Nurses’ accountability for stroke quality of care: Part one: Review of the literature on nursing-sensitive patient outcomes

By Theresa Green, RN, PhD, Linda Kelloway, RN, MN, Corrine Davies-Schinkel, BSc, MSc, Michael Hill, MD, MSc, FRCPC, and M. Patrice Lindsay, RN, PhD

Abstract

Over the past decade, an exciting area of research has emerged that demonstrates strong links between specific nursing care activities and patient outcomes. This body of research has resulted in the identification of a set of “nursing-sensitive outcomes” (NSOs). These NSOs may be interpreted with more meaning when they are linked to evidence-based best practice guidelines, which provide a structured means of ensuring care is consistent among all health care team members, across geographic locations, and across care settings. Uptake of evidence-based best practices at the point of care has been shown to have a measurable positive impact on processes of care and patient outcomes. The purpose of this paper is to present a systematic, narrative review of the literature regarding the clinical effectiveness of nursing management strategies on stroke patient outcomes sensitive to nursing interventions. Subsequent investigation will explore current applications of nursing-sensitive outcomes to patients with stroke, and identify and validate measurable NSOs within stroke care delivery.

Context and background

All members of an interprofessional stroke team play a pivotal role in the assessment and management of stroke patients throughout the continuum from prevention through acute care, rehabilitation, long-term care and return to the community. Evidence-based best practice guidelines provide a structured means of ensuring care is consistent among all health care team members, across geographic locations, and across care settings. Uptake of evidence-based best practices at the point of care has been shown to have a measurable positive impact on processes of care and patient outcomes (Doran et al., 2006a). The research in this area has traditionally focused on medical care that is primarily physician driven. Over the past decade, an exciting area of research has emerged that demonstrates strong links between specific nursing care activities and patient outcomes. This body of research has resulted in the identification of a set of “nursing-sensitive outcomes” (NSOs) (Pierce, 1997). The purpose of our article is to apply the underpinnings of research on NSOs to the area of stroke care, an important next step in monitoring the quality of stroke care and adding to this body of research. Our goal is to examine current applications of nursing-sensitive outcomes and identify, validate and measure NSOs in the stroke population. This paper is part one of a series and presents a systematic, narrative review of the literature regarding the clinical effectiveness of nursing management strategies on stroke patient outcomes sensitive to nursing interventions. Part two will include the identification and measurement of specific NSO indicators relevant to stroke patients and further explore the primary impact of other interprofessional team members on patient outcomes.

Performance indicators that monitor the quality of stroke care are often broad and non-specific regarding which health care team members may have the greater impact on the measured levels of performance. The Canadian Best Practice Recommendations for Stroke Care have attempted to address part of this issue by identifying validated performance measures directly associated with each recommendation (Lindsay et al., 2010). This project will further develop the Canadian Stroke Network performance measurement framework by identifying, validating and measuring a core set of stroke performance indicators that reflect where nurses may have the greater impact on outcomes. Further, given that interprofessional teams provide stroke care, we will also explore whether some NSO outcome indicators are more strongly impacted by other members of the stroke team.

Nursing-sensitive outcomes are defined as those outcomes arrived at, or significantly impacted by nursing interventions. The interventions must be within the scope of nursing practice and integral to the processes of nursing care; an empirical link must exist. Nursing-sensitive outcomes represent the consequences, or effects of nursing interventions and result in

La responsabilité des infirmières quant à la qualité des soins d’Accident Vasculaires Cérébraux (AVC) : Première partie: Examen de la documentation sur les soins infirmiers sensibles à l’état de santé des patients

Résumé

Ces dix dernières années, un domaine de recherche intéressant a émergé et démontré des liens forts entre les activités de soins infirmiers spécifiques et l’état de santé des patients. Cet ensemble d’études a eu pour résultat d’identifier une série de « soins infirmiers relatifs à l’état de santé des patients » (SIRESPs). Ces SIRESPs peuvent être interprétés avec plus de sens quand ils sont liés aux lignes directrices des bonnes pratiques scientifiquement fondées, qui fournissent des moyens structurés pour assurer des soins constants par tous les membres de l’équipe de soin, quels que soient les lieux et la structure de soin. Il a été démontré que l’application des bonnes pratiques scientifiquement fondées au moment des soins a un impact mesurable et positif sur les procédés de soins et l’état de santé des patients. Le but de cet article est de présenter un examen de la documentation systématique et narratif en ce qui concerne l’efficacité clinique des stratégies de gestion des soins pour les patients ayant subit un AVC et qui ont reçu des soins infirmiers relatifs à leur état de santé. Des recherches ultérieures exploreront les applications actuelles des soins infirmiers relatifs à l’état de santé des patients ayant subit un AVC et identifieront et valideront des SIRESPs mesurables pendant les soins des patients.
changes in patients’ symptom experience, functional status, safety, psychological distress, and/or costs (Given & Sherwood, 2007). Given and Sherwood (2007) apply the Quality Health Outcomes model (Mitchell & Lang, 2004) to NSOs, where nursing interventions are mediated by client and system characteristics. They further identify five types of outcomes that were found to be sensitive to nursing interventions. These include appropriate self-care, demonstration of health-promoting behaviours, health-related quality of life, symptom management, and perception of being well cared for (Given & Sherwood, 2007, p. 775).

Over the past decade, there has been an increase in research related to NSOs. Typically, most acute care health care organizations collect data to measure patient outcome such as prevalence of patient falls and pressure ulcers in medical/surgical, critical care, and step-down units. Often, indicator tools such as the Minimum Data Set 2.0 (Hirdes et al., 1999), Nursing Intervention Classification (NIC) (McCloskey & Bulechek, 2000), and the Nursing Sensitive Outcome Classification (NOC) (Morehead, Johnson, & Maas, 2004) are used to capture and document the effectiveness of nursing interventions. Additional indicators that describe nursing care (nurse staffing care hours, skill mix, nurse/patient ratios, workload intensity, voluntary turnover, and use of sitters) and patient descriptors (age, gender, and diagnosis description) may be used to guide performance improvement initiatives (Brown, et al., 2010). Nursing contributions to patient outcomes studied using randomized controlled trials also indicate that nurses influence patient outcomes in areas such as patient education, health promotion, cardiac rehabilitation, pre- and post-operative care, anxiety prevention/reduction, and pain management (Cullum, 1997).

In Canada, the NSO project has demonstrated that direct care activities such as symptom control and symptom management, physical and psychological functioning and self-care activities, which are considered nursing-specific, can have a measurable impact on patients (White & McGillis Hall, 2003; Doran et al., 2006a). In the United States, Patrician et al. (2010) describe the creation, evolution, and implementation of a database of current and potent nursing-sensitive indicators in the Military Nursing Outcomes Database (MilNOD). The goals of MilNOD were to enable targeted patient care improvements through data measurement and sharing, and to examine the associations between staffing and outcomes at the shift level. Using standardized nurse staffing and nurse-sensitive patient outcomes, nursing administrators were able to compare staffing adequacy and outcomes across military facilities and to institute improvement strategies targeted to their individual institution.

Specific NSO measures have been identified across the health care continuum. To date, there has been a paucity of literature examining the application of NSOs to specific patient populations including the nursing care of stroke patients. Currently, national and international stroke leaders are building models of performance measurement and accountability for stroke care (Lindsay et al., 2011) and, since nurses represent a significant member of the interdisciplinary stroke team, it is important that their contributions and impacts be identified and reported.

### Methods

#### Literature search strategy

The literature search was performed by three researchers using a peer-reviewed search strategy. Published literature was identified by searching the following bibliographic databases: MEDLINE (1998–present) with in-process records and daily updates via OVID; EMBASE (1998–present) via OVID; The Cochrane Library (2011, Issue 1–10) via Wiley; PubMed; and CINAHL (1998–present) via OVID. The search strategy was composed of both controlled vocabulary, such as the National Library of Medicine’s MeSH (Medical Subject Headings), and keywords. The main search concepts were acute stroke, nursing-sensitive outcomes, patient outcomes, nursing interventions, and nursing practice. Keywords were searched in the title and text while controlled vocabulary was restricted to major subject headings.

Methodological filters were applied to limit retrieval to health system assessments (HSAs), systematic reviews, meta-analyses, randomized controlled trials and non-randomized comparative studies. Conference abstracts were excluded from the search results. Retrieval was limited to the human population and also limited to documents published in English, between January 1, 1998, and September 30, 2011. The initial search was completed on July 30, 2011, and a final update on October 15, 2011.

Grey literature (literature that is not commercially published) was identified by searching the bibliographies of key papers and through contacts with appropriate key experts in the area of nursing sensitive outcomes.

#### Selection criteria and method

Three reviewers (TG, PL, CDS) independently screened citations and selected HSAs, systematic reviews, meta-analyses, RCTs, and non-randomized studies regarding nursing-sensitive outcomes for stroke management. The decision to pull an article was based on the title and abstract, where available. When there was insufficient information, the article was also pulled. The same reviewers selected the final papers for inclusion based on full-text publications. An article was selected for review based on selection criteria established a priori (Table 1). Any disagreement between reviewers was discussed until consensus was achieved.

<table>
<thead>
<tr>
<th>Table 1. Primary selection criteria*</th>
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<tr>
<td><strong>Population</strong></td>
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<td><strong>Intervention</strong></td>
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<td><strong>Comparator</strong></td>
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<td><strong>Outcomes</strong></td>
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<td><strong>Study designs</strong></td>
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* Of note, there were a scant number of articles specifically referring to acute stroke or stroke, thus the literature search was broadened to encompass other disease entities (e.g., oncology) and health care departments (e.g., emergency, community).
Exclusion criteria
Studies were excluded if they did not meet inclusion criteria; focused on non-nursing sensitive outcomes; were editorials; were conference abstracts without a subsequent publication; or were performed in a pediatric population.

Data extraction strategy
One reviewer extracted clinical data for each article to tabulate relevant characteristics, nursing management and outcomes from the included studies (Table 2, page 16). Data extraction was verified by a second reviewer to confirm accuracy.

Critical appraisal of individual studies and data analysis methods
Two reviewers independently appraised the included studies. The quality of systematic reviews was evaluated using the AMSTAR instrument, which is used to assess the methodological quality of systematic reviews (Shea et al., 2007). The quality of randomized controlled trial studies (RCTs) was assessed using the Critical Appraisal Skills Programme (CASP, 2006) (RCT) appraisal instrument (© Public Health Resource Unit, England); non-randomized studies were appraised using Critical Appraisal Skills Programme (CASP) cohort and case-study appraisal tools (2004). Methodological quality of clinical effectiveness evidence was evaluated based on randomization, adequate concealment of randomization, degree of blinding, use of intention to treat analysis, and description of dropouts and withdrawals, where appropriate. A numeric score was not calculated for each study and, due to heterogeneity of the selected studies, meta-analysis was not undertaken. Studies are described using a narrative approach. Any disagreements were discussed between all three reviewers until consensus was reached.

Results
Nursing-sensitive outcomes—Review of the literature
NSOs and stroke
Very little evidence exists documenting the relationship between NSOs and acute stroke patient outcomes. In a recent article Hill, Middleton, O’Brian and Lalor (2011), described the implementation of clinical guidelines for acute stroke management with a focus on the role of nurses in the process of implementation. These authors reviewed the latest Australian National Stroke Foundation Clinical Guidelines for Acute Stroke Management Recommendations to identify which

![Figure 1. Quantity of research available.](image-url)

Overall, Considine and McGillivray found that improvements in triage decisions (increase in triage category 2; \( p = 0.009 \)); decrease in triage category 4, \( p = 0.048 \)); frequency of assessments of respiratory rate (\( p = 0.009 \)); heart rate (\( p = 0.022 \)); blood pressure (0.032) and oxygen saturation (0.001) were achieved. Documentation also increased significantly for pressure area interventions (\( p = 0.006 \)) and swallow assessment prior to oral intake (\( p = 0.003 \)). While not statistically significant, ED speech pathology assessments increased by 6.1%, nursing documentation of “nothing orally” status improved (increased by 13.8%) and, for patients admitted to inpatient care after the intervention, there was a 93.5 minute decrease in time to speech pathology assessment.

In another stroke study, Middleton et al. (2011) reported the results of a single-blind cluster randomized controlled trial assessing the impact of implementing evidence-based (EB) treatment protocols for the management of fever, hyperglycaemia and swallowing dysfunction in acute stroke units (ASUs; \( n = 19 \)) across New South Wales, Australia. These three variables were selected as they were felt to be most impacted by interdisciplinary teamwork during the first few days post-stroke. Acute stroke units were defined as those that provided care for stroke patients in a geographically defined area, had immediate CT access and on-site dependency units. The ASUs were randomly assigned to intervention (\( n = 10 \)) or control (\( n = 9 \)). The intervention consisted of implementation of fever, glucose, and swallowing clinical treatment protocols by nurses for the first 72-hours of ASU care. Pre-intervention and post-intervention cohorts were compared for 90-day death or dependency (modified Rankin scale [MRS] ≥ 2), functional dependency (Barthel Index), and SF-36 physical and mental component scores. Regardless of stroke severity, death and dependency in the intervention group compared to the control group was significantly reduced (\( p = 0.002 \)) and SF-36 physical component scores...
were better (p = 0.002). No improvement between groups was noted in the mean SF-36 mental component score (p = 0.69) or functional dependency scores (BI ≥ 60; p = 0.44). Findings suggest that implementation of multidisciplinary-supported EB protocols initiated by nurses resulted in better patient outcomes after discharge from ASUs.

For the three main outcome areas included in Middleton’s study, temperature and glycemic control have been identified and validated as NSOs by other studies, as well (Considine & McGillivray, 2010; Heise, 2011). Literature exists to support screening for swallowing function in stroke patients. However, other than Considine and McGillivray (2010), none of the studies present swallow screening in terms of an NSO. The approach from other researchers was to indirectly link swallow screening to the NSO of hospital-acquired pneumonia (Twigg et al., 2011). Jones, Albright, Fossatti-Bellani, Siegler, and Martin-Schild (2011) explored the impact of nursing shift change in the

Table 2. Article review summary

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
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<th>Journal</th>
<th>Population</th>
<th>Outcomes</th>
<th>Study design</th>
<th>Primary findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behrenbeck, Timm, Griebenow, &amp; Demmer</td>
<td>Nursing-outcome reliability testing in a tertiary care setting</td>
<td>2005</td>
<td>International Journal of Nursing Terminologies and Classifications, 16(1), 14–20</td>
<td>Specialty acute care</td>
<td>Coping, mobility, knowledge: disease process, and tissue integrity: skin and mucous membranes</td>
<td>Observational</td>
<td>Nursing outcomes are identified for acute care nursing practice. Establishment of meaningful data analysis is required</td>
</tr>
<tr>
<td>Brown, Donaldson, Burns Bolton, &amp; Aydin</td>
<td>Nursing-sensitive benchmarks for hospitals to gauge high-reliability performance</td>
<td>2010</td>
<td>Journal for Healthcare Quality, 32(6), 9–17</td>
<td>Medical/surgical, critical care and step-down units</td>
<td>Falls, falls with injuries and hospital acquired pressure ulcers stage 2 or worse, hours of nursing care, skill mix, nurse/patient ratios, contract or agency nurses, sitter hours, workload intensity, RN voluntary turnover, Unit/patient characteristics</td>
<td>Methodological/observational</td>
<td>Benchmark development for nurse-sensitive indicators based on California data</td>
</tr>
<tr>
<td>Chaboyer, Johnson, Hardy, Gehrie, &amp; Panuwatwanich</td>
<td>Transforming care strategies and nursing-sensitive patient outcomes</td>
<td>2010</td>
<td>Journal of Advanced Nursing, 66(5), 1111–1119</td>
<td>—</td>
<td>Medication errors, patient falls and pressure ulcers</td>
<td>Observational</td>
<td>Bedside improvement strategies improved reported medication errors, falls and pressure ulcers</td>
</tr>
<tr>
<td>Doran, Harrison, Laschinger, Hirdes, Rukholm, Sidani, Hall, &amp; Tourangeau</td>
<td>Nursing-sensitive outcomes data collection in acute care and long-term-care settings</td>
<td>2006</td>
<td>Nursing Research, 55(25), 575–581</td>
<td>Acute care and long-term care</td>
<td>Minimum data set 2.0, symptom (pain, nausea, dyspnea, fatigue) and therapeutic self-care</td>
<td>Repeated measures design</td>
<td>Nurses are able to collect data on nurse-sensitive indicators in a reliable, valid way</td>
</tr>
<tr>
<td>Doran, Mildon, &amp; Clarke</td>
<td>Towards a national report card in nursing: A knowledge synthesis</td>
<td>2011</td>
<td>Nursing Leadership, 24(2), 38–57</td>
<td>All health care settings</td>
<td>Indicators provided for the following domains: system integration and change; clinical utilization and outcomes; patient satisfaction; and financial performance and conditions</td>
<td>Review/Knowledge Synthesis</td>
<td>A summary of nursing sensitive indicators that should be considered for inclusion in Ontario’s hospital report is given</td>
</tr>
<tr>
<td>Duffy</td>
<td>Nosocomial infections: Important acute care nursing-sensitive outcomes indicators</td>
<td>2002</td>
<td>AACN Clinical Issues, 13(3), 358–366</td>
<td>Acute care</td>
<td>Nosocomial infection rates</td>
<td>Review</td>
<td>Nursing variables such as staffing and care practices have been linked to infection rates and advance practice nurses have the ability to influence practice change</td>
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continued…
emergency department of a tertiary care facility (an acute stroke centre) in a southern U.S. state on rates of pneumonia in patients presenting with acute stroke (n = 366). Using a retrospective observational study design, these authors found that in this centre, acute ischemic stroke patients admitted during nursing shift change experienced higher rates of pneumonia (p = 0.07) and decreased rates of favourable discharge (p = 0.04) than did patients who maintained continuity of care during their emergency department stay.

In Sweden, Jansson, Pilhammar-Andersson and Forsberg (2009) conducted a retrospective cross-sectional study to evaluate whether documented nursing care plans affected stroke patient outcomes (as assessed by NSO indicators [NSOIs]) at the time of discharge and at two to three weeks post-discharge. Two acute intervention units used care plans on a daily basis; two acute care control units did not. Functional NSOIs were studied by means of the “Euroquol five dimensions” (EQ-5D™), which assess patients’ perception of their current mobility, self-care, usual activities, pain/discomfort, and anxiety/depression situ-

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<tbody>
<tr>
<td>Head, Aquilino, Johnson, Reed, Maas, &amp; Moorhead</td>
<td>Content validity and nursing sensitivity of community-level outcomes from the nursing outcomes classification (NOC)</td>
<td>2004</td>
<td>Journal of Nursing Scholarship, 36(3), 251–259</td>
<td>Public health/community-level</td>
<td>Community-level outcomes included in the nursing outcomes classification (community competence; community health status; community health: immunity; community risk control: communicable disease; and community risk control: lead exposure)</td>
<td>Survey study</td>
<td>Community outcomes were deemed important; only community competence had a content validity score &lt; 0.80; the outcome sensitivity scores ranged from .62–.80; 87% of indicators were deemed critical for importance and that 45% were sensitive to nursing interventions</td>
</tr>
<tr>
<td>Heise</td>
<td>Implementing the hypothermia protocol</td>
<td>2011</td>
<td>Advanced Emergency Nursing Journal, 33(2), 137–144</td>
<td>Cardiac arrest patient</td>
<td>Inclusion/exclusion criteria for hypothermia protocol</td>
<td>Case study</td>
<td>Advanced practice nurses in the ED need to be aware of hypothermia protocols</td>
</tr>
<tr>
<td>Jansson, Pilhammar-Andersson, &amp; Forsberg</td>
<td>Evaluation of documented nursing care plans by the use of nursing-sensitive outcome indicators</td>
<td>2010</td>
<td>Journal of Evaluation in Clinical Practice, 16, 611–618</td>
<td>Patients with suspected stroke admitted to and discharged from stroke unit</td>
<td>Documented care plans included measurement of ADL activities, movement disabilities, nutrition, social planning, pain, ulcers, knowledge, risk of falls, social planning and activities</td>
<td>Retrospective, cross-sectional study</td>
<td>Patients admitted to stroke unit with documented care plans were more satisfied with individual care, participation, and had a shorter length of stay</td>
</tr>
<tr>
<td>Lake &amp; Cheung</td>
<td>Are patient falls and pressure ulcers sensitive to nurse staffing?</td>
<td>2006</td>
<td>Western Journal of Nursing Research, 28(6), 654–677</td>
<td>Inpatient</td>
<td>Falls, pressure ulcers, nurse staffing</td>
<td>Review</td>
<td>Inconsistent methodologies within individual studies has led to inconsistent results</td>
</tr>
<tr>
<td>Nakrem, Vinsnes, Harkless, Paulsen, &amp; Seim</td>
<td>Nursing sensitive quality indicators for nursing home care: International review of literature, policy and practice</td>
<td>2009</td>
<td>International Journal of Nursing Studies, 46, 848–857</td>
<td>Nursing home care</td>
<td>Process and outcome indicators including: meals and mealtimes; standardized needs assessments as a basis for care plan; health care; infection control; physical restraints; oral and dental health; emotional support; sleep; sensory loss; skin care; mobility, dexterity and rehabilitation; continence management; behavioural management; pressure ulcers; nutrition and hydration; falls; pain</td>
<td>Review</td>
<td>Several countries require data collection for nursing home patients; however, there is a lack of consistency in how indicators were developed and how data are used</td>
</tr>
<tr>
<td>Patrician, Loan, McCarthy, Brosch, &amp; Davey</td>
<td>Nursing sensitive quality indicators for nursing home care: International review of literature, policy and practice</td>
<td>2010</td>
<td>Journal of Nursing Scholarship, 42(4), 358–366</td>
<td>Military health system</td>
<td>Direct staff hours by level, staff categories, patient census, acuity, admissions, discharges, transfers, adverse events, patient satisfaction, nurse work environment, pressure ulcer and restraint prevalence</td>
<td>Methodological</td>
<td>Describes the development and implementation of a nursing-sensitive database</td>
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ation. Clinical and perceptual NSOIs were measured by the “Quality of Patients’ Perspective” (QPP) instrument. Within the framework of the QPP, patients’ perceptions of quality of care may be considered in four dimensions: medical—technical competence of the caregivers, physical—technical conditions of the care organization, degree of identity-orientation in the attitudes and actions of the caregivers, and socio-cultural atmosphere of the care organization. Safety NSOI data (i.e., unexpected complications) included pneumonia, thrombosis and fractures that could be caused by falls and use of health care NSOIs were measured by additional questions about any follow-up visits and re-admissions in the weeks following the patient’s return home. These researchers indicated there were no differences in functional NSOIs between the two types of units. However, the patients from the intervention units were more satisfied with individual care (p = 0.03) and participation (p = 0.007), and had a shorter length of stay (p = 0.004).

Barrere, Delaney, Peterson, and Hickey (2010) discuss the need to improve and enhance stroke nursing education in order to improve patient physical and psychological

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<th>Study design</th>
<th>Primary findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidani &amp; Doran</td>
<td>Relationship between processes and outcomes of nurse practitioners in acute care</td>
<td>2010</td>
<td>Journal of Nursing Care Quality, 25(1), 31–38</td>
<td>Acute care</td>
<td>Patient’s perception of the extent to which their inhospital care was coordinated, perception of the flow of their inhospital care, perception of the extent to which advanced care nurses discussed their condition and treatment and taught them how to manage their problems; symptom resolution and functional status</td>
<td>Non-experimental repeated measures design</td>
<td>There was a relationship between processes and outcomes of care provided by advanced care nurse practitioners</td>
</tr>
<tr>
<td>Schneider, Barkauskas, &amp; Keenan</td>
<td>Evaluating home health care nursing outcomes with OASIS and NOC</td>
<td>2008</td>
<td>Journal of Nursing Scholarship, 40(1), 76–82</td>
<td>Home health care</td>
<td>OASIS cardiac condition quality indicator group (activities of daily living, cardiopulmonary status, coping and instrumental activities of daily living); corresponding NOC outcome indicators were used; additional indicators were included (effects of medication, illness management behaviour, and knowledge)</td>
<td>Quasi-experimental before-after study</td>
<td>Neither OASIS nor NOC were sensitive to the effects of intervention intensity; OASIS was not responsive to clinically discernible patient outcomes; NOC was responsive to patient status change</td>
</tr>
<tr>
<td>Spilsbury &amp; Meyer</td>
<td>Defining the nursing contribution to patient outcome: Lessons from a review of the literature examining nursing outcomes, skill mix and changing roles</td>
<td>2001</td>
<td>Journal of Clinical Nursing, 10, 3–14</td>
<td>Mainly inpatient</td>
<td>Patient hygiene; patient nutrition and hydration; pressure sores/skin integrity; intravenous therapy; discharge planning; pain control; education/rehabilitation; and elimination; patient education; health promotion; cardiac rehabilitation; postoperative and preoperative care; anxiety prevention/reduction; and pain management</td>
<td>Review</td>
<td>Studies included primarily focus on outcome measures</td>
</tr>
<tr>
<td>Twigg, Duffield, Brenner, Rapley, &amp; Finn</td>
<td>The impact of the nursing hours per patient day (NHPPD) staffing method on patient outcomes: A retrospective analysis of patient and staffing data</td>
<td>2011</td>
<td>International Journal of Nursing Studies, 48, 540–548</td>
<td>Inhospital care</td>
<td>Central nervous system complications, wound infections, pulmonary failure, urinary tract infection, pressure ulcer, pneumonia, deep vein thrombosis, ulcer/gastriitis/upper gastrointestinal bleed, sepsis, physiologic/metabolic derangement, shock/cardiac arrest, mortality, failure to rescue and length of stay</td>
<td>Retrospective analysis</td>
<td>Following the implementation of NHPPD staffing, 9/14 nursing-sensitive outcomes improved at the hospital level (mortality, central nervous system complications, pressure ulcers, deep vein thrombosis, sepsis, ulcer/gastriitis/upper gastrointestinal bleed shock/cardiac arrest, pneumonia and average length of stay)</td>
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<tr>
<td>Whitman, Kim, Davidson, Wolf, &amp; Wang</td>
<td>Measuring nurse-sensitive patient outcomes across specialty units</td>
<td>2002</td>
<td>Outcomes Management, 6(4), 152–158</td>
<td>Cardiac and non-cardiac ICUs; cardiac and non-cardiac intermediate care units; medical surgical units</td>
<td>Central line blood-associated infection, pressure ulcer, medication error, fall, patient satisfaction with pain management by nurses, and restraint application duration rates</td>
<td>Prospective observational study</td>
<td>Differences in central line infection rates, pressure ulcer rates, fall rates and restraint application duration rate existed between medical units</td>
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<td>Whitman</td>
<td>Nursing-sensitive outcomes in cardiac surgery patients</td>
<td>2004</td>
<td>Journal of Cardiovascular Nursing, 19(5), 293–298</td>
<td>Cardiac surgery patients</td>
<td>Mortality, morbidity, cost of care, symptom control, functional status, knowledge, quality of life, behaviour, home function and psychological status</td>
<td>Review</td>
<td>Nursing-sensitive indicators are identified for cardiac surgery patients</td>
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outcomes in primary stroke centres in the U.S. They describe a stroke education program that includes core components of foundational stroke information, advanced cardiac life support for stroke patients, review of stroke order sets, swallow screen assessment, stroke education and rehabilitation, preparation for discharge planning or transfer, end-of-life care, and new staff orientation. Supportive management and leadership teams are considered crucial to the successful implementation and enhancement of education processes designed to improve the nursing contribution to stroke patient care outcomes and utilization of NSOs.

Acute care
The value, quality and contribution of nursing to patient care and outcomes in acute tertiary care settings have been a focus of investigation for the past 15 years in the international nursing community. In Canada, Doran et al. (2006b) used a repeated-measures design in acute care hospitals (n = 5) and long-term-care settings (LTC; n = 8) to determine: a) the reliability of instruments used to measure NSOs, b) whether these outcomes were sensitive to change in patients’ health status, and c) whether the outcome measures were related to nursing interventions. Patient outcomes investigated included “patients’ functional health status, symptom frequency and severity (nausea, dyspnea, fatigue, pain), and therapeutic self-care” (p. S77). A total of 890 patients participated in the study (574 from acute care and 316 from LTC), with functional data collected on Minimum Data Set 2.0 (MDS) activities of daily living (ADL) items. Reliability of the instruments, determined by congruence between nurses’ and research assistant assessments of 110 nursing intervention items, was demonstrated with Kappa coefficients of .70–.80. In acute care, significant differences were found between admission and discharge for all ADL and symptom frequency/severity scores (p = 0.001). In LTC, only functional status reflected a significant change between admission and discharge (p = 0.001). These results are directly applicable to stroke, where between 10% and 15% of stroke patients will enter long-term care following their stroke, and functional status is a key focus in their recovery (Lindsay et al., 2011).

Key findings from this study in the acute care setting demonstrated that functional status was significantly related to several nursing interventions. Energy management, exercise therapy, urinary bladder training, bed rest care, positioning and self-care assistance were among the most responsive areas to nursing activities. Further, frequency and severity of dyspnea and pain were correlated with nursing interventions for chest physiotherapy and oxygen therapy, and analgesic administration and patient-controlled analgesia respectively. Therapeutic self-care was also related to assistance with bathing and pressure ulcer prevention. In LTC settings, functional status was correlated with nursing interventions for bowel incontinence, bed rest care, positioning in a wheelchair, bathing, dressing and self-care assistance. Dyspnea and pain frequency and severity were related to nursing interventions for analgesic administration and patient-controlled analgesia assistance respectively. All of these NSOs could be applied to stroke patients both during the acute phase and throughout rehabilitation and recovery.

A strong positive relationship between functional status outcome and nursing interventions was further validated for positioning, self-care related to oral hygiene, and exercise promotion (p < .01 respectively) for acute care patients (Doran et al., 2006b). A repeated-measures design was utilized in this study to examine therapeutic self-care and functional health patient outcomes variables over a six-month period for 574 patients at admission and discharge to four urban and rural acute care hospitals in Southern and Northern Ontario. These study findings did not demonstrate that nursing intervention variables mediated the relationship between admission patient age, depression, or cognitive status.

Twigg and colleagues (2011) found that adopting a new nursing staffing method led to improvements for nine NSOs including mortality, central nervous system complications, pressure ulcers, deep vein thrombosis, sepsis, ulcer/gastritis/upper GI bleed, shock/cardiac arrest, pneumonia and average length of stay. These findings suggest that staffing can impact nurse-sensitive outcomes at the unit level and that within specialty care environments, such as acute stroke units, measurement of these outcomes is possible.

Sidani and Doran (2010) recently explored the role of acute care nurse practitioners in coordination and provision of counseling and education on symptom resolution, functional status and satisfaction with care. They reported small to moderate positive associations between processes of care. In a repeated measures study conducted across inpatient units at eight acute care facilities with a sample of 320 patients, Sidani and Doran (2010) found patients who perceived high levels of care coordination reported increased satisfaction with care and improvement in mental health (p = 0.005); patients who perceived high levels of counselling showed improvement in physical function (p = 0.000); and, patients who perceived high levels of education demonstrated improvement in social function (p = .002).

Chaboyer et al. (2010) describe an Australian-based intervention study in which three NSOs, including medication errors, patient falls, and pressure ulcers were examined in the context of transforming nursing care practices. Researchers collected data on reported incidents of the three NSOs for 15 months prior to implementation of a Transforming Care at the Bedside strategy (TCAB) and again for 18 months post-implementation. They demonstrated that the proportion of reported medication errors, patient falls and pressure ulcers that resulted in patient harm decreased (from 46.3% to 17.1%, 97.0% to 51.0%, and 91.3% to 46.6% respectively) after the introduction of Trans-

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1 ADL items from the MDS 2.0 functional status scale include independence in mobility, locomotion, dressing, eating, toileting, hygiene and bathing.

2 A Kappa coefficient of .61 and higher is considered substantial evidence of inter-observer agreement (McDowell & Newell, 1996).

3 Transforming Care at the Bedside strategy (TCAB) is a Robert Wood Johnson Foundation and Institute for Healthcare improvement (IHI) initiative to engage frontline staff and managers in identifying, implementing and evaluating strategies to improve patient care experiences for patients and nurses. (Rutherford et al., 2004).
forming Care at the Bedside strategies. Consistent, sustained reduction in NSOs, including medication errors and patient falls, was demonstrated. However, wide variation was evident in consistent pressure ulcer reduction.

To determine the relationships between nursing staffing and specific nurse-sensitive outcomes (central line blood-associated infection, pressure ulcer, fall, medication error and restraint application duration rates) across specialty units, Whitman et al. (2002) conducted a secondary analysis of prospective observational data from 95 patient care units (cardiac ICU, n = 15; non-cardiac ICU, n = 7; cardiac intermediate care, n = 18; non-cardiac intermediate care, n = 12, and medical-surgical, n = 43) across 10 acute care hospitals (rural, community, and tertiary). Nursing staffing was defined as the total worked hours (WHPPD; paid hours minus sick, vacation, and holiday hours) for all direct and indirect unit personnel (including RN, LPN, nursing aides, unit managers and secretarial staff). These researchers reported the absence of statistically significant relationships between staffing and central line infection and pressure ulcer rates across specialty units. However, staffing and falls in cardiac intermediate care (p = 0.05) were reported to have statistically significant inverse relationships. Similar results were found for medication errors in both cardiac and non-cardiac ICUs (p = 0.05 respectively), and restraint use rates in medical-surgical units (p = 0.01).

Nursing-sensitive outcomes influenced by cardiac nursing care was the focus of a follow-up review paper written by Whitman (2004). Categories of NSOs measured or monitored on cardiac surgery patients were identified as mortality, morbidity, cost of care, symptom control, functional status, knowledge, quality of life, behavioural, home function, and psychological. Whitman reported that sufficient studies have been conducted to allow for identification of cardiac surgery-specific outcomes sensitive to nursing interventions. She suggested that it was time to move beyond identification of NSOs in this population to exploratory, descriptive work; followed by predictive and correlational work; and finally to experimental/interventional work in order to achieve positive, optimal outcomes.

Behrenbeck et al. (2005) conducted a prospective observational study to explore which Nursing Outcome Classifications (NOCs) were most applicable to acute care nursing practice. Over a 14-month period, these researchers collected patient classification data (based on NOC taxonomy) from an electronic clinical information system on 434 patients on a cardiac ICU (n = 76), a cardiac surgery ICU (n = 153) and a medical unit (n = 205). Of 330 NOC outcomes (e.g., pain, bowel elimination, endurance, mobility) used to evaluate the effects of nursing interventions, 36 were used 10 or more times during the study (e.g., comfort level, fluid balance, symptom severity, vital signs status, and wound healing). Of those, 16 had an inter-rater reliability of 75% or higher (e.g., ambulation, hydration, fall prevention, and self-care ADLs at 100%). With computerized documentation becoming more prevalent in acute care facilities, a balance between what is feasible for users to practically collect and what is needed for the advancement of patient care within a nursing context is necessary. This has implications for the implementation of nursing-sensitive outcome measures and data collection in stroke nursing in terms of determining what EBP guideline outcomes are nursing sensitive, what is reasonable and feasible to collect, and what is needed to advance stroke patient care.

Community care
Several standardized sets of indicators have been developed to measure NSOs in the community setting, including the Outcome and Assessment Information Set (OASIS) and the Nursing Outcomes Classification (NOC)™. A study by Schneider, Barkauskas, and Keenan (2008) examined whether these indicator sets were sensitive to the effects of home health care nursing interventions. Indicator data were collected from 106 home health care patients on admission and at discharge from nursing care. OASIS indicators (clinically discernible changes in health status, including ADLs, cardiopulmonary status, coping, and instrumental activities of daily living) were not sensitive to the effects of home health care nursing when the intensity of the intervention was measured (p = 0.332). Only the NOC patient status outcome categories of ADLs and coping were responsive to clinically discernible patient status change (p = 0.003 and 0.008 respectively). When considering responsiveness, more condition-specific outcome measures such as NOC are apt to capture clinically relevant change resulting from nursing interventions, as compared to more generic OASIS outcome measures. These authors indicate that while they may be difficult to measure, it is important to use outcome measures that are sensitive to nursing interventions so nursing practice may be guided effectively.

Head et al. (2004) conducted a survey study asking nursing experts to evaluate content validity and nursing sensitivity for up to 30 NOC indicators for six community health outcomes including community competence, health status, health immunity, risk control, chronic and communicable diseases, and lead exposure. Community-level NSOs were defined as measurable community states, behaviours, or perceptions that are measured along a continuum in response to nursing interventions (Johnson, Maas, & Moorhead, 2004). Nursing sensitivity was described in this study as “the degree to which an outcome or indicator is subject to the influence of nursing intervention relative to other health professionals” (p. 252). All six of the outcomes were determined to have acceptable content validity” with scores of .79 (Community competence)–.92 (Community health immunity). Each of the six core community health outcomes were also determined to be strongly influenced by nursing interventions (sensitivity) with outcome sensitivity scores of .62 to .80.

In a review of nursing-sensitive indicators used for nursing home care across seven nations with similar elder care (U.S., Australia, Norway, New Zealand, England, Sweden and Denmark), Nakrem et al. (2008) found that considerable variation existed in the way data collection tools were developed and how data were used. While standardized needs assessment (SNA) of each patient completed prior to admission to nursing home was the main consistent indicator across six nations (excluding Sweden), different numbers of indicators were used in many countries (e.g., 23 in U.S., four in Norway; three in New Zealand and England). Generally, overlap of indicators across nations was
limited. Three New Zealand indicators (nutrition and hydration, SNA, and infection control) overlapped indicators from the U.S., Australia and Norway. Incontinence was addressed by the U.S. and Australia while oral/dental health was identified as a nursing-sensitive quality indicator by Australia and Norway. None of the quality indicators met all the criteria for validity while evidence that the quality indicators demonstrated meaningful differences in patient care and could be easily extracted was not found. Thus, reliability and validity of nursing-sensitive quality indicators for nursing home care is lacking while documentation of indicator development is sparse.

Studies such as these are important to improve health of populations and communities based on nursing interventions. Similar work is needed to improve the health and well-being of stroke patients based on stroke nursing interventions. However, challenges remain in collecting and reporting data on NSOs. For instance, Pierce (1997) suggests that structure indicators such as number of nurses or nurse staffing hours may not actually lead to improvements in care, or that adding workers may not change what nurses actually do. As a result of inconclusive evidence and methodological variety collectively, the literature also does not conclusively support a relationship between nurse staffing and patient falls or pressure ulcers (Lake & Cheung, 2006).

Discussion

Outcomes that focus on how patients and their health care problems are affected by nursing interventions have been identified and are described as NSOs. NSOs are those outcomes arrived at, or significantly impacted by nursing interventions. In a health care system that has become more strongly focused on quality of care and accountability, NSOs allow nurses to identify their contributions and demonstrate the quality level of the care they are providing (Doran, 2003). This has become an increasingly important area of research for nursing practice. During times of fiscal restraint, those who work within the Canadian health care system are under increasing pressure to demonstrate impact of the care they provide, to be accountable for their actions, to confirm the ongoing value of their contribution to patient care and the sustainability of the health care system (Solberg, 1997).

In reviewing the literature for this manuscript, several observations and issues have arisen. First, NSOs have been identified and validated across a range of care settings. The initial research on NSOs began in the acute care setting with a main focus on outcomes such as patient safety (falls) and skin integrity (Whitman, 2002) and, more frequently, with patients on general medical or surgical wards. The most current research on NSOs has expanded to include settings such as primary care, specialized clinical areas including cardiac and intensive care, rehabilitation, home care, ambulatory community care and long-term care. Since nurses play an active role in patient care throughout the care continuum, work to identify nurses’ impact in all care settings should be a priority area for future research.

This literature review also demonstrated that not only is the range of settings expanding where NSOs are being measured and used to improve care, these NSOs are now being considered for all nursing disciplines and preparation levels. The studies presented have included nurses in training, staff nurses, nursing assistants, and nurses with advanced training such as nurse practitioners, clinical nurse specialists and advanced practice nurses. This is an important advancement in this body of knowledge acquisition. As nurses’ roles expand, there is an increased expectation for accountability to demonstrate the distinct contributions of each specialized role, and to support sustainability of such roles in times of fiscal cut-backs.

Another key observation was that the number of NSOs being measured has increased significantly. This is likely due, in part, to the number of settings where NSOs are being measured, and also to the ongoing work in defining nurses’ roles, nursing classification systems, improved data systems to collect this information, and expanding nursing roles. As part of this literature review, the authors created a master list of all the NSOs reported among the included papers. This exercise generated a list of more than 70 discrete outcomes that have been measured across studies, patient populations and settings. There was a moderate overlap of the specific outcomes measured across studies, which may help to increase the validity of certain outcomes (further information and discussion regarding this analysis will be presented in part two of this series).

When the outcomes from the included research were examined more closely, it was discovered that the definitions used to measure the outcomes varied between studies. This is an important limitation of NSO and creates significant challenges for researchers, managers and front-line nurses who want to understand the meaning of their results by comparing them across organizations and settings. Benchmarks are needed in order to assess the degree to which achievements in quality are being made (Whitman, Kim, Davidson, Wolf, & Wang, 2002). Standardization and consistency of measuring NSOs is imperative, as this work continues to grow. Researchers and other investigators who develop and report on NSOs are urged to develop clear indicator definitions that include the required data elements, numerators and denominators and any inclusion and exclusion criteria in their publications and reporting of NSOs. This will enhance consistency and reliability in measurement across initiatives, further validate specific NSO measures, and enable the calculation of benchmarks and creation of comparative analyses.

An additional challenge in consistency of measures is the lack of data sources to collect and access nursing-sensitive outcomes. Doran and colleagues have presented reliable ways to collect

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OASIS indicators (clinically discernible changes in health status) included activities of daily living (ADL), cardiopulmonary status, coping, and instrumental activities of daily living. The NOC outcome measures included measurements of ADLs, cardiopulmonary status, coping, and illness management behaviour.

The estimation of outcome content validity (OCV) was established by first weighting indicators of critical (ratio ≥ 0.80) characteristics of nursing outcomes concerning both importance and nursing contribution and then averaging each outcome. A score of ≥ 0.60 was determined to be the cut-off for OCV.
NSO measures (Doran et al., 2006a). The emergence of electronic health records (EHR) in all care settings presents a major opportunity for nurses to create access to NSO data. In order to facilitate this, it is imperative that nurses work closely with EHR developers to ensure that the required data elements for a core set of NSOs are built into the system from the onset of design and development. Attempting to add or change data elements once an EHR has been implemented is very difficult to do and requests take months to be reviewed and considered for future updates. Further, as documentation of care is a prerequisite for measuring quality and outcomes of nursing care indicators, it is important to evaluate documentation patterns and processes. Many important nursing-sensitive measures, such as providing patient education, cannot be measured with any degree of validity due to the lack of informative charting and documentation of the care delivered. Indeed, a review of more than 10,000 patient charts during a recent stroke chart audit in Canada revealed very poor charting in areas such as this. Tools and processes to enhance documentation of NSOs that are being collected within an organization and ongoing education for nurses on charting practices (even conducting anonymous peer-reviews of charts) are important initiatives to improve the reliability and validity of NSOs.

In examining the list of NSOs generated from the various studies and reports, the authors of this manuscript started to categorize them under Donabedian’s domains of structure, process and outcome (Donabedian, 1988). This follows work completed by Pierce (1997) and Nakrem et al. (2009), who also explored NSOs in the context of the Donabedian model. Many of the NSOs included in the literature, such as fever, pressure ulcers, falls, secondary infections, deep vein thrombosis and continence are patient-focused and should be regarded as “nursing-sensitive patient outcomes”. Measures related to nursing-to-patient ratios, nursing hours, overtime, competency, and workload can be categorized as “structural” measures. In future, perhaps these could be referred to as “nursing-sensitive system measures”, since they are influenced, for example, by the system that sets up staffing models, provides educational opportunities, and determines staff ratios. Further, several of the measures described in the NSO literature could be considered “process measures” since they reflect more of what the nurses actually do, rather than how it impacts the patients directly. These may include measures such as medication errors, providing patient education (as opposed to knowledge gained, which would be a patient outcome) and continuity of care. We propose that these measures be referred to as “nursing-sensitive process measures”. We open this revised classification up to discussion and debate among researchers and front-line nurses with the goal of further enhancing and refining this important area to support accountability for nurses.

Ongoing measurement and monitoring is key to sustaining and improving best practice initiatives within the clinical setting. All interprofessional stroke team members contribute to the quality of care delivered to stroke patients. Within the context of stroke care delivery, a collaborative interprofessional team approach is strongly emphasized as the model of care. Within the team, it is important and reasonable to tease out those measures that are most impacted by one discipline more than others. This expands the current research beyond the impact of nursing care. Although articles and grey literature pertaining to outcomes attributable to other health care professions were excluded from this report, we conducted a separate literature review for all other disciplines. While the results of the search were abundant for physician-sensitive measures, there was a paucity of findings for physical therapy, occupational therapy, speech language pathologists, social workers, dietitians and pharmacists. Identification of discipline-sensitive structure, process and outcome measures using standardized measurement definitions will enhance continuity of care and increase patient safety, as well as increase the opportunity to meet patient and family care needs across all settings. This is particularly important in complex conditions such as stroke, where all team members play a significant role in patient recovery and the patient’s and family’s reintegration into the community. Further research is needed to strengthen the evidence base for performance measures that are sensitive to the role of all team members. Identification of discipline-sensitive outcomes could also contribute to better understanding by the interprofessional team members of each other’s role and, thus, contribute to more collaborative, supported patient-centred care.

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