

From the Chief Medical Officer  
Dr Henrietta Campbell CB



Department of  
**Health, Social Services  
and Public Safety**

An Roinn

**Sláinte, Seirbhísí Sóisialta  
agus Sábháilteachta Poiblí**

[www.dhsspsni.gov.uk](http://www.dhsspsni.gov.uk)

Castle Buildings  
Stormont Estate  
Belfast BT4 3SQ  
Tel: 028 9052 0563  
Fax: 028 9052 0574  
Email: [Henrietta.Campbell@dhsspsni.gov.uk](mailto:Henrietta.Campbell@dhsspsni.gov.uk)

**HSS(MD) 11/2005**

**For Action –**

Chief Executives Acute and Combined HSS Trusts  
Medical Directors Acute and Combined HSS Trusts  
Chief Executive NI Ambulance Service HSS Trust  
Medical Director NI Ambulance Service HSS Trust

**For Information –**

Chief Executive Ulster Community & Hospitals HSS Trust  
Medical Director Ulster Community & Hospitals HSS Trust  
Chief Executives Community HSS Trusts  
Medical Directors Community HSS Trusts  
Chief Executives HSS Boards  
Directors of Public Health

Your Ref:

Our Ref: HSS(MD) 11/2005

Date: 22 March 2005

Dear Colleague

**MANAGEMENT OF MINOR HEAD INJURY IN CHILDREN**

At a recent workshop in January 2005, on the Clinical Care of Children in Hospital, the issue of the management of head injury was discussed and the approach taken in the Ulster Community and Hospitals Trust (UCHT) Women and Child Directorate was presented.

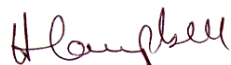
The guideline that has been developed in UCHT is based on the recent guidance from the National Institute of Clinical Excellence (NICE) and was developed in consultation with local stakeholders. A copy of the guideline is enclosed.

There was agreement at the workshop that it would be useful to circulate the UCHT guideline amongst other Trusts in Northern Ireland, which currently receive children with minor head injury. This guideline could then be discussed with the local health professionals involved and used as a framework for producing Trust specific guidelines for local use.

There will be varying amount of local adaptation required and you may wish also to refer back to the original NICE document: Head Injury. Triage, assessment, investigation and early management of head injury in infants, children and adults. National Institute for Clinical Excellence. Clinical Guideline for (June 2003), which can be found at: [www.nice.org.uk](http://www.nice.org.uk) However I would encourage you to undertake such an exercise as soon as possible and ensure that all those within your Trust are aware of, and use, your local version of the guideline.

It was clear from the workshop in January that there are a number of important issues in the clinical care of children that need to be addressed in Northern Ireland, and it is incumbent on us all to work together to ensure children receive the highest possible quality of care in our hospitals.

Yours sincerely



**Dr Henrietta Campbell**  
**Chief Medical Officer**

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## ULSTER COMMUNITY AND HOSPITALS TRUST

### WOMAN AND CHILD HEALTH DIRECTORATE

#### GUIDELINE: MANAGEMENT OF MINOR HEAD INJURY IN CHILDREN

##### 1.0 INTRODUCTION

This guideline is to assist paediatric medical and nursing staff in the management of children aged <13 years admitted to the paediatric wards following minor head injury.

##### 1.1 Exclusions:

Children in the following groups who should be admitted to RBHSC:

- Moderate severe head injury
- Multiple injuries
- Those who exhibit haemodynamic instability

##### 1.2 Main aim is to reduce morbidity and mortality due to secondary brain injury and to detect secondary brain injury at an early stage to allow prompt treatment.

##### 2.0 ASSESSMENT

The main focus of assessment should be the risk of clinically important head injuries while paying due attention to other injuries or concerns.

##### 2.1 Mechanism and timing of injury: Significant morbidity and mortality are associated with:

- RTA/bicycle collision.
- Falls from a height (> 3ft or 5 stairs). Height fallen from is inversely related to age!
- High velocity injuries e.g. Golf ball injuries.
- Penetrating injuries.

##### 2.2 Past history: schooling, medical problems e.g. bleeding disorders, diabetes, seizures. Historical features associated with brain injury include

- Loss of consciousness (high risk if prolonged >5 min)
- Transient cortical blindness or paresis.
- Seizure activity especially focal seizures.

2.3 Other symptoms which may occur such as headache, lassitude, nausea and vomiting may be significant if they are persistent. It is difficult to determine loss of consciousness by history in infants and young children. Apnea, pallor and failure to cry immediately are indicators for possible brain injury in the younger child.

### 3.0 EXAMINATION

Assessment of level of consciousness is vital for guiding management using Glasgow Coma Scale and score and Childs Glasgow Coma scale for children < 4 years (See Appendix 1).

Examine for haematomas and abrasions which may point to underlying fracture. Blood or CSF from the ears or nose, periorbital or retromastoid haematoma are indicators of basal skull fracture.

### 4.0 IMAGING

The current primary investigation of choice for the detection of clinically important brain injuries is computed tomography (CT) of the head, carried out at an appropriate period post-injury (at least 2 hours post injury unless the child has risk factors that demand immediate imaging).

Skull X – rays have a role when there is a suspicion of non-accidental injury in infants and children (< 12 years) in conjunction with other established investigations (e.g. CT, ophthalmoscopic examination).

#### 4.1 INDICATIONS FOR HEAD CT

CT scanning should be done in a patient who has any of the following features:

- (1) GCS < 13 at any point since the injury.
- (2) GCS = 13 or 14 at 2 hours after the injury
- (3) Radiological/clinical evidence of a fracture
- (4) Focal neurological signs
- (5) Tense fontanelle or splaying of sutures
- (6) Post traumatic seizure
- (7) Severe and persistent headache
- (8) Repeated vomiting
- (9) Irritability or altered behavior
- (10) Amnesia for greater than 30 min of events before the injury ( difficult< 5yr)
- (11) Any loss of consciousness or memory in combination with a dangerous mechanism of injury or history of coagulopathy

## 4.2 Urgency of CT scanning

CT should be performed immediately in patients with GCS<9 at any time since the injury. All other indications listed above should be performed within 1 hour of request but no earlier than 2 hours post-injury.

## 4.3 INDICATIONS FOR SKULL X-RAY

*If an emergency CT scan is planned, there is no reason to carry out skull radiography.*

Skull films should be carried out if any of the following apply and if CT is not being performed:

If the patient is alert and orientated and obeying commands (GC515/15) **but:**

- The mechanism of injury has not been trivial; or
- consciousness has been lost; or
- the patient has loss of memory or has vomited or
- the scalp has a full thickness laceration or a boggy haematoma; or - the history is inadequate.

**NOTE: Assessment must also include consideration of the possibility of spinal injury and need for immobilisation and imaging of the cervical spine.**

## 4.4 INDICATIONS FOR IMAGING CERVICAL SPINE

In children under 10 years, because of the increased risks associated with irradiation, particularly to the thyroid gland, and the generally lower risk of significant spinal injury, CT of the cervical spine should only be used in exceptional circumstances. The child < 10 years should receive anterior/posterior and lateral views without the A/P peg view. Abnormalities or uncertainties should be clarified using CT imaging.

Children over 10 years can be treated as adults for the purposes of cervical spine imaging. CT scan is the first line investigation if the patient is having a head scan otherwise first line investigation of choice is three view images of good quality.

- GCS < 15
- Paraesthesia in the extremities
- Focal neurological deficit
- Not possible to test for full range of movements
- Unable to actively rotate neck to 45 degrees
- Presence of neck pain or tenderness where mechanism of injury has been dangerous

- All imaging should be reviewed by an experienced radiologist as soon as possible.

- If discussion with or transfer to the neurosurgeons is required CT images should be transmitted to the RVH by teleradiology.
- CT scanning should not cause delay in transfer to neurosurgeons. If clinical features point strongly to an intracranial haematoma discuss with neurosurgeons about benefits of immediate transfer to RVH where CT scanning and neurosurgery are available.

## 5.0 ADMISSION OR DISCHARGE?

Children should be admitted to hospital if **any** of the following risk factors apply:

- History of loss of consciousness
- Neurological abnormality or persisting headache, nausea or vomiting
- Clinical or radiological evidence of skull fracture or penetrating injury
- Difficulty in making a full assessment - suspicion of non-accidental injury
- Other significant medical problem.
- Not accompanied by responsible adult or social circumstances considered unsatisfactory.

*In injured children, especially the very young, the possibility of non-accidental injury must be considered when findings are not consistent with the explanation given, if the history changes, or if the family is known to be on the 'At Risk' register. In such a case an experienced paediatrician should be involved and should contact the duty social worker to allow early investigation. (Ref: Guidelines Management NAI).*

## 6.0 INDICATIONS FOR REFERRAL TO THE NEUROSURGICAL UNIT

The speed with which patients who need neurosurgical care are identified, referred and transferred may critically influence their outcome. The main aim is to take pre-emptive action.

### **A head injured patient should be discussed with a neurosurgeon:**

- When CT scan shows a recent intracranial lesion.
- When patient fulfils the criteria for CT scanning but this cannot be done within an appropriate period.
- Irrespective of the result of any CT scan, when the patient has clinical features that suggest that neurosurgical assessment, monitoring, or management are appropriate.

### **Features suggesting that neurosurgical assessment, monitoring, or management are appropriate include:**

- (1) Persisting coma (GCS score less than 13/15) after initial resuscitation.
- (2) Confusion which persists for more than 4 hours.
- (3) Deterioration in level of consciousness after admission (a sustained drop of one point on the motor or verbal subscales, or two points on the eye opening subscale of the GCS).
- (4) Progressive focal neurological signs.
- (5) A seizure without full recovery.
- (6) Depressed skull fracture.
- (7) Definite or suspected penetrating injury.

- Children with multiple injuries or haemodynamic instability should be admitted to RBHSC to paediatric surgery or neurosurgery depending on primary problem at the time.

## **7.0 TRANSFER BETWEEN THE ULSTER HOSPITAL AND THE NEUROSURGICAL UNIT/PICU**

Transfer should ideally be undertaken by staff experienced in the transfer of critically ill children - i.e. a (Regional) Paediatric Transfer Team but currently is responsibility of an anaesthetist experienced with trauma. They should be supported by an experienced assistant.

The proforma containing the Glasgow Coma Scale and other relevant features should be copied and images should be copied and transferred with the child.

## **8.0 INPATIENT OBSERVATION IN THE ULSTER HOSPITAL**

Children <13 years with minor head injury (GCS 14 or greater) deemed to need to stay in hospital should be admitted under the care of the paediatrician on call. Children > 1 year age should be admitted to Craig ward. Infants < 1 year should be admitted to Maynard ward.

On arrival in the ward nursing staff should carry out a neurological examination and compare it with that obtained in A&E. Any discrepancy or concerns should be communicated immediately with the medical staff.

All medical and nursing staff involved in the care of head injured patients should be trained in the use and recording of the Glasgow Coma Scale. Each subscale should be monitored and recorded in addition to total score to provide better prediction. Other features monitored should be pupil size and reactivity, limb movements, respiratory rate, heart rate, blood pressure blood oxygen saturation and temperature. Observations should be recorded on a proforma.

## **9.0 FREQUENCY OF OBSERVATIONS**

Observations should be performed and recorded on a half-hourly basis until GCS = 15 has been achieved. The minimum frequency of observations for patients with GCS = 15 should be as follows, starting after initial assessment in A&E:

- 1/2 hourly for 2 hours
- 1 hourly for 4 hours
- 2 hourly thereafter.

Should the GCS deteriorate at any time after the initial 2-hour period, observations should revert to half-hourly and follow the original frequency schedule.

- 9.1 Medical staff should assess the patient on admission to the ward and should re-assess the patient at least once within the next 24 hours. Assessment should include examination for the GCS, neck movement, limb power, pupils, cranial nerves and signs of basal skull fracture.

If the patient fails to improve at the expected rate or there is evidence of clinical worsening they should be reappraised by medical staff to assess for complications.

9.2

Any of the following examples of neurological deterioration should prompt urgent reappraisal by a doctor.

- the development of agitation or abnormal behaviour
- a sustained (i.e. for at least 30 min) drop of one point in GCS ( a greater weight should be given to a drop of one point in the motor score of the GCS)
- a drop of greater than two points on the GCS regardless of duration of GCS sub-scale.
- the development of severe or increasing headache or persisting vomiting
- new or evolving neurological symptoms or signs, such as pupil inequality or asymmetry of limb or facial movement.

9.3 **Children <3 years who have sustained a head injury are particularly difficult to evaluate and clinicians should have a low threshold of suspicion for early consultation with the neurosurgeons.**

9.4 If reappraisal confirms a neurological deterioration, many factors need to be evaluated including consideration of a further CT scan but the first step is to ensure the airway is clear, and that oxygenation and circulation are adequate.

9.5 Clinical signs of shock in a head injured patient should be assumed, until proven otherwise, to be due to hypovolaemia caused by associated injuries. Resuscitation should continue according to APLS principles while anaesthetic help and neurosurgical advice are sought.

9.6 If a child has had a normal CT scan but fails to achieve GCS equal to 15 after 24 hours observation, a further CT scan should be considered.

## 10.0 DISCHARGE AFTER OBSERVATION

Before discharge from the ward the child must be assessed by an experienced doctor, who must establish that all the following criteria have been met:

- (a) Consciousness has recovered fully and is sustained at the pre-injury state.
- (b) The patient is eating normally and not vomiting.
- (c) Neurological symptoms/signs have either resolved, or are minor and resolving or are amenable to simple advice or treatment, (e.g. headache relieved by simple analgesia).
- (d) The results of imaging and other investigations have been reviewed and no further investigation is required.
- (e) Extracranial injury has been excluded or treated.

10.1 An immediate discharge document should be sent to the patient's general practitioner, in advance of the more detailed discharge letter. Written head injury advice should be given to and discussed with the carers of children at the time of discharge



## **REFERENCES**

Head injury. Triage, assessment, investigation and early management of head injury in infants, children and adults. National Institute for Clinical Excellence. Clinical Guideline 4. (June 2003).

Guidelines for Good Practice. Early management of patients with a head injury. RCPCH 2001

Early management of patients with a head injury. A National Clinical Guideline. Scottish Intercollegiate Guidelines - Network 2000.

Report of the working party on the management of patients with head injuries. The Royal College of Surgeons of England June 1999

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**E.D. McElkerney (Mrs)**  
**Directorate Manager**  
**Woman & Child Health Directorate**

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**Dr. A. Bell**  
**Clinical Director**  
**Woman & Child Health Directorate**

**Review Date:**