Neuroscience Nursing

Assessment and Patient Management





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edited by

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Contents

Section 3 Management of patients with long-term neurological conditions

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Preface

Sue Woodward

The last few years have been an exciting time for anyone working within the field of neuroscience nursing, with the profile of neuroscience services being raised nationally. There have been many initiatives impacting on practice, from the work undertaken through the NHS Modernisation Agency *Action on Neurology* project (Modernisation Agency, 2005) and the *Neurosciences Critical Care Report* (Modernisation Agency, 2004), to the publication of the *National Service Framework for Long-term Conditions* in March 2005 (Department of Health, 2005). Also, 2004 saw the inaugural conference from the newly formed Royal College of Nursing Neuroscience Forum, so there was much to be enthused about.

In April 2004 the *British Journal of Nursing* (*BJN*) re-launched in a new format, with a special focus on neuroscience nursing. As commissioning editor for this journal, I was in a position to be able to encourage authors to come forward from all fields of neuroscience nursing practice to publish within the journal. There was so much innovative work going on within this field, but at the time there was no neuroscience nursing journal in the UK. Very often potential authors from a neuroscience nursing background were unsure where to submit papers, with the net result that they did not submit at all. Once these authors became aware that the *BJN* was keen to publish neuroscience focused papers, the volume of manuscripts submitted increased, culminating in the launch of the *British Journal of Neuroscience Nursing* a year later.

This book brings together the best of the articles that have been published in the *BJN* since April 2004. Together they provide an essential reference for nurses working with people with neurological problems in a variety of settings from critical care and tertiary referral centres with specialist neuroscience units, through to stroke services and primary care teams to name a few. All the authors have had an opportunity to update their papers since their original publication in the *BJN* specifically for this book. In this way we are able to bring you a series of up-to-date, evidence-based papers from leading UK neuroscience nurses to underpin neuroscience nursing practice. This is the first time that such a collection of neuroscience articles has been brought together in one title for nurses practising in the UK.

The book is divided into three sections. The first section focuses on aspects of assessment relevant to neurological patients, the second covers a variety of issues in the management of patients with acute neurological conditions, including some key aspects of neuroscience critical care practice. The final section focuses on the management of patients with long-term neurological conditions.

The aim of this book is not to provide the definitive neuroscience nursing text, but rather to identify key areas of practice and evidence of current best care. The fact that such a wide range of papers has been published over such a short space of time in one generic nursing journal is testament to the importance of the subject for all practising nurses. With over 10 million people in the UK suffering from a neurological problem one can see the need for nurses everywhere to have access to resources to help them understand and implement appropriate care for these patients.

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Section I

Aspects of assessment in neuroscience nursing

Chapter 1

Intra- and extracranial causes of alteration in level of consciousness

Anne McLeod

Consciousness depends on effective interactions between the cerebral cortex and the brainstem. There are a variety of processes that can alter this exchange and, therefore, result in an altered level of consciousness. Level of consciousness is the most important aspect of neurological assessment as it is the earliest and most sensitive indicator of neurological deterioration (Hickey, 2002). Changes can occur rapidly over a few minutes or hours, or more slowly over weeks or even months. However, in the acute situation, nurses caring for patients outside designated neuroscience units must have knowledge of what can provoke an altered level of consciousness so that prompt action can be taken to resolve the problem, as it may be an indication of acute brain injury (Hickey, 2002).

Consciousness

Consciousness is a state of awareness of oneself and the surrounding environment and is particularly dependent on the functioning of the reticular activating system (RAS) (Hickey, 2002).

The RAS arises from the medulla oblongata within the brainstem, proceeds through the pons, midbrain and thalamus before it innervates the cerebral cortex as a diffuse network of neurones. This system controls the activity of the central nervous system (*Figure 1.1*).

Different sections of the RAS act in different ways: the

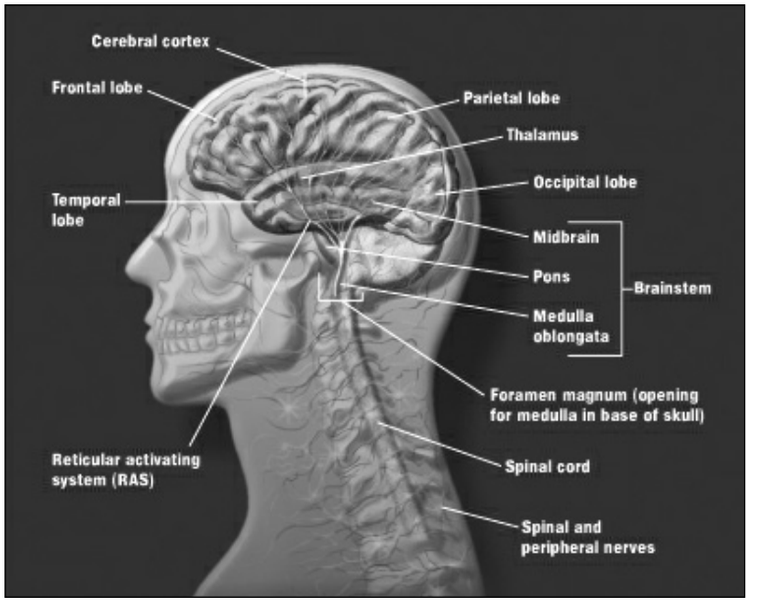

Figure 1.1: Diagrammatic representation of the brain

brainstem portion is believed to be involved with wakefulness, whereas the thalamic portion is believed to be involved with mental activity (Hickey, 2002). Therefore, consciousness, in terms of alertness and behaviour, relies on effective communication between the brainstem and the cerebral cortex.

A reduction or altered level of consciousness can be the result of lesions or metabolic disorders that directly affect either the cerebral hemispheres or the RAS. Therefore, altered level of consciousness can be defined as either a reduction in alertness or an alteration in behaviour (Vander et al, 2000); these changes may occur in isolation or in combination.

Intracranial pressure

Intracranial pressure (ICP) can be defined as the pressure exerted within the ventricles by the cerebrospinal fluid (CSF) (Hickey, 2002). Although a normal ICP is 0–10 mmHg (Lindsay et al, 1998), it is a fluctuating pressure influenced by respiratory movements and normal daily activities, such as coughing or the Valsalva manoeuvre (a technique for producing a transient increase in intrathoracic pressure) (Hickey, 2002; Porth, 2003) (*Table 1.1*).

The contents of the skull, which in adults is a rigid structure, fill the space available within the skull to capacity. The three essentially non-compressible contents of the skull are brain tissue (80%), blood (10%) and CSF (10%). In order to maintain a stable ICP, if one of the three volumes within the skull increases, another must decrease otherwise the ICP will rise. This concept is called the modified Monro–Kellie hypothesis (Hickey, 2002). An ICP above 15 mmHg is viewed as being raised (Hickey, 2002). Reciprocal compensation occurs among the three intracranial components to accommodate any increases in volume. Thus, if there is a rise in brain tissue volume, CSF can be displaced, CSF absorption can be increased and the low-pressure venous system can be compressed (Lindsay et al, 1998).

Table 1.1: Factors that elevate intracranial pressure

- Valsalva manoeuvre
- Coughing or sneezing
- Certain body positions (e.g. prone, neck flexion, extreme hip flexion)
- Emotional upset/pain
- Noxious stimuli
- Arousal from sleep
- Rapid eye movement sleep

From Hickey (2002)

Increases in volume over a longer period can be accommodated far more easily than a sudden increase in volume, such as is seen with a spontaneous intracranial bleed. This is clearly demonstrated by the pressure volume curve of ICP (*Figure 1.2*).

However, in either situation an altered level of consciousness will eventually occur if the source of the increase in volume does not dissipate.

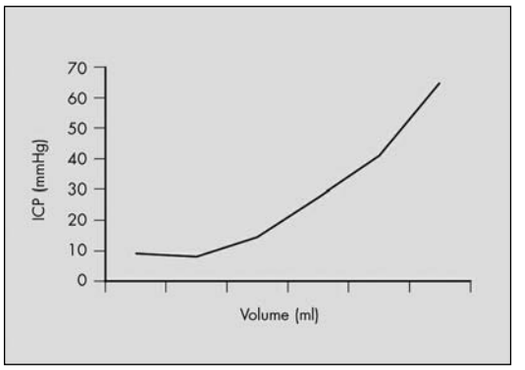

Figure 1.2: Pressure–volume curve of intracranial pressure

Assessment of level of consciousness

The Glasgow Coma Scale (GCS) (Teasdale and Jennett, 1974) (*Table 1.2*) is commonly used to assess level of consciousness in terms of providing a stimulus and observing the response. It was devised to assess depth of impaired consciousness with the aim of avoiding ambiguities and inconsistency between different assessors (Fairley and Cosgrove, 1999), thus providing an objective tool. With the GCS, level of consciousness is assessed in terms of eye opening and verbal and motor responses, with each aspect being assessed independently (Price, 2002), and the best response for each being documented.

These three responses provide information on the patient's awareness of the environment and stimuli within the environment. As consciousness is seen as a continuum from alertness to unconsciousness (Vander et al, 2000), the stimulation a patient requires to elicit a response is also on a continuum. The stimulation provided should begin with the minimal required to elicit a response, and allowing the stimulation to be increased as necessary. There is a range from not requiring any stimulation (or fully alert and aware) through auditory stimulation to painful stimulation, and finally to no response (or unconsciousness) (*Figure 1.3*).

Table 1.2: Glasgow Coma Scale

Eyes open	
Spontaneous	4
To speech	3
To pain	2
None	1
C=eyes closed by swelling	
Verbal response	
Oriented	5
Confused	4
Inappropriate words	3
Incomprehensible sounds	2
None	1
T=Endotracheal tube or tracheostomy	
Motor response	
Obeys commands	6
Localizes to pain	5
Normal flexion	4
Abnormal flexion	3
Extension	2
None	1
Record best arm response	

From Teasdale and Jennett (1974)