECOMMENDATIONS	
CHAPTER 8	CONCLUSIONS	399
CHAPTER 9	RECOMMENDATIONS	406
1.	Establishing facilities for the comprehensive care of the head injured patient.	406
2.	Epidemiology of head injuries.	407
3.	Patient recovery.	409
4.	Comprehensive rehabilitation.	410
5.	The introduction of quality assurance in the unit.	416
6.	The multidisciplinary team.	417
7.	Communication.	418
8.	The management of the head injured patient.	421
9.	Nursing the head injured patient:	424
9.1	General considerations.	424
9.2	Nurse staffing.	461
9.3	Education and clinical expertise of nursing staff.	472
9.4	Recommendations for further research.	481
CHAPTER 10	PROBLEMS AND LIMITATIONS INHERENT IN THE RESEARCH	484
CHAPTER 11	FINALE	489

APPENDICES
REFERENCES
BIBLIOGRAPHY

LIST OF TABLES

		Page
3:1	Age distribution of head injured patients in various studies (expressed as percentages)	12
3:2	Sex distribution of head injured patients in various studies (expressed as a ratio or percentage of sample)	13
3:3	The mechanism of head injury in various studies (expressed as percentages*)	14
3:4	The legal limit for serum alcohol	15
3:5	The number of head injury deaths that occur per 10^5 population per annum	15
3:6	Monitoring patient status	44
3:7	Standards for the frequency of assessment of the neurosurgical patient	45
3:8	Glasgow Coma Scale (G.C.S.)	45
3:9	Nursing diagnoses pertaining to head injury	50
3:10	A comparison of The Quality Patient Care Scale and The Slater Nursing Competencies Rating Scale	73
3:11	Sequalae of head trauma	77
3:12	The extent of recovery of head injured patients in three countries according to the Glasgow Outcome Scale (expressed as percentages)	85
3:13	The extent of recovery of severe head injuries at three centres according to the Glasgow Outcome Scale (expressed as percentages)	85
4:1	Summary of the research methodologies and means of data analysis utilized	112
4:2	Name and location of institutions visited	116
4:3	The design and structure of the questionnaires relating to the HEAD INJURY UNIT (I) and REHABILITATION FACILITIES (IIA/B)	117
4:4	The number of institutions who received questionnaires	118
4:5	Mechanism of head injury	120
4:6	Severity of injury	120

4:7	Outcome after head injury	121
4:8	Average number of head injured patients admitted to the trauma unit (November, 1982 - October, 1983)	123
4:9	The design of the data sheet: Assessment of patient - Day of admission	125
4:10	The design of the data sheet: Assessment of patient - Day of observation	126
4:11	The design of the questionnaire: Assessment of the pre-injury status of the patient and family knowledge	129
4:12	Definition of terms	131
4:13	The design of the questionnaire: The post-injury assessment of the patient	131
4:14	The design of PART II - THE CHECKLIST	132
4:15	Items not included in the calculation of patient recovery	133
4:16	The design of the data sheet: Assessment of present status of patient	136
4:17	The design of the situational analysis data sheet	138
4:18	Explanation of terms	138
4:19	Modalities of care included in the study as part of comprehensive management of the head injured patient	141
4:20	Modalities of care that are examined in terms of the prescription, patient care standards, the frequency, extent, norm and weighted norm of care received	142
4:21	Modalities of care that are evaluated in terms of extent, norm and weighted norm of care received	143
4:22	The relevance of nursing, the multidisciplinary team and rehabilitation to the modalities of care under study	144
4:23	Explanation of terms	146
4:24	An example of a frequency of care data sheet designed for one observational shift	147
4:25	The relationship of the overall study to the three approaches to quality assurance	150
4:26	Schedules that contain a component of all three aspects of quality assessment	151
4:27	Schedules relating to patient management that measure process alone	151
4:28	Summary of the number of quality assurance criteria included in the study	153

4:29	Explanation of identifying data on the schedule	157
4:30	Explanation of the schedule designed to measure the extent, norm and weighted norm of care received	159
4:31	Extracts from the schedules LEVEL OF CONSCIOUSNESS and BLOOD PRESSURE to illustrate the placement of items in rank order	160
4:32	Extracts from the schedules BRONCHIAL TOILET and UROGENITAL CARE to illustrate the placement of items in group order	161
4:33	Levels of care	161
4:34	Description of values for item weighting	162
4:35	Rating scale and value assigned for extent of care received	162
4:36	Rating scale and value assigned for norm of care received	163
4:37	An example of a frequency of care data sheet designed for one observational shift	165
4:38	Rating scale and value assigned for norm of care received	171
4:39	An example of the schedule PULSE to illustrate the calculation of the total weighted norm of care score	172
4:40	An example of the schedule PULSE to illustrate the calculation for NOT APPLICABLE items	173
4:41	An example of the schedule PULSE to illustrate the calculation of the sum of the weighted norm of care score attained	173
4:42	Cubicle size and patient dependency	176
4:43	The number of times each shift was utilized to observe patients	177
4:44	Summary of the qualifications of the observers	178
4:45	The design of the unit personnel questionnaires	184
4:46	The design of the questionnaire: Education of Student Nurses	185
5:1	Distribution of questionnaires	190
5:2	Type of unit	191
5:3	Sub-division of unit for bed allocation	191

5:4	The average number of head injured patients admitted to the unit per month, per institution	192
5:5	Summary of the post-registration professional qualifications of the nursing staff in the unit, per institution	193
5:6	The grade of nursing students allocated to the unit	194
5:7	The status of nursing students in the unit	194
5:8	Methods of evaluation employed to assess the quality of care in the unit	194
5:9	Personnel responsible for the teaching of Student Nurses in the unit	195
5:10	System of practical assignment	196
5:11	Method of recording neurological observations	196
5:12	The frequency of nursing care prescribed for a patient with a severe head injury (G.C.S. ≤8/15)	197
5:13	Discharge assessment performed by health professionals	198
5:14	Type of facilities where head injured patients were admitted for rehabilitation purposes	200
5:15	Facilities that were available at the rehabilitation centres	201
5:16	The average number of live-in head injured patients admitted to the centre per month, per institution	201
5:17	Professional services that were available at the rehabilitation facilities	202
5:18	Assessment of the patient on admission to and at discharge from the rehabilitation facilities, by the various health professionals	202
5:19	Staff establishment	203
5:20	Systems of practical assignment employed	205
5:21	The family's involvement in the rehabilitation setting	206
5:22	Methods of introducing the patient to the home setting	207
5:23	Reasons cited for the lack of co-ordinated rehabilitation facilities	207
5:24	The placement of the head injured patient on discharge from the acute setting	208
5:25	The assessment of the patient prior to discharge from the acute setting	208
5:26	The availability of rehabilitation services in the acute setting	209

5:27	Sex distribution of patients	211
5:28	Mean age of sample	212
5:29	Age distribution of sample	212
5:30	Age distribution of males	213
5:31	Age distribution of females	213
5:32	Mechanism of injury	213
5:33	Severity of head injury on admission	215
5:34	The route of admission of head injured patients admitted to the trauma unit	216
5:35	Placement of the patients on discharge from the trauma unit	216
5:36	The distribution of the length of stay of head injured patients in the trauma unit	217
5:37	Sex distribution	220
5:38	Age distribution of patients	220
5:39	Marital status	221
5:40	Mechanism of injury	221
5:41	Route of admission	222
5:42	Length of stay in trauma unit	222
5:43	Monthly distribution of patients	223
5:44	The distribution of the periods of observation per day of the week	223
5:45	Classification of the neurological disorders on admission	224
5:46	Associated injuries on admission	225
5:47	Pre-existing disorders of patients	225
5:48	Summary of the level of consciousness on admission	226
5:49	Summary of the pupil responses on admission	227
5:50	Summary of motor function on admission	229
5:51	Means of airway maintenance on admission	230

5:52	Record of alcohol consumption	230
5:53	Insertion of intravenous therapy	231
5:54	Insertion of nasogastric drainage	231
5:55	Insertion of urinary drainage system	231
5:56	Investigations performed on admission	232
5:57	Summary of the medications recorded as prescribed on admission	232
5:58	Length of time post head injury in relation to the period of observation	233
5:59	Maintenance of airway on the day of observation	233
5:60	A comparison of the nursing personnels' and researcher's assessment of the Glasgow Coma Scale Total Score	234
5:61	Status of limbs on the day of observation	235
5:62	Assessment of motor function on the day of observation by the researcher	235
5:63	Summary of the medications administered to the patients on the day of observation	237
5:64	Means of feeding employed	237
5:65	Means of monitoring output	238
5:66	Means of restraint	239
5:67	Permissible stimulation	241
5:68	Summary of dependency rating per patient	242
5:69	Classification of patients according to the dependency rating	243
5:70	Summary of the patient care standards per patient as established for the day of observation by the researcher	244
5:71	Marital status of patients	245
5:72	Religious affiliation of patients	246
5:73	Place of residence prior to injury	246
5:74	Living arrangements	246
5:75	Description of patient's personality and mood	247

5:76	The assessment of motivation in terms of betterment, enjoying life and desire to achieve needs	247
5:77	Frequency of socialisation	248
5:78	Involvement of patients in community work	248
5:79	Hobbies of patients	249
5:80	Sports undertaken	249
5:81	Frequency of participation in sport	249
5:82	Educational standard achieved	250
5:83	Employment status	250
5:84	Occupation of patients	251
5:85	Income per month	251
5:86	Aspects of information provided to families	252
5:87	Recovery of patients based on the Glasgow Outcome Scale	253
5:88	Placement (on discharge from the trauma unit)	254
5:89	Length of stay in primary and secondary placement centres	255
5:90	Attendance at out-patient facilities	255
5:91	The involvement of the health professionals at various intervals since injury	256
5:92	Formal assessment of the patients since injury	256
5:93	Detail of information	257
5:94	Preparation of the families and significant others prior to discharging the patients from The Hospital	257
5:95	Personnel who advised the families to stimulate the patients	258
5:96	Means employed by the families to stimulate the patients	258
5:97	Summary of the time of the patient's first responses	258
5:98	The nature of the patient's first response to the family/significant others	259
5:99	Means of transport used by the patients (12 months after injury)	259

5:100	Variations in the patients' attitude to the injury (12 months after injury)	260
5:101	The future plans of the patients (12 months after injury)	279
5:102	Persistent problems of the patients (two years after injury)	280
5:103	Aids required to assist mobility	280
5:104	Services of health professionals needed two years after injury	281
5:105	Trauma unit staffing establishment	282
5:106	The number of nursing personnel allocated to the unit per month (November, 1983 - April, 1984)	282
5:107	The ratio of registered and non-registered nursing personnel in the unit, according to the established norm	283
5:108	The actual ratio of Registered Nurses and non-registered nursing personnel per month (expressed as percentages)	283
5:109	The staff allocation and the overall patient dependency during the periods of observation	284
5:110	The staff allocation, number of patients and nursing assignment in the specific cubicle during the periods of observation	285
5:111	The modalities and expected frequency of performance of care according to the prescription for care and the patient care standards	290
5:112	The modalities of care and expected frequency of performance omitted from the prescription for care according to the patient care standards, per patient	291
5:113	The overall expected frequency of care according to the prescription for care and the patient care standards, per modality	291
5:114	The overall expected frequency of care according to the prescription for care and the patient care standards, per patient	292
5:115	Number of schedules used in study per type of intervention	295
5:116	A comparison of the number of schedules for recorded care and actual care received per modality per category of personnel	295
5:117	The overall percentage performance of actual care received per category of personnel	297
5:118	The overall frequency of care received per prescribed modality	300
5:119	The overall true percentage prescribed frequency of care received per patient	302

5:120	The overall frequency of care received according to the performed frequency of care and the patient care standards, per modality	303
5:121	Changes that occurred in the overall true percentage frequency of care received according to the prescription for care and the patient care standards, per modality (vide TABLE 5:118 and 5:120)	303
5:122	The overall frequency of care received according to the performed frequency of care received and the patient care standards, per patient	304
5:123	Changes that occurred in the care category when the patient care standards were introduced	305
5:124	The overall percentage of care received by moderate and severely head injured patients (extent, norm and weighted norm)	307
5:125	The overall percentage of care received per patient (extent, norm and weighted norm)	309
5:126	The overall percentage of care received per grouped modalities (extent, norm and weighted norm)	313
5:127	An overview of the quality of actual care received showing the range of scores and overall care category per modality (extent, norm and weighted norm)	332
5:128	The overall performance of actual care received per category of personnel as noted by the co-observers	342
5:129	A comparison of the observers' scores for the overall percentage of care received by moderate and severely head injured patients (extent, norm and weighted norm)	342
5:130	A comparison of the observers' scores for the overall percentage of actual care received per patient (extent, norm and weighted norm)	343
5:131	A comparison of the observers' overall percentages for actual care received per modality (extent, norm and weighted norm)	344
5:132	The total number of items per schedule according to the item weighting system	345
5:133	The total number of ratings of actual care received according to the item weighting, per modality	346
5:134	The overall distribution of the norm of care ratings for actual care received on the six-weighted items per modality	347
5:135	The distribution of the norm of care ratings for actual care received on six-weighted items per category of personnel	348
5:136	The rating of LEVEL OF CONSCIOUSNESS per ITEMS 9, 34, 35 and 45	351
5:137	The rating of ITEMS 15, 31, 33 and 38	358
5:138	Distribution of the quality assurance module	364

5:139	Response to questionnaires	372
5:140	Professional qualifications of medical personnel	372
5:141	Professional qualifications of Registered Nurses	372
5:142	Educational level of Student Nurses and Pupil Nurses	373
5:143	Attendance of Student Nurses at college/university prior to working in the unit	374
5:144	The syllabus of the training school/university completed by Student Nurses prior to working in the unit	374
5:145	The number of periods and year of study in which subjects related to the nervous system were undertaken, according to the prescribed syllabus of the training school	375
5:146	Topics related to the nervous system that were included in the overall nursing science syllabus of the training school	375
5:147	Topics related to the nervous system that were included in the training school syllabus for General Nursing and Science and Art III	376
5:148	Clinical experience of personnel working in the unit	377
5:149	Length of time spent in these areas	377
5:150	Tuition of personnel on commencement in unit	379
5:151	Knowledge of possible causes of increased intracranial pressure	380
5:152	Knowledge of the clinical features of increased intracranial pressure	381
5:153	Knowledge of the significance of clinical features	381
5:154	Knowledge of the monitoring of an acute severely head injured patient	382
5:155	The frequency of performance of neurological observations as stated by respondents	383
5:156	Knowledge of aspects of management of the severely head injured patient	384
5:157	Knowledge of specific nursing care required by the severely head injured patient	384
5:158	Knowledge of members of the health team involved in patient management	385
5:159	The need for additional information as expressed by the nursing personnel	386
5:160	The need for various facilities to be introduced at The Hospital	386

6:1	Summary of the ethical issues requiring no observer intervention	391
6:2	Summary of the ethical issues necessitating observer intervention	393
9:1	Example of programme card	412
9:2	Number of schedules that could be used to evaluate care received over a two hour period	429
9:3	Nursing care plan for the moderate and severely head injured patient	432
9:4	The salary scale for nursing staff	463
9:5	Ratio of professional nurses to sub - professional nurses	465
9:6	Unit staff establishment	471

LIST OF FIGURES

		Page
Fig. 3:1	The multidisciplinary team	19
Fig. 3:2	Quality assurance model	65
Fig. 4:1	Gaining access to the research site/s	114
Fig. 4:2	An example of a completed section of THE CHECKLIST: FEEDING to illustrate the calculation of the percentage recovery of the patient	134
Fig. 4:3	An example of the schedule: PULSE	158
Fig. 4:4	An example of a completed schedule: PULSE	169
Fig. 5:1	Schematic overview of research findings	187
Fig. 5:2	The mechanism of injury (expressed as percentages)	214
Fig. 5:3	Scarring as a result of incorrect restraint of PATIENT 18	240
Fig. 5:4.1	Recovery of PATIENT 6 at three, six and 12 months after injury (expressed as percentages)	261
Fig. 5:4.2	Recovery of PATIENT 7 at three, six and 12 months after injury (expressed as percentages)	263
Fig. 5:4.3	Recovery of PATIENT 8 at three, six and 12 months after injury (expressed as percentages)	264
Fig. 5:4.4	Recovery of PATIENT 9 at three, six and 12 months after injury (expressed as percentages)	266
Fig. 5:4.5	Recovery of PATIENT 11 at three, six and 12 months after injury (expressed as percentages)	267
Fig. 5:4.6	Recovery of PATIENT 12 at three, six and 12 months after injury (expressed as percentage)	269
Fig. 5:4.7	Recovery of PATIENT 14 at three, six and 12 months after injury (expressed as percentage)	270
Fig. 5:4.8	Recovery of PATIENT 15 at three, six and 12 months after injury (expressed as percentages)	271
Fig. 5:4.9	Recovery of PATIENT 16 at three, six and 12 months after injury (expressed as percentages)	273
Fig. 5:4.10	Recovery of PATIENT 17 at three, six and 12 months after injury (expressed as percentages)	274

Fig. 5:4.11	Recovery of PATIENT 18 at three, six and 12 months after injury (expressed as percentages)	275
Fig. 5:4.12	Recovery of PATIENT 19 at three, six and 12 months after injury (expressed as percentages)	276
Fig. 5:4.13	Recovery of PATIENT 20 at three, six and 12 months after injury (expressed as percentages)	277
Fig. 5:5	The number of times a category of personnel performed the actual care of a modality (expressed as percentages)	299
Fig. 5:6	The overall percentage of recorded care received per category of personnel (extent, norm and weighted norm)	310
Fig. 5:7	The overall percentage of actual care received per category of personnel (extent , norm and weighted norm)	311
Fig. 5:8	The overall percentage of actual care per modality (extent of care)	314
Fig. 5:9.1	The range of overall percentage of actual care received for neurological assessment per modality (extent of care)	316
Fig. 5:9.2	The range of overall percentage of actual care received for assessment of vital signs per modality (extent of care)	316
Fig. 5:9.3	The range of overall percentage of actual care received for patient care per modality (extent of care)	317
Fig. 5:9.4	The range of overall percentage of actual care received for patient independence per modality (extent of care)	317
Fig. 5:9.5	The range of overall percentage of actual care received for motivation and stimulation per modality (extent of care)	318
Fig. 5:10.1	The overall percentage of actual care received per patient assessment and patient care modalities per category of personnel (extent of care)	319
Fig. 5:10.2	The overall percentage of actual care received per patient independence modalities per category of personnel (extent of care)	319
Fig. 5:11	The overall percentage of actual care received per modality (norm of care)	320
Fig. 5:12	The overall percentage of actual care received per modality (weighted norm of care)	321
Fig. 5:13.1.1	The range of overall percentage of actual care received for neurological assessment per modality (norm of care)	322
Fig. 5:13.1.2	The range of overall percentage of actual care received for neurological assessment per modality (weighted norm of care)	322
Fig. 5.13.2.1	The range of overall percentage of actual care received for vital signs per modality (norm of care)	323

Fig. 5:13.2.2	The range of overall percentage of actual care received for vital signs per modality (weighted norm of care)	323
Fig. 5:13.3.1	The range of overall percentage of actual care received for patient care per modality (norm of care)	324
Fig. 5:13.3.2	The range of overall percentage of actual care received for patient care per modality (weighted norm of care)	324
Fig. 5:13.4.1	The range of overall percentage of actual care received for patient independence per modality (norm of care)	325
Fig. 5:13.4.2	The range of overall percentage of actual care received for patient independence per modality (weighted norm of care)	325
Fig. 5:13.5.1	The range of overall percentage of actual care received for motivation and stimulation per modality (norm of care)	326
Fig. 5:13.5.2	The range of overall percentage of actual care received for motivation and stimulation per modality (weighted norm of care)	326
Fig. 5:14.1	The overall percentage of actual care received per patient assessment and patient care modalities per category of personnel (norm of care)	329
Fig. 5:14.2	The overall percentage of actual care received per patient independence modalities per category of personnel (norm of care)	329
Fig. 5:15.1	The overall percentage of actual care received per patient assessment and patient care modalities per category of personnel (weighted norm of care)	330
Fig. 5:15.2	The overall percentage of actual care received per patient independence modalities per category of personnel (weighted norm of care)	331

LIST OF APPENDICES

Introduction to setting	A
Permission to undertake study	B1; B2
Letter to Heads of Departments	B3
REGARDING AVAILABLE FACILITIES:	C
Letter to policy making institutions/authorities	C1.1;1.2
Letter regarding visit to centres in the U.K.	C2
QUESTIONNAIRE I HEAD INJURY UNIT	C3
QUESTIONNAIRE IIA COMPREHENSIVE REHABILITATION FACILITY AVAILABLE	C4
QUESTIONNAIRE IIB NO COMPREHENSIVE REHABILITATION FACILITY AVAILABLE	C5
Covering letters regarding available facilities:	
Facilities visited	C6
International facilities	C7
National facilities	C8
EPIDEMIOLOGICAL SURVEY	D
PATIENT STATUS:	E
DATA SHEET I ASSESSMENT OF PATIENT - DAY OF ADMISSION	E1
DATA SHEET II ASSESSMENT OF PATIENT - DAY OF OBSERVATION	E2
PATIENT DEPENDENCY RATING	E3.1
CLASSIFICATION FOR PATIENT DEPENDENCY	E3.2
Letter of introduction	E4
Consent form	E5
ASSESSMENT OF THE PRE-INJURY STATUS OF THE PATIENT AND FAMILY KNOWLEDGE	E6
Covering letter for E6	E7
INSTRUCTIONS FOR COMPLETING THIS RECORD	E8
POST-INJURY ASSESSMENT:	
PART I THE QUESTIONNAIRE	E9
PART II THE CHECKLIST	E10
Covering letter	E11

ASSESSMENT OF PRESENT STATUS OF PATIENT	E12
QUALITY ASSURANCE:	
DATA SHEET III SITUATIONAL ANALYSIS	F1
CLASSIFICATION FOR OVERALL PATIENT DEPENDENCY	F2
FREQUENCY OF CARE DATA SHEET	G
Letter to Chief Matron Education	H1
Data sheet	H2
Schedules	I 1 -27
Standard practice guides	J 1 - 27
Patient care standards	K
Expected compliance	L
INSTRUCTIONS FOR OBSERVERS PRIOR TO COMMENCING THE OBSERVATION	M
Letter to Sister-in-charge of the unit	N1
FACT SHEET	N2
Letters regarding quality assurance comment:	O
Neurosurgical nursing experts	O1
Nursing experts	O2
Nurses in clinical practice	O3
EXPLANATION AND USE OF SCHEDULES	P
Unit personnel questionnaires:	Q
NURSING PERSONNEL QUESTIONNAIRE	Q1
MEDICAL/PARAMEDICAL QUESTIONNAIRE	Q2
Letter of introduction to personnel:	
First response	Q3
Second response	Q4
Letter to Principal of Nursing College	Q5
EDUCATION OF STUDENT NURSES	Q6
RESULTS OF CARE	R
QUALITY CONTROL	S
PROTOCOLS OF MANAGEMENT	T
JOB DESCRIPTION OF NURSING PERSONNEL	U
SPECIALIST NURSING COURSES	V

CHAPTER 1

INTRODUCTION

Comprehensive care of the moderate and severely head injured patient, based on a multidisciplinary approach, commences after injury and continues until maximum recovery has been achieved. The concept of comprehensive care has always been regarded as an integral aspect of nursing practice.

"Nursing Science is a human clinical health science that constitutes the body of knowledge for the practice of persons registered or enrolled under the Nursing Act, as nurses ... it is concerned with the development of knowledge for the nursing diagnosis, treatment and personalized health care of persons exposed to, suffering or recovering from physical or mental ill-health. It encompasses the study of preventive, promotive, curative and rehabilitative health care for individuals, families, groups and communities and covers man's life-span from before birth." (Directive for the course leading to registration as a nurse (general, psychiatric and community) and midwife. April 1985: 1)

The rehabilitation of patients suffering from head injuries is included in the definition of nursing.

"The unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death:) that he would perform unaided if he had the necessary strength, will or knowledge. And to do this in such a way as to help him gain independence as rapidly as possible. This aspect of her work, this part of her function, she initiates and controls; of this she is master... She also, as a member of a medical team, helps other members, as they in turn help her, to plan and carry out the total program whether it be for the improvement of health, or the recovery from illness or support in death." (Henderson, 1966: 15)

Orem (1980) when defining nursing, describes the role of the nurse in relation to patient independence and self-care; factors that are fundamental to the comprehensive care of the moderate and severely head injured patient.

HEALTH CARE CONCEPTS BASIC TO THIS STUDY:

1. THE PATIENT AS A HOLISTIC BEING

The patient is an individual with needs of a physical, psychological, emotional, social, spiritual, educational and economic nature that are particular to his/her circumstances. Integrated man in totality must be attended to by a multidisciplinary team.

2. NURSING EXCELLENCE IS A PRIORITY FOR PATIENT CARE

The nurse is the one member of the health team who has the most contact and therefore the greatest opportunity to work with the patient and the family, throughout all phases of recovery.

Quality care is the aim of nursing service and education. Therefore in a comprehensive care setting, nurses individually and collectively, must ensure that the quality of nursing maximises recovery. The quality of care received by the moderate and severely head injured patient may be described in terms of direct nursing intervention that includes analysis of the prescription, frequency, extent and norm of care received

The role of the nurse in the comprehensive care of the head injured patient is independent, interdependent and dependent (Searle, 1982). It is necessary to differentiate those aspects of comprehensive care that relate to direct nursing intervention (independent function) such as patient assessment and the maintenance of patient hygiene; those that relate to medical intervention (dependent) such as the administration of medications; and those that relate to paramedical or wider team intervention (interdependent) such as communication with the patient and family, mobility, exercise therapy, motivation and stimulation of the patient and promotion of independence. There are many variables that may intervene and influence the final outcome and ultimate recovery of the moderate and severely head injured patient. It is thus difficult to prove or evaluate the direct effect that the initial quality of the nursing service has on final patient outcome (vide p64).

In the opinion of the researcher, the nurse is not always aware of the significance of her role throughout the recovery of the patient who has suffered a head injury, particularly regarding preventive rehabilitation and reality orientation. It appears that insufficient emphasis has been placed on the effect of nursing on:

2.1 The physical, psychological, emotional, social and economic well-being of the patient, the family and the community.

2.2 Morbidity and mortality throughout the path to recovery.

3. THE ESSENCE OF NURSING EXCELLENCE IS IN THE APPLICATION OF KNOWLEDGE

The 'body of knowledge' that constitutes nursing practice enables the professional nurse to provide quality nursing to the head injured patient. A broad knowledge base in the

scientific and social sciences allows the nurse to accept her rightful role in the comprehensive care setting. The responsibility for ensuring that nurses acquire the knowledge, clinical expertise and the ability to correlate theory and practice in order to attain and maintain excellence in neurosurgical nursing, is vested in registered nurses as practitioners, life long learners and teachers.

The nurse, as peer in the health team involved in the comprehensive care including the rehabilitation of head injured persons, needs an extensive foundation of knowledge based on scientific principles that can be applied to achieve excellence.

4. THE USE OF THE NURSING PROCESS (SCIENTIFIC APPROACH IN NURSING)

The nursing process, through a systematic approach, enables the nurse to utilize nursing knowledge in the pursuit of excellence, in the care of the head injured patient.

4.1 The scientific approach in nursing includes the following:

4.1.1 The recognition, assessment and evaluation of the physical, psychological, emotional, social, economic, educational and spiritual needs, be the needs overt or covert, of the patient and/or significant others.

4.1.2 The establishment of nursing diagnoses in order to plan intervention. This incorporates the setting of immediate, intermediate and long term goals.

4.1.3 The implementation of the prescribed, individualised nursing care plan.

4.1.4 The evaluation of the effectiveness of care in terms of:

a. Patient outcome.

b. The individual programme.

4.1.5 The documentation of the intervention required, the findings and the outcome of care received.

4.2 The nurse in order to provide quality nursing must utilize the nursing process during all stages of comprehensive care of the head injured patient:

4.2.1 For the prevention of head injuries utilizing epidemiological data.

4.2.2 When providing preventive rehabilitation simultaneously with curative care.

4.2.3 During the recovery phase.

4.2.4 For discharge planning and follow-up care.

4.2.5 As a means of evaluating outcome.

5. QUALITY HEALTH CARE IS THE AIM OF THE HEALTH TEAM

It is the right of every patient to expect excellence from those health professionals delivering the care (Searle, 1986). The comprehensive care of the head injured patient is preventive, curative and rehabilitative in nature and is part of a quality health service. Quality care includes the availability of facilities and resources for the rehabilitation and maximum recovery of the moderate or severely head injured patient.

In the best interests of the head injured patient the staff establishment should be multidisciplinary. Each health professional needs to take cognizance of his/her responsibility and role in relation to the patient and together with other health professionals must be involved from the outset of the rehabilitative process. In the opinion of the researcher, valuable nursing time should be used to provide direct and indirect care to the head injured patient, in consultation with the family and other health professionals and not in seeking out health professionals who should be readily available for the co-ordinated care of the head injured patient.

The nurse as co-ordinator of the health team, in a professional and individual capacity, is responsible and accountable for the quality of nursing care provided for the patient and should make a meaningful contribution to the health team. The emphasis in the rehabilitation setting is placed on the role of the physician, physiatrist and the allied health personnel. For too long the contribution of the nurse to the rehabilitation team has been minimised. This situation has resulted, in part, in the nurse in the rehabilitation setting being regarded more as 'house mother' than a professional person with responsibility and accountability for nursing excellence. The researcher believes that this custodial approach to rehabilitation nursing is one of the reasons for few registered nurses in South Africa being active in this specialised field.

6. FOUNDATIONS FOR REHABILITATION

The foundation for the rehabilitation towards maximum recovery of the patient who is suffering from a moderate or severe head injury is based on co-ordinated, comprehensive care that includes preventive and curative rehabilitation. Rehabilitation commences as soon after injury as possible and occurs simultaneously, not following other aspects of health care. The role of the nurse in preventive and curative rehabilitation must be emphasized.

Nursing based on scientific principles of practice is involved in the promotion of health, the prevention of disease, the care and the rehabilitation of the head injured patient. Fölscher (1974: 75) expresses the importance of the care received by the head injured patient

"... die aard en standaard van die behandeling wat die pasiënt met hoofbeserings direk na besering sowel as gedurende die verloop van sy siekte ontvang, bepalend kan wees van sy prognose, insidensie en graad van komplikasies wat mag intree en sy uiteindelike rehabilitasie." (Freely translated as ... the nature and quality of care which the patient with head injuries receives directly after the injury and during the course of the illness may determine his prognosis, the incidence and extent of complications that may arise and his ultimate rehabilitation.)

Thus the main concern of the thesis focuses on the evaluation of the quality of comprehensive care received by the moderate and severely head injured patient in terms of:

1. The availability of facilities and resources for effective care and rehabilitation of moderate and severely head injured patients.
2. Epidemiological data for the primary prevention of head injuries.
3. The progress and recovery of the patient at three months , six months, 12 months and two years after injury.
4. The quality of comprehensive care received by the head injured patient, in terms of:
- 4.1 Preventive and curative rehabilitation.
- 4.2 The prescription, frequency, extent, norm and weighted norm of care received by the patient, irrespective of who delivered the care to the patient.
- 4.3 The establishment of standards of quality care on which to base future nursing practice, in order to assist the patient in his/her progress and recovery towards maximum functional capacity.
- 4.4 Knowledge with regard to the management of the head injured patient.

The research is founded on the premise that the researcher, a Registered Nurse, has the knowledge base to investigate the comprehensive care received by the head injured patient from the time of admission until two years after injury.

The researcher has always had a special interest in neurosurgical nursing. In 1978 as there was no such course available in South Africa, The Rotary Club of Johannesburg South awarded the researcher a scholarship to undertake a post-graduate course in neurosurgical nursing in the United Kingdom. While studying in the United Kingdom the researcher was impressed by the rate and extent of recovery of the head injured patients with whom she came in contact, yet puzzled as to why the majority of head injured patients that she had previously nursed had remained in a persistent vegetative state or with a severe disability (Jennett & Bond, 1975). A fundamental belief of the researcher persistently recurred:

MAN MUST BE GIVEN EVERY OPPORTUNITY TO FUNCTION AT MAXIMUM CAPACITY

Closer examination of the patients' recovery revealed the fact that these patients had been subjected to a comprehensive, co-ordinated care and rehabilitation programme. The researcher was ever conscious of the positive approach to the patient as a total being and the fact that maximum recovery (whether complete or partial) was possible if the patient was exposed to the right circumstances. It was the fact that the head injured patients had done so well that inspired the researcher, on her return, to undertake this study into the comprehensive care of the head injured patient in this environment (S.A.). The researcher wondered 'Why had the patients I had nursed not achieved similar levels of recovery?'

The aim of the research was to investigate the circumstances of the head injured patients in an endeavour to assist them to function at maximum capacity, achieve independence and improve their quality of life. The researcher realised it was an area that had not been fully investigated and now was the time for her to prove her commitment in the interest of the head injured patient.

CHAPTER 2

STATEMENTS

The title of the research "The comprehensive care of the moderate and severely head injured patient" is broad. This is intentional, as it is important to realise that comprehensive care is a fundamental concept, commencing on the day of injury and continuing until maximum recovery has been achieved.

The principles underlying the comprehensive care of the moderate and severely head injured patient that are under investigation in the study include:

1. **FACILITIES FOR THE COMPREHENSIVE CARE OF HEAD INJURED PATIENTS IN SOUTH AFRICA SHOULD BE ADEQUATE.**

1.1 Head injured patients receive care in a specific head injury unit.

1.2 Co-ordinated rehabilitation units for head injured patients exist.

2. **RESPONSIBILITY FOR THE COMPREHENSIVE CARE OF THE MODERATE AND SEVERELY HEAD INJURED PATIENT IS EVENLY DISTRIBUTED AMONGST THE HOSPITAL SERVICES, THE FAMILY AND THE COMMUNITY.**

3. **THE EPIDEMIOLOGY OF HEAD INJURED PERSONS IN SOUTH AFRICA FOLLOWS THE SAME PATTERN AS THOSE IN THE UNITED KINGDOM AND UNITED STATES OF AMERICA.**

3.1 The role of the nurse regarding preventive rehabilitation is enhanced by knowledge of epidemiological data.

4. **THE COMPREHENSIVE CARE OF THE HEAD INJURED PATIENT IS BASED ON CO-ORDINATED TEAM EFFORT.**

4.1 Team involvement is well planned and co-ordinated to meet the needs of the head injured patient.

4.2 Family involvement in the management of the patient is maximal.

5. **REHABILITATION IS CO-ORDINATED, PLANNED, PROGRAMMED AND INDIVIDUALISED.**

6. **THE CARE AND REHABILITATION RECEIVED BY THE HEAD INJURED PATIENT CONTRIBUTES TO THE PATIENT FUNCTIONING AT MAXIMUM CAPACITY.**

7. **THE PATIENT HAS A RIGHT TO QUALITY CARE.**

7.1. Quality is the essence of comprehensive patient care, therefore the foundations must be based on scientifically formulated criteria.

7.2 Quality care depends on a multidisciplinary approach.

7.3 Care received by head injured patients is constant. Irrospective of who delivers the care a high degree of competence is maintained at all times.

7.3.1 The knowledge of the care-givers is adequate to maintain competency.

7.4 The care received by moderate or severely head injured patients forms part of the preventive rehabilitation for the individual patient.

7.5 The quality of care received by head injured patients, particularly in areas such as communication, motivation and stimulation promotes the rehabilitation process.

POSING THE RESEARCH PROBLEMS

After making the afore-mentioned statements the researcher asked the following questions:

1. What facilities are available for the comprehensive care and rehabilitation of head injured persons?
2. Are there co-ordinated head injury and rehabilitation units/programmes for head injured persons?
3. Where are head injured patients managed?
4. Is a specific head injury unit necessary?
5. What are the epidemiological findings with regard to head injuries?
6. What is the level of recovery of the head injured patients three months , six months, 12 months and two years after injury?
7. What is the quality of care received by head injured patients?
8. What preventive rehabilitation is received by persons who have suffered moderate or severe head injuries.
9. What is the staffing level for care?
10. What is the educational level of the care-givers?

The study is vast and focuses on the head injured patient from time of injury until two years thereafter and covers many aspects of comprehensive care. Although all aspects are of importance the comprehensive nature of the study is itself a limitation, therefore in as far as the research is concerned the areas of major import are those concerned with patient recovery, preventive rehabilitation, the quality of care and rehabilitation.

The study attempts to highlight aspects of care that are of concern to health practitioners, the patient and the family. It is an endeavour to assess the resources available for the comprehensive care of moderate and severely head injured patients.

In terms of comprehensiveness and content the thesis is a major undertaking but the researcher believes:

(i) In order to assess recovery in its correct perspective one needs to be aware of the facilities and resources available to the patient and family that promote recovery.

(ii) The epidemiological survey to discover the origin of head injured patients is necessary. This study could be regarded as an independent study but in this instance forms the basis for further patient selection.

(iii) That when one is examining the comprehensive care and recovery of head injured patients it is not possible:

(a) To examine the quality of care without completing a situational analysis.

(b) To examine recovery unless one has a knowledge of the patient's history.

The researcher on completing the investigation and in the light of the findings will attempt to discuss the statements and answer the above questions.

CHAPTER 3

LITERATURE REVIEW

The study incorporates the comprehensive care of the moderate and severely head injured patient, extending from the time of injury and includes preventive, curative and rehabilitative aspects of head injury management throughout recovery.

There is an abundance of literature pertaining to certain aspects of the research such as the medical management of a patient with a severe head injury and a dearth of literature in other spheres such as quality assurance programmes relating to neurosurgical nursing. The literature review extends over a period of 26 years (1960-1986) and is extensive as the detailed content is required to establish fundamental principles of comprehensive care that are applicable to the thesis. Much time has been spent on the literature review to provide as brief but comprehensive an introduction as possible.

The literature review is presented as follows:

1. Epidemiology of head injuries (vide p10).
2. Quality of comprehensive care (vide p16).
3. The multidisciplinary team approach to comprehensive health care (vide p18).
4. The medical management of head injuries (vide p23).
5. Nursing (vide p39).
6. Assuring nursing quality (vide p57).
7. Sequalae of brain trauma (vide p76).
8. Recovery (vide p79).
9. Rehabilitation (vide p85).

1. EPIDEMIOLOGY OF HEAD INJURIES

Epidemiology is defined as

"the study of the distribution and the determinants of disease and problems of health, disease or injuries in human populations." (Barker, 1982: 1)

There is no universal means of classifying epidemiological data. Therefore the comparison of epidemiological findings in different countries or different studies may be inaccurate, lead to false impressions and/or incorrect data interpretation because:

(i) Various factors may influence the findings:
- The socio-economic, cultural and educational beliefs and values of the population being studied.
- Occupational, climatic and environmental factors.
- Statutory laws that are in operation e.g. the mandatory use of safety belts and speed limits.

(ii) The grouping or range of variables may not be constant.
e.g. the grouping of mechanism of injury and age distribution in the studies of Jennett, et al. (1977), Fischer, et al. (1981), Marshall, et al. (1983) differ. These include or preclude certain persons in the study thus affecting outcome and making comparisons difficult.

1.1 THE NURSE AND EPIDEMIOLOGICAL DATA

Knowledge of the epidemiology of head injuries enables the nurse to identify common denominators and allows the nurse, as a member of the health team, to plan strategies of primary prevention that are community and hospital based and within the scope of nursing practice (Government Gazette No. R.2598 of 30 November 1984). The neurosurgical nurse plays a vital role in the prevention of head injuries, health education and counselling of the patients and families of head injured victims (Rimel, 1981, 1982).

1.1.1 Epidemiological data is necessary for the effective planning and organisation of services.
The provision of a quality health service and the need for preventive measures in the early stages of medical care and throughout all phases of recovery of the head injured patient must be recognised (Hawthorne, Symposium on head injuries, 1977).

1.1.2 Relevant epidemiological data, that enables the nurse to offer an excellent promotive and preventive nursing service must be considered when planning for a primary prevention programme and health intervention and should include:

a. Age, sex and racial distribution of head injured patients are important considerations when deciding the target audience of the preventive programme. Marshall, et al. (1983) in the United States of America (U.S.A.) found that 28 percent of the total sample studied were whites, in the age range 15-29 years, who were victims of motor vehicle accidents and 76 percent were male.

b. Predisposition to head injury (Maitra, 1981; Rimel, 1981).

c. The mechanism of injury.

d. The use of safety belts in motor vehicles (Trunkey, 1983).
The compulsory wearing of safety belts in motor cars came into effect on 16 November, 1977 in South Africa (Road Traffic Ordinance No. 21 of 1966 as amended).

e. The use of motorcycle helmets (Trunkey, 1983).

f. The abuse of alcohol.
Health education must include the avoidance of alcohol consumption (Patel, Symposium on head injuries, 1977).

g. Community education.

1.2 AGE DISTRIBUTION

Age is an important variable in relation to the recovery of the head injured patient. If age alone is considered, the younger the patient, the better the outcome; the older the patient, the poorer the outcome. Steadman and Graham (1970) found a predisposition to head injuries in the younger age group. Motor vehicle accidents occurred predominantly in the 15-30 year age group and road traffic accidents accounted for half the injuries between the ages of 15-64 years (Hawthorne, Symposium on head injuries, 1977).

TABLE 3:1

Age distribution of head injured patients in various studies (expressed as percentages)

Study	Country	N	Mean age (years)	Age range (years of age)	Percentage of sample
Jennett, et al. (1977)		700			
	Glasgow		34	20-40	42
	Netherlands		33	≤50	73
	Los Angeles		36		
Jennett, et al. (1979)	UK	765		≤15	25
				16-64	65
				≥ 65	10
Fischer, et al. (1981)	USA	933		The majority in the range 10-29 then 20-29 then 30-39	
Maitra (1981)	UK	221		Majority in range 16-50	
Rimel, et al. (1981a)	USA	630	27		
Marshall, et al. (1983)	USA	581		≤15	10
				16-29	50
				30-59	30
				60+	10

Age distribution varies according to the study but the commonest age range is less than 50 years.

1.3 SEX DISTRIBUTION

TABLE 3:2

Sex distribution of head injured patients in various studies (expressed as a ratio or percentage of sample)

Study	Country	Number in study	Ratio		Percentage	
			Male	Female	Male	Female
Steadman and Graham (1970)	UK	484 admitted cases	2.6	1	-	-
Jennett, et al. (1977)	UK	694	-	-	81	29
Maitra (1981)	UK	221 in accident and emergency department	2 4 admitted 3 not admitted	1 1 1	-	-
Rimel, et al. (1981a)	USA	538	-	-	66	34
Marshall, et al. (1983)	USA	581	-	-	76	24
Jagger, et al. (1984)	USA	735	2.4	1	-	-

Sex distribution varies according to the study.

1.4 MECHANISM OF INJURY

The mechanisms of head injury in westernised society show similarity in causative factors; road traffic accidents being the most prevalent. Annegers, et al. (1980) noted a seasonal occurrence of head injury-highest in summer and fall and lowest in spring and winter. Motor vehicle accidents and interpersonal violence as a cause of head injury are highest in the summer. 41.4 percent of head injuries occur on week-ends. Falls occur most commonly between 12h00-17h59, motor vehicle accidents between 18h00-20h59 and interpersonal violence between 21h00 - 23h59 (Jagger, et al., 1984). 75 percent of those injured in sport activities are male, although in 'horse riding' injuries females have a higher incidence (Lindsay, et al., 1980).

TABLE 3:3

The mechanism of head injury in various studies (expressed as percentages*)

Study	Number of cases	RTA	MVA	MBA	PVA	Fall	Assault	Sport	Work	Home	Other	Unknown
Skeadman & Graham (1970)	464	45					7	3	9	14		
Jennett, et al. (1977)	604	50			21	(≥10ys)	(≥10ys)		(≥10ys)			
	424 Glasgow	53			24	17	10		8			
	171 Netherlands	78			19	1	1		0			
	99 Los Angeles	47			11	17	17		2			
Strang, et al., 1976 (Lindsay, et al., 1980)	64000							11				
Jennett, et al. (1979)	765	37					(>15ys) 15					
Lindsay, et al. (1980)	1000							2				
Maltra (1981)	221											
	37 admitted	13				67	18					
	184 not admitted	8				53	16				22	
Rimel (1981)	1330	55	65	5	15	18	12	17				
Rimel, et al. (1981a)	550	40				23	10	16			3	
Marshall, et al. (1983)	501		67			16	9				8	1

KEY: RTA = Road traffic accident, MVA = Motor vehicle accident, MBA = Motorcycle accident, PVA = Pedestrian vehicle accident
* These figures are as stated in the particular study.

1.5 SEVERITY OF INJURY

Minor head injuries outnumber severe head injuries many-fold (Rimel, et al., 1981a; Marshall, et al., 1983). This strengthens the belief of the researcher that primary prevention of head injuries must be included in the scope of nursing practice. Symonds (Rimel, et al., 1981a : 227) states

"It is questionable whether the effects of concussion, however slight, are ever completely reversible."

Patients with minor head injury may suffer from deficits of memory, thought processing, concentration and judgement (Marshall, et al., 1983). Repeated head injury has a cumulative effect (Purchese, 1977: 191) and leads to traumatic encephalopathy (Lewin, 1976). Injuries that cause a few minutes of post-traumatic amnesia may cause microscopic structural damage.

1.6 PREDISPOSITION

The existence of recognised predisposition to head injury is debatable. Maitra (1981) indicates that patients with a predisposition to sustaining a head injury are those who have had a previous head injury. This is supported by Annegers, et al. (1980), Rimel, et al. (1981a) and Rimel (1981). Ker, et al. and Jennett found an excess of maladjusted patients among the head injured, although Klonoff, Thompson, et al. and Craft, et al. found no such evidence (Maitra, 1981).

1.7 USE OF ALCOHOL

According to the Insurance Institute for Highway Safety in the U.S.A., 50-60 percent of fatal motor vehicle accidents are caused by drunken drivers (Trunkey, 1983). Alcohol as a contributory factor in the causation, extent and severity of head injury must not be underestimated (Jennett, 1976b; Jennett & Teasdale, 1977; Maitra, 1981; Rimel, 1981; Rimel, et al., 1981a).

TABLE 3:4

The legal limit for serum alcohol

Country	Legal limit
S.A.	<0.08 ug/dl
U.K.	<0.08 ug/dl
U.S.A.	<0.10 ug/dl

(Lewis & Collier, 1983)

1.8 HEAD INJURY MORTALITY

Jennett (1976c) states that since the mid-sixties there has been a decline in the number of severe head injuries.

TABLE 3:5

The number of head injury deaths that occur per 10^5 population per annum

Country	Year		
	1972	1974	1976
Wales and England	10.5	9.5	9.2
Scotland	10.5	10.5	9.3

(Jennett & MacMillan, 1981: 102)

Head injuries account for nine deaths per 10^5 population in the U.K. per annum i.e. less than 1 percent of all deaths. 15 percent of these deaths are in the age group 15-24 years (Jennett & MacMillan, 1981: 102). Jennett and MacMillan (1981) add that in 1972, 60 percent of the deaths of head injured patients occurred before the patients reached hospital (40 percent at the site of the accident and 20 percent before the patient could be admitted to hospital). According to Klauber, et al. (1985), 65 percent of head injury deaths occur before admission (San Diego).

Jennett and Carlin (Klauber, et al., 1985: 531) ascribe most avoidable head injury deaths to "inappropriate management of patients who reach hospital alive."

In San Diego in 1976 and 1982 the death rate was 21.3 and 17.5 per 100 000 population per annum respectively (Gunshot wounds excluded) (Klauber, et al., 1985). According to Rimel (1981) and Trunkey (1983), trauma is the leading cause of death in persons under 45 years of age in the U.S.A. and craniocerebral injuries account for most of these. Motor vehicle accidents account for 40 percent of the deaths in young whites in the U.S.A. (Trunkey, 1983). The mortality rate for severe head injured patients in the U.K. and U.S.A. is ± 50 percent (Jennett, et al., 1977: 297; Editorial, 1978: 589). According to Minteer-Convery (1985: 215), the mortality rate has dropped to 36 percent.

In summary, in the opinion of the researcher, no study is complete without an epidemiological survey.

2. QUALITY OF COMPREHENSIVE CARE

Kron (1976) states that the primary objective of a hospital is caring for patients directly (patient care) and indirectly (teaching and research). The quality of care received by head injured patients from the time of admission until ultimate recovery affects the patients' final outcome, morbidity and mortality (Fölscher, 1974).

Quality is defined by Woody (n.d.: 33) as "having the characteristics of excellence."

Zimmer (DiVincenti, 1977: 139) defines quality care as

"...the wise use of knowledge, skill, and compassion to meet the needs of the patient."

Weinstein (1976) and Schmadl (1979) state that there is no absolute for quality of care. Quality care is care that is adapted to the social, cultural, geographic environment and professional level of a particular population (Wictorson & Öjermark, 1981). The delivery of quality care involves the optimal organisation of services (Wictorson & Öjermark, 1981), manpower supply, facilities, resources, equipment, space and appropriate cost (Rowland & Rowland, 1980). According to Lanham (1981) and Lambertsen (1965), the hospital is obliged to ensure that health professionals provide safe, cost effective, high quality care as it remains accountable professionally, legally and ethically for the care provided. Physicians, nursing and allied health personnel, within the scope of their practice, individually and collectively, are responsible and accountable to the patients (Schmadl, 1979), the hospital boards, governing bodies, accrediting agencies (Lanham, 1981) and the community for the services they provide. According to Ramey (1973), the degree of expertise of the professionals in the institution, the expectations of the community and the financial resources available to the nursing service all have serious implications for the standards of care that prevail in an institution.

The concept of quality care is viewed by the patient and community as a right not a privilege (Lewis, (ed.) 1981). An unspoken social contract exists between society and the professionals involved in the health service (Phaneuf, 1976). Persons receiving care have high expectations (Phaneuf, 1964), and all costs must be justified (DiVincenti, 1977).

Irrespective of the setting, excellence of care must be ensured (Rowland & Rowland, 1980). In medicine, quality assurance must be a priority (Smeltzer, et al., 1983) and is imperative (Andrews, 1981; Buckley, 1981; DeVries, 1981; Dubbelboer, 1981). Woody (n.d.) suggests that to ensure treatment produces maximum care and recovery there should be objective evaluation of medical care.

In the opinion of the researcher, hospitals should have quality assurance committees and quality assurance programmes that cover all aspects of care (Andrews, 1981). Persons must be appointed to co-ordinate and maintain the quality assurance programmes. Expert clinicians and the nursing faculty must be active contributors on the quality assurance committee. According to DiVincenti (1977), quality assurance programmes must be developed to evaluate care in terms of the contemporary model of nursing practice.

Planned comprehensive co-ordinated health care, that ensures a quality service is being delivered to the patient and significant others and results in economy of staff, resources and time is the goal of the health service. The comprehensive health care system includes preventive rehabilitation that commences at the scene of the accident and continues until ultimate recovery (Tyson, et al., 1978; Rimel, 1982). It is important that an individualised holistic approach to

the head injured patient be adopted. The patient must be considered as a total human being, not only as a 'head injury' per se.

The comprehensive care of the head injured patient is directed towards assessment of the patient's needs, appropriate medical, nursing, paramedical intervention and client teaching (Conway-Rutkowski, 1982). The contribution of both the medical and nursing conceptual framework to patient care will enhance the quality of the health care system and that of the care delivered to the patient.

The researcher believes that it is the right of the head injured patient to receive comprehensive, co-ordinated quality care from the time of injury until ultimate recovery or death.

3. THE MULTIDISCIPLINARY TEAM APPROACH TO COMPREHENSIVE HEALTH CARE

According to Jennett (Dinning & Connelley, 1981: 2), the needs of the head injured patient are misunderstood and inadequately met as there are so many disciplines involved in the care of the patient and the patient does not belong exclusively to any one discipline. In order to meet the needs of the head injured patient adequately, better co-ordination of patient management by a multidisciplinary team will lead to one co-ordinator directing not necessarily supervising many disciplines.

The most effective means of achieving high quality care for the head injured patient with multiple disabilities is through a multidisciplinary team approach from the outset (Vanhogan, 1979; Evans, 1981) until ultimate recovery (Long, et al., 1984). The team functions well as a complimenting group of individuals capable of carrying out specific tasks (Hirschberg, et al., 1976). Each professional is a collaborator, consultant, teacher and resource person (Fanshawe, 1981). All of whom function as peers in decision making (Arndt, et al., 1978). Each team member within the scope of practice of his/her profession has independent, dependent, and interdependent functions and is responsible and accountable for the prescribed therapeutic intervention. Fanshawe (1981: 194) while referring to the occupational therapist's role in rehabilitation states "...the quality of service will depend a great deal on the individual therapist." The researcher endorses this statement and believes it to be applicable to all members of the team.

Rimel (1981) suggests that the primary nurse because of the ramification of her communication, the use of the nursing process and after team consultation is best able to co-ordinate, design and organise the planned intervention into a comprehensive programme, in

such a way as to be most beneficial to the patient, maximise patient ability and staff feasibility. Although the nurse may be the team co-ordinator the medical practitioner remains the team leader, giving direction for health intervention (vide p21). In actual fact, utilizing the holistic approach the patient is said to be the team leader (Searle, 1982). Although in the case of the head injured patient this may not be possible as the patient may lack the mentation, intellect and insight required.

The aim of the multidisciplinary team is to provide comprehensive, co-ordinated care in order to promote maximum recovery. The members of the health team that may be involved in the care and rehabilitation of the head injured patient include:

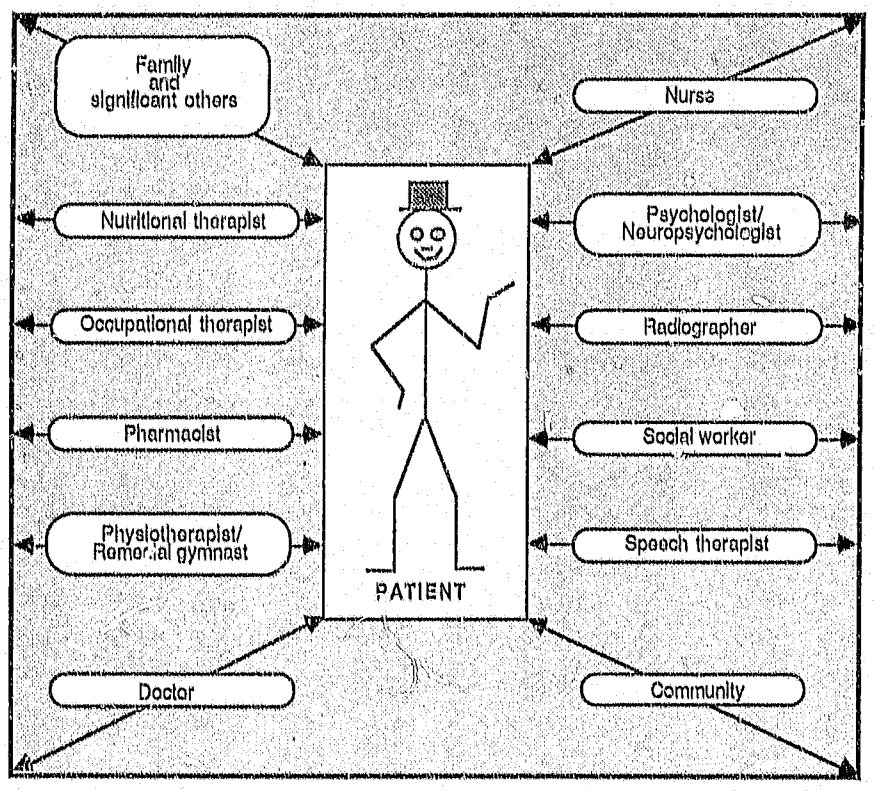

Fig. 3:1 The multidisciplinary team

The roles of the various team members are described in the listed references (Brunner & Suddarth, 1974; Nichols, 1975; Hirschberg, et al., 1976; Bond, 1977; Clarke, 1977; Cross, 1977; Edmonds-Hill, 1977; Jennett, 1978; Ozga, 1978; Evans, 1981; Fanshawe, 1981; Howard, 1981; Tumin, 1981; Caplan, 1982; Prigatano, et al., 1984; Purchase & Allan, 1984). Due to

the limited space only the role of the patient, the family, the physician and the nurse will be described in greater detail.

THE PATIENT

Rehabilitation is a patient centred process (Eddy & Westbrook, 1975). According to Bisdee and Hipkens (1981), the patient must participate actively in the rehabilitation process as he is the primary source that will affect rehabilitation.

FAMILY

As care and rehabilitation of the head injured patient is a lengthy process it is vital that from the outset the family be included in the management, involved in goal setting, decision making and programme planning (Jacus, 1981). It is important to obtain the family's co-operation for they remain with the major responsibility for the patient (Evans, 1981). According to Bisdee and Hipkens (1981), if a holistic approach to the patient is not adopted and the family is not involved in the rehabilitation process, then the change that occurs because of rehabilitative intervention is superficial. Thus, for effective family relationships and rehabilitation, communication with the patient and family is essential.

The role of the multidisciplinary team with regard to the family includes:

3.1 Recognising the needs of the family in order to promote recovery.

3.1.1 Family therapy, individual and group therapy is an essential element of rehabilitation (Jacus, 1981).

3.1.2 Counselling and emotional support of the family must occur as early as possible, in order to prepare the family for changes in the patient's behaviour and to avert inappropriate reactions that complicate the rehabilitation process. All team members must offer support to the patient and family at set intervals and keep them fully informed (Edmonds-Hill, 1977). A support group 'The Family Huddle' as suggested by Elliott and Smith (1985) may be developed especially in the acute care setting.

3.1.3 Assisting the family through the grieving process (Jones, 1981).

3.1.4 Allowing the family to express fears, anxieties and feelings as they may be devastated. Stress is highest in the months following the accident and plateaus at six to twelve months after injury. The anxiety level of the family is related to the degree of eventual recovery.

3.2 Preparing the relatives regarding the patient's recovery, interim and long term goals (De Villiers, 1981; Jennett & Teasdale, 1981). The attitude of the family towards the patient, the rehabilitation programme and recovery will affect the patient's

rehabilitation outcome. A positive realistic attitude to the patient and recovery will aid the rehabilitation process.

3.2.1 Giving complete, honest answers (Jones, 1981) and sensible advice to the family (Jennett & Teasdale, 1981).

3.3 Encouraging normal family relationships (Bisdee & Hipkens, 1981).

3.4 Preparing and involving the relatives in the rehabilitation programme.

3.4.1 Allowing and encouraging the family to work in and with the programme (Fölscher, 1974).

3.4.2 Using the family as a resource, a supportive tool in the preventive rehabilitation programme and for reality orientation (Jones, 1981). In the opinion of the researcher, motivation and stimulation of the head injured patient, from admission until ultimate recovery, is included in the responsibility of the family and should be promoted by all team members.

3.5 The role of the nurse with regard to the family is that of counselling, support, teaching and referral (Habermann, 1982).

It is important to explain the emphasis on independence and self-care in the rehabilitation programme so that the family does not regard it as neglect (Jacus, 1981), nor spoil the patient (Fölscher, 1974). A barrier to the patient's progress towards independence can be caused by others who utilize the patient's dependence as a prop for their own existence (De Villiers, 1981).

THE PHYSICIAN

The question of which medical practitioner should have final accountability for the patient's management remains debatable (Steadman & Graham, 1970; Jennett, et al., 1977; Rimel, 1981; Jennett, 1983). The head injured patient is primarily the responsibility of the neurosurgeon, but if all head injured patients were admitted under the neurosurgeons they would need two and a half times the present number of available neurosurgical beds (Jennett, et al., 1979). In the acute phase most head injured patients are cared for by doctors whose speciality is not the brain and who do not have the skills and training in the management of brain trauma (Jennett & Teasdale, 1981: 344). Therefore there is much confusion about the patient's management (Jennett, 1983). Jennett, et al. (1979) state that medical practitioners should become more self-sufficient, must be aware of the medical protocol of management for the patient and that a patient stands a better chance of survival if managed by a team of doctors and nurses who are used to caring for head injured patients.

According to Hirschberg, et al. (1976), rehabilitation should be carried out as a continuing programme with general medical care. The physician is legally responsible for the general care

and direction of the rehabilitation efforts (Evans, 1981: 15). Arndt, et al. (1978) state that the team is under the control and co-ordination of the physician. The rehabilitation team is usually headed by the physiatrist (a medical practitioner trained in rehabilitation medicine) who is responsible for the evaluation of the patient as well as supervising the patient's rehabilitation programme (Brunner & Suddarth, 1974).

THE NURSE

According to Fölscher (1974), rehabilitation commences as soon as the patient is admitted and clearly needs more nursing input from the acute treatment until the patient has assumed a positive role in society. The role of the neurosurgical nurse in the pre-hospital, emergency unit, ward situation, physical and psychological rehabilitation from the outset must not be underestimated (Rimel, 1982). According to Evans (1981), if nurses are to be allowed to play a full role in the multidisciplinary rehabilitation effort, then the nursing establishment must be altered to allow for more time with patients.

The nurse's attitude and approach may affect the entire therapeutic milieu (Fölscher, 1974; Rimon, 1979). In the acute phase the nurse is the one member of the health team who is with the patient constantly and has most contact with the patient, significant others, medical and allied health personnel. According to Government Gazette No. R.2598 of 30 November 1984 (:14), the scope of practice of the nurse includes

"the co-ordination of the health care regimens provided for the patient by other categories of health personnel;..."

Quality nursing care is supported when the nursing department functions on an equal and integrated basis with all other departments and is strengthened when effective collaborative relationships exist between nurses and physicians (Evanston Hospital Corporation, 1979). The nurse is a full member of the team with responsibility for comprehensive care to patients and a contribution to the total nursing effort. The primary nurse, clinical nurse specialist and rehabilitation liaison officer must be included in the multidisciplinary team and must make a contribution to the therapeutic programme (Evans, 1981: 134). It is essential that the nurse support the work of the team.

The staff involved in the care of the head injured patient, in order to make management decisions rely on the nurse's assessment of the patient via verbal or written feedback.

Co-ordinated care programmes as suggested by Riley and Moses (1977: 22) utilizing the specialists in the field of head injury as consultants would ensure that institutions are able

"...to provide humane, thoughtful, and expert care for the patient as soon as he has been admitted to any primary treatment unit."

Team communication is essential. Multidisciplinary meetings improve staff interpersonal relationships with the resultant indirect improvement of care (Arndt, et al., 1978). Elliott and Smith (1985) add that multidisciplinary team meetings to review care must be held weekly. The agenda must be itemised to include discussion by all therapists of short and long term goals and discharge planning. As many of the modalities of care of the head injured patient incorporate more than one therapist (Nichols, 1975; Purchese, 1977), Rotkovitch ((ed.) 1976) suggests the use of 'therapy communication sheets' to aid communication between the team members.

Purchese (1977) states that for the patient to receive the best, good neurosurgical care is based on team effort. Active co-operation to promote physical, psychological and social well-being and maximise the rehabilitation of the patient is essential. According to Rimel (1981), a multidisciplinary comprehensive care plan will result in decreased morbidity of head injured patients. Cross (1977) states that from admission, vigorous treatment by all members of the health team is required to decrease the physical and mental disability after severe head injury. Each member of the health team has an important contribution to make to the patient's care and recovery (Jennett, 1978; Vanhegan, 1979). The researcher believes the above to be of paramount importance to comprehensive patient management.

4. THE MEDICAL MANAGEMENT OF HEAD INJURIES

The purpose of this section of the literature review is not to criticize, evaluate or present a new protocol of management for head injured patients, for this is beyond the scope of a nurse practitioner. It is to review some aspects of the medical management of head injured patients that form an integral part of comprehensive quality patient care, rehabilitation and recovery of head injured patients.

Hippocrates said about head injuries "No injury is too trivial to ignore nor too serious to despair of." (Jennett & Teasdale, 1981: 341)

The medical management of head injured patients remains a contentious issue. Uniformity in treatment of head injured patients has still to be achieved nationally and internationally (Jennett & Teasdale, 1981). Given the variation in the availability of resources for the pre-hospital, hospital and post-hospital management of the head injured patient in the various countries one wonders whether this is feasible? Optimal care is likely to come from a compromise between the systems of care most prevalent in the U.S.A. and Europe (Jennett & Teasdale, 1981). Prompt management of the head injured patient in a hospital that has a co-ordinated trauma health care facility that provides quality care, offers the patient a better chance of survival (Trunkey, 1983).

The head injured patient is managed both conservatively and aggressively (Conway-Rutkowski, 1982). Medical intervention is essentially supportive, aimed at controlling intracranial pressure and preventing medical complications (Nikas, (ed.) 1982). The 50 percent mortality rate with serious head injury can be reduced by accurate diagnosis and aggressive treatment (Rose, et al., 1977).

THE AIMS OF COMPREHENSIVE CARE OF THE HEAD INJURED PATIENT INCLUDE:

1. To maintain life and sustain the highest level of well-being (Conway-Rutkowski, 1982).
2. To detect, minimise and prevent secondary brain damage (Nikas, (ed.) 1982; Jennett, 1983).
3. To maintain and/or preserve function and avoid permanent damage.
4. To achieve maximal physical, psychological, emotional, social, educational and economic recovery (Headway, 1983).

Certain issues regarding the medical management of the head injured patient, that have direct bearing on the nursing intervention required by the patient, will be discussed.

4.1 PROTOCOLS OF MANAGEMENT

Set protocols of management of the head injured patient that allow for comprehensive co-ordinated quality patient care, with minimum cost and maximum utilization of team effort must be available (Webster, 1984). The protocols of care must:

1. Be designed for use by medical practitioners, nurses, allied health personnel and emergency personnel according to their individual scope of practice (Rimel, et al., 1978; Rimel & Langfitt, 1980).

2. Allow for intelligent assessment of individual patient needs and adjustment of the regimen as required (Jennett & Teasdale, 1981: 211; Nikas, (ed.) 1982; Trunkey, 1983).

4.1.1 Protocols should be available for the following aspects of head injury patient management:

a. According to the severity of the injury.

b. According to the site or location:

(i) At the site of the incident.

(ii) Pre-hospital treatment.

Data suggests that advanced pre-hospital emergency medical services can substantially reduce mortality rates of head injured patients as experimental evidence has shown that apnoea and hypertension followed by hypotension characterise the immediate impact after head injury (Klauber, et al., 1985: 531).

(iii) Transfer of the patient to the neurosurgical centre.

c. According to the phase of recovery:

(i) Management of the acute phase.

(ii) Preventive rehabilitation.

(iii) Long term management.

(iv) Rehabilitation.

(Jennett, 1978; Rimel, et al., 1978; Jennett, et al., 1979; Connolly & Zewe, 1981; Jennett & Teasdale, 1981; Nikas, (ed.) 1982; Marshall, et al., 1983; Trunkey, 1983; Shapiro, Webster, 1984).

4.1.2 The general principles of management incorporated in the protocols, irrespective of locality and stage of recovery are similar and must include:

a. A multidisciplinary approach.

b. The provision of an environment that is conducive to recovery.

c. The assessment of the needs of the patient:

(i) Emergency assessment.

(ii) General assessment:

Assess all systems and associated injuries (Kunkel, 1981).

(iii) Neurological assessment:

Assess the primary injury and secondary effects (Kunkel, 1981).

(iv) The provision of a means of continuous observation.

d. Ensuring adequate oxygenation, ventilation and maintenance of a clear airway.

e. Patient resuscitation.

f. The maintainance of haemodynamic status, cardiac output and treatment of shock.

Maintain mean arterial blood pressure ≥80 mm.Hg (Helse, 1983: 202).

g. The maintenance of intracranial pressure within normal limits.
h. The maintenance of body homeostasis.
i. The maintenance of fluid, electrolyte balance and nutrition.
j. Treatment of open injuries.
k. Maintenance of mobility.
l. Provision of a means of elimination.
m. Documentation of the therapeutic plan and the findings.

4.2 ADMISSION OF HEAD INJURED PATIENTS

In South Africa there is no uniformly accepted policy regarding the admission of head injured patients, in particular the less severe head injury. According to Vanhegan (1979), 100 000 head injury patients are seen in accident and emergency departments in the U.K. per annum. Totten and Buxton (1979) found that for every one patient admitted, four or five are sent home. Patel's figures (Symposium on head injuries, 1977) shows one in six. Maitra (1981) and Jennett and McMillan (1981) state that head injury patients account for 10 percent and 11 percent of all patients seen in accident and emergency departments respectively. According to Totten and Buxton (1979), head injuries account for 25 percent of acute surgical admissions to an average general hospital. Trunkey (1983) adds that head injuries account for 0.2 percent of all hospital admissions in the U.S.A. Fischer, et al. (1981) state that head injuries comprise ± 20-30 percent of trauma admissions and are regarded as the single most common cause of admission. 10 - 15 percent of the cases admitted have a severe head injury requiring extensive observation and treatment. In the U.S.A., six and a half million head injured patients are admitted per year, one million of these are serious (Connolly & Zowe, 1981). Green's figures (Wulf, 1985) concerning head injury admissions to the Johannesburg Hospital, South Africa, for June, July, and August, 1984 are 72, 73 and 51 out of a total of 122, 116 and 99 cases admitted to a general trauma unit respectively.

As the use of available resources is considerable (Totten & Buxton, 1979), it is important to define a low risk group of patients who could safely be discharged from the accident and emergency department. The criteria that have been debated by many authors regarding admission policy include:

1. Loss of consciousness
   Admit for 24 hours if any evidence of loss of consciousness (Purchese, 1977; Nikas, (ed.) 1982).
2. The presence or absence of a skull fracture (Jennett, 1976a/b, 1983; Fischer, et al., 1981).

Hospitalise for 24 hours if a skull fracture is present (Bailey, 1980).

3. The fear of a patient with a minor head injury developing a subdural or extradural haemorrhage (Green, 1984).

According to Totten and Buxton (1979), Fischer, et al. (1981), Weston (1981) and Jennett (1983), if there is no amnesia, fracture or neurological signs the patient:

1. May be sent home in the company of a responsible adult.
2. Must be given adequate written instruction regarding the occurrence of drowsiness, confusion and severe headache.

Since the publication of an article by Jennett, et al. (1984) a uniform policy for the admission of head injured patients in the United Kingdom does exist. According to the researcher, staffing levels will be affected by the admission policy and patient dependency amongst other factors.

4.3 THE MANAGEMENT OF INTRACRANIAL PRESSURE

In the opinion of the researcher, the role of the nurse in the control of intracranial pressure must not be underestimated. The nurse because of her constant contact with the patient is the one most likely to detect early changes in intracranial pressure. Medical and nursing intervention incorporated in the plan of management of the head injured patient who is suffering from raised intracranial pressure (detected by intracranial pressure monitoring, fundoscopy or assessment of the patient's clinical status), as stated by Connolly and Zowe (1981), Jennett and Teasdale (1981), Nikas ((ed.)1982), Tucker, et al. (1984) include the following:

4.3.1 Minimise noxious stimulation

When planning the therapeutic programme the multidisciplinary team must consider the factors that affect intracranial pressure directly or indirectly. Always maintain the cerebral perfusion pressure (C.P.P.) above 50 mm.Hg.

a. Patient intervention must be carried out as timeously and quietly as possible.

b. Factors known to affect intracranial pressure include:

(i) Bronchial suctioning (Parsons & Shogan, 1984).

Inhibit the cough reflex with I.V. lidocaine prior to suctioning (Webster, 1984). Note the rise in intracranial pressure and stop suctioning if it is more than 30 mm.Hg (Hravnak, Webster, 1984).

(ii) Emotionally disturbing conversations.

Boortz - Marx (1985) found that there was no change in response to talking, kissing, touching and noise of bottles and cotsides. Parsons and Wilson (1984) suggest talking to the patient decreases the startle reflex.

(iii) Nursing intervention.
Eye care, shaving (Boortz - Marx, 1985), oral hygiene, urogenital care and bathing cause an increase in intracranial pressure. Return to baseline occurs within one minute of the procedure provided C.P.P. ≥ 50 mm.Hg.; therefore it is safe to perform nursing intervention (Parsons, et al., 1985).

(iv) Pain.

(v) Position of the bed (Parsons & Wilson, 1984).

(vi) Positioning and turning the patient.

(vii) Positive end expiratory pressure.

(viii) Restraining the patient.

(ix) Taking arterial blood gases.

(x) The combination of several activities such as turning and suctioning in succession.

c. Activities that are performed by the patient that are associated with increases in intracranial pressure include:

(i) Chewing.

(ii) Coughing.

(iii) Isometric muscle contractions.

(vi) Passive range of motion exercises.

(v) Periodic breathing.

(vi) REM sleep.

(vii) Restlessness.

(viii) Straining during elimination.

(iv) Use of the bedpan.

(x) The valsalva manoeuvre.

4.3.2 Assess patient status

Assessment of the patient and establishing diagnoses form the initial phase of management and thereby commences the patient's rehabilitation towards ultimate recovery.

Astute observation and recording of neurological status, intracranial pressure, C.P.P. and vital signs to detect changes in the patient's status must be undertaken (Abelson, 1982). (Vide p42 for further discussion concerning patient assessment). The physician must be notified if changes in the patient's neurological status, intracranial pressure recordings and vital signs occur.

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4.3.3 Maintain adequate oxygenation and ventilation

"Respiratory dysfunction should be suspected in all unconscious head injury patients." (Jennett & Teasdale, 1981: 218)

Acute respiratory insufficiency is a common initial finding in head injured patients and causes hypoxaemia, cytotoxic cerebral oedema and vasodilatation that result in further vascular congestion. Hypoxia affects the quality of recovery adversely (Lewin, 1976: 1235). Hypercarbia also results in vessel dilation and thus increases intracranial pressure (Nikas, (ed.) 1982). According to Lewin (1976), the primary cause of death in the head injured patient is not cardiac failure but respiratory arrest.

a. Maintenance of a clear airway.

There is no dispute about the importance of maintaining a clear airway:

Maintain PaO_2 above 80 mm.Hg and $PaCO_2$ at 25-30 mm.Hg (Tucker, et al., 1984).

According to Jennett and Teasdale (1981), it is often when the patient reaches hospital that insufficient attention is paid to the airway. In the opinion of the researcher, the oral airway should never be strapped into the patient's mouth as:

- The airway interferes with normal swallowing.
- Increased salivation occurs.
- In the event of vomiting the airway is open allowing for aspiration and further ventilatory compromise.

b. Ventilation.

The use of the ventilator in the management of the head injured patient may be either:

(i) To assist the patient's ventilation and oxygenation by means of intermittent mandatory ventilation.

(ii) To control the patient's ventilation by means of continuous mandatory ventilation by the use of hyperventilation and/or neuromuscular blocking agents. There is still considerable debate about the usefulness of controlled hyperventilation (McDowall, Symposium on head injuries, 1977). Intubation is not in itself an indication for controlled ventilation (Jennett & Teasdale, 1981: 222).

Spontaneous hyperventilation and hypocapnia are common in severely head injured patients. Jennett and Teasdale (1981: 225) suggest that it is better to electively intubate and ventilate all patients with a specified degree of impairment of consciousness rather than to wait for the development of abnormalities. Jennett and Teasdale (1981) add that intubation and mechanical ventilation are accepted practices of management of the severe head injured patient and may be used in conjunction with intracranial pressure monitoring (McDowall, Symposium on head injuries, 1977) and barbiturate therapy.

4.3.4 The use of intracranial pressure monitoring

a. According to Teasdale (Symposium on head injuries, 1977), Davis and Mason (1979), Jennett and Teasdale (1981: 130) and Nikas ((ed.) 1982), the continuous monitoring of intracranial pressure in the severe head injured patient can prove to be of value and is indicated in:

(i) Aiding the diagnosis.

(ii) Evaluating intracranial dynamics.

(iii) Managing the patient:

- Possibly those patients who do not obey commands.
- Cerebral engorgement.
- After the evacuation of a clot.
- A patient with a 'silent' intracranial haematoma to decide if surgery is necessary.
- Lowin (1976) states that when intermittent positive pressure ventilation and/or hypothermia are used reliance on clinical monitoring alone is unwise. In Leeds, all patients who receive controlled ventilation have continuous intracranial pressure monitoring (McDowall, Symposium on head injuries, 1977).

(iv) Aiding the prognosis.

(v) Assessing the patient's response to treatment (Lowin, 1976).

According to Ricci (Nikas, (ed.) 1982), direct measurement of intracranial pressure is the only clinically reliable and valid way to detect intracranial hypertension. Snyder and Jacklo (1981) add that observations of the patient are indirect evidence of alteration in intracranial pressure that are only observed after some pathological changes have occurred. Fleischer, et al. (Jennett & Teasdale, 1981: 131) consider that there may be no reason to monitor intracranial pressure if there is no evidence of a space occupying lesion on computerised scanning. Monitoring of intracranial pressure often shows that patients with severe brain stem dysfunction do not have raised intracranial pressure, but on the other hand it may be clear that pressure is high or rising and that intervention is required (Jennett, 1978; Nikas, (ed.) 1982). Jennett and Teasdale (1981: 128) add that in patients who have suffered diffuse brain damage the increased intracranial pressure may be a reflection of the degree of brain damage; both the incidence and the level of intracranial pressure correlating with the patient's clinical symptoms. Jennett and Teasdale (1981) and Nikas ((ed.) 1982) also state that depending on the type of injury, high levels of intracranial pressure may occur with little evidence of raised intracranial pressure during clinical monitoring.

b. Intracranial pressure can be monitored by various routes. According to Ricci (Nikas,(ed.) 1982: 37), the intraventricular cannula is the most reliable and most accurate method of intracranial pressure monitoring.

Connolly and Zewe (1981) and Marshall, et al. (1983) state that an intracranial pressure of ≥ 20 mm.Hg must be treated. Budassi and Barber (1984: 367) add that if the intracranial pressure is ≥ 50 mm.Hg for over 20 minutes, then the patient has a poor prognosis.

In many neurosurgical units, the measuring of intracranial pressure has become routine treatment for severely affected patients (Jennett, 1978). According to Teasdale (Symposium on head injuries, 1977) and Jennett and Teasdale (1981: 132), the procedure of intracranial pressure monitoring and the interpretation of the results requires a degree of effort and expertise. The use of intracranial pressure monitoring should be restricted to a constant neurosurgical service where neurosurgical expertise is available around the clock, as the difficulties and complications of intracranial pressure monitoring must not be underestimated (Connolly & Zewe, 1981; Snyder & Jackle, 1981: 184; Tucker, et al., 1984: 250). For this reason intracranial pressure monitoring is not undertaken in The Hospital (Lipschitz).

4.3.5 The use of chemotherapeutic agents to treat raised intracranial pressure

Drugs are prescribed by the physician and administered by the nurse.

a. Steroids.

The use of steriods for the treatment of head injured patients remains debatable. According to Nikas and Tolley (Nikas, (ed.) 1982: 90), the efficacy of glucocorticoids in the treatment of head injuries is not well documented. There is evidence suggesting that glucocorticoids do not influence the outcome in severe head injury (Webster, 1984: 48/49). Jennett and Teasdale (1981: 241) add that the value of steroids in head injury management remains uncertain. According to Tyson, et al. (1978: 23) and Connolly and Zewe (1981), steroid therapy should begin as soon as possible after the arrival of the patient in the emergency department, as the effect of steroid therapy is known to be diminished if initiation of therapy is delayed.

Mitchell (Nikas, (ed.) 1982: 42) and Tucker, et al. (1984: 249) advocate the use of high doses of steroids for patients with a Glasgow Coma Scale ≤ 12/15. Other authors who

support the use of steroids in the management of head injured patients include Brunner and Suddarth (1974), McDowall (Symposium on head injuries, 1977) and Davis and Mason (1978). Various regimens for the use of steroids exist. Points to note with the use of steroids include:

(i) Ant-acids/Cimetidine must be used to prevent gastric irritation (Webster, 1984).

(ii) Careful fluid and electrolyte management is imperative (Connolly & Zewe, 1981).

(iii) Steroids may mask a developing operable lesion (Vanhegan, 1979).

(iv) Steroids may mask infection (Webster, 1984).

(v) If the drug is used on a long term basis it must be withdrawn gradually (Vanhegan, 1979).

b. The use of diuretic agents.

Mannitol is used as a temporary life saving measure to treat increased intracranial pressure, only after other therapeutic modalities have failed to halt progressive neurological deterioration (Tyson, et al., 1978). According to McDowall (Symposium on head injuries, 1977), dehydration therapy is used if more than 25 percent of the intracranial pressure readings in any 30 minute period exceed 30 mm.Hg. McDowall (Symposium on head injuries, 1977) adds that later on in management a high intracranial pressure does not respond, except temporarily to dehydration therapy.

The use of Mannitol for the treatment of raised intracranial pressure is advocated by Vanhegan (1979), Jennett and Teasdale (1981)and Nikas ((ed.) 1982). 1-2 gm/kg body weight of Mannitol 20 percent as a bolus dose is infused over 10-20 minutes and when necessary (Vanhegan, 1979; Connolly & Zewe, 1981). When using Mannitol it is important to check serum osmolality (N≤320 m osmol/L) (Vanhegan, 1979). Other diuretic agents such as Furosemide (Lasix) may be used to decrease intracranial pressure (Webster, 1984).

c. The use of barbiturates to induce barbiturate coma.

A contentious issue is that of the use of barbiturate therapy. Marshall and Shapiro (Symposium on head injuries, 1977) state that in severe head injured patients the use of induced barbiturate coma with or without hypothermia has shown promise. According to Connolly and Zewe (1981), barbiturate therapy has shown encouraging results in decreasing cerebral metabolism and intracranial pressure when other therapy has failed. Webster (1984: 50) adds

"... no study has conclusively demonstrated that barbiturates are effective in reducing patient mortality."

When utilizing barbiturate therapy the effects of noxious stimulation are reduced (Studebakor & Dykstra, 1984). The general effects of barbiturates must be incorporated in the therapeutic plan for the patient (Kunkel, 1981; Mitchell, Nikas, (ed.) 1982). Pentobarbital 5-15 mg/kg body weight may be administered intravenously over 5-30 minutes (Connolly & Zewe, 1981). Serum barbiturate levels must be monitored in order to adjust the dosage per patient (Therapeutic range : 2-4 mg/dL) (Quandt, Studebaker & Dykstra, 1984: 78).

When intracranial pressure is 15 mm.Hg for more than two hours, barbiturate therapy is discontinued slowly and anti-convulsants should be administered (Connolly & Zewe, 1981). Jennett and Teasdale (1981: 244) advise against the use of barbiturate therapy in ordinary clinical practice where there is no continuous surveillance or availability of a neurosurgeon. Barbiturate therapy is not utilized in the unit under review.

d. The use of Pancuronium (Pavulon) to decrease the effect of environmental stimulation.

e. The use of stool softeners to avoid constipation (Johanson, et al., 1981).

4.3.6 Drainage of cerebrospinal fluid via an intraventricular cannula

4.3.7 Maintenance of fluid and electrolyte balance and nutritional state

a. Prescribe fluid, electrolyte and kilojoule intake on a daily basis (Tucker, et al., 1984: 249).

b. Restrict fluid intake to 1200 - 1500 mls. per 24 hours.

c. Keep the patient nil per os.

d. Measure and chart fluid intake and output.

e. Catheterise the patient for accurate fluid assessment.

(Vide p34 for further discussion of fluid, electrolyte and nutritional status).

4.3.8 Mobility and positioning of the patient

a. The patient is at bed rest.

b. Maintain body position in normal alignment (Nikas, (ed.) 1982; Tucker, et al., 1984).

c. Elevate the head of the bed to an angle of 30^{0} (Tucker, et al., 1984: 249).

d. Avoid:

- Semi-prone or prone position.
- Flexion of the neck and rotation of the head (Parsons & Wilson, 1984).
- Compression of the neck veins.
- Extreme flexion of the hip.

4.4 FLUID, ELECTROLYTE BALANCE AND NUTRITION

The prescription of fluid, electrolyte and kilojoule intake is the responsibility of the physician and is supervised by the nurse. Severe brain damage may increase the metabolic response to trauma. Catabolism after injury is associated with a glucose intolerance that results in hyperglycaemia and glucosuria (Insulin may be necessary). In the patient who has only a head injury, the increased metabolic demand may be offset by the energy-sparing effects of starvation and bedrest, so that total energy requirements may be little different from normal. A fast of two to three days may therefore be of little clinical significance (Jennett & Teasdale, 1981: 232).

The recommended kilojoule intake for an adult who has sustained a severe head injury is 1 500-2 000 cals. (Minteer-Convery, 1985) /2 000 - 3 000 cals./24 hours, with a calorie: nitrogen ratio of 180:1 (Jennett & Teasdale, 1981: 233; Conway-Rutkowski, 1982: 208). This value appears to be rather low as the daily recommended calorie intake for a healthy male 19-22 years is 2 500-3 300 cals. and for a female is 1 700 - 2 500 cals. (National Research Council, Food and Nutrition Board, Lewis & Collier, 1983: 909). In severely catabolic patients, or patients with infection daily requirements may be 4 000 - 5 000 cals./24 hours.

Nutrition must be provided by the third to the fourth day after injury (Jennett & Teasdale, 1981: 232). A protocol for the nutritional support of the patient that is well balanced and contains all the nutrients essential to maintain body homeostasis, must be established (Jennett & Teasdale, 1981: 232; Lewis & Collier, 1983: 907-909; Anderson, 1984; Tucker, et al., 1984: 249).

The route used to administer the patient's intake will be determined by the level of consciousness and condition of the patient. The head injured patient may require the insertion of an intravenous cannula for the purpose of fluid, nutritional replacement and drug administration. Jennett and Teasdale (1981) and Tucker, et al. (1984) recommend that wherever possible feeding be carried out via the alimentary tract as this ensures better nutrition than intravenous feeding (Brunner & Suddarth, 1974). Oral feeds must not be given to unconscious patients. Once the patient has a cough, gag and swallow reflex oral fluids may be commenced. If no paralytic ileus is present enteral nutrition can be commenced and maintained by a nasogastric or nasoduodenal tube (Anderson, 1984: 50). If the patient is unconscious for more than four weeks a gastrostomy may be performed (Minteer-Convery, 1985). Intravenous hyperalimentation may be used when oral or enteral feeding is contra-indicated or not tolerated.

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