

Sussex Trauma Network
Guidelines for:

Imaging for Trauma

- Adults and Children



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Imaging for Trauma – Adults and Children

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1 Executive Summary

- Protocol-driven imaging must be available in all hospitals receiving patients with acute trauma (from RCR Standard 2).
- Where there is a difference between adult and paediatric guidelines in this document, it will be specified. Paediatric guidelines take precedence for patient under 16 years of age.
- Digital radiology should be available in the emergency department (from RCR Standard 4).
- Whole-body contrast-enhanced head-to-thigh CT (CT Traumagram) is the default imaging procedure of choice for seriously injured adults (from RCR Standard 9).
- If there is an early decision to request CT scan, focused abdominal sonography in trauma (FAST) and plain x-rays should not cause any delay (from RCR Standard 5).
- A CT request in the trauma setting should comply with the Ionising Radiation (Medical Exposure) Regulations 2000 (IR(ME)R) justification regulations in the same way as any other request for imaging involving ionising radiation (RCR Standard 7).
- Imaging protocols for CT Traumagram should be clearly defined and uniform across the trauma network.
- Consultants in Emergency Medicine should be able to request CT Traumagram for a suitable patient according to the protocol without initial conversation with a radiologist.
- There should be 24-hour access to an on-call radiologist for the Trauma Team Leader to discuss imaging for patients outside the protocols.
- When a CT Traumagram has been requested by the Trauma Team Leader for a patient with suspected or potential life-threatening trauma, a primary survey imaging report should be issued immediately to the trauma team leader, and at latest within 30 minutes of the scan. There should be in place a system by which the reporting radiologist is informed of the need for an urgent primary survey report. See section [7.2.1.1](#) for explanation.
- On-call radiologists should provide the final report on a seriously injured patient within one hour of CT image acquisition (RCR Standard 12).
- Whenever patients are transferred between hospitals, relevant imaging must be made available electronically to the receiving hospital within two hours (RCR Standard 19).
- Clinicians caring for patients with acute trauma should have access to a facility with 24-hour Magnetic Resonance Imaging (MRI).

2 Introduction

Appropriate and timely imaging can be a crucial element in successful management of seriously injured patients. Imaging such as whole-body contrast-enhanced head-to-thigh CT is often the quickest way to accurately identify serious injuries, including some that are life-threatening.

Achieving such timely imaging can only be done with a combination of prospectively agreed and defined protocols, appropriate and available imaging hardware, and suitably trained staff.

3 Purpose of the Guideline

3.1 Aims & Objectives

The aims and objectives of this guideline are:

- To provide a system-wide approach for imaging patients with major trauma
- To define appropriate patient pathways for these patients
- To list appropriate accepted routes of communication
- To highlight continuing areas of contention
- To help meet TQUINs requirements for creation of network-agreed guidelines for the Network and Trauma Units (TUs)

3.2 Principles

- Protocol-driven trauma imaging must be available
- It must be delivered by experienced staff
- Agreed reporting mechanisms for imaging must be in place

4 Definitions

None provided.

5 Scope

The guideline covers all major trauma patients within the Sussex Trauma Network. It replaces and supersedes all previous imaging guidelines covering Sussex Trauma Network.

This document includes guidelines for both adults and children, but there are differences in the guidelines for each, which are highlighted where appropriate. Paediatric guidelines take precedence for patient under 16 years of age.

The guideline does not cover interventional radiology in trauma, for which there is a separate guideline – Interventional Radiology in Trauma.

6 Relevant Documents and Guidance

This guideline assumes and incorporates compliance with:

- [The Royal College of Radiologists - Standards of practice and guidance for trauma radiology in severely injured patients](#)
- [The Royal College of Radiologists – Paediatric Trauma Protocols](#)
- [NICE Clinical Guideline \[CG176\] - Head injury: assessment and early management](#)

This guideline also aspires to compliance with the relevant 2016 Major Trauma Service Quality Indicators (TQUINs) issued by the NHS England Quality Surveillance Team - [tquins resources measures major trauma measures final 230416 7 .pdf \(wymtn.com\)](#) and the subsequent 2020 version applying to Trauma Units.

The relevant extracts from the indicators are:

6.1 For Trauma Networks

- **T16-1C-105**
There should be teleradiology facilities between the major trauma centre and all the trauma units in the network allowing immediate image transfer 24/7.
- **T16-1C-107**
There should be network agreed clinical guidelines for the management of:
 - CT imaging
 - Imaging for children
- **T16-1C-109**
All spinal imaging should be reviewed and reported by a consultant radiologist within 24 hours of admission.

6.2 For Major Trauma Centres (MTC)

- **T16-2B-106**
There should be CT scanning located in the emergency department and available 24/7. There should be an on-site radiographer available 24/7 to prepare the CT scanner for use.
- **T16-2B-107**
There should be a protocol for trauma CT reporting that specifies:
 - there should be a 'hot' report documented within 5 minutes. (See [7.2.1.1](#) for compromise statement)
 - there should be detailed radiological report documented within 1 hour from the start of scan.

- scans should be reported by a consultant radiologist within 24 hours.
- **T16-2B-108**
MRI scanning should be available 24/7.
- **T16-2B-113**
The following consultants should be available to attend an emergency case within 30 minutes
 - a radiologist (interpreted as meaning able to review the images not necessarily physically present)
- **T16-2C-104**
There should be a single daily multi-specialty meeting for the presentation and discussion of all new major trauma patients following admission.

The meeting should include:
 - Radiology (not currently achievable)
 Accommodation for the meeting should include facilities for:
 - PACS
- **T16-2C-107**
The MTC should have the following neurosurgical provision:
 - on-site neuroradiology (interpreted as meaning ability to produce scans and review them, rather than needing to transfer to another facility. Radiologists do not have to be on-site.)

6.3 For Trauma Units

- **T20-2B-305**
There should be CT scanning available within 60 minutes of the trauma team activation.
- Reporting should include:
 - a 'hot' report documented within 30 minutes for both CT and MRI
 - a detailed radiological report documented within 1 hour from the start of the scan
 - a report by a consultant radiologist within 24 hours.

7 Standard Operating Procedure

7.1 Initial Assessment

Seriously injured patients should be assessed by an experienced Trauma Team Leader (usually consultant level) who is in overall charge of acute care. The team leader should determine the appropriate imaging required according to agreed protocols.

There should be 24-hour access to an on-call radiologist for the Trauma Team Leader to discuss imaging for patients outside the protocols.

7.2 Imaging

Protocol-driven imaging must be available in all hospitals receiving patients with acute trauma.

All imaging of children should be appropriate to the child's age and clinical condition reported by a suitable trained radiologist. Exposure of children to ionising radiation should always be kept to a minimum. The routine use of adult trauma protocols is inappropriate for children.

7.2.1 CT Scan

Whole-body contrast-enhanced head-to-thigh CT (CT Traumagram) is the default imaging procedure of choice for seriously injured adult patients.

Imaging protocols for CT Traumagram should be clearly defined and uniform across the trauma network.

Consultants in Emergency Medicine should be able to request CT Traumagram for a suitable adult patient according to the protocol without initial conversation with a radiologist.

A polytrauma protocol MDCT is indicated for an adult patient when:

- There is haemodynamic instability
- The mechanism of injury or presentation suggests that there may be occult severe injuries that cannot be excluded by clinical examination or plain films
- FAST (if used) has demonstrated intra-abdominal fluid
- Plain films suggest significant injury, such as pneumothorax or pelvic fractures
- There is obvious severe injury on clinical assessment.

For seriously injured children, routine use of CT Traumagram is not appropriate. Instead, focused CT can be used with different algorithms for each area. See [Appendix 2 - Emergency Department Paediatric Major Trauma Imaging Decision Tool](#).

CT is the primary investigation for cranial trauma in the child who has suffered trauma, but should only be used as indicated by an agreed protocol – see [Appendix 3 – Selection of children for a CT head scan](#).

CT is only used for imaging of the cervical spine in the child who has suffered trauma in defined circumstances – see [Appendix 4 – Selection of children for imaging of the cervical spine](#). In other circumstances and for other spinal imaging, x-ray +/- MRI is preferred.

7.2.1.1 Initial primary survey review

The aim of this is to give an immediate indication of the major life-threatening injuries while active management continues. The initial images should be reviewed looking for thoracic injuries that might impair breathing, vascular injuries that might cause bleeding and neurological injuries that might cause disability if not treated rapidly.

When a CT Traumagram has been requested by the Trauma Team Leader for a patient with suspected or potential life-threatening trauma, a primary survey imaging report should be issued immediately to the trauma team leader, and at latest within 30 minutes of the scan.

This statement represents a pragmatic compromise and does not meet the specific wording of the TQUIN - T16-2B-107 (see [6.2](#)) but applies to the MTC and Trauma Units alike.

There should be in place a system by which the reporting radiologist is informed of the need for an urgent primary survey report.

A suggested CT primary survey pro forma is provided in Appendix 3 of [The Royal College of Radiologists - Standards of practice and guidance for trauma radiology in severely injured patients](#). Such a form should be filled in at the time, signed and dated and made immediately available to the Trauma Team Leader. This can be done electronically, as long as there is a mechanism for informed the Trauma Team Leader of the availability of the report.

7.2.1.2 Formal CT report

On-call radiologists should provide the final report on a seriously injured patient within one hour of CT image acquisition.

7.2.2 FAST Scans (Focused Ultrasonography in Trauma)

FAST should never be allowed to delay performance of a CT scan. FAST is a poor discriminator in abdominal trauma. It is of more value in detecting pericardial fluid or, in experienced hands, might detect free fluid in un-compromised patients. So FAST might be of value in speeding access to CT scan.

FAST may also be useful in triaging access to CT scan.

FAST has only modest sensitivity in detecting haemoperitoneum in children and is not routinely used.

As with all imaging, a report on a FAST scan should be documented and the designation of the operator recorded.

7.2.3 Digital X-rays

Digital x-rays should be available in the emergency department. However, a chest x-ray would only precede a CT scan if there were doubt about the side or presence of a pneumothorax in a patient with respiratory compromise.

Any other x-rays would be taken after a CT Traumagram and delayed until after life-threatening injuries have been diagnosed and treated.

7.2.4 Magnetic Resonance Imaging (MRI)

MRI is not indicated in the management of life-threatening injury.

However, in the Major Trauma Centre, MRI must be available 24 hours a day, seven days a week. In a Trauma Unit without access to 24-hour MRI, this guideline represents a formal agreed protocol whereby patients requiring MRI can be transferred to the MTC or another hospital within the network able to perform MRI.

Transfers for MRI should be negotiated and agreed with a relevant receiving speciality according to the **non-immediate** pathway of the STN Patient Pathways policy (present version called Patient Pathway v9.5) from www.bsuh.nhs.uk/stn/docs/.

7.3 Transfers to another hospital

Patients with serious injury who are initially assessed at a Trauma Unit and found to have a life-threatening injury may be transferred to the Major Trauma Centre according to the **Immediate Transfers** pathway of the STN Patient Pathways, after notification of the duty ED Consultant of the MTC by the treating senior clinician in the TU. This may be either before or after any urgent imaging has been done.

Whenever patients are transferred between hospitals, relevant imaging must be made available electronically to the receiving hospital within two hours, and preferably as soon as possible, especially in life-threatening injury.

8 Training Implications

This document represents the standard of practice acceptable for trauma networks and so all participating clinicians should already have relevant skills and training. No extra training requirements have been identified.

9 Documentation

There is no formal documentation of these processes, other than the following:

- Written and computer patient medical records
- Electronic order comms records
- PACS images
- Paper and/or electronic imaging reports

10 Monitoring Arrangements

These include:

- [STN Clinical Governance log](#)

- TARN Audit

11 Equality Impact Assessment Screening

None in process.

12 Links to other SOPs and Trust policies

This guidance refers to and links with the following STN and Trust publications:

- STN Patient Pathways (present version called Patient Pathway v9.5) from www.bsuh.nhs.uk/stn/docs/

13 References

- [The Royal College of Radiologists - Standards of practice and guidance for trauma radiology in severely injured patients](#)
- [The Royal College of Radiologists – Paediatric Trauma Protocols](#)
- [NICE Clinical Guideline \[CG176\] - Head injury: assessment and early management](#)

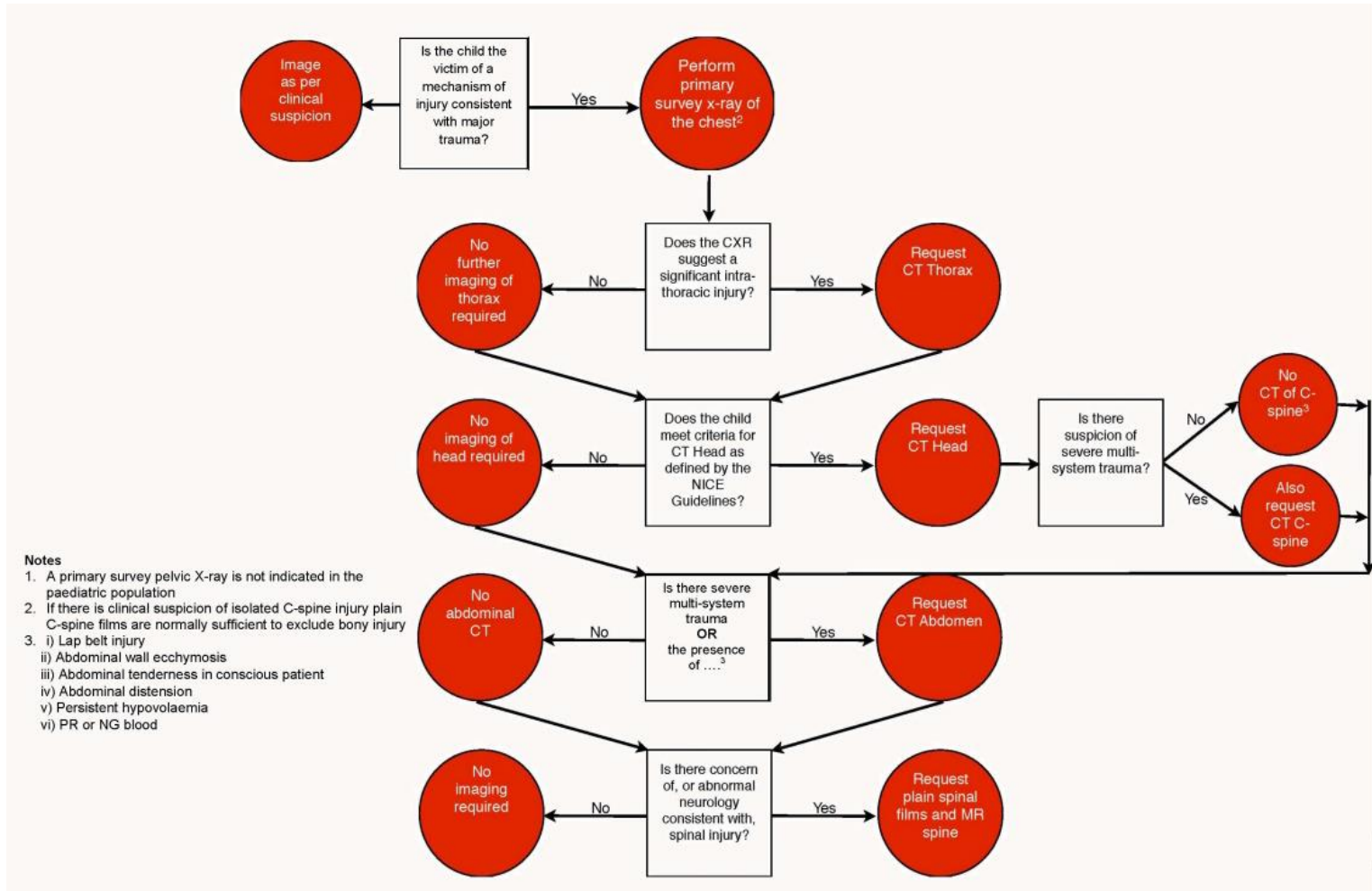
14 Appendices

14.1 Appendix 1 – Abbreviations

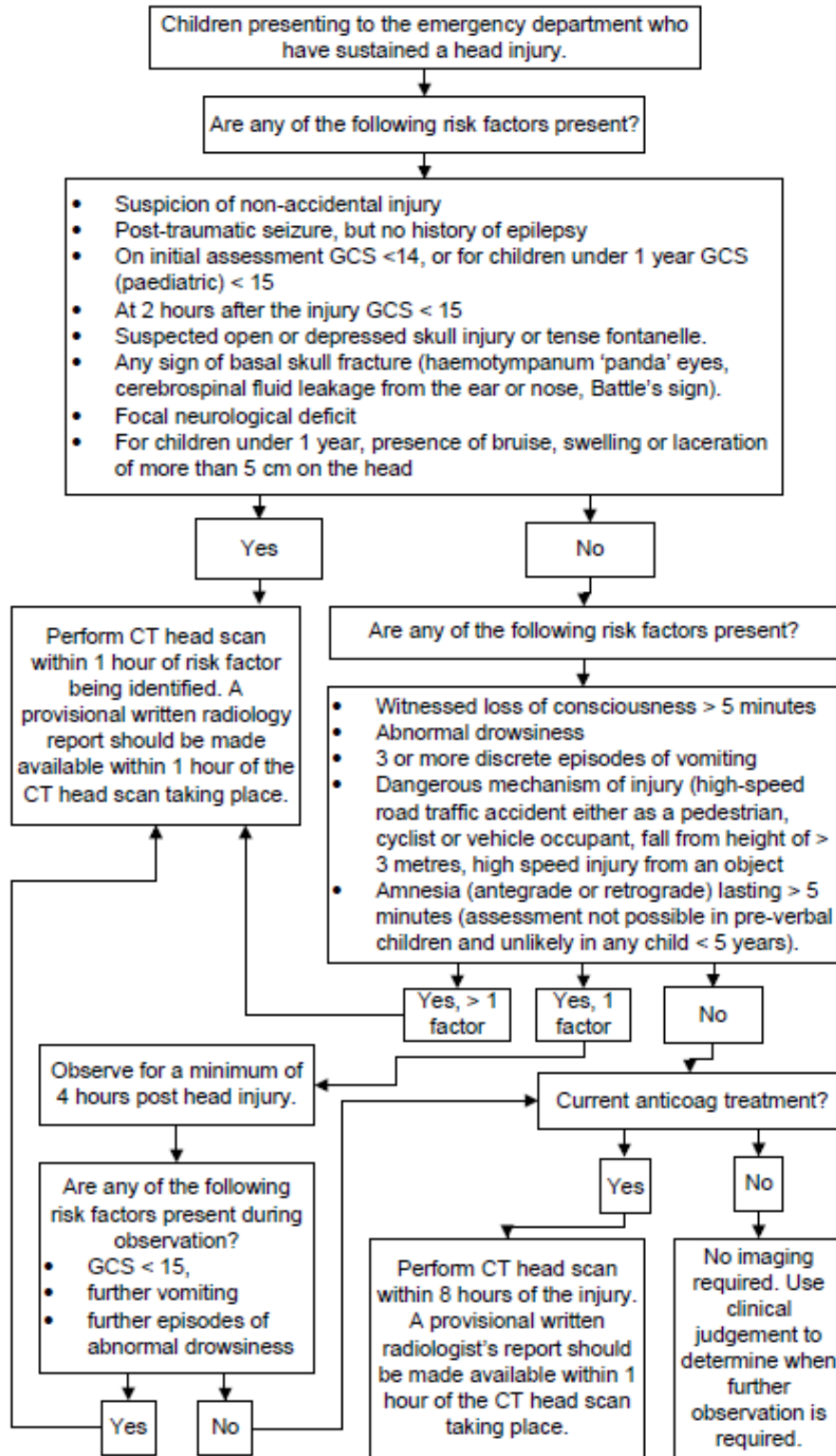
CCG	Clinical Commissioning Group
CT	Computerised Tomography scan
FAST	Focused Ultrasonography in Trauma
LEH	Local Emergency Hospital
MDT	Multi-Disciplinary Team
MRI	Magnetic Resonance Imaging
MTC	Major Trauma Centre
ODN	Operational Delivery Network
TU	Trauma Unit
TUs	Trauma Units

14.2 Appendix 2 – Emergency Department Paediatric Major Trauma Imaging Decision Tool

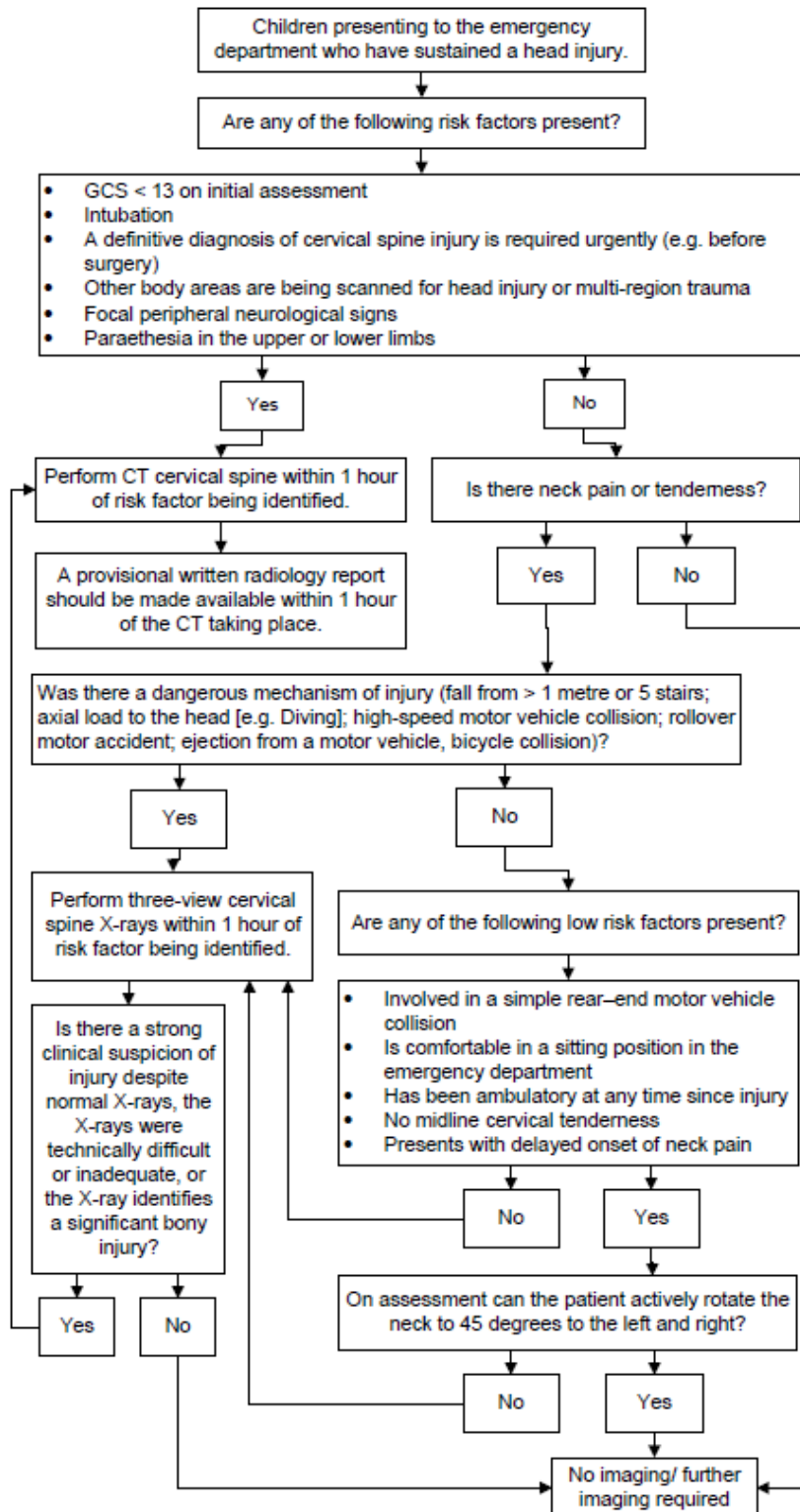
Developed by Dr Tony Kehoe, ED Consultant, Derriford Emergency Department



14.3 Appendix 3 – Selection of children for a CT head scan



14.4 Appendix 4 – Selection of children for imaging of the cervical spine



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www.guidance.nice.org.uk/CG176