Lancashire Teaching Hospitals NHS
NHS Foundation Trust

Welcome and learning package

Pre- registration nurse

Neurosciences Directorate

Students Name _____

Mentors Name _____

Dates of placement _____

Updated August 2011

Welcome to the Neurosciences Directorate. During your placement we hope that you will feel part of the team.

You will be allocated a mentor who will, with the assistance of others, provide you with support. You will be rostered to work with your mentor as much as possible during your placement.

We encourage you to take responsibility for your own learning and it will be your responsibility to arrange times with your mentor for your assessments and to review your work. Your priority will be to learn and the staff will endeavour to facilitate this for you. We encourage you to ask questions which can be directed at any member of the Multi disciplinary team (MDT) within the ward, and to seek out learning opportunities.

During your placement you will be aiming to achieve the learning outcomes for NU 2500 Nursing Interventions in adult nursing care, and NU 2501 Practical ethics. There are plenty of opportunities for you to achieve this during your placement.

On your first day please complete the learning contract and ensure that the orientation and health and safety checklist has been completed.

Resources for learners.

Each ward in the directorate has a folder containing information about training and education available within the Trust, information can be found either here or in the resource room where there is a notice board for pre-registration students.
The resource room, although situated on Ward 2a, is for the use of the whole directorate where there are a variety of resources available. If you need any other resources please ask the Clinical Educator.
The computer in the resource room is also available for you to use.
The orange 'information' folders provided by the university are located in the office of each of the wards.

The speciality of Neurosciences is vast and it would be impossible to cover everything during the short duration of a placement. The purpose of this learning package is to assist you in developing the basic skills and knowledge required to safely care for a patient in the Neuroscience setting. It is important to consider the area in which you are working within the context of the directorate as a whole and in consideration of the patient's journey.

The neuroscience directorate consists of Neurosurgery on Wards 2a, b, and c and Neurology on Ward 17. On ward 2a, b and c, pre and post- operative patients are cared for. Some post op patients are level 2 (more highly dependant) and these patients are monitored on Ward 2a.

Ward 17 is a neurology ward. The Neuro-rehabilitation unit cares for patient's who have had a traumatic brain injury.

The directorate is supported by various specialist nurses, and physiological measurements technicians.

Current Hours of duty worked within the directorate:-

	Ward 2a,	2b	Ward 2c	17	NRU
Early shift	07.00 – 15.00				07.15 – 15.15
Late Shift	13.30 – 21.30				
Night Shift	21.00 – 07.30				

Suggested reading for this placement.

Any good anatomy and physiology book such as 'Principles of Anatomy and Physiology' Tortora and Babowski. Wiley.

A Neurosciences nursing book e.g. 'The Clinical practice Neurological and Neurosurgical Nursing.' Joanne V Hicky. Lippincott.

Nursing journals.

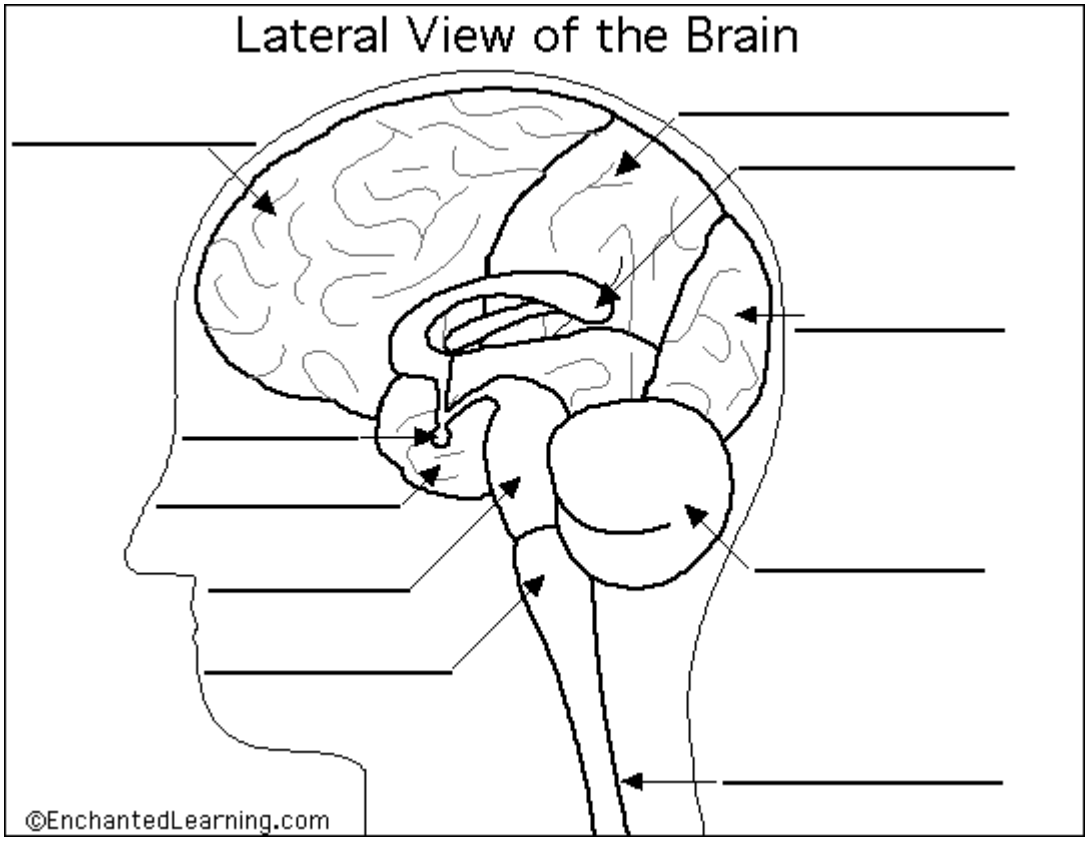
'Neurology and Neurosurgery illustrated.' Lyndsey, Bone, Callendar.

You will find it helpful to have knowledge of the following.

- The areas of the brain and their function.
- Cerebral circulation
- The cranial nerves
- Basic spinal anatomy.

Neuro Anatomy and Physiology.

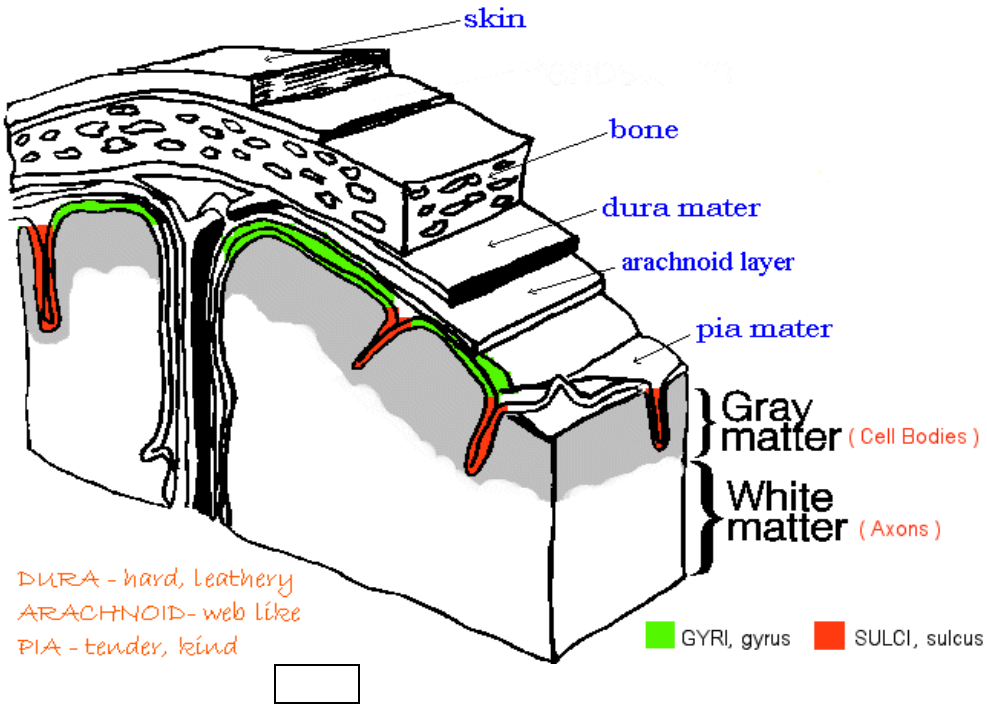
From reviewing the basic anatomy of the brain from a textbook of your choice can you label the diagram below?



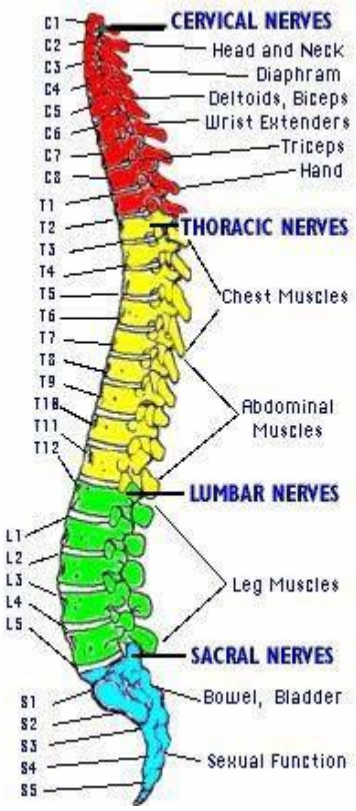
Which areas of the brain are responsible for these functions?

Function	Area of brain responsible.
Personality Emotions Motor Problem solving reasoning	
sensory	
Hearing Language Speech	
vision	
Balance and coordination	
Regulation of basic body functions	

The Meninges.



The spine



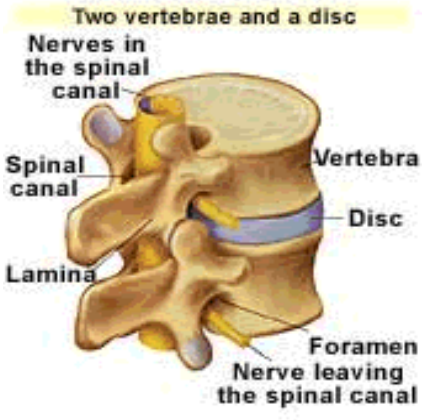
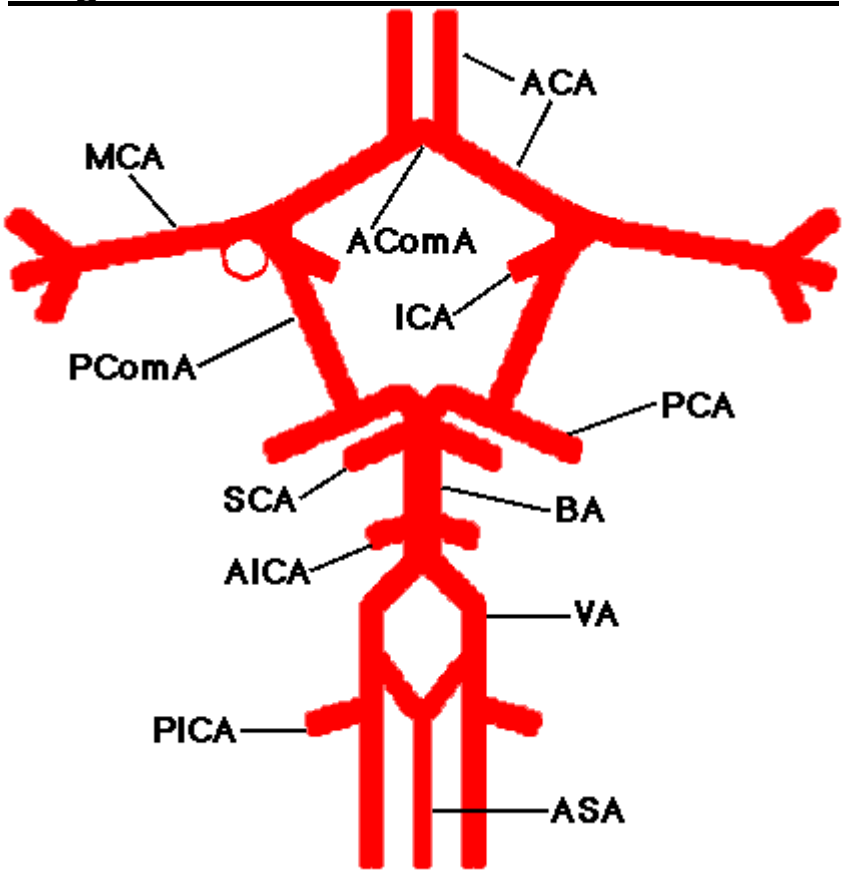


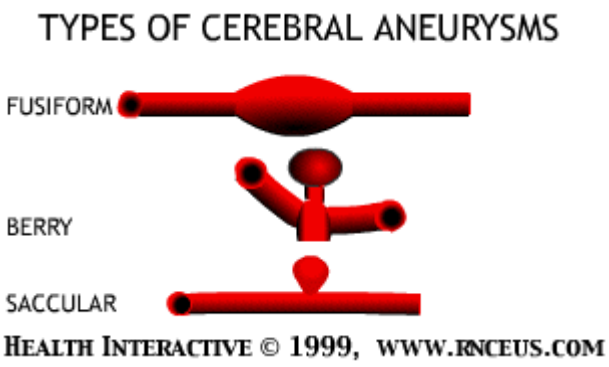
Diagram to illustrate cerebral circulation.



Can you complete the diagram by indicating what the letters stand for?

ACA		AICA	
MCA		ICA	
PCA		PICA	
AICA		VA	
BA		ASA	
SCA			

Diagram to illustrate cerebral aneurysms



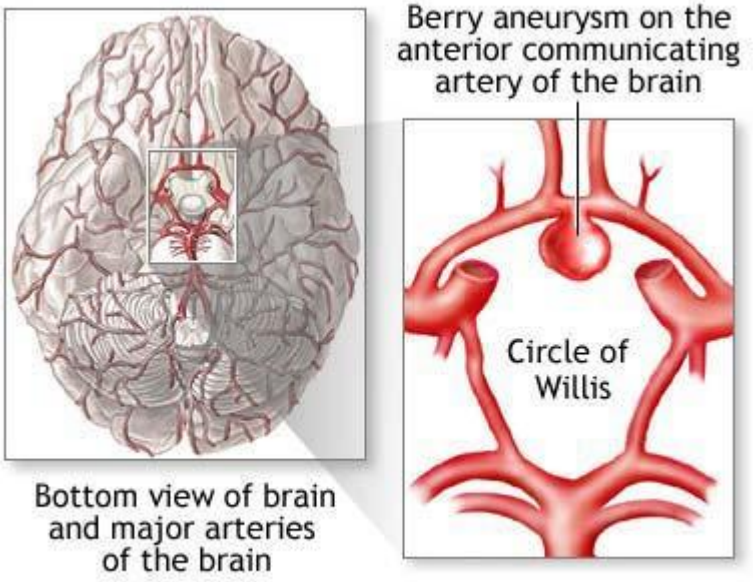
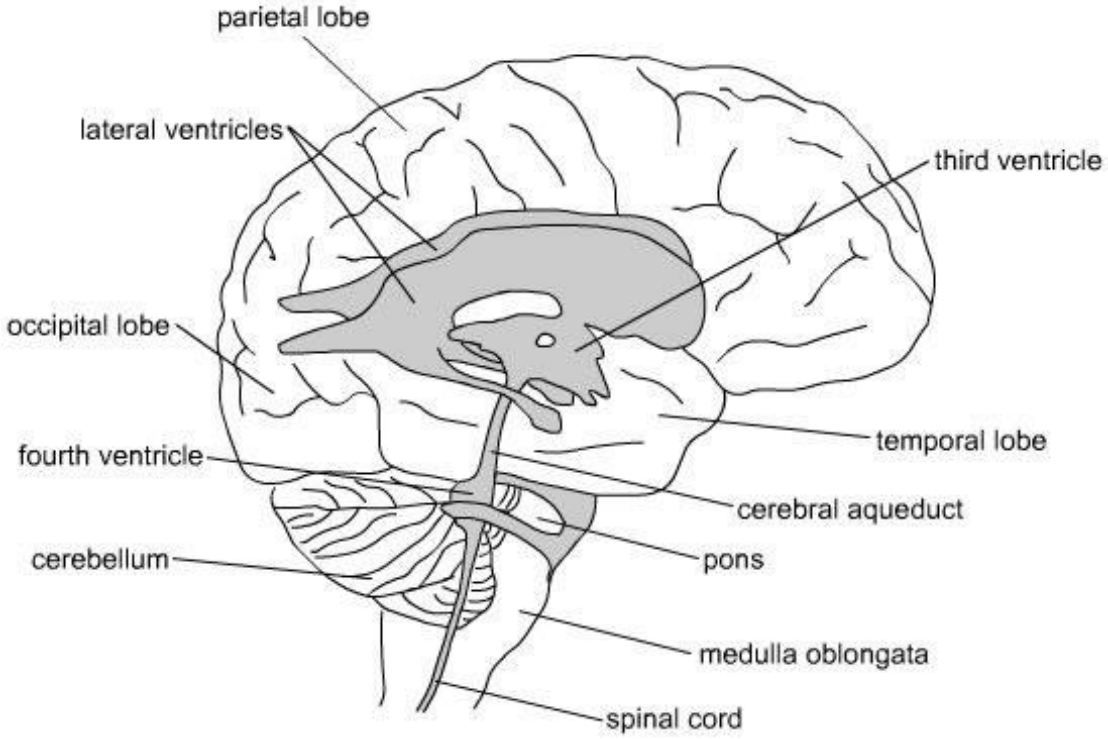


Diagram to illustrate the ventricles of the brain.

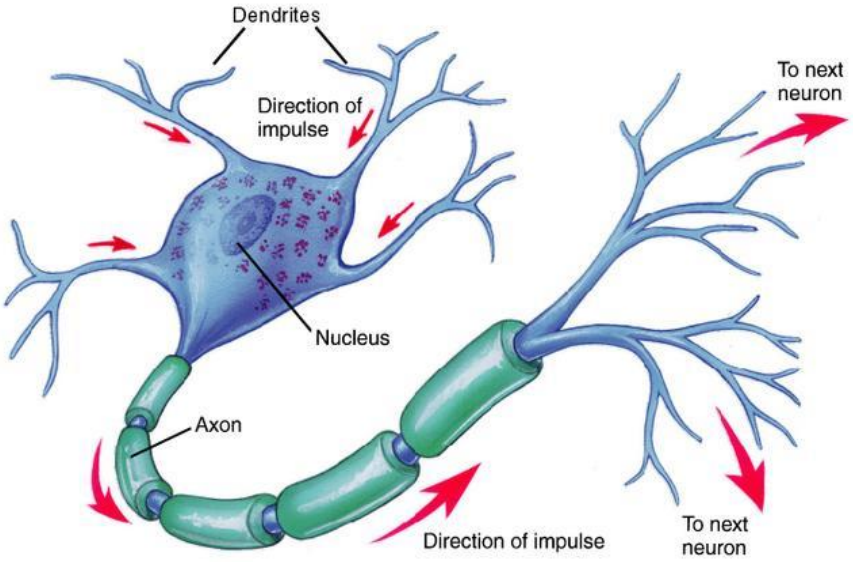


Where is CSF produced?

What is its purpose?

Where does it go?

Neurological disorders can occur as a result of damage or dysfunction of the nerve cells (neurones).



Describe the following

Sensory nerve

_____

Motor nerve

_____

Which Neurological disorder is associated with degeneration of motor neurones.

_____

Neurotransmitter

_____

Which Neurological disorders are associated with dysfunction at the neuromuscular junction.

_____

The shaded areas around the neuron on the diagram above represent the myelin sheath. What is the function of the myelin sheath?

_____

Which neurological condition is caused by a disorder of the myelin sheath?_____

Neurological assessment

All patient s admitted to Neurosciences have a full Neurological assessment carried out by the medical staff who document this information in a booklet. Take a look at a completed booklet. Ongoing Neurological assessments are also carried out by the nursing staff.

Why do we perform neurological assessment?

- To give information about a patient's conscious level by looking at behavioural responses, in association with vital signs and pupil reaction,
- To help determine which regions of the nervous system need further investigation and if any emergency therapeutic interventions are needed prior to further investigation
- ….and thus to help preserve the functioning of the nervous system.
- To highlight any deterioration in the patient's condition.

How do we carry out neurological assessment?

A full neurological examination of the patient for diagnostic purposes involves assessment of:-

- Patient history
- Mental status
- Cranial nerves
- Motor system
- Reflexes
- Coordination and gait
- Sensory system.
- Skull and spine

Neurological observations give us information about the patient's central nervous system i.e. the brain and spinal cord.
The Glasgow coma scale devised by Teasdale and Jennet 1974 is a useful tool for assessing level of consciousness.
Reduced level of consciousness can occur as a result of intracranial disease, or secondary to other systemic conditions. It is a common feature in acute illness and therefore forms part of the overall patient assessment A, B, C, D, E.
D is for debility and refers to neurological assessment.
The ALERT principles highlight that a reduction in level of consciousness can lead to a compromised airway and for this reason a more rapid assessment can be used using the AVPU scale.

Causes of neurological deficit.

Head injury
Intracranial haemorrhage
Space occupying lesion
Cerebral infarction
Intracranial infection / abscess
Cerebral malignancy
Hypoxaemia
Hypotension
Hypercapnoea
hypoglycaemia
hyponatraemia
drugs
fits
hypothermia
hyperthermia
hypothyroidism
hepatic encephalopathy

The Glasgow Coma Scale. (GCS)

The GCS is a numerical scale where scores are assigned to three behavioural responses:-

- Eyes opening
- Verbal response
- Motor response.

The total score gives a combined score of 15. It is more helpful to report the score for each behaviour as an indication of where the problem lies, and this is often abbreviated thus E3, V2, M5, = GCS 10. The highest score of 15 indicates a person who is alert and responsive, the lowest score is 3. A patient with a GCS of <9 is usually electively intubated because of the risk of loss of airway.

E – Eyes opening

		Score	
EYES OPEN (Eyes closed by swelling = C)	Spontaneously	4	The patient opens eyes as you approach.
	To speech	3	Opens eyes when spoken to or touched. Persist, raise voice if necessary. If no response apply painful stimuli.
	To pain	2	If the patient does not have facial injuries or a basal skull fracture apply orbital pressure, or pressure at the jaw margin. Alternatively try squeezing the trapezius muscle between thumb and forefinger.
	None	1	

Painful stimuli should be performed for no longer than 30 seconds.

V – Verbal response

		Score	
Best verbal response	Orientated.	5	The patient needs to be able to state who and where they are, the month and current year.
	Confused.	4	The patient is confused if they are unable to answer these questions.
	Uses inappropriate words	3	Those that are unrelated to the questions asked.
	Makes incomprehensible sounds	2	Moans and groans in response to speech or stimuli.
	None	1	

If the patient is unable to respond due to the presence of an Endo tracheal tube or tracheostomy then this is recorded as T.
If the patient has dysphasia this is recorded as a D.
What is dysphasia?

M – Motor response

Best motor response.	Obeys commands	6	Ask patient to stick their tongue out. Allows assessment of patients who may have spinal injury that prevents them from moving their limbs. Asking a patient to squeeze your fingers can illicit a primitive grasp which can be confused with an appropriate response.
	Localizes to pain	5	If patient does not obey command apply painful stimulus. Attempting to remove cause of pain is an example of localizing.
	Withdraws to pain	4	
	Abnormal flexion to pain	3	There may be a purpose less flexion of arms. Unequal flexion in the arms could indicate Hemiparesis or hemiplegia.
	Extension to pain	2	Sometimes accompanied by internally rotating the shoulder and hand.
	None	1	Painful response should not be applied to the lower limbs as any response may be the result of a spinal reflex which could be confused as appropriate.

The chart overleaf is an example of a Neurological observation chart. The chart currently in use on the Neurosciences wards is an enlarged version of this chart and includes the early warning score and action plan.

AVPU

Carrying out a full neurological assessment and getting an exact score can take time. In the emergency situation where a loss of consciousness is often secondary to hypovolaemia, and or hypoxia, a simple assessment of the patient's overall response using AVPU is applied.

A = awake and alert
V= responds to speech
P= responds to painful stimuli
U= unresponsive.

Pupil response.

Raised intracranial pressure can cause pressure and or damage to the occulomotor nerve, which affects pupil reaction, if this is suspected then pupil response should be checked regularly.

Pupil size.

Pupil size and reactivity assesses the nerve pathway from the optic nerve to the midbrain. Changes in pupils are a late sign of raised intracranial pressure and deteriorating level of consciousness. Pupil size is estimated against a scale of 1 – 8 millimetres. The normal size is 3 – 4. Pupils should be symmetrical. Some individuals have normally asymmetrical pupils but they should react normally. None reacting pupils can occur as a result of eye disease, ocular motor nerve compression, or optic nerve disorders. Bilateral dilatation can also occur where there is sympathetic over activity such as in overdose of tricyclic antidepressant drugs, or when adrenaline has been administered during resuscitation.

Direct light response.

Move a lit pen torch from the outer aspect of the eye towards the pupil. The pupil should constrict briskly. Move the pen away and the pupil should dilate to its original size. Repeat in the other eye. This constriction and dilatation is referred to as the direct light response.

Consensual light response.

When shining the light in one eye, watch the reaction in the other. Both pupils should react the same simultaneously. This is referred to as the consensual light response.

Brisk constriction is recorded as +, no reaction is recorded as -.

Abnormal responses.

If the patient has a lesion on one side then the pupil on that side will be unresponsive. The opposite pupil will however react consensually, the none responding pupil referred to as unresponsive consensually.

Limb responses

These are assessed to identify any deficit such as weakness (muscle weakness) or loss of movement which can be caused by damage to nerve pathways e.g. in spinal cord lesions or injuries, or by compression of brain tissue. Each limb needs to be assessed separately.

Optimum position for assessing limbs is semi-recumbent. Strength of response is assessed from no response to normal power. Apply resistance to the patient's limbs, with normal power the patient should be able to resist you. A patient with normal power will be able to hold their arms up in the air and hold them there, or raise a leg up off the bed. If the patient is unable to obey commands then the limb's response to pain can be assessed by applying pressure to the side of the nail bed in a toe or finger. This should result in flexion of the arms and extension in the legs.

Patients who have suffered a spinal injury will have a lack of movement in both limbs below the level of the injury.

The limb responses are referred to as MRC grade. What does this mean?

Vital signs.

Raised intracranial pressure causes a rise in blood pressure, a drop in heart rate, a drop in respiratory rate, and a rise in temperature. These are late signs with agitation or confusion and weakness of the limbs presenting first.

The unconscious patient may also maintain stable vital signs.

Laboratory assessment

The cause of neurological deterioration may be chemical which needs to be confirmed or excluded. A bedside measurement of blood sugar supported with a laboratory assessment can easily be carried out. Blood can also be taken to assess electrolyte balance and other specific investigations.

Neurological assessment includes assessment of GCS, pupil reaction, limb movements, vital signs, and laboratory investigations in order to determine the nature of the patient's problem, and therefore any interventions that may be required. Follow ABCDE, as management of the airway overrides any other potential interventions.

The following is a tool that is used to assess the competence of nurses in this Trust in carrying out the nursing component of the neurological assessment of a patient. When you have had sufficient practice with your mentor ask your mentor to assess you using the tool.

Competency statement

Can perform the nursing component of the neurological assessment of a patient.

Assessment criteria **Minimum Assessment Criteria level to be achieved: - Stage ……..**	**Final Assessment Date:** ……
Performance indicator (To include Range where applicable)	**Stage achieved**
Identifies the need to carry out neurological assessment and observations. **Range** • Newly admitted patient • Patient in whom neurological deterioration is anticipated or suspected.	
Explains to the patient the need for carrying out neurological observations and describes what this will entail. (Where appropriate)	
Communicates with the individual in a way that is appropriate with their **Range** • Level of understanding, • Culture, • Life experiences • Preferred ways of communicating	
Can assess the patient's behavioural response using AVPU scale.	
Assesses the patient's behavioural responses using Glasgow Coma Scale (GCS). • Assesses eye opening. • Assesses best verbal response • Assesses best motor response.	
Records the responses on the correct chart. • Records correctly where the patient is unable to open eyes due to swelling. • Records correctly where patient is intubated or has an endotracheal tube in place. • In accordance with the Neurosciences benchmark (Where appropriate)	
Elicits responses in the correct way. • Applies painful stimuli by applying supraorbital pressure (unless patient has facial fractures) or by squeezing the trapezius muscle (avoids pinching the skin.) • Asks patient to stick out tongue. (If appropriate) • Ensures verbal commands can be audible to the patient. • Avoids applying painful stimuli to lower limbs. • Avoids asking patient to 'squeeze'	
Checks the patient's pupils, records findings correctly, and can discuss the significance of findings. • Size • Response to direct light using pen torch. • Consensual response.	

Assesses the patient's limb responses. **Range** • Assesses limbs with patient in the optimum semi-recumbent position. • Assesses each limb separately for strength and movement. • Records strength in correct way on neurological observations chart. •	
Recognises abnormal responses.	
Can demonstrate / discuss the appropriate action to be taken in the event of the GCS being less than 9. • Can identify medical contact. • Is proficient in basic airway management. • Can assist with advanced airway management.	
Observes and records the patient's vital signs.	
Checks the patient's blood sugar and performs bedside measurement of blood sugar where appropriate.	
Related knowledge	**Stage achieved**
Can describe the basic anatomy and physiology of the brain and nervous system.	
Can state the conditions that give rise to changes in neurological status	
Can discuss the possible causes of deterioration in patient's neurological state.	
Can identify and describe seizure activity document this, and take appropriate action.	
Can discuss the investigations that may be required as part of the neurological assessment.	
Can discuss the impact of neurological deterioration on vital signs.	
Can describe the medical components of a full neurological assessment. **Range** • Patient history • Cranial nerve function.	
Specifically understands the effects of predisposing conditions on baseline assessments and subsequent measurement of change with regards to patients who have learning / physical disablities.	

Please indicate in the grid below, which method(s) of evidence production have been used to demonstrate your competency and underpinning knowledge

Written Evidence	**Observation**	Testimonial	**Questioning Discussion**	**Reflection**	**Simulation**

Signature
Assessor/Mentor_____Print Name_____

Signature
Staff_____Print Name_____

Evidence base/references

ALERT Manual 2000
Mooney G, Commerford D. Neurological observations. *Nursing Times 29 April 2003.*

Vol 99 No 17.
Teasdale G, Jennet B (1974) Assessment of coma and impaired consciousness: a practical scale. Lancet 2 (7827) 81-84
North West Region and Dublin Neurosciences Benchmark Group.
Woodward S. Glasgow coma scale. *Nursing Times*. *January 1998.*

Surgical procedures commonly undertaken on Neurosurgery.

- Clipping of arterial aneurysm – anterior communicating aneurysm, middle cerebral artery aneurysm, posterior communicating aneurysm.
- Preparation of patients for coiling.
- Craniotomy – removal of tumour, evacuation of haematoma.
- Burr hole biopsy.
- Removal of extradural haematoma.
- Removal of intracerebral haematoma.
- Anterior cervical discectomy.
- Decompression laminectomy / discetomy / microdiscectomy.
- Transphenoidal pituatory
- Drainage of cerebral cysts
- Repair of CSF leak
- Peritoneal shunts, insertion, revision, replacement.

From the above list choose 3 (1 if on Neurology) conditions and consider the following questions.

- What preparation would these patients require?
- What does the procedure entail?
- What is the post-operative patient care of this procedure?
- What are the expected outcomes for the patient?
- What are the unwanted outcomes of this procedure?
- What advice would the patient need following this procedure?
- Which procedures require *urgent* surgical intervention?

Investigations commonly carried out within Neurosciences.

- Angiogram
- Ct scan, CTA
- Doppler
- ECG
- EEG
- EMG
- LPS
- MRI scan MRA
- Muscle biopsy
- Myelogram
- Tensilon test
- VEP
- Skull X R
- Chest X ray
- Dutch test
- Nerve conduction tests
- Visual fields

From the above list choose 3 investigations.

- Why are these tests carried out?
- Where are they carried out?
- What special preparation if any is required beforehand?
- What special care will the patient need afterwards?
- Who undertakes the investigation?
- Are there any other special consideration?

Problems commonly found in Neuroscience patients.

- Agnosia
- Dysphasia
- Dyspraxia
- Facial palsy
- Hemiplegia
- Motor and sensory deficits.
- Paraplegia
- Spacticity
- Quadraplegia
- The effects of being wheelchair or bed bound.
- The effects of uncertainty regarding diagnosis.

From the above list chose 3 and consider:-

- When can these problems occur in patients?

- What is the significance of these conditions?

- Are there any interventions that can alleviate them?

Conditions commonly found in Neuroscience patients.

- Cerebral and spinal tumours
- Chronic inflammatory polyneuropathies.
- Dementia.
- Encephalitis
- Epilepsy
- Guillain Barre syndrome.
- Motor Neurone disease
- Multiple sclerosis
- Myasthenia Gravis.
- Parkinson's disease.
- Dystonia.
- Normal pressure hydrocephalus.

From the above list chose one (3 if in Neurology) condition and explore:-

- The causes
- The aetiology
- Patient management, and specific nursing interventions.

Are there any specialist nurses who help to manage these patients?

Head injuries

Consider the head injured patients in the ward during your placement. How did they sustain their injury?

List some of the other causes of head injuries:-

Most people admitted to hospital with head injuries are discharged home after 48 hours.
More severe head injuries require a longer stay possibly including Intensive care.
Head injuries can be mild, moderate, or severe? How is this determined?

Primary brain injury – neurological damage produced by the cause, occurs at the time.
Secondary insult – occurs following trauma and can be prevented or minimised. What are the possible causes?

What can we do to minimise this?

What are the common types of head injuries that the patients on the ward have sustained?

Rehabilitation

Consider the following:-

- Can you define rehabilitation?

- When does rehabilitation start?

- Who are the people involved in rehabilitation?

- Where does rehabilitation take place?

- What is the role of the nurse in rehabilitation?

The future

Are you aware of any initiatives planned for Neurosciences, or initiatives that will affect care delivery within Neurosciences?

E.g. National service frameworks NSF. 'Action on' projects, NICE guidance. Tissue and organ donation.

Words commonly used in Neurosciences, and their meanings

A – (or An)	Absence of or inability to
Abdominal reflexes	Abdominal muscle contractions on stroking the skin
Akinesia	Inability to start a movement, slowness in movement.
Amnesia	Loss of memory
Anaesthesia	Inability to feel touch
Anarthria	Inability to pronounce words
Aneurysm	A weal bulge in an arterial wall
Angioma (AVM)	A collection of abnormal arteries, capillaries and veins.
Anosmia	Loss of sense of smell
Aphasia	Inability to speak
Aphonia	Inability to make sounds
Ataxia	Unsteadiness
Aura	Warning symptoms
Axon	Long process of nerve cell
Bulbar	Concerning the medulla
Burr-hole	A hole drilled in the skull
Carpel tunnel	Channel in wrist through which the median nerve passes.
Cat scan	Computerised axial tomography
Cauda equina	The nerve fibres below the spinal cord.
Cephalgia	Headache
Chiasma	Crossing of the optic nerves.
Choroid plexus	Vascular tissue in the ventricles forming the CSF
Circle of Willis	The arteries at the base of the brain
Cortex	The surface layer of the cerebral and cerebellar hemispheres.
Craniotomy	Opening the skull
Craneoplasty	Repair of the skull with synthetic material.
C.S.F.	Cerebro spinal fluid
Diploplia	Seeing double
Disc (optic)	The optic nerve leaving the eye as through an ophthalmoscope
Disc (intravertebral)	Fibro-cartilagenous cushion between the vertebrae.
Disorientation	Confusion as to time place, person.
Doppler	Method of using ultrasound
Dorsiflexion	Bending backwards

Words commonly used in Neurosciences, and their meanings-continued

Dys -	Difficulty in
Dysarthria	Difficulty on pronouncing words
Dysphasia	Difficulty in expressing thoughts in words
Electro encephalopathy (EEG)	Recording the electrical activity of the brain
Electromyography (EMG)	Recording the electrical activity of muscle
Encephalitis	Inflammation of the brain
Euphoria	A casual cheerfulness
Extrinsic	Outside and separate from nervous tissue
Fascia	Tough tissue covering the muscles in limbs or trunks
Flaccid	Limp, floppy, loss of tone
Focal	Arising from or limited to one part.
Focal epilepsy	A fit affecting one part of the body, arising from one point of the brain.
Foramen	A opening
Fossa	A compartment of the skull holding a part of the brain.
Ganglia	Collection of nerve cells.
Generalised fits	Convulsions affecting all parts of the body.
Gilia	Supporting cells and fibres of the nervous system.
Glioblastoma	The most malignant glioma.
Glioma	Tumours growing from supporting cells.
Grand mal (tonic clonic seizure)	Generalised tonic clonic seizures with loss of consciousness.
Grey matter	Nervous tissue containing nerve cells.
Hallucinations	Sensory impression of something that is not there.
Hemianopia	Loss of half of the visual field.
Hemiplegia	Paralysis of one half of the body.
Hydrocephalus	Enlargement of the ventricles.
Hypopituitrism	Loss of pituitary gland
Idiopathic	Of unknown cause
Intracranial hypertension	High pressure within the skull.
Intrinsic	Inside
Jacksonian fits	Convulsions starting at one pint and spreading to involve wider areas.
Medulla	Lower part of the brain stem.
Meningioma	A benign tumour growing from the arachnoid.

Words commonly used in Neurosciences, and their meanings - continued

Myelogram	X-R of the vertebral canal using contrast medium.
Magnetic resonance imaging (MRI)	A method of brain scanning using magnetic fields.
Neuralgia	Pain in the nerve
Neurone	The nerve cell, its fibre and all its branches.
Nystagmus	Rhythmical oscillation of the eyes.
Oculomotor	Concerned with eye movement
Olfactory	Concerned with the sense of smell.
Optic	Concerned with the eyes or visual pathways.
Otorrhoea	Running from the ear.
Papilloedema	Swelling of the optic nerve seen with an ophthalmoscope.
Petit mal (absence seizures)	A form of epilepsy, frequent episodes of detachment from surroundings.
Photophobia	Dislike of light
Posterior horns	Part of spinal grey matter receiving sensory roots
Ptosis	Drooping of the eye lid
Reflex	An automatic response to stimuli
Retro- Bulbar	Behind the eye
Rhinorrhea	Running from the nose.
Scotoma	A patch of blindness
Sella Turcica	A saddle shaped cavity at the base of the skull containing the pituitary gland.
Sensory	Concerned with feeling.
Sensory level	The point where sensation changes from normal to abnormal
Shunt	A method of bypassing an obstruction to CSF flow.
Space occupying lesion	A tumour or other growing lesion.
Spondylosis	Degeneration changes in bone and disc in the spine.
Status epilepticus	Prolonged seizure or, seizures following each other in rapid succession
Stereotaxis	Use of instrumentation to locate accurately locate lesions in the brain
Stupor	Unconscious but rousable
Subdural	Between dura and arachnoid.
Sulci	Furrows on the surface of the brain.

Words commonly used in Neurosciences, and their meanings - continued

Syrinx	A cavity in brain stem or cord
Tentorial herniation	Forcing part of the brain through the
Tic	Recurrent spasm
Tinnitus	Ringing in the ears
Trephine	A circular disc cut in the skull
Ventricles	Cavities in the brain containing CSF
Vertigo	A sense of rotation
Vestibular	Concerned with the Labyrinth and its connections.
White matter	The parts of the brain and spinal cord containing myelinated fibres.
Xanthochromic	Yellow coloured.

References and further reading

ALERT Manual 2000

Neurological observations Mooney G, Commerford D. *Nursing Times 29 April 2003. Vol 99 No 17.*

Aminof, M. Greenburg, D. Simon. RP. (1999). Clinical Neurology 3rd Ed. Appleton and Lange.

Glasgow Coma Scale Woodward S. *Nursing Times January 1998.*

Improving the Glasgow Coma Scale Score: motor score alone is a better predictor. Healy C et al. *Trauma Journal 2003 April 54(4):671*.

Hicky Joanne V. (2008) 'The Clinical practice of Neurological and Neurosurgical Nursing.' 6th Ed. Lippincott.

Other useful resources

The brain and Spine Foundation	www.brainandspine.org.uk
The Neuroscience Nursing Benchmark group	www.nnbg.org.uk
Movement disorders	www.wemove.org
The Neurological alliance	www.neural.org.uk
	www.parkinsons.org.uk
For patients with Guillain-Barre Syndrome	www.gbs.org.uk
	www.cancerhelp.org.uk

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