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GUIDELINES FOR BASIC ADULT NEUROLOGICAL OBSERVATION

Neurosurgical Nurse Educator Network
Critical Care Services Ontario | April 2014

These Guidelines are a product of Critical Care Services Ontario (CCSO)

The Guidelines for Basic Adult Neurological Observation are the result of a collaborative effort between CCSO, the Neurosurgical Nurse Educator (NNE) Network and Provincial Neurosurgery Ontario. The NNE Network supports system-wide improvements for Ontario's neurosurgical services through education and outreach across neurosurgical and non-neurosurgical centres. Aligned with the work of Provincial Neurosurgery Ontario, the NNE Network will increase the knowledge and expertise of Ontario's nurses to support equitable and timely access to neurosurgical care and help to maintain the province's neurosurgical capacity.

How to Use This Document

This document provides direction bedside neurological observation protocols to ensure consistency within and across organizations. It was developed by a sub-group of the NNE Network for Registered Nurses (RN) across Ontario that assess patients' neurological status. These Guidelines are not meant to be exhaustive and its contents are recommended but not mandated for use. The Guidelines have been reviewed and approved by the Provincial Neurosurgery Ontario stakeholder board. RNs should use their clinical judgement and utilize other assessment parameters if determined necessary.

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CCSO is funded by the Government of Ontario

Version Control

Name of document	Guidelines for Basic Adult Neurological Observation
Version 1.0	April 2014
Recommended next review	January 2016
Approved By	Neurosurgical Nurse Educator Network and Provincial Neurosurgery Ontario

Acknowledgements

We would like to thank the following individuals for their support and guidance in the development of these guidelines:

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Please see the Appendix for a full list of NNE Network Membership

Disclaimer: *The contents of these guidelines may change over time. Clinicians and hospital administrators should use sound judgment for individual patient encounters. Critical Care Services Ontario, the Neuro-Nurse Educator Network, and Provincial Neurosurgery Ontario strongly recommend evidence-based practices.*



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Introduction

Neurosurgical Nurse Educator Network and the Provincial Neurosurgery Strategy

In 2011, the Ministry of Health and Long Term Care committed 66 new Nursing Positions, including 11 Neurosurgical Nurse Educator (NNE) positions, to support the management of specialized neurosurgical patients in critical care units at adult neurosurgical centres. NNEs provide education to staff within their centres and work collaboratively in a provincial network to identify educational needs and build materials for nurses in non-neurosurgical hospitals.

Also in 2011, the Ministry requested that Dr. Robert Bell, President and CEO, University Health Network and Dr. James T. Rutka, Chair, Department of Surgery, University of Toronto, lead a planning process to develop a comprehensive neurosurgical system to meet the needs of adult and paediatric patients across Ontario. Their efforts resulted in a final report (December 2011) which outlined recommendations aimed at improving the access, quality and responsiveness of neurosurgical care. These recommendations are being implemented by the Provincial Neurosurgery Ontario committee supported by Critical Care Services Ontario (www.criticalcareontario.ca).

The NNE Network was established in May 2013 to work in collaboration with Provincial Neurosurgery Ontario to support these actions. Comprised of Nurse Educators and Program Directors from each of the province's adult neurosurgical centres, their work will form part of an educational outreach program to educate non-neurosurgical centres on neurosurgical patient's signs, symptoms, clinical best practices, and post-surgical care. The Network is co-chaired by Joanna Pierazzo, APN, Neurosurgery Outreach, Trillium Health Partners and Debra Carew, Director of Operations, Trauma, Emergency and Critical Care Program, Sunnybrook Health Sciences. A full membership list of the NNE Network is included in the Appendix.

About these Guidelines

These Guidelines were developed by the provincial Neurosurgical Nurse Educator (NNE) Network to document the processes associated with the basic assessment of a patient's neurological status. The Guidelines provides direction for local development of bedside neurological observation protocols, in order to ensure consistency of neurological assessment within and across different organizations. For the individual patient, this provides a baseline from which changes in the patient's neurological status may be identified, reported, and managed in a timely manner.

Registered Nurses (RN) assess patients' neurological status as per physician order and as needed. The frequency of neurological assessments depends on the severity of the patient's illness as well as his/her underlying condition. The physician's order of frequency may range from every 15 minutes for the more critically ill patient to every four to eight hours for the more stable patient. The RN should use his or her clinical judgment to determine the need for an increase in the frequency of neurological observations and whether observations should be expanded to include other assessment parameters. A physician order is not necessary for the RN to increase the frequency of neurological assessments, which are within their scope of practice.

The patient's neurological status is assessed according to and documented in a neurological observation record or an equivalent patient care record, providing a concise and accurate record of the assessment. The

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neurological observation record is used to assess the patient's neurological status unless other neurological testing tools are ordered i.e. the Canadian Neurological Scale (CNS) or the National Institute of Health Stroke Scale (NIHSS). The basic neurological observation includes assessment of the patient's:

- Level of consciousness (LOC) using the Glasgow Coma Scale (GCS)
- Pupillary response
- Limb movement/ strength
- Vital signs

The accurate and precise performance of neurological assessment has important implications for patient care. It provides a snapshot in time of the patient's neurological condition and establishes a baseline. Changes from this baseline may indicate a deterioration in the patient's condition, necessitating an increase in the frequency of monitoring by the RN, a notification to the physician and/or calling the Rapid Response Team (RRT) or facility equivalent as per calling criteria. In order to improve the accuracy and decrease variability in the neurological observations related to an individual staff's perception of patient response to applied stimuli, it is recommended that observations during a particular shift are performed primarily by the same RN/health care provider. During handover of care between shifts, it is recommended that one set of neurological observations be performed together by RNs of both the outgoing and oncoming shifts.

Note: These Guidelines are for adult neurological assessments only. A separate Guideline for paediatric populations will be available in the future.

Definitions

Glasgow Coma Scale:

The GCS is an assessment scale developed by Teasdale & Jennett (1974), which provides a standardized measure of the patient's Level of Consciousness (LOC), by observing the patient's behaviour in response to a gradually increasing stimulus. This stimulus ranges from a less invasive stimulus (i.e. speaking to the patient), to the application of a painful stimulus (i.e. supraorbital pressure) in order to obtain a behavioural response. The scale contains three subscales: best eye opening response, best verbal response and best motor response. It has a collective maximum score of 15 indicating a fully alert and oriented person, and a minimum score of 3 indicating a comatose person.

Painful stimuli:

In the absence of any spontaneous movements assessing the patient's neurological status may include applying either a peripheral painful stimuli to elicit eye opening or central painful stimuli in order to elicit a motor response. When applying a painful stimulus, a nurse may use any of the techniques described under procedures on page 12.

Pupillary response:

Tests the function of cranial nerve II & III. Changes in the pupil size, equality and/or reaction may be an indicator of a change in intracranial conditions. This could be caused by a number of conditions, such as increased intracranial pressure, brainstem damage, anoxia, ischemia or oculomotor nerve compression.

Vital signs:

Vital signs include respiratory rate & pattern, oxygen saturation, heart rate, blood pressure, and temperature. Changes in vital signs in the patient with neurological problems may be an indicator of neurological deterioration, in particular for patients with brainstem pathology or increased ICP.

Note: Changes in vital signs related to neurological deterioration are often a late sign of deterioration. Changes to pupils, LOC, and motor strength/symmetry are typically observed first.

Procedures

Documentation

During the neurological observation assessment, document the data on the patient's Neurological Observation Record using a pen (unless computerized charting in use). The GCS is documented by placing a dot or number in the appropriate space to document the patient's response.

Document a total score, which may include a "C" (eyes closed due to swelling or trauma), or "T" (tracheostomy/ endotracheal tube) depending on the assessment as outlined in the following sections.

Note: Additional documentation related to neurological assessment should be included in the nursing/interdisciplinary notes. The placement of an asterisk (or other institutional specific indicators) on the neurological observation tool, can be used to indicate that further documentation is included in the nursing/interdisciplinary notes. This should include documenting the stimuli used, as a means of communicating to other health care providers that any noted changes are not merely due to different techniques.

Painful stimuli

Central Pain:

- **Trapezius twist (cranial nerve XI):** Using the thumb and two fingers as pincers, feel for the mass of the trapezius muscle located at the angle where the neck and the shoulder meet. Take hold of about two inches of muscle and twist. Apply gradually increasing pressure for 10 to 20 seconds to elicit a response.
Note: High level spinal cord injuries may interfere with assessment using Trapezius twist.
- **Supra-orbital pressure (cranial nerve V):** Place the flat of the thumb on the supra-orbital ridge (small notch below the inner part of eyebrow) while the hand rests on the head of the patient. Apply gradually increasing pressure for 10 to 20 seconds to elicit a response.
Note: Supraorbital pressure is NOT to be used with orbital, skull, facial fractures, or frontal craniotomies.

Alternative method of applying central pain

- **Jaw margin pressure (cranial nerve V):** Place the flat of the thumb at the angle of the jaw at the maxilla-mandibular joint. Apply gradually increasing pressure for 10 to 20 seconds to elicit a response.
Note: Apply with caution in patient with increased intracranial pressure (ICP), as this may increase ICP if venous return is compromised due to compression of jugular vein

Peripheral Pain:

- **Interphalangeal joint pressure:** Apply pressure with a pen/pencil to the lateral outer aspect of the proximal or distal interphalangeal joint (lateral aspect of the patient's finger or toe). Apply the painful stimulus for 10 to 15 seconds to elicit a response.

Note: Sternal rub is NOT recommended due to potential for severe bruising and residual pain and discomfort

Glasgow Coma Scale (GCS)

1. Assess the following three aspects of behaviour to determine level of consciousness and document the best response as outlined below:

Eye Opening Response:

- a. If eyes are closed by swelling or surgery and are unable to be opened, score 1 and indicate with a “1C” or a “C” in the “no response/none” section.
- b. If one eye is closed, document the response from the functioning eye.

Behaviour		GCS Score
Spontaneously	Patient’s eyes open spontaneously with no prompting from the nurse as he or she approaches the patient.	4
To speech	Patient’s eyes do not open spontaneously but they do to a verbal stimulus. <ul style="list-style-type: none"> • Speak in a normal voice initially, and then in a louder voice as needed to consider hearing impairments/medications/status fluctuations 	3
To pain	Patient’s eyes do not open spontaneously or with verbal stimulation, but they do open to painful central or peripheral stimulation. Central pain stimulation for testing eye opening may cause the patient to grimace & confound the examination, if so use peripheral stimulation	2
None	There is no eye opening to any stimuli.	1

Best Verbal Response:

- a. If the patient is unable to vocalize due to presence of endotracheal tube (ETT) or tracheostomy, score 1 and indicate with a “1T” or a “T” in the “no response/none” section.

Note: If a patient is unable to vocalize due to the presence of an ETT/tracheostomy, but able to communicate through the writing or mouthing of words, the response still receives a score of 1 indicated with a “1T” or a “T” in the “no response/none” section, in addition a description of the patient’s response should be described in the nursing/interdisciplinary notes.

- b. If the patient is able to verbalize despite the presence of a tracheostomy, enter a “T” in the appropriate section.
- c. If the patient has a language or communication barrier and there is no interpreter or family present at the time of the assessment, document the language barrier across the section and expand in the nursing/interdisciplinary notes.

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Behaviour		GCS Score
Oriented	The patient answers all of the following correctly: <ol style="list-style-type: none"> 1. who he/she is (person) 2. where he/she is (place) 3. the month and year (time) <ul style="list-style-type: none"> • When testing orientation, change the order of the questions as the patient may memorize the answers. • If the patient is oriented but exhibits inappropriate behaviour, score the patient as oriented in that section and expand in the nursing/interdisciplinary notes describing the behaviour as clearly as possible. 	5
Confused	The patient is disorientated to ANY or all of time, place, and person.	4
Inappropriate words	The patient clearly articulates words, but his/her verbal responses bear no relation to the context of the orientation questions, e.g. patient swears.	3
Incomprehensible sounds	The patient fails to articulate words, but does utter sound, e.g., moans or groans.	2
None	There is no verbal response to any form of stimuli.	1

Best Motor Response (usually best arm response):

- a. If a painful stimulus is required to elicit motor response, apply a central pain stimulus.

Note: Peripheral pain stimulation may only reflect a simple spinal reflex response, and not higher-level brain function.
- b. It is not necessary to utilize a painful stimulus, if patient is clearly localizing, for example purposefully attempting to remove oxygen mask, naso-gastric tubes or when being endotracheally suctioned
- c. If the patient is localizing with one arm and not moving anything else, document this as the best response.

Behaviour		GCS Score
Obeys commands	The patient is able to understand and obey verbal/ written/gestured commands. Acceptable commands include: “show me a thumb/two fingers”, “stick out your tongue”. <p>Note: It is not acceptable to ask a patient to squeeze one’s hand unless he/she is also asked to release it. Hand grasping, without a release, may be merely a reflex.</p> <p>If the patient is unable to obey commands, place the patient in a supine position with hands positioned at the groin area, if possible, and proceed through the assessment by applying a painful central stimulus.</p>	6
Localizes to pain	The patient purposefully moves a limb in an attempt to locate and remove the source of the applied central painful stimulus. The hand must move toward the source in an attempt to remove the painful/noxious stimulus i.e. to the chin or across the midline of the body.	5

Flexion/ withdrawal	The patient withdraws the limb in response to a painful central stimulus by flexing at the elbow/knee with the limb drawn away from the trunk (recoil). There is no direct attempt to remove the source of the painful stimuli.	4
Abnormal Flexion to pain	The patient flexes the limb at the elbow in response to painful central stimuli. Accompanying this movement is shoulder adduction, wrist flexion and the making of a fist. Flexion to pain is usually a slow movement, with no attempt to remove the painful stimuli.	3
Extension to pain	The patient extends the limb at the elbow in response to painful central stimuli. Accompanying this movement is adduction of the shoulder; flexion of the wrist while the fingers either make a fist or extend.	2
None	No movement of the limbs occurs in response to painful central stimuli.	1

1. Changes from baseline may indicate deterioration in a patient's condition. Follow up by increasing the frequency of monitoring, informing the physician and/or calling the Rapid Response Team or equivalent as per organizational defined criteria.
2. At this point of the assessment, add the numbers from each section (eye opening, best verbal and best motor response) and document in the "total" section of the record.
 - This number may include a "C" or "T". For example, eye opening = 4, best verbal response = 1T, best motor response = 6, would have a total score = 11T.
 - Remember - C or T is associated with a score of 1.

Assessment of Pupils

Assess pupil size, equality and reaction.

- a. Check pupils in ambient light prior to assessing reaction, in order to observe the size of the pupil. The size of the pupil adjusted to ambient light is the pupil size recorded.
- b. Since not every person has equal pupils, assess and document a baseline for each individual patient.
- c. Check the patient's baseline/history for any cataracts, surgeries or dilating drops that will affect the assessment.
- d. Instruct the patient to look forward. If unconscious, RN to open patient's eyes by lifting the eyelids looking for midline status.
- e. Use a concentrated light source (e.g., penlight/ophthalmoscope/otoscope/ flashlight) in a dim room (turn off ambient light to attain a response) and assess for:
 - **Direct constriction:** Move the light from the outer aspect of the eye inward toward the pupil. The pupil should constrict. Repeat for the other eye.
 - **Consensual constriction:** Shine the light into one pupil and observe the other pupil for constriction. Repeat for the other eye.
- f. Examine each pupil in sequence for any constriction to direct and consensual illumination.
- g. Record a "+" symbol if the pupil reacts, a "-" symbol if the pupil does not react.

Note: If the eyelids are closed due to edema, attempt to open them gently but do not force the eyelids open, otherwise record a "C" for closed.

Note: If pupils change from baseline or NO pupillary constriction is observed, this may indicate a deterioration in a patient's condition. Follow up by increasing the frequency of monitoring, informing the physician and/or calling the Rapid Response Team or equivalent as per organizational defined criteria.

Assessment of Limb Movement and Muscle Strength in the Non-Spinal Cord Injured Patient

Note: To assess motor strength and sensory function in the spinal cord injured or suspected spinal cord injured patient use the spinal cord testing guidelines as per the American Spinal Injury Association.

Limb Muscle strength is tested to observe for any sign of asymmetry between limbs, and may provide information about the possible anatomical location of any intracranial pathological process or dysfunction

In a patient who obeys commands:

1. Assess the patient's ability to move limbs against gravity and resistance in response to a command.
2. Assess and document each limb separately.
3. Observe for differences from side to side.
 - Arms: Assess for straight arm lift, elbow flexion and extension.
 - Legs: Assess for leg extension, plantar flexion and dorsiflexion.

In a patient who does not obey commands:

- If the patient does not respond to commands, assess/document symmetry and strength of each unrestrained limb movement based on assessment of motor function for GCS (i.e. by observing patient's spontaneous movements or patient's response to central pain).

Document the best response of each limb separately on the Neurological Observation Record. A number of different motor strength scales are being used depending on organizational preference, below is an example of one such scale.

Document observed response as described below:

Scale for Muscle Strength:

Grade	Description
5	Limb moves against full resistance.
4	Limb moves against moderate resistance, but strength is diminished.
3	Limb may move against minimal resistance or against gravity, e.g., if the patient lifts the arm off a surface and it immediately drops back.
2	Limb moves on a horizontal surface with the inability to lift against gravity.
1	Limb or muscle flickers.
0	No movement is observed.

Adapted from the Medical Research Council (MRC) muscle grading scale.

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If patient is posturing:

Abnormal Flexion to pain document “F” for flexion:

- Arms: Flexes at the elbow in response to painful central stimuli. Accompanying this movement is shoulder adduction, wrist flexion and the making of a fist.
- Legs: Extend at the hips and knees

Extension to pain: Document “E” for extension:

- Arms: Extends at the elbow in response to painful central stimuli. Accompanying this movement is adduction of the shoulder; flexion of the wrist while the fingers either make a fist or extend.
- Legs: Extended with toes pointing downwards.

Note: If unable to assess strength/movement of limb due to fracture, cast, traction, etc. document as Not Applicable (N/A*) and document reasoning in the nursing/interdisciplinary notes.

Vital Signs

Obtain and document vital signs as per the Neurological Observation Record or an equivalent patient care record

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Appendix: Neurosurgical Nurse Educator Network Membership

Name	Title/Role	Organization
Joanna Pierazzo (Co-Chair)	APN, Neurosurgery Outreach	Trillium Health Partners
Debra Carew (Co-Chair)	Director of Operations, Trauma, Emergency & Critical Care Program	Sunnybrook Health Sciences
Sean Hopkins	Clinical Practice Manager, Neurosurgical Program	Windsor Regional Hospital – Ouellette Site
Janice Dawson	Director, Critical Care and Cardiology	Windsor Regional Hospital – Ouellette Site
Jean Morrow	Nurse Educator, Critical and Neurosurgical Care	London Health Sciences Centre
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Kathryn LeBlanc	Director, Neurosciences Program	Hamilton Health Sciences
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