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NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Guideline

Head injury: assessment and early management

Draft for consultation, September 2022

This guideline is an update to the [NICE guideline on head injury](#) (published January 2014). We have reviewed the evidence on the assessment, diagnosis, initial treatment and early consequences of head injury.

This guideline covers the assessment and early management of head injury in babies, children, young people and adults. It aims to promote effective clinical assessment so that people have the right care for the severity of their head injury, including direct referral to specialist care if needed.

Who is it for?

- Healthcare professionals
- People with a head injury, their families and carers
- Commissioners and providers

What does it include?

This draft guideline contains:

- the draft recommendations
- recommendations for research
- rationale and impact sections that explain why the committee made the September 2022 recommendations and how they might affect practice or services

- the guideline context.

Information about how the guideline was developed is on the [guideline's webpage](#). This includes the evidence reviews, the scope, details of the committee and any declarations of interest.

New and updated recommendations

You are invited to comment on the new and updated recommendations. These are marked as **[2022]**.

You are also invited to comment on [recommendations that we propose to delete from the 2003 guideline](#).

We have not reviewed the evidence for the recommendations marked **[2003]**, **[2007]**, **[2014]**, **[2003, amended 2007]**, **[2003, amended 2014]** and **[2003, amended 2007 and 2014]** (shaded in grey), and cannot accept comments on them. In some cases, we have made minor wording changes for clarification.

See [update information](#) for a full explanation of what is being updated.

Full details of the evidence and the committee's discussion on the 2022 recommendations are in the [evidence reviews](#). Evidence for the 2003, 2007 and 2014 recommendations are in the [full version](#) of the 2014 guideline.

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1 Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in [NICE's information on making decisions about your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

See [NICE's guideline on major trauma service delivery](#) for recommendations on prehospital triage, procedures for transferring people, pre-alert procedures, procedures for receiving people in trauma units and major trauma centres, documentation, monitoring and audit, and access to major trauma services.

2 For the purposes of this guideline, a head injury is defined as any trauma to
3 the head other than superficial injuries to the face. Also, babies are defined as
4 being under 1 year, and children and young people as being 1 year to
5 under 16 years.

6 **1.1 Prehospital assessment, advice and referral to** 7 **hospital**

8 1.1.1 Public health literature and other non-medical sources of advice
9 (for example, St John Ambulance, police officers) should
10 encourage people who have any concerns after a head injury to
11 themselves or to another person, regardless of the injury severity,
12 to seek immediate medical advice. **[2003]**

13 **Telephone advice services**

14 1.1.2 Telephone advice services (for example, NHS 111) should refer
15 people who have sustained a head injury to the emergency

1 ambulance services (that is, 999) for emergency transport to the
2 emergency department if there are any of these risk factors:

- 3 • unconsciousness or lack of full consciousness (for example,
4 problems keeping eyes open)
- 5 • any [focal neurological deficit](#) since the injury
- 6 • any suspicion of a [complex skull fracture or penetrating head](#)
7 [injury](#)
- 8 • any seizure ('convulsion' or 'fit') since the injury
- 9 • a [high-energy head injury](#)
- 10 • there is no other way of safely transporting the person to the
11 hospital emergency department (see recommendation 1.1.3).
- 12 **[2003, amended 2007 and 2014]**

13 1.1.3 Telephone advice services (for example, NHS 111) should refer
14 people who have sustained a head injury to a hospital emergency
15 department if there are any of these risk factors:

- 16 • any loss of consciousness ('knocked out') because of the injury,
17 from which the person has now recovered
- 18 • amnesia for events before or after the injury ('problems with
19 memory'; it will not be possible to assess amnesia in children
20 who are preverbal and is unlikely to be possible in children
21 under 5)
- 22 • a persistent headache since the injury
- 23 • any vomiting episodes since the injury
- 24 • any previous brain surgery
- 25 • any history of bleeding or clotting disorders
- 26 • current anticoagulant treatment
- 27 • current drug or alcohol intoxication
- 28 • any safeguarding concerns (for example, possible non-
29 accidental injury or a vulnerable person is affected)

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- irritability or altered behaviour ('easily distracted', 'not themselves', 'no concentration', 'no interest in things around them'), particularly in babies and children under 5
 - continuing concern by helpline staff about the diagnosis. **[2003, amended 2014]**

6 **Community health services**

7 1.1.4 Community health services (GPs, ambulance crews, NHS walk-in
8 or minor injury centres, dental practitioners) should refer people
9 who have sustained a head injury to a hospital emergency
10 department, using the ambulance service if necessary, if there are
11 any of these risk factors:

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- a [Glasgow Coma Scale](#) (GCS) score of less than 15 on initial assessment
 - any loss of consciousness because of the injury
 - any [focal neurological deficit](#) since the injury
 - any suspicion of a [complex skull fracture or penetrating head injury](#) since the injury
 - amnesia for events before or after the injury (it will not be possible to assess amnesia in children who are preverbal and is unlikely to be possible in children under 5)
 - a persistent headache since the injury
 - any vomiting episodes since the injury (use clinical judgement about the cause of vomiting in children 12 years or under and the need for referral)
 - any seizure since the injury
 - any previous brain surgery
 - a [high-energy head injury](#)
 - any history of bleeding or clotting disorders
 - current anticoagulant treatment
 - current drug or alcohol intoxication

- 1
- any safeguarding concerns (for example, possible non-
- 2 accidental injury or a vulnerable person is affected)
- continuing concern by the professional about the diagnosis.
- 3
- 4 **[2003, amended 2007 and 2014]**

5 1.1.5 In the absence of any risk factors in recommendation 1.1.4,
6 consider referral to an emergency department if any of these
7 factors are present, depending on judgement of severity:

- 8
- irritability or altered behaviour, particularly in babies and children
9 under 5.
- 10
- visible trauma to the head not covered in recommendation 1.1.4
11 but still of concern to the professional
- 12
- no one is able to observe the injured person at home
- 13
- continuing concern by the injured person, or their family or carer
14 about the diagnosis. **[2003, amended 2014]**

15 **Transport to hospital from community health services**

16 1.1.6 Ensure people referred from community health services are
17 accompanied by a competent adult during transport to the
18 emergency department. **[2003]**

19 1.1.7 The referring professional should determine if an ambulance is
20 needed, based on the person's clinical condition. If an ambulance
21 is not needed, providing the person is accompanied, public
22 transport or being driven in a car are appropriate means of
23 transport. **[2003]**

24 1.1.8 The referring professional should inform the destination hospital (by
25 phone) of the impending transfer. In non-emergencies, a letter

1 summarising signs and symptoms should be sent with the person.
2 **[2003]**

3 **Training in risk assessment**

4 1.1.9 Train GPs, nurse practitioners, dentists and ambulance crews, as
5 necessary, to ensure that they are capable of assessing the
6 presence or absence of the risk factors listed in
7 [recommendations 1.1.4 and 1.1.5](#). **[2003, amended 2007]**

8 **1.2 Immediate management at the scene and transport to** 9 **hospital**

10 **Glasgow Coma Scale**

11 1.2.1 Base monitoring and exchange of information about people with a
12 head injury on the 3 separate responses on the scale (for example,
13 describe a person with a GCS score of 13 based on scores of 4 on
14 eye opening, 4 on verbal response and 5 on motor response as E4,
15 V4, M5). **[2003]**

16 1.2.2 When recording or passing on information about total GCS score,
17 give this as a score out of 15 (for example, 13 out of 15). **[2003]**

18 1.2.3 Describe the individual components of the GCS in all
19 communications and every patient record and ensure that they
20 always accompany the total score. **[2003]**

21 1.2.4 In the paediatric version of the GCS, include a 'grimace' alternative
22 to the verbal score to enable scoring in children who are preverbal.
23 **[2003]**

24 1.2.5 In some people (for example, people with dementia, underlying
25 chronic neurological disorders or learning disabilities), the pre-injury

1 baseline GCS score may be less than 15. Establish this when
2 possible, and take it into account during assessment. **[2014]**

3 **Initial assessment and care**

4 **1.2.6** Initially assess people 16 and over who have sustained a head
5 injury and manage their care according to clear principles and
6 standard practice, as embodied in the:

- 7 • Advanced Trauma Life Support course or European Trauma
- 8 course
- 9 • International Trauma Life Support course
- 10 • Pre-hospital Trauma Life Support course
- 11 • Advanced Trauma Nurse Course
- 12 • Trauma Nursing Core Course
- 13 • Joint Royal Colleges Ambulance Service Liaison Committee
- 14 Clinical Practice Guidelines for Head Trauma. **[2003, amended**
- 15 **2007]**

16 **1.2.7** Initially assess people under 16 who have sustained a head injury
17 and manage their care according to clear principles outlined in the:

- 18 • Advanced Paediatric Life Support course or European Paediatric
- 19 Life Support course
- 20 • Pre-hospital Paediatric Life Support course
- 21 • Paediatric Education for Pre-hospital Professionals course.
- 22 **[2003, amended 2007]**

23 **1.2.8** When administering immediate care, first treat the greatest threat to
24 life and avoid further harm. For advice on volume resuscitation for
25 people with a [traumatic brain injury](#) and haemorrhagic shock, see

- 1 [NICE's guideline on major trauma assessment and initial](#)
2 [management](#). **[2003]**
- 3 1.2.9 For recommendations on when to carry out full in-line spine
4 immobilisation and how long immobilisation is needed if indicated,
5 see [NICE's guideline on spinal injury](#). **[2003, amended 2007]**
- 6 1.2.10 Make standby calls to the destination emergency department for
7 anyone with a GCS score of 8 or less to ensure appropriately
8 experienced professionals are available for their treatment and to
9 prepare for imaging. **[2003]**
- 10 1.2.11 Manage pain effectively because it can lead to a rise in intracranial
11 pressure. Provide reassurance, splint limb fractures and catheterise
12 a full bladder, when needed. Also see NICE's guideline on major
13 trauma assessment and initial management. **[2007, amended**
14 **2014]**
- 15 1.2.12 Always follow best practice in paediatric coma observation and
16 recording, as detailed by the National Paediatric Neuroscience
17 Benchmarking Group. **[2003]**

18 **Transport to hospital**

- 19 1.2.13 Transport people who have sustained a head injury directly to a
20 major trauma centre or trauma unit that has the age-appropriate
21 resources to further resuscitate them, and to investigate and initially
22 manage multiple injuries. **[2022]**
- 23 1.2.14 For guidance on the care of people with major trauma, see [NICE's](#)
24 [guideline on major trauma service delivery](#). **[2022]**

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on transport to hospital](#).

Full details of the evidence and the committee's discussion are in [evidence review B: transport to a specialist centre](#).

1 **Training for ambulance crews**

2 1.2.15 Ambulance crews should be fully trained in the use of the adult and
3 paediatric versions of the GCS and its derived score. **[2003]**

4 1.2.16 Ambulance crews should be trained in the safeguarding of people
5 under 16 and people 16 and over who are vulnerable. They should
6 document and verbally inform emergency department staff of any
7 safeguarding concerns. **[2003, amended 2014]**

8 **Tranexamic acid**

9 1.2.17 For people with a head injury and a GCS score of 12 or less who
10 are not thought to have active extracranial bleeding, consider:

- 11 • a 2 g intravenous bolus injection of tranexamic acid for people
12 16 and over
- 13 • a 15 mg/kg to 30 mg/kg (up to a maximum of 2 g) intravenous
14 bolus injection of tranexamic acid for people under 16.

15
16 Give the tranexamic acid as soon as possible within 2 hours of
17 the injury, and before imaging. In **September 2022**, these were
18 off-label uses of tranexamic acid. See [NICE's information on](#)
19 [prescribing medicines](#). **[2022]**

20 1.2.18 For people with a head injury, and suspected or confirmed
21 extracranial bleeding, see the recommendations in the section on
22 haemostatic agents in prehospital and hospital settings in [NICE's](#)

- 1 [guideline on major trauma assessment and initial management](#).
2 **[2022]**

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on tranexamic acid](#).

Full details of the evidence and the committee's discussion are in [evidence review A: tranexamic acid](#).

3 **Direct access from the community to imaging**

- 4 1.2.19 Do not refer people who have had a head injury for neuroimaging
5 by direct access from the community. **[2022]**

For a short explanation of why the committee made this recommendation and how they might affect practice or services, see the [rationale and impact section on direct access from the community to imaging](#).

Full details of the evidence and the committee's discussion are in [evidence review C: direct access to imaging from the community](#).

6 **1.3 Assessment in the emergency department**

- 7 1.3.1 Be aware that the priority for all people admitted to an emergency
8 department is to stabilise the airway, breathing and circulation
9 (ABC) before attending to other injuries. See [NICE's guideline on
10 major trauma assessment and initial management](#). **[2003]**
- 11 1.3.2 Only assume a depressed conscious level is due to intoxication
12 after an important [traumatic brain injury](#) has been excluded. **[2003]**
- 13 1.3.3 Ensure all emergency department clinicians involved in assessing
14 people with a head injury are capable of assessing the presence or
15 absence of the risk factors for CT head and cervical spine imaging
16 listed in [recommendations 1.4.8 to 1.4.14](#) and

- 1 [recommendations 1.5.6 to 1.5.11](#). Make training available as
2 needed to ensure this. **[2003]**
- 3 1.3.4 Ensure people presenting to the emergency department with
4 impaired consciousness (a GCS score of less than 15) are
5 assessed immediately by a trained member of staff. **[2003]**
- 6 1.3.5 For people with a GCS score of 8 or less, ensure early involvement
7 of an anaesthetist or critical care physician to provide appropriate
8 airway management, as described in [recommendations 1.7.7](#)
9 [and 1.7.8](#), and to assist with resuscitation. **[2003]**
- 10 1.3.6 Ensure a trained member of staff assesses anyone presenting to
11 an emergency department with a head injury within a maximum of
12 15 minutes of arrival at hospital. Part of this assessment should
13 establish whether they are at high or low risk for clinically important
14 traumatic brain or cervical spine injury, as described in
15 [recommendations 1.4.8 to 1.4.14](#) and [recommendations 1.5.6](#)
16 [to 1.5.11](#). **[2003]**
- 17 1.3.7 In people considered to be at high risk for clinically important
18 traumatic brain or cervical spine injury, extend assessment to full
19 clinical examination to establish any need for CT imaging of the
20 head, or imaging of the cervical spine and other body areas. Use
21 [recommendations 1.4.8 to 1.4.14](#) and [recommendations 1.5.6](#)
22 [to 1.5.11](#) as the basis for the final decision on imaging after
23 discussion with the radiology department. **[2003, amended 2007]**
- 24 1.3.8 **Re-examine people who, on initial assessment, are triaged to be at**
25 **low risk for clinically important traumatic brain or cervical spine**
26 **injury by an emergency department clinician.** During the
27 assessment, establish whether CT imaging of the head or cervical
28 spine will be needed. Use [recommendations 1.4.8 to 1.4.14](#) and
29 [recommendations 1.5.6 to 1.5.11](#) as the basis for the final decision

1 on imaging after discussion with the radiology department. **[2003,**
2 **amended 2007 and 2022]**

3 1.3.9 **Review people who return to an emergency department** with any
4 persistent complaint relating to the initial head injury, and discuss
5 them with a senior clinician experienced in head injuries. Consider
6 whether a CT scan is needed. **[2003, amended 2022]**

7 1.3.10 Manage pain effectively to help prevent any rise in intracranial
8 pressure. Provide reassurance, splint limb fractures and catheterise
9 a full bladder when needed. See [NICE's guideline on major trauma
10 assessment and initial management for information on pain
11 management](#). **[2007]**

12 1.3.11 Consider or suspect abuse, neglect or other safeguarding issues as
13 a contributory factor to, or cause of, a head injury. See [NICE's
14 guidelines on child maltreatment](#), on [child neglect and abuse](#), on
15 [domestic violence and abuse](#), and on [safeguarding adults in care
16 homes](#) for clinical features that may be associated with
17 maltreatment. **[2022]**

For a short explanation of why the committee made this recommendation
and how it might affect practice or services, see the [rationale and impact
section on assessment in the emergency room](#).

Full details of the evidence and the committee's discussion are in [evidence
review D: selecting people for CT and MRI](#).

18 1.3.12 Involve a clinician with training in safeguarding in the initial
19 assessment of any person with a head injury presenting to the
20 emergency department. If there are any concerns identified,
21 document these and follow local safeguarding procedures
22 appropriate to the person's age. **[2003, amended 2014]**

23 1.3.13 Use a standard head injury proforma for documentation when
24 assessing and observing people with a head injury throughout their

1 time in hospital. This form should be of a consistent format across
2 all clinical departments and hospitals in which a person might be
3 treated. Use a separate proforma for people under 16. Include
4 areas to allow extra documentation (for example, in cases of non-
5 accidental injury). Examples of proforma that should be used for
6 people with a head injury are provided in [tools and resources](#).
7 **[2003, amended 2007]**

8 **Involving the neurosurgical department**

9 1.3.14 Discuss with a neurosurgeon the care of anyone with new and
10 surgically significant abnormalities on imaging. The definition of
11 'surgically significant' should be developed by local neurosurgical
12 centres and agreed with referring hospitals, along with referral
13 procedures. **[2003, amended 2014]**

14 1.3.15 Regardless of imaging, discuss a person's care plan with a
15 neurosurgeon if they have:

- 16 • persisting coma (a GCS score of 8 or less) after initial
- 17 resuscitation
- 18 • unexplained confusion that persists for more than 4 hours
- 19 • deterioration in GCS score after admission (pay more attention
- 20 to motor response deterioration)
- 21 • progressive focal neurological signs
- 22 • a seizure without full recovery
- 23 • a definite or suspected penetrating injury
- 24 • a cerebrospinal fluid leak. **[2003]**

1 **1.4 Investigating clinically important traumatic brain**
2 **injuries**

3 1.4.1 The current primary investigation of choice for detecting an acute
4 clinically important [traumatic brain injury](#) is CT imaging of the head.
5 **[2003]**

6 1.4.2 For safety, logistic and resource reasons, do not do MRI scanning
7 as the primary investigation for clinically important [traumatic brain](#)
8 [injury](#) in people who have sustained a head injury. But additional
9 information of importance to prognosis can sometimes be detected
10 using MRI. **[2003]**

11 1.4.3 Ensure that there is appropriate equipment for monitoring people
12 with a head injury who are having an MRI scan. Also ensure that all
13 staff involved are aware of the dangers and necessary precautions
14 for working near an MRI scanner. **[2003]**

15 1.4.4 Do not use plain X-rays of the skull to diagnose important [traumatic](#)
16 [brain injury](#) before a discussion with a neuroscience unit. However,
17 people under 16 presenting with suspected non-accidental injury
18 may need a skeletal survey. **[2007]**

19 1.4.5 **Arrange transfer to a suitable hospital** for people with indications for
20 a CT scan who present to a hospital where CT scans are not
21 available (see [recommendations 1.4.8 to 1.4.14](#) and
22 [recommendations 1.5.6 to 1.5.11](#)). **[2007, amended 2022]**

23 1.4.6 Trauma networks should make sure that people can be transferred
24 as indicated in recommendation 1.4.5. **[2007, amended 2022]**

25 1.4.7 In line with good radiation exposure practice, make every effort to
26 minimise radiation dose during imaging of the head and cervical

1 spine, while ensuring that image quality and coverage is sufficient
2 to achieve an adequate diagnostic study. **[2003]**

3 **Criteria for doing a CT head scan**

4 **Adults**

5 1.4.8 For people 16 and over who have sustained a head injury, do a CT
6 head scan within 1 hour of any of these risk factors being identified:

- 7 • a GCS score of 12 or less on initial assessment in the
8 emergency department
- 9 • a GCS score of less than 15 at 2 hours after the injury on
10 assessment in the emergency department
- 11 • suspected open or depressed skull fracture
- 12 • any sign of basal skull fracture (haemotympanum, 'panda' eyes,
13 cerebrospinal fluid leakage from the ear or nose, Battle's sign)
- 14 • post-traumatic seizure
- 15 • [focal neurological deficit](#)
- 16 • more than 1 episode of vomiting. **[2022]**

17 1.4.9 For people 16 and over who have had some loss of consciousness
18 or amnesia since the injury, do a CT head scan within 8 hours of
19 the head injury, or within the hour in someone presenting more
20 than 8 hours after the injury, if they have any of these risk factors:

- 21 • age 65 years or over
- 22 • any current bleeding or clotting disorders
- 23 • dangerous mechanism of injury (a pedestrian or cyclist struck by
24 a motor vehicle, an occupant ejected from a motor vehicle or a
25 fall from a height of more than 1 m or 5 stairs)
- 26 • more than 30 minutes' retrograde amnesia of events
27 immediately before the head injury. **[2022]**

1 **People under 16**

2 1.4.10 For people under 16 who have sustained a head injury, do a CT
3 head scan within 1 hour of any of these risk factors being identified:

- 4 • suspicion of non-accidental injury
- 5 • post-traumatic seizure
- 6 • on initial emergency department assessment, a GCS score of
7 less than 14, or for children under 1 year a GCS (paediatric)
8 score of less than 15.
- 9 • at 2 hours after the injury, the GCS score is less than 15
- 10 • suspected open or depressed skull fracture, or tense fontanelle
- 11 • any sign of basal skull fracture (haemotympanum, 'panda' eyes,
12 cerebrospinal fluid leakage from the ear or nose, Battle's sign)
- 13 • [focal neurological deficit](#)
- 14 • for children under 1 year, a bruise, swelling or laceration of more
15 than 5 cm on the head. **[2022]**

16 1.4.11 For people under 16 who have sustained a head injury and have
17 more than 1 of these risk factors, do a CT head scan within 1 hour
18 of the risk factors being identified:

- 19 • loss of consciousness lasting more than 5 minutes (witnessed).
- 20 • abnormal drowsiness
- 21 • 3 or more discrete episodes of vomiting
- 22 • dangerous mechanism of injury (high-speed road traffic accident
23 as a pedestrian, cyclist or vehicle occupant, fall from a height of
24 more than 3 m, high-speed injury from a projectile or other
25 object)
- 26 • amnesia (antegrade or retrograde) lasting more than 5 minutes
27 (it will not be possible to assess amnesia in children who are
28 preverbal and is unlikely to be possible in children under 5)
- 29 • any current bleeding or clotting disorder. **[2022]**

1 1.4.12 Observe people under 16 who have sustained a head injury but
2 have only 1 of the risk factors in recommendation 1.4.11 for a
3 minimum of 4 hours. If, during observation, any of the risk factors
4 below are identified, do a CT head scan within 1 hour:

- 5 • a GCS of less than 15
- 6 • further vomiting
- 7 • a further episode of abnormal drowsiness.

8
9 If none of these risk factors occur during observation, use clinical
10 judgement to determine whether a longer period of observation
11 is needed. **[2022]**

12 **People taking anticoagulant or antiplatelet medication**

13 1.4.13 For people who have sustained a head injury and have no other
14 indications for a CT head scan, but are on anticoagulant treatment
15 (including heparin, vitamin K antagonists and direct-acting oral
16 anticoagulants) or antiplatelet treatment (excluding aspirin
17 monotherapy), consider doing a CT head scan:

- 18 • doing a CT head scan within 8 hours of the injury (for example, if
19 it is difficult to do a risk assessment or if the person might not
20 return to the emergency department if they have signs of
21 deterioration), or
- 22 • within the hour if they present more than 8 hours after the injury.

23
24 For advice on reversing vitamin K antagonists and direct-acting
25 oral anticoagulants for people with traumatic intracranial
26 haemorrhage, see [NICE's guideline on blood transfusion](#) and
27 [NICE's technology appraisal guidance on andexanet alfa for
28 reversing anticoagulation from apixaban or rivaroxaban](#). **[2022]**

1 **Timing of radiology report**

- 2 1.4.14 Make a provisional written radiology report available within 1 hour
3 of a CT scan. **[2014]**

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the rationale and impact section on [criteria for doing a CT head scan](#).

Full details of the evidence and the committee's discussion are in [evidence review D: selecting people for CT and MRI](#) and [evidence review E: selecting subgroups for CT or MRI](#).

4 **Investigation to predict postconcussion syndrome**

- 5 1.4.15 For information on advising people about the possible development
6 of postconcussion syndrome, see [recommendation 1.9.13](#). **[2022]**

For a short explanation of why the committee made this recommendation and how they might affect practice or services, see the [rationale and impact section on postconcussion syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review F: biomarkers and MRI for postconcussion syndrome](#).

7 **1.5 Investigating injuries to the cervical spine**

8 **Assessing range of movement in the neck**

- 9 1.5.1 Be aware that range of movement in the neck when there is clinical
10 suspicion of a cervical spine injury can only be assessed safely
11 before imaging in people with a head injury if they have no high-risk
12 factors (see [recommendation 1.5.6](#), and [recommendations 1.5.8](#)
13 [and 1.5.10](#)). Only do the assessment if they have at least 1 of these
14 low-risk features:

- 15
 - they were in a simple rear-end motor vehicle collision

- 1 • they are comfortable in a sitting position
- 2 • they have been ambulatory at any time since injury
- 3 • there is no midline cervical spine tenderness
- 4 • they present with delayed onset of neck pain.

5 See also [NICE's guideline on spinal injury assessment](#). [2014]

6 **Imaging investigations**

7 1.5.2 Ensure that imaging reports are based on **high-resolution source**
8 **data** and multiplanar reformatting of the entire cervical spine.
9 **[2003, amended 2014 and 2022]**

10 1.5.3 **Do MRI if there are neurological signs and symptoms suggesting**
11 **injury to the cervical spine. [2003, amended 2014 and 2022]**

12 1.5.4 Do CT or MRI angiography of the neck vessels if there is a
13 suspicion of vascular injury **(for example, vertebral malalignment, a**
14 **high-risk fracture, posterior circulation syndrome). [2003, amended**
15 **2014, 2022]**

16 1.5.5 Consider MRI for assessing ligamentous and disc injuries
17 suggested by CT or clinical findings. **[2003]**

18 **Criteria for doing a CT cervical spine scan in people 16 and over**

19 1.5.6 For people 16 and over who have sustained a head injury
20 (including people with delayed presentation), do a CT cervical
21 spine scan within 1 hour of presentation to the emergency
22 department if any of these high-risk factors apply:

- 23 • the GCS score is 12 or less on initial assessment
- 24 • the person has been intubated
- 25 • a definitive diagnosis of a cervical spine injury is urgently needed
26 (for example, if cervical spine manipulation is needed during
27 surgery or anaesthesia)

- 1 • there has been blunt polytrauma involving the head, and chest,
2 abdomen or pelvis in someone who is alert and stable
- 3 • there is clinical suspicion of a cervical spine injury and any of
4 these factors:
 - 5 – age 65 years or over
 - 6 – a dangerous mechanism of injury (that is, a fall from a height
7 of more than 1 m or 5 stairs, an axial load to the head such as
8 from diving, a high-speed motor vehicle collision, a rollover
9 motor accident, ejection from a motor vehicle, an accident
10 involving motorised recreational vehicles or a bicycle collision)
 - 11 – focal peripheral neurological deficit
 - 12 – [paraesthesia](#) in the upper or lower limbs. **[2022]**

13 1.5.7 For people 16 and over who have sustained a head injury, and
14 have neck pain or tenderness but no high-risk indications for a CT
15 cervical spine scan (see [recommendation 1.5.6](#)), do a CT cervical
16 spine scan within 1 hour for any of these risk factors:

- 17 • it is not thought to be safe to assess the range of movement in
18 the neck (see [recommendation 1.5.1](#))
- 19 • safe assessment of range of neck movement shows that the
20 person cannot actively rotate their neck 45 degrees to the left
21 and right
- 22 • the person has a condition predisposing them to a higher risk of
23 injury to the cervical spine (for example, axial spondyloarthritis).
24 **[2022]**

25 **Criteria for doing a CT cervical spine scan in people under 16**

26 1.5.8 For people under 16 who have sustained a head injury (including
27 those with delayed presentation), only do a CT cervical spine scan
28 if any of these risk factors apply:

- 29 • the GCS score is 12 or less on initial assessment
- 30 • the person has been intubated

- 1 • there are focal peripheral neurological signs
- 2 • there is [paraesthesia](#) in the upper or lower limbs
- 3 • a definitive diagnosis of a cervical spine injury is needed urgently
- 4 (for example, if manipulation of the cervical spine is needed
- 5 during surgery or anaesthesia)
- 6 • the person is having other body areas scanned for head injury or
- 7 multisystem trauma, and there is clinical suspicion of a cervical
- 8 spine injury
- 9 • there is strong clinical suspicion of injury despite normal X-rays
- 10 • plain X-rays are technically difficult or inadequate
- 11 • plain X-rays identify a significant bony injury.

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Do the scan within 1 hour of the risk factor being identified.

[2022]

15 1.5.9 For people under 16 who have sustained a head injury, and have
16 neck pain or tenderness but no indications for a CT cervical spine
17 scan (see [recommendation 1.5.8](#)), do 3-view cervical spine X-rays
18 before assessing range of movement in the neck if any of these risk
19 factors are identified:

- 20 • there was a dangerous mechanism of injury (that is, a fall from a
- 21 height of more than 1 m or 5 stairs, an axial load to the head, for
- 22 example, diving, a high-speed motor vehicle collision, a rollover
- 23 motor accident, ejection from a motor vehicle, an accident
- 24 involving motorised recreational vehicles or a bicycle collision)
- 25 • safe assessment of range of movement in the neck is not
- 26 possible (see [recommendation 1.5.1](#))
- 27 • the person has a condition that predisposes them to a higher risk
- 28 of injury to the cervical spine (for example, collagen vascular
- 29 disease, osteogenesis imperfecta, axial spondyloarthritis).

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The X-rays should be done within 1 hour of the risk factor being

1 identified and reviewed by a clinician trained in their
2 interpretation. **[2022]**

3 1.5.10 If range of neck movement can be assessed safely (see
4 [recommendation 1.5.1](#)) in a person under 16 who has sustained a
5 head injury, and has neck pain or tenderness but no indications for
6 a CT cervical spine scan, do 3-view cervical spine X-rays if they
7 cannot actively rotate their neck 45 degrees to the left and right.
8 When the person is unable to understand commands or open their
9 mouth, a peg view may be omitted. The X-rays should be done
10 within 1 hour of this risk factor being identified, and reviewed by a
11 clinician trained in their interpretation. **[2014]**

12 **Timing of radiology report**

13 1.5.11 Make a provisional written radiology report available within 1 hour
14 of a CT scan. **[2014]**

For a short explanation of why the committee made these recommendations and how they might affect practices or services see the [rationale and impact section on investigating injuries to the cervical spine](#).

Full details of the evidence and the committee's discussion are in [evidence review H: imaging of the cervical spine](#).

15 **1.6 Information and support for families and carers**

16 1.6.1 Staff caring for people with a head injury should introduce
17 themselves to family members or carers, and briefly explain what
18 they are doing. **[2003, amended 2014]**

19 1.6.2 Ensure that information for families and carers explains the nature
20 of the head injury and the likely care pathway. **[2003]**

21 1.6.3 Staff should think about how best to share information with people
22 under 16, and introduce them to the possibility of long-term
23 complex changes in their parent or sibling who has had a head

1 injury. Literature produced by patient support groups may be
2 helpful. **[2003]**

3 1.6.4 Encourage family members and carers to talk to and make physical
4 contact (for example, holding hands) with the person with a head
5 injury. But ensure that relatives and friends do not feel obliged to
6 spend long periods at the bedside. If they wish to stay with the
7 person with a head injury, encourage them to take regular breaks.
8 **[2003, amended 2007]**

9 1.6.5 Ensure there is a board or area displaying leaflets or contact details
10 for local and national patient support organisations to help family
11 members and carers to gather further information. **[2003]**

12 **1.7 Transfer from hospital to a neuroscience unit**

13 **Transfer of people 16 and over**

14 1.7.1 Ensure local guidelines on the transfer of people with severe
15 traumatic brain injuries are drawn up between the referring hospital
16 trusts, the neuroscience unit and the local ambulance service, and
17 recognise that:

- 18 • transfer would benefit anyone with serious head injuries (a GCS
19 score of 8 or less), irrespective of the need for neurosurgery
- 20 • if transfer of people who do not need neurosurgery is not
21 possible, ongoing liaison with the neuroscience unit over clinical
22 management is essential. Also see [NICE's guideline on major
23 trauma service delivery](#) for recommendations on transfer
24 between emergency departments. **[2003, amended 2007]**

25 1.7.2 Think about the possibility of occult extracranial injuries in
26 people 16 and over with multiple injuries, and do not transfer them

1 to a service that is unable to deal with other aspects of trauma.

2 **[2007]**

3 1.7.3 Ensure there is a designated consultant in the referring hospital
4 with responsibility for establishing arrangements for the transfer of
5 people with head injuries to a neuroscience unit. Also ensure there
6 is another consultant at the neuroscience unit with responsibility for
7 establishing arrangements for communication with referring
8 hospitals, and for receiving people transferred. **[2003]**

9 1.7.4 Ensure that people with traumatic brain injuries needing emergency
10 transfer to a neuroscience unit are accompanied by healthcare staff
11 with appropriate training and experience in the transfer of people
12 with an acute [traumatic brain injury](#). They should:

- be familiar with the pathophysiology of traumatic brain injuries, the medicines and equipment they will use, and working in the confines of an ambulance (or helicopter if appropriate)
- have a dedicated and adequately trained assistant
- be provided with appropriate clothing for the transfer, medical indemnity and personal accident insurance.

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20 Ensure that people needing non-emergency transfer are
21 accompanied by appropriate clinical staff. **[2003, amended**
22 **2007]**

23 1.7.5 Provide the transfer team responsible for transferring a person with
24 a head injury with a means of communicating changes in the
25 person's status with their base hospital and the neurosurgical unit
26 during the transfer. **[2003, amended 2014]**

27 1.7.6 Although it is understood that transfer is often urgent, complete the
28 initial resuscitation and stabilisation of the person, and establish
29 comprehensive monitoring before transfer to avoid complications
30 during the journey. Do not transport someone with persistent

1 hypotension, despite resuscitation, until the cause has been
2 identified and they are stabilised. **[2003, amended 2007]**

3 1.7.7 Intubate and ventilate anyone with a GCS score of 8 or less
4 needing transfer to a neuroscience unit, and anyone with the
5 indications detailed in recommendation 1.7.8. **[2003]**

6 1.7.8 Intubate and ventilate the person immediately when there is:

- 7 • coma, that is, they are not obeying commands, not speaking and
8 not eye opening (that is, a GCS score of 8 or less)
- 9 • loss of protective laryngeal reflexes
- 10 • ventilatory insufficiency as judged by blood gases: hypoxaemia
11 (PaO₂ less than 13 kPa on oxygen) or hypercarbia (PaCO₂ more
12 than 6 kPa)
- 13 • irregular respirations. **[2003, amended 2007]**

14 1.7.9 Use intubation and ventilation before the start of the journey when
15 the person has:

- 16 • significantly deteriorating conscious level (1 or more points on
17 the motor score), even if not coma
- 18 • unstable fractures of the facial skeleton
- 19 • copious bleeding into the mouth (for example, from a skull base
20 fracture)
- 21 • seizures. **[2003, amended 2007]**

22 1.7.10 Anyone whose trachea is intubated should have appropriate
23 sedation and analgesia along with a neuromuscular blocking drug.
24 Aim for a PaO₂ of more than 13 kPa, and a PaCO₂ of 4.5 kPa to
25 5.0 kPa, unless there is clinical or radiological evidence of raised
26 intracranial pressure, in which case more aggressive
27 hyperventilation is justified. If hyperventilation is used, increase the
28 inspired oxygen concentration. Maintain the mean arterial pressure

1 at 80 mm Hg or more by infusion of fluid and vasopressors, as
2 indicated. **[2003, amended 2007]**

3 1.7.11 Give family members and carers as much access to the person
4 with a head injury as is practical during transfer. If possible, give
5 them an opportunity to discuss the reasons for transfer and how the
6 transfer process works with a member of the healthcare team.
7 **[2003, amended 2014]**

8 **Transfer of people under 16**

9 1.7.12 **Recommendations 1.7.1 to 1.7.9 and 1.7.11** were written for
10 people 16 and over. But apply these principles to people under 16,
11 providing that the paediatric modification of the GCS is used for
12 preverbal and non-verbal children. **Ventilate people under 16**
13 **according to the age-appropriate level of oxygen saturation and**
14 **maintain blood pressure at a level appropriate for their age.** **[2003,**
15 **amended 2022]**

16 1.7.13 Ensure that service provision for transfer to tertiary care follows the
17 principles outlined in the service specification for [paediatric](#)
18 [intensive care retrieval \(transport\) NHS England](#) and the [quality](#)
19 [standards for the care of critically ill or injured children](#). **[2003]**

20 1.7.14 Think about the possibility of occult extracranial injuries for people
21 under 16 with multiple injuries. Do not transfer them to a service
22 that is unable to deal with other aspects of trauma. **[2007]**

23 1.7.15 Ensure that transfer of people under 16 to a specialist
24 neurosurgical unit is done either by staff experienced in the transfer
25 of people under 16 who are critically ill **or according to local**
26 **guidelines with specialist paediatric retrieval teams.** **[2003,**
27 **amended 2022]**

28 1.7.16 Give family members and carers as much access to their child as is
29 practical during transfer. If possible, give them an opportunity to

1 discuss the reasons for transfer and how the transfer process
2 works with a member of the healthcare team. **[2003, amended**
3 **2014]**

4 **1.8 Admission and observation**

5 1.8.1 Use these criteria for admitting people to hospital after a head
6 injury:

- 7 • new, clinically important abnormalities on imaging (an [isolated](#)
8 [simple linear non-displaced skull fracture](#) is unlikely to be a
9 clinically important abnormality unless they are taking
10 anticoagulant or antiplatelet medication)
- 11 • after imaging, a GCS score that has not returned to 15 or their
12 pre-injury baseline, regardless of the imaging results
- 13 • when there are indications for CT scanning but this cannot be
14 done within the appropriate time period, either because CT is not
15 available or because the person is not sufficiently cooperative to
16 allow scanning
- 17 • continuing worrying symptoms (for example, persistent vomiting,
18 severe headaches, seizures) of concern to the clinician
- 19 • other sources of concern to the clinician (for example, drug or
20 alcohol intoxication, other injuries, shock, suspected non-
21 accidental injury, meningism, cerebrospinal fluid leak, **suspicion**
22 **of post-traumatic amnesia**). **[2003, amended 2022]**

23
24 See the section on discharge and follow up for
25 recommendations about other factors to consider, such as
26 whether supervision at home is available.

1 1.8.2 Be aware that some people may need an extended period in a
2 recovery setting because of having general anaesthesia during CT
3 imaging. **[2003, amended 2007]**

4 1.8.3 Admit people with multiple injuries under the care of the team that
5 is trained to deal with their most severe and urgent problem. **[2003]**

6 1.8.4 When someone with a head injury needs hospital admission, admit
7 them under the care of a team led by a consultant who has been
8 trained in managing this condition. The consultant and their team
9 should have competence (defined by local agreement with the
10 neuroscience unit) in:

- 11 • assessment, observation and indications for imaging (see
12 [recommendations 1.4.8 to 1.4.14](#) and [recommendations 1.5.6](#)
13 [to 1.5.11](#))
- 14 • inpatient management
- 15 • indications for transfer to a neuroscience unit (see the
16 recommendations in section 1.7)
- 17 • hospital discharge and follow up (see the recommendations in
18 section 1.9). **[2003, amended 2007]**

19 **Admission and observation of people with concussion symptoms**

20 1.8.5 For people with concussion symptoms after normal brain imaging
21 or no indication for early imaging, follow the indications for
22 admission in [recommendation 1.8.1](#). Also see
23 [recommendations 1.9.8 to 1.9.12](#) for advice on discharge. **[2022]**

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on admission and observation](#).

Full details of the evidence and the committee's discussion are in [evidence review I: admission and observation of people on anticoagulants and](#)

[antiplatelets](#), [evidence review J: admission and observation of people with concussion](#), [evidence review K: indications for admission in people with small intracranial injuries](#), and [evidence review L: rate of deterioration in people with isolated skull fracture](#).

1 **Early diagnosis of hypopituitarism**

2 1.8.6 Be aware that any severity of head injury can cause pituitary
3 dysfunction. This may present immediately, hours, weeks or
4 months after the injury. A variety of symptoms could indicate
5 [hypopituitarism](#). [2022]

6 1.8.7 In people admitted to hospital with a head injury who have
7 persistently abnormal low sodium levels or low blood pressure,
8 consider investigations for [hypopituitarism](#). [2022]

9 1.8.8 In people presenting to primary or community care with persistent
10 symptoms consistent with [hypopituitarism](#) in the weeks and months
11 after a head injury, consider investigations or referral for
12 hypopituitarism. [2022]

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on early diagnosis of hypopituitarism](#).

Full details of the evidence and the committee's discussion are in [evidence review M: who to investigate for hypopituitarism](#) and [evidence review N: when to investigate for hypopituitarism](#).

1 **Observation of people who are admitted**

2 1.8.9 Ensure that in-hospital observation of people with a head injury is
3 only done by professionals competent in assessing head injuries.

4 **[2003]**

5 1.8.10 For people admitted for head injury observation, the minimum
6 acceptable documented neurological observations are: GCS, pupil
7 size and reactivity, limb movements, respiratory rate, heart rate,
8 blood pressure, temperature and blood oxygen saturation. **[2003]**

9 1.8.11 Carry out and record observations on a half-hourly basis until there
10 is a GCS score of 15. Observations for people with a GCS score

1 of 15 should start after the initial assessment in the emergency
2 department and the minimum frequency should be:

- 3 • half-hourly for 2 hours, then
- 4 • 1-hourly for 4 hours, then
- 5 • 2 hourly. **[2003]**

6 1.8.12 Revert to half-hourly observations and follow the original frequency
7 schedule for people with a GCS score of 15 who deteriorate at any
8 time after the initial 2-hour period. **[2003]**

9 1.8.13 Urgently reassess a person with a head injury if they have any of
10 these signs of neurological deterioration:

- 11 • agitation or abnormal behaviour
- 12 • a sustained (that is, for at least 30 minutes) drop of 1 point in
13 GCS score (give more weight to a drop of 1 point in the motor
14 response score of the GCS)
- 15 • any drop of 3 or more points in the eye opening or verbal
16 response scores of the GCS, or 2 or more points in the motor
17 response score
- 18 • severe or increasing headache, or persistent vomiting
- 19 • new or evolving neurological symptoms or signs such as pupil
20 inequality or asymmetry of limb or facial movement.

21
22 A supervising doctor should do the appraisal. **[2003, amended**
23 **2007]**

24 1.8.14 To reduce interobserver variability and unnecessary referrals, get a
25 second member of staff competent in observations to confirm
26 deterioration before involving the supervising doctor. Do this
27 immediately if possible. If not possible (for example, because no

1 staff member is available to do the second observation), contact
2 the supervising doctor without the confirmation being done. **[2003]**

3 1.8.15 If any of the changes noted in recommendation 1.8.13 are
4 confirmed, consider doing an immediate CT scan, and reassess the
5 person's clinical condition and manage appropriately. **[2003,**
6 **amended 2007]**

7 1.8.16 If a person has had a normal CT scan but does not have a GCS
8 score of 15 after 24 hours of observation, consider a further CT or
9 MRI scan and discuss with the radiology department. **[2003]**

10 **Observation of babies and children under 5**

11 1.8.17 Be aware that observation of babies and children under 5 is
12 difficult, so should only be done by units with staff experienced in
13 the observation of under 5's with a head injury. Babies and children
14 under 5 may be observed in normal paediatric observation settings,
15 as long as staff have the appropriate experience. **[2003]**

16 **Training in observation**

17 1.8.18 Ensure that medical, nursing and other staff caring for people with
18 a head injury admitted for observation are trained in doing the
19 observations listed in [recommendation 1.8.6](#), and
20 [recommendations 1.8.9 and 1.8.10](#). **[2003]**

21 1.8.19 Make dedicated training available to all relevant staff to enable
22 them to acquire and maintain observation and recording skills.

1 Specific training is needed for the observation of people under 16.
2 **[2003]**

3 **1.9 Discharge and follow up**

4 1.9.1 If CT is not indicated based on history and examination and there is
5 no suspicion of clinically important [traumatic brain injury](#), discharge
6 the person from hospital if there are:

- 7 • no other factors that would warrant a hospital admission (for
8 example, drug or alcohol intoxication, other injuries, shock,
9 suspected non-accidental injury, meningism, cerebrospinal fluid
10 leak)
- 11 • appropriate support structures for safe discharge to the
12 community and for subsequent care (for example, competent
13 supervision at home). **[2003]**

14 1.9.2 If imaging of the head is normal and the risk of clinically important
15 [traumatic brain injury](#) is low, transfer the person to the community
16 if:

- 17 • the GCS score has returned to 15
- 18 • there are no other factors that would warrant a hospital
19 admission (for example, drug or alcohol intoxication, other
20 injuries, shock, suspected non-accidental injury, meningism,
21 cerebrospinal fluid leak)
- 22 • there are appropriate support structures for safe transfer to the
23 community and for subsequent care (for example, competent
24 supervision at home). **[2003]**

25 1.9.3 After normal imaging of the cervical spine, risk of injury to the
26 cervical spine is low enough to warrant transfer to the community if:

- 27 • the GCS score is 15
- 28 • clinical examination is normal

- 1
- there are no other factors that would warrant a hospital admission are present (for example, drug or alcohol intoxication, other injuries, shock, suspected non-accidental injury, meningism, cerebrospinal fluid leak)
- 2
- 3
- 4
- there are appropriate support structures for safe transfer to the community and for subsequent care (for example, competent supervision at home). **[2003]**
- 5
- 6
- 7

8 1.9.4 Do not discharge people presenting with a head injury until their GCS score is 15 or, in preverbal and non-verbal children, consciousness is normal as assessed by the paediatric version of the GCS. In people with pre-injury cognitive impairment, their GCS should be back to that documented before the injury. **[2003]**

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13 1.9.5 Only transfer people with any degree of head injury to their home if there is somebody suitable at home to supervise them. Discharge people with no carer at home only if suitable supervision arrangements have been organised, or when the risk of late complications is thought to be negligible. **[2003]**

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18 1.9.6 Ensure that people with pre-injury cognitive impairment (for example, dementia or a learning disability) and people returning to a custodial setting are supervised and monitored. Also, make sure that arrangements are in place should there be any signs of deterioration. **[2022]**

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For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on discharge and follow up](#).

Full details of the evidence and the committee's discussion are in [evidence review E: selecting subgroups for CT or MRI](#).

1 Discharge after observation

2 1.9.7 People admitted after a head injury may be discharged after
3 resolution of all significant symptoms and signs, provided they have
4 suitable supervision arrangements at home, **in custody or in**
5 **continued care.** [2003, amended 2022]

6 Discharge advice

7 1.9.8 Give verbal and printed discharge advice to people with any degree
8 of head injury who are discharged from an emergency department
9 or observation ward. **This should also be provided to the person**
10 **responsible for their care after discharge. This may include their**
11 **families, carers or custodial staff.** Follow the recommendations in
12 [NICE's clinical guideline on patient experience in adult NHS](#)
13 [services](#) about providing information in an accessible format. [2014,
14 **amended 2022]**

15 1.9.9 Ensure that printed advice for patients, families and carers is age
16 appropriate and includes:

- 17 • details of the nature and severity of the injury
- 18 • risk factors that mean people need to return to the emergency
19 department (see [recommendations 1.1.4 and 1.1.5](#))
- 20 • a specification that a responsible adult should stay with the
21 person for the first 24 hours after their injury
- 22 • details about the recovery process, including the fact that some
23 people may appear to make a quick recovery but later have
24 difficulties or complications
- 25 • contact details of community and hospital services in case of
26 delayed complications
- 27 • information about return to everyday activities, including school,
28 work, sports and driving
- 29 • details of support organisations. [2014]

- 1 1.9.10 Offer information and advice on alcohol or drug misuse to people
2 who presented to the emergency department with drug or alcohol
3 intoxication when they are fit for discharge. **[2003]**
- 4 1.9.11 Inform people with a head injury, and their families and carers,
5 about the possibility of persistent or delayed symptoms after a head
6 injury and who to contact if they have ongoing problems. **[2014]**
- 7 1.9.12 For anyone who has attended the emergency department with a
8 head injury, write to their GP within 48 hours of discharge, giving
9 details of clinical history and examination. Also share this letter with
10 health visitors (for preschool children) and school nurses (for
11 school-age children and young people). If appropriate, provide a
12 copy of the letter for the patient, and their family or carer. **[2014]**

13 **Follow up**

- 14 1.9.13 Ensure that people who have persisting problems can be referred
15 from primary care to outpatient care for an appointment with a
16 professional trained in assessing and managing the consequences
17 of a [traumatic brain injury](#) (for example, [a neuropsychologist](#),
18 clinical psychologist, neurologist, neurosurgeon, [endocrinologist](#), or
19 [multidisciplinary neurorehabilitation team](#)). **[2003, amended 2022]**

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on follow up](#).

Full details of the evidence and the committee's discussion are in [evidence review J: admission and observation of people with concussion](#) and [evidence review N: when to investigate for hypopituitarism](#).

20 **Investigations for hypopituitarism**

- 21 1.9.14 Consider further endocrinology investigations for people who have
22 been discharged after a head injury if they have persistent

1 symptoms consistent with [hypopituitarism](#) or are not recovering as
2 expected. [2022]

For a short explanation of why the committee made these recommendations and how they might affect practice or services, see the [rationale and impact section on investigations for hypopituitarism](#).

Full details of the evidence and the committee's discussion are in [evidence review M: who to investigate for hypopituitarism](#) and [evidence review N: when to investigate for hypopituitarism](#).

3 **Terms used in this guideline**

4 This section defines terms that have been used in a particular way for this
5 guideline.

6 **Complex skull fracture or penetrating head injury**

7 Signs of a basal, open or depressed skull fracture or penetrating head injury
8 include:

- 9 • clear fluid running from the ears or nose
- 10 • a black eye with no associated damage around the eyes
- 11 • bleeding from 1 or both ears
- 12 • bruising behind 1 or both ears
- 13 • penetrating injury signs
- 14 • visible trauma to the scalp or skull of concern to the professional.

15 **Focal neurological deficit**

16 Neurological problems restricted to a particular part of the body or a particular
17 activity, for example:

- 18 • difficulties with understanding, speaking, reading or writing
- 19 • decreased sensation
- 20 • loss of balance
- 21 • general weakness

- 1 • visual changes
- 2 • abnormal reflexes
- 3 • problems walking.

4 **Glasgow Coma Scale (GCS)**

5 In people with a head injury, the GCS score is an early assessment of the
6 severity of any associated traumatic brain injury. It is a standardised system
7 used to assess the degree of brain impairment and to identify the seriousness
8 of injury in relation to outcome. The scale has 3 domains: eye opening, verbal
9 and motor responses. These are all evaluated independently in the scale
10 according to a numerical value that indicates the level of consciousness and
11 degree of dysfunction. The scores in each element of the scale are summed
12 to give the overall GCS score, which ranges from 3 (unresponsive in all
13 domains) to 15 (no deficits in responsiveness):

- 14 • Mild traumatic brain injury is a GCS score of 13 to 15.
- 15 • Moderate traumatic brain injury is a GCS score of 9 to 12.
- 16 • Severe traumatic brain injury is a GCS score of 8 or less.

17 **High-energy head injury**

18 An injury arising from, for example, a pedestrian being struck by motor
19 vehicle, an occupant being ejected from motor vehicle, a fall from a height of
20 more than 1 m or more than 5 stairs, a diving accident, a high-speed motor
21 vehicle collision, a rollover motor accident, an accident involving motorised
22 recreational vehicles, a bicycle collision or any other potentially high-energy
23 mechanism.

24 **Hypopituitarism**

25 Underactivity of the pituitary gland that can lead to:

- 26 • adrenocorticotrophic hormone deficiency causing weakness, fatigue, weight
27 loss, hypotension, hyponatraemia, hypoglycaemia, hypercalcaemia,
28 anaemia and fatigue

- 1 • growth hormone deficiency causing decreased energy, low mood,
2 neuropsychiatric and cognitive symptoms, decreased lean body mass,
3 increased fat mass, altered metabolic profile and decreased exercise
4 capacity
- 5 • lack of sex hormones that can cause later puberty, hot flushes, fatigue,
6 tiredness, loss of body hair, reduced sex drive, irregular periods, erectile
7 dysfunction and reduced fertility
- 8 • thyroid stimulating hormone deficiency presenting with slow growth, fatigue,
9 lethargy, cold intolerance and weight gain
- 10 • vasopressin deficiency causing polyuria, polydipsia, nocturia and
11 incontinence.

12 **Isolated simple linear non-displaced skull fracture**

13 A single or solitary linear fracture that does not exhibit any (inward or outward)
14 displacement, does not consist of multiple fracture lines and does not involve
15 or cross the normal sutures of the skull.

16 **Paraesthesia**

17 Pins and needles, or a prickling sensation, tingling or itching in any part of the
18 body.

19 **Postconcussion syndrome (or postconcussion symptoms)**

20 Postconcussion syndrome is seen in all severities of head injury, and is under-
21 recognised in mild head injuries. It is the term used in evidence review F. The
22 term concussion was used in evidence review J. Examples of symptoms in
23 these reviews include, but are not limited to:

- 24 • Physical:
 - 25 – headache
 - 26 – dizziness
 - 27 – nausea
 - 28 – fatigue
- 29 • Motor:

- 1 – difficulties with balance, co-ordination and mobility, often resulting in
- 2 falls, banging into objects and, at times, further traumatic brain injuries
- 3 – speech problems

- 4 • Cognition:
 - 5 – cognitive difficulties (as long as the Glasgow Coma Scale score is 15)
 - 6 sometimes described as 'brain fog', which may include a problem finding
 - 7 words or numbers, difficulty in speaking, slowed responsiveness, short-
 - 8 term memory problems, difficulty concentrating and problems with
 - 9 information processing, such as following conversations, digesting text
 - 10 and finding words
 - 11 – difficulties with executive functions, such as organising, planning and
 - 12 multitasking
 - 13 – amnesia
 - 14 – problems with spatial awareness and proprioception, including the
 - 15 sensation of touching something as if through a layer of numbness

- 16 • Emotional:
 - 17 – lability, such as unusual laughing or crying (because of being
 - 18 overwhelmed by sense impressions) or irritability
 - 19 – depression
 - 20 – anxiety

- 21 • Sensory:
 - 22 – changes in vision, such as blurred vision, double vision, 'seeing stars'
 - 23 and 'looking through a haze'
 - 24 – visual processing problems, such as not taking in what you are seeing
 - 25 – difficulties staying awake, sleeping for many more hours than usual and
 - 26 chronic fatigue when awake
 - 27 – unusual sensitivity to noise (hyperacusis)
 - 28 – unusual sensitivity to bright lights (photophobia)

- 29 • Additional symptoms that may present in children under 5:

- 1 – changes in normal behaviour after a head injury, such as crying a lot or
- 2 irritability
- 3 – changes in feeding or sleeping habits
- 4 – loss of interest in people or objects
- 5 – listlessness

6 **Traumatic brain injury**

7 An alteration in brain function, or other evidence of brain pathology, caused by
8 an external force.

9 **Recommendations for research**

10 The guideline committee has made these recommendations for research.

11 **Key recommendations for research**

12 **1 Indications for admission in people with a mild head injury and a** 13 **confirmed abnormality on a CT scan**

14 What are the indications for admission using clinical decision rules in people
15 with a Glasgow Coma Scale score of 13 to 15 (a mild head injury) and a
16 confirmed abnormality on a CT scan? [2022]

For a short explanation of why the committee made this recommendation,
see the [rationale section on admission and observation](#).

Full details of the evidence and the committee's discussion are in [evidence
review K: indications for admission in people with small intracranial injuries](#).

17 **2 Using biomarkers for predicting acute post-traumatic brain injury** 18 **complications**

19 What is the diagnostic accuracy of brain injury biomarkers for predicting acute
20 complications after a traumatic brain injury? [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on postconcussion syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review G: biomarkers for postinjury complications](#).

1 **3 Indications for imaging for people with a history of recurrent**
2 **head injuries**

3 What is the risk of intracranial injuries in people with a history of recurrent
4 head injuries, including from sports and falls, and no other indications for a CT
5 scan? [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on criteria for doing a CT head scan](#).

Full details of the evidence and the committee's discussion are in [evidence review E: selecting subgroups for CT or MRI](#).

6 **4 Risk of bleeding for people with a pre-injury coagulopathy**

7 What is the risk of any intracranial bleeding or intracranial bleeding associated
8 with clinical deterioration after head injury in people with a pre-injury
9 coagulopathy? This includes medical conditions such as liver failure or
10 haemophilia, or taking anticoagulants or antiplatelets in people who:

- 11 • have a Glasgow Coma Scale score of 15 at 2 hours after the head injury
12 and medium risk factors for intracranial bleeding, or
13 • loss of consciousness or amnesia with no additional risk factors (that is,
14 they are under 65, had a low energy transfer injury and any retrograde
15 amnesia has lasted for less than 30 minutes), or
16 • there is no loss of consciousness or amnesia? [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on criteria for doing a CT head scan](#).

Full details of the evidence and the committee's discussion are in [evidence review E: selecting subgroups for CT or MRI](#).

1 **5 Indications for imaging for people with a pre-injury cognitive**
2 **impairment**

3 What are the indications for selecting for imaging in adults, young people,
4 children and babies with a head injury sustained through a low energy fall and
5 with suspected pre-injury cognitive impairment when loss of consciousness or
6 amnesia is difficult to assess or the pre-injury Glasgow Coma Scale score is
7 not 15? [2022]

For a short explanation of why the committee made this recommendation see the [rationale section on criteria for doing a CT head scan](#).

Full details of the evidence and the committee's discussion are in [evidence review E: selecting subgroups for CT or MRI](#).

8 **Other recommendations for research**

9 **Transport to a neuroscience centre**

10 What is the clinical and cost effectiveness of prehospital strategies to take
11 people with a head injury to a distant specialist neuroscience centre instead of
12 a closer non-specialist unit? [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on transport to hospital](#).

Full details of the evidence and the committee's discussion are in [evidence review B: transfer to a specialist centre](#).

13 **Tranexamic acid**

14 What is the clinical and cost effectiveness of tranexamic acid before imaging
15 in people presenting within 2 hours of a head injury with a Glasgow Coma

- 1 Scale score of 13 to 15 and high-risk indications for intracerebral bleeding?
2 [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on tranexamic acid](#).

Full details of the evidence and the committee's discussion are in [evidence review A: tranexamic acid](#).

- 3 **Indications for selecting people for imaging when they present**
4 **more than 24 hours after a head injury**

- 5 What are the indications for selecting people of any age who present more
6 than 24 hours after a head injury for a CT or MRI head scan? [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on criteria for doing a CT head scan](#).

Full details of the evidence and the committee's discussion are in [evidence review E: selecting subgroups for CT or MRI](#).

- 7 **Using biomarkers and MRI for predicting postconcussion**
8 **syndrome**

- 9 What is the prognostic accuracy of brain injury biomarkers or MRI for
10 predicting postconcussion syndrome? [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on postconcussion syndrome](#).

Full details of the evidence and the committee's discussion are in [evidence review F: biomarkers and MRI for postconcussion syndrome](#).

- 11 **Timing of testing for hypopituitarism**

- 12 When should people with a head injury be investigated for hypopituitarism?
13 [2022]

For a short explanation of why the committee made this recommendation, see the [rationale section on early diagnosis of hypopituitarism](#).

Full details of the evidence and the committee's discussion are in [evidence review N: when to investigate for hypopituitarism](#).

1 **Rationale and impact**

2 These sections briefly explain why the committee made the recommendations
3 and how they might affect practice or services.

4 **Transport to hospital**

5 [Recommendations 1.2.13 and 1.2.14](#)

6 **Why the committee made the recommendations**

7 Evidence from 1 randomised controlled trial (RCT) and 1 retrospective cohort
8 study was identified. This compared transport for a head injury to a specialist
9 neuroscience centre with transport to the nearest non-specialist acute hospital
10 or general hospital emergency department. All the evidence was in people 16
11 and over. No evidence was available for people under 16.

12 The evidence from the RCT suggested some benefit for transfer to a non-
13 specialist general hospital for the outcome of mortality, but this was uncertain.
14 The evidence from the retrospective cohort study suggested that there was no
15 difference between the 2 groups for the outcome of survival benefit. The
16 committee agreed that there was limited evidence of a possible benefit for
17 transfer to a specialist neuroscience centre for some outcomes but that this
18 was uncertain. They agreed that there was no compelling evidence to change
19 practice, and to cross refer to [NICE's guideline on major trauma service
20 delivery](#).

21 The committee noted that the data collection for the RCT was in 2012. This
22 was when trauma care was reorganised in the UK to enable rapid and safe
23 transfer of people to major trauma centres. So, the evidence does not reflect

1 the recent trauma care system, which includes more consultants, quicker CT
2 scans and rehabilitation. So, the committee agreed that further research
3 should be done in this area to determine the effectiveness of transport to
4 specialist neuroscience centres in people with a head injury. They developed
5 a [recommendation for research on transport to a neuroscience centre](#).

6 **How the recommendations might affect practice or services**

7 There is not expected to be any change.

8 [Return to recommendations](#)

9 **Tranexamic acid**

10 [Recommendations 1.2.17 and 1.2.18](#)

11 **Why the committee made the recommendations**

12 **People 16 and over**

13 There was evidence from 2 RCTs for tranexamic acid, both of which included
14 adults with no suspicion of extracranial bleeding. One trial was in a prehospital
15 (out-of-hospital) setting and the other was in a hospital setting. There was no
16 evidence available for people under 16 (1 trial included a few people aged
17 15 and 16).

18 In the prehospital setting, a single 2 g bolus dose of tranexamic acid was
19 given within 2 hours of a head injury. The evidence suggested that it reduced
20 all-cause mortality at 28 days and 6 months in people with moderate or severe
21 traumatic brain injury. But there was no clinically important difference between
22 tranexamic acid and placebo for hospital-free days at 28 days, degree of
23 disability at discharge and after 6 months (Glasgow Outcome Score–
24 Extended more than 4), and serious adverse events (that is, myocardial
25 infarction, pulmonary embolism, deep vein thrombosis and stroke).

26 In the hospital setting, a 1 g bolus dose of tranexamic acid was given within
27 3 hours of injury, followed by an 8-hour intravenous infusion of 1 g of
28 tranexamic acid. The evidence suggested that this reduced death from

1 traumatic brain injury at 28 days in groups with mild or moderate traumatic
2 brain injury. Evidence suggested reduced mortality related to severe traumatic
3 brain injury at 28 days in high income countries. But there was no difference in
4 mortality related to traumatic brain injury in low- and middle-income countries.
5 No evidence was available separating the mild from moderate severity groups
6 for mortality related to traumatic brain injury and all-cause mortality. But
7 communication with the study authors suggested significant uncertainty about
8 tranexamic acid's effect in mild traumatic brain injury. There was no clinically
9 important difference between tranexamic acid and placebo for serious
10 adverse events (that is, myocardial infarction, pulmonary embolism, deep vein
11 thrombosis and stroke) and disability rating scale scores in a mixed severity
12 group (mild, moderate and severe) across all income groups.

13 The committee considered that, despite the uncertainty in the clinical
14 evidence, there was a benefit with tranexamic acid in terms of reducing all-
15 cause mortality and mortality from traumatic brain injury. They also considered
16 that the evidence showed that it caused very few adverse events. Based on
17 the evidence, they agreed that a 2 g intravenous bolus dose of tranexamic
18 acid, given within 2 hours of a head injury and before imaging, could be
19 considered for people 16 and over with moderate or severe traumatic brain
20 injury. The committee recommended a 2 g intravenous bolus injection of
21 tranexamic acid because this dose was found to be the most safe and
22 effective.

23 An economic model was developed that looked at each traumatic brain injury
24 severity subgroup separately. It was based primarily on the prehospital clinical
25 trial because:

- 26 • that provided data for moderate traumatic brain injury separately from that
27 for mild injury
- 28 • the benefits of tranexamic acid were found to be greater when it was given
29 earlier.

1 For moderate traumatic brain injury, the health benefits associated with a 2 g
2 bolus given in the prehospital setting outweighed the costs in all scenarios.
3 For severe traumatic brain injury, the cost-effectiveness estimate was more
4 borderline. But, when limitations in the modelling were taken in to account, the
5 committee concluded that the health benefits were likely to outweigh the costs
6 in this group too.

7 **People under 16**

8 Because of a lack of trial evidence for tranexamic use in people under 16, the
9 committee used extrapolated evidence from the trials in adults, and their
10 expertise and knowledge. In NHS clinical practice, a tranexamic acid dose of
11 15 mg/kg is used in people under 16 with extra cranial injuries. But, in this age
12 group, tranexamic acid is not currently widely used for isolated head injury
13 and dosing is variable (15 mg/kg to 30 mg/kg). Evidence for people 16 over
14 with a head injury from a prehospital setting suggested that a 2 g dose of
15 tranexamic acid reduced all-cause mortality (at 28 days and 6 months), with
16 no evidence of negative effects. So, the committee concluded that it could
17 recommend the equivalent of a 2 g dose of tranexamic for people under 16.
18 They discussed that, based on the average weight of people 16 and over
19 being 70 kg, a 2 g dose of tranexamic acid for people 16 and over would
20 equate to a 30 mg/kg dose for people under 16. So, they concluded that a
21 dose range of 15 mg/kg to 30 mg/kg was appropriate for people under 16.

22 For people with mild traumatic brain injury, it is less clear whether the benefits
23 of tranexamic acid outweigh the potential risk of blood clots. So, the
24 committee made a [recommendation for research on tranexamic acid](#) for this
25 group.

26 **How the recommendations might affect practice or services**

27 Tranexamic acid is already used for people who have a head injury and other
28 major trauma. NICE has not previously recommended it for people with an
29 isolated head injury. It is expected that doing so will increase tranexamic acid
30 use by paramedics. This should lead to improved survival for people with

1 head injury. More resources might be needed for treatment, rehabilitation and
2 care for the people who would not have survived without tranexamic acid.

3 [Return to recommendations](#)

4 **Direct access from the community to imaging**

5 [Recommendation 1.2.19](#)

6 **Why the committee made the recommendation**

7 No evidence was identified for direct access from the community for CT scans
8 or MRI of the head compared with usual care for a suspected or confirmed
9 head injury (including people with delayed presentation, and people in
10 residential and care homes). The committee discussed that imaging ordered
11 in the community setting is mainly used to exclude intracranial bleeding or
12 provide reassurance. They noted that the timing of imaging depends on
13 whether there is an acute injury or the person has postconcussion syndrome.
14 Based on their experience, the committee agreed that people should go to
15 hospital if:

- 16 • there has been important traumatic brain injury within 24 hours, or
- 17 • there is an impaired Glasgow Coma Scale score (GCS).

18 The committee were aware that some trusts do have referral pathways that
19 allow for imaging to be requested directly from the community setting or
20 primary care. But they noted the logistical challenges in the acute phase of a
21 head injury in getting access to, and timely reporting of, imaging. They also
22 noted the challenges faced in primary care and general practice in interpreting
23 complex neuroradiology reports. The committee therefore agreed that people
24 should not be referred to imaging directly from the community.

25 **How the recommendation might affect practice or services**

26 This is expected to be a change in practice for a few centres that will now
27 have to send people for imaging by the emergency department route.

28 [Return to recommendation](#)

1 **Assessment in the emergency department**

2 [Recommendation 1.3.11](#)

3 **Why the committee made the recommendations**

4 The committee highlighted the need to follow relevant guidance if abuse or
5 other safeguarding issues may be factors in a head injury.

6 [Return to recommendation](#)

7 **Criteria for doing a CT head scan**

8 [Recommendations 1.4.8 to 1.4.14](#)

9 **Why the committee made the recommendations**

10 **People 16 and over**

11 Several diagnostic accuracy studies were identified but there were no
12 diagnostic RCTs. Most of the evidence was of low to very low quality and was
13 in people with a mild head injury (defined as a GCS score of 13 to 15 in many
14 studies, but sometimes limited to a GCS score of 14 to 15). The committee
15 noted that the existing recommendations for clinical decision rules for head
16 imaging in people 16 and over were largely based on the Canadian CT Head
17 Rule (CCHR). This involves identifying high and medium risk factors, with
18 some modifications aimed at improving sensitivity. Updated evidence for this
19 decision rule showed that it has good sensitivity when used as intended but
20 that its specificity values are poor. The committee noted that specificity values
21 of decision rules are often low because they prioritise very high sensitivity.

22 Evidence identified for other decision rules showed sensitivity values similar to
23 those of the CCHR. However, specificity values were lower compared with the
24 CCHR high and medium risk rule. Limited evidence showed that the NEXUS 2
25 decision rule has specificity values similar to those of the CCHR.

26 Only 1 study had assessed the performance of the 2014 update of NICE's
27 head injury guideline recommendations for head imaging. This reported
28 sensitivity values that were poorer than those for the CCHR. But the specificity

1 values were better compared with other decision rules. The committee agreed
2 that it was unclear why the sensitivity of the NICE recommendations would be
3 worse than those of CCHR. They also agreed that it was unclear why the
4 CCHR did not do as well in this study as in other studies. They thought that
5 this possibly suggested some differences between study populations, which
6 may have affected the results. The committee also agreed that, in their clinical
7 experience, the sensitivity of the NICE recommendations was not as low as
8 suggested in this study.

9 The committee agreed that there was insufficient evidence to support
10 changing the clinical decision rule recommendations for head imaging in
11 people 16 and over. Because the NICE recommendations were largely based
12 on the CCHR rule, this decision was further supported by cost-effectiveness
13 evidence. This showed the CCHR rule to be the most cost effective of the
14 multiple decision rules assessed.

15 **People under 16**

16 The committee noted that the existing recommendations for clinical decision
17 rules for head imaging in people under 16 were largely based on the
18 CHALICE rules with some modifications. These modifications were based on
19 current practice and experience allowing for the option of an observation
20 period with imaging if the condition of some people deteriorated, rather than
21 immediate imaging.

22 Updated evidence identified for this decision rule showed that it had good
23 sensitivity when considering clinically important injuries or neurosurgical
24 outcomes. In the 2014 update of this guideline, the committee stated that an
25 improvement in specificity relative to the NICE recommendations would be
26 needed to warrant switching to another decision rule for people under 16.
27 They noted that PECARN and CATCH-7 may have slightly better sensitivity
28 values compared with CHALICE, but agreed that, overall:

- 29 • the specificity values for CHALICE are much better than for other rules
30 assessed

- 1 • the sensitivity values for CHALICE are still over 90% for clinically important
2 injuries and neurosurgical outcomes.

3 The committee noted that, in terms of the content of the rules, PECARN and
4 the NICE guideline are not very different but that PECARN is vaguer and does
5 not give timings. They thought this less useful. In addition, they noted that the
6 PECARN and CATCH rules apply to more specific populations than the NICE
7 guideline recommendations.

8 The committee agreed that the recommendations in the NICE guideline are in
9 widespread use in current practice, and used with little variation. Their opinion
10 was that they are currently well-accepted and used with good effect. The
11 committee therefore agreed that there was insufficient evidence to support
12 changing the clinical decision rule recommendations for head imaging in
13 people under 16.

14 **People having anticoagulants or antiplatelets**

15 There was conflicting evidence from cohort studies on whether people who
16 are on anticoagulants or antiplatelets are at higher risk of intracranial
17 haemorrhage than people not on anticoagulants or antiplatelets. CT scans
18 could be limited to people with symptoms of traumatic brain injury such as
19 loss of consciousness or amnesia. However, the committee thought that the
20 new evidence was not strong enough to warrant stopping imaging in people
21 with a head injury who are on anticoagulants but have no other indication for
22 imaging. So, they decided CT scanning should be considered rather than
23 automatically done in this group. They also agreed that antiplatelets other
24 than aspirin monotherapy should be included in this. The review findings
25 suggested that people on anticoagulants (including warfarin and direct-acting
26 oral anticoagulants) or antiplatelets (excluding people on aspirin
27 monotherapy) with low-risk factors (no loss of consciousness, amnesia, a
28 GCS score of 15 and no other indications for CT brain scan) can be risk
29 assessed (including for other injuries, supervision at home, cause of incident
30 and risk of further falls). Then, if there are no risk factors and after shared
31 decision making, they could be discharged safely without a CT scan, with the

1 usual discharge advice (see the [recommendations in section 1.9](#)). The
2 committee highlighted that clinicians would either scan or admit someone for
3 monitoring if any risks were identified. This might be, for example, if a person
4 (with pre-existing cognitive impairment) may be less likely to return to the
5 emergency department urgently if they have any signs of deterioration. The
6 committee noted that, if an intracranial haemorrhage is not detected at initial
7 presentation, delayed recovery is more likely rather than death. They also
8 discussed that neurosurgical intervention for traumatic brain injury is less
9 likely to be offered for people over 74 because risks outweigh the benefits.

10 In current practice, in accordance with the 2014 update of NICE's head injury
11 guideline recommendations, a CT head scan is done within 8 hours of a head
12 injury in people with no other indications for a CT head scan who are having
13 anticoagulant treatment. The 2014 update did not make specific
14 recommendations for people on antiplatelets. The committee agreed that, in
15 clinical practice, there is variation, with some services offering imaging to
16 people on antiplatelets. Based on the evidence, they also agreed that
17 antiplatelets other than aspirin monotherapy should be included but did not
18 specify which antiplatelets. This was because they did not want to be
19 prescriptive and exclude any newer antiplatelets in development. Based on
20 their experience and extrapolation of evidence in people presenting within
21 8 hours of injury, the committee agreed that these recommendations could be
22 applicable to people presenting more than 8 hours after their injury. However,
23 they agreed that imaging should be done within an hour of confirming that the
24 person with head injury is on anticoagulant or antiplatelet medication.

25 There was limited evidence on aspirin. From their knowledge and clinical
26 experience, the committee highlighted that the risk of intracranial
27 haemorrhage is low with aspirin. This is even so in people with neurological
28 symptoms such as loss of consciousness or amnesia. So, they agreed that
29 people on aspirin monotherapy could be discharged without a CT head scan
30 after shared decision making if there is no other indication for a CT brain scan
31 or hospital admission.

1 The committee made a [recommendation for research on risk of bleeding for](#)
2 [people with pre-injury coagulopathy](#).

3 **People with liver or coagulopathy disorders**

4 There was no evidence for people with liver or coagulopathy disorders.
5 Current practice is variable, with some services offering imaging to people
6 with liver disease who have no symptoms. People with liver or coagulopathy
7 disorders are at increased risk of bleeding, although some people will have a
8 tendency for increased clotting. People with acquired coagulation defects can
9 be a heterogenous and complex group. They can include people with
10 acquired haemophilia through to people with other abnormalities such as
11 disseminated intravascular coagulation.

12 The committee agreed to keep the existing recommendations from the 2014
13 update of NICE's head injury guideline for people with bleeding and clotting
14 disorders. This was because there was no new evidence to change practice.
15 But they changed the recommendation wording from 'history of bleeding or
16 clotting disorders' to 'current bleeding or clotting disorders'. In people
17 under 16, some disorders are short-lived or resolve in a couple of months. In
18 adults, a history of bleeding or clotting disorders is used to help screen people
19 before surgery. However, this may not be appropriate in the emergency
20 department setting. So, the committee agreed to keep the changed wording
21 for all age groups to help provide a consistent message.

22 **People with pre-injury cognitive impairment who have a head injury** 23 **through low energy impact or low-level falls**

24 Limited evidence from cohort studies suggested that, in people 16 and over
25 falling from a standing position, being over 70, having a reduced GCS score
26 compared with normal, taking antiplatelet medication including aspirin and
27 having neurological symptoms (loss of consciousness, vomiting after fall)
28 were risk factors associated with the diagnosis of an intracranial bleed.
29 Anticoagulant medication in this population was not associated with an

1 intracranial bleed. It was not clear if people in the studies had pre-injury
2 cognitive impairment, so the applicability of this evidence is limited.

3 The committee discussed the challenges in assessing risk in people with
4 cognitive impairment. For example, people with dementia may under report or
5 may be unaware of symptoms such as loss of consciousness or amnesia. It is
6 also difficult to differentiate head injury symptoms from the pre-existing
7 dementia in these people. There was no evidence for people under 16.

8 The committee acknowledged the limited evidence for this group. They made
9 a [recommendation for research on indications for imaging in people with pre-
10 injury cognitive impairment.](#)

11 **People with recurrent head injuries**

12 There was no evidence for recurrent head injuries in any age group.
13 Recurrent head injuries could occur in people with epilepsy, people with
14 mobility issues at high risk of falls and with some sports activities. Particularly
15 in the context of sports injuries, these injuries can be repeated and lead to
16 cumulative risks. Because of a lack of evidence, the committee decided to
17 make a [recommendation for research on indications for imaging for people
18 with a history of recurrent traumatic head injuries.](#)

19 **People presenting more than 24 hours after a head injury**

20 Evidence from 1 observational study suggested that there was an increased
21 risk of any traumatic brain injury or important traumatic brain injury on a CT
22 head scan in babies and children under 2:

- 23 • the younger their age
- 24 • if they have a GCS score of less than 15.
- 25 • if they present more than 24 hours after head injury.

26 There was no evidence for people 2 years or over. The committee discussed
27 that people 16 and over presenting more than 24 hours after injury have
28 increased risk factors such as vomiting and loss of consciousness. This is

1 because they would be attending because of worsening symptoms. The 2014
2 update of NICE's head injury guideline recommendations are for people
3 presenting within 24 hours of injury. But, because of a lack of evidence, the
4 committee agreed that these could be extrapolated to people presenting more
5 than 24 hours after a head injury (see [recommendations 1.4.8 to 1.4.14](#)). They
6 also agreed that this was an important area, so proposed a [recommendation
7 for research on indications for selecting people for imaging when they present
8 more than 24 hours after a head injury](#).

9 **How the recommendations might affect practice or services**

10 Weakening the recommendation for people with a head injury who are on
11 anticoagulants but have no other indication for imaging from offer to consider
12 is expected to result in fewer scans. But expanding the recommendation to
13 include people with a head injury who are on clopidogrel, prasugrel or
14 ticagrelor is expected to result in more scans. It is uncertain whether this will
15 lead to an overall increase or decrease in scanning.

16 [Return to recommendations](#)

17 **Postconcussion syndrome**

18 [Recommendation 1.4.15](#)

19 **Why the committee made the recommendation**

20 **Postconcussion syndrome**

21 The committee agreed that high specificity is needed for brain injury
22 biomarkers for postconcussion syndrome. This was because the population
23 with a mild head injury is large but only a small proportion go on to develop
24 postconcussion syndrome. So, false positives would have a negative effect on
25 resources if biomarkers were to be used to direct everyone towards
26 interventions or monitoring.

27 Overall, the committee agreed that the evidence was too limited to be able to
28 make recommendations for using biomarkers (including fluid biomarkers or

1 MRI) to predict postconcussion syndrome in people with mild traumatic brain
2 injury. There was no evidence from prognostic test-and-treat studies
3 comparing clinical outcomes, so the committee agreed to highlight the criteria
4 for doing a CT head scan. They also made a [recommendation for research on](#)
5 [using biomarkers or MRI for predicting postconcussion syndrome](#) [2022].

6 **Using biomarkers for predicting acute complications after a traumatic** 7 **brain injury**

8 Evidence from diagnostic accuracy studies suggested that there were high
9 sensitivity values for some biomarkers at certain thresholds for predicting
10 acute complications after a traumatic brain injury. But the specificity values
11 were not high enough across the evidence. Also, many biomarkers were only
12 tested in small samples, which led to imprecise estimates. The committee
13 noted that accuracy differed quite widely between different studies looking at
14 the same biomarker test. Also, the evidence was heterogenous, with variable
15 thresholds and time points for different biomarkers. Most people with a head
16 injury present to hospital within 3 hours and the manufacturers recommend
17 this time frame for optimal test results. Many of the studies assessed
18 biomarkers beyond this time point.

19 The committee agreed that the specificity values were equally as important as
20 the sensitivity values, given the consequences of unnecessary radiation from
21 CT scans. They thought this was particularly important in people under 16.
22 But, after considering the limitations of the evidence, the committee were
23 unable to make recommendations for using biomarkers to predict acute
24 complications after a mild traumatic brain injury. They did think that biomarker
25 tests had promise, so proposed a [recommendation for research on using](#)
26 [biomarkers for predicting acute post-traumatic brain injury complications](#).

27 **How the recommendation might affect practice or services**

28 Biomarkers are not routinely used in people with acute head injury and the
29 recommendation for MRI has not changed. So, there is not expected to be a
30 change in practice.

1 [Return to recommendation](#)

2 **Investigating injuries to the cervical spine**

3 [Recommendations 1.5.1 to 1.5.11](#)

4 **Why the committee made the recommendations**

5 The committee considered sensitivity to be the most important measure for
6 types of investigation for cervical spine injuries in people with head injuries.
7 This is to ensure the investigation does not miss important cervical spine
8 injuries, which could result in subsequent negative consequences such as
9 disability. The evidence was limited because the proportion of people with a
10 confirmed head injury was not reported in the diagnostic accuracy studies. But
11 it suggested that X-rays have poor sensitivity compared with CT scans in
12 people 16 and over.

13 Based on the evidence, and the committee's experience and knowledge of
14 current practice, the committee agreed that X-rays of the cervical spine should
15 not be done initially in people 16 and over with a head injury. They also agreed
16 that CT scans of the cervical spine scan should be used in people 16 and over
17 in a way consistent with current clinical practice. There was limited evidence
18 for MRI (less accurate at showing bony injuries, takes longer to do and
19 younger people might need sedation). Also, MRI is rarely used as an initial
20 imaging strategy. So, MRI is recommended as an additional form of imaging
21 in certain circumstances (as in previous versions of the guideline). For people
22 under 16, limitations in the evidence, and radiation exposure and risk of
23 cancer, contributed to the committee's decision not to make any major
24 changes to the recommendations.

25 **How the recommendations might affect practice or services**

26 CT scanning of the neck in people 16 and over with a head injury has already
27 replaced X-rays when there is at least a medium risk of serious spinal injury.
28 So, there is not expected to be a change in practice.

29 [Return to recommendations](#)

1 **Admission and observation**

2 [Recommendations 1.8.1 to 1.8.5.](#)

3 **Why the committee made the recommendations**

4 **Small intracranial injuries**

5 Limited evidence from cohort studies in people with intracranial injuries
6 suggested that effect sizes for the clinical decision rules were larger overall
7 than those for individual risk factors. So, the committee agreed that clinical
8 decision rules were likely to be the way to identify people who should be
9 admitted in the future. This was because they thought it would be difficult to
10 make decisions based on individual risk factors in clinical practice. But the
11 evidence for clinical decision rules was all retrospective. So, the committee
12 did not think any specific clinical decision rules could be recommended,
13 particularly because they would be new to clinical practice.

14 For individual risk factors, the committee noted that there was consistent
15 evidence across all studies (including 1 study in people under 16) that GCS
16 scores of 13 and 14 were associated with a worse outcome than a GCS score
17 of 15. But this is already an existing indication for admission (see
18 [recommendation 1.8.1](#)).

19 Evidence for specific thresholds and findings on CT (including thresholds for
20 subdural or epidural haemorrhage size, or findings such as midline shift or
21 mass effect on CT) also indicated larger effect sizes than for some other risk
22 factors. But, for factors such as midline shift, the committee noted that a
23 threshold for degree of shift would be more useful in practice. They also noted
24 that the varying thresholds used for subdural and epidural haemorrhage
25 across the different studies made the ideal threshold to use unclear.

26 The evidence also suggested that thresholds for age could be associated with
27 a worse outcome in higher age groups. But the committee noted that older
28 age would not solely be used in practice to make decisions about admission.
29 This is particularly because admission in older age groups can also be

1 associated with harms such as hospital-acquired infections. The committee
2 agreed that age or frailty may be a concern but should not be a sole indicator
3 for admission. Overall, the committee agreed that prospective studies are
4 needed in people with a GCS score of 13, 14 or 15 and a head injury of any
5 size confirmed with CT to validate existing clinical decision rules for predicting
6 deterioration. The aim would be to refine indications for admission in this
7 group. So, the committee made a [recommendation for research on indications
8 for admission in people with a mild head injury and a confirmed abnormality
9 on a CT scan.](#)

10 **Isolated skull fracture**

11 Evidence from several case series suggested that there was low risk of death,
12 neurosurgery, admission to critical care, unplanned hospital admission and
13 delayed intracranial injury in babies and children (age cut-off varied across
14 studies) with an isolated skull fracture. The evidence suggested that there was
15 a slightly higher risk of seizure (at presentation) and evaluation for suspected
16 non-accidental injury in this group. According to current guidelines
17 ([recommendations 1.4.8 and 1.4.10](#)), people with seizures and suspected
18 non-accidental injuries will be admitted to hospital after head injury.

19 Based on the evidence the committee agreed that that simple, linear, non-
20 displaced fractures are not likely to be a clinically important injury. So, they
21 agreed that, after shared decision making, people under 16 with such
22 fractures can be safely discharged if they have normal neurological status and
23 there are no safeguarding concerns.

24 There was no direct evidence for people 16 and over with an isolated skull
25 fracture. Indirect evidence from cohort studies suggested that there was low
26 risk of clinical deterioration from a simple skull fracture compared with

- 27 • a complex skull fracture
- 28 • 1 to 2 bleeds
- 29 • bleeds less than 5 mm in diameter
- 30 • no or minimal mass effect

- 1 • significant midline shift
- 2 • a high or mixed density lesion
- 3 • cerebellar or brain stem injury.

4 Clinical deterioration was measured by a composite of death due to traumatic
5 brain injury, neurosurgery, seizure, a fall in GCS score of more than 1,
6 admission into intensive care for traumatic brain injury, intubation or hospital
7 readmission for traumatic brain injury. The simple skull fracture group included
8 both isolated and non-isolated skull fractures. But the committee agreed that
9 the evidence is still likely be broadly applicable for people 16 and over with an
10 isolated skull fracture. Based on the evidence and their collective experience,
11 the committee agreed that, after shared decision making, people 16 and over
12 with an isolated skull fracture can be discharged safely (except for people on
13 anticoagulants or antiplatelets) if there are no safety concerns.

14 **Anticoagulants and antiplatelets**

15 The evidence was limited on admission to and observation in hospital of
16 people who have a head injury and are on anticoagulants (warfarin and other
17 vitamin K antagonists, and direct-acting oral anticoagulants) or antiplatelets
18 (including aspirin, ticlopidine, clopidogrel, prasugrel and ticagrelor), and have
19 normal brain imaging or no indication for early imaging.

20 Limited evidence from non-randomised studies suggested that there was no
21 clinically important difference between pre-injury anticoagulant or no
22 anticoagulant treatment in terms of delayed bleeding. The evidence included
23 at least 1 propensity matched study including about 70,000 people.

24 The committee agreed that the evidence was not strong enough to
25 recommend using anticoagulation status as a sole indicator for admission for
26 people with a negative initial CT head scan. They highlighted that admission
27 based solely on this could cause harm in people already vulnerable (because
28 of, for example, frailty, an underlying condition such as delirium or risk of
29 hospital-acquired infections). This is particularly so if there is not a large

1 increase in risk of delayed bleeding. Also, when these events do occur they
2 are usually not clinically important.

3 Evidence from non-randomised studies for antiplatelet comparisons was more
4 limited than that for anticoagulants. There were no large studies, and all
5 reported effects were based on a difference of only 1 to 2 events between pre-
6 injury antiplatelet and no-antiplatelet groups per study. The committee agreed
7 that the evidence was not strong enough to recommend using antiplatelet
8 status as a sole indicator for admission for people with a negative initial CT or
9 no indication for a CT. The committee did not make a research
10 recommendation for this group this because they did not consider it to be a
11 priority for research.

12 **Concussion symptoms**

13 There was no evidence on admission or discharge of people with concussion
14 symptoms after normal imaging or no indication for imaging. The committee
15 agreed that their discharge is based on clinical discretion, and admission is
16 considered if non-accidental injury is suspected. From their experience, the
17 committee also agreed that most people with concussion symptoms and
18 normal imaging do not need further intervention, and are safe to be
19 discharged from the emergency department. They highlighted that current
20 practice is to not admit people with concussion symptoms unless they have
21 any of the indications in [recommendation 1.8.1](#). The committee were unaware
22 of any evidence indicating that current practice was causing harm (coroners
23 reports, safety reports, patient group feedback). They also noted that
24 someone's condition may worsen if they are admitted, for example, because
25 of being in a noisy and unfamiliar environment, and because the risk of
26 hospital-acquired infections could increase. When people with concussion
27 symptoms are discharged, information is provided on when to return to
28 hospital to seek further immediate care and ongoing support for persistent
29 symptoms (see the [recommendations on discharge advice](#)). The committee
30 agreed that this is important, and did not think there was any evidence on
31 which to base a change in practice.

1 **How the recommendations might affect practice or services**

2 Currently, most people with an isolated skull fracture are admitted for
3 observation. It is expected that many of these people could be discharged
4 from the emergency department without admission to hospital unless there
5 are other indications for admission. For people on anticoagulants or
6 antiplatelets, and people with concussion symptoms, there are no significant
7 changes in practice recommended, and the recommendations are thought to
8 reflect current practice.

9 [Return to recommendations](#)

10 **Early diagnosis of hypopituitarism**

11 [Recommendations 1.8.6 to 1.8.8](#)

12 **Why the committee made the recommendations**

13 The committee highlighted that there is a higher risk of hypopituitarism with
14 more severe head injuries, but noted that it can be caused by a mild head
15 injury. Also, the condition can occur immediately after a head injury or months
16 afterwards. This and the wide variety of symptoms of hypopituitarism can
17 make the condition difficult to diagnose.

18 The committee supplemented the small amount of observational evidence
19 (cohort studies) with their expertise. They discussed that why head injury
20 causes hypopituitarism is not fully understood, and that there could be various
21 reasons. Current practice for screening for hypopituitarism is variable, but it is
22 not commonly identified on CT scanning in the emergency department.
23 Whether it is diagnosed can also depend on the clinician's familiarity with
24 hypopituitarism. Also, testing in the emergency department may not be useful
25 because the acute injury phase stimulates cortisol secretion. This makes it
26 difficult to tell if there is hypoadrenalism. So, the committee agreed that it
27 would be better to investigate for hypopituitarism in people admitted to
28 hospital with a head injury if they have clinical symptoms such as hypotension
29 or hyponatraemia. When head imaging has been done or the person has

1 been admitted to hospital, the committee suggested this would provide an
2 opportunity for referral to a specialist.

3 In the absence of evidence on the timing of investigations, the committee also
4 made a [recommendation for research on timing of testing for hypopituitarism](#).

5 **How the recommendations might affect practice or services**

6 Hospital staff are advised to look out for symptoms of hypopituitarism in
7 people admitted to hospital after a head injury. So, there might be an increase
8 in testing for hypopituitarism in hospital. It is also intended that people will get
9 referred for specialist care sooner.

10 [Return to recommendations](#)

11 **Discharge and follow up**

12 [Recommendation 1.9.6](#)

13 **Why the committee made the recommendation**

14 **People with pre-injury cognitive impairment**

15 Pre-existing cognitive impairment such as dementia, Parkinson's disease or
16 stroke was reported in some studies in people taking anticoagulants and
17 antiplatelets. But the studies did not report the effect of pre-injury cognitive
18 impairment on the outcomes. Examples of pre-injury cognitive impairments in
19 people of any age include autism, Down syndrome, cerebral palsy,
20 developmental delay, foetal alcohol syndrome and a learning disability.

21 Examples of pre-injury cognitive impairment seen only in adults include
22 depression, dementia and medication side effects. The committee noted from
23 their experience that people with pre-existing conditions affecting cognition
24 are less likely to recognise and to raise an alarm about the early signs of a
25 late intracranial bleed (such as a severe headache, drowsiness and vomiting)
26 than people with no pre-existing cognitive impairment. So, in current practice,
27 a short overnight admission for observation is arranged for people with a pre-
28 existing cognitive impairment when no supervision at home is available. The

1 committee agreed that people with a pre-existing cognitive impairment will
2 need to be appropriately supervised and monitored to ensure that their
3 symptoms are not worsening if they are discharged from the emergency
4 department. Supervision and monitoring was also noted to be important for
5 people discharged to custodial settings. The committee noted that, at
6 discharge, it is important for people and their carers to be given a written copy
7 of the head injury discharge advice.

8 **How the recommendation might affect practice or services**

9 There might be a small increase in overnight admissions for people with a pre-
10 existing cognitive impairment when no supervision is available at home. This
11 should lead to better outcomes for people who do deteriorate and reduced
12 longer-term care costs.

13 [Return to recommendation](#)

14 **Follow up**

15 [Recommendation 1.9.13](#)

16 **Why the committee made the recommendation**

17 People with head injury may have persisting problems including physical,
18 sensory, motor, cognitive, emotional and hormonal (hypopituitarism). These
19 can occur even in people who are not admitted to hospital or have normal
20 imaging at the time of their injury. It is important that people know how to seek
21 help and ongoing support for these symptoms. It is also important for
22 healthcare professionals to make appropriate outpatient referrals to other
23 healthcare professionals trained in managing these symptoms.

24 **How the recommendation might affect practice or services**

25 There might be an increase in referrals from primary care to hospital
26 outpatient clinics for people were not admitted to hospital, or had a normal
27 scan or no scan at the time of their head injury. This should mean that people
28 get earlier access to effective treatment for persisting symptoms resulting from
29 their head injury.

1 [Return to recommendation](#)

2 **Investigations for hypopituitarism**

3 [Recommendation 1.9.14](#)

4 **Why the committee made the recommendation**

5 The committee discussed the importance of further investigation in
6 endocrinology for suspected hypopituitarism in people who have been
7 discharged after a head injury if symptoms persist or they are not recovering
8 as expected. But they noted that there are many non-specific symptoms that
9 may indicate hypopituitarism but which are too general to ensure the
10 diagnosis. They agreed that investigation in endocrinology may be needed.

11 In people under 16 delayed symptoms may include slow growth, tiredness
12 and late puberty. The committee emphasised that, if hypopituitarism is
13 suspected, it is important to urgently refer the person under 16 to a paediatric
14 endocrinologist.

15 **How the recommendation might affect practice or services**

16 The guideline raises awareness of the symptoms of hypopituitarism for people
17 with a head injury, and their carers and clinicians. So, there might be an
18 increase in testing for hypopituitarism in primary care. It is also intended that
19 people will get referred for appropriate care sooner.

20 [Return to recommendation](#)

21 **Context**

22 Head injuries are a major cause of death and disability in people aged 1 to
23 40 in the UK. Each year, over 1 million people attend emergency departments
24 in England and Wales with a recent head injury. Between 33% and 50% of
25 these people are aged under 15. About 200,000 people are admitted to
26 hospital with a head injury every year. Of these, about 40,000 have evidence
27 of traumatic brain injury. Most people with a head injury recover without
28 specific or specialist intervention. Others have long-term disability or even die

1 from associated traumatic brain or other injuries. An increasing proportion of
2 people presenting with head injury are over 65. Many people are injured
3 through low-level falls, which can be sustained in the context of acute illness.

4 The incidence of death from head injuries is low. As few as 0.2% of people
5 attending emergency departments with a head injury die because of their
6 injury. Of people who have sustained a head injury, 95% present with a
7 normal or minimally impaired conscious level, that is, a Glasgow Coma Scale
8 (GCS) score of 13 or more. Most fatal outcomes are in the groups with a
9 moderate (GCS score of 9 to 12) or severe (GCS score of 8 or less) head
10 injury, and account for only 5% of attenders. This means emergency
11 departments need to identify the small number who will go on to have serious
12 acute intracranial complications. It is estimated that, in 25% to 30% of children
13 under 2 who are hospitalised with a head injury, it is caused by abuse. This
14 guideline has updated some of the terminology used in relation to
15 safeguarding people under 18 and vulnerable adults. This update addresses
16 these areas, including in particular:

- 17 • indications for transporting people with a head injury from the scene of
18 injury directly to the nearest neuroscience centre, bypassing the nearest
19 emergency department
- 20 • indications for, and timing of, CT head scans and imaging of the cervical
21 spine in the emergency department, with particular reference to
22 anticoagulant treatment and levels of circulating brain injury biomarkers
- 23 • the clinical and cost effectiveness of administering tranexamic acid to
24 people who have sustained a head injury and have suspected intracranial
25 bleeding
- 26 • consideration of traumatic injury to the pituitary gland in people with a head
27 injury
- 28 • information that should be provided to patients, family members and carers
29 on discharge from the emergency department or observation ward.

30 **Drug recommendations**

1 The guideline will assume that prescribers will use a drug's summary of
2 product characteristics to inform decisions made with individual patients.

3 This guideline recommends some medicines for indications for which they do
4 not have a UK marketing authorisation at the date of publication, if there is
5 good evidence to support that use. The prescriber should follow relevant
6 professional guidance, taking full responsibility for the decision. The patient
7 (or those with authority to give consent on their behalf) should provide
8 informed consent, which should be documented. See the [General Medical
9 Council's Good practice in prescribing and managing medicines and devices](#)
10 for further information.

11 **Finding more information and committee details**

12 To find NICE guidance on related topics, including guidance in development,
13 see the [NICE webpage on injuries, accidents and wounds](#).

14 For details of the guideline committee see the [committee member list](#).

15 **[After consultation the editor will expand this section to include
16 additional links]**

17 **Update information**

18 This guideline is an update of NICE guideline CG176 (published January
19 2014) and will replace it.

20 We have reviewed the evidence on prehospital interventions, assessment and
21 management in the emergency department, and discharge and follow up,
22 including follow up of people with a head injury and normal scans for
23 deterioration.

24 Recommendations are marked **[2022]** if the evidence has been reviewed.

1 **Recommendations that have been deleted, or changed**
2 **without an evidence review**

3 We propose to delete some recommendations from 2003 and 2007
4 guidelines. [Table 1](#) sets out these recommendations and includes details of
5 replacement recommendations. If there is no replacement recommendation,
6 an explanation for the proposed deletion is given.

7 For recommendations shaded in grey and ending **[2003, amended 2022]**,
8 **[2007, amended 2022]** and **[2014, amended 2022]**, we have made changes
9 that could affect the intent without reviewing the evidence. Yellow shading is
10 used to highlight these changes, and reasons for the changes are given in
11 [table 2](#).

12 For recommendations shaded in grey and ending **[2003]**, **[2007]**, **[2014]**,
13 **[2003, amended 2007]**, **[2003, amended 2014]** and **[2003, amended 2007**
14 **and 2014]**, we have not reviewed the evidence. In some cases, minor
15 changes have been made – for example, to update links, or bring the
16 language and style up to date – without changing the intent of the
17 recommendation. Minor changes are listed in [table 3](#).

18 See also the previous [NICE guideline and supporting documents](#).

1 **Table 1 Recommendations that have been deleted**

Recommendation in 2014 guideline	Comment
1.2.9 Attempt full cervical spine immobilisation for patients who have sustained a head injury and present with any of the following risk factors unless other factors prevent this: GCS less than 15 on initial assessment by the healthcare professional. Neck pain or tenderness. Focal neurological deficit. Paraesthesia in the extremities. Any other clinical suspicion of cervical spine injury. [2003, amended 2007]	1.2.9 For recommendations on when to carry out full in-line spine immobilisation, see NICE's guideline on spinal injury . [2022]
1.5.1 Be aware that, as a minimum, CT should cover any areas of concern or uncertainty on X-ray or clinical grounds. [2003]	Established good practice
1.5.4 Be aware that MRI may add important information about soft tissue injuries associated with bony injuries demonstrated by X-ray and/or CT. [2003]	Established good practice
1.5.6 In CT, routinely review on 'bone windows' the occipital condyle region for patients who have sustained a head injury. Reconstruction of standard head images onto a high-resolution bony algorithm is readily achieved with modern CT scanners. [2003]	Established good practice
1.5.7 In patients who have sustained high-energy trauma or are showing signs of lower cranial nerve palsy, pay particular attention to the region of the foramen magnum. If necessary, perform additional high-resolution imaging for coronal and sagittal reformatting while the patient is on the scanner table. [2003]	Established good practice

2

3 **Table 2 Amended recommendation wording (change to intent) without**
4 **an evidence review**

Recommendation in guideline	Recommendation in current guideline	Reason for change
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<p>1.3.8 Patients who, on initial assessment, are considered to be at low risk for clinically important brain injury and/or cervical spine injury should be re-examined within a further hour by an emergency department clinician. Part of this assessment should fully establish the need to request CT imaging of the head and/or imaging of the cervical spine. Use recommendations 1.4. to 1.4.12 and 1.5.8 to 1.5.14 as the basis for the final decision on imaging after discussion with the radiology department. [2003, amended 2007]</p>	<p>1.3.8 Re-examine people who, on initial assessment, are triaged to be at low risk for clinically important traumatic brain or cervical spine injury by an emergency department clinician. During the assessment, establish whether CT imaging of the head or cervical spine will be needed. Use recommendations 1.4.8 to 1.4.14 and recommendations 1.5.6 to 1.5.10 as the basis for the final decision on imaging after discussion with the radiology department. [2003, amended 2007 and 2022]</p>	<p>To reflect current clinical practice</p>
<p>1.3.9 Patients who return to an emergency department within 48 hours of transfer to the community with any persistent complaint relating to the initial head injury should be seen by or discussed with a senior clinician experienced in head injuries, and considered for a CT scan.</p>	<p>1.3.9 Review people who return to an emergency department to the community with any persistent complaint relating to the initial head injury, and discuss them with a senior clinician experienced in head injuries. Consider whether a CT scan is needed. [2003, amended 2022]</p>	<p>Updated in accordance with current clinical practice</p>
<p>1.4.5 If CT imaging is unavailable because of equipment failure, patients with GCS 15 may be admitted for observation. Arrangements should be in place for urgent transfer to a centre with CT scanning available should there be a clinical deterioration that indicates immediate CT scanning is necessary. [2007]</p>	<p>1.4.5 Within trauma networks ensure the availability of secondary transfer to a suitable hospital for people with head injury and indications for CT scan who self present to hospital where CT scans are not available (see recommendations 1.4.8 to 1.4.14 and recommendations 1.5.6 to 1.5.10. [2007, amended 2022]</p>	<p>Read that the person should be admitted for observation if GCS 15 which does not reflect current clinical practice</p>
<p>1.5.2 Ensure that facilities are available for multiplanar reformatting and interactive viewing of CT cervical spine scans. [2003, amended 2014]</p>	<p>1.5.2 Ensure that imaging reports are based on high-resolution source data and multiplanar reformatting of the entire cervical spine.</p>	<p>Updated in accordance with current clinical practice</p>

	[2003, amended 2014 and 2022].	
1.5.3 MR imaging is indicated if there are neurological signs and symptoms referable to the cervical spine. If there is suspicion of vascular injury (for example, vertebral malalignment, a fracture involving the foramina transversaria or lateral processes, or a posterior circulation syndrome), CT or MRI angiography of the neck vessels may be performed to evaluate for this. [2003, amended 2014]	1.5.3 Do MRI if there are neurological signs and symptoms suggesting injury to the cervical spine. [2003, amended 2014 and 2022]	Updated in accordance with current clinical practice
1.5.3 MR imaging is indicated if there are neurological signs and symptoms referable to the cervical spine. If there is suspicion of vascular injury (for example, vertebral malalignment, a fracture involving the foramina transversaria or lateral processes, or a posterior circulation syndrome), CT or MRI angiography of the neck vessels may be performed to evaluate for this. [2003, amended 2014]	1.5.4 Do CT or MRI angiography of the neck vessels if there is a suspicion of vascular injury (for example, vertebral malalignment, a high-risk fracture, posterior circulation syndrome). [2003, amended 2014 and 2022]	Updated in accordance with current clinical practice
1.7.13 Recommendations 1.7.1–1.7.12 were written for adults, but apply these principles equally to children and infants, providing that the paediatric modification of the GCS is used. [2003]	1.7.12 Recommendations 1.7.1–1.7.3, 1.7.4-1.7.9 and 1.7.11 were written for adults, but apply these principles equally to people under 16, providing that the paediatric modification of the GCS is used for preverbal and non-verbal children. Ventilate people under 16 according to age-appropriate level of oxygen saturation and maintain blood pressure at a level appropriate for their age. [2003, amended 2022]	Updated in accordance with current clinical practice
1.7.16 Transfer of a child or infant to a specialist neurosurgical unit should be undertaken by staff experienced in the transfer of critically ill children. [2003]	1.7.15 Ensure that transfer of a people under 16 to a specialist neurosurgical unit is done either by staff experienced in the transfer of people under 16 who are critically ill or as per local guidelines with specialist	Time critical injuries will require transfer without waiting for staff experienced in the transfer of people under 16.

	paediatric retrieval teams. [2003, amended 2022]	
<p>1.8.1 Use the criteria below for admitting patients to hospital following a head injury:</p> <ul style="list-style-type: none"> • Patients with new, clinically significant abnormalities on imaging. • Patients whose GCS has not returned to 15 after imaging, regardless of the imaging results. • When a patient has indications for CT scanning but this cannot be done within the appropriate period, either because CT is not available or because the patient is not sufficiently cooperative to allow scanning. • Continuing worrying signs (for example, persistent vomiting, severe headaches) of concern to the clinician. • Other sources of concern to the clinician (for example, drug or alcohol intoxication, other injuries, shock, suspected non-accidental injury, meningism, cerebrospinal fluid leak). [2003] 	<p>1.8.1 Use these criteria for admitting people to hospital after a head injury:</p> <ul style="list-style-type: none"> • new, clinically important abnormalities on imaging (an isolated simple linear non-displaced skull fracture is unlikely to be a clinically important abnormality) if they are not taking anticoagulant or antiplatelet medication (excluding aspirin monotherapy) • after imaging, a GCS score that has not returned to 15 or their pre-injury baseline, regardless of the imaging results • when there are indications for CT scanning but this cannot be done within the appropriate time period, either because CT is not available or because the person is not sufficiently cooperative to allow scanning • continuing worrying symptoms (for example, persistent vomiting, severe headaches, seizures) of concern to the clinician • other sources of concern to the clinician (for example, drug or alcohol intoxication, other injuries, shock, suspected non-accidental injury, meningism, cerebrospinal fluid leak, suspicion of post-traumatic amnesia). [2003, amended 2022] 	
<p>1.9.6 Patients admitted after a head injury may be discharged after resolution of all significant symptoms and signs providing they have suitable supervision arrangements at home.</p>	<p>1.9.7 People admitted after a head injury may be discharged after resolution of all significant symptoms and signs, providing they have suitable supervision arrangements at home, in</p>	<p>People in custody identified in the equalities impact assessment. Continued care added to reflect the different</p>

	custody or in continued care. [2003, amended 2022]	models of providing care.
1.9.7 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 their families and carers. Follow recommendations in the NICE guideline on patient experience in adult NHS services about providing information in an accessible format. [new 2014]	1.9.7 People admitted after a head injury may be discharged after resolution of all significant symptoms and signs, providing they have suitable supervision arrangements at home, in custody or in continued care. [2003, amended 2022]	People in custody identified in the equalities impact assessment. Continued care added to reflect the different models of providing care.
1.9.7 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 their families and carers. Follow recommendations in the NICE guideline on patient experience in adult NHS services about providing information in an accessible format. [new 2014]	1.9.8 Give verbal and printed discharge advice to people with any degree of head injury who are discharged from an emergency department or observation ward. This should also be provided to the person responsible for their care after discharge. This may include their families, carers or custodial staff. Follow the recommendations in NICE's clinical guideline on patient experience in adult NHS services about providing information in an accessible format. [2014, amended 2022]	People in custody identified in the equalities impact assessment.
1.9.12 When a patient who has undergone imaging of the head and/or been admitted to hospital experiences persisting problems, ensure that there is an opportunity available for referral from primary care to an outpatient appointment with a professional trained in assessment and management of sequelae of brain injury (for example, clinical psychologist, neurologist, neurosurgeon, specialist in rehabilitation medicine). [2003]	1.9.13 Ensure that people who have persisting problems can be referred from primary care to outpatients for an appointment with a professional trained in assessing and managing the consequences of a traumatic brain injury (for example, a neuropsychologist, clinical psychologist, neurologist, neurosurgeon or endocrinologist, or a multidisciplinary	Endocrinologist added to reflect the follow up of patients with hypopituitarism. A neuropsychologist and multidisciplinary neurorehabilitation team has been added to reflect current models of care.

	neurorehabilitation team). [2003, amended 2022X]	
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1 **Table 3 Minor changes to recommendation wording (no change to**
2 **intent)**

Recommendation numbers in current guideline	Comment
All recommendations, except those labelled [2022] and [amended 2022]	Recommendations have been edited into the direct style (in line with current NICE style for recommendations in guidelines) where possible.
All recommendations, except those labelled [2022] and [amended 2022]	Language has been updated to current NICE style, for example 'babies' has been used instead of 'infants'.

3

4 **September 2019:** Recommendation 1.4.12 on when to have a CT scan was
5 updated to change warfarin to anticoagulants.

6 **June 2017:** Recommendations 1.2.8 and 1.4.12 were updated with cross-
7 references to related NICE guidelines. An outdated research recommendation
8 was stood down and removed.

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