

## Children and Infants with Head Injury - Acute Management

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### Director-General

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**CIRCULAR**

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**Acute Management of Infants and Children with Head Injury**

The attached clinical practice guideline applies to all facilities where paediatric patients are managed and were prepared for the NSW Health Department by an expert clinical reference group under the auspice of the Statewide Paediatric Steering Committee. Area Health Services are required to have local guidelines in place in all hospitals and facilities likely to be required to assess or manage children with an acute head injury. In developing local guidelines other relevant Departmental circulars should also be considered eg. *NSW Health Department Guidelines for the Hospitalisation of Children Revised July 1998* (State Health Publication SWS 980088).

It should be noted that this document reflects what is currently regarded as a safe and appropriate approach to care. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines. This document should be used as a guide, rather than as a complete authoritative statement of procedures to be followed in respect of each individual presentation. It does not replace the need for the application of clinical judgment to each individual presentation.

In early 2004 the NSW Institute of Clinical Excellence commenced a Children's Emergency Care Project, which involves working with a number of pilot sites to implement the clinical practice guidelines. Contact details are: Marilyn Cruickshank, Project Manager, Children's Emergency Care Project, NSW Institute for Clinical Excellence, GPO Box 1614, SYDNEY 2001, Phone: (02) 9382 7658, Fax: (02) 9382 7615.

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# Acute management of head injury in children within the first 24 hours

*Clinical Practice Guidelines*



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December 2004

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# Introduction

These Guidelines are aimed at achieving the best possible paediatric care in all parts of the State. The document should not be seen as a stringent set of rules to be applied without the clinical input and discretion of the managing professionals. Each patient should be individually evaluated and a decision made as to appropriate management in order to achieve the best clinical outcome.

The formal definition of clinical practice guidelines comes from the National Health and Medical Research Council:

*'systematically developed statements to **assist** practitioner and patient decisions about appropriate health care for specific clinical circumstances.'* (National Health and Medical Research Council A Guide to the Development, implementation and evaluation of Clinical Practice Guidelines, Endorsed 16 November 1998, available from [www.nhmrc.gov.au/publications/synopses/cp65syn.htm](http://www.nhmrc.gov.au/publications/synopses/cp65syn.htm))

It should be noted that this document reflects what is currently regarded as a safe and appropriate approach to care. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines, this document should be used as a guide, rather than as a complete authoritative statement of procedures to be followed in respect of each individual presentation. It does not replace the need for the application of clinical judgment to each individual presentation.

This document represents basic clinical practice guidelines for the acute management of head injury in children within the first 24 hours. Further information may be required in practice; suitable widely available resources are listed throughout this document.

Each Area Health Service is responsible for ensuring that local protocols based on these guidelines are developed. Area Health Services are also responsible for ensuring that all staff treating paediatric patients are educated in the use of the locally developed paediatric guidelines and protocols.

In the interests of patient care it is critical that contemporaneous, accurate and complete documentation is maintained during the course of patient management from arrival to discharge.

**Parental anxiety should not be discounted: it is often of significance even if the child does not appear especially unwell.**

# Overview

Head injuries are one of the most frequent reasons for a visit to the Emergency Department (1–2 per cent). The majority have a ‘minor head injury’, of which 3–5 per cent actually have an intracranial injury.<sup>1</sup> The evaluation and management of injured children may be influenced by local practice settings, the availability of technology and/or appropriately trained staff.<sup>2</sup> However, the magnitude of the problem suggests that it is critical to adopt a consistent approach to the management of such children.

These guidelines apply to children and adolescents 16 years and under, neonates excluded. It is recognised that the borderline between childhood and adulthood is not distinct and in some instances the guidelines need to be interpreted with caution particularly if there is co-existent longstanding disability.

The initial management plan for children is based on early management of severe trauma principles but it is in the apparently minor head injury that considerable judgment is required. Delay in diagnosis and intervention is a major factor influencing the decision to adopt a clinical strategy of immediate CT scan as opposed to patient observation. Given that many injuries in NSW occur at some distance from a CT scanner then practitioners should be familiar with the different patterns of injury in children versus adults. This knowledge aided by case discussion with experienced practitioners in the children’s hospitals will ensure the appropriate triage and transfer of those most at risk.

## Patterns of head injury in children

The patterns of head injury and the principles of management in children have some important differences from adults. These relate to the developmental level of the child, anatomic variations in a child particularly the head, the frequency of inflicted injury in the young child and finally the response of the child’s brain to trauma.<sup>3</sup> In particular these include:

- The Glasgow Coma Scale (GCS) may be unreliable and a modified scale should be adopted for infants and small children (see page 15).
- A history of loss of consciousness may be unobtainable or unwitnessed. Children, particularly aged less than two years,<sup>4</sup> with no history of loss of consciousness can still have a significant risk of intracranial injury.<sup>5</sup>

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<sup>1</sup> Haydel MJ. The use of computed tomography in paediatric patients with minor head injury. <EmedHome.com>, Emergency Medicine’s home page.

<sup>2</sup> NSW guidelines for the hospitalisation of children, July 1998.

<sup>3</sup> The management of acute neurotrauma in rural and remote locations. The Neurosurgical society of Australasia, The Royal Australasian College of Surgeons, 2000 (second edition).

<sup>4</sup> Greenes DS, Schutzman SA. Clinical indicators of intracranial injury in head-injured infants. *Pediatrics* 1999; 104:861–7.

<sup>5</sup> Simon B, Letourneau P, Vitorino E, McCall J. Pediatric minor head trauma: indications for computed tomographic scanning revisited. *J Trauma* 2001; 51:231–7; discussion 237–8.

## Overview

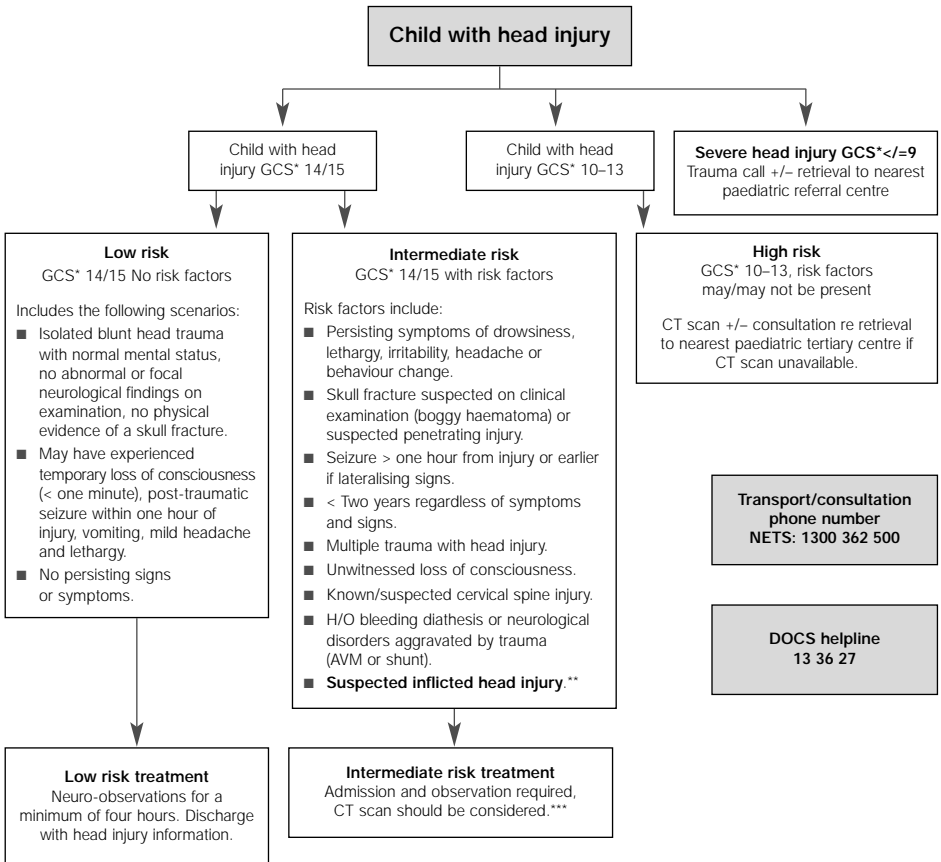
- Parents provide the most reliable and trustworthy information, however, **if the history is inconsistent and or does not match the physical findings then an investigation into the possibility of inflicted head injury must be carried out.** Children with inflicted head injury (child abuse) present to Emergency Departments. Much of this can go unrecognised unless a high index of suspicion is maintained. The current NSW guidelines stipulate that recognition of inflicted head injury is a duty of care for all practitioners and that notification to the Department of Community Services is mandatory in all suspected cases (see page 16).
- Vomiting after head injury is common in children and there appears no strong correlation between emesis and intracranial injury.<sup>6</sup>
- Blunt trauma to a child's head may be followed within a short time by acute brain swelling. This can occur despite the absence of a significant history or any visible physical abnormality in the head region. Fluid balance is critical because of the propensity to cerebral oedema.<sup>3</sup>
- A seizure is not uncommon after a minor head injury and does not necessarily imply an intracranial injury, particularly if the seizure is generalised and of short duration. The decline in conscious state following the seizure may mean a CT scan is indicated to eliminate an associated intracranial injury.<sup>1</sup>
- The physical characteristics of a child's skull alter the likelihood of certain injuries. Depressed skull fractures are more common after a direct blow, eg golf club injury. In contrast, the pliability of the skull means local injury to the brain, with or without bleeding, can occur in the absence of a fracture.<sup>3</sup>
- Blood loss into an intracranial haematoma or a scalp haematoma can be considerable and is likely to be underestimated given the compensatory mechanisms present. The head represents 18 per cent of the body surface area, versus seven per cent in adults, and as a consequence scalp lacerations can result in life-threatening haemorrhage.

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<sup>6</sup> Quayle KS, Jaffe DM, Kuppermann N, et al. Diagnostic testing for acute head injury in children: when are head computed tomography and skull radiographs indicated? *Pediatrics* 1997; 99: E11.

# Assessment and management

## Flow chart of initial patient care



\* GCS: Glasgow coma scale.

\*\* If inflicted head injury is suspected then there should be communication with the paediatric referral centre to discuss the indicators of the case. If it is agreed that it is a suspected case of inflicted head injury then transfer to the paediatric referral centre should occur. DoCS should immediately be notified of the suspicion and the transfer.

\*\*\* Consult with paediatric expert (neurosurgeon, paediatric surgeon, intensivist, emergency physician) if CT scan unavailable and/or staff are inexperienced in interpretation of clinical features.

The aim of initial evaluation and management is rapid assessment of the severity of injury and initiation of an appropriate treatment plan for a child with a head injury, with or without other injuries.

### Primary survey

- **A**irway with cervical spine immobilisation
- **B**reathing pattern and adequacy
- **C**irculation and haemorrhage control
- **D**isability – rapid neurological examination [AVPU] and pupils (size and reaction to light)
  - **A**lert
  - Responds to **V**oice only
  - Responds to **P**ain only
  - **U**nresponsive.
- **E**xposure: complete examination of the patient with *protection against hypothermia* to which children are particularly at risk, as well as consideration of dignity.

### Resuscitation

#### Airway

- Ensure clear and in the unconscious patient (GCS $\leq$ 9) consider intubation with rapid sequence induction and cervical spine protection, as this is likely to be required. Oral route of intubation preferred in children with a risk of base of skull fracture.
- Maintain cervical spine immobilisation: in small children an appropriately fitting semi-rigid ('hard') collar may not be available, in which case the cervical spine should be protected either using sandbags or trained staff (see spinal immobilisation).

### Breathing and oxygenation

- Give supplemental oxygenation initially, preferably a nonrebreather mask. A minimum of four litres/minute O<sub>2</sub> should be given via standard 'Hudson' face mask: children have a higher requirement for oxygen given their increased metabolic rate in comparison with adults.
- Treat shock: identified by tachycardia, reduced (thready) pulse volume and slow capillary refill: blood pressure may be normal. Give IV/IO 20mL/kg normal saline. Note the normal physiological measurements in children vary with age (see Table 1). Pulse and blood pressure need to be interpreted in this context. Inexperienced practitioners may underestimate blood loss as children maintain their blood pressure effectively. Hypotension occurs late and is often a sudden sign of cardiovascular decompensation.
- If a bleeding site is evident apply constant firm pressure to minimise blood loss. A scalp or intracranial injury may cause hypovolaemic shock in young children.
- Fluid balance is critical in the child. Resuscitation with normal saline is necessary to maintain euvoemia (see Table 2). Care must be taken to avoid unnecessary IV crystalloid fluids because children are susceptible to cerebral oedema.

### Disability

- The Glasgow coma scale (GCS) is the best quantitative measure of a patient's consciousness. A modified GCS (with amendments to the assessment of the verbal response) is useful in infants (see page 15).

### Temperature maintenance

- Children are susceptible to hypothermia because of their large surface area to body mass ratio. Temperature must be monitored and maintained at all times.
- Oro-gastric tubes and urinary catheters are unpleasant and stressful in the conscious child. A careful judgment should be made about whether these are necessary to further management.

**Table 1. Normal physiology in children**

Age	Respiratory rate	Heart rate	Blood pressure (systolic)
< 1	30–40	110–160	70–90
1–2	25–35	100–150	80–95
2–5	25–30	95–140	80–100
5–12	20–25	80–120	90–110
> 12	15–20	60–100	100–120

Reference: Advanced Paediatric Life Support The Practical Approach third edition. BMJ books 2001.

**Table 2. Fluid balance**

Weight (kg)	Maintenance (ml/hr)	2/3 maintenance (ml/hr)
4	16	11
5	20	13
6	24	16
7	28	19
8	32	21
9	36	24
10	40	27
15	50	34
20	60	40
25	65	44
30	70	47
35	75	50
40	80	54

*Initial fluid bolus*

Normal saline 20ml/kg

*Maintenance fluid administration*

4ml/kg/hr for first 10kg then 2ml/kg/hr for next 10 kg (ie 10–20kg) then 1ml/kg/hr thereafter.

### Spinal immobilisation

Cervical spine immobilisation is essential when there is a potential of cervical spine or cord injury. The principles include:

- Soft collars do not provide protection to the unstable spine (but may be all that is available for the infant < one year old).
- Semi-rigid collars (eg Stiffneck®), even when appropriately fitted, allow some flexion/extension movement.
- Lateral support with 'sandbags' or head blocks provide additional support to a semi-rigid collar and may reduce movement.
- Infants' occiputs are prominent, resulting in neck flexion when lying supine (unless the head is recessed to accommodate the occiput or the trunk is elevated).
- Manual in-line immobilisation can provide excellent stability; allows reassurance by the staff member to the child, but requires total dedication of the staff member to that specific task.
- Spine boards may be used in the short term to facilitate transfer between trolleys etc, otherwise the patient should lie supine on a trolley/bed with a firm, supportive mattress/base.
- Generally tapes should not fix the patient to the bed, but be placed across the forehead and chin to a spine board or head blocks/sandbags; thus allowing prompt rolling in the event of vomiting.
- Log rolling the patient to examine the back or apply a spine board, ideally should be undertaken by several people (preferably three for an infant and four for a child to roll and additional person to examine).

- Combative children require urgent reassessment. Check for hypoxia, hypoventilation and pain/fear particularly. Reassure the child throughout. If the child remains combative DO NOT persist with attempts to restrain the child in order to provide spinal 'immobilisation'.
- Other devices like Jordan frames and scoop stretchers may be used to facilitate safe transfer of patients between beds/trolleys/x-ray and scanning tables.

The process of 'clearing' a cervical spine requires clinical and radiological evaluation. Clinical staff uncertain about this process should seek early, appropriate consultation with paediatric experts.

### Secondary survey

- Systematic examination of each region of the body from head to toe.
- Assess response to resuscitation, monitor pulse, blood pressure, respiratory rate and temperature as well as GCS (see page 15) at 15–30-minute intervals.
- Document all drugs and fluids administered. Commence a fluid balance chart.
- Specific neurological assessment includes:
  - A careful history including the time and mechanism of injury, loss of consciousness, seizures, verbal patterns and the range and appropriateness of movement. An assessment of the plausibility of the history in terms of the severity of the injury should be made. Seek information about the development of the child, particularly in relation to the mechanism of injury. Any possible irregularities (eg unexplained or repeated injury) or lack of consistency in the history should alert practitioners to the possibility of inflicted head injury.

- Identification of a past history of disease and or risk factors which increase the predisposition to intracranial injury, a full immunisation history including tetanus status.
- A neurological examination including a GCS or a modified scale for younger infants (see page 15) with other observations.
- Assessment of the fontanelle tension, measuring and plotting the head circumference on percentile charts and examining the optic fundi for the presence of retinal haemorrhage.
- Radiological examination: chest x-ray, pelvic x-ray and lateral cervical spine x-ray for all significant trauma cases.

### Tertiary survey

A routine head-to-toe examination of a patient should take place within 24 hours of the injury to document any missed injuries and re-evaluate existing injuries and their treatment. This is particularly important in non-ambulant children – look for evidence of bruising particularly in the facial, ear and/or head area.

### Stabilisation of a child with severe head injury (prior to scanning or transport)

The objective of ongoing management is to limit the likelihood of secondary brain injury by prevention of hypotension, hypoxemia, hypercapnoea and acidosis.

### Airway and breathing

Establish a clear airway. If intubated, the endotracheal tube position should be confirmed clinically (including EtCO<sub>2</sub> if available) prior to a chest x-ray (the tube should be positioned in the trachea above the carina). Neuromuscular blockade (other than for intubation) is relatively contraindicated, as neurological signs will be masked. Mechanical ventilation should be directed by the results of arterial blood gases where available. Oximetry +/- capnography may also be utilised. If possible the PaO<sub>2</sub> should be > 90mmHg (SaO<sub>2</sub> > 96 per cent) and PaCO<sub>2</sub> kept in the range 35–40mmHg.

**Hyperventilation to PaCO<sub>2</sub> below these values is NOT indicated.** Positive end expiratory pressure (PEEP) of 3–5cm H<sub>2</sub>O should be applied to protect from atelectasis. This level of PEEP does not raise intracranial pressure.

### Circulatory support

The patient should be euvolaemic. If hypovolaemia is apparent, normal saline boluses of 20mL/kg should be given to restore circulating volume. Following resuscitation, 'maintenance' fluids should be administered either as isotonic normal saline (0.9 per cent) or 0.45 per cent saline with 2.5 per cent dextrose as these fluids will reduce the likelihood of hyponatraemia. As a guide, if serum Na < 145mmol/L, use 0.9 per cent saline, otherwise use 0.45 per cent saline with 2.5 per cent dextrose. **Quarter normal saline (0.225 per cent saline with 3.75 per cent dextrose) should never be administered.** Blood glucose should be monitored to prevent hypoglycaemia, particularly with normal saline infusions. Addition of dextrose to normal saline may be required. In the severely head injured child who is euvolaemic consider restriction to two-thirds maintenance volume.

### Analgesia

Effective analgesia and sedation are paramount to good management of elevated intracranial pressure. Patients should receive narcotics in a dose appropriate to injuries, and may be sedated with a variety of agents. A bolus of IV morphine (50–100microgram/kg) or an infusion (20–40microgram/kg/hr) is recommended as initial therapy.

### Observations and positioning

Perform continuous or 15–30-minutely observations during stabilisation. Nurse the patient flat (if hypotensive) or 15–30°C head up and with the head in the midline, observing spinal precautions (see spinal immobilisation).

### Identification of acute deterioration and appropriate intervention

The following clinical signs indicate acute deterioration and are an indication for urgent consultation/intervention:

- deteriorating level of consciousness as measured by GCS (decrease > one point)
- clinical signs suggestive of seizure activity
- clinical signs consistent with herniation:
  - extensor posturing or hemiparesis
  - change in vital signs – hypertension, bradycardia and irregular respirations (cushing's reflex)
  - pupillary signs – sluggish reaction or unilateral/bilateral pupillary dilation.

In general, the younger the child, the more non-specific the clinical signs of elevated intracranial pressure may be (due to CNS immaturity and greater reflex activity).

<sup>7</sup> The American Academy of Paediatric: The management of minor closed head injury in children. Paediatrics 1999; 104(6): 1407–1415.

<sup>8</sup> Royal College of Paediatrics and Child Health: Guidelines for good practice: early management of patients with a head injury. September 2001.

### Urgent intervention

- Check head position, oxygenation and ventilation. Commence bag valve mask ventilation.
- If seizing, administer midazolam (100microgram/kg bolus) or diazepam (100–250microgram/kg bolus) and consider loading with phenytoin 15–20mg/kg in **normal saline** over 30 minutes.
- Consider administration of mannitol 0.5g/kg IV, but **only after** discussion with paediatric referral centre.
- Urgently discuss with retrieval team or neurosurgeon regarding mannitol, performing/repeating the CT scan and other necessary interventions such as emergency craniotomy/burr holes.

### Role of investigation in a child with a head injury

#### Skull x-ray

Large studies of children and adults have shown that the sensitivity of skull radiographs for identifying intracranial injury in children is quite low (approximately 25 per cent) although higher figures have been reported in adolescents. Similarly specificity is also limited. Therefore children with intracranial injury can have a normal skull x-ray and skull x-rays are likely to be interpreted as abnormal for a substantial number of children without intracranial injury. Thus skull x-ray has a limited role in the management of children with head injuries. If this form of imaging is used the findings should be interpreted with caution as observation over time is the key to the recognition of intracranial injury.<sup>8</sup>

However, skull x-ray may have a place for the infant < 12 months who is neurologically normal, but has clinical suspicion of a fracture. A fracture does increase the risk of intracranial injury up to 10 times, may give clues to inflicted head injury from the fracture pattern (anything but a single linear fracture) and indicates that follow up is required to detect the possible presence of a leptomeningeal cyst.

### CT scan

The most accurate and rapid means of detecting intracranial injury is with a CT scan. A CT scan is itself a safe procedure although some children require sedation (particularly between six months and four years of age) and or general anaesthesia for the procedure. Further, given the issue of distance and dislocation for families if the child needs to move to a larger centre, the benefits of a scan have to be weighed against the risks of delay in diagnosis resulting from an observation-only policy. If a CT scan is accessible this should be performed as the investigation of choice. Access to monitoring and resuscitation is necessary during transfer and scanning. Alternatively, a policy of skull x-ray and observation may be appropriate in low-risk patients, if the practitioner is aware that deterioration can occur despite an initial categorisation of low risk. CT scans can also be 'normal' if performed early after the injury. Sub-dural haematoma classically manifests clinically some time after the initial injury often with subtle symptoms. Thus practitioners should perform a repeat CT scan if ongoing observation indicates deterioration and leads to recategorisation, eg persistence or development of neurological symptoms or signs. Young children are particularly difficult to evaluate and clinicians should have a low threshold for repeat CT scan or consultation with a paediatric expert if a CT scan is unavailable.

## Transport for the child with a head injury to a children's hospital

NETS hotline telephone number is  
1300 362 500.

NETS (NSW Newborn & Paediatric Emergency Transport Service) is the statewide retrieval service for babies and children in NSW. In this document, calls to NETS are recommended for patients with moderate or severe head injuries, requiring transfer and/or advice. Advice about minor head injuries is likely to be managed at local or regional level. Calls to NETS usually involve (simultaneously) conferencing a number of medical specialists (eg NETS' consultant, paediatric emergency physicians, intensivists, neurosurgeons, paediatric surgeons) to provide a clinical consultation that results in appropriate management advice. It is recognised that all clinical information may not be available when advice calls are made early, but such calls are encouraged if clinical support or advice is needed urgently. Concurrently, if appropriate, a medical retrieval will be activated by the same telephone call. Appropriate management and transport may involve the use of local, regional and other statewide resources, which can all be activated by the call to NETS. Changes in the patient's condition should result in further consultation with NETS, even once retrieval has been activated, to permit a change in management strategy if required by the patient's condition. All clinical calls to NETS are audio taped for clinical and quality reasons, and become a permanent component of the NETS' medical record. Ambulance pre-hospital notification, when escalated to a state co-ordination level, will engage NETS via the MRU (medical retrieval unit).

### **Parental information and discharge instructions**


Childhood injury is devastating. Parental support is critical to long-term outcome. Provision of timely information on their child's condition and involvement of parents in decision-making is essential. Health professionals should make arrangements for the parent to be with the child at all times with the exception of times of urgent intervention. The child, especially if conscious, will be more co-operative and interpretation of clinical symptoms and signs will be more reliable in the presence of a parent.

The role of the local medical practitioner will be essential during the recovery period following discharge from hospital. Detection of unrecognised injuries and early implementation of a head injury recovery plan will ensure optimal recovery. Timely information should be provided at the time of discharge to parents, medical practitioners, and on some occasions to the education department if the child is going to require rehabilitation.

Transport to and from rural centres is supported by the Department of Health. Isolated Patients' Travel Accommodation Assistance Scheme forms, requiring completion by the referring medical practitioner, parents and treating medical specialist should be provided for each family with instructions on how to complete the form and where to send it (for patients residing  $\geq$  200kms from referral centre).

# Parent information sheet – head injury

**NSW HEALTH**  
DEPARTMENT




## CHILDREN WITH HEAD INJURY

A GUIDE FOR PARENTS



Head Injury: A major cause of childhood death and disability



We suggest you let your child's school know that your child has had a head injury.....

After your child has been back at school for one month, we suggest that you talk to your child's teachers about whether there have been any changes in their performance or behaviour since their injury.


**After You go home.....**

If you have any concerns please contact The Brain Injury Rehabilitation Team at your nearest children's hospital:

- **The Children's Hospital at Westmead**  
Center of Head Injury, Head & Spinal Cord Injury  
Westmead  
Phone: (02) 96467132
- **Sydney Children's Hospital**  
Westmead  
Phone: (02) 93521690
- **John Hunter Children's Hospital**  
Newcastle  
Phone: (02) 49215932

Help is also available around the state at various regional brain injury services:

- Albany (02) 69231832
- Ballarat (03) 93723336
- Bathurst (02) 94519888
- Brisbane (07) 55227411
- Darwin (08) 94221111
- Port Macquarie (02) 94222336
- Tamworth (02) 67420448
- Townsville (07) 47824444
- Warragamba (02) 62101717



## SIGNS TO LOOK FOR

### EARLY ON

If your child has suffered a head injury, however minor, and develops any of the following symptoms:

1. Headache
2. Giddiness
3. Nausea or vomiting
4. Drowsiness
5. Unsettled or continued crying
6. Unsteady when walking

Report immediately to the hospital or to your local medical practitioners.

Do not delay especially if the symptoms get worse.

If you are worried you can any of the following:

- Local Doctor
- Local emergency department
- Nearest children's hospital
- Dial 999 for an ambulance



# HEAD INJURY

Most children with Head Injuries make a full recovery. Please read this carefully so that you are aware of the signs that may indicate the need for further investigation.



### LATER ON

You may notice some changes in your child's behaviour and/or ability to learn and understand information at home or at school. Some of the following changes may be noticed by the family or the teacher during the weeks and months after a head injury.

### Memory and Learning

- Difficulty with new school work or new activities
- Problems with concentrating or remembering
- Slowness when thinking about new things

### Physical

- Poor co-ordination
- Clumsiness

### Behaviour

- More demanding and easily frustrated
- More fearful and anxious
- Changes in sleeping patterns

Note: Children often feel guilty after a head injury and this tendency can exaggerate any of their symptoms.

### Speech and Language

Change in the ability to:

- Understand or follow a conversation or spoken directions
  - Tell a story or re-tell events
  - Find the right word
- Change in the amount or style of speech

# Assessment of conscious state

## The Glasgow Coma Scale and the Modified Glasgow Coma Scale

The Glasgow Coma Scale (GCS) provides the best quantitative measure of a patient's level of consciousness. GCS has prognostic value for trauma patients (but not in other causes of coma, where it is simply a descriptive tool to describe the level of consciousness). Prognosis in trauma patients is associated with the initial GCS

- GCS 3–5 = severe head injury with significant likelihood of some permanent impairment.
- GCS 6–8 = moderately severe head injury, will require ICU and may have permanent impairment.
- GCS > 8 = mild head injury, likely to have good outcome.

A GCS of three or four at 24 hours after injury (assuming this is not caused by sedation administered in the ICU) is a very poor prognostic sign.

**Table 3. Glasgow Coma Scale (GCS)**

Eye opening	E
Nil	1
To pain	2
To voice	3
Spontaneous	4
Verbal response	V
Nil	1
Groans	2
Some words, inappropriate/mumbled	3
Confused but recognisable speech	4
Appropriate conversation	5
Movement/motor response	M
Flaccid paralysis	1
Extensor/decerebrate response to pain	2
Flexor/decorticate response to pain	3
Withdraws to pain	4
Localises pain*	5
Obeys commands	6

**Total = E + V + M = 3 to 15**

\* Purposeful movement in response to painful stimulus – patient will reach for painful area.

### A modified GCS is used for young infants; modified best verbal response

- |   |   |
|---|---|
| 1 | None  |
| 2 | Restless, agitated                                    |
| 3 | Persistently irritable                                |
| 4 | Cries, but is consolable                              |
| 5 | Appropriate words or social smile, fixes and follows. |

Regardless of GCS, the following signs are also indicative of severe head injury:

- unequal pupils
- unequal motor response
- open head injury with cerebrospinal fluid leak or exposed brain tissue.

# Recognition of non-accidental injury and mandatory reporting of children or young people at risk of harm

Under section 27 of the *Children and Young Persons (Care and Protection) Act 1998*, a person who:

- in the course of his or her professional work or other paid employment delivers health care to children, and
- has reasonable grounds to suspect that a child is at risk of harm

**must**, as soon as practicable, report to the Department of Community Services the name, or a description, of the child and the grounds for suspecting that they are at risk of harm (DOCS Helpline 13 36 27).

Similarly, under section 27 of the Act, a person who:

- holds a management position in an organisation the duties of which include direct responsibility for, or supervision of, the provision of health care wholly or partly to children, and
- has reasonable grounds to suspect that a child is at risk of harm

**must**, as soon as practicable, report to the Department of Community Services the name, or a description, of the child and the grounds for suspecting that they are at risk of harm (DOCS helpline 13 36 27).

Health workers who fail to comply with this legal obligation may be guilty of an offence. The maximum penalty for a person found guilty of this offence is 200 penalty units (currently \$22,000).

In addition to this legal requirement, a **ministerial directive** requires that all health workers who have reasonable grounds to suspect that a child is at risk of harm, irrespective of whether the

health worker is delivering a service to the child, must make a report to the Department of Community Services. Examples include staff providing health care for drug and alcohol or mental health clients. Health workers who fail to comply with this ministerial directive may be subject to disciplinary action.

Section 23 of the *Children And Young Persons (Care And Protection) Act 1998* defines a child or young person as being at risk of harm'... if current concerns exist for the safety, welfare or well-being of the child or young person because of the presence of any one or more of the following circumstances:

- The child's or young person's basic physical or psychological needs are not being met or are at risk of not being met.
- The parents or other caregivers have not arranged and are unable or unwilling to arrange for the child or young person to receive necessary medical care.
- The child or young person has been, or is at risk of being, physically or sexually abused or ill-treated.
- The child or young person is living in a household where there have been incidents of domestic violence and, as a consequence, the child or young person is at risk of serious physical or psychological harm.
- A parent or other caregiver has behaved in such a way towards the child or young person that the child or young person has suffered or is at risk of suffering serious psychological harm.

Note: Physical or sexual abuse may include an assault and can exist despite the fact that consent has been given.

# Head injury clinical expert working party

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