



**CHOC – Children’s Health Orange County**  
***Best Evidence and Recommendations (BEaR)***

**Standardizing Pediatric Neurological Assessments**  
**Across Levels of Nursing Care**

**Christine Le, BSN, RN, CPN**  
[Christine.Le@choc.org](mailto:Christine.Le@choc.org)

**Abstract**

Hospitalized children may experience subtle and rapid changes in clinical neurological signs and symptoms related to their medical condition. Serial neurological assessments are regularly completed by bedside nurses and physicians, status changes are evaluated, and interventions are implemented as needed. However, there are no gold standard guidelines for pediatric neurological assessments that include the specific components, frequency, and communication thresholds.

This evidence-based project aims to standardize a pediatric neurological assessment that can be used across the levels of nursing care in an acute pediatric hospital setting. Moreover, the aim is to identify the specific neurological assessment components that would be evaluated, including a discussion of the best complementary neuro tools to incorporate (SNAP, GCS, PedsNIHSS, etc.), frequency and timing of assessments, standardized interventions, and documentation, and education/implementation of tools and policies.

This project highlighted the need to create an interdisciplinary task team consisting of physicians, neurosurgery, neurologists, physical/occupational/speech therapists, nurses, stroke coordinators, managers, and educators. Upon creating this task force, they will establish neurological assessment components and define the timing of assessments, interventions, documentation, and best practices to educate staff.

The project outcome is to have more thorough neurological assessments completed in the emergency department, intensive care units, and acute floors; to implement a neurological assessment tool, in addition to Glasgow Coma Scale currently used, that better evaluates a patient’s neurological status.

**Keywords**

Serial neurological assessments, pediatric stroke certified, acute brain injury, Glasgow coma scale, PedsNIHSS, FOUR Score, and pediatric neurological scale, assessment documentation

**PICO(T)**

Among pediatric stroke centers, what are the best practices in nursing neurologic assessment and documentation across the continuum of care?

## **Background and Significance**

Neurological assessments are an essential tool in helping to evaluate the decline in a patient's neurological status. Often these serial assessments are part of a more comprehensive neurological examination and are used by the bedside nurse. There are currently multiple assessment tools that can help clinicians diagnose and report neurological changes. These tools include the Glasgow Coma Scale, Four Score, Serial Neurological Assessment in Pediatrics (SNAP), and PedNIHSS. There is no gold standard guideline for pediatric neurologic assessment for nurses, let alone assessments that consider children with developmental disabilities or chronic brain injuries (Iacono, Wells, & Mann-Finnerty, 2014). The lack of a consistent tool that all healthcare team members utilize can lead to deficits in patient assessment and miscommunication among providers regarding clinical issues. Having a standardized set of guidelines for neurologic assessments will help nurses caring for neuroscience patients to be able to communicate changes in neurological status and interventions to be done quicker, thus preventing further decline in the patients.

## **Framework**

This EBP project utilizes the "Translating Evidence into Practice: CHOC's Approach to EBP" model, adapted from the EBPI Model © 2007 Brown & Ecoff (Ecoff, Stichler & Davidson, 2020).

## **Search for the Evidence**

Databases searched for this review included CINAHL and PubMed. Key search words: serial neurological assessments, pediatric stroke certified, acute brain injury, Glasgow coma scale, PedNIHSS, Four Score, pediatric neurological scale, and assessment documentation. Thirteen articles were found to have the applicable information.

Communication with CHOC personnel and clinicians from children's hospitals in Los Angeles, San Diego, Colorado, Philadelphia, Boston, Stanford, Texas, and Seattle was incorporated in the search for evidence. The AANN listserv was also utilized to seek information on best practices.

## **Critical Appraisal and Synthesis of the Evidence**

- A survey of 67 institutions revealed that current practices of assessing and monitoring neurologic status are suboptimal, with the components of neurological assessment varying between institutions and different scales used. The frequency of evaluations varied depending on each patient and the physician's orders (*Kirschen,*

Snyder, Winters, Ichord, Berg, Nadkarni, Topjian, 2018).

- Scales include:
  - Glasgow Coma Scale (GCS)
  - Alert, Voice, Pain, Unresponsive (AVPU)
  - Full Outline of UnResponsiveness (FOUR) Score
  - Pupillary Reflex
  - Face, Legs, Activity, Cry, Consolability (FLACC)
  - Richmond Agitation Sedation Scale (RASS)
  - State Behavioral Scale (SBS)
- Several articles reviewed neurological assessment tools:
  - The *Serial Neurological Assessment in Pediatrics (SNAP)* tool has excellent protocol adherence and reliability. It is easily feasible to implement, though more work is needed to determine clinically meaningful neurologic decline (Kirschen et al., 2021).
    - Components of the neurological assessments are highly variable (includes consciousness, cranial nerves, communication, and sensorimotor system)
    - SNAP includes scoring options to assess patients with artificial airways, pharmacologic sedation, baseline developmental disabilities
    - Scales included are for children less than six months, six months to 2 years, and older than two years
    - SNAP has the potential to achieve an ideal balance between the complexity of neurological examination and user-friendliness for nurses and physicians
  - Standardizing Neurological Assessments was an attempt to redefine and specify the assessment based on the risk of injury (Kirschen et al., 2019).
    - The assessment included a modified GCS, pupillary light reflex, cough reflex, gag reflex, and motor strength of each extremity with modification as needed for children less than two years old
    - It was necessary to identify a patient's risk level for an acute brain or spinal cord injury, which then determines the frequency of assessment every 1, 2, 3, or 12 hours
    - A comparison of patients' current neurological status with their pre-illness neurological status to help decipher changes
    - Improvements needed to account for patients with developmental disabilities and consistency of assessment scoring
  - Basic Neurological Check (Iacono, Wells, Mann-Finnerty, 2014)
    - This assessment addressed the following domains: alertness, orientation, facial palsy, and four-limb strength that incorporated some simple elements of the NIHSS
    - Facial palsy was also added to this assessment to screen for new stroke onset
    - Intended for use on any patient with a confirmed or suspected neuroscience diagnosis, except stroke, and could be performed by any nurse regardless of specialty.
  - Coma Neurological Check (Iacono, Wells, Mann-Finnerty, 2014)



- This assessment combined a four-extremity motor examination and the GCS and was used for all patients in a coma but used exclusively in intensive care areas
  - Performed GCS once per shift and a coma neurological check hourly
- The FOUR score is a new coma scale that strives to address intubated patients (Wijdicks, Bamlet, Maramattom, Manno, & McClelland (2005))
  - Consists of four components (eye, motor, brainstem, and respiration) with a maximum score of 4 in each area
  - Can be used in patients with impaired consciousness and recognizes certain unconscious states
- Based on the literature review, there is a need to standardize neurological assessments to identify the decline of neurological status in patients. Thus far, there has not been a cohesive agreement on which assessment is best.

### **Practice Recommendations**

- Create an interdisciplinary task team of key stakeholders, including, but not limited to, the chief of neurology, neurosurgeons, patient care services director, stroke coordinator, clinical educator, manager, and neuroscience nurses to review and determine the following:
  - The necessity of neurologic assessment components, including additional assessment tools to be added to help assess pediatric patients who have developmental disabilities, are nonverbal or intubated
  - The frequency and timing of assessments
  - The intervention protocols to be followed based on the neurological assessment findings, including lab draws and imaging as needed
- Collaborate with the clinical education and information systems department to identify educational gaps and implementation of standardized neurological assessments
- Resources to retrieve and collect data, particularly completeness of assessments, must be discussed.
  - Data and statistics must be collected from patients with a neurologic decline that includes interventions performed and documentation

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