

# 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 of Consciousness
- Associated seizure
- Amnesia (pre/post injury)
- Vomiting
- Headache
- Visual Disturbance

## Signs

- **Reduced GCS**
- Pupil Reaction
- Tympanic Membranes
- CSF Leak
- Abnormal Behaviour
- Focal Neurology

# GCS

<b>Behaviour</b>	<b>Response</b>
 <p>Eye Opening Response</p>	<ol style="list-style-type: none"><li>4. Spontaneously</li><li>3. To speech</li><li>2. To pain</li><li>1. No response</li></ol>
 <p>Verbal Response</p>	<ol style="list-style-type: none"><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></ol>
 <p>Motor Response</p>	<ol style="list-style-type: none"><li>6. Obeys command</li><li>5. Moves to localised pain</li><li>4. Flex to withdraw from pain</li><li>3. Abnormal flexion</li><li>2. Abnormal extension</li><li>1. No response</li></ol>

# AVPU

**A**lert  
Patient is fully awake  
and responsive.



**V**oice  
Patient responds to  
your voice.



**P**ain  
Patient responds when  
you cause them pain.

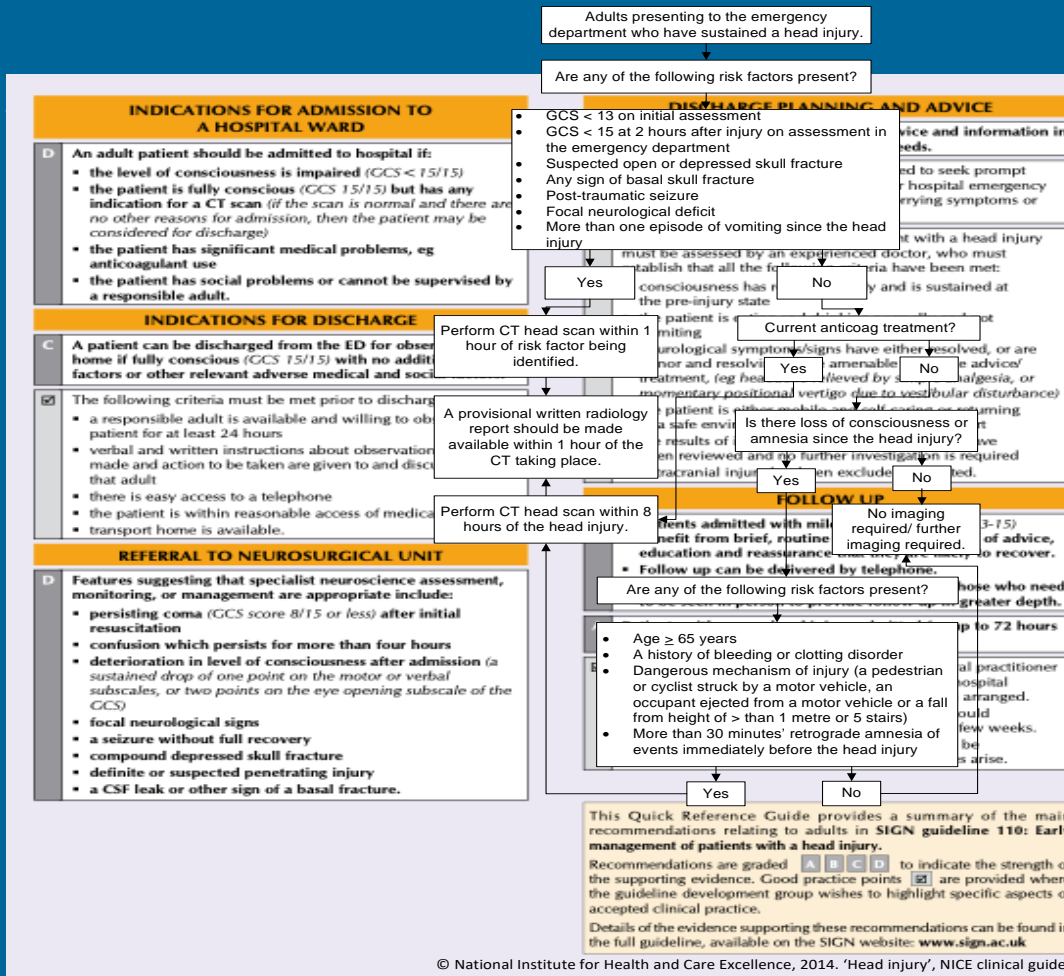


**U**nresponsive  
Patient does not respond  
no matter what you do.



# Imaging


Algorithm 1: Selection of adults for CT head scan



**SIGN** Scottish Intercollegiate Guidelines Network

**NHS** Quality

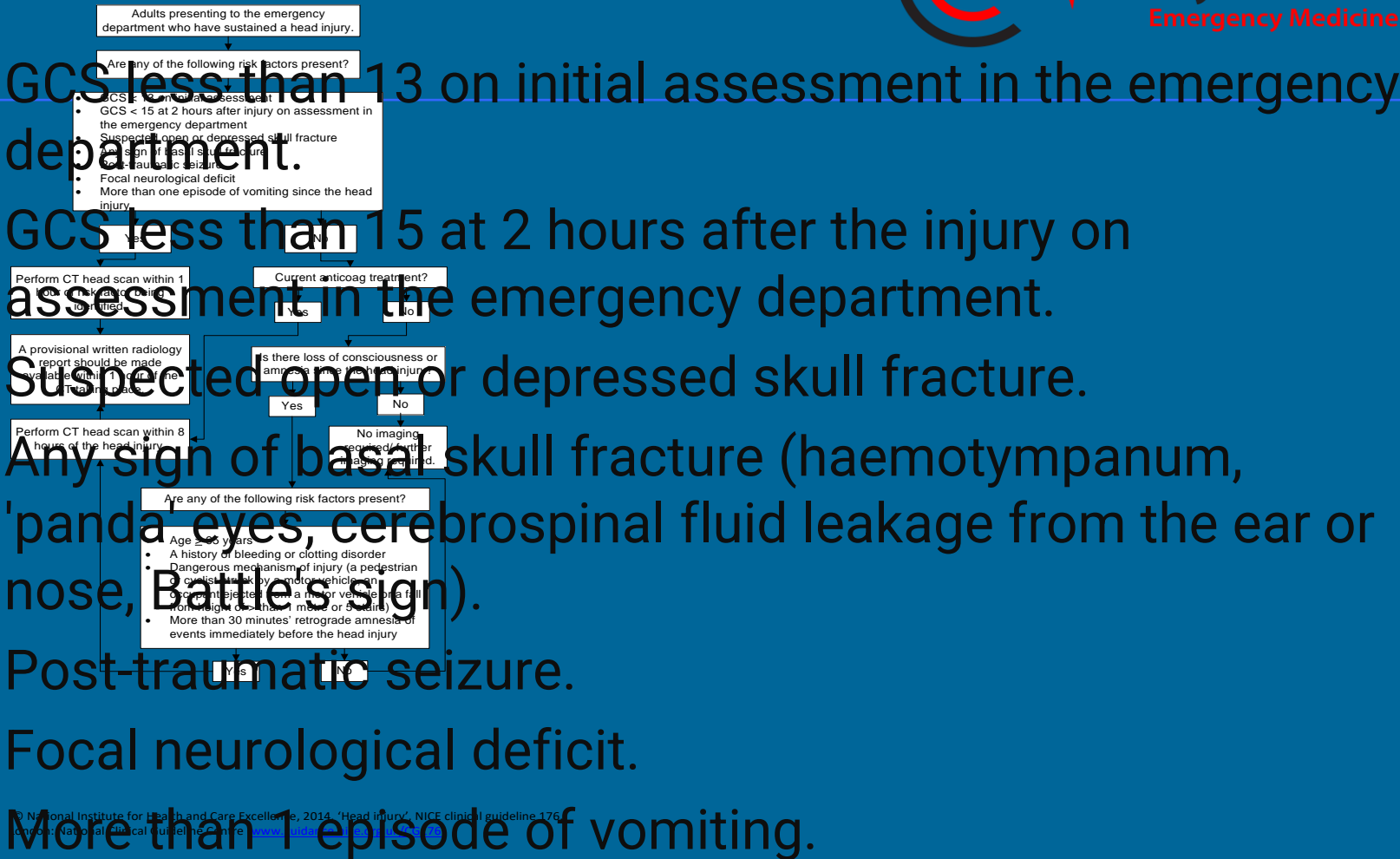
**110** Early management of adult patients with a head injury  
Quick Reference Guide



May 2009

COPIES OF ALL SIGN GUIDELINES ARE AVAILABLE ONLINE AT [WWW.SIGN.AC.UK](http://WWW.SIGN.AC.UK)

Algorithm 1: Selection of adults for CT head scan



© National Institute for Health and Care Excellence, 2014. "Head injury". NICE clinical guideline 176. <http://www.nice.org.uk/guidance/CG176>



# C spine: limited signs if low GCS





# Discharge



- 1.8 Admission and observation
- 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 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]

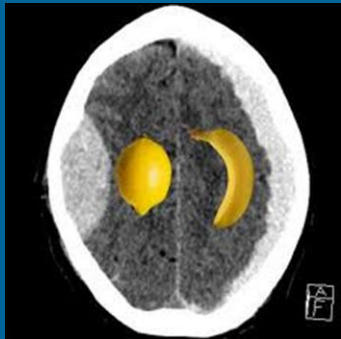
# Extradural Bleeding



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

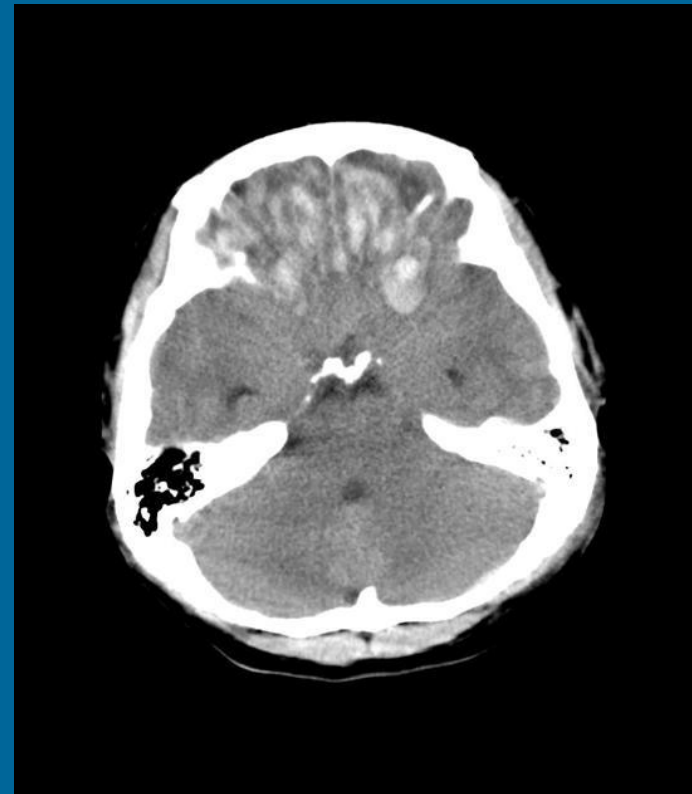


- The sensitivity of CT to the presence of subarachnoid blood is strongly influenced by both the amount of blood and the time since the haemorrhage.
- The diagnosis is suspected when a hyper-dense material is seen filling the subarachnoid space. Most commonly this is apparent around the circle of Willis



# 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**

## HEAD INJURY

For all patients with a head injury under ED. Attach inside the ED card. For patient simplest of presentations, other relevant information must also be recorded

Sticky Label or write details:

Today

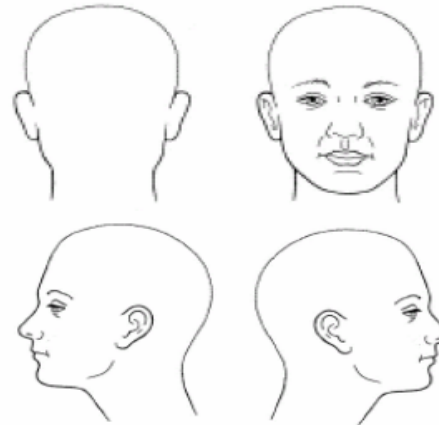
Date of

Time

Mechanism of injury:

Lacerations, bruises, etc: indicate size in cms.

Treatment: indicate number of sutures, glue, etc



Have you given:	Not needed or N/A	Yes
Tetanus Booster or course started		
HI Advice Card (& patient discharged)		

For all admitted patients:

Main Reason for admission:

	E	/4	M	/6	V	/5	GCS
any time (include ambulance)	E		M		V		Time
Not needed	Done		Result				

	Done	Not needed	Ward Nurses please do
CIWA scale prescription			Neuro Obs
IV fluids chart			Hourly <input type="checkbox"/> Half Hourly <input type="checkbox"/>
Bloods done (inc. arrangements for results)			

Given:	Not needed or N/A	Yes
course started		
patient discharged		

For all admitted patients:

	Done	Not needed	Ward Nurses please do
arrangements for results)			Neuro Obs
admissions:			Hourly <input type="checkbox"/> Half Hourly <input type="checkbox"/>

Compulsory for ALL admissions:

Doctors Signature:

Drug Kardex

Neuro obs: at least two sets done in ED.

ED card: usual admission details including PMH, drugs, general examination, etc.

Print name:

sets done in ED.			
with details including examination, etc.			
Doctors Signature:			
Print name:			

## 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  
TELEPHONE: 01475 633777  
VALE OF LEVEN HOSPITAL  
TELEPHONE: 01389 754121



**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:

**HEAD INJURY ADVICE**

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

Do you still feel unwell?

Often people can feel unwell after a head injury even when they are back home. Common symptoms are:

- mild headache
- irritability or being easily annoyed
- dizziness
- tiredness
- poor concentration
- poor sleep
- memory problems

If you have any of these symptoms, **DO NOT WORRY** because they should clear up in time without any treatment.

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

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

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

DO have plenty of rest and avoid stressful and noisy situations.

DO NOT take any alcohol

DO NOT take sleeping pills, sedatives or tranquillizers unless they are given by a doctor

DO NOT return to sporting activities if you continue to have any of the symptoms mentioned above. Once these symptoms have resolved then a gradual return to sporting activities should be done over a 3 week period. This is particularly important in contact sports such as football & rugby. If symptoms recur during this return to activities then reduce level of activity and consider contacting your GP for further advice.

Reviewed - GM 2014

**1. Do not leave the patient alone.**

**2. Make sure there is a nearby telephone and that the patient stays 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?
  - 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



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## apixaban (Eliquis)

Indication:	Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE) and prevention of recurrent DVT and PE in adults.
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 Squibb
Indication:	Treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE) and prevention of recurrent DVT and PE in adults.
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# Anticoagulation & Head Injuries

WARFARIN : Urgent INR. Near Patient Test if available

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

LMWH : refer [Therapeutics Handbook](#)

Assess

## HIGH SUSPICION OF INTRACRANIAL BLEED

- GCS < 15
- 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  $\leq 2$ h to inhibit further drug absorption.

## Arrange Early CT Scan

(ideally <1hr)

## Arrange Immediate CT Scan

consider PCC before CT if felt clinically appropriate

## CT SCAN NEGATIVE

- INR  $\geq 3$  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
- Appropriate close supervision
- Suitable social circumstances

with [Anticoagulated Head Injury Advice Leaflet](#)

## CONFIRMED INTRACRANIAL BLEED

### WARFARIN

- Aim full warfarin reversal, even prosthetic valve patients, for  $\geq 7$  days
- Phone Resus to start PCC reconstitution ([guidance here](#))

### DOAC

- Dabigatran 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



## Concussion

Temporarily altered brain function after trauma to the head



### Common symptoms

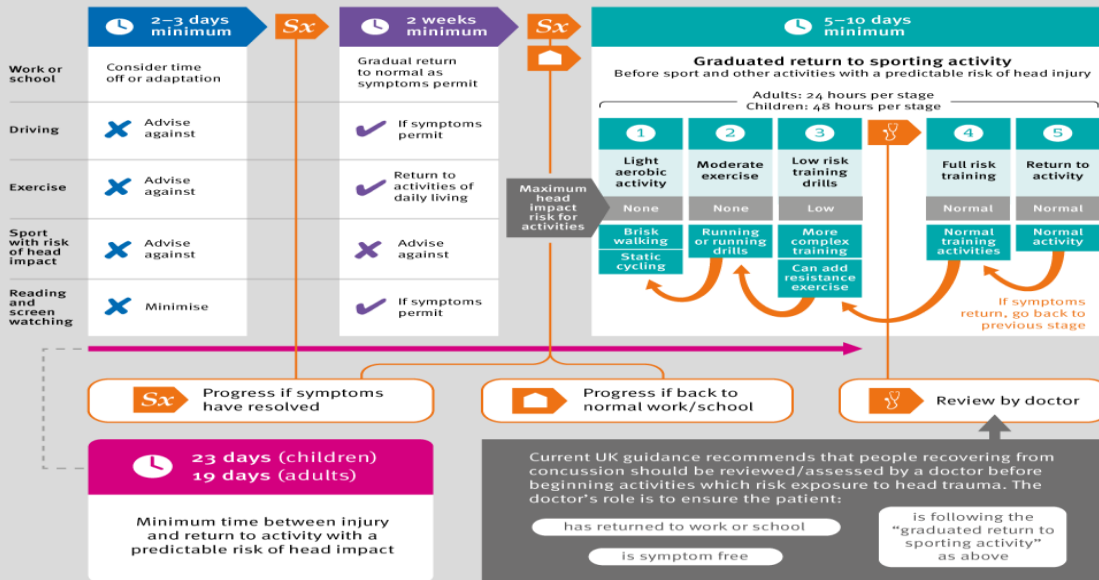
<b>Somatic symptoms</b>	Headache
<b>Cognitive symptoms</b>	Amnesia, feeling in a fog
<b>Emotional symptoms</b>	Lability, mood disorders
<b>Behavioural signs</b>	Irritability
<b>Physical signs</b>	Loss of consciousness, disturbed gait/balance
<b>Cognitive impairment</b>	Slow reaction times, difficulty concentrating
<b>Sleep disturbance</b>	Insomnia

### One step at a time

Recommend a gradual return to work and play, which is thought to reduce risks of:

- Delayed recovery
- Persistent symptoms
- Poor cognitive performance
- Other musculoskeletal injuries
- Long term consequences
  - Including chronic traumatic encephalopathy

## Suggested recovery progression



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Adapted from   
 Consensus statement on concussion in sport (Zurich, 2013). doi: 10.1136/bjsports-2013-092313  
 Secondary concussion guidelines for the education sector (2015) www.sbn.org.uk/index.php/download\_file/view/873/559/

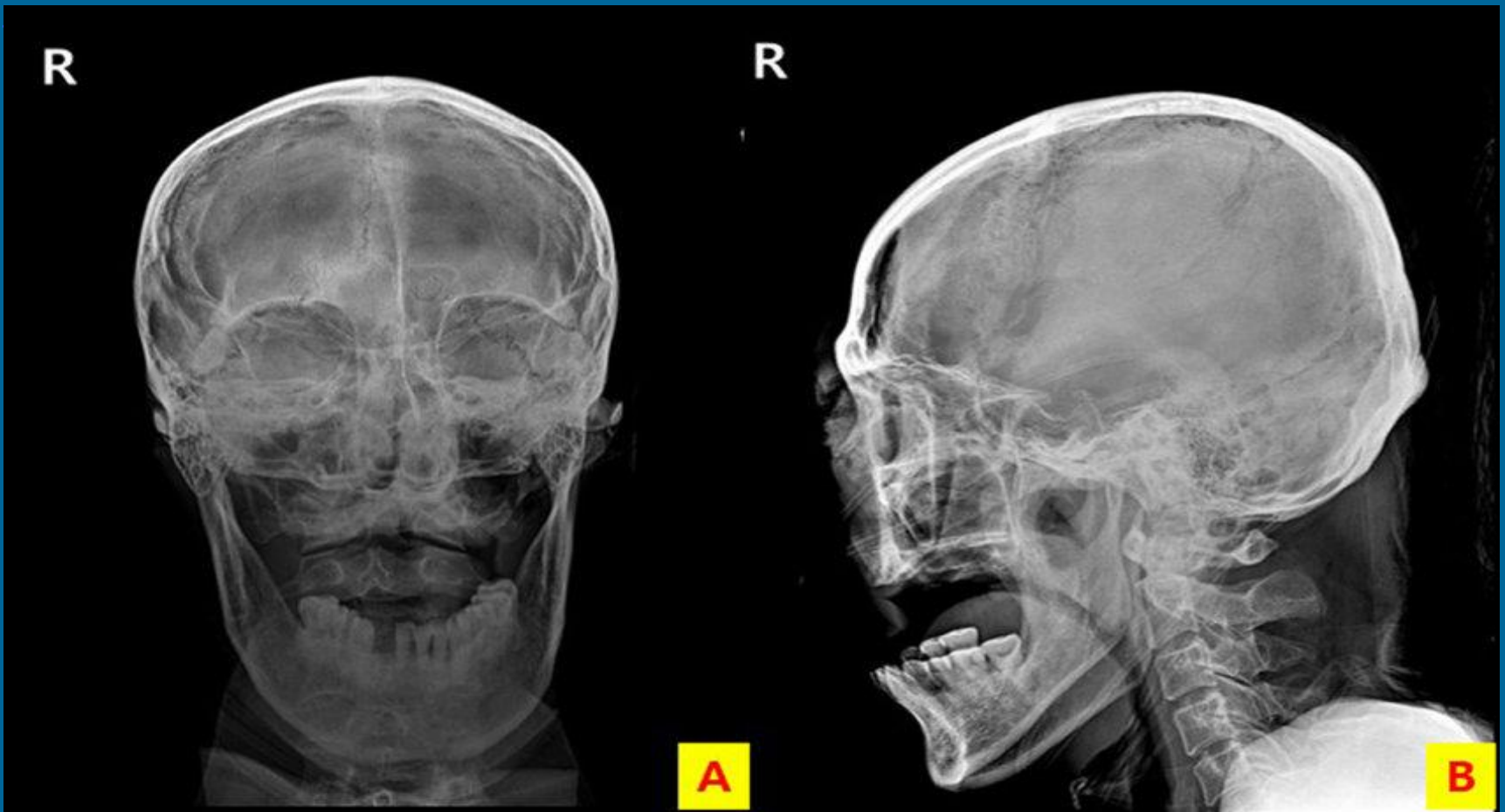
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# 'Retro' imaging



# Radiation exposure

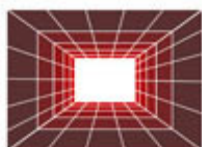


## 5.4 RADIATION RISK

Inevitable natural background radiation gives adults and children in the UK a mean radiation 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.

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

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NO COMMENTS

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

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# Questions?

<https://www.acquiredbraininjury-education.scot.nhs.uk/glasgow-coma-scale/>