

Bridging the gap: the effectiveness of teaming a stroke coordinator with patient's personal physician on the outcome of stroke

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Abstract

Objectives to test the hypothesis as to whether persons newly discharged into the community following an acute stroke and assigned a stroke case manager would experience, compared to usual post-hospital care, better health-related quality of life (HRQL), fewer emergency room visits and less non-elective hospitalisations.

Design a stratified, balanced, evaluator-blinded, randomised clinical trial.

Setting five university-affiliated acute-care hospitals in Montreal, Quebec, Canada.

Participants persons ($n = 190$) returning home directly from the acute-care hospital following a first or recurrent stroke with a need for health care supervision post-discharge because of low function, co-morbidity, or isolation.

Intervention for 6 weeks following hospital discharge a nurse stroke care manager maintained contact with patients through home visits and telephone calls designed to coordinate care with the person's personal physician and link the stroke survivor into community-based stroke services.

Measurements the primary outcome was the Physical Component Summary (PCS) of the Short-Form (SF)-36 survey. A secondary outcome was utilisation of health services. Also measured was the impact of stroke on functioning. Measurements were made at hospital discharge (baseline), following the 6-week intervention and at 6-months post-stroke.

Results the average age of the participants was 70 years. Discharge was achieved on average 12 days post-stroke and most participants had had a stroke of moderate severity. There were no differences between groups on the primary outcome measure, health services utilisation, or any of the secondary outcome measures.

Conclusion for this population, there was no evidence that this type of passive case management inferred any added benefit in terms of improvement in health-related quality of life or reduction in health services utilisation and stroke impact, than usual post-discharge management.

Keywords: stroke, case management, health services research, quality of life, co-morbidity, elderly

Introduction

One of the challenges faced by the health care system today is how to offer high-quality, comprehensive and coordinated care to an increasingly frail and elderly population [1]. This becomes a predominate concern when elderly persons experience an acute health event, for either a new or established condition, and have to make a transition from

hospital to community-based care. In this situation, concerns arise about continuity of care [2].

Shortening the length of acute-care hospital stay for virtually all conditions means that patients are returning to the community much earlier in the course of their recovery than in past decades. Health conditions that affect the elderly, like stroke, pose a particular challenge and methods to optimise

the provision of post-stroke care would be welcomed by patients and providers alike [2–4]. Early supported discharge, in the form of provision of medical and rehabilitation services in the home, has been shown by a meta-analysis of 11 trials [5] to be effective in reducing disability, length of stay, and costs of care. However, these studies, conducted mostly in Europe, have targeted stroke survivors with moderate disability for whom some form of rehabilitation is recommended. The trial conducted by our team, and included in the meta-analysis [6], found that most persons discharged home directly from the acute-care hospital usually do not have major disability from stroke but nevertheless have complex needs for follow-up and service provision which could potentially be facilitated through nursing case management. The evidence for this type of intervention for other conditions is mixed, with some studies showing benefit and other studies showing little or none. There have been few studies of this management strategy in stroke. Therefore, the objective of this study is to determine whether persons newly discharged into the community following an acute stroke would report better HRQL and have fewer emergency room visits and non-elective hospitalisations if assigned to a stroke case manager who would interact with the patient's personal physician to coordinate and provide continuity of care in comparison to those receiving usual procedures for post-hospital care.

Methods

Subject selection

This study targeted all persons returning home directly from the acute-care hospital following a first or recurrent stroke with any of the following criteria indicating a specific need for health care supervision post-discharge: lives alone; mobility problem requiring assistive device, physical assistance or supervision; mild cognitive deficit, dysphagia; incontinence; social service consultation during acute hospitalisation; or need for post-discharge medical management for diabetes, congestive heart failure, ischemic heart disease, arthritis, chronic obstructive pulmonary disease (COPD), atrial fibrillation, kidney disease, peripheral vascular disease. Excluded were persons discharged to an in-patient rehabilitation facility or to long-term care.

The population was drawn from the five acute-care hospitals within the McGill University hospital network. The study was approved by each hospital's research ethics board.

Design

A stratified, balanced, evaluator-blinded, randomised clinical trial was carried out. Persons were stratified according to whether they identified a personal physician. Randomisation was done at discharge, in random blocks of four, six or eight and sealed envelopes were prepared in advance. The intervention period was 6 weeks with 6-months follow-up post-stroke.

Case-management intervention

Case management was defined according to the Case Management Association of Canada (www.cmsa.org) as 'a collaborative process of assessment, planning, facilitation and advocacy for options and services to meet an individual's health needs through communication and available resources to promote quality cost-effective outcomes'. Case management was done through home visits and telephone contacts for a period of 6 weeks. Case managers were two nurses with extensive experience with geriatric nursing, including stroke. Training involved establishing guidelines for assessments to be carried out and creating a documentation system for recording the interactions. The first task was to establish contact with the patient's existing personal physician and arrange for an appointment and for documentation about the stroke to be forwarded to the physician. For persons without personal physicians, the local community health centre (CLSC) was contacted for physician follow-up. The stroke patients were also provided with a 24-h contact number for the nurse, which was used sparingly mostly on weekends or in the early evening mostly prompted by visits from family members.

The interactions and interventions that the nurse case-manager carried out with the patient, family, caregiver and physician were recorded and subsequently coded using the Nursing Intervention Classification (NIC) system by an independent team [7]. The results of this coding have previously been reported [8]; the interventions provided were surveillance (91%), information exchange (80%), medication management (70%), health system guidance (41%), active listening (34%), family support (31%), teaching (23%) and risk identification (19%).

Usual care comparison

For persons assigned to usual care, the patient and family were instructed to make an appointment with the patient's personal physician or, if the patient did not have a physician, at their CLSC as soon as possible. They were provided with a list of these centres. No other interventions were provided to persons in this group.

Measurement

The primary outcome was the Physical Component Summary PCS of the SF-36 survey where a difference of 5 points is equivalent to a moderate effect size of 0.5 and is also clinically important [9]. The study was powered at 90% to detect this difference (type I error 0.05). A number of other measures were included to quantify the impact of stroke on functioning: Mental Component Summary (MCS) of the SF-36 [9], Euroqol EQ-5D [10], Preference-Based Stroke Index (PBSI) [11], Reintegration to Normal Living Index [12], Barthel Index [13], Geriatric Depression Scale [14], gait speed [15] and Timed Up and Go (TUG) test [16]. A secondary outcome was utilisation of health services as identified through linkage of participants' health insurance number to the provincial billing database, Régie

d'assurance de Maladie du Québec (RAMQ). Two additional explanatory variables were cognitive status and stroke severity. The telephone version of the Mini-Mental State Examination [17] has a maximum correct response score of 22. Stroke severity was assessed using the Canadian Neurological Scale [18].

Statistical analyses

The principal analysis was a comparison of the two groups at 6 weeks on the main outcome, physical health measured by the PCS of the SF-36 with an 'intention-to-treat' approach using linear regression with multiple imputation for missing data. This approach was used for all other outcomes and time-points. The assumption of linear regression, normality of the residuals, was verified and only seriously violated for one secondary outcome, the TUG test, the values for which were subjected to a log transformation. The impact of adjusting for gender, age and stroke severity was assessed. For health services outcomes, either *t*-tests or chi-square tests were used to compare the two groups.

Results

Figure 1 shows the path of subjects through the study. A total of 190 persons were randomised, there were three deaths, one in the case-management group and two in the usual care group; an additional 14 and 16 people, in these two groups respectively could not be fully assessed. Only four persons did not consent to provide their health insurance number for linkage to provincial health insurance databases. There were no important differences between the groups at baseline (Table 1). There were no statistically significant differences in any of these outcomes at any time point (Table 2). The main outcome, PCS, showed a statistically significant change which was similar for both groups and was influenced by gender, age and stroke severity with women, older persons and persons with more severe strokes having lower values (data not shown).

Table 3 presents the results of the analysis on health services utilisation. While there was a tendency for the usual care group to use more services, particularly in the period following the intervention (6 weeks to 6 months) only the average number of specialists visits in the post-intervention

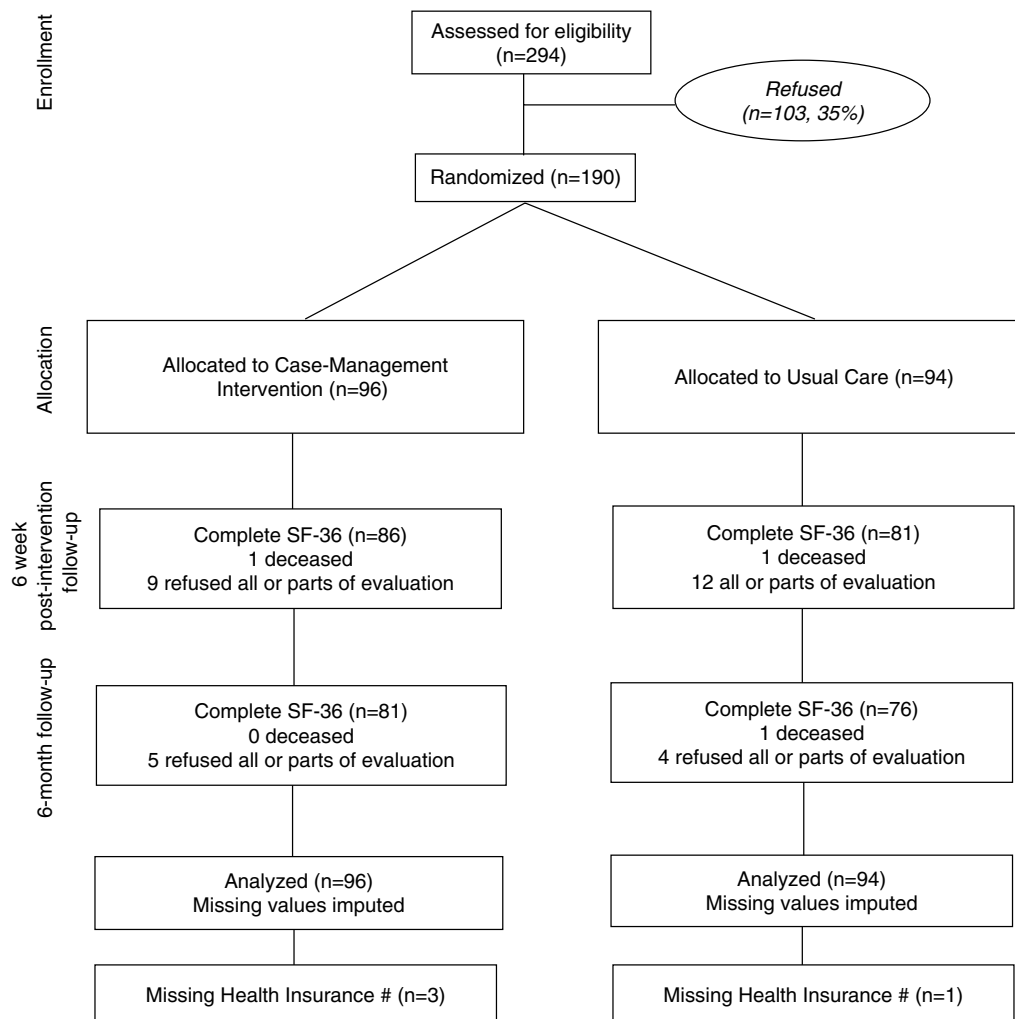


Figure 1. The path of subjects through the study.

Table 1. Characteristics of the two groups at baseline

| Characteristic | Nurse case-manager group (<i>n</i> = 96) | Usual care group (<i>n</i> = 94) |
|--|---|-----------------------------------|
| Age (mean ± SD) in years | 70 (14.5) | 72 (12.95) |
| Men/women | 64 (67%)/32 (33%) | 52 (55%)/42 (45%) |
| Length of stay (mean ± SD) in days | 12 (11.7) | 13 (15.7) |
| Stroke severity [19] | | |
| CNS (mean ± SE) ^a | 8.8 (0.24) | 9.4 (0.20) |
| Severe (CNS < 6) | 14 (14.89) | 5 (5.38) |
| Moderate (CNS 6–10.5) | 59 (62.77) | 61 (65.59) |
| Mild (CNS > 11) | 21 (22.34) | 27 (29.03) |
| Type of stroke | | |
| Infarction/haemorrhage | 93 (97%)/3 (3%) | 89 (94%)/6 (6%) |
| Co-morbidity profile and | | |
| Hypertension | 57 (59%) | 49 (52%) |
| Ischemic heart disease | 23 (24%) | 20 (21%) |
| Diabetes | 26 (27%) | 22 (23%) |
| Atrial fibrillation | 16 (17%) | 16 (17%) |
| One cardiovascular condition | 36 (38%) | 41 (44%) |
| > 1 cardiovascular condition | 40 (42%) | 32 (34%) |
| Other organ co-morbidity | 10 (10%) | 12 (13%) |
| Charlson Comorbidity Index | | |
| 1/≥2 | 51 (53%)/43 (45%) | 44 (47%)/46 (49%) |
| Telephone version of modified Mini-Mental State Examination (0 to 22) [17] | 17.2 ± 0.6 | 17.4 ± 0.5 |
| Lives alone | 22 (23%) | 22 (23%) |
| No primary care physician | 11 (11%) | 10 (11%) |
| Deceased within 6 weeks | 1 | 1 |
| Deceased between 6 weeks and 6 months | 0 | 1 |

^a SE, standard error; these are presented because of the use of multiple imputation; to approximate the sample standard deviation, the estimated SE is multiplied by the square root of the sample size.

period (2.2 for the case-management group compared with 3.4 for usual care group) reached statistical significance in the latter period ($P = 0.01$). Patients received on average 4.8 home visits which lasted approximately 40–90 min depending on the issues identified; on average each participant received 7.8 telephone contacts lasting 5–20 min. Within the 6 weeks intervention period, 14% of the case-management group and 21% of the control group did not have a physician visit; by 6 months only 9% had not yet had a visit recorded.

Discussion

The stroke survivors recruited into this study differ from those commonly included in studies of stroke because we purposely targeted persons whose motor deficits were milder, who were not referred to in-patient rehabilitation and who had other co-morbidities and stroke consequences that pose management problems at home, the very characteristics that often exclude persons from stroke trials. We felt this population would benefit from nurse-directed case management and did not require home rehabilitation services as we had provided in our trial of early supported discharge [6]. As can be seen from the information presented in Table 2, their score on the Barthel Index averaged 87 at discharge, a full 3-points higher than those in our early supported discharge trial [6]. However, this population would be characterised as borderline community ambulators as their

average gait speed was approximately 0.80 m/s just above what is suggested for safe community mobility (0.71 m/s) but well below the speed required for ambulation in a busy, urban environment (1.38 m/s) [22]. The average score on the TUG test (approximately 20 s), is within the range reported for frail, elderly, persons [16]. However, their co-morbidity was similar to that of an unselected sample of stroke survivors recruited for an observational study of quality of life [23].

Nevertheless, there was no impact of the nurse case-management intervention on any of the outcomes and very little on health services utilisation. The question must be raised as to whether any of the interventions offered were potent enough to alter HRQL or health services utilisation [24]. Most of the interventions were ‘passive’ in nature, such as providing surveillance, information and education and psycho-social support [8]. It may be that these interventions are not sufficiently potent to alter health status as perceived by the subject.

There have been several randomised trials of post-hospital support services for vulnerable populations. Lim *et al.* [25] reviewed 11 of them and a 1998 systematic review covered 17 such trials [26]. These trials were also reviewed as part of an evidence-based summary [24] and the conclusion was that services aimed to alter the course of the disease (e.g. services to enhance function, reduce medication errors and detect health threats) were

Table 2. Two groups are similar on HRQL and related outcomes at each time point

| HRQL outcome (scoring range) | Nurse case-manager group (n = 96) Mean ± SE ^a | Usual care group (n = 94) Mean ± SE ^a |
|--|---|---|
| Primary outcome | | |
| PCS | | |
| Post-intervention (6 weeks) | 40.0 ± 1.3 | 38.4 ± 1.4 |
| Follow-up (6 months post-stroke) | 43.4 ± 1.4 | 40.1 ± 1.5 |
| <i>Norm Canadians 65–74 years</i> [20] : 47.2 | | |
| Secondary HRQL outcomes | | |
| MCS | | |
| Post-intervention (6 weeks) | 6.4 ± 1.4 | 45.6 ± 1.4 |
| Follow-up (6 months post-stroke) | 50.6 ± 1.3 | 48.2 ± 1.5 |
| <i>Norm Canadians 65–74 years</i> [20] : 53.7 | | |
| EQ-5D _{utility} (0–1) | | |
| Randomisation | 0.61 ± 0.02 | 0.58 ± 0.02 |
| Post-intervention (6 weeks) | 0.63 ± 0.02 | 0.62 ± 0.02 |
| Follow-up (6 months post-stroke) | 0.69 ± 0.02 | 0.64 ± 0.03 |
| EQ-5D _{VAS} (0–100) | | |
| Randomisation | 65.6 ± 2.3 | 63.1 ± 2.3 |
| Post-intervention (6 weeks) | 74.3 ± 1.9 | 70.2 ± 2.3 |
| Follow-up (6 months post-stroke) | 74.4 ± 2.1 | 71.7 ± 2.3 |
| <i>Quebec population value > 65 years</i> [21] : 79.9 | | |
| PBSI (0–100) | | |
| Post-intervention (6 weeks) | 69.7 ± 2.3 | 72.4 ± 2.3 |
| Follow-up (6 months post-stroke) | 75.9 ± 2.2 | 71.0 ± 2.3 |
| Reintegration to Normal Living Index ^b (22–0) | | |
| Post-intervention (6 weeks) | 5.7 ± 0.6 | 5.9 ± 0.5 |
| Follow-up (6 months post-stroke) | 4.4 ± 0.5 | 5.0 ± 0.6 |
| Barthel Index (0–100) | | |
| Randomisation | 87.2 ± 2.2 | 87.5 ± 1.9 |
| Post-intervention (6 weeks) | 91.4 ± 2.1 | 90.4 ± 1.7 |
| Follow-up (6 months post-stroke) | 92.7 ± 2.0 | 89.9 ± 2.2 |
| Geriatric Depression Scale (GDS-15; 0–15) | | |
| Randomisation | 4.5 ± 0.4 | 4.9 ± 0.5 |
| Post-intervention (6 weeks) | 5.0 ± 0.4 | 5.5 ± 0.4 |
| Follow-up (6 months post-stroke) | 4.0 ± 0.4 | 4.9 ± 0.4 |
| Gait speed (meters) | | |
| Randomisation | 0.84 ± 0.05 | 0.78 ± 0.03 |
| Post-intervention (6 weeks) | 0.81 ± 0.05 | 0.80 ± 0.04 |
| Follow-up (6 months post-stroke) | 0.90 ± 0.04 | 0.80 ± 0.04 |
| TUG ^c (median: seconds) | | |
| Randomisation | 13.3 | 12.6 |
| Post-intervention (6 weeks) | 10.6 | 11.3 |
| Follow-up (6 months post-stroke) | 10.7 | 11.7 |

^a SE, standard error; these are presented because of the use of multiple imputation; to approximate the sample standard deviation, the estimated SE is multiplied by the square root of the sample size.

^b Lower scores on the RNL indicate better re-integration.

^c Normality of residuals was severely violated; so the median is presented.

generally successful in reducing re-admissions. Supportive interventions (e.g. services providing education, phone calls, contact information, reminders about appointments) were not successful in altering re-admission rates. To improve HRQL, the interventions need to target the drivers of HRQL, which are mainly related to physical, psychological and social functioning. The improvement of function requires active ingredients such as physical and occupational therapy, counselling, and community integration.

There have also been new trials in this area [27–29]. Again, with passive interventions such as providing information and

coordination [27, 28], the impact on outcomes was negligible. With more active interventions such as described by Anderson *et al.* [29], which included in-hospital assessments and physical therapy with active follow-up on the home recommendations, there was a reduction in re-admissions (12 versus 44%).

A strong indicator of need for health care management is use of health care services. These are shown in Table 3. The intervention and control groups showed 26 and 30%, respectively as rates of emergency room attendance during the total study period of 6 months. To put these values in context, persons over the age of 65 drawn from family

Table 3. Two groups were similar on use of most^b health services

| Health service | Nurse case-manager group <i>n</i> = 93 ^a | | Usual care group <i>n</i> = 93 ^a | |
|--|---|------------------------|---|------------------------|
| | Discharge to 6 weeks | 6 weeks to 6 months | Discharge to 6 weeks | 6 weeks to 6 months |
| | <i>n</i> (%) or mean ± SD | | <i>n</i> (%) or mean ± SD | |
| Re-admission (at least one) | | | | |
| Unplanned | 4 (4.3%) | 9 (9.7%) | 3 (3.2%) | 12 (12.9%) |
| Scheduled | 1 (1.1%) | 5 (5.4%) | 3 (3.2%) | 10 (10.8%) |
| Days of re-admission | | | | |
| Unplanned | 0.4 (2.3) | 2.0 (7.5) | 0.3 (1.4) | 3.0 (8.8) |
| Scheduled | 0.04 (0.4) | 0.8 (4.8) | 0.1 (0.66) | 0.7 (3.6) |
| Emergency without hospitalisation at least on day | 15 (16%) | 15 (16%) | 13 (14%) | 21 (23%) |
| Number of days at the emergency without an hospitalisation after | 0.2 (0.5) | 0.4 (1.2) | 0.2(0.4) | 0.5 (1.1) |
| General practitioner outpatient visit | 51 (55%) | 61 (66%) | 47 (50%) | 62 (67%) |
| 0 | 42 (45%) | 32 (34%) | 46 (50%) | 31 (33%) |
| 1–2 | 47 (51%) | 37 (40%) | 43 (46%) | 30 (32%) |
| 3–5 | 2 (2%) | 16 (17%) | 4 (4%) | 27 (29%) |
| >5 | 2 (2%) | 8 (9%) | 0 | 5 (5%) |
| Average | 0.8 (1.1) | 1.8 (2.1) | 0.8 (1.1) | 2.1 (2.8) |
| Specialist outpatient visit | 64 (69%) | 72 (77%) | 57 (61%) | 77 (82%) |
| 0 | 29 (31%) | 21 (23%) | 37 (40%) | 17 (18%) |
| 1–2 | 47 (51%) | 42 (45%) | 36 (39%) | 36 (39%) |
| 3–5 | 17 (18%) | 21 (23%) | 17 (18%) | 20 (22%) |
| >5 | 0 | 9 (10%) | 3 (3%) | 20 (22%) |
| Average | 1.3 (1.3) | 2.2 (2.2) ^b | 1.3 (1.6) | 3.4 (3.9) ^b |
| Average number of nurse visits : 4.8 (1.9) | | | | |
| Average number of nurse telephone contacts : 7.4 (5.8) | | | | |

^a Ninety-three subjects in each group were available because of no matching health insurance number.

^b Average number of specialists visits $P < 0.01$.

physician practices in Montreal, had a rate of emergency room visits of 15% in 11 months [30]. This would suggest that the stroke sample studied here was in need of health care management as their rate of emergency room attendance was double that of a comparable non-stroke population over half the time. The rate of hospitalisation was also high during the first 6 months post-stroke, 17 and 28% for the intervention and control groups, respectively, compared with 12% reported from the study cited above [30] for an 11 month period.

This intervention was also offered in isolation and not as part of a multi-disciplinary team approach. This single intervention was chosen as the impact of offering home-based rehabilitation, which included un-classified nursing follow-up, as it had already been shown to be effective [6] and subsequently confirmed by a meta-analysis [5].

In conclusion, this study did not provide evidence for this population that passive case management offered alone and not as part of a multi-disciplinary team approach focusing on rehabilitation was successful.

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Key points

- For persons with stroke, nursing case management in the first 6 weeks following discharge to home from the acute-care setting did not have impact on health or on function-related outcomes and had very little impact on health services utilisation.
- This type of intervention—health surveillance, information, education and psycho-social support—is passive in nature and may not be sufficiently potent to alter health status as perceived by the stroke survivor or health services utilisation, at the time of post-stroke.
- To alter the disease course or outcome, services targeted to enhance function, reduce medication errors and detect health threats have been shown to be successful.
- Interventions such as case management have the potency to induce a response shift by changing a person's conceptualisation of the construct or the calibration of the measurement scale, rendering pre–post comparisons difficult to interpret.

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