

PRACTICE

GUIDELINES

Early management of head injury: summary of updated NICE guidance

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This is one of a series of *BMJ* summaries of new guidelines based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists.

Head injury is the commonest cause of death and disability in people aged 1–40 years in the UK. Each year, 1.4 million people attend emergency departments in England and Wales with a recent head injury. The National Institute for Health and Care Excellence (NICE) published guidance on managing head injury in 2003 (clinical guideline 4)¹ and updated this in 2007 (clinical guideline 56),² which resulted in computed tomography (CT) replacing skull radiography as the primary imaging modality for assessing head injury. Key changes driving this update include the introduction of regional trauma networks with prehospital major trauma triage in England; the extension of indications for anticoagulation therapy; the establishment of local safeguarding boards in the UK, requiring front-line clinical staff to assess not only the severity of the head injury but also why it occurred; and new evidence on the initial assessment and early management of head injury.

This article summarises the most recent recommendations from the National Institute for Health and Care Excellence (NICE).³

Recommendations

NICE recommendations are based on systematic reviews of best available evidence and explicit consideration of cost effectiveness. When minimal evidence is available, recommendations are based on the Guideline Development Group's experience and opinion of what constitutes good practice. Evidence levels for the recommendations are given in italic in square brackets.

Transport to hospital

- Transport patients who have sustained a head injury directly to a hospital that has the resources to further resuscitate them and to investigate and initially manage multiple injuries.
 - All acute hospitals receiving patients with head injury directly from an incident should have these resources, which should be appropriate for a patient's age
 - In NHS England these hospitals would be trauma units or major trauma centres. In NHS Wales this should be a hospital with equivalent capabilities
- (New recommendation.) [*Based on the experience and opinion of the Guideline Development Group (GDG)*]

Assessment in the emergency department

- A clinician with training in safeguarding should be involved in the initial assessment of any patient with a head injury presenting to the emergency department. If there are any concerns identified, document these and follow local safeguarding procedures appropriate to the patient's age. (Updated recommendation.) [*Based on the experience and opinion of the GDG*]

Figures 1–4 summarise selection criteria for CT head scans in adults (algorithm 1↓), CT head scan in children (algorithm 2↓), imaging of the cervical spine in adults (algorithm 3↓), and imaging of the cervical spine in children (algorithm 4↓).

Assessing range of movement in the neck

- In adults and children who have sustained a head injury and in whom there is clinical suspicion of cervical spine

injury, range of movement in the neck can only be assessed safely before imaging if there are no high risk factors requiring cervical spine CT scanning within an hour (see algorithms 3 and 4) and if at least one of the following low risk features applies:

- Patient was involved in a simple, rear end, motor vehicle collision
- Patient is comfortable in a sitting position in the emergency department
- Patient has been ambulatory at any time since injury
- Patient has no midline cervical spine tenderness
- Patient presents with delayed onset of neck pain.

(New recommendation.) *[Based on low to high quality observational studies and on the experience and opinion of the GDG]*

Discharge and follow-up

- Give verbal and printed discharge advice to patients with any degree of head injury who are discharged from an emergency department or observation ward, and to their families and carers. Follow recommendations in NICE guidance on patient experience in adult NHS services (clinical guideline 138)^{3 4} about providing information in an accessible format. (New recommendation.) *[Based on adequate quality qualitative studies and on the experience and opinion of the GDG]*
- Printed advice for patients, family members, and carers should be age appropriate and include:
 - Details of the nature and severity of the injury
 - Details of risk factors that mean the patient should return to the emergency department, such as seizure, vomiting or drowsiness
 - A specification that a responsible adult should stay with the patient for the first 24 hours after the injury
 - Details of the recovery process, including that some patients seem to make a quick initial recovery but later experience difficulties or complications
 - Contact details of community and hospital services in case of delayed complications
 - Information about return to everyday activities, including school, work, sports, and driving
 - Details of support organisations.

(New recommendation.) *[Based on adequate quality qualitative studies and on the experience and opinion of the GDG]*

- Inform patients and their families and carers about the possibility of persistent or delayed symptoms after head injury and who to contact if they experience ongoing problems. (New recommendation.) *[Based on the experience and opinion of the GDG]*
- For all patients who have attended the emergency department with a head injury, write to their GP within 48 hours of discharge, giving details of the clinical history and examination. This letter should also be shared with health visitors (for preschool children) and school nurses (for school age children). If appropriate, provide a copy of the letter for the patient and their family or carer. (New recommendation.) *[Based on the experience and opinion of the GDG]*

Overcoming barriers

Over the past decade the NHS has greatly increased the use of CT scanning to investigate head and other injuries, with associated improvements in outcome.^{5 6} A further “stretch” during this period of relative austerity is required by this 2014 guideline, with more indications for CT scans of the head (for all patients treated with anticoagulant drugs) and cervical spine, although there are fewer indications for CT head scanning in children. This will increase time and resource use during an emergency department assessment and for radiology departments, which also need to provide written provisional reports within an hour of performing a CT scan. The clinical and cost effectiveness evidence on which these imaging recommendations are based suggest that they will save NHS resources through delayed or missed diagnoses.

The members of the Guideline Development Group were Fiona Lecky (chair), Mukul Agarwal, Robin Clarke, Barbara Green (until January 2013), Kieran Hogarth, Peter Hutchinson, Gaby Lomas, Mark D Lyttle, David Menon, Lisa Turan, and Paul D Wallman. The technical team at the National Clinical Guideline Centre included Sarah Bermingham (until May 2012), Saskia Cheyne (from July 2013), Sarah Hodgkinson (until September 2013), Sue Latchem, Lillian Li (from November 2012 until August 2013), Vicki Pollit (from November 2012), Antonia Morga (until November 2012), and Carlos Sharpin.

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Further information on the guidance

Methods

The Guideline Development Group (GDG) comprised two emergency medicine physicians (including the chair), a general practitioner, two patient representatives, a neuroradiologist, a neurosurgeon, an emergency medicine nurse, an emergency medicine paediatrician, and an intensivist. The GDG followed the standard NICE methods in the development of this guideline.⁷ The group developed clinical questions; collected and appraised clinical evidence; and evaluated the cost effectiveness of proposed interventions through literature review and original economic modelling.

For studies of diagnostic test accuracy (including clinical decision rules for head CT and cervical spine imaging), the following outcomes were reported: sensitivity, specificity, positive predictive value, and negative predictive value. In cases where the outcomes were not reported, 2x2 tables were constructed from raw data to allow calculation of these accuracy measures. The threshold of a diagnostic test is defined as the value at which the test can best differentiate between those with and those without the target condition, and, in practice, it varies among studies.

The evidence for outcomes from the included studies were evaluated and presented using an adaptation of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox developed by the international GRADE working group.⁸ The quality elements for intervention studies were adapted for diagnostic studies.

The draft guideline went through a rigorous reviewing process, in which stakeholder organisations were invited to comment; the group took all comments into consideration when producing the final version of the guideline.

A formal review of the need to update a guideline is usually undertaken by NICE after its publication. NICE will conduct a review to determine whether the evidence base has progressed significantly to alter the guideline recommendations and warrants an update.

Cost effectiveness

A new cost effectiveness analysis was undertaken from an NHS and Personal Social Services perspective to compare decision rules for imaging with CT or x ray. The analysis used a decision tree to evaluate a series of diagnostic imaging decisions that could typically stem from use of the tool in order to check the spine. In comparison with alternative decision rules, the Canadian C-Spine rule⁹ to select adults with suspected head and cervical spine injury for initial imaging with CT is expected to reduce costs (if high monetary penalties are associated with missed injury) and improve clinical outcome (with conservative estimation of quality of life or life expectancy gain by avoiding missed injury).

Future research

The GDG identified some priority areas for research:

- For patients with head injury and reduced level of consciousness, are clinical outcomes improved by direct transport from the scene of injury to a tertiary centre with neuroscience facilities compared with outcomes for patients transported initially to the nearest hospital regardless of neurosurgical facilities?
- When selecting children and infants for head CT scanning, what is the clinical and cost effectiveness of the 2014 NICE guideline recommendation on CT head scanning versus clinical decision rules (including CHALICE,¹⁰ CATCH,¹¹ and PECARN¹²)?
- In patients with head injury, does the use of antiplatelet and anticoagulant drugs increase the risk of intracranial haemorrhage over and above factors included in the current recommendations for CT head scans?
- In adults with medium risk indications for brain injury under the 2014 NICE guideline on CT assessment of head injury, what is the clinical and cost effectiveness of using the diagnostic circulating biomarker S100B to rule out important intracranial injury?
- What are the optimal predictor variables for long term sequelae after mild traumatic brain injury? A systematic review of the literature could be used to derive a clinical decision rule to identify relevant patients at the time of injury. This would lay the foundation for a derivation cohort study.

Figures

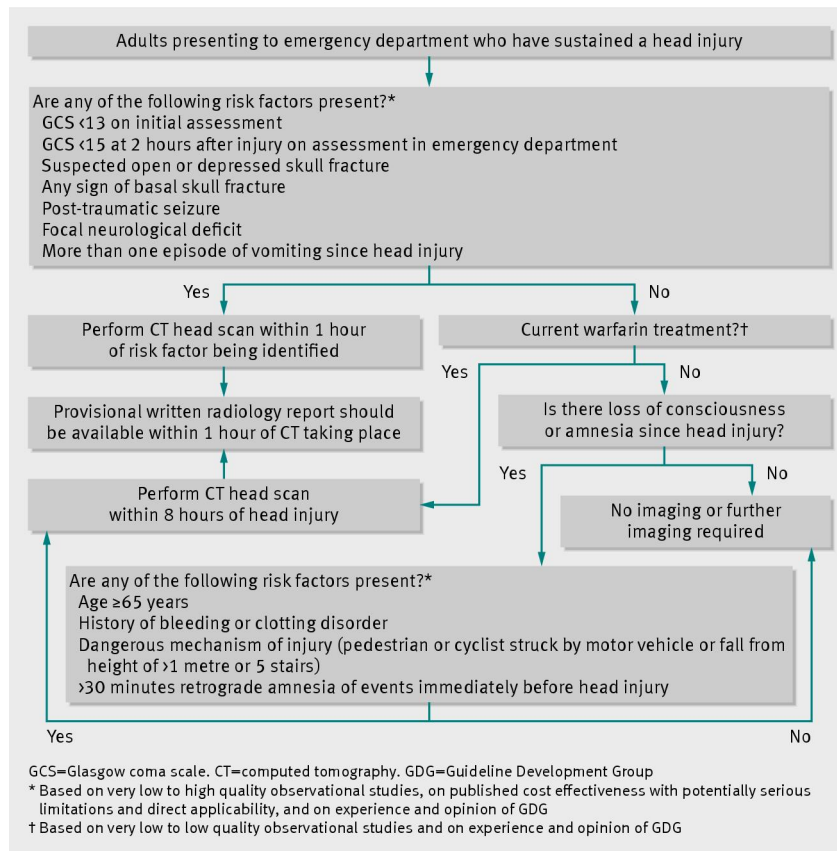


Fig 1 Algorithm 1: selection of adults for CT head scan

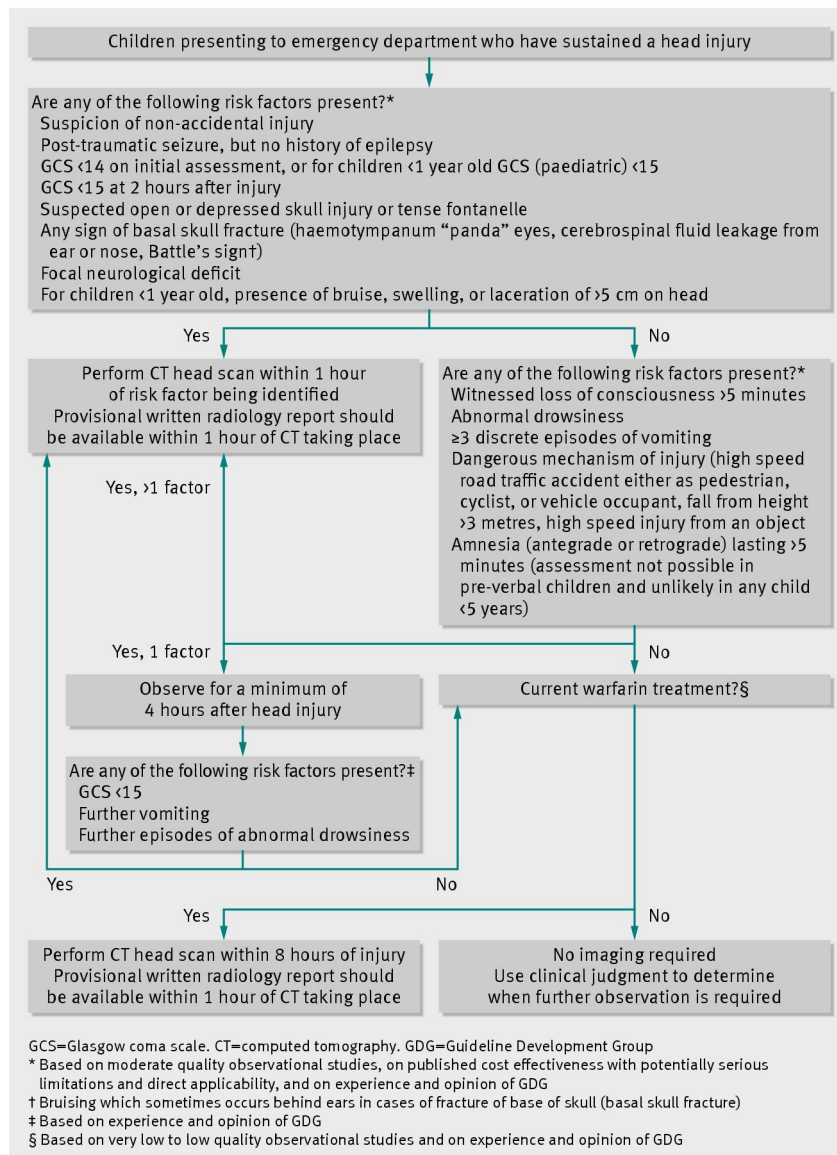


Fig 2 Algorithm 2: selection of children for CT head scan

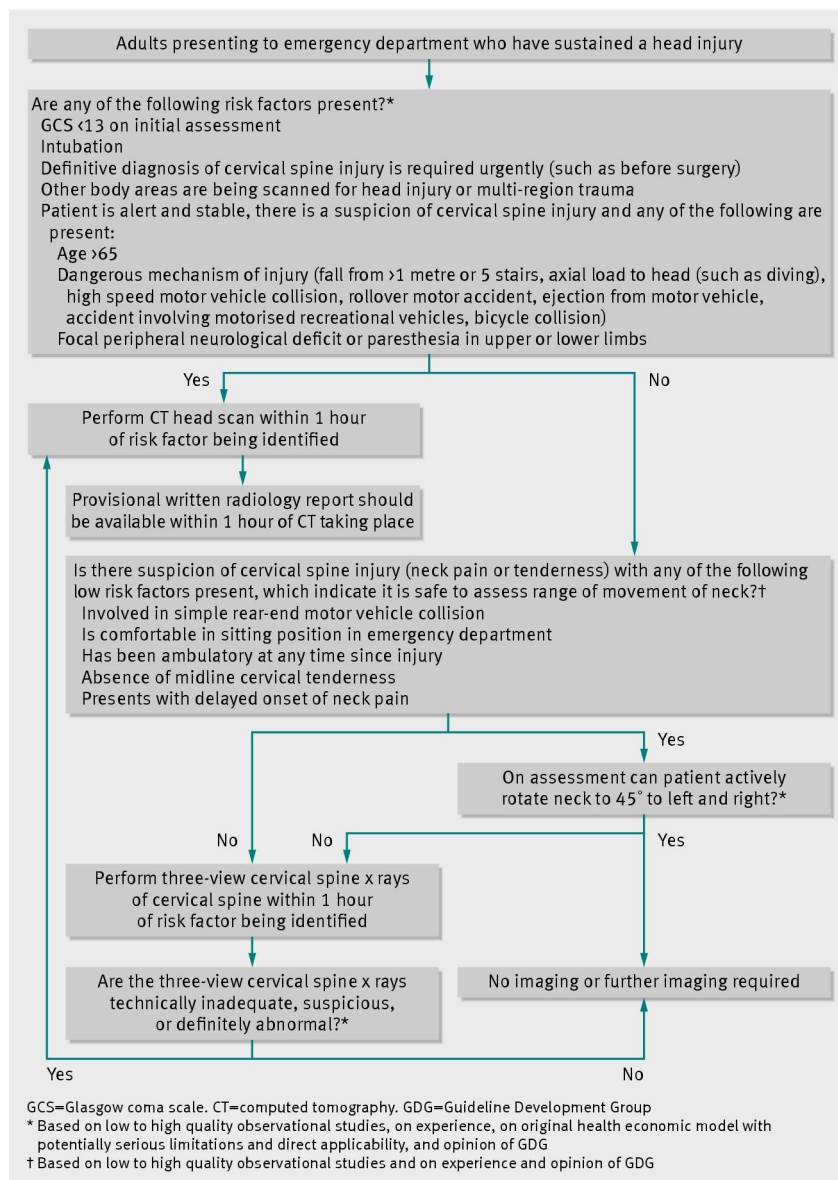


Fig 3 Algorithm 3: selection of adults for imaging of the cervical spine

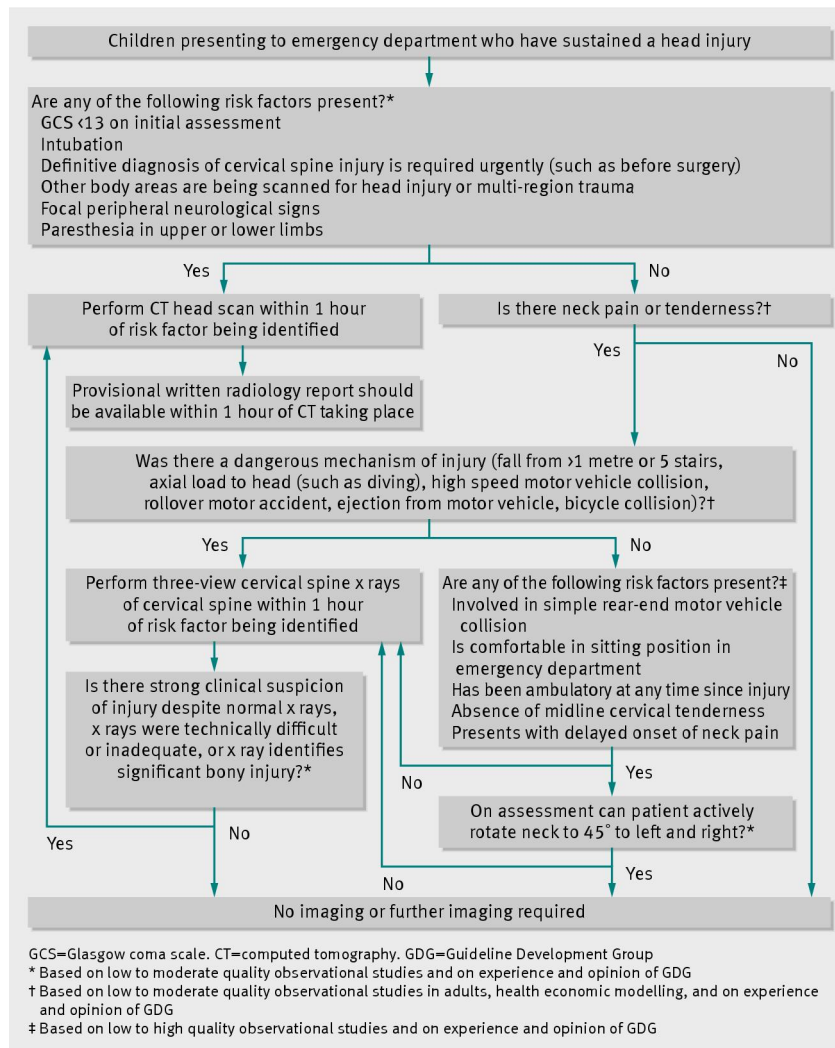


Fig 4 Algorithm 4: selection of children for imaging of the cervical spine