



—BELMATT—  
HEALTHCARE TRAINING

# Head Injuries

Dorthe Swaby-Larsen

# Session Aims and Objectives

**Overall aim** of this session is to develop your skills and knowledge to confidently assess patients with head injuries in line with nationally approved guidelines.

- Objectives: By the end of the course, you should be able to:
  - Apply essential aspects of neurological anatomy
  - Discuss causes and forms of head injury
  - Understand the reasons behind raised intra –cranial pressure
- Undertake assessment of head injury patients including cranial nerves
- Understand the national guidelines for the management of a head injury

# Session Agenda

- Introduction to head injuries including
  - Current incidence
  - Mechanism of injury
  - Classification
- Intra cranial pressure
- *History taking, red flags & patient examination including cranial nerve assessment*
  - *Practice*
- *Discharge /onward referral*

# National Guidance- published 2014 .Updated 2019

**NICE** National Institute for  
Health and Care Excellence



## Head injury: assessment and early management

Clinical guideline

Published: 22 January 2014

[www.nice.org.uk/guidance/cg176](https://www.nice.org.uk/guidance/cg176)

### From NICE:

*This guideline covers the assessment and early management of head injury in children, young people and adults.*

*In **September 2019**, we changed our advice to indicate that adults and children who are on any anticoagulant (not just warfarin) should have a CT head scan within 8 hours of head injury.*

# Definition

*Head injury is defined as any trauma to the head other than superficial injuries to the face. (NICE 2014)*



## Spectrum



- Major; easy to spot
  - Eg focal sign
  - Reduced GCS
- Seemingly normal
  - Alert
  - Need to unearth the indicators of a problem

# Incidence

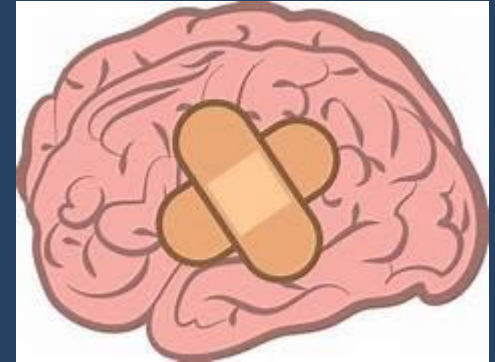
- Commonest cause of death and disability in people aged 1–40 years in the UK.
- 1.4 million people attend emergency departments in England and Wales each year with a recent head injury.
- Approx 200,000 people are admitted annually to hospital with head injury
- Between 33% and 50% of these are children aged under 15 years.
- Leading cause of death in children aged 13 and under (Conchie et al 2016)

# Incidence-2

- The incidence of death from head injury is low, (0.2% of all patients attending ED with a head injury)
- 95% of people who have sustained a head injury present with a normal or minimally impaired conscious level (Glasgow Coma Scale [GCS] greater than 12) but the majority of fatal outcomes are in the moderate (GCS 9–12) or severe (GCS 8 or less) head injury groups, which account for only 5% of attenders.
- Therefore, EDs/UCCs see a large number of patients with minor or mild head injuries and need to identify the very small number who will go on to have serious acute intracranial complications.

# Incidence- 3

- Traumatic Brain Injury most frequently occurs:
  - in very young children (age 0 to 4 years)
  - and in adolescence and young adulthood (age 15 to 24 years),
  - with a subsequent peak in incidence in older adults (over age 65)
- Older age comprises the group with the highest rates of TBI-related hospitalisations and deaths
- Estimated average annual rates of TBI are higher for males than for females across all age groups

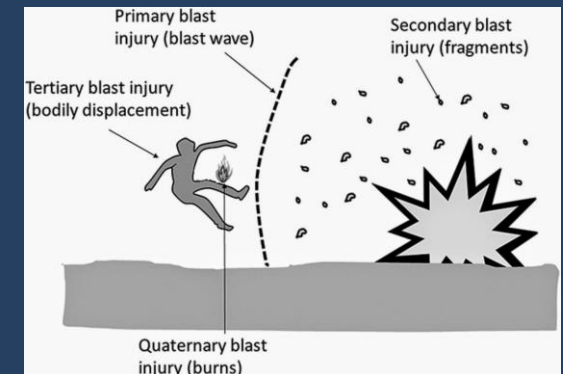
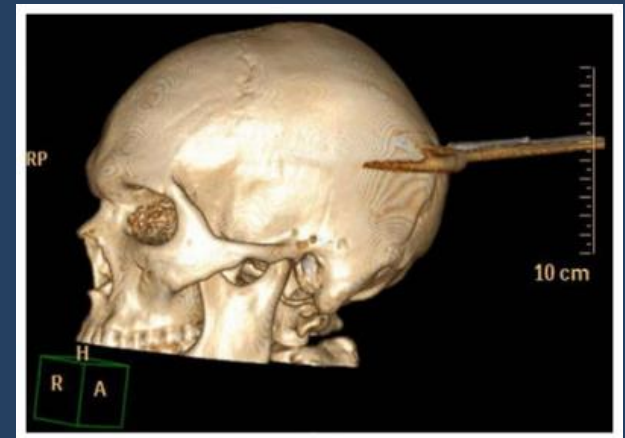




# Causes classification

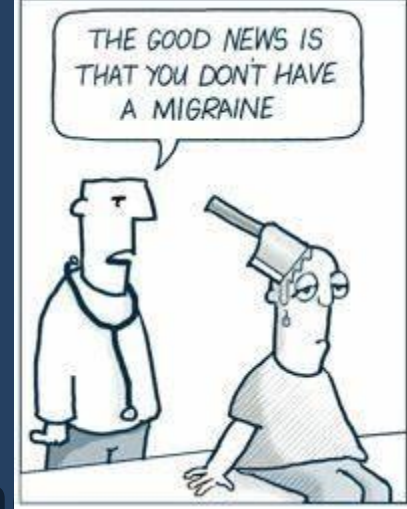
May be blunt, penetrating, or blast-related.

- Blunt TBI: occurs when external mechanical force leads to rapid acceleration or deceleration with brain impact. It is typically found in the setting of motor vehicle-related injury, falls, crush injuries, or physical altercations.
- Penetrating TBI: occurs when an object pierces the skull and breaches the dura mater, seen commonly in gunshot and stab wounds.
- Blast TBI: commonly occurs after bombings and warfare, due to a combination of contact and inertial forces, overpressure, and acoustic waves

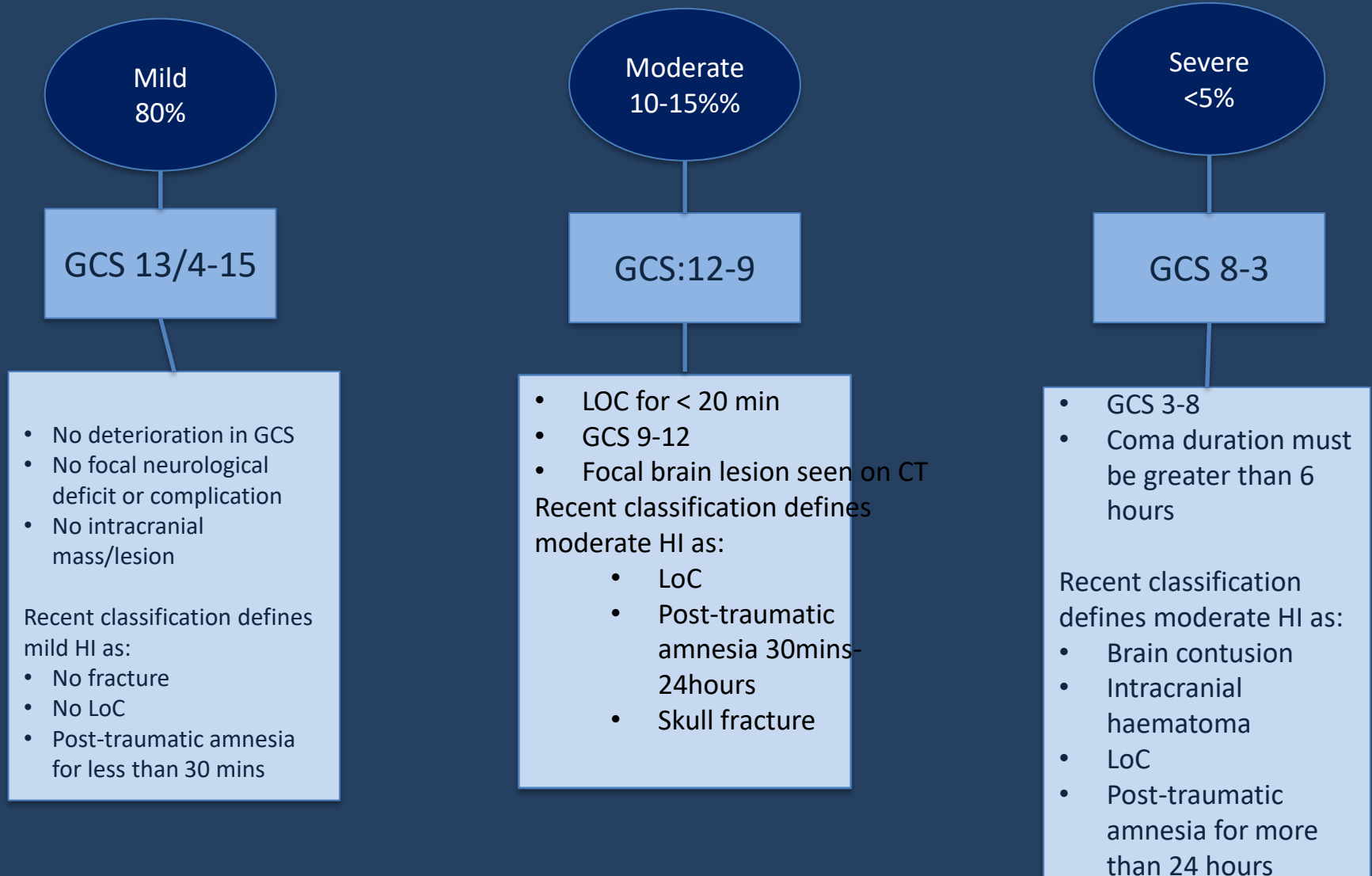


# Causes of :

- 50% caused by road traffic accidents, which includes cars, motorbikes, bicycles, lorries, and pedestrians hit by vehicles
- 21% cause by falls, trip and slips, which can occur at home, the workplace or in the street
- 12% caused by physical assaults, which includes assaults in public places and domestic violence
- 10% caused by sports, particularly high impact activities such as football, rugby, boxing, skiing and extreme sports
- 7% caused by other incidences

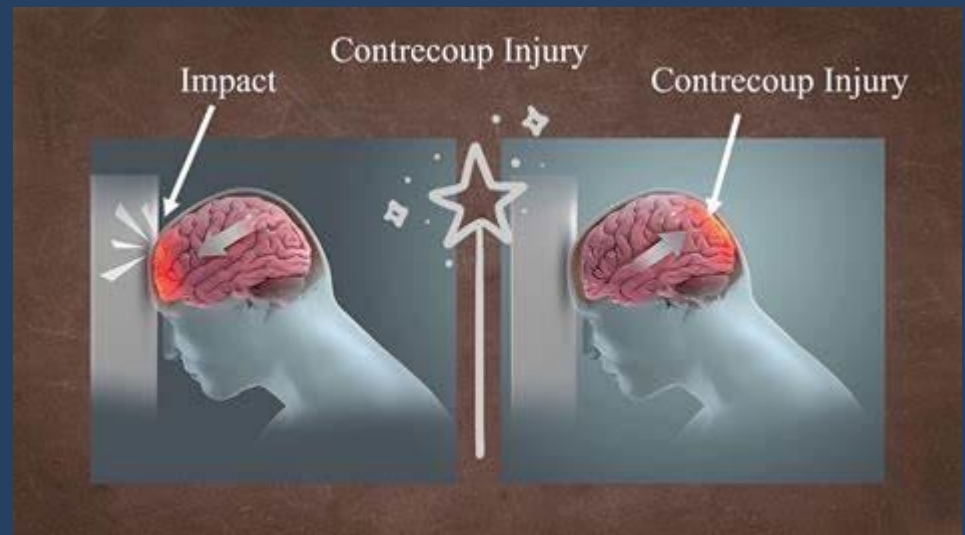


# Classification of Head Injuries- (NICE2014)



# Mechanism of Injury

- ▶ Can be at the site of the impact (localised)
- ▶ Can be counter coup
- ▶ Area of injury is significant:
  - Temporal bone is thinner and more fragile
  - Middle meningeal artery located there



# Types of Injury

- ▶ Can include injuries to the brain or other parts of the head
- ▶ Closed
  - Dura mater remains in tact
  - Skull might be fractured (linear or depressed)
- ▶ Diffuse or local
- ▶ Open
  - Object pierces the skull and breaches the dura mater

# Types of Injury

- Concussion
  - Clumsiness, fatigue, confusion, nausea, blurred vision and headache
  - Most common type of HI seen in children
- Skull Fracture
  - Caused by significant blow or force to the skull
  - Can result in an underlying brain injury

# Concussion-1

- Concussion occurs in most patients with TBI, and is typically the only finding in patients with mild TBI.
  - Patients with moderate or severe TBI typically have a combination of injuries, including concussive symptoms.
- The five major subtypes of concussion include :
  - headache, cognitive, vestibular, mood and ocular-motor.
  - One meta-analysis demonstrated that headache and cognitive are the most common subtypes in both adults and children

# Concussion-2

- The World Health Organization's definition of post-concussive syndrome includes the presence of 3 or more of the following symptoms after a head injury: headache, dizziness, fatigue, irritability, difficulty with concentrating and performing mental tasks, impairment of memory, insomnia and reduced tolerance to stress, emotional excitement, or alcohol
- In 2017, 15% of high school students in the US reported at least one sports-related concussion in the past year.
- Approximately 30% of children and adults experience persistent post-concussive symptoms lasting more than 30 days after injury.



# RAISED INTRACRANIAL PRESSURE

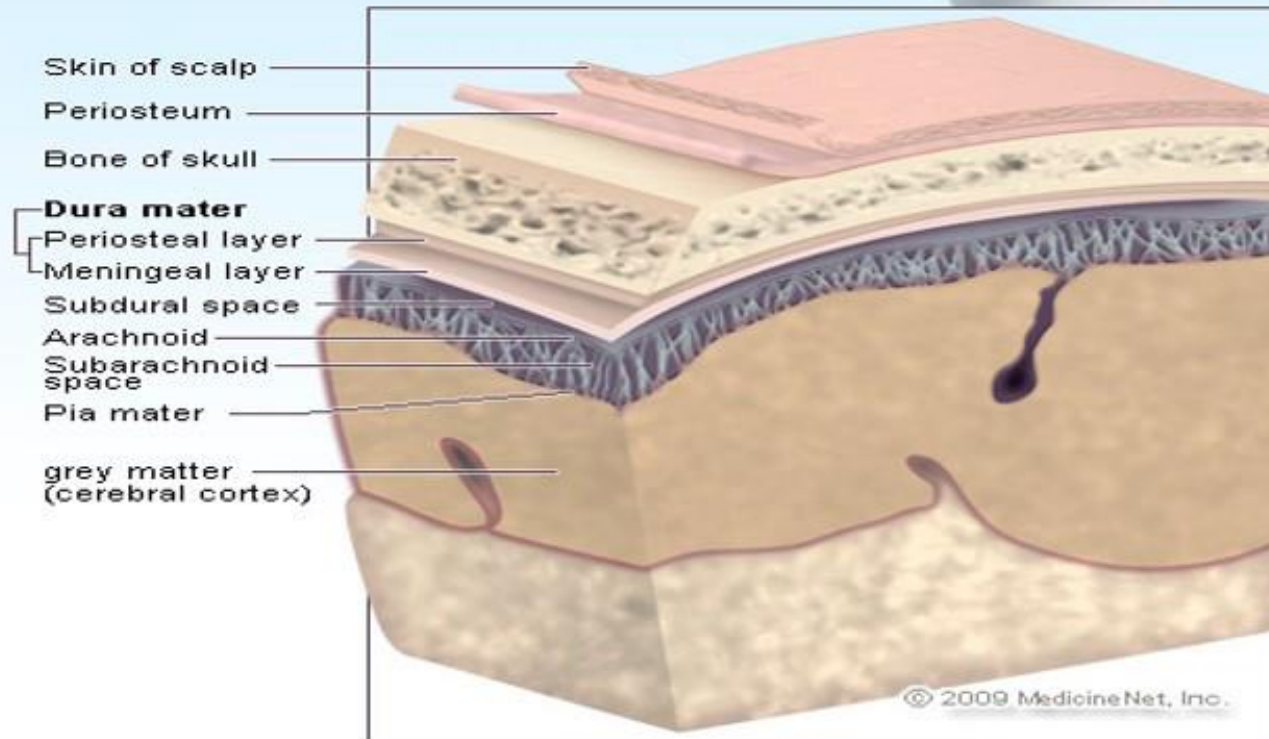


# Neuro Anatomy

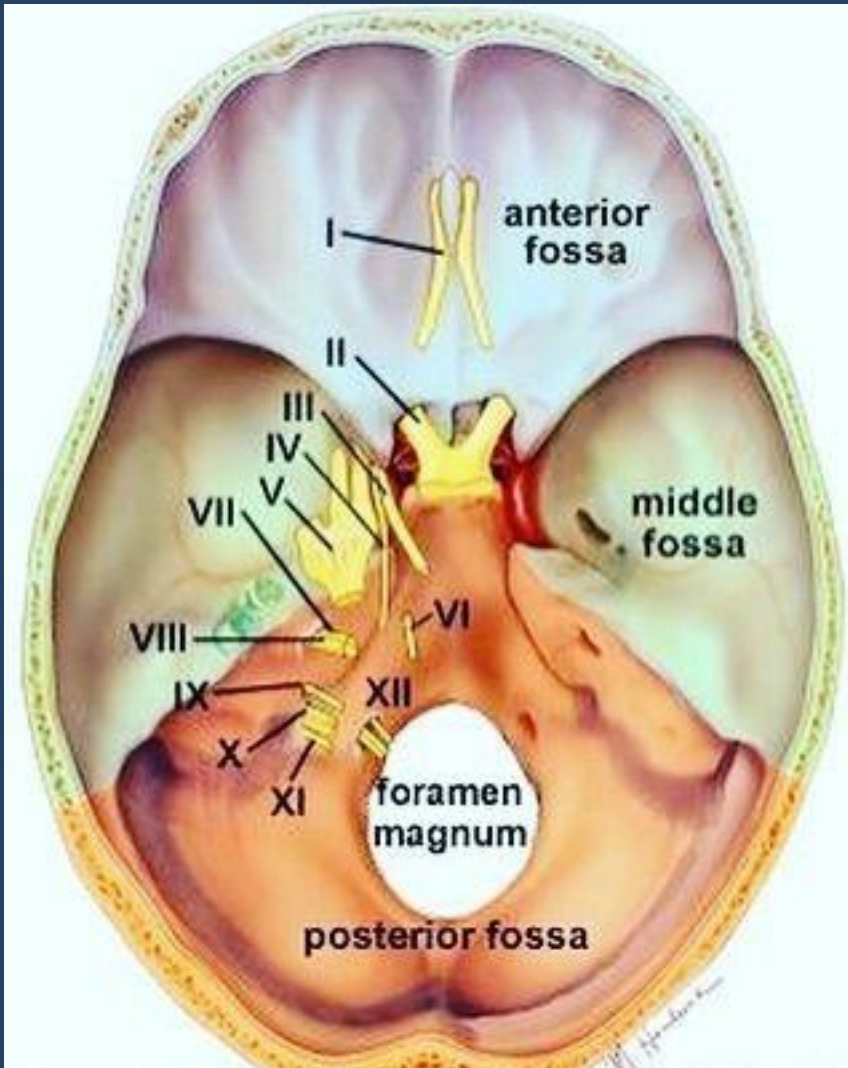
- Classification of HI is based on focal neurology
  - Also known as:
    - Focal neurological signs
    - Focal neurological deficits
    - Focal CNS signs
  - Refers to impairment in function of the:
    - Brain
    - Nerves
    - Spinal Cord

# Anatomy & Physiology

## Cross-Section of Head and Brain



# Base of Skull

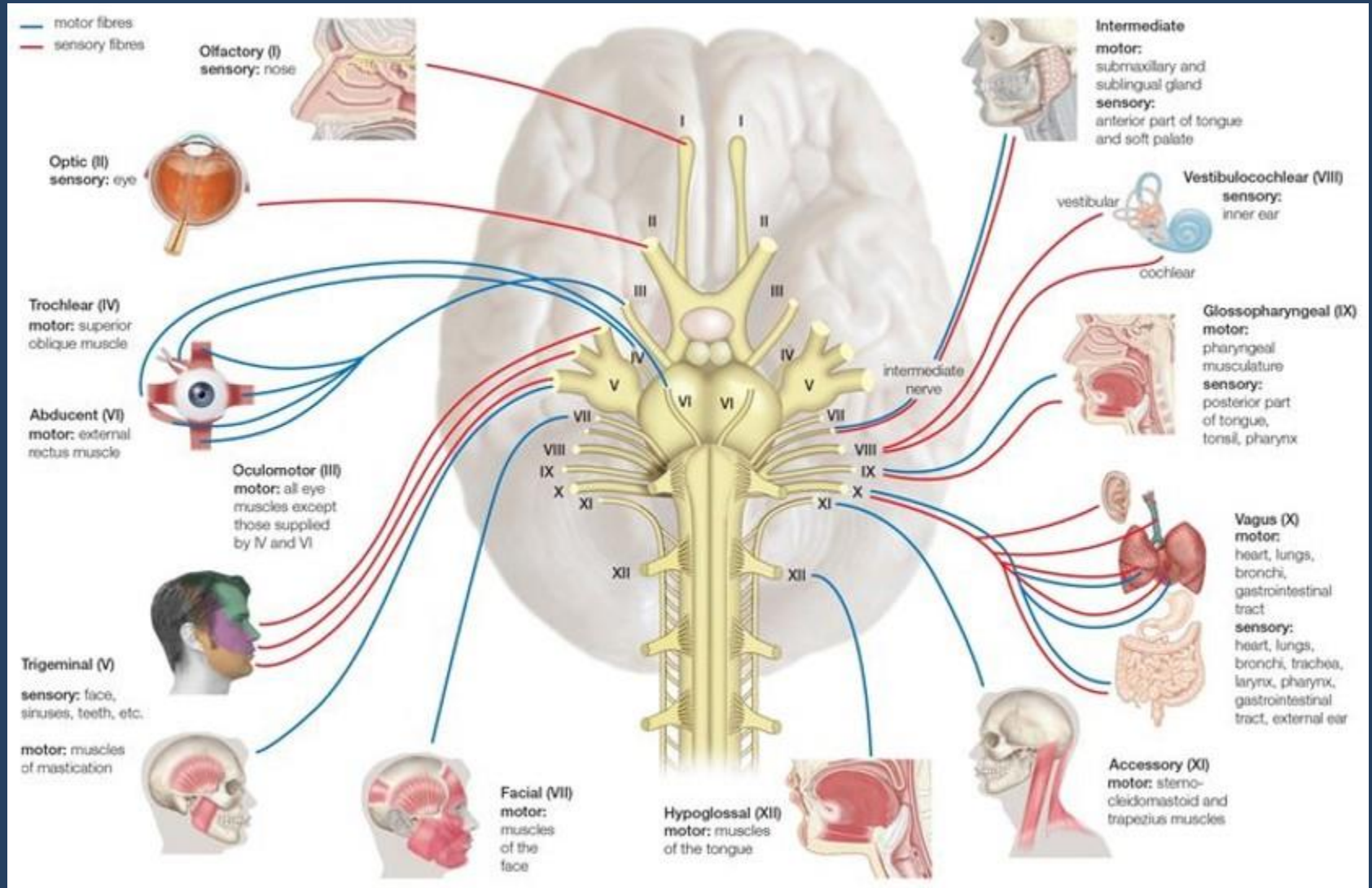


- The base of the skull forms the floor of the cranial cavity and separates the brain from the structures of the neck and face
- Bones :
  - Frontal bone
  - Ethmoid bone
  - Sphenoid bone
  - Temporal bones (paired)
  - Occipital bone
  - Parietal bones (paired)  
(although some texts state that the base does not include the parietal bones)

## Foramina

The base of the skull is perforated by numerous foramina which allow vessels and nerves to pass through the base of the skull allowing the intracranial cavity to communicate with the rest of the body -

# CRANIAL NERVE



# Raised ICP

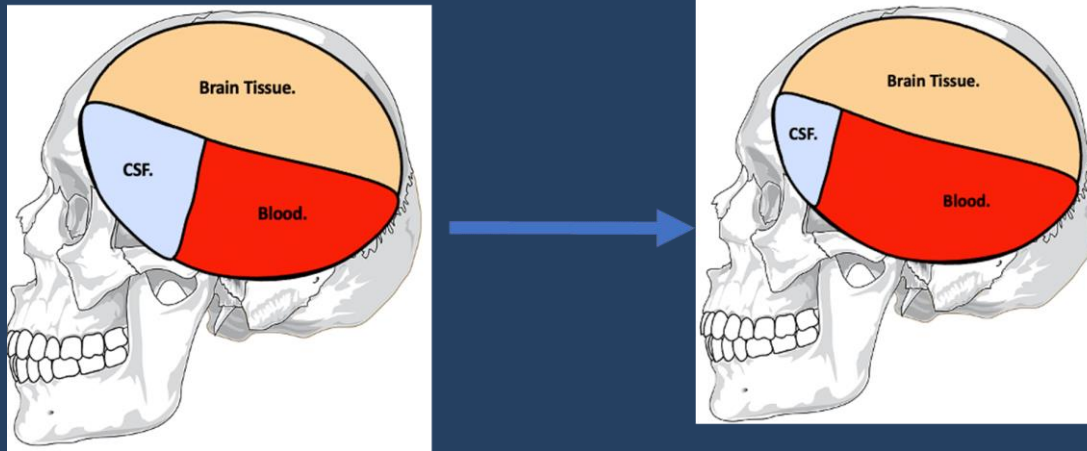
- One of the most damaging aspects of trauma
- Very high ICP is usually fatal if prolonged
- Children can tolerate higher pressures for longer periods



# Intracranial Pressure

- The pressure inside the skull, brain tissue and CSF
- The body has various mechanisms by which it keeps the ICP stable
  - CSF pressures varying by about 1 mmHg in normal adults through shifts in production and absorption of CSF
- CSF pressure has been shown to be influenced by abrupt changes in intrathoracic pressure :
  - Coughing (intra-abdominal pressure)
  - Valsalva Manoeuvre
  - Communication with the venous and arterial system
- ICP is measured in mmHg
  - At rest, is normally 7–15 mmHg for a supine adult
  - Becomes negative (averaging –10 mmHg) in the vertical position
  - Changes in ICP are attributed to volume changes in one or more of the constituents contained in the cranium
- Intracranial hypertension, is elevation of the pressure in the cranium
  - At 20–25 mm Hg, the upper limit of normal, treatment to reduce ICP may be needed

# RAISED ICP : Monro-Kellie hypothesis



Any increase in one of the components must be at the expense of the other two

Initially, this can be achieved through a process referred to as **compliance**.

An increase in the amount of blood in the skull leads to a compensatory decrease in the amount of CSF and normal ICP is maintained

Small increases in brain volume do not lead to immediate increase in ICP because of the ability of the CSF to be displaced into the spinal canal

The **Monro-Kellie hypothesis** describes the relationship between the contents of the skull and intracranial pressure (ICP).

The skull is a closed rigid box with a **fixed capacity** (after the sutures have closed).

Within the skull there are three main substances:

- Brain tissue,
- Cerebrospinal fluid (CSF)
- Blood



# Raised ICP

- An increase in pressure, most commonly due to head injury leading to intracranial haematoma or cerebral oedema can:
  - crush brain tissue
  - shift brain structures
  - contribute to hydrocephalus
  - cause the brain to herniate
  - restrict blood supply to the brain
  - reflex bradycardia

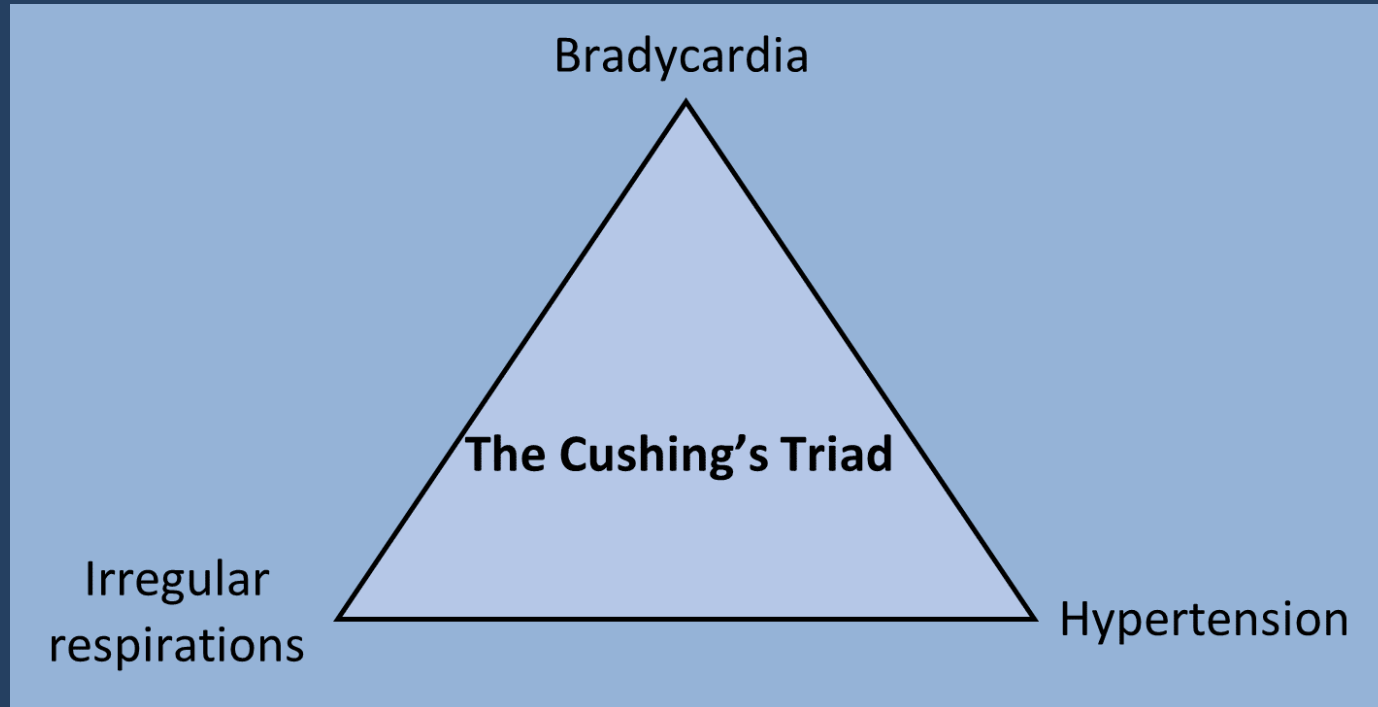
# Raised ICP – The Dangers

- Severely raised ICP, if caused by a unilateral space-occupying lesion (e.g. haematoma) can result in:
  - Midline shift of the brain tissue
    - Can compress ventricles and lead to hydrocephalus
    - Prognosis is much worse in patients with midline shift than in those without it
  - Brain herniation
    - Leading to brainstem compression
    - If brainstem compression is involved, it may lead to respiratory depression and is potentially fatal
    - This herniation is often referred to as "coning"

# Raised ICP – Signs & Symptoms

- Headache
- Vomiting without nausea
- Restlessness, agitation or drowsiness
- Slow slurred speech
- Cranial nerve palsy (eg CN III Palsy with 'down & out' pupil)
- Altered level of consciousness
- Papilloedema
- Pupillary dilatation: Ipsilateral sluggish dilated pupil when then becomes fixed ('blown pupil')
- Abnormal respiratory pattern
- Abnormal posturing
- Cushing's Triad -
- As a rule, patients with normal BP retain normal alertness with ICP of 25–40 mmHg (unless tissue shifts at the same time)
- ICP exceeding 40–50 mmHg causes CPP and cerebral perfusion to decrease to a level that results in loss of consciousness
- Any further elevations will lead to brain infarction and brain death

# Cushing Triad



**Cushing's reflex** is a physiological response to raised ICP which attempts to improve perfusion.

- An increased systolic BP

- A widened pulse pressure

- Bradycardia

- An abnormal respiratory pattern

- In children, a slow heart rate is especially suggestive of high ICP

Ref: Kelly, 2022

# Examination

- History & mechanism of injury (How, where, when etc)
- Assessment (General & neurological assessment)
- Management plan

# Head Injury - Initial Assessment

**A**irway with C-Spine Control

**B**reathing, with particular attention to other chest injury

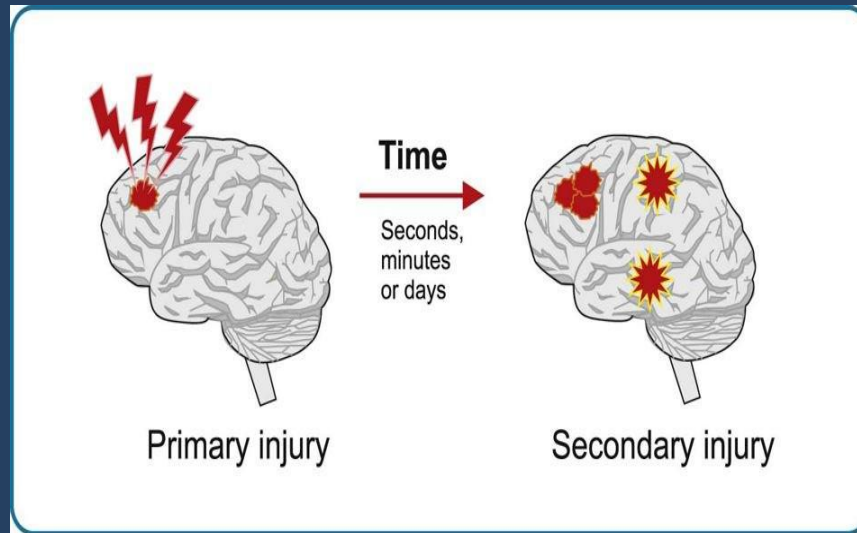
**C**irculation, with particular attention to haemorrhage control

**D** Neurological assessment

**E**xposure, glucose

# Pathophysiology

## Traumatic Brain Injury (TBI)



Irreversible

From the initial  
trauma

Avoidable if prompt  
intervention

- Hypoxia
- Increased ICP
- Acidosis
- Intracranial  
haematomas

**THESE ARE  
TREATABLE  
CAUSES**

# History Taking

- Always follow:
  - PC
    - What is the problem?
  - HPC
- “I have six honest serving men who taught me all they knew- their names are what and where and why and how and when and who” (Kipling)
- **WHAT:** Happened– Do they think is the matter- is their job
- **Where:** Did it happen? Are their relatives
- **WHEN:** was the accident- did the symptoms start and in what order- Did they have any previous tx? Had they had anything like this before
- **HOW:** Did it happen and think practicalities: how are they going to manage/get home
- **WHY:** Think health education- are they here at all? Are they here now? Did this happen (drink, health & safety, and are they worried about this?
- **WHO:** Hit them (think police)- looks after them- has treated them in the past?



# History Taking

- PMHx
  - Surgical, medical and gynae
- DHx
  - Include OTC, herbal and non-prescription
- Allergies
- SHx
  - Include alcohol and drug use
- Diet/weight
- Immunisation
- Exercise
- Travel

# History Taking- cont

- Mechanism of injury
  - Significant mechanism of injury
  - Precautions taken (e.g. Helmet)
  - Primary or secondary head injury
  - Events immediately after the injury
  - Fall (illness or accident)
- History of loss of consciousness or impaired consciousness
- Amnesia for the incident or subsequent events
- Behaviour,
- Visual complaints
- Hx of vomiting

# History taking:

## Significant mechanism of injury

- RTA
- Pedestrian vs. car, even glancing contact
- Ejection from any motor vehicle
- Fall from height and onto what surface
- Any assault
- Blast injury
- Any forced mechanism, such as shaking e.g. fairground rides,
- Sport

*'Red flags are those clinical syndromes which alert the doctor to the fact that the patient needs prompt investigation and treatment for a potentially dangerous condition' (Stephenson, 2011: page IX)*

## **LIST RED FLAGS FOR HEAD INJURY**

# Red Flags



- LOC
- GCS <15 on initial assessment
- Focal neurological deficit
- Retrograde or anterograde amnesia
  - Anterograde amnesia is the loss of long-term memory, the loss or impairment of the ability to form new memories after the event that caused the amnesia
  - Retrograde amnesia is the loss of pre-existing memories

# Red Flags (con't/d)



- Persistent headache
  - Headache often results from traction to or irritation of the meninges and blood vessels
  - Brain has no pain receptors
- Vomiting or seizures post injury
  - Vomit  $>2$  in children and  $>1$  in adults

# Red Flags (con't/d)



- Past medical history:
  - Previous neurosurgical intervention
  - Use of anticoagulants- But inconclusive re clopidrogel (Moffatt, et al, 2023) : Systematic review and meta-analysis found no statistical significant evidence that clopidrogel increases risk of traumatic intracranial haemorrhage but risk of bias and other limitations identified
  - Clotting disorders
  - Alcohol excess (acute or chronic)
- All increase the likelihood of structural brain injuries after apparently minor trauma

# Loss of consciousness

- Seen in up to 13% of patients
- Length of consciousness correlates with severity
- Decreasing level of consciousness can be very hard to detect in an infant as they may be asleep



# Vomiting

- Observed in approx 13% of patients
- Three episodes of vomiting within 4 hours in children under 12 with head injury should be cause of concern even if no other signs or symptoms
  - Initially benign as a result of stress
  - Delayed for several hours in ICP – (pressure on the floor of the 3<sup>rd</sup> ventricle, and projectile)
- There is a 50% greater chance of developing an important traumatic brain injury in children who have vomited compared to those who have not

# Neurological assessment

- Orientation levels
- Vital signs
- External head exam
- CSF leak, Battle's sign
- Pupils & Cranial nerves

# Glasgow Come Scale

- The GCS has been used extensively to classify TBI into levels of severity and prognosis.
- There is an inverse relationship between the GCS score and the incidence of positive findings on computed tomography (CT); the rate of intracranial injury (ICI) and need for neurosurgical intervention doubles when the GCS drops from 15 to 14
- Mild TBI: GCS 13-15; mortality 0.1%
- Moderate TBI: GCS 9-12; mortality 10%
- Severe TBI: GCS <9; mortality 40%.

# GLASGOW COMA SCALE : Do it this way

GCS  
EYES  
VERBAL  
MOTOR

Institute of Neurological Sciences NHS Greater Glasgow and Clyde



## CHECK

For factors interfering with communication, ability to respond and other injuries.



## OBSERVE

Eye opening, content of speech and movements of right and left sides



## STIMULATE

Sound: spoken or shouted request  
Physical: Pressure on finger tip, trapezius or supraorbital notch



## RATE

Assign according to highest response observed

### Eye opening

Criterion	Observed	Rating	Score
Open before stimulus	✓	Spontaneous	4
After spoken or shouted request	✓	To sound	3
After finger tip stimulus	✓	To pressure	2
No opening at any time, no interfering factor	✓	None	1
Closed by local factor	✓	Non testable	NT

### Verbal response

Criterion	Observed	Rating	Score
Correctly gives name, place and date	✓	Orientated	5
Not orientated but communication coherently	✓	Confused	4
Intelligible single words	✓	Words	3
Only moans / groans	✓	Sounds	2
No audible response, no interfering factor	✓	None	1
Factor interfering with communication	✓	Non testable	NT

### Best motor response

Criterion	Observed	Rating	Score
Obey 2-part request	✓	Obeys commands	6
Brings hand above clavicle to stimulus on head/neck	✓	Localising	5
Bends arm at elbow rapidly but features not predominantly abnormal	✓	Normal flexion	4
Bends arm at elbow, features clearly predominantly abnormal	✓	Abnormal flexion	3
Extends arm at elbow	✓	Extension	2
No movement in arms / legs, no interfering factor	✓	None	1
Paralysed or other limiting factor	✓	Non testable	NT

### Sites For Physical Stimulation

Finger tip pressure

Trapezius Pinch

Supraorbital notch



### Features of Flexion Responses

Modified with permission from Van Der Naalt 2004  
Ned Tijdschr Geneesk

**Abnormal Flexion**  
Slow Stereotyped  
Arm across chest  
Forearm rotates  
Thumb clenched  
Leg extended



**Normal flexion**  
Rapid  
Variable  
Arm away from body

Ref: [www.glasgowcomascale.org/downloads/GCS-Assessment-Aid-English.pdf?v=3](http://www.glasgowcomascale.org/downloads/GCS-Assessment-Aid-English.pdf?v=3).

For further information and video demonstration visit [www.glasgowcomascale.org](http://www.glasgowcomascale.org)

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# Vital signs

- Orientation: time & space
  - Name
  - Where are you
  - Today's date & time of day ( context of child's age)
- Check pulse –BP
  - Main serious consideration is CUSHING effect:
    - Reduced pulse rate and increased BP
    - Resp chaotic
    - Temperature high

# PUPIL ASSESSMENT

Anisocoria= naturally unequal pupils

- Clinical significance!
- Don't be confused by misshaped pupils from eye surgery!



# PUPIL Assessment

## Acute dilated pupil

- acute neuro problem, e.g. severe bleeding or swelling in brain;
- usually accompanied by other neuro signs/symptoms

## Early signs of increased intracranial pressure (ICP): Pupillary changes

- "blown pupil" - pupil becomes fixed (no reaction) and dilated, with neuro changes (needs immediate CT of head!)
- Ovoid/transitional pupil: normal pupil takes oval shape when increased ICP is about to become very high

# External head exam

Raccoon eye

Subconjunctival haemorrhage  
without posterior limit

Nose: epistaxis  
Blood in ears/mouth

Ears: Battle sign



Source: John Murtagh, Jill Rosenblatt: *John Murtagh's General Practice*, 6e:  
[www.murtagh.mhmedical.com](http://www.murtagh.mhmedical.com)  
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## Signs of basal skull #

- Battle sign
- Racoon or panda eyes
- Cranial nerve palsy
- Deafness
- CSF otorrhoea/rhinorrhoea
- hemotympanum

# Wound Assessment

- Common type of minor head injury;
- Highly vascularised –
  - Scalp receives blood supply via five pairs of arteries.
- Clinical evaluation should identify other associated head injuries as laceration of the galea or bony defect of the skull.
- Document size and shape
- Include size, shape, depth, active bleeding
- Location, and surrounding bruising
- Any FB in wound

# Types of Injury

## ▶ Concussion

- Clumsiness, fatigue, confusion, nausea, blurred vision and headache

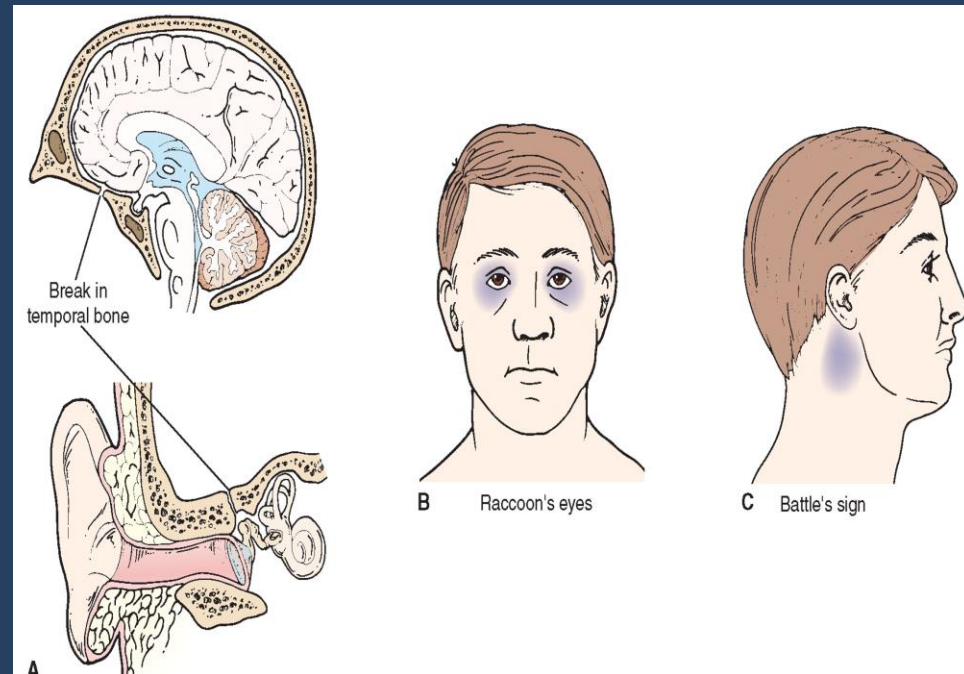
## ▶ Skull Fracture

- Caused by significant blow or force to the skull
- Can result in an underlying brain injury

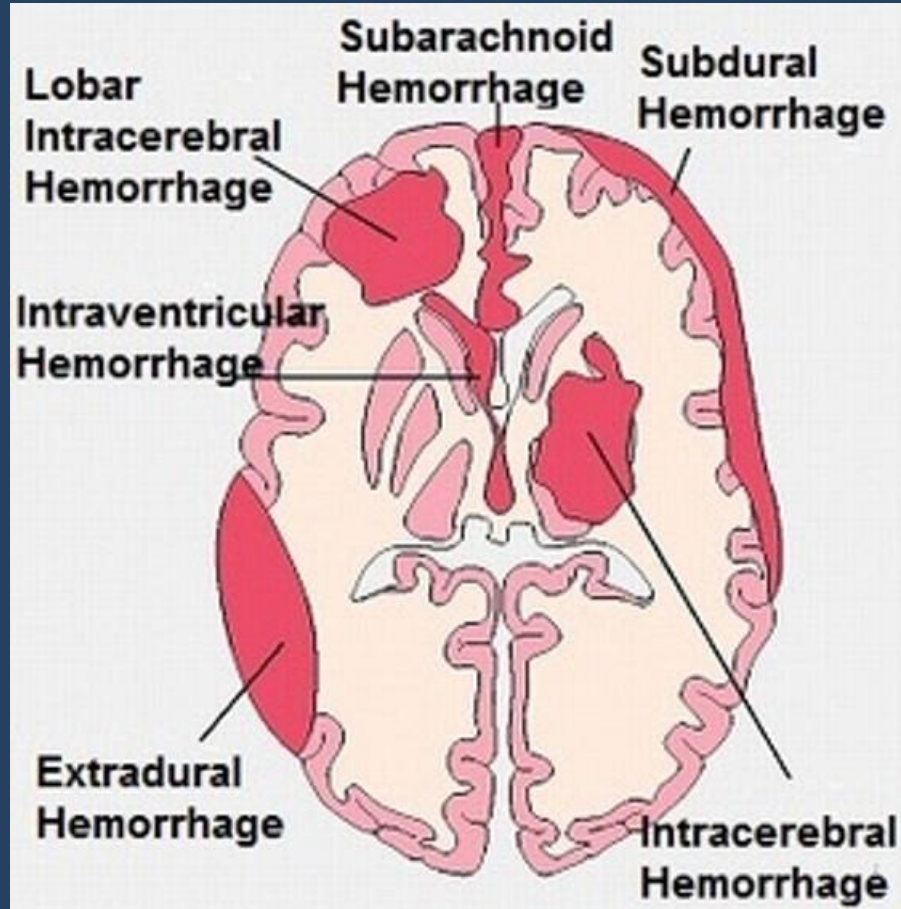
# Skull Fractures

## Basal fracture

- Blunt trauma
- Fracture to base of the skull
- Bruising around the eyes (Raccoon or panda Eyes)
- Bruising behind the ears (Battle Sign)
- Can extend to the sinuses

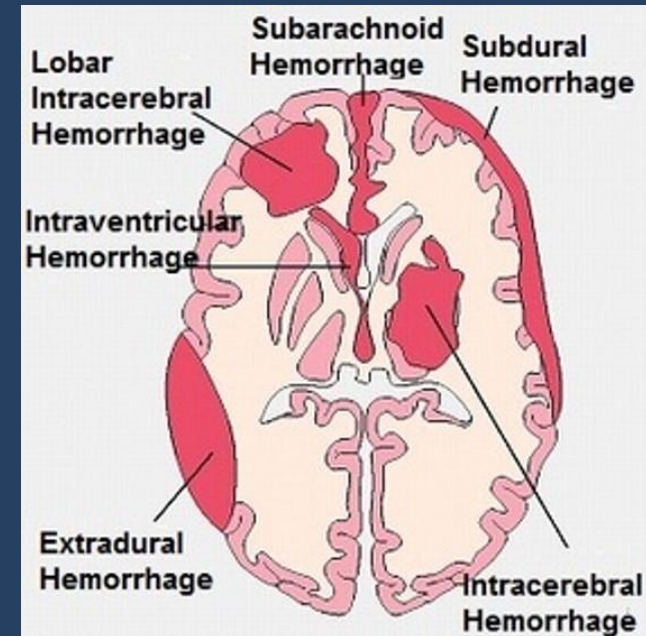


# Intracranial haemorrhages



# Intra cranial bleeding

- Intracranial bleeding:
  - Spaces between the meninges:
    - Epidural
      - This dura is one of the meninges which attaches at the suture lines
      - Clots form and exert pressure
      - Common with impact to the temporal bone
    - Subdural
      - Veins that cross through the subdural space can tear and bleed
      - Clots form and exerts pressure on brain tissue
      - Site of trauma or countercoup

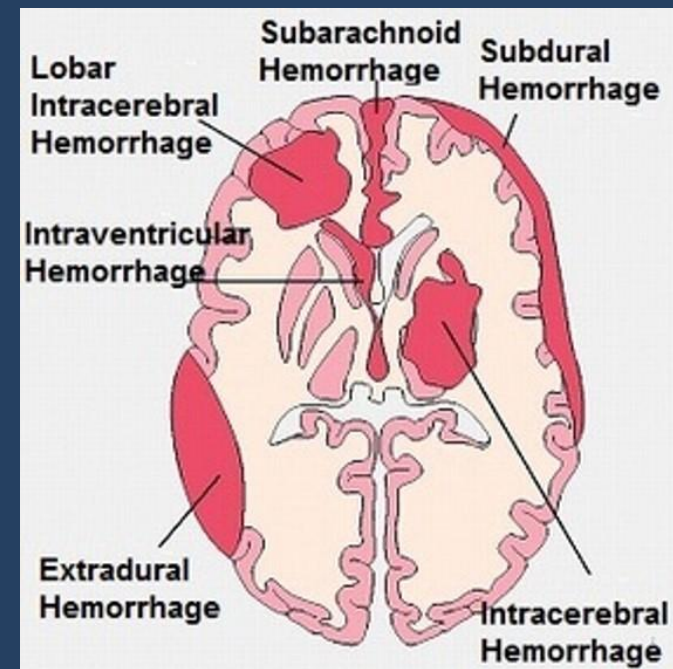


# Intra cranial bleeding

- Intracranial bleeding:

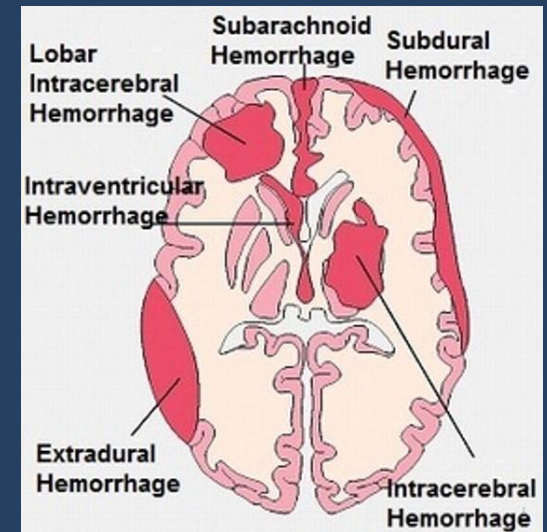
- Subarachnoid

- Blood accumulates in space between inner arachnoid layer and meninges
    - Often associate with intracerebral bleed
    - CSF is also present:
      - Severe headache
      - Vomiting
      - Stiff neck (irritation of the meningeal layer)



# Intra cranial bleeding

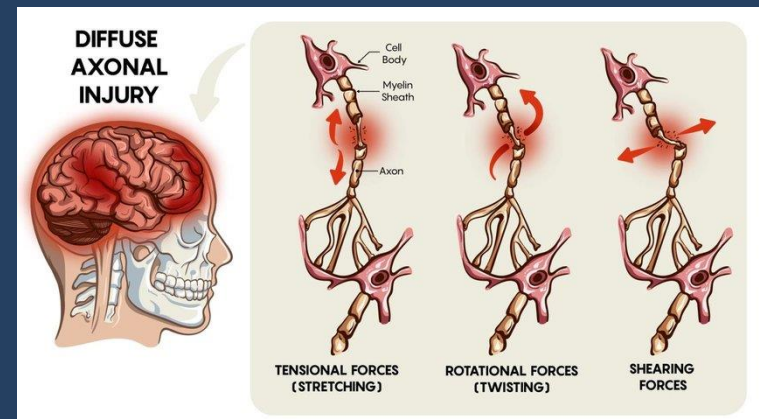
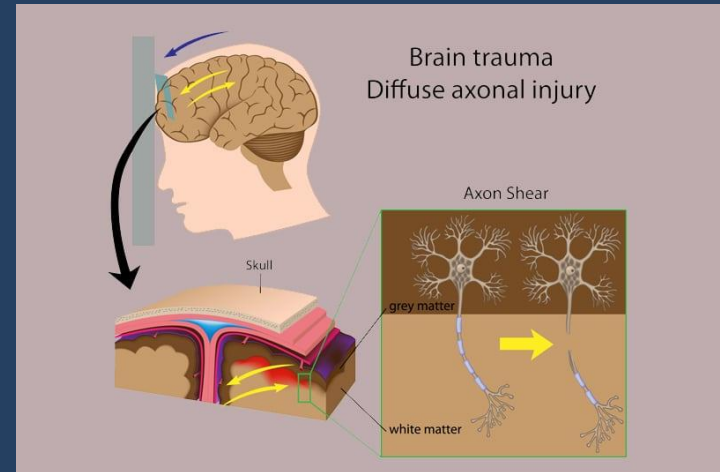
- Intracerebral Haemorrhage:
  - Bleeding within brain tissue
  - Can lead to oedema secondary to swelling



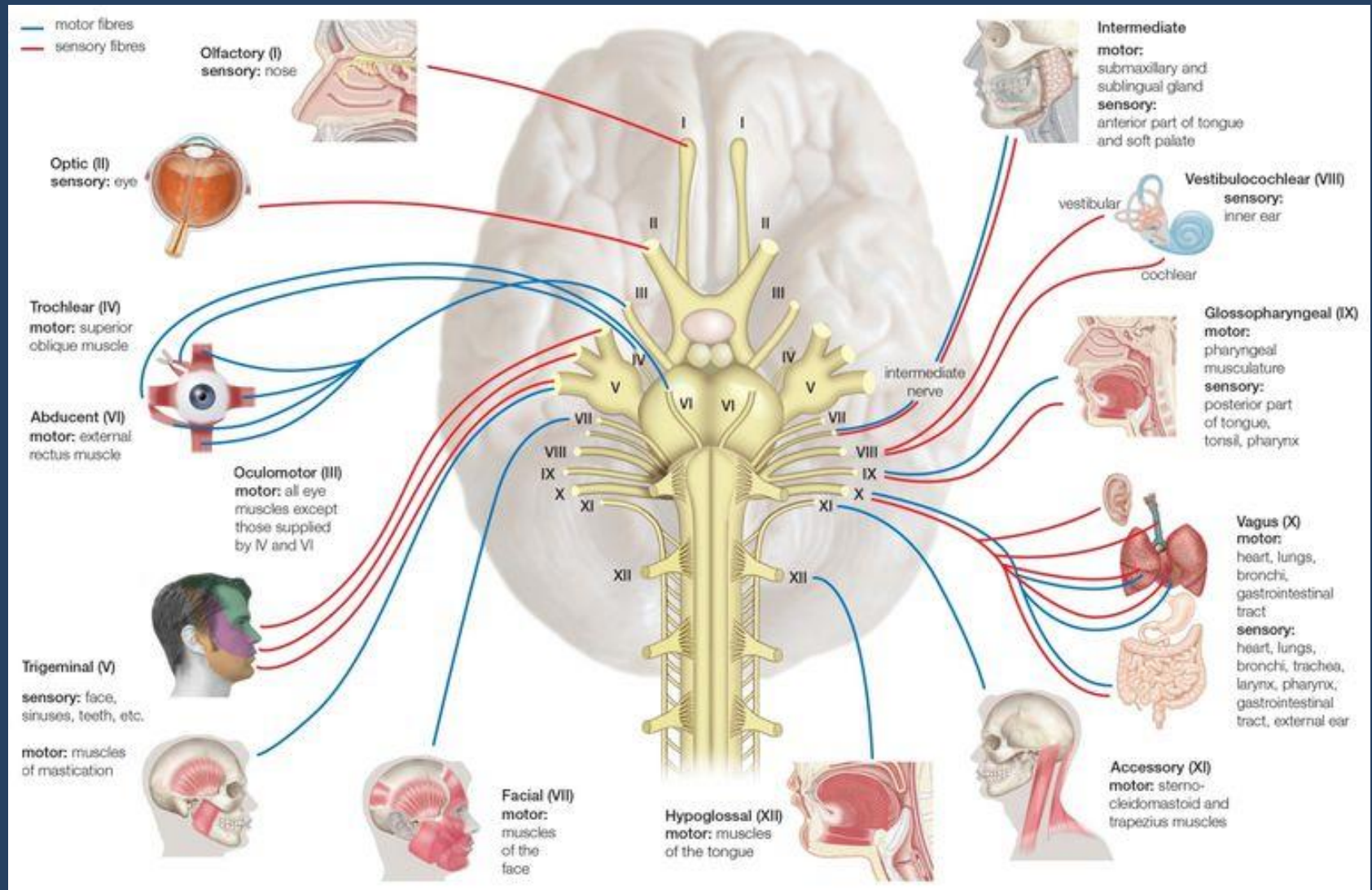


# Diffuse Axonal injury

- Diffuse Axonal Injury occurs when the brain rapidly shifts inside the skull as an injury is occurring.
- The long connecting fibers in the brain called axons are sheared as the brain rapidly accelerates and decelerates inside the hard bone of the skull.
- Devasting injury
- Axons (message sending part of the brain cell) is damaged
- Patient appears to be in a coma with no evidence of an intracerebral bleed



# CRANIAL NERVE



# CRANIAL NERVE TESTING

- I: disturbance of smell
- II: visual acuity using Snellen chart
- II & III: pupillary reaction direct and consensual accommodation
- III,IV,VI: conjugate eye movement, note nystagmus / diplopia
- V&VII: facial muscle strength / sensation
- VIII: disturbance of hearing / vertigo
- IX,X,XII: tongue movement, soft palate movement, gag reflex, taste
- XI: shoulder shrug, trapezius and sternomastoid

# Cranial nerves

- Takes time to learn
- II – VI: most important in initial settings
  - Pupillary response & eye movements
- Cranial nerve I: OLFACTORY:
  - Generally not tested in emergency settings
- II-XII

## Cranial nerve II

- Optic sensory
  - Not fully tested : usually no fundoscopy
  - Left to test is:
    - VISUAL FIELDS
    - Visual Acuity



Gross defects can be tested asking of any part of face is missing

- Tests all 4 quadrants
- Temporal
- Nasal
- Superior
- Inferior

Ask how many fingers in each quadrant

# Cranial nerve III-IV-VI: eye movements

## Cranial nerve III

- OCULOMOTOR
- One of the most important as in danger of compression if RICP
  - Check eye movement: H pattern (-see next slide)
  - In, up and down movement

- Cranial nerve IV
  - In & down

## Cranial nerve VI:

- out

Observe for any restrictions in movement and nystagmus

<https://www.youtube.com/watch?v=oQuvTgOcvb8>

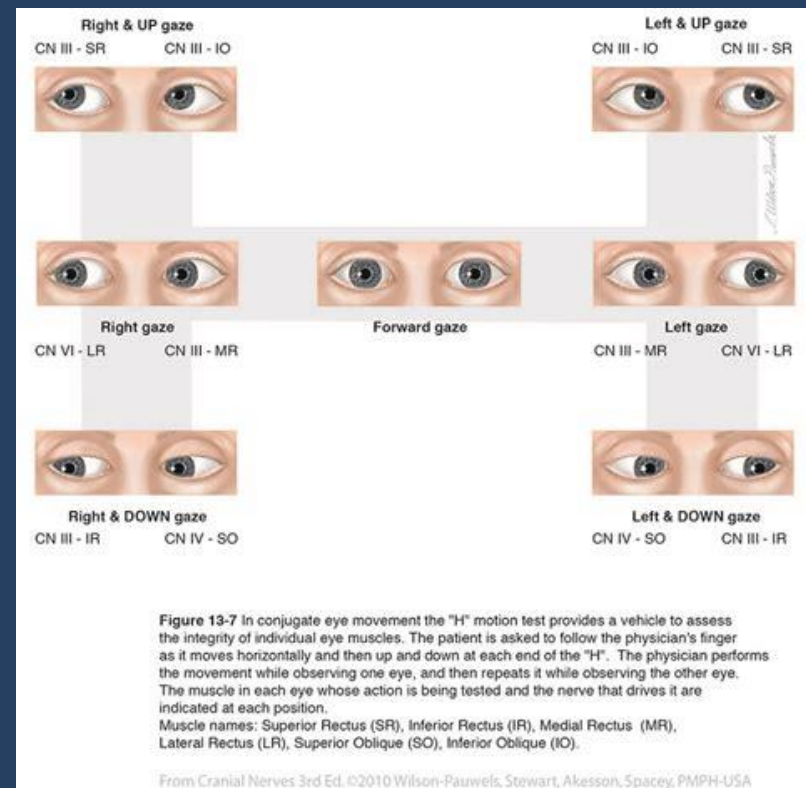
1. Hold your finger (or pen torch) about 30cm directly in front of the patient's eyes and ask them to look at it. Look at the eyes in the primary position for any deviation or abnormal movements.

2. Ask the patient to keep their head still and follow your finger with their eyes.

3. Ask the patient to report any double vision.

4. Move your finger through the various axes of eye movement ("H" shape).

5. Observe for restriction of eye movement and note any nystagmus.



# Examination – Cranial Nerves

Cranial Nerve	What is does	How to test	Abnormal
I Olfactory	Smell	<ul style="list-style-type: none"> <li>•Ask patient to close eyes and smell common aromas(coffee/lemon) one nostril at a time</li> <li>•Identify smell</li> </ul>	<ul style="list-style-type: none"> <li>•Fracture to the ethmoid bone</li> <li>•Trauma to nerve</li> <li>•Anosmia</li> </ul>
II Optic	Vision	<ul style="list-style-type: none"> <li>•Pupil reactions with a light</li> <li>•Visual Fields – Finger movements in upper, lower, nasal and temporal fields</li> </ul>	<ul style="list-style-type: none"> <li>•Lack or direct reflex but has consensual reflex then optic nerve or retina</li> <li>•Pupil fixed &amp; dilated with consensual response then ocular motor nerve</li> <li>•Diplopia</li> <li>•Nystagmus</li> <li>•Ptosis</li> </ul>



# Examination – Cranial Nerves

Cranial Nerve	What it does	How to test	Abnormal
III, IV, VI Oculomotor, Trochlear and abducens	Eye movement Pupil constriction	<p><b><u>Oculomotor</u></b> Assess eyelids for openness Assess eye movements (up/down/towards nose)</p> <p><b><u>Trochlear</u></b> Assess eye movements (down when adducted)</p> <p><b><u>Abducent</u></b> Abducts the eye</p>	<ul style="list-style-type: none"> <li>•External strabismus (oculomotor nerve)</li> <li>•Ptosis</li> <li>•Impairment of eye movement</li> <li>•Diplopia</li> <li>•Poor close focus</li> <li>•Impairment of eye movement</li> <li>•Internal strabismus</li> <li>•Nystagmus – fracture of petrous bone</li> </ul>



# Examination – Cranial Nerves

Cranial Nerve	What is does	How to test	Abnormal
V, VII Trigeminal and facial nerves	<p><b><u>Trigeminal</u></b> Sensory &amp; motor function &amp; supplies the face</p> <ul style="list-style-type: none"> <li>•Sensory: Ophthalmic, Maxillary &amp; mandibular</li> <li>•Motor: Muscles for mastication</li> </ul> <p><b><u>Facial nerve</u></b> Temporal, zygomatic, buccal, mandibular and cervical Facial expression Taste (anterior 2/3 of tongue) Tears and saliva</p>	<ul style="list-style-type: none"> <li>•Stroke the patient on the forehead, cheek and mandible</li> <li>•Ask patient to resist mouth opening</li> </ul> <ul style="list-style-type: none"> <li>•Observe face for symmetry</li> <li>•Observe smiling</li> <li>•Observe blinking</li> <li>•Resist eye opening</li> <li>•Bare teeth</li> <li>•Balloon cheeks</li> <li>•Purse the lips</li> <li>•Whistle</li> </ul>	<ul style="list-style-type: none"> <li>•Loss of sensation</li> <li>•Inability to resist actions</li> <li>•Asymmetry</li> </ul>

# Examination – Cranial Nerves

Cranial Nerve	What is does	How to test	Abnormal
VIII Vestibulocochlear	Sensory information to the brain from vestibular balance receptors (inner ear) Hearing	<ul style="list-style-type: none"> <li>•Tuning fork on the mastoid process (bone conduction)</li> <li>•Tuning fork in front of ear (air conduction)</li> <li>•Walk patient heel to toe</li> </ul>	<ul style="list-style-type: none"> <li>•Loss of hearing</li> <li>•Poor balance with tendency to fall towards the side of deficit</li> </ul>
XI, X, XII Glossopharyngeal, vagus & hypoglossal	<p><b><u>Glossopharyngeal</u></b> Posterior 1/3 tongue, swallowing and gag reflex</p> <p><b><u>Vagus</u></b> Parasympathetic motor fibres to heart, lungs and abdo organs</p> <p><b><u>Hypoglossal</u></b> Motor fibres to the tongue</p>	<ul style="list-style-type: none"> <li>•Use tongue depressor to visualise uvula and ask patient to say “ahh”. Uvula should rise</li> <li>•Touch tonsil area to cause gag</li> <li>•Larynx can be assessed by asking patient to speak, cough and swallow water</li> <li>•Ask patient to stick out their tongue</li> </ul>	<ul style="list-style-type: none"> <li>•No gag response</li> <li>•Choking</li> <li>•Deviation of tongue to one side</li> </ul>

# Examination – Cranial Nerves

Cranial Nerve	What is does	How to test	Abnormal
XI Accessory	Combined cranial and cervical spine nerve Motor fibres to the sternocleidomastoid muscles of neck/trapezius	<ul style="list-style-type: none"><li>•Resisted flexion movements of the neck</li><li>•Resisted movements of the shoulders</li></ul>	<ul style="list-style-type: none"><li>•Reduced strength</li></ul>

# ***CRANIAL NERVE VIDEO***

# DOCUMENTING CRANIAL NERVE TESTING

- II: visual acuity using Snellen chart
- II & III: pupillary reaction direct and consensual accommodation
- III,IV,VI: conjugate eye movement, note nystagmus / diplopia
- V&VII: facial muscle strength / sensation
- VIII: disturbance of hearing / vertigo
- IX,X,XII: tongue movement, soft palate movement, gag reflex, taste
- XI: shoulder shrug, trapezius and sternomastoid
- PEARL
- No altered vision (Central or peripheral)
- No nystagmus or diplopia
- No ptosis
- FROM eyes
- No facial numbness
- Equal and symmetrical facial movement. FROM jaw
- NO hearing loss
- No voice changes and talking in full sentences
- Uvula central and rising
- Full strength on resisted movement to neck and shoulders
- No tongue fasciculation

# Additional tests

- Upper limb strengths / weakness
- Lower leg strength / weakness
- Fine tests, touch examiners nose / own nose / clapping
- Heel along opposite shin

## CRANIAL NERVES

1. OLFACTORY
2. OPTIC
3. OCULOMOTOR
4. TROCHLEAR
5. TRIGEMINAL
6. ABDUCENS

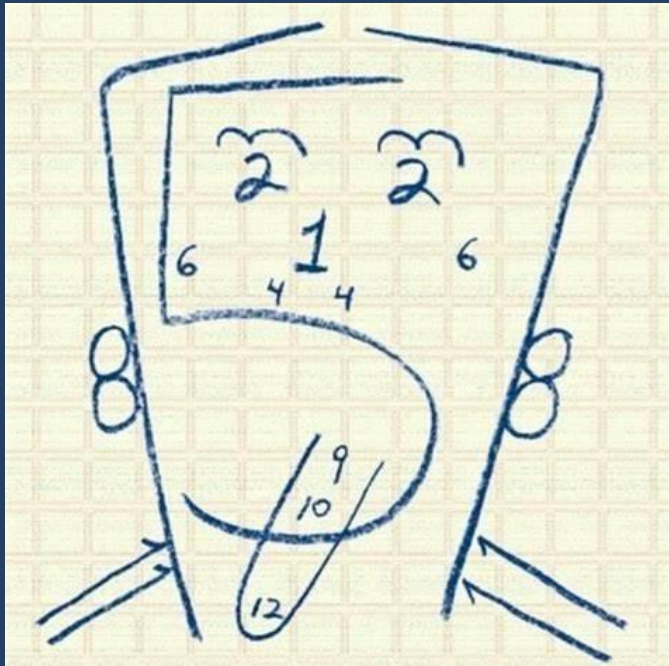


7. FACIAL
8. ACOUSTIC
9. GLOSSOPHARYNGEAL
10. VAGUS
11. ACCESSORY
12. HYPOGLOSSAL

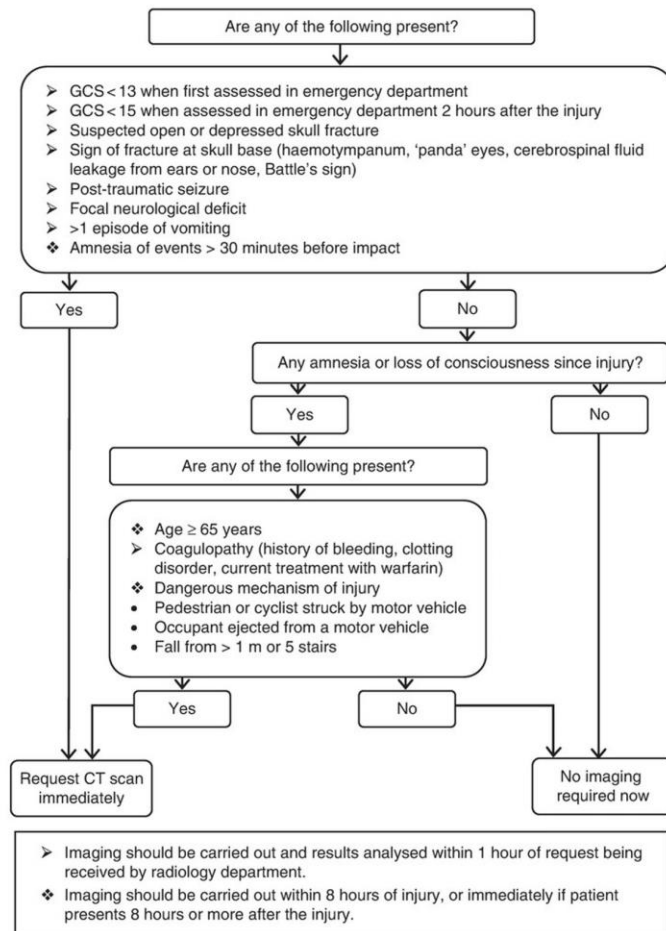
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# PRACTICE



## Appendix IV Adapted NICE guideline for CT scanning in adult head injury



- One study showed that use of biomarker (S100B) within 6 hrs of injury performed well as a diagnostic test to exclude significant intracranial pathology in low risk patients meeting NICE CT head injury criteria (Rogan et al, 2023)



# Discharge

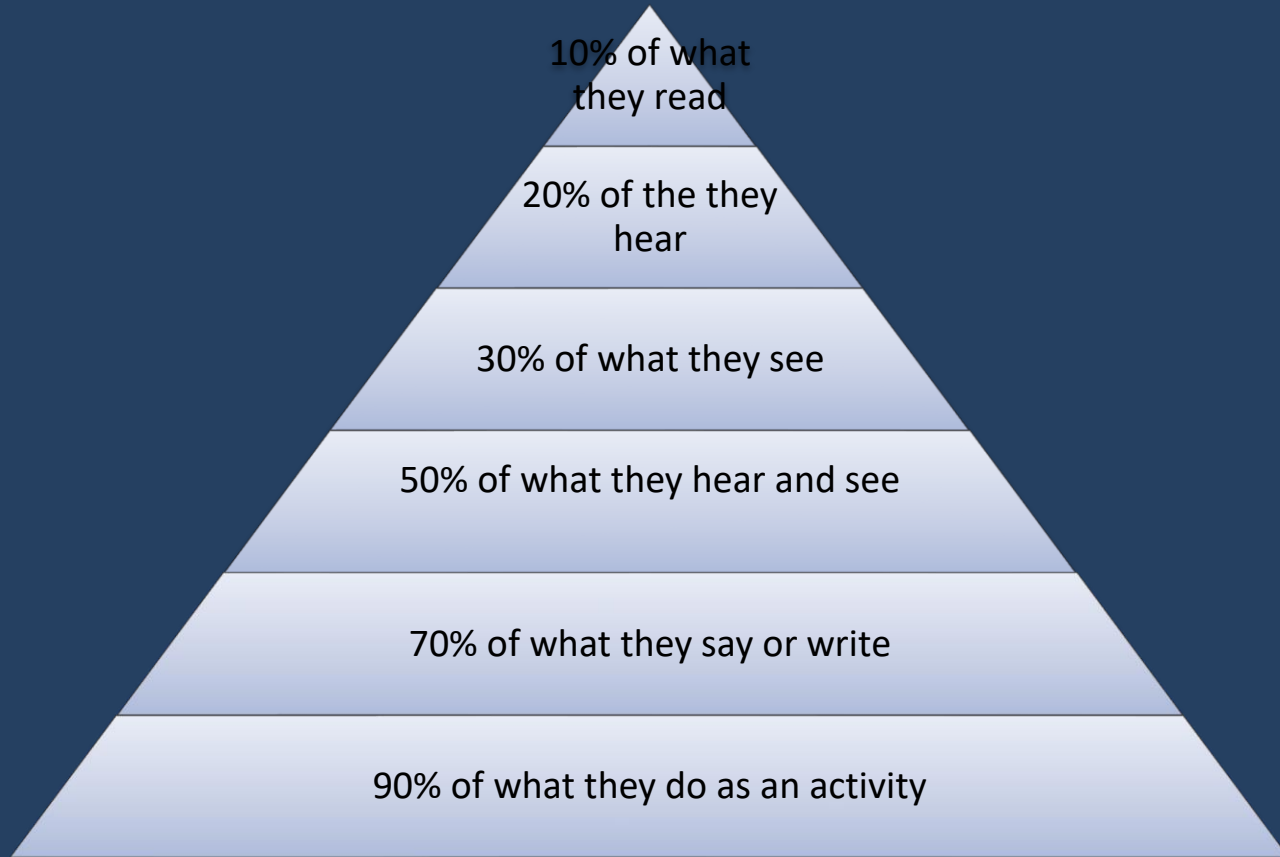
- All patients must have been given written and verbal head injury advice
- If wound closure has been carried out they should have written and verbal wound care advice
- Advised re: use of simple analgesia
- Advise re: when to return to UCC or attend ED
- Discharge in the care of a responsible adult if child
- Accident Prevention advice where appropriate

# Discharge and Follow-up

- ✓ Follow-up as required
- ✓ Responsible adult to stay with the patient for first 24 hrs
- ✓ Inform about community resources
  - *Headway Website*
- ✓ Worsening Care Advice
  - Inform about *Post Head Injury Symptoms*
  - Recovering process
  - Provide verbal & written discharge advice
  - Information about everyday activities including work and sport
  - Return if worsen symptoms



# People generally remember:



Ref: Masters, 2013

## Advice for people 16 and over with a head injury

We have assessed your head injury and it's very unlikely to cause worrying symptoms in the coming days.

Do not stay at home alone for the first 24 hours after leaving hospital. Also, stay near a telephone for the first 24 to 48 hours in case you need to access emergency medical help.

Do not drive, cycle or operate machinery until you feel completely better. You can ask your doctor for advice about this.

### When to go back to hospital

Go to your nearest hospital emergency department as soon as possible, if you develop any of these symptoms:

- unconsciousness or lack of full consciousness (for example, a problem keeping your eyes open)
- drowsiness (feeling sleepy) that lasts longer than 1 hour when you would normally be wide awake
- problems understanding or speaking
- loss of orientation (such as knowing where you are, what time of day it is, who you're with and what's going on around you)
- loss of balance or problems walking
- weakness in 1 or more arms or legs
- problems with your eyesight
- a painful headache that will not go away
- being sick
- seizures (also called convulsions or fits)
- clear fluid coming out of your ears or nose
- bleeding from 1 or both ears.

If you're unwell, get someone to take you to the emergency department or call 999 or 111.

NICE

Suggestion for  
written head injury  
discharge advice

# Further learning/resources

Short on line head injury learning module covering with quiz at the end

<https://dontforgetthebubbles.com/head-injuries-module/>

A charity dedicated to promote understanding of all aspects of brain injury and provide information, support and services to survivors, their families and carers.

**Headway (2018) *Minor Head Injuries and concussions* .**

<https://www.headway.org.uk/about-brain-injury/individuals/types-of-brain-injury/minor-head-injury-and-concussion>

# Further learning/resources

→ ↻ 🔒 https://what0-18.nhs.uk

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Improving the health of children and young people  
in Donset, Hampshire and the Isle of Wight

  
**RCPCH**  
Royal College of  
Paediatrics and Child Health  
*Leading the way in Children's Health*

  
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- Healthier Together **Head Injury Advice Sheet.** [https://what0-18.nhs.uk/application/files/8815/8643/3598/CS45385\\_NHS\\_Head\\_Injury\\_advice\\_sheet\\_April\\_20.pdf](https://what0-18.nhs.uk/application/files/8815/8643/3598/CS45385_NHS_Head_Injury_advice_sheet_April_20.pdf)
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