

Emergency Management of Head Injury: An Emergency Department Perspective



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# **ED Aims**



- 1. Identify injuries requiring urgent neurosurgical intervention
- 2. Manage less severe injuries and arrange for observation and self care
- 3. Palliate injuries that are unexpected to survive

# Patient groups







# **Assessment**



# **Symptoms**

- Loss ofConsciousness
- Associated seizure
- Amnesia (pre/post injury)
- Vomiting
- Headache
- Visual Disturbance

# **Signs**

- Reduced GCS
- Pupil Reaction
- TympanicMembranes
- CSF Leak
- Abnormal Behaviour
- Focal Neurology

# GCS



Behaviour	Response
	<ul><li>4. Spontaneously</li><li>3. To speech</li><li>2. To pain</li><li>1. No response</li></ul>
Eye Opening Response	
Verbal Response	<ul> <li>5. Oriented to time, person and place</li> <li>4. Confused</li> <li>3. Inappropriate words</li> <li>2. Incomprehensible sounds</li> <li>1. No response</li> </ul>
Motor Response	<ol> <li>Obeys command</li> <li>Moves to localised pain</li> <li>Flex to withdraw from pain</li> <li>Abnormal flexion</li> <li>Abnormal extension</li> <li>No response</li> </ol>

# **AVPU**



Alert
Patient is fully awake and responsive.



**Voice**Patient responds to your voice.



ain
Patient responds when you cause them pain.



Patient does not respond no matter what you do.



# **Imaging**

### NICE National Institute for Health and Care Excellence

#### Algorithm 1: Selection of adults for CT head scan

Adults presenting to the emergency department who have sustained a head injury.

Are any of the following risk factors present? GCS < 13 on initial assessment INDICATIONS FOR ADMISSION TO A HOSPITAL WARD GCS < 15 at 2 hours after injury on assessment in vice and information in the emergency department An adult patient should be admitted to hospital if: Suspected open or depressed skull fracture the level of consciousness is impaired (GCS < 15/15)</li> ed to seek prompt Any sign of basal skull fracture hospital emergency the patient is fully conscious (GCS 15/15) but has any Post-traumatic seizure indication for a CT scan (if the scan is normal and there are rrying symptoms or Focal neurological deficit no other reasons for admission, then the patient may be More than one episode of vomiting since the head considered for discharge) t with a head injury injury the patient has significant medical problems, eg must be assessed by an experienced doctor, who must anticoagulant use tablish that all the fo ria have been met: the patient has social problems or cannot be supervised by consciousness has r v and is sustained at a responsible adult. the pre-injury state INDICATIONS FOR DISCHARGE patient is e Current anticoag treatment? Perform CT head scan within 1 niting A patient can be discharged from the ED for obse hour of risk factor being urological symptoms/signs have either resolved, or are home if fully conscious (GCS 15/15) with no addit identified. nor and resolvi Yes amenable No e advice/ atment, (eg hea factors or other relevant adverse medical and soci atment, (eg hea momentary positional vertigo due to vestibular disturbance) The following criteria must be met prior to discharge patient is citho A provisional written radiology a responsible adult is available and willing to ob safe envir Is there loss of consciousness or report should be made patient for at least 24 hours results of amnesia since the head injury? available within 1 hour of the verbal and written instructions about observation reviewed and no further investigation is required CT taking place. made and action to be taken are given to and disc ranial injur Yes en exclude No that adult there is easy access to a telephone
 the patient is within reasonable access of medical bours of the head injury.

| Perform CT head scan within 8 | P · there is easy access to a telephone FOLLOW UP No imaging required/ further transport home is available. nefit from brief, routine of advice, imaging required. education and reassurance REFERRAL TO NEUROSURGICAL UNIT Follow up can be delivered by telephone Features suggesting that specialist neuroscience assessment, Are any of the following risk factors present? monitoring, or management are appropriate include: eater depth. persisting coma (GCS score 8/15 or less) after initial o 72 hours resuscitation Age ≥ 65 years confusion which persists for more than four hours A history of bleeding or clotting disorder deterioration in level of consciousness after admission (a Dangerous mechanism of injury (a pedestrian ractitioner sustained drop of one point on the motor or verbal latiic or cyclist struck by a motor vehicle, an subscales, or two points on the eye opening subscale of the arranged. occupant ejected from a motor vehicle or a fall from height of > than 1 metre or 5 stairs) focal neurological signs weeks. More than 30 minutes' retrograde amnesia of · a seizure without full recovery events immediately before the head injury compound depressed skull fracture · definite or suspected penetrating injury a CSF leak or other sign of a basal fracture. No Yes This Quick Reference Guide provides a summary of the main recommendations relating to adults in SIGN guideline 110: Early management of patients with a head injury. Recommendations are graded A B C D to indicate the strength of the supporting evidence. Good practice points 🖬 are provided where the guideline development group wishes to highlight specific aspects of accepted clinical practice.









Early management of adult patients with a head injury

Quick Reference Guide



May 2009

COPIES OF ALL SIGN GUIDELINES ARE AVAILABLE

© National Institute for Health and Care Excellence, 2014. 'Head injury', NICE clinical guideline 176.

Details of the evidence supporting these recommendations can be found in the full guideline, available on the SIGN website: www.sign.ac.uk NICE National Institute for Health and Care Excellence

Algorithm 1: Selection of adults for CT head scan

Adults presenting to the emergency department who have sustained a head injury



- GCS-(SCS + 15 at 2 hours after injury on assessment in the emergency department suspected cape or depressed stall fracture

  Focal neurological deficit

  Focal neurological deficit

  Suspected cape or depressed of word to the hood.
- GCS less than 15 at 2 hours after the injury on assessment in the emergency department.
- Selection of the control of the cont
- Any Sign of base drived skull fracture (haemotympanum,
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  of the head soan within 8 and of the following risk factors present?

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  of the head soan within 8 and of the following risk factors present?

  Aye any of the following risk factors present?

  A history or bleeding or clotting disorder

  of Dangerous mechanism of injury (a pedestrian processes)

  of the following risk factors present?

  Of the following risk fact
- Post-traumatio seizure.
- Focal neurological deficit.
- Nylonal Institute for the pand care excellence, 2014. 'Head injury, NICE clinical suite line 176f vomiting.

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# Discharge



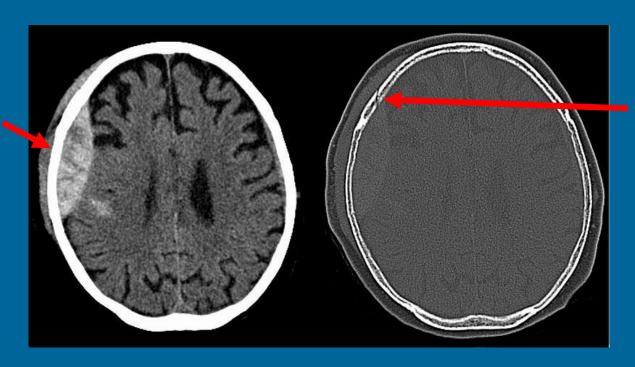


- Patients with new, clinically significant abnormalities on imaging.
- Patients whose GCS has not returned to 15 after imaging, regardless of the imaging results.
- When a patient has indications for CT scanning but this cannot be done within the appropriate periodContinuing worrying signs (for example, 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]





**Extradural Bleed** 



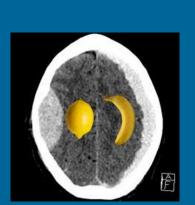
Overlying skull fracture seen on bony windows

The characteristic "biconvex" shape of extradural haemorrhage is caused by the dura adhering to the sutures on the inner surface of the skull causing "compartmentalisation"

# Subdural Haemorrhage

Venous bleed into the theoretical space between dura and arachnoid maters.





On CT a subdural bleed can be compared to a BANANA

Extradural bleeding is compared to a LEMON

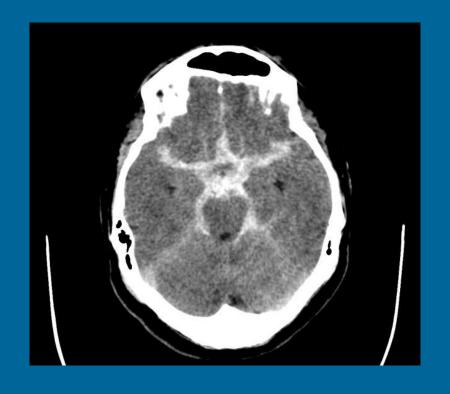


Subdural Bleed

# Subarachnoid Haemorrhage CMM

- The sensitivity of CT to the presence of subarachnoid blood is strongly influenced by both the amount of blood and the time since the haemorrhage.
- The diagnosis is suspected when a hyper-dense material is seen filling the subarachnoid space. Most commonly this is apparent around the circle of Willis

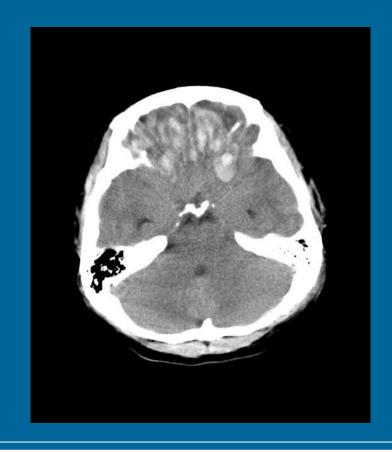




# **Cerebral Contusions**



 Cerebral contusions are common in certain locations, as a result of the direction of the head strike and the intrinsic shape of the skull cavity.





# Practical tips

# Scalp Wounds



Adequate anaesthetic

Remove any haematoma

Wound toilet

Palpate to assess for skull fracture

Close with staples/sutures



SHAVE

	Royal Alexandra Hospital & Inver HEAD For all patients with a head injury under ED. Att simplest of presentations, other relevant i Sticky Label or write details:  Mechanism of injury:	INJU	JRY ED card. For patien		Laceration	ons, bruises, et	o: indicate size in oms		Treatment:	indicate number of sutures, glue, et	
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## **Head Injury Advice**

Explain to patients about the symptoms they can expect

- Headache
- Dizziness
- Poor concentration
- Poor sleep

Also- explain what action should be taken to minimise these symptoms

## EMERGENCY DEPARTMENT AND MINOR INJURY UNITS

ROYAL ALEXANDRA HOSPITAL
TELEPHONE: 0141 887 9111
INVERCLYDE ROYAL HOSPITAL and Clyde

INVERCLYDE ROYAL HOSPITAL TELEPHONE: 01475 633777 VALE OF LEVEN HOSPITAL TELEPHONE: 01389 754121

## HEAD INJURY ADVICE

Advice for a patient allowed home from Emergency Departme following a head injury.

#### Do you still feel unwell?

Often people can feel unwell after a head injury even when they are ba

- mild headaci
- Irritability or being easily anno
- dizziness
   poor concentration
  - tiredness
     noor sleen
- f you have any of these symptoms, DO NOT WORRY because they should clear up in time without any treatment.

Sut if you still have symptoms after two weeks you should see your own doctor

#### Some extra advice to help you get well

collowing this advice will help you to recover from your head injury more quickly, and may stop some of the symptoms from happening.

XO have plenty of rest and avoid stressful and noisy utuation XO NOT take any sicohol

NOT take alwaying oilly sudations or transmillings unless

O NOT return to sporting activities if you continue to have any of the symptoms enrollmed above. Once these symptoms have resolved then a gradual return to sport childres should be done over a 3 week period. This is particularly important in contact ports such as football & nighty. If symptoms recur during this return to activities then educe level of activity and consider contacting your OF for further advice.

leviewed - GM 201

#### FOR PATIENTS AFTER A HEAD INJURY

Head Injury Warning Important things to look for after a head injury

(Advice for the person taking a patient home from Emergency Department

Name has suffered a head injury, but does not need to be admitted to a hospital ward. We have examined

the patient, and believe that the injury is not serious. Very rarely, complications can develop as a result of a head injury so please watch the patient closely over the next few days or so, and follow this advice:

#### Do not leave the patient alone.

Make sure there is a nearby telephone and that the patient stay, within easy reach of medical help.

#### 3. Symptoms to look out for:

- . Is it difficult to wake the patient up?
- Is the patient very confused?
- . Does the patient complain of very severe headache?
- Has the patient
  - Vomited?
     Lost consciousness?
  - Complained of weakness or numbness in an arm or leg?
  - Complained about not seeing properly?
  - o Had any watery fluid coming out of ears or nose?

If the answer to any of these questions is 'YES" or if you are worried about anything else, you should telephone the Emergency Department on:

0141 314 7411 (RAH Emergency Dept.)

0141 887 9111 (RAH Hospital) 01475 633777 (IRH Hospital)

Or if you are very worried, take the patient straight back to the Emergency Department.

# Head Injury Warning

Advise the patients about which symptoms should cause them to RETURN to ED

- Inability to rouse
  - Confusion
- Persistent vomiting
- Visual disturbance
- Focal neurological deficit

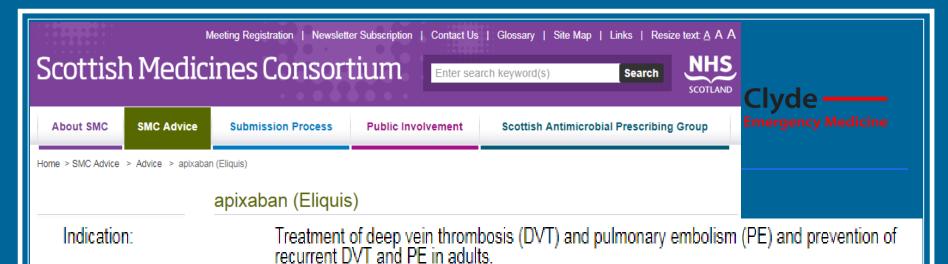
Ensure that the observing adult understands these symptoms

# Patient groups









BNF Category: 2. Cardiovascular system

Sub Category: 2.8 Anticoagulants and protamine

Submission Type: Full submission

Status: Accepted

Date Advice Published: 9 March 2015

Drug Details	
Drug Name:	apixaban (Eliquis)
SMC Drug ID:	1029/15
Manufacturer:	Pfizer/Bristol Myers Squbb
Indication:	Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE) and prevention of recurrent DVT and PE in adults.
BNF Category:	Cardiovascular system
Sub Category:	2.8 Anticoagulants and protamine
Submission Type:	Full submission
Status:	Accepted
Date Advice Published:	9 March 2015

# **Anticoagulation & Head Injuries**

WARFARIN : Urgent INFL Near Patient Test if available

DOACs : Coag (+/- anti-Xa) [document time of last dose] FBC,U&E

LMWH : refer Therapeutics Handbook

## HIGH SUSPICION OF INTRACRANIAL BLEED

- GCS < 15</p>
- New neurological deficit
- Loss of Consciousness
- Headache severe/persistent
- Amnesia
- Suspected fracture
- Vomiting

## Minor symptoms

(not normally requiring CT)

or

## Non-trivial Head/Face injury

(e.g. sufficient to cause a wound or haematoma)

## No Symptoms or Signs

Discuss with Senior regarding CT, admission or discharge

### WARFARIN

- Vitamin-K 5 mg IV
   100 ml Dextrose 5% over 15 minutes
- Consider/Plan Prothrombin Complex Concentrate [PCC] (Dosing here)
- Patients Weight ideally weigh/obtain from relatives/notes, otherwise estimate

## DOAC

 Oral activated charcoal Consider if ingestion ≤ 2h to inhibit further drug absorption.

## Arrange Early CT Scan

(ideally <1hr)

## Arrange Immediate CT Scan

consider PCC before CT if felt clinically appropriate

## CONFIRMED INTRACRANIAL BLEED

### WARFARIN

- Aim full warfarin reversal, even prosthetic valve patients, for >= 7 days
- Phone Resus to start PCC reconstitution (quidance here)

## DOAC

- Dabigitran use Idaracizumab (Praxbind™ in Pharmacy Emergency Fridge)
   Dose 5g: as two consecutive infusions of 2.5g/50mls over 5-10 minutes (or bolus)
- Consider Platelets / IV Tranexamic Acid (1g over 10 mins, 1g 8hrs)
- Discuss with haematology re PCC (if Xa inhibitors Apixaban or Rivaroxiban)

Discuss with Neurosurgical Institute and Haematologist

## CT SCAN NEGATIVE

- INR ≥ 3 then administer 0.5mg Vitamin K IV
- INR 2-3 consider withholding next warfarin dose(s). Review Anticoagulation & Falls risk.
- Aim INR 2-3 for 2 weeks following head injury
- DOAC: Review further dosing

Discuss potential for discharge if CT negative and

- INR < 3</p>
- Appropriate close supervision
- Suitable social circumstances

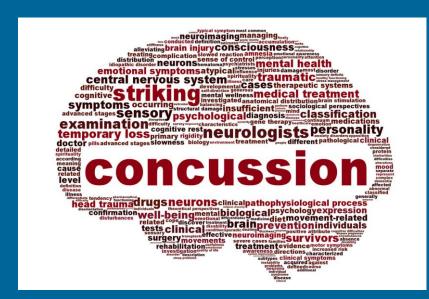
with Anticoagulated Head Injury Advice Leaflet

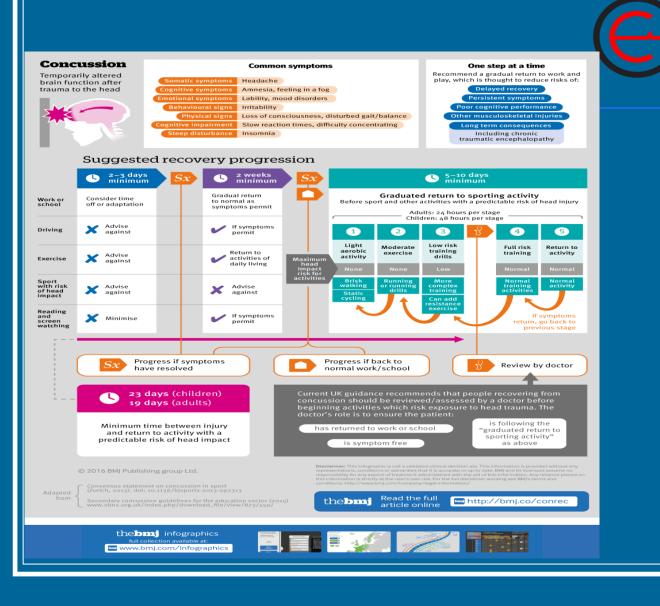
Authors: Dr S Taylor (EM Consultant) | Dr C Teit (Consultant Heematologist) NHSGGC Thrombosis Group | v2.9 Created: July 2017 | Review: July 2019.



# Concussion

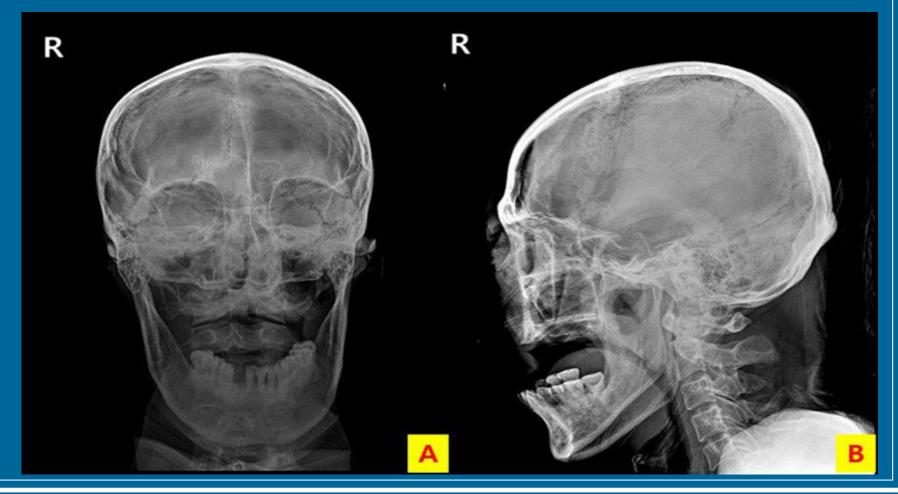
- Concussion is a traumatic brain injury following either a direct blow to the head or a force transmitted to the head without a direct hit.
- The brain releases chemicals that change how nerve cells work. This change can affect thinking and remembering, mood, sleep, behaviour, and level of consciousness.
- Offer patients written or online advice about the diagnosis, symptoms, and recovery.
- 80-90% of people with concussion recover spontaneously and fully, but some can experience serious consequences if their injury is poorly managed.





# 'Retro' imaging





# Radiation exposure



## 5.4 RADIATION RISK

of the brain (2 mSv).<sup>77</sup> Children are more radiosensitive and the radiation risk increases with decreasing age. At age 0-10 years it is estimated to be 1 in 4,200 compared to 1 in 6,000 at age 20 of inducing a fatal cancer. <sup>77,79</sup> The risk depends on which organs are irradiated but careful choice of CT protocol can minimise the risk.

decreasing age. At age 0-10 years it is estimated to be 1 in 4,200 compared to 1 in 6,000 at age 20 of inducing a fatal cancer.<sup>27,79</sup> The risk depends on which organs are irradiated but careful choice of CT protocol can minimise the risk.

Given that CT will only be carried out when clinically indicated then the direct benefit of the scan to the individual outweighs the theoretical small overall increased lifetime risk of cancer.



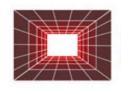
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Clyde ——— Emergency Medicine

HOME HEALTH LAW MEDICARE MEDICAID COST & QUALITY HEALTH INDUSTRY PHARMA

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# Medical Law Perspectives LAW AND MEDICINE PUBLICATIONS FOR LITIGATION SUCCESS

HOME REPORTS PUBLICATIONS NEWS MEMBERS CONTACT

Risks and Benefits of CT Scans; Ionizing Radiation Injury and Other Litigation

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The long-term radiation risk of CT scans seem well established but will CT litigation go the way of asbestos?



# Questions?

https://www.acquiredbraininjury-education.scot.nhs.uk/glasgow-comascale/