Nurse case management to improve risk reduction outcomes in a stroke prevention clinic

By Sandra Ireland, RN, PhD, Gail MacKenzie, RN, MScN, Linda Gould, RPN, Diane Dassinger, RN, Alicja Koper, RN, and Kathryn LeBlanc, BSc, MSc

Abstract
Stroke prevention clinic health care professionals are mandated to provide early access to neurological consultation and treatment, diagnostic testing, and behavioural risk factor management for clients with transient ischemic attack or mild non-disabling stroke. Clinic nurses collaborate with clients and interprofessional teams to support risk factor reduction to prevent recurrent stroke events. Although hypertension is the most important modifiable risk factor for stroke, broader evidence indicates that adherence to prescribed medications may be less than 50%. One clinic identified a need to improve risk factor outcomes through identifying clients with uncontrolled hypertension, cognitive, self-efficacy and/or adherence characteristics predictive of non-achievement of blood pressure targets. To address this need, an expanded nurse case management care delivery model was pilot tested for feasibility in a participant sample of 20 clients. Motivational interviewing and self-management approaches were combined with interventions designed to improve adherence: facilitation of the simplification of medication routines, providing memory cues and home self-monitoring equipment, counselling, and six-month nursing follow-up. Results demonstrated that an expanded nurse case management model of care delivery is feasible with only a modest impact on clinic resources. At six months, there were significant reductions in blood pressure and increases in medication self-efficacy and adherence for selected clients identified with high risk for stroke and non-achievement of treatment outcomes.

Key words: stroke, transient ischemic attack, prevention, hypertension, nurse case management, self-efficacy, adherence

Introduction
The mandate of health care providers in secondary stroke prevention clinics (SPC) in Ontario is to provide early access to neurological consultation and treatment, diagnostic testing, and behavioural risk factor management for clients with transient ischemic attack (TIA) or mild non-disabling stroke (Ministry of Health and Long-Term Care of Ontario, 2001). The SPC in the study site described here provides services to a client population ranging from middle to older age adults (M = 67.5 years). Clients present with multiple and complex comorbidities: hypertension, ischemic heart disease, diabetes, hyperlipidemia, mild dementia and/or depression, and a variety of psychosocial health care issues (Hamilton Health Sciences, 2009). On admission to the SPC clinic, clients referred from emergency department, family and other physicians receive comprehensive neurological assessment and diagnosis, determination of disease etiology, evidence-based treatment, and support in self-management of behavioural risk factors. Effective management of risk factors is essential for clients following TIA or minor stroke whose 30-day risk for stroke is 5% to 12% without timely treatment and reduction of modifiable risk factors (Gladstone, Kapral, Fang, Laupacis, & Tu, 2004). These include hypertension, smoking, hyperlipidemia, diabetes, obesity, excess alcohol consumption, and sedentary lifestyle.

Hypertension is prevalent in SPC client populations and is one of the most important modifiable risk factors for stroke (O’Donnell et al., 2010). Even modest reductions in blood pressure have been reported to offer significant risk reduction in recurrent stroke (Faxon et al., 2004; Pickering et al., 2005). Although adherence
to blood pressure medications and other treatments has been reported to be less than 50% in stroke and other populations (Haynes et al., 2005), often the first response is to intensify medical therapy without considering potential client adherence issues. Adherence issues may include client lack of understanding of how medications work and possible side effects, as well as personal beliefs about the efficacy of medications.

At the study site SPC, newly referred clients routinely are limited to two to three visits with a neurologist and clinical nurse specialist (CNS) extending over approximately one to two months. Within this limited timeframe, the expectations of the CNS nurse case manager (NCM) role are to 1) develop rapport with clients, 2) facilitate behavioural change using motivational interviewing techniques (Rollnick & Miller, 1995), 3) implement self-managed care strategies (McGowan, 2005), and 4) evaluate the outcomes of these changes. Meeting these expectations within tight timelines and relatively static resources in an environment of rapidly increasing clinic volumes, reflective of the growing burden of chronic illness in our aging population, has resulted in a need to test alternative care delivery approaches. Based on the findings of a recently completed research study conducted at the study site (Ireland, Arthur, Gunn, & Oczkowski, 2010), a process was developed to determine those clients whose level of risk and adherence to treatment characteristics would most benefit from expanded NCM interventions. Based on the results of a literature review, interventions were identified and a pilot study designed to test the feasibility of an expanded NCM care delivery model.

**Literature review**

A systematic review of the literature conducted by Haynes et al. (2005) recommended a combination of interventions to improve client adherence to medications. These included simplifying dosing regimens, adherence counselling, providing memory cues, home self-monitoring, and nurse-led supportive follow-up care.

In a recent study, Ireland et al. (2010) found that deficits in cognition and self-reported medication self-efficacy and adherence independently predicted six-month non-achievement of blood pressure targets in 93 participants attending a SPC. Specifically, participants’ scores of 1) < 26 on the Mini Mental Status Examination (MMSE) (OR, 1.277; CI, 1.062-1.53; \(p = 0.033\)) (Folstein et al., 1975); 2) < 100% on a question to determine self-efficacy that the prescribed medication(s) would improve their health (OR, 1.613; CI, 1.025–1.253; \(p = 0.039\)); and 3) < 100% on a question to determine adherence to medications in an average week (OR, 1.14; CI, 1.011–1.291; \(p = 0.033\)) were predictive of non-achievement of national stroke blood pressure recommended targets (Lindsay et al., 2008). In addition, this study and others reviewed concluded the need for improvement in risk factor management for high risk for stroke clients attending SPCs (Joseph, Babikian, Allen, & Winter, 1999; Mouradian, Majumdar, Senthilselvan, Khan, & Shuaib, 2002).

**Theoretical perspectives**

Concepts identified from Self-Efficacy and Self-Managed Care theories provided the framework for this nursing research (Bandura, 1998; McGowan, 2005). Self-efficacy, a major concept in Social Cognitive Theory, is described as the confidence that a person has in their ability to change their behaviour and achieve goals. Individual self-efficacy in any specific behaviour may be increased through provision of 1) exposure to mastery experiences (successful experiences in the behaviour of interest), 2) vicarious learning (modelling or observing others performing similar tasks), 3) receiving physiological feedback following achievement of the behaviour of interest (physiological signs), and 4) verbal persuasion (receiving positive feedback) (Bandura, 1998). From this theoretical perspective, what people believe and feel affects how they act. For example, positive physiological feedback received by clients from blood pressure self-monitoring may result in feelings of self-efficacy in taking antihypertensive medications and result in continued adherence.

Approaches to behaviour change informed by Self-Managed Care help people to develop self-esteem regarding their abilities in the behaviours of interest, gain insight into their own behavioural triggers, and develop the knowledge and confidence to make healthy choices (McGowan, 2005). Motivational Interviewing is an approach that facilitates self-management by assisting the person to identify discrepancies between beliefs and actions, and participate in the development of care goals (Rollnick & Miller, 1995).

In summary, two theoretical approaches and the evidence reviewed informed the development of the expanded NCM interventions included in this study. The purpose of the interventions was to improve client medication self-efficacy and adherence, reduce blood pressure and achieve long-term stroke risk reduction for a specific subset of high risk for stroke SPC clients. Interventions included 1) facilitating medical management, 2) provision of home self-monitoring devices, 3) supportive lifestyle and adherence counselling, and 4) adherence monitoring. Adherence monitoring was performed in collaboration with community providers (pharmacists, family practitioners and family caregivers).

**Primary research questions**

1. Is an expanded NCM model of care delivery feasible in an SPC from a resource utilization perspective; that is, is there adequate staff and time and nursing resources to perform the work effectively?

2. Do NCM strategies (facilitating the simplification of medication regimens and home self-monitoring, providing adherence counselling and memory cues) and six-month follow-up of clients with probable TIA or confirmed stroke and deficits in cognition, self-efficacy and/or self-reported adherence result in reductions in blood pressure and improved medication self-efficacy and/or self-reported adherence?

**Methods**

**Design**

The pilot study employed a mixed methods design. A prospective cohort design was utilized to obtain a convenience sample of 20 consenting adult participants attending an SPC with hypertension and confirmed minor stroke or probable transient ischemic attack and deficits in any or all of cognition, medication self-efficacy and self-reported medication adherence. Additionally, a qualitative analysis of NCM visit notes, client responses to open-ended questions and other communications was conducted to identify recurrent themes or concepts of the NCM experience from the nurse and client perspectives (Straus & Corbin, 1990).
Study setting
The study was conducted in an outpatient SPC located in an urban, university-affiliated regional stroke centre hospital. Each designated Ontario Stroke Centre must meet identified best practice requirements. They are responsible for organizing the human and medical resources required to provide continuum of care stroke services across their respective regions (Ontario Stroke System, 2008). The study site SPC manages approximately 1,000 client referrals annually (HHS, 2009). Five neurologists, one CNS, one part-time nurse clinician, and one administrative support person routinely staff the SPC. A specialist in internal medicine with an interest in stroke is available for consultation. Additionally, a dietician assistant contributes to monthly client educational sessions, as one component of usual care.

Recruitment and sampling procedures
The sample size for this pilot study was determined based on a historical review of SPC data to determine the expected number of clients attending the SPC with the specific characteristics of interest over a six-month period (HHS, 2009). Participants were initially eligible for recruitment if they were 18 years of age or older, English speaking and able to provide admitting information. Participants were recruited after diagnostic test results and neurologist examinations indicated a diagnosis of probable TIA or confirmed stroke. Clinic nurses approached eligible clients to explain the study and identify interest in participation. Informed consent was obtained by a nurse not involved in study.

Participant demographic data regarding age, educational level and living status were collected. Additionally, risk factor data regarding hyperlipidemia, diabetes, obesity, smoking and history of previous TIA or stroke were also collected (Table 1). These data provided the NCM with necessary information within which to frame adherence and other risk factor counselling.

Participants were recruited over a seven-month period. Eligibility requirements included 1) a diagnosis of probable TIA or confirmed stroke; 2) hypertension (defined as clinic blood pressure readings greater than national stroke recommendations recorded at both admission [SPC visit one] and recruitment visit [SPC visit two or three] [Lindsay et al., 2008]); and 3) deficits in one or all of cognition (MMSE score < 26) (Folstein et al., 1975), medication self-efficacy (score < 100%) and/or medication non-adherence (self-report of any missed medications in an average week) (Ireland et al., 2010).

Screening measures
Blood pressure was measured utilizing a single manual sphygmomanometer with the client at rest and in a seated position. The measure recorded was the mean of readings of pressures taken from both arms. Hypertension was defined as exceeding national stroke recommendations (≥ 140/90 mmHg or ≥ 130/80 mmHg for those clients with diabetes or chronic renal impairment) (Lindsay et al., 2008).

Cognition was screened by the recruiting nurse using the MMSE. A score of < 26 of a possible 30 indicated some degree of cognitive deficit (Folstein et al., 1975; Molloy, 1999). The MMSE was designed to identify dementia, delirium and cognitive changes over time. Test-retest reliability has been reported to vary from 0.82 to 0.98; a sensitivity of 87% and specificity of 82% have been reported (Cockrell & Folstein, 1988).

Medication self-efficacy expectation was determined by asking the client to rate his or her level of confidence that taking the prescribed stroke risk reduction medication(s) would reduce the risk for another TIA or stroke on a Likert-type 7-point rating scale with 1 being no confidence and 7 being high confidence (Ireland et al., 2010). The validity and reliability of this measure have not been established.

Medication adherence. Three measures of adherence were included. Deficits in any or all of these measures resulted in a rating of non-adherence.

Self-reported adherence to medication was measured by the number of pills clients self-reported as missed in an average week (Craig, 1985). Participants were asked to respond to the question “Remembering to take medications is difficult. In an average week, how many pills have you missed taking?” Using this measure, Ireland et al. (2010) found that any report of missed medication taking was an independent predictor of SPC clients’ non-achievement of national guideline blood pressure targets (Lindsay et al., 2008).

Participants were requested to bring all medications to their clinic visits in the original containers. Pill counts of up to three antihypertensive or other medications specific to stroke risk reduction were conducted by the study nurse using the following formula: number of pills taken since prescription refill date divided by number of pills the client was prescribed to take multiplied by 100 equaled pill count adherence percentage. Additionally, with the written consent of the participants, community pharmacists were contacted by fax to confirm whether

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<th>Table 1. Study participant characteristics</th>
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<tr>
<td>Characteristic</td>
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<tr>
<td>Age &gt; 65 years</td>
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<tr>
<td>Probable TIA or confirmed stroke</td>
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<tr>
<td>Blood pressure exceeding national</td>
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<td>recommendations</td>
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<tr>
<td>Medication self-efficacy rating &lt;100%</td>
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<td>Self-reported adherence to medication</td>
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<tr>
<td>&lt;100%</td>
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<tr>
<td>Mini-Mental State Examination &lt;26</td>
</tr>
<tr>
<td>Education level &lt; 9 years</td>
</tr>
<tr>
<td>Lives alone</td>
</tr>
<tr>
<td>Hyperlipidemia (documented)</td>
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<tr>
<td>Diabetes (documented)</td>
</tr>
<tr>
<td>BMI &gt;30</td>
</tr>
<tr>
<td>Current smoker (within last 6 months)</td>
</tr>
<tr>
<td>Former smoker (quit &gt; 6 months ago)</td>
</tr>
<tr>
<td>Never smoked</td>
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<tr>
<td>Depression (treated)</td>
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<td>Past HX of TIA or stroke</td>
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the client had been adherent (≥ 80%) according to prescription renewal patterns for these medications. An allowance of 20% was provided to allow for individual variability in prescription renewal patterns.

**Outcome measures**

*Primary outcome measure:* The feasibility of the expanded NCM care delivery model was determined based on the number of NCM hours spent in counselling and telephone consultation over six months, and a qualitative analysis of narrative visit notes. Hours were compared to usual care CNS SPC hours.

*Secondary outcome measures:* Blood pressure readings were recorded at study admission and at six-month follow-up. Medication self-efficacy scores were measured on study admission and at six-month follow-up. Medication adherence to three medications prescribed to reduce stroke risk was originally based on study admission and six-month follow-up ratings of 1) self-report, 2) pill counts, and 3) community pharmacist assessment of participant adherence based on renewal patterns.

**Analysis:** Study data were analyzed using a commercially available statistics package, SPSS Version 12 (2005). Statistical procedures conducted in the analysis included descriptive procedures, Student’s t-test, chi-square and Wilcoxon Signed Rank Tests.

**Interventions**

Each participant had a minimum of one physician assessment and six consultations with the NCM in addition to their routine SPC visits over the six-month study period. At the first study visit, a specialist in internal medicine with an interest in hypertension management and stroke counselled participants on the need for medication adherence. Included was an assessment of the need for 1) adjustments to current blood pressure medications (altering dosages or simplification of dosing schedules), 2) additional medications, and 3) utilization of combination therapy (for example, a vasodilator medication combined in the same pill as a diuretic). At this visit, the NCM reviewed with participants the purpose of their medications and discussed individual lifestyle changes to assist in blood pressure reduction. Lifestyle changes discussed included reduction in dietary salt, increased activity, weight loss, smoking cessation, reduced alcohol consumption, and improved adherence to medications.

**Motivational interviewing** techniques and a self-managed care approach were integrated into all discussions with participants to support behaviour change. Group training in motivational interviewing and self-managed care had been previously provided by the regional stroke program. At their first study visit with the NCM, participants were provided with a memory cue in the form of a weekly medication dosette if they were not previously using one. Additional individualized memory cues were collaboratively identified by the NCM, participants and family members/supportive others that would assist in taking medications at the prescribed times, for example, at meal times or at time of brushing teeth in the morning. Participants were also instructed in how to self-monitor blood pressure using either personal machines or equipment available at their local pharmacy. Where other resources were not available, automatic blood pressure machines were loaned to participants for the duration of the study.

Nurse case management follow-up over an approximate six-month study period included, at a minimum, a monthly telephone call to the participants that provided counselling and ongoing support for risk factor management including adherence. Based on these discussions and participant requests, additional clinic visits with the NCM and the physician were provided, as needed, for the management of hypertension issues. Attendance at a two-hour stroke prevention class led by the NCM and a dietetic assistant, as part of usual care, was also offered to both participants and family members.

Approval for the study was obtained from the joint Hamilton Health Sciences and McMaster University Research Ethics Board (March 10, 2008). The authors of this publication have no declared conflicts of interest.

**Results**

**Participants**

An additional month of recruitment was required to ensure an adequate number of participants. At the end of seven months, a total of 20 participants with probable TIA or confirmed stroke, hypertension, and one or all of the following had been recruited: cognitive deficit (MMSE < 26), reduced level of self-efficacy (score < 7), and/or any self- or pharmacist-reported non-adherence to specific medications. Early in the study process, pill counts were found by the research team to be an unreliable measure of adherence. Based on these concerns, a calculation of improvement in pill count at six-months from baseline was not conducted or included in these results. The wide range of adherence calculated from pill count data confirms the difficulty with this measure (range 50% to 116%) in this participant group.

Most characteristics of study participants were similar to the historical profile of SPC clients at the study site (Hamilton Health Sciences, 2009). Participants ranged in age from 32 to 87 years (M = 67.5 years; SD = 16.07), (Folstein et al. 1975). Differences in the characteristics of the participant group when compared to historical SPC client data included a higher incidence of hypertension (100% versus 71.8%), diabetes (50% versus 21%) and hyperlipidemia (65% versus 58.1%). Table 1 provides the characteristics of study participants.

All participants (n = 20) self-monitored blood pressure during the study. Fifty per cent of participants owned blood pressure monitoring machines at recruitment or were able to attend a local pharmacy weekly for blood pressure checks. Others were provided with machines (50%). Thirty per cent were in the habit of using medication dosettes on recruitment. Only one participant did not have a family physician (5%).

**Primary outcomes**

The average amount of NCM contact and therapeutic intervention time for each participant over the six-month follow-up period was 4.8 hours. This translated into approximately four hours per week in calls and visits. The qualitative analysis of NCM case notes and client responses to open-ended questions revealed the following themes and concepts and the NCM interventions that followed.
a) Medication knowledge gaps created anxiety for participants and their caregivers requiring ongoing NCM support and education. Knowledge needs included education regarding the purpose and possible side effects of medications. In some cases, this required the NCM to negotiate changes in dosing regimens with prescribing physicians. For example, spacing the administration times of antihypertensive agents reduced unpleasant side effects for some participants and resulted in controlled blood pressure measures in the morning and evening. When mild cognitive loss was thought to impact on participants’ adherence, blister packs were requested from community pharmacists.

b) Gaps in transition of care communication required the NCM to act as a link with family physicians, supportive others and community providers. Examples included locating a family physician for a participant, making referrals for community homecare follow-up for falls prevention and medication monitoring, alerting pharmacists when a participant was receiving incompatible medications from more than one pharmacy, and providing assistance in completing applications for funding.

c) Some healthy lifestyle changes were reported to the NCM by each participant. For example, participants reported now reading labels to identify salt and fat content of the food, or adding a formal exercise component, or losing weight. Two participants who had been counselled in smoking cessation by the NCM reported quitting smoking.

Secondary outcomes

Improved hypertension management: Thirty per cent (n = 6) of the 20 participants at the six-month follow-up visit had achieved nationally recommended blood pressure targets of < 140/90 mmHg or < 130/80 mmHg for those with diabetes or chronic renal impairment (Lindsay et al., 2008). Importantly, the majority experienced significant reductions in blood pressure from the time of recruitment when compared to the study follow-up at six months (see Table 2). Analysis using Student t-tests demonstrated a mean reduction in systolic blood pressure from baseline of 16.75 mmHg (p = 0.000), and a mean reduction in diastolic blood pressure of 5.025 mmHg (p = 0.004).

<table>
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<tr>
<th>Visit</th>
<th>BP in mmHg</th>
<th>SD</th>
<th>Significance</th>
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<tr>
<td>Mean SBP at screening</td>
<td>150.80</td>
<td>8.920</td>
<td></td>
</tr>
<tr>
<td>Mean SBP at follow-up</td>
<td>134.05</td>
<td>7.870</td>
<td>p = 0.000</td>
</tr>
<tr>
<td>Mean DBP at screening</td>
<td>81.72</td>
<td>11.971</td>
<td></td>
</tr>
<tr>
<td>Mean DBP at follow-up</td>
<td>76.70</td>
<td>10.569</td>
<td>p = 0.004</td>
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</table>

Improvement in medication self-efficacy: In addition to the presence of probable TIA or confirmed stroke and hypertension, the most frequent inclusion criteria met by 95% of participants was decreased medication self-efficacy expectations, i.e., any degree of belief that taking medications as directed would not prevent a future stroke (M = 4.63; SD = 1.29). At six-month follow-up, participants reported significantly increased levels of medication self-efficacy (M = 5.88; SD = 1.050; p = 0.04).

Adherence to medication: At study enrolment, 20% of participants (n = 5) reported missing one or more medications in an average week. At six-month follow-up, there was a significant improvement in self-reported medication adherence with only three participants (15%) reporting having missed taking one or more pills in an average week (p = 0.003).

The majority of participants were reported by their community pharmacists as having been ≥ 80% adherent with medications based on prescription renewal patterns at both study baseline and at six-month follow-up. However, pharmacist adherence ratings reflecting renewal of only statin and antihypertensive agents demonstrated a mean adherence increase of 14.6% at six-month follow-up when compared to baseline. This trend did not demonstrate statistical significance.

Discussion

In this study, a combination of medical and NCM interventions significantly reduced systolic and diastolic blood pressure at six months in a high-risk group of 20 SPC participants diagnosed with probable TIA or confirmed stroke and increased risk of non-adherence. Additionally, participant medication self-efficacy and self-reported adherence to medication scores improved significantly from baseline.

The wide range of scores and the difficulty in collecting meaningful data regarding participant adherence from pill counts was an important finding in terms of future study of SPC client populations. In spite of instructions and reminders, study nurses noted that participants frequently brought the original pill containers, but neglected to bring the filled dosettes from home. Others ordered medication early from their pharmacy, before they had run out. Some others placed re-fill medication in old containers so that dates of re-fill were inaccurate. In addition, study nurses reported feeling uncomfortable counting pills in front of participants, feeling that this action conveyed a lack of trust that was detrimental to the nurse-client relationship.

The results of this study suggest that pharmacists were responsive and amenable to participating in a review of adherence for their clients. All returned comment sheets by fax indicating each participant’s level of adherence based on renewal patterns. Based on this finding and the potential lack of reliability of pill count data described, pharmacists may be an underutilized partner in client follow-up, discussion of medication adherence issues and research. Pharmacist feedback may provide clinicians and researchers with reliable data to determine correlation with client self-report of adherence.

The medical management of hypertension of two participants varied from NCM recommendations and may have impacted on overall blood pressure outcomes in this small study sample. For one participant, their physician made the decision not to increase the dosage of antihypertensive medication to avoid lowering diastolic blood pressure and to increase the pulse pressure range. This was done to maintain a mean arterial blood pressure 70 mmHg or greater in order to provide adequate coronary artery perfusion. For the second participant, a family physician discontinued his antihypertensive...
therapy just prior to the six-month follow-up visit because of the participant’s reports of falling.

During the development of the study protocol, it was anticipated that combination therapy (e.g., vessel dilator medication plus a diuretic medication in one pill) would be helpful in promoting adherence to medication taking, as it would reduce the number of medications the client would need to take. However, only one participant was prescribed a combination medication.

For certain study participants for whom stabilization of blood pressure was difficult, it was important to have the capacity to collaborate with a physician to titrate doses of diuretic and to alter times of medication administration. One participant required changes to the timing of medications including taking his ACE inhibitor and a diuretic in the morning, a calcium channel blocker at noon, and a second dose of the ACE inhibitor in the evening. By combining different antihypertensive medications at different times of the day, blood pressure was lowered without the participant experiencing precipitous drops in pressure experienced when all medications were taken at the same time.

Consistent with evidence that supports interventions to improve self-efficacy, the qualitative data from NCM field notes and interview responses, as well as the increased self-efficacy scores of participants at six months, supports the expanded NCM approach taken. The inclusion of verbal persuasion using motivational interviewing to assist participants and their caregivers in coming to an understanding of medication regimens and the need for adherence appears to have been effective. Memory cues provided participants with mastery experiences in medication taking. Group classes provided opportunities for participants and their caregivers to identify with others who, like themselves, had experienced a stroke event and were recovering successfully (Bandura, 1998; McGowan, 2005).

Home self-monitoring of blood pressure provided participants with physiological feedback that medication and lifestyle changes were associated with measurable improvements in their health (Bandura, 1998). Consistent with other evidence, home blood pressure readings also provided objective data upon which medical and NCM decisions could be made to tailor treatment to meet individual client needs (Brook, 2000; Nordmann, Frach, Walker, Martina, & Bettegay, 1999; Yarows, Julius & Pickering, 2000).

The extension of NCM counselling and intervention over the six-month period described here reflect an approach that encourages self-management and a collaborative model of care planning. This approach recognized clients as partners in care and encouraged ongoing communication with their health care providers. Telephone contact was an effective method of providing support. However, during the course of the study, extra physician visits were facilitated by the NCM for a few participants to monitor response to treatment and make changes to medications. Alternatively, some participants preferred to communicate with the NCM by email or fax, as they could send blood pressure reports rather than call. This approach was less disturbing for those who worked shifts and slept in the daytime or were at work. One participant with mild aphasia found it easier to communicate in person or by email.

Motivational interviewing was integrated into the counselling approach so that clients were major participants in determining personal goals and identifying strategies for lifestyle change. Some of the participants made dramatic changes in levels of activity (e.g., recreational dancing, sports), weight loss (bariatric clinic programs), and smoking cessation. Most counselling occurred by means of telephone conversations and required only positive reinforcement of the health benefits of the changes that were reflected in improved blood pressures.

Important to the feasibility of an expanded NCM approach within limited resources, the additional time required to telephone, counsel or participate in extra visits with the limited number of participants identified by the study screening criteria was not excessive. However, if a case management model of follow-up is adopted, in order to sustain the quality of this intervention and demonstrate the value attached to the work and the potential for improved client outcomes, additional NCM contact hours will need to be built into clinic staffing plans.

Implications for research and practice

Additional study is required to evaluate the broader economic impact on health service utilization of an NCM approach to stroke prevention in high risk for stroke and non-adherence subgroups of SPC client populations. Further research may determine the economic impact of facilitating a smooth transition from intensive clinic specialty care to home, increasing collaboration with family practitioners and closing gaps and addressing discrepancies between the plan of care and its implementation by clients and supportive others. The value of meeting other SPC client needs for concrete assistance, for example, locating a family physician or completing required financial assistance forms, may also need evaluation. Additionally, further study is needed to determine how longer term NCM through the continuum impacts on the perceptions of care and quality of life of clients at risk for stroke and their supportive others.

The screening processes implemented in this study captured an important subgroup of SPC clients with complex health care management needs meriting a practice enhancement. Clinic practice at the study site now incorporates self-efficacy and adherence screening questions into assessment. Cognitive assessment testing occurs if the nurse or neurologist assesses client problems in providing a history, uncertainty about medications taken, and/or if clients or family members identify memory deficits and confusion. With client permission, if medication adherence is uncertain or if they are unable to provide a list of their medications, their community pharmacist is consulted to verify medications and renewal patterns. Home self-monitoring equipment is available on loan. Clients with blood pressures above national stroke recommended levels are requested to monitor and record their blood pressure on a weekly basis and bring their records to their SPC visits. Alternatively, clients are now invited to email or fax records to the clinic nurse between appointments.

Limitations

The results of this pilot feasibility study are limited in their generalizability by the small participant sample size, lack of a control group reflecting routine care and recruitment at a single site. A randomized controlled trial with an adequately powered sample size is currently being conducted at multiple sites to determine the efficacy of the expanded NCM model of care delivery in improving client hypertension management.
The trial is utilizing the Montreal Cognitive Assessment (MoCA) Scale to screen for cognition based on a sub study comparison of the MoCA and the MMSE conducted in parallel to the study reported here. The MoCa has demonstrated higher sensitivity in detecting mild cognitive impairment (90%) when compared to the MMSE (90%) in other older client populations (Nasreddine et al., 2005).

Conclusions
An expanded NCM care delivery model that included an extended follow-up for those SPC clients with probable TIA or confirmed stroke, uncontrolled hypertension and additional risk associated with deficits in cognition and medication self-efficacy and adherence was feasible within current clinical operations with only a modest impact on nursing resources. In addition, the results suggested that a cluster of nurse-led case management follow-up interventions tailored to support self-management has potential to improve risk factor management and medication self-efficacy and adherence outcomes in order to reduce risk for stroke.

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