Neurological assessment by nurses using the National Institutes of Health Stroke Scale: Implementation of best practice guidelines

By Sophia Gocan and Andrea Fisher

Abstract

Assessment is an essential nursing skill that gathers clinical information to strengthen decisions about health interventions and priorities inpatient care delivery. Neurological assessment of the acute stroke survivor provides the cornerstone for early diagnosis, appropriate prognostic evaluation, and optimal management to obtain favourable patient outcomes. The nursing approach to neurological assessment has been enhanced in recent years through the development of new evidence-based assessment tools and the support of best practice guidelines.

Based on gaps seen in clinical practice and current best practice guideline recommendations, neurological nurses from The Ottawa Hospital (TOH) identified the need to assess acute stroke survivors using a standardized neurological assessment tool. In 2004, a Registered Nurses of Ontario (RNAO) nursing advanced clinical practice fellowship provided the opportunity for the development of expertise in stroke assessment and establishment of recommendations for neurological nursing assessment at TOH. As a result, standards for nursing neurological assessment have been adopted at TOH using the National Institutes of Health Stroke Scale (NIHSS). This paper will review current evidence and best practice guidelines for neurological assessment. The significances of using the NIHSS for nurses in the context of the provision of acute stroke care will be presented. Knowledge transfer, application and evaluation of best practice guidelines (BPGs) in clinical nursing practice will also be discussed.

Background and introduction

Stroke can be defined as the sudden development of a focal neurological deficit, which is caused by thrombotic or embolic arterial occlusion (ischemic stroke) or by rupture of an artery into the brain or subarachnoid space (hemorrhagic stroke) (Internet Stroke Center, 2008). Approximately 80% of all strokes are ischemic and 20% are hemorrhagic (Kapral et al., 2005). In Canada, stroke accounts for 7% of all adult deaths and it is a leading cause of disability. Consequences of stroke are considerable and have a substantial impact on quality of life. In 2000, of Canadians who reported having a stroke, 77% needed to restrict their activities and 71% required help with their activities of daily living (Heart & Stroke Foundation of Canada, 2003). Even for those who return to living in the com-
munity after stroke, residual disability can significantly affect daily life as the result of stroke-related damage to important sensory, motor, cognitive, and communicative neurological domains (Ministry of Health and Long-Term Care of Ontario [MOHLTC] & the Heart and Stroke Foundation of Ontario [HSFO], 2000).

Acute stroke is a medical emergency. The longer blood flow to the brain is interrupted, the greater the chance of permanent brain damage (Camarata, Heros, & Latchow, 1994). “Time is brain” is a phrase commonly used by the Ontario Stroke System to convey to the general public the need to seek immediate help when stroke symptoms occur (MOHLTC & HSFO, 2000). This phrase emphasizes the need for rapid identification of symptoms and access to appropriate treatment.

As brain ischemia may not be evident on a Computerized Tomography (CT) scan during the first 24 hours of stroke, the early stages of management require constant expert assessment to identify correlations between patient history of the event, imaging studies, and clinical findings. Focal brain ischemia occurs as soon as there is an interruption in cerebral blood flow. When cerebral blood flow is cut off, there is a core area of ischemic tissue that develops, surrounded by a marginally perfused area that has been called “the ischemic penumbra” (Camarata et al., 1994). Medical interventions have the greatest effect on stroke outcomes in the early phase of stroke where at-risk cells in the penumbra have the potential to be salvaged (Astrup, Siesjo, & Symon, 1981). Priority goals include stabilization and improvement of cerebral perfusion to ischemic tissue. An estimated 25% of patients may have neurological worsening during the first 24 to 48 hours after stroke (Adams et al., 2007).

Stroke can be effectively treated. “Organized stroke care” using evidence-based protocols and interdisciplinary stroke teams has demonstrated a reduction in stroke mortality, morbidity, hospital costs and the need for long-term care (Indredavik, 1997). The administration of the ‘clot-busting’ drug tissue plasminogen activator (tPA) within the critical three-hour window can also minimize or reverse the effects of stroke (The National Institute of Neurological Disorders & Stroke rt-PA Stroke Study Group, 1995). The Canadian Alteplase for Stroke Effectiveness Study (CASES) demonstrated that tPA resulted in a return to pre-stroke level of functioning in 36.8% of patients (Hill & Buchan, 2005). Clinical decisions and measurement of treatment outcomes rely on accurate, valid assessment of neurological function (Sun, Chiu, Yeh, & Chang, 2006).

“Stroke care now requires rapid assessment and triage in the acute phase to implement thrombolysis. Timing is critical—every 10 minutes’ delay in treatment substantially reduces the chance of a good outcome” (Hill, 2002, p. 649).

Best practice guidelines
BPGs are systematically developed statements to assist practitioners and patient decisions about appropriate health care for specific clinical circumstances (Field & Lohr, 1990). A panel of experts using a rigorous methodological approach that includes a systematic review of the evidence derives guidelines. Recommendation statements reflect the best evidence and may include expert opinion when the evidence is not available. The implementation of evidence-based BPGs improves patient outcomes by reducing variation in practice and ensuring consistent quality care (United States Department of Veteran Affairs, 2008).

RNAO has been developing, piloting, implementing, evaluating, disseminating and supporting the uptake of nursing BPGs in Ontario since 1999. RNAO launched the Nursing Best Practice Guidelines Program with funding from the Government of Ontario in 1999. To date, more than 30 guidelines, a tool kit and educator’s resource are available on the website to support nurses with implementation (www.rnao.org).

In June 2005, RNAO published the Stroke Assessment Across the Continuum of Care BPG. This guideline is a comprehensive document that provides nurses with evidence-based recommendations regarding the assessment and/or screening of stroke survivors across the continuum of care (HSFO & RNAO, 2005). The HSFO and RNAO worked collaboratively with clinical experts to develop and evaluate this guideline. The process involved external stakeholder review of the BPG and feedback. The guideline includes recommendations for practice, education, organization and policy. Each recommendation is assigned a level of evidence ranging from the most rigorous studies, meta-analysis or systematic review of randomized controlled trials (highest) to expert committee report or expert opinion (lowest). It provides evidence-based recommendations regarding a broad scope of important issues such as stroke recognition, secondary prevention, pain, nutrition and, of greatest interest for the purposes of this paper, neurological assessment.

The Stroke Canada Optimization of Rehabilitation through Evidence (SCORE) project has developed and piloted evidence-based recommendations for the rehabilitation of persons who have experienced stroke with residual disability (Canadian Stroke Network [CSN], 2005). Recommendations were developed by a Canadian panel of stroke rehabilitation researchers and clinicians using the Evidence Review of Stroke Rehabilitation (http://www.ebrsr.com), published clinical practice guidelines, and opinions of experts in the field.

In 2006, the Canadian Stroke Strategy (CSS) Best Practice and Standards Working Group, in partnership with the CSN and HSFC, published recommended best practices in stroke care appropriate to Canadians. The topic list includes recommendations for public awareness and responsiveness, patient and caregiver education, prevention of stroke, acute stroke management, stroke rehabilitation and community reintegration after stroke (CSS, 2006). The above guidelines describe several initiatives in stroke care to increase knowledge of stroke through evidence-based research. Additional work can be retrieved at: http://www.canadianstrokestrategy.ca/ and http://profed.heartandstroke.ca/.

RNAO Fellowship
There is no clear consensus among experts regarding the optimal order of performing components of a neurological examination. Nursing neurological assessment practices can vary widely between colleagues on a given unit, or between health
A comprehensive review of the literature was conducted in methods. As part of the background information collection to identify assessment practices at Ontario regional stroke centres (RSCs), Gocan and Fisher (2005) conducted a survey. The survey explored the use of neurological stroke assessment scales by nurses at RSCs in Ontario, Canada (Gocan & Fisher, 2005). Findings revealed that nurses were moving away from reliance on the Glasgow Coma Scale (GCS) towards use of standardized stroke severity scales to facilitate assessment, documentation, and care planning with acute stroke survivors. Scales used in regional stroke centres were consistent with the 2005 HSFO & RNAO BPG and included the Canadian Neurological Scale (CNS), the National Institutes of Health Stroke Scale (NIHSS) and the GCS.

The purpose of this paper is to illustrate the integral role of nursing in acute stroke assessment, reviewing TOH neuroscience nursing experience in implementation of the NIHSS. Current evidence and published BPGs for neurological assessment will be presented. The NIHSS and its significance in the care of acute stroke survivors will be described. Our experiences in the application and evaluation of BPGs in clinical nursing practice will also be discussed.

Methods
A comprehensive review of the literature was conducted in 2004 examining research evidence and BPGs pertaining to neurological nursing assessment. Three BPGs addressing neurological assessment of acute stroke survivors were identified. At that time, the HSFO & RNAO BPG was available in 'draft' form. The BPGs included:

1. 'Stroke assessment across the continuum of care' developed by the Heart and Stroke Foundation of Ontario and Registered Nurses Association of Ontario (HSFO & RNAO, 2005)
2. 'Post-stroke rehabilitation: Clinical practice guideline number 16' developed by the Agency for Health Care Policy and Research (Gresham et al., 1995)
“Nurses in all practice settings should conduct a neurological assessment on admission and when there is a change in client status. This neurological assessment, facilitated with a validated tool (such as the Canadian Neurological Scale, National Institutes of Health Stroke Scale, or Glasgow Coma Scale), should include at minimum:

- Level of consciousness
- Orientation
- Motor (strength, pronator drift, balance and coordination)
- Pupils
- Speech/language
- Vital signs (temperature, pulse, and respiration, blood pressure, pulse oximetry)
- Blood glucose
  (Level of Evidence IV)” p. 29.

Multidisciplinary expert panel: Stroke scale selection and guidelines

A multidisciplinary expert panel was convened at TOH with the aim to critically examine nursing neurological assessment of acute stroke survivors. Fourteen nurses, one stroke neurologist and two allied health professionals (physiotherapist and occupational therapist) specializing in stroke participated on the panel. Participants reviewed the nursing literature regarding neurological assessment and three identified stroke BPGs. Open discussions were used to examine current nursing assessment practices, gaps in practice, and optimal strategies to translate knowledge from BPGs into clinical practice. Once the panel identified key neurological assessment features they would like to see in the chosen instrument, round table discussions were used to examine the advantages and disadvantages of three standardized stroke scales. This was accompanied by reference to key journal articles demonstrating the validity and reliability of the CNS, the mNIHSS and the NIHSS. Round-table discussions followed with the objective of reaching a consensus regarding recommendations for a standardized stroke scale for nursing assessment of acute stroke survivors at TOH and to provide guidelines for use of the selected scale.

The expert panel selected the NIHSS as a standard of care for neurological nursing assessment at TOH. Table 1 summarizes the factors that influenced the decision to adopt the NIHSS at TOH. This includes recognition from the expert panel that the NIHSS provides nurses with the means to objectively and quantitatively assess stroke survivors. The scale is recognized as the ‘industry standard’ and its comprehensive nature when compared with other scales was another important factor. The usefulness of the NIHSS for intra- and multidisciplinary communication across the continuum of care was another important consideration.

Other merits of the scale that were taken into account included the potential to monitor improvement or deterioration of the stroke survivors’ neurological status, the collection of relevant information regarding the extent and evolution of stroke and the potential impact to early intervention and patient outcomes. Organizational strengths included support by management for human and financial resources involved in the educational training, implementation and evaluation of the chosen scale.

Table 1 outlines the summary of recommendations from the expert panel regarding NIHSS nursing use at TOH. The NIHSS (Appendix A) is a validated stroke severity scale that measures level of consciousness, orientation, gaze, visual fields, motor response, sensation, language, ataxia, dysarthria and neglect (Brott et al., 1989; Lyden et al., 1999). The pictures

<table>
<thead>
<tr>
<th>Table 1. Factors that influenced the decision to adopt the NIHSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>National Institutes of Health Stroke Scale</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ADVANTAGES</td>
</tr>
<tr>
<td>Comprehensive neurological examination</td>
</tr>
<tr>
<td>Provides valid information regarding stroke severity and assists in monitoring stroke progression</td>
</tr>
<tr>
<td>Good communication tool between nursing colleagues and with physicians/health team</td>
</tr>
<tr>
<td>Tool is user-friendly after education has been completed</td>
</tr>
<tr>
<td>The admitting neurologist establishes a baseline with this tool for patients eligible for thrombolysis (t-PA)</td>
</tr>
<tr>
<td>Predictive value, usefulness in discharge planning and rehabilitation</td>
</tr>
<tr>
<td>Useful in communicating with families</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Table 2. Guidelines for nursing assessment with the NIHSS

|                                                                 |
| The NIHSS should be used as an assessment tool by nurses on the neurology service |
| NIHSS should be used to assess acute stroke patients: t.i.d. x 72 hours; with any neurological change; and at discharge. |
| When the neurological assessment is required frequently (> t.i.d.) the assessment should include at minimum: vital signs; level of consciousness (LOC) (orientation, questions, commands); motor exam; language; and key neurological deficits the patient presented with and/or any new deficits that have evolved. |
and sentences that accompany the NIHSS are used to assess components of language function and dysarthria. The NIHSS requires training for its use, which is available free on-line through the American Stroke Association website, or through video/DVD (Schmülling, Grond, & Rudolf, 1998). NIHSS scores correlate with functional outcome scales (i.e., Barthel Index), other stroke severity scales, lesion volume and activity of daily living scores (Brott et al., 1989; Lai, Duncan, & Keighley, 1998; Muir, Weir, Murray, Povey, & Lee, 1996). The NIHSS score has been shown to predict hospital costs, length of stay and discharge location (Schlegel et al., 2003).

Implementation of the NIHSS
Implementation of the NIHSS at TOH involved 90 nurses working on the inpatient neurology unit and neurology observation (step-down) unit. One hundred per cent of the nurses participated in the NIHSS education, which consisted of a three-hour workshop. While all nurses attended the workshop in addition to their regular work hours, supplemental hourly pay was provided. The workshop was hosted by the regional stroke program and included NIHSS video instruction, a PowerPoint presentation, one-on-one demonstration, and return demonstration using practice scenarios. All participants were given the NIHSS pocketbook (published by the National Institutes of Neurological Disorders and Stroke [NINDS]) and workshop materials.

In order to promote success of this clinical practice change, many supportive activities occurred at TOH in conjunction with the education workshops. The RNAO (2002) ‘Toolkit: Implementation of clinical practice guidelines’ was used by the ACPF nurse to assist in the development of an action plan that would maximize the likelihood of success in the implementation of the NIHSS in clinical practice. Members of the expert panel met on a second occasion to develop action items to support the NIHSS implementation and evaluation plan. Topics discussed included communicating expert panel NIHSS recommendations, providing support for nursing staff, addressing workload issues, developing documentation forms, policy and procedure documentation, and collaborating with the medical team. Educational development plans were established including timelines, objectives, educational strategies, funding, and support to enhance impact at the bedside. Brainstorming around evaluation strategies were also discussed at this time.

Clinical nursing staff was involved in the expert panel meetings and had an important role in the planning and decision-making phases of this project. Nursing staff from each of the two neurology units was involved in a "train-the-trainer" workshop and acted as a resource for colleagues in clinical practice. The "train-the-trainer" workshop was also offered to clinical nurses from variety of stroke settings in the Champlain Region – including nurses from the Pembroke emergency department where TOH provides thrombolytic therapy through the use of Tele-stroke, and stroke rehabilitation colleagues.

Education on advanced neurological assessment techniques was provided to TOH staff in combination with NIHSS teaching. The education package was developed using the NINDS NIHSS materials, the NIHSS video, a PowerPoint presentation and scenarios developed by the ACPF nurse. As part of the Ontario Stroke Strategy, these teaching materials have been modified for provincial use and are available in the Professional Education Atlas (HSFO, 2008). One-on-one support was provided in the clinical setting after the NIHSS education by nursing members of the regional stroke program, and staff nurses who completed the “train-the-trainer” workshop. One staff nurse on modified duties was assigned to be a resource for the NIHSS implementation and contributed greatly to this project. Documentation, shift report and patient rounds were modified to incorporate the NIHSS.

On completion of the workshop, nursing performance of the NIHSS was evaluated in the clinical setting. Bedside evaluation was performed by clinical nurses who had attended the "train-the-trainer" workshop and completed the on-line standardized NIHSS certification. Staff nurses received a ‘TOH certificate of competence’ when the NIHSS assessment was successfully completed.

Evaluation of the NIHSS in clinical practice
Project evaluation consisted of three main components: focus group sessions, continuous quality improvement, and a competence survey. Focus group sessions were held pre- and post-implementation to provide open communication and support. Continuous quality improvement indicators were assessed using chart audits. This targeted several quality indicators such as compliance with scale use as per the new policy, accurate documentation, and documentation of nursing response to changes in patient condition, as identified by changes in scoring of the NIHSS (Table 3). Compliance rate targets were set for 80% at six months, and 90% for one year. At six months, 31 audits were completed and 79% of the indicators were met. Documentation frequency and documenta-

<table>
<thead>
<tr>
<th>Table 3. Chart audit indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIHSS Integrated Acute Stroke Flowsheet was stamped and initiated in the Emergency Room for Stroke Code patients</td>
</tr>
<tr>
<td>Neurology physician examining patient in the Emergency Room completed a baseline NIHSS for Stroke Code patients</td>
</tr>
<tr>
<td>NIHSS assessment is documented on admission or transfer to neurology unit</td>
</tr>
<tr>
<td>Glasgow Coma Scale is used when the patient scores an NIHSS score 2 or 3 on LOC 1a</td>
</tr>
<tr>
<td>NIHSS assessment is documented on patients cared for on neurology unit t.i.d.: a) in first 24 hrs; b) at 48 hrs; and c) at 72 hrs post stroke</td>
</tr>
<tr>
<td>Modified NIHSS assessment (shaded areas and other area identified by examiner) is performed when neurological exam is required more frequently than t.i.d. (q 1–6 hr neurological assessment)</td>
</tr>
<tr>
<td>Total score is tabulated for complete NIHSS assessments</td>
</tr>
<tr>
<td>If a new deficit is indicated, nursing note documented in chart explaining action/interventions</td>
</tr>
<tr>
<td>If a change in NIHSS Total Score &gt; 3 occurs: Nursing note documented in chart explaining actions/interventions</td>
</tr>
</tbody>
</table>
tion of nursing response when the NIHSS demonstrated a change in patient condition needed improvement. At one year, a small sample of 10 audits demonstrated consistent findings with 100% of indicators met.

One year following the implementation of the NIHSS at TOH, 68 nurses were available to participate in a written survey aimed at evaluating their self-assessed competency in neurological assessment techniques (see Appendix B). Approval for this survey was obtained through TOH Research Ethics Board in 2005. The multiple choice survey was based on the novice to expert work of Benner, Tanner and Chesla (1992) with a score of (1) representing novice (2) advanced beginner, (3) competent, (4) proficient, and (5) expert. The survey took approximately 20 minutes to complete and examined specific neurological assessment skills required for the NIHSS assessment, critical thinking, and professional behaviours. The response rate was 50% (34/68 nurses). The number of years’ experience in neurology nursing ranged from 2 months to 20 years.

As displayed in Figure 1, the average score was 3.5 (competent to proficient) or higher on all clinical skill survey items including level of consciousness (LOC), coma, mental status (MS), gaze and extraocular movements (gaze), visual fields (visual), facial palsy (facial), motor strength and drift (motor), limb ataxia (ataxia), sensation, language, dysarthria (dysarth) and neglect.

Survey items pertaining to critical thinking and professional behaviour can be seen on the survey in Appendix B. The average score was 3.8 (competent to proficient) or higher on assessment skills dealing with critical thinking, assessment of trends, patient risk, communication, nursing interventions, professional judgment, care plan development, problem solving, and scope of practice. None of the surveyed nurses rated themselves novice or advanced beginner on these items.

As demonstrated in Figure 2, the six clinical skills most often rated by nurses as expert or proficient included level of consciousness, mental status, motor strength and drift, facial palsy, sensation and language. Figure 3 includes the six clinical skills least often rated expert or proficient: dysarthria, coma, limb ataxia, neglect, gaze and extraocular movements, and visual fields.

**Discussion**

Nurses make clinical decisions every day that impact on the lives of their patients (Arries, 2006). Standards for stroke assessment, monitoring, and evaluation affect the quality of those decisions and, ultimately, patient outcomes. Our experience indicates that the implementation of BPGs for nursing neurological assessment of acute stroke survivors has potential to attain very positive results including high levels of self-reported nursing competence in neurological assessment skills, problem solving, and care plan development.

Del Bueno (1983) noted that the most efficient and lasting technique to achieving expertise at any skill, physical or intellectual, is repeated practice in the same setting or conditions as those under which the skill will be performed. For the NIHSS implementation, nursing expertise was enhanced through video simulation, practice scenarios where nurses simulated assessment in pairs, and clinical experience that was supported at the bedside. Nursing self-assessed competency results demonstrated a high level of proficiency and expertise across stroke scale items. Diverse teaching methods and a high degree of support in the implementation of a significant clinical change such as the NIHSS cannot be undervalued.

Education, clinical application and ongoing maintenance of skills are all necessary for successful learning and development of assessment expertise (Wilson & Lillibridge, 1995). It has been noted that spending time performing assessment skills with experts is a critical component to solidify nursing confidence (O’Farrell et al., 2000). This continuous education component entails a concerted investment of time and resources. In our experience, there are many competing demands for

![Figure 1. Average competency rating by nurses one year post-implementation of NIHSS](image-url)
Figure 2. Competency ratings by nurses’ one year post-implementation of NIHSS: Six clinical skills most often rated expert (5) or proficient (4)

Figure 3. Competency ratings by nurses’ one year post-implementation of NIHSS: Six clinical skills least often rated expert (5) or proficient (4)
knowledge and skill development in nursing clinical practice. Bedside clinical support has been instrumental to enhancing proficiency in neurological assessment skills at TOH.

Clinical assessment skills identified to be more “novice” by nurses at TOH include ataxia, neglect, gaze, and visual fields. Nurses also reported that stroke survivors with receptive aphasia deficits presented a particular challenge in the assessment of ataxia, gaze, neglect and visual fields. Under these circumstances, a broader skill set needed to be employed, using tools such as visual threat to assess visual fields and the oculocephalic manoeuvre to assess gaze (Brott, 1989). This was particularly true in the context of receptive language deficits. In response to this feedback a “Tips and Tools Aphasia Guide” was developed by the ACPF nurse to coach nurses through the standardized process of following the NIHSS with aphasic patients. This guide was distributed during the education sessions and made available on the unit. A video simulation where a stroke survivor has expressive and receptive aphasia is also used to discuss the unique challenges in assessment of this population.

Language barriers and cognitive deficits associated with stroke have also been identified as challenges to the use of the NIHSS at TOH. Many of the stroke survivors who seek care at TOH are French-speaking, and modification in the language and dysarthria component have been made to provide francophone patients with a comprehensive neurological exam. This component was modified in consultation with a Speech Language Pathologist from the regional stroke program.

In addition, initially allied health staff noted there was an adjustment period to understand and apply the new language involved in the NIHSS and interpret completed scores. Educational resources were provided to allied health team members to assist with this transition once the need was identified. Neurologists at TOH reported enhanced satisfaction with the consistency in communication of stroke assessment for individual patients and in care planning at multidisciplinary rounds.

Continuous quality improvement chart audit indicators evaluating documentation compliance demonstrated excellent results with 79% of indicators met at six months, and 100% of indicators met at one year. The nursing use of the NIH Integrated Acute Stroke Flowsheet was incorporated into clinical practice with few challenges. Documentation frequency and nursing response when changes in patient condition occurred were not performed consistently at six months, but by one year were addressed appropriately. The NIHSS does not include the assessment of pupil size and reaction to light. This component was added to our Flowsheet to facilitate centralized documentation for the complete neurological assessment. This minimized the need for narrative documentation or the use of multiple Flowsheets.

**Sustainability plan**
Implementation of BPGs for neurological assessment of stroke survivors has been a positive experience at TOH. It has provided a means of standardizing stroke severity assessment, and has created a common thread in communication among members of the health care team.

Based on the one-year self-assessed competency evaluation, quality improvement audits, and ongoing feedback, a sustainability plan has been developed at TOH to help nurses maintain needed neurological assessment knowledge and skills. Ongoing educational activities have been offered to meet learning needs. Additional support has been provided to increase expertise with clinical assessment skills in areas identified to be more “novice”: ataxia, neglect, gaze, and visual fields. Clinical decision-making, and multidisciplinary communication have been promoted using NIHSS components across the continuum of care, and orientation of newly hired staff includes the NIHSS education and bedside evaluation.

**Next steps**
The best language component of the NIHSS was translated into French for nurses to be able to assess the language of French-speaking patients post-stroke. Further testing of the tool is recommended to evaluate the reliability and validity of these revisions. French translation will be a requirement for implementation of the tool in settings with French-speaking health care professionals and stroke survivors.

Future research to evaluate the sustainability of nurses’ competence using the NIHSS over time would provide valuable information to assist with planning of educational programs. The frequency of certification for nurses to maintain competence has not been established. Annual certification using the NIHSS website (http://www.nihstrokescale.org/) has been suggested. Compliance and successful completion of the training requires further follow-up.

**Conclusion**
Stroke management requires rapid assessment, triage, treatment and evaluation. Time lost reflects brain lost and, more importantly, function lost. The evidence indicates that nursing assessment of stroke severity and changes in neurological function are essential for optimal stroke survivor outcomes. Additionally, standardized, validated assessment tools are available to help nurses objectively and quantitatively assess stroke survivors and use a common language to communicate findings with other health care providers. Further, the benefits of implementing stroke BPGs into practice are broad and culminate around the provision of enhanced evidence-based care for stroke survivors. Neuroscience nurses at TOH who assimilated the NIHSS into routine bedside practice have reported a high level of competence in performing the key components of the neurological exam. In addition, nursing survey results indicated proficiency in dealing with critical thinking, monitoring trends in patient status, patient risk assessment, problem solving and scope of practice. In our experience, the NIHSS added consistency to assessment across the continuum of care from initial assessment in the emergency room to acute care, rehabilitation and discharge planning in the community. In this project, nursing leadership played a significant role in narrowing gaps in practice related to implementing best practices in neurological assessment and optimizing stroke survivor care.
About the authors
Sophia Gocan, BSNC, CNN(c), RN, Stroke Nurse Specialist, Champlain Regional Stroke Program, The Ottawa Hospital, Ottawa, ON.

Correspondence regarding this article should be addressed to Sophia Gocan. E-mail: sgocan@ottawahospital.on.ca
Andrea Fisher, MSc, MSN, RN, Advanced Practice Nurse, Stroke, Champlain Regional Stroke Program, The Ottawa Hospital, Ottawa, ON.

References


1. **Level of Consciousness:**

   - Alert, keenly responsive 0
   - Not alert (arousable by minor stimulation to obey, answer, or respond). 1
   - Not alert (responds to repeated or painful stimulation). 2
   - Only reflex motor, autonomic effects, or totally unresponsive. 3

2. **LOC, questions:**

   - (Month, age) 0
   - Performs both tasks correctly 1
   - Performs one task correctly 2
   - Performs neither task correctly 3

3. **Visual:**

   - (Introduce visual stimulus/threat to patient's field quadrants)
     - No visual loss 0
     - Partial hemianopia (sector or quadrant field deficit) 1
     - Complete hemianopia (dense field loss, such as half of visual field) 2
     - Bilateral hemianopia (blind) 3

4. **Facial Palsy:**

   - (Show teeth, raise eyebrows, squeeze eyes shut.) Pantomime may be used
     - Normal 0
     - Minor paralysis (mild asymmetry on smiling) 1
     - Partial paralysis (paralysis of lower face) 2
     - Complete (one or both sides: paralysis of upper and lower face) 3

5. **Motor arm—Left**

   - (Test each limb independently; Palm down: Elevate arm to 90° if pt sitting, 45° if pt supine and score drift/movement over 10 seconds)
     - No drift (limb holds for full 10 seconds) 0
     - Drift (limb drifts downward but does not fall to rest on a support) 1
     - Some effort against gravity (drift to fall on support) 2
     - No effort against gravity (trace movement, limb fall immediately) 3
     - No voluntary movement 4
     - Amputation, joint fusion, etc. 5

6. **Motor leg—Left**

   - (Test each limb independently; With pt supine, elevate extremity to 30° and score drift/movement over 5 seconds)
     - No drift (limb holds for full 5 seconds) 0
     - Drift (limb drifts downward but does not fall to rest on a support) 1
     - Some effort against gravity (drifts to fall on support) 2
     - No effort against gravity (trace movement, limb falls immediately) 3
     - No voluntary movement 4
     - Amputation, joint fusion, etc. 5

7. **Limb ataxia**

   - (Finger–nose, heel down shin)
     - Absent 0
     - Present in one limb 1
     - Present in two limbs 2

8. **Sensory**

   - (Pin prick to face, arm, trunk, and leg—compare side to side. Look at grimace in aphasic patient)
     - Normal 0
     - Mild to moderate sensory loss (less sharp/dullness) 1
     - Sensory or total sensory loss (not aware of touch) 2

9. **Best language**

   - (Name item, describe a picture and read sentences)
     - No aphasia 0
     - Mild to moderate aphasia (reduced fluency or comprehension) 1
     - Severe aphasia (communication exchange very limited) 2
     - Mute, global aphasia 3

10. **Dysarthria**

    - (Evaluate speech clarity by having patient read or repeat listed words)
      - Normal articulation 0
      - Mild to moderate dysarthria (can be understood) 1
      - Severe dysarthria (unintelligible or worse) 2
      - Intubated or other physical barrier 3

11. **Extinction and inattention**

    - (Use information from prior testing to identify neglect or double simultaneous stimuli testing)
      - No abnormality (no neglect) 0
      - Visual, tactile, auditory, spatial, or personal inattention, or extinction to bilateral stimulation in one of the sensory modalities) 1
      - Profound: more than one modality affected 2

---

**PUPILS—PUPILLES**

<table>
<thead>
<tr>
<th>Size</th>
<th>1mm</th>
<th>2mm</th>
<th>3mm</th>
<th>4mm</th>
<th>5mm</th>
<th>6mm</th>
<th>7mm</th>
<th>8mm</th>
<th>9mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**

Left size/Reaction

Right size/Reaction

Signatures, date, initials

---

**Appendix A. TOH NIH Integrated Acute Stroke Flowsheet. Adapted from www.ninds.nih.gov**
It is recognized that each nurse engaging in these education sessions comes with a foundation of knowledge and skills from past experiences. The purpose of these education sessions is to build on current abilities and facilitate professional development, performance enhancement, and provide updated information regarding current best practices.

To facilitate an understanding of where your strengths are and areas for skill development, we would ask you to complete the attached Neurological Assessment Techniques competency self-assessment. In 6 months, we will ask you to repeat this questionnaire to help in the evaluation of the impact of these education sessions and the clinical support associated with the NIHSS implementation. This is a big practice change, and we want to make sure that it is meeting professional practice needs and development.

Writing your name on this form will allow us to evaluate how the education program has impacted nurses over time. It will not be used to evaluate your nursing performance and responses will be kept confidential.

You will also have other avenues for giving feedback on this program including:
- Designated focus group sessions for open discussions regarding satisfaction, practice issues, and challenges.
- One-on-one discussion with your manager, nurse educator, or stroke team members to verbalize concerns or ongoing need for one-on-one support.

### Categories used in this self-assessment (based on Patricia Benner’s Novice to Expert Theory):

Please use the following levels to determine your level of skill and knowledge in performing the competencies identified on the following 2 pages.

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>SKILL &amp; KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERT</td>
<td>&gt; Analysis, synthesis, application, <em>highly skilled performance</em></td>
</tr>
<tr>
<td></td>
<td>• Extensive exposure, with deep understanding of situation</td>
</tr>
<tr>
<td></td>
<td>• Able to rapidly and consistently identify actual and potential assessment changes</td>
</tr>
<tr>
<td></td>
<td>• Able to rapidly change priorities under all conditions</td>
</tr>
<tr>
<td></td>
<td>• Able to keep personal values in perspective and therefore able to encourage and support patient and family choices</td>
</tr>
<tr>
<td>PROFICIENT</td>
<td>&gt; Conceptual understanding, <em>proficient performance</em></td>
</tr>
<tr>
<td></td>
<td>• Extensive exposure in most situations</td>
</tr>
<tr>
<td></td>
<td>• Able to anticipate potential assessment changes</td>
</tr>
<tr>
<td></td>
<td>• Able to prioritize in response to changing situations</td>
</tr>
<tr>
<td></td>
<td>• Able to interpret the patient and family experience from a wider perspective and can envision possibilities</td>
</tr>
<tr>
<td>COMPETENT</td>
<td>&gt; Conceptual understanding and skill performance <em>competent</em></td>
</tr>
<tr>
<td></td>
<td>• Varied exposure to many situations</td>
</tr>
<tr>
<td></td>
<td>• Able to identify normal and abnormal findings</td>
</tr>
<tr>
<td></td>
<td>• Able to prioritize under stable conditions</td>
</tr>
<tr>
<td></td>
<td>• Increased awareness of patient and family viewpoints</td>
</tr>
<tr>
<td>ADVANCED BEGINNER</td>
<td>&gt; Conceptual understanding, minimal clinical experience</td>
</tr>
<tr>
<td></td>
<td>• Limited exposure to clinical situations</td>
</tr>
<tr>
<td></td>
<td>• Able to identify normal findings</td>
</tr>
<tr>
<td></td>
<td>• Guided by what they need to do, rather than patient responses</td>
</tr>
<tr>
<td>NOVICE</td>
<td>&gt; Marginal conceptual understanding, minimal clinical experience</td>
</tr>
<tr>
<td></td>
<td>• Seeks assistance in making clinical decisions</td>
</tr>
</tbody>
</table>

Appendix B. National Institutes of Health Stroke Scale. Self-Assessed Competency of Neurological Assessment Techniques Survey
## Competency

### CLINICAL SKILLS

1. I use a variety of neurological assessment techniques to collect data pertinent to my patients.

   (a) I am able to accurately determine the patients’ level of consciousness.

   (b) I incorporate neurological examination techniques to complete a comprehensive assessment when assessing stuporous or comatose patients.

   (c) I am able to accurately assess the mental status of my patients including the patient’s orientation, awareness, attention and concentration level, comprehension, memory, reasoning and judgment.

   (d) I have the skills and knowledge to assess the patients’ gaze and extraocular movements. I can determine a normal and abnormal response.

   (e) I am competent in the assessment of gross visual fields. I have the skills and knowledge to determine a normal and abnormal response and identify hemianopias.

   (f) I am able to accurately assess facial palsy. I incorporate testing into my assessment to determine if the patient has motor weakness of the lower face only or both the upper and lower face.

   (g) I am competent in the assessment of motor strength and drift. I utilize various assessment techniques to determine subtle weakness and changes in the patients’ motor strength.

   (h) I am able to accurately assess limb ataxia. I use assessment strategies to determine cerebellar impairment. I assess limb movement abnormalities in relation to sensory or motor dysfunction.

   (i) I am competent in the assessment of sensation. I utilize light touch as well as sharp/dull testing assessment techniques when appropriate based on the patient’s diagnosis and situation.

   (j) I am competent in the assessment of expressive and receptive communication deficits. I am able to perform a general assessment to determine the patients’ ability to understand the spoken and written word and to express thoughts orally and in writing.

   (k) I am competent in the assessment of dysarthria. I evaluate the patients’ clarity of speech.

   (l) I have the skills and knowledge to assess the presence of absence of “neglect”. I assess inattention to aspects of the patients’ senses including visual and tactile stimuli. I use assessment techniques to determine if a patient is not aware of (or is unable to identify) physical deficits.

## Competency

### CLINICAL SKILLS, CRITICAL THINKING AND PROFESSIONAL BEHAVIOUR

2. I use a variety of assessment techniques and information sources to collect data pertinent to my neuroscience patients.

   (a) I determine the right data collection method based on my patient’s condition (e.g., interviewing, listening, consulting, auscultating, percussing, observing, palpating, inspecting, monitoring, measuring).

   (b) I use identified patterns/trends to direct further assessment needs and synthesize all data to make care decisions.

   (c) I identify potential and actual situations of patient risk based on assessment results and take action to ensure patient safety.

   (d) I communicate changes in patient condition and document situations and outcomes to the appropriate authority in an objective and timely manner.

3. I identify and prioritize nursing interventions.

   (a) I create a plan of care in collaboration with the patient and other team members that is based on patient priorities.

   (b) I develop a written plan of care.

   (c) I identify nursing interventions and modify the plan of care based on actual or potential problems.

4. I exercise professional judgment in decision-making.

   (a) I assess the risks and benefits of the required actions based on my patient’s condition, determine the actions to be performed and can provide a rationale for my decisions.

   (b) I consult with others when I reach the limits of my knowledge and skill.

5. I use problem-solving skills when responding to critical and ongoing situations.

   (a) I identify problems based on my patient’s condition and determine if the problem is within my scope of practice.

   (b) I decide appropriate nursing actions considering possible risks and benefits and collaborate with appropriate health care providers as necessary.

Appendix B continued