TACKLING INJURY HEAD ON

The National Institute for Clinical Excellence last month issued guidance critically examining the clinical management of head injury. GEOFF HALL gives an overview.
New guidance issued by the National Institute for Clinical Excellence (NICE) is set to cut dramatically the number of hospital admissions resulting from head injury and improve patient care.

It advocates much wider use of computed tomography (CT) scanning to reduce the need for precautionary admission and recommends that patients who require admission should be observed only by suitably qualified and trained specialist nurses.

Head injury is among the most frequent reasons for A&E attendance and accounts every year for 320,900 hospital bed days in England alone. However, only 1 to 3 per cent of people admitted following head injury go on to require medical or surgical intervention. Almost all go home within 48 hours after observation without treatment. So why are they admitted?

The reasons for the almost routine admission of patients with head injury for observation are historical. The serious consequences of persistent disability or even death make the protective attitude of A&E professionals understandable. Complications arising from intracranial haemorrhage can arise insidiously and so most department procedures favour caution and watchfulness. These attitudes have been reflected in various guidelines over the past 20 years.

However, with the development of better diagnostic and imaging technology, such guidelines are now out of date and can generate controversy and uncertainty.

The NICE guideline provides evidence based recommendations on treatments and care. Moreover, by promoting better use of NHS resources, by urging greater use of CT scanning in the early detection of intracranial haemorrhage for example, the new guidance aims to improve patient outcomes.

Guidelines so far have aimed at identifying patients with head injury at high risk of intracranial complications. The Harrogate guideline was drawn up by a working party of neurosurgeons (Briggs et al 1984) and was used in the UK for more than 15 years. It relied on various clinical factors, particularly level of consciousness, to triage patients with head injury into different risk categories. Consistent with the time, when skull fracture was perceived as being a highly important risk factor for intracranial complications, the main investigation advocated was skull X-ray.

This advice was succeeded by guidelines from the Society of British Neurological Surgeons (Bartlett et al 1998) and the Royal College of Surgeons of England (1999), while guidance from the Royal College of Radiologists in the same year dealt with patient triage and imaging (Royal College of Radiologists 1999).

As technology advanced, the Scottish Intercollegiate Guidelines Network (2000) published a guideline giving higher priority to CT imaging. This aimed to identify patients at high risk of intracranial complications using the Glasgow Coma Scale (GCS), the presence of skull fracture and other clinical variables. Patients identified as being at high risk were recommended for CT scanning. Nevertheless, admission to hospital for observation was still considered pivotal to managing patients at medium risk of intracranial complications.

The NICE guideline, issued last month, critically examines the place of skull X-ray in determining patient management. There is no doubt that patients with skull fracture diagnosed by radiography are five times more likely to have intracranial haemorrhage than those with no apparent skull fracture. However, negative interpretation of skull X-ray cannot, and does not, rule out intracranial haemorrhage: hence the large numbers of patients admitted for observation.

One reason for the low sensitivity of skull X-ray in predicting intracranial haemorrhage is the reliability of radiographic interpretation by A&E clinicians compared with specialist radiologists. Studies have shown that clinically competent A&E clinicians miss between 13 and 23 per cent of all skull fractures that are detected when radiographs are subsequently reviewed by radiologists (Gorman 1987, Thillainayagam et al 1987, Lloyd et al 1997). Moreover, skull X-ray is simply incapable of revealing intracranial haemorrhage.

THE NICE RECOMMENDATIONS

At first sight, Head Injury: Triage, assessment, investigation and early management of head injury in infants, children and adults is a formidable document, stretching to more than 60 pages. But its recommendations are clear and to the point.

Consistency of assessment and reliable communication of information on the condition of patients are key priorities. The
**Box 1. When should patients be referred to A&E?**

The guideline recommends that community health services such as GP, paramedic and minor injury clinics should refer patients to hospital A&E whenever there is:

- A GCS of less than 15 at any time since injury.
- Loss of consciousness due to injury.
- Focal neurological deficit since injury. Examples include: problems understanding, speaking, reading or writing; decreased sensation; loss of balance; general weakness; visual changes; abnormal reflexes; problems walking.
- Suspicion of skull fracture or penetrating head injury since injury. Indications include: clear fluid running from the ears or nose, black eye with no associated damage around the eyes, bleeding in one or both ears, new deafness in one or both ears, bruising behind one or both ears, penetrating injury signs, visible trauma to the scalp or skull.
- Amnesia for events before or after injury.
- Persistent headache after injury.
- Vomiting episodes after injury, although clinical judgement should be used regarding the cause of vomiting in those aged 12 years or less.
- Seizure after injury.
- Previous cranial neurosurgical interventions.
- High-energy head injury. Examples include: pedestrian struck by motor vehicle; occupant ejected from motor vehicle; fall from a height of more than 1m or more than five stairs; diving accident; high-speed motor vehicle collision; rollover motor accident; accident involving motorised recreational vehicles; bicycle collision. A lower threshold for fall heights should be used when dealing with infants and children aged less than five years.
- History of bleeding or clotting disorder.
- Current anticoagulant therapy such as warfarin.
- Current drug or alcohol intoxication.
- Age of 65 years or more.
- Suspicion of non-accidental injury.
- Continuing concern about diagnosis.

In the absence of any of the above factors, the professional should consider referral to A&E if any of the following factors are present:

- Irritability or altered behaviour, particularly in infants and children aged under five years.
- Visible trauma to the head not covered above but still of concern.
- Adverse social factors such as no one being able to supervise the injured person at home.
- Continuing concern by the injured person or their carer about the diagnosis.

The guideline recommends that all departments should use the adult and paediatric versions of the GCS and its derivative, the Glasgow Coma Score. The guideline sets out good practice principles for GCS use.

The guideline is not confined to hospital A&E departments. It makes recommendations for all sectors of health care and public service that can be involved in caring for people with head injury. These include police helplines and NHS Direct, minor injury clinics, GPs and dentists, and there is clear guidance on when referral to hospital A&E departments is warranted (Box 1).

For paramedics, the guideline states that head injury should be assessed and managed according to clear principles and standard practice as embodied in the advanced trauma life support (ATLS) system and, for children, the advanced paediatric life support (APLS) system. It looks at training issues for paramedics and others and stresses the importance of recognising non-accidental injury in children.

High priority is also given to the management of cervical spine injury. Any suspicion of this is an indication for full cervical spine immobilisation, as is head injury, accompanied by any of a list of risk factors highlighted. These include a GCS of less than 15 at any time since the injury, neck pain or tenderness, focal neurological deficit or paraesthesia in the extremities.

**INVESTIGATION OF CHOICE**

The NICE guideline re-emphasises that the focus of managing head and cervical spine injury is the patient and the priority is to minimise the risk of clinically important brain or cervical spine injury. To this end, the guideline states: ‘The current primary investigation of choice for the detection of acute clinically important brain injuries is CT imaging of the head.’

Because of the 24-hour unavailability of CT scanning facilities in some NHS trusts, there will be concern about the service implications of this recommendation. But this may be the time for these trusts to seek funding to satisfy this demand. In its recommendations for selecting patients for CT scanning, the guideline follows the Canadian CT Head Rule (Stiell et al 2001) (Box 2).

Skull X-rays retain a role, albeit minor: first in detecting non-accidental injury in children; second where CT scanning is unavailable. The guideline authors see no place for magnetic resonance imaging (MRI) scanning in primary investigation for clinically important brain injury for safety, logistical and resource reasons.

**ADMISSION FOR OBSERVATION**

More widespread use of CT scanning in assessing patients with head injury should dramatically reduce the number of patients admitted for observation.
However, the guideline acknowledges that there will be circumstances when this will be essential even if CT is available. Examples include patients whose CT scans show clinically significant problems and those who, regardless of imaging result, have not returned to a GCS of at least 15.

The guideline recommends that in-hospital observation, including all A&E observation, should be conducted only by professionals who are competent in assessing head injury. GCS, pupil size and reactivity, limb movement, respiratory rate, heart rate, blood pressure, temperature and blood oxygen saturation should all be monitored every half hour until two hours after GCS reaches 15, then hourly for four hours and every two hours thereafter.

CONSULTATION
The objective of Head Injury: Triage, assessment, investigation and early management of head injury in infants, children and adults is to provide guidance for every branch of the health service that could be involved with head or cervical spine injury.

No fewer than 27 stakeholder organisations were consulted during the guideline development process, so the final document is based on consensus. But it is evidence based, and every recommendation is weighted according to the level of evidence that supports it.

THE FUTURE
The head injury guideline informs the everyday work of emergency nurses and how head injury is treated. It is expected to take pressure off beds, yet add to the burden of work in radiography. It may also signal a significant switch of resources to imaging and trusts may find it a good defensive strategy to sign up to it.

However, the work of the project team is not yet complete. Because the guideline is evidence based, the recommendations regarding children are given relatively low grades, simply because few studies in this age group have been conducted. The purpose of the exercise has been to provide better patient services. Auditing use of the guideline recommendations will be key to assessing its effect on patient management.

The guideline is due for review in two years’ time, when everybody involved in the care of individuals with head injury will be welcome to comment on the guideline’s impact.

Head Injury: Triage, assessment, investigation and early management of head injury in infants, children and adults is available on the NICE website, www.nice.org.uk

Printed copies can be obtained by calling the NHS Response Line on 0870 1555 455 and quoting reference N0234.

The Early Management of Head Injuries, which has been written for non-healthcare professionals who want to know about the guideline, is also available from the NICE website, or by calling the NHS Response Line and quoting reference N0235.

Geoff Hall is a freelance journalist commissioned by NICE

Box 2. Who should have CT imaging of the head?

The NICE guideline recommends that CT imaging should be requested immediately for patients with any one of the following:

- A GCS of less than 13 at any point since injury.
- A GCS equal to 13 or 14 at two hours after injury.
- Suspected open or depressed skull fracture.
- Any sign of basal skull fracture. These include: haemotympanum, ‘panda’ eyes, cerebrospinal fluid otorrhoea, Battle’s sign.
- Post-traumatic seizure.
- Focal neurological deficit.
- More than one episode of vomiting, although clinical judgement should be used regarding cause in patients aged 12 years or less.
- Amnesia for more than 30 minutes of events before impact.

It also states that CT should be requested immediately for patients with any of the following risk factors if they have experienced some loss of consciousness or amnesia after injury:

- Age of 65 years or more.
- Coagulopathy including: history of bleeding, clotting disorder, current treatment with warfarin.
- Dangerous mechanism of injury. Examples include: pedestrian struck by motor vehicle; occupant ejected from motor vehicle; fall from a height of more than 1m or more than five stairs. A lower threshold for fall heights should be used when dealing with infants and children aged less than five years.

References