

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/7857431>

The Glasgow Coma Scale and other neurological observations

Article in *Nursing standard: official newspaper of the Royal College of Nursing* · April 2005

DOI: 10.7748/ns2005.04.19.33.56.c3857 · Source: PubMed

CITATIONS

27

READS

131,210

1 author:



Catheryne Waterhouse

Sheffield Teaching Hospitals NHS Foundation Trust

13 PUBLICATIONS **213** CITATIONS

SEE PROFILE

Page 56

The Glasgow Coma Scale and other neurological observations

Page 66

Neurological assessment multiple choice questionnaire

Page 67

Guidelines on how to write a practice profile

Page 68

Read Marilyn Bailey's practice profile on palliative care

The Glasgow Coma Scale and other neurological observations

NS289 Waterhouse C (2005) The Glasgow Coma Scale and other neurological observations. *Nursing Standard*. 19, 33, 56-64. Date of acceptance: October 14 2004.

Summary

The primary tool used by nurses to assess a patient's neurological status is the neurological observation chart incorporating the Glasgow Coma Scale. This article explains the correct use of the chart and how to interpret the findings.

Author

Cath Waterhouse is lecturer practitioner, Royal Hallamshire Hospital, Sheffield. Email: Cath.waterhouse@sth.nhs.uk

Keywords

Glasgow Coma Scale; Neurological assessment; Observations; Vital signs

These keywords are based on the subject headings from the British Nursing Index. This article has been subject to double-blind review. For related articles and author guidelines visit the online archive at www.nursing-standard.co.uk and search using the keywords.

Introduction

Many patients are admitted to neurosurgical units from general clinical areas such as medical units or accident and emergency departments. Nurses working in these areas need to be able to perform a basic neurological assessment accurately and understand the significance of the findings. Accurate assessment and prompt action when needed can improve the eventual outcome, not just in terms of survival but also by minimising the degree of residual neurological deficit.

The neurological observation chart incorporating the GCS is well established both nationally and internationally (Teasdale and Jennett 1974) as the primary tool used by nurses to make quick, repeated evaluations of several key indicators of neurological status (Auken and Crawford 1998):

- ▶ Level of consciousness (GCS).
- ▶ Pupil size and response to light.
- ▶ Limb movements (motor and sensory function).
- ▶ Vital signs.

Recently published guidelines for the management of patients with head injuries (National Institute for Clinical Excellence (NICE) 2003) stipulate the use of the GCS for assessment and classification of all head-injured patients.

Although there have been some useful articles on the GCS tool (Ellis and Cavanagh 1992, Shah 1999, Woodward 1997a, b, c, d), benchmarking standards have relied on consensus and the expertise of skilled nurses from neuroscience units throughout the UK.

The layout and appearance of the neurological observation chart incorporating the GCS will vary, depending on the trust in which you work.

Aims and intended learning outcomes

This article aims to raise awareness of basic neurological observations, namely the Glasgow Coma Scale (GCS), pupil reaction, limb responses and vital signs. It should be of value to all nurses who care for patients at risk of neurological deterioration. It explains how to complete the neurological observation chart, which includes the GCS, accurately, safely and consistently. After reading this article you should be able to:

- ▶ Outline the rationale for using the GCS.
- ▶ Assess a patient's level of consciousness by evaluating three behavioural responses: eye opening, verbal response and motor response.
- ▶ Perform a neurological assessment, using the GCS, pupil reaction, limb responses and vital signs, and interpret the findings.

Time out 1

Obtain your local neurological observation chart:

- Identify which section makes up the GCS. Note what other observations are contained within the form.
- Consider the relevance of the observations to determining the level of consciousness.

The GCS was originally developed to monitor the progress of patients with an acute head injury; however, it is now generally considered to be a useful tool for assessing all patients who are potentially at risk of neurological deterioration, regardless of their primary pathology. The GCS is designed to assess the integrity of normal brain function and is the best tool for consistently assessing a patient's level of consciousness (Auken and Crawford 1998).

However, the apparent 'simplicity' of the tool leaves it open to misunderstanding and misuse (Addison and Crawford 1999). 'Quick and easy to use' does not denote insignificant (Shah 1999). In practice, although practitioners may be able to tick the right 'boxes' on the chart, few nurses appreciate the mechanism underpinning the assessment, which enables them to act appropriately when the patient's condition changes. Not infrequently, a patient's changing neurological state is not identified early enough to be either life-saving or prevent further brain insults (Ellis and Cavanagh 1992).

Time out 2

Recall a patient that you have nursed recently who was having neurological observations carried out.

- Identify the potential causes of a reduced level of consciousness in the patient. It is quite possible that a patient's low level of consciousness is not an intracranial pressure problem but is post-ictal or drugs-related, for example.
- Discuss these with a colleague and add four other possible causes of a reduced level of consciousness.

Time out 3

Label as many of the marked structures on Figures 1 and 2 as you can without using a textbook. Check and complete the exercise using a general anatomy and physiology textbook, such as Martini (2001) or Tortora and Anagnostakos (2003).

FIGURE 1

Cross-section of the brain

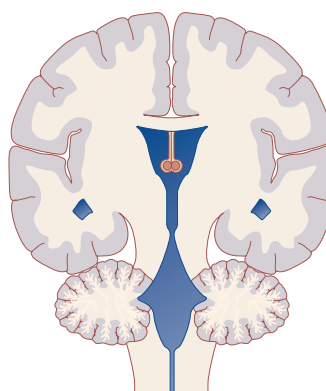
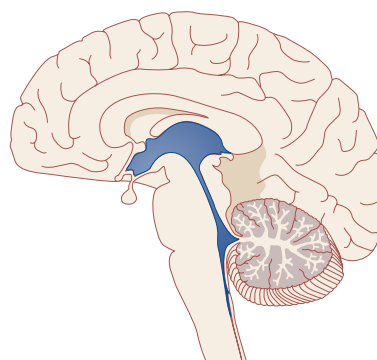


FIGURE 2

Lateral view of the brain



Anatomy and physiology

The skull is a hard, unyielding structure containing brain parenchyma and cerebrospinal fluid (CSF), interstitial fluid and arterial and venous blood. There is little 'free space' to accommodate expanding lesions such as a blood clot, tumour or oedema. Therefore, any increase in the volume of one of the primary components will, unless compensated for by a corresponding reduction in the volume of another component, lead to an increase in pressure inside the skull. This will compress the blood vessels and severely compromise blood flow and perfusion to the cerebral tissues (Hickey 2002, Lindsay and Bone 2004). **Total intracranial volume = brain + CSF + blood.** Possible causes of raised intracranial pressure (ICP) are listed in Box 1.

Consciousness Consciousness has been defined as 'a general awareness of oneself and the surrounding environment, it is a dynamic state that is subject to change' (Hickey 2002).

Consciousness consists of two components:

- ▶ Arousal or wakefulness, which is largely a

function of a specialised group of neurones within the brainstem known as the reticular activating system (RAS).

- ▶ Awareness and cognition, which is a function of the higher cortical areas of the cerebral cortex activated via the thalamic portion of the RAS.

The Glasgow Coma Scale

The score derived from the GCS provides an essential baseline for comparison with future scores to determine whether a patient's neurological condition is improving, static or deteriorating. Its graphic, visual format ensures uniformity and gives a quick, concise, visual interpretation of the patient's level of consciousness, and hence neurological status over a period of time (Shah 1999).

The GCS evaluates three key categories of behaviour that most closely reflect activity in the higher centres of the brain: eye opening, verbal response and motor response. These enable us to determine whether the patient has cerebral dysfunction. Within each category, each level of response is allocated a numerical value, on a scale of increasing neurological deterioration and brain insult. The lowest score that a patient can achieve is 3, indicating total unresponsiveness. The maximum score is 15, indicating an awake, alert and fully responsive patient (Table 1) (NICE 2003).

The GCS was designed specifically as a tool for detecting and monitoring changes in a patient's

neurological condition. In practice, this means that you should imagine that you are 'taking the patient's photograph' and then record what you see in it, thereby avoiding the temptation to adjust the information to take into account either the patient's medical history or any pre-existing barriers to communication or language. Another potential error is failure to stimulate patients sufficiently to get a true reflection of their neurological responses (Addison and Crawford 1999, Lower 1992).

Unless you have a firm baseline for comparison, you are not going to recognise when the patient's neurological condition deteriorates and will not be able to react appropriately to the rising ICP (Lower 1992).

How to assess best eye response This directly assesses the functioning of the brainstem and demonstrates to the assessor that the RAS has been stimulated and the patient is aware of his or her environment. Note that eye opening is not always an indication of intact neurological functioning. Patients who have been assessed as being in a persistent vegetative state will open their eyes (they also track movement) as a direct reflex action generated by the RAS.

Eye opening spontaneously – scores 4 This is recorded when the patient is seen to be awake, with eyes open. Approach the patient. If aware of your presence, the patient should open his or her eyes without the need for speech or touch.

Eye opening to verbal command – scores 3 Again, this observation is made without touching the patient. Speak to the patient in a normal voice first. Then, if necessary, gradually raise your voice. In some cases the patient will respond better to a familiar family voice.

Eye opening to pain – scores 2 Initially, to avoid unnecessary distress, simply touch or shake the patient's shoulder. If there is no response to this manoeuvre, a deeper stimulus is required, and a peripheral stimulus must be applied. Before any stimulus is applied, it is essential to explain to the patient and relatives exactly what you are going to do and why, apologising for the need to hurt the patient (even if he or she appears to be unconscious).

At this stage of the assessment it is important to use a peripheral painful stimulus, as the application of a central painful stimulus tends to make patients close their eyes and induces a grimacing effect (Teasdale and Jennett 1974), which is not the response you are trying to achieve.

Peripheral stimulation involves applying pressure with a pen to the lateral outer aspect of the second or third finger, rotating the point of stimulation around on each assessment. Pain should be applied gradually, up to a maximum of ten seconds, and then released. This can be

BOX 1

Causes of raised intracranial pressure

- ▶ Extradural, subdural or intracerebral haematoma
- ▶ Cerebral oedema (primary and secondary) occurring as a response to injury
- ▶ Obstructed venous return due to a thrombus or embolism
- ▶ Hypercapnia (excess carbon dioxide in the blood) causes vasodilation of cerebral vessels, and hence a rise in intracranial pressure
- ▶ Tumour and its associated oedema resulting from compression of surrounding tissue and increasing permeability of the capillary walls
- ▶ Hydrocephalus – increase in the volume of cerebrospinal fluid
- ▶ Metabolic factors - renal and hepatic disease, electrolyte imbalance resulting in diffuse cerebral oedema (Hickey 2002)

repeated, but the patient should suffer only momentarily and not experience long-term pain (Fairley and Cosgrove 1999). If the desired response is still not observed it is important to seek a second opinion.

Under no circumstances should sternal rubbing or nail-bed pressure be used, as this can result in unnecessary bruising and prolonged residual discomfort (Fairley and Cosgrove 1999).

No eye opening – scores 1 This score is recorded when no response to a painful stimulus is observed. This should only be recorded when the nurse is satisfied that a sufficient stimulus was used. Remember that inadequate stimulation will lead to an inaccurate assessment.

Points to note

- ▶ If the patient's eyes are closed as a result of swelling or facial fractures, this is recorded as 'C' on the chart. In such cases it is impossible to perform an accurate assessment of the patient's level of arousal or awareness.
- ▶ A good sensitive indicator of neurological change is the patient's level of consciousness – is the patient becoming more difficult to rouse? Patients will often become increasingly restless, or a previously restless patient may become atypically quiet.
- ▶ Even if the patient is thought to be in a chronic state of long-term coma, his or her eyes may be wide open but he or she will not be aware of him or herself or the environment. One of the criteria for diagnosing persistent vegetative syndrome is that the patient develops a sleep-wakefulness cycle (Berrol 1986, Jennett and Teasdale 1977). Remember only record what you see.

Time out 4

- Reflect on and write down how you would carry out the eye opening part of the Glasgow Coma Scale assessment.
- Observe a colleague (or ask him or her to describe his or her practice) and discuss, and note, any variations in approach.
- Identify where eliciting an eye opening response is difficult or impossible, yet unrelated to conscious level. How should these situations be managed?

How to assess best verbal response Best verbal response provides the practitioner with information about the patient's speech, comprehension and functioning areas of the higher, cognitive centres of the brain, and reflects

TABLE 1

Glasgow Coma Scale and Score (NICE 2003)

Feature	Response	Score
Best eye response	Open spontaneously	4
	Open to verbal command	3
	Open to pain	2
	No eye opening	1
Best verbal response	Orientated	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No verbal response	1
Best motor response	Obeys commands	6
	Localising pain	5
	Withdrawal from pain	4
	Flexion to pain	3
	Extension to pain	2
	No motor response	1

the patient's ability to articulate and express a reply.

Orientated – scores 5 This assesses orientation to time, place and person. Patients must be able to tell you:

- ▶ Who they are (their name).
- ▶ Where they are and why (in which town or city and the name of the hospital).
- ▶ The current year and month (avoid using the day of the week or the date).

If all three questions are answered correctly, the patient may be classed as orientated.

Confused – scores 4 If one or more of the above questions are answered incorrectly, the patient must be recorded as being confused. If the patient has recently been transferred from another hospital, some degree of disorientation is understandable, but remember that such subtle orientation loss can be a good early indicator of neurological deterioration (Frawley 1990).

At the same time, it is important to attempt to re-orientate patients by correcting all wrong answers. Reassure them, and ask them to try to remember for the next time you ask. Typically, patients who are deteriorating will lose orientation to time, place and person – in that order (Shah 1999).

Inappropriate words – scores 3 Completely understandable conversation is usually absent or extremely limited. Patients offer words rather than sentences, which make little sense in the context of the questions. Sometimes these words

are communicated as obscenities. Patients with a motor dysphasia are often difficult to assess as they are frequently unable to utter the words they wish to say, or are unable to think of the right words to express themselves. Patients may also continue for an exceptionally long period, repeating a phrase or particular words – this is known as perseveration (Patten 1998).

Incomprehensible sounds – scores 2 Although the patient's response can follow verbal questioning, more often it comes in direct response to a painful stimulus. The patient responds to speech or painful stimulation with no understandable words, and may only be able to produce moaning, groaning or crying sounds. If the patient has sustained damage to the speech centres in the brain and is unable to talk, but remains aware and alert, the score must still be recorded as 2, unless alternative communication devices such as writing, computers or light writers can be used.

No verbal response – scores 1 The patient is unable to produce any speech or sounds in response to speech or painful stimuli.

Points to note

- ▶ If the patient is unable to respond because of the presence of a tracheostomy or endotracheal tube, this should be recorded on the chart as a letter 'T'.
- ▶ If the patient is dysphasic, this should be recorded on the chart as a letter 'D'.
- ▶ The recording of accurate baseline observations is the most important element of the tool as it allows the practitioner to identify the earliest subtle signs. For this reason, every assessor must apply the same stimulus in the same manner and question each patient in the same way (Frawley 1990).
- ▶ One criticism of the GCS tool (Williams 1992) is that patients cannot be adequately assessed if they have any kind of communication difficulties related to age (cannot be used for patients under five years old), language (no comprehension of the English language), or any pre-existing pathology that might affect speech such as learning difficulties or stroke. It is important not to attempt to adapt, change or write on the chart to 'fit in' with the patient – you must only record what you see. Information gathered from the family, such as the patient's preferred name or details of any pre-existing deficits, may be invaluable in making an accurate assessment.

Time out 5

From your experience, what barriers unrelated to altered consciousness may prevent you from obtaining or interpreting a verbal response from a patient?



How to assess best motor response Best motor response tests the area of the brain that identifies sensory input and translates this into a motor response. The best possible motor response is being able to obey simple commands convincingly, and is the highest level of motor response (Frawley 1990).

Obeys commands – scores 6 The patient can accurately respond to instructions. Ask the patient to perform a couple of different movements, for example, stick out his or her tongue, raise his or her eyebrows, show his or her teeth and hold up his or her thumb. If asking patients to 'squeeze my fingers', ensure that you also ask them to 'let go', to discount a primitive grasp reflex. It is good practice to have patients obey two different commands, and at the very least they should obey the same command twice (Lower 1992).

Localising pain – scores 5 This is the response to a central painful stimulus. It involves the higher centres of the brain recognising that something is hurting the patient and trying to remove that pain source (Jennett and Teasdale 1977). A painful stimulus should be applied only when the patient shows no response to verbal instruction, and need not be applied if the patient is already localising, for example, by pulling at an oxygen mask or nasogastric tube.

To be classified as localisation, patients must move their hand to the point of stimulation, bringing the hand up towards the chin, across the midline, in an obvious, co-ordinated attempt to remove the cause of the pain. It is useful to start with the arm in a 30° flexed position to minimise any anomalies when assessing abnormal flexion or extension.

Three methods of applying a central painful stimulus have been recognised by the National Neuroscience Benchmarking Group:

1. Supra-orbital pressure – This was identified as the 'gold standard' but must only be used when the practitioner has been trained to apply it correctly. Just below the inner aspect of the eyebrow is a small notch through which a branch of the facial nerve runs. The nurse's hand rests on the head of the patient, and the flat of the thumb or the knuckle is placed on the supra-orbital ridge under the eyebrow. Pressure is gradually increased for a maximum of 30 seconds. This is contraindicated if there is any orbital damage or skull fracture (in which case the 'trapezius

squeeze' is a suitable alternative (Ellis and Cavanagh 1992)).

2. Jaw margin pressure Pressure is applied at the angle of the jaw. Rest the flat of the thumb against the corner of the maxillary and mandibular junction and apply gradually increasing pressure for a maximum of 30 seconds.

3. The trapezius squeeze – The trapezius muscle extends across the back of the shoulders from the middle of the neck. Hold the muscle between the thumb and forefingers and apply gradually increasing pressure for a maximum of 30 seconds. The trapezius muscle has both a sensory and a motor component and there is a risk of eliciting a spinal reflex on stimulation.

Other methods of applying a central painful stimulus are not recommended because they can elicit a peripheral reflex response only.

Withdrawal from pain – scores 4 In response to a central painful stimulus, patients will bend their arms at the elbow as a normal flexion reflex action, but fail to locate the source of the pain.

Flexion to pain – scores 3 This is also known as decorticate posturing. It occurs when there is a block in the motor pathway between the cerebral cortex and the brain stem. It is a much slower response to a painful stimulus, and can be recognised by the patient flexing the upper arm and rotating the wrist. Often the thumb comes through the fingers.

Extension to pain – scores 2 This is also known as decerebrate posturing. It occurs when the motor pathway is blocked or damaged within the brainstem, and is characterised by straightening of the elbow and internal rotation of the shoulder and wrist. Often the legs are also in extension, with the toes pointing downwards.

No motor response – scores 1 The patient's brain is incapable of processing any sensory input or motor activity, and the patient is therefore unable to move at all in response to a painful stimulus. Before recording 'none', ensure that adequate stimulation has been applied. Note that a patient may be unresponsive because of local disease or injury.

Points to note

- ▶ Always record the best arm response using a central painful stimulus: when assessing motor response it is the brain that is being assessed, not the spinal response. Spinal reflexes may cause limbs to flex briskly and can even occur in patients who have been certified brainstem dead (Stewart 1996).
- ▶ Nurses should also be aware of their own non-verbal behaviour, as patients may simply mimic what they see, giving rise to interpretation error.

Time out 6

Discuss with a medical colleague and a nursing colleague, the conditions, other than serious reduction in level of consciousness, that may contribute to a patient becoming unable to move their limbs.

General notes

The level of consciousness is the most sensitive indicator of neurological deterioration. Unless the patient is receiving anaesthetic agents or sedatives, it should be possible to identify deterioration using the GCS, before changes in pupils or vital signs occur.

A deterioration of 1 point in the motor response or an overall deterioration of 2 points in the GCS score is clinically significant and must be reported immediately to a senior member of staff (Cree 2003, NICE 2003). To ensure consistency, the same member of staff should carry out the assessment over a given shift. At handover, the receiving nurse should observe how the GCS score was obtained. Without such continuity, subtle yet significant alterations can be missed (Grant *et al* 1990).

Patients will often give out subtle clues that they are deteriorating such as becoming less communicative with slower responses, particularly relating to changes in their behaviour. The practitioner must be attentive to these changes and document them in the patient's records. Lack of confidence in completing the chart can lead practitioners to be influenced by the previous assessment (Watson *et al* 1992). Always ask a colleague to reassess if you are unsure of the procedure. The GCS was not intended to be used in isolation. It should be used in conjunction with other aspects of the neurological assessment, such as pupil reaction, limb responses, temperature and vital signs (Addison and Crawford 1999).

Time out 7

Consider the legal and ethical aspects of causing direct pain to patients when assessing the motor response, and the methods by which the pain stimulus is applied. Discuss the key issues with your colleagues and reflect on their perceptions of these.

Pupil reaction

Pupil reaction is a very important observation as it gives the practitioner a 'window to view the brain' and is the only way of monitoring the

neurological status of a sedated patient. Table 2 sets out guidelines for the assessment of pupil reaction to light and the rationale for the procedure.

Any changes in pupil reaction, shape or size are a late sign of raised ICP. Sluggish or suddenly dilated unequal pupils are an indication that oedema or haematoma is worsening and the oculomotor cranial nerve is being compressed through the foramen magnum. Urgent intervention at this stage can make a significant difference to the patient's outcome. Remember that some patients may have a pre-existing ophthalmic condition that produces a unilaterally dilated pupil, such as a cataract or localised injury.

A more subtle sign is constriction and dilation of the pupil without regard to light. The pupil is unable to sustain its constriction in the presence of a bright light and re-dilates (referred to as unilateral hippus (Patten 1998)).

All of these signs are obvious danger signals and must be reported to the medical team urgently, as this is a medical emergency and potentially life-threatening.

Points to note

- ▶ If both eyes are closed because of gross orbital swelling, this is recorded with a letter 'C'.

- ▶ Brisk pupils are recorded as '+', unreactive pupils as '-' and sluggish pupils as 'S'.
- ▶ A bright pen torch must be used – not an ophthalmoscope.
- ▶ Minor inequalities in the size of the pupils are normal.
- ▶ It is not uncommon for healthy people to have pupils of unequal size.
- ▶ Very small pupils (1-2mm) may suggest the use of opiates, fentanyl or barbiturates.
- ▶ The use of eye drops, such as atropine, can dilate the pupils.

Limb responses

Evaluation of limb responses provides the assessor with detail of the geographical distribution of dysfunction, and is an important consideration when performing a full neurological assessment of the patient (Lower 1992). Each limb should be assessed separately. Ask patients to hold their arms out in front of them and observe for signs of weakness or 'drift'. Assess the legs by asking patients if they can push and pull their feet towards the assessor, or ask whether they are able to raise their legs off the bed and hold them there briefly. A peripheral painful stimulus needs to be applied to limbs that have not been seen to move.

TABLE 2

Guidelines for assessment of pupil reaction to light

Procedure	Rationale
Inform the patient, whether conscious or not, that you are going to look into his or her eyes with a torch, and explain the procedure	Helps to reduce anxiety. Ensures, as far as possible, that the patient consents to, and understands, the procedure
Reduce the light from overhead lights to see any pupil reaction	Enables a better view of the eye and reaction to a light stimulus
Wash hands thoroughly	Prevents contamination of the eye and reduces the risk of infection
Hold the patient's eyes open and note as a baseline the size, shape and equality of the pupils as an indication of brain damage	Normal pupils are round, usually central and range in diameter from 1.5mm to 6.0mm
Hold one of the patient's eyes open, and move a light from the outer aspect of the eye towards the pupil. This should cause the eye to constrict quickly (direct light response)	To assess pupil reaction to light. A normal reaction indicates no lesion or pressure on the third cranial nerve or brainstem regulating the pupil reaction
Record unusual eye movements such as nystagmus or deviation to the side	To assess cranial nerve damage
Repeat tests on the opposite eye	To assess equality of reaction and ensure that all areas are functioning correctly

(Mallett and Dougherty 2000)

Temperature

A patient's temperature may be elevated as a result of infection; however, a patient who has sustained a severe head injury may have localised damage to the temperature-regulating centre in the hypothalamus. As the patient's temperature rises, cerebral cell metabolism produces excess carbon dioxide, producing vasodilation of the cerebral blood vessels which compounds the existing cerebral swelling.

Vital signs

The final warning is Cushing's triad or reflex – a classic set of clinical and physiological signs and symptoms which indicate that the ICP is dangerously high and the patient is in danger of 'coning' (cerebral herniation) which will rapidly lead to the death of the patient. The reflex is a very late sign and is characterised by hypertension, bradycardia and respiratory irregularity.

Hypertension Typically the patient will have an elevated systolic blood pressure combined with a widening pulse pressure. This causes systemic vasoconstriction and hypertension.

- ▶ As the ICP increases, arterial blood cannot get through to perfuse the brain. Mean arterial pressure (MAP) minus ICP equals cerebral perfusion pressure (CPP) ($\text{MAP} - \text{ICP} = \text{CPP}$).

When CPP falls below a critical threshold, blood cannot enter the brain.

- ▶ As systolic blood pressure increases, diastolic blood pressure remains relatively unchanged, resulting in a widening pulse pressure.

Bradycardia The heart rate may drop as low as 35-50 beats per minute. This allows each systole to pump more blood at a higher pressure, forcing blood into the brain during the peak arterial systolic blood pressure.

Respiratory irregularity Pressure on the respiratory centres in the lower pons and upper medulla causes impairment of respiratory patterns. The following patterns may be seen:

- ▶ Cheyne-Stokes breathing.
- ▶ Hyperventilation blows off carbon dioxide and constricts cerebral vessels in an attempt to lower ICP.
- ▶ Cluster breathing – periods of rapid irregular and noisy breathing separated by apnoeic spells.

Frequency of observations

The NICE (2003) guidelines are specifically aimed at managing patients in accident and

emergency departments. They recommend that head-injured patients with a GCS score of less than 15 should have half-hourly observations recorded until the maximum score is reached, while patients with a GCS score of 15 should be recorded half-hourly for two hours, one-hourly for four hours then two-hourly thereafter.

Although this a useful guide, within clinical areas the patient's neurological condition usually dictates the frequency of the observations, and any adverse change in the patient's condition is an indication to increase the frequency of observations. Quality of observations is at least as important as quantity.

Discontinuation of neurological observations relies on individual clinical judgement, but it is reasonable to stop them if the patient has been consistently stable for a couple of days provided that the initial pathology has been rectified (NICE 2003).

Discussion

Addison and Crawford (1999) reported that the GCS assessment tool is often misunderstood and misused, and there is little evidence to suggest that this situation has changed or improved recently. Research has shown that when the GCS observation chart is used by general nurses, as opposed to specialist 'neuroscience' nurses, it can take up to two hours longer to detect a deterioration in the patient's neurological status (Crewe and Lye 1990, Fielding and Rowley 1990). This is probably because experienced neuroscience nurses are more practised at identifying the almost imperceptible signs of altered levels of consciousness and drowsiness, as well as the more subtle behaviour changes that such patients may exhibit.

Soon after the introduction of the GCS, Jennett and Teasdale (1977) acknowledged that 'the validity of the assumption that each of the three parts of the scale should count equally, and that each step should differ equally from the next to it, has still to be tested'. This statement still holds true, despite research that examined the inter-rater reliability of the chart and concluded that the tool may be used with confidence to evaluate neurological patients (Lyons and Juarez 1995, Teasdale *et al* 1979).

However, to state that a patient has a GCS score of 5 or 8 or 11 tells us very little about the patient's exact neurological status, and it is important not to take any aspect of neurological assessment in isolation (Watson *et al* 1992). When communicating the GCS score it is good practice to state it in terms of the individual components, for example, E3, V2, M4 – indicating that the patient opens his or

her eyes to speech, offers incomprehensible verbal responses and flexes to a painful stimulus.

‘The GCS is a tool that, with education, is simple to use, highlights changes in the patient’s condition and allows nurses and doctors working in different hospitals to communicate the patient’s state of consciousness in a clear and objective way’ (Addison and Crawford 1999). Lowry (1999) was critical of the structure of the chart; however, it is not the chart design or its underlying objectives that are flawed, but the way it is implemented in the clinical areas.

Conclusion

Addison and Crawford (1999) recommend that all new staff are taught how to apply the GCS tool in clinical practice. This should be extended

to all healthcare practitioners involved in the care and management of potentially vulnerable and unconscious patients, and should apply to all neurological observations. Although many specialist benchmarking groups have written best practice guidelines, further audits and research are needed to establish why errors are still being made when performing neurological observations.

To maintain the ethos of benchmarking, it is essential that we share our knowledge and skills with colleagues in other areas to ensure that neurological observations are performed accurately, safely and consistently **NS**

Time out 8

Now that you have completed the article you might like to write a practice profile. Guidelines to help you are on page 67.

References

- Addison C, Crawford B** (1999) Not bad, just misunderstood. *Nursing Times*. 95, 43, 52-53.
- Auken S, Crawford B** (1998) Neurological assessment. In Guerrero D (Ed) *Neuro-oncology for Nurses*. Whurr Publishers, London.
- Berrol S** (1986) Evolution and the persistent vegetative state. *Journal of Head Trauma Rehabilitation*. 1, 7-13.
- Cree C** (2003) Acquired brain injury: acute management. *Nursing Standard*. 18, 11, 45-55.
- Crewe H, Lye R** (1990) Nurses’ knowledge of coma assessment. *Nursing Times*. 86, 41, 52-53.
- Ellis A, Cavanagh SJ** (1992) Aspects of neurological assessment using the Glasgow Coma Scale. *Intensive and Critical Care Nursing*. 8, 2, 94-99.
- Fairley DF, Cosgrove JA** (1999) Glasgow Coma Scale: improving nursing practice through clinical effectiveness. *Nursing in Critical Care*. 4, 6, 276-279.
- Fielding K, Rowley G** (1990) Reliability of assessment by skilled observers using the Glasgow Coma Scale. *Australian Journal of Advanced Nursing*. 7, 4, 13-17.
- Frawley P** (1990) Critical care. Neurological observations. *Nursing Times*. 86, 35, 29-34.
- Grant J, Kinney M, Guzzetta C** (1990) A method of validating nursing diagnosis. *Advances in Nursing Science*. 12, 3, 65-74.
- Hickey JV** (2002) *The Clinical Practice of Neurological and Neurosurgical Nursing*. Fifth edition. JB Lippincott, Philadelphia PA.
- Jennett B, Teasdale G** (1977) Aspects of coma after severe head injury. *Lancet*. 1, 8017, 878-881.
- Lindsay KW, Bone I** (2004) *Neurology and Neurosurgery Illustrated*. Fourth edition. Churchill Livingstone, Edinburgh.
- Lower J** (1992) Rapid neuro assessment. *American Journal of Nursing*. 92, 6, 38-45.
- Lowry M** (1999) The Glasgow Coma Scale in clinical practice: a critique. *Nursing Times*. 95, 22, 40-42.
- Lyons M, Juarez VJ** (1995) Interrater reliability of the Glasgow Coma Scale. *Journal of Neuroscience Nursing*. 27, 5, 283-286.
- Mallett J, Dougherty L** (2000) *The Royal Marsden NHS Trust: Manual of Clinical Nursing Procedures*. Fifth edition. Blackwell Science, London.
- Martini F** (2001) *Fundamentals of Anatomy and Physiology*. Fourth edition. Prentice Hall, New Jersey NJ.
- National Institute for Clinical Excellence** (2003) *Head Injury: Triage, Assessment, Investigation and Early Management of Head Injury in Infants, Children and Adults*. Clinical Guideline 4. NICE, London.
- Patten J** (1998) *Neurological Differential Diagnosis*. Second edition. Spencer Publishing, New York NY.
- Shah S** (1999) Neurological assessment. *Nursing Standard*. 13, 22, 49-56.
- Stewart N** (1996) Neurological observations. *Professional Nurse*. 11, 6, 377-378.
- Teasdale G, Jennett B** (1974) Assessment of coma and impaired consciousness: a practical scale. *Lancet*. 2, 7872, 81-84.
- Teasdale GM, Murray G, Parker L, Jennett B** (1979) Adding up the Glasgow Coma Score. *Acta Neurochirurgica. Supplementum*. 28, 1, 13-16.
- Tortora GJ, Anagnostakos NP** (2003) *Principles of Anatomy and Physiology*. Tenth edition. Harper Collins, New York NY.
- Watson M, Horn S, Curl J** (1992) Searching for signs of revival. Uses and abuses of the Glasgow Coma Scale. *Professional Nurse*. 7, 10, 670-674.
- Williams J** (1992) Assessment of head-injured children. *British Journal of Nursing*. 1, 2, 82-84.
- Woodward S** (1997a) Practical procedures for nurses no. 5.1. Neurological observations – 1. Glasgow Coma Scale. *Nursing Times*. 93, 45, Suppl 1-2.
- Woodward S** (1997b) Practical procedures for nurses no. 5.2. Neurological observations – 2. Pupil response. *Nursing Times*. 93, 46, Suppl 1-2.
- Woodward S** (1997c) Practical procedures for nurses no. 5.3. Neurological observations – 3. Limb responses. *Nursing Times*. 93, 47, Suppl 1-2.
- Woodward S** (1997d) Practical procedures for nurses no. 5.4. Neurological observations – 4. Case studies. *Nursing Times*. 93, 48, Suppl 1-2.