

Exploring the Feasibility and Efficacy of a Telehealth Stroke Self-Management Programme: A Pilot Study

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ABSTRACT

Purpose: Moving On after STroke (MOST) is an established self-management programme for persons with stroke and their care partners. Through 18 sessions over 9 weeks, each including discussion and exercise, participants learn about goal-setting, problem-solving, exercise, and community-reintegration skills. This study was undertaken to evaluate the feasibility and efficacy of telehealth delivery of MOST.

Method: Efficacy was evaluated using an experimental non-randomized trial comparing a telehealth MOST intervention group (T-MOST) ($n=10$) with a waiting list control group (WLC) ($n=8$). Outcome measures included the Berg Balance Scale (BBS), the Reintegration to Normal Living Index, the Stroke-Adapted Sickness Impact Profile, Goal Attainment Scaling, and the Geriatric Depression Scale. The feasibility evaluation included attendance rates, focus groups, and facilitator logs. In MOST Telehealth, one co-facilitator was local and the other was connected by videoconference.

Results: Attendance rates for persons with stroke (83.9%, $SD=2.6$) and care partners (76.7%, $SD=2.9$) and participant and facilitator experiences indicated feasibility of this mode of programme delivery. There was a significant difference in BBS scores between the T-MOST group and the WLC group (mean difference -4.27 , 95%CI: -6.66 to -1.87). Participants reported additional benefits, including increased motivation and awareness of partners' needs. Videoconferencing was reported to decrease their sense of isolation.

Conclusion: It appears feasible to deliver the MOST programme with two facilitators, one connected by videoconference and one in person. In addition, preliminary evidence suggests that the programme is associated with improved well-being in persons with stroke and their care partners. Practitioners delivering self-management programmes may consider wider dissemination using videoconferencing.

Key Words: community reintegration, participation, self-management, stroke, telehealth

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RÉSUMÉ

Objectif : Le programme *Moving On after STroke* (MOST) est un programme d'autogestion conçu pour les personnes ayant subi un AVC et leur partenaire soignant/e. Il comporte 18 séances réparties sur neuf semaines, comprenant des discussions et des exercices. Les participants y apprennent à se fixer des objectifs, à résoudre les problèmes, se renseignent sur les exercices et les capacités d'intégration à la communauté. Cette étude a été entreprise dans le but d'évaluer la faisabilité et l'efficacité de la prestation du programme MOST par l'intermédiaire de Télésanté (service téléphonique d'aide et de conseil en santé offert en Ontario).

Méthode : L'efficacité de Télésanté a été évaluée à l'aide d'une étude expérimentale non randomisée visant à comparer le groupe d'intervention du programme MOST de Télésanté (T-MOST) ($n=10$) avec un groupe de contrôle de la liste d'attente (WLC) ($n=8$). Pour l'analyse des résultats, on retrouve une échelle d'équilibre de Berg (Berg Balance Scale), l'indice de réintégration à la vie normale (Return to Normal Living Index), un profil de l'impact de la maladie adapté à l'accident vasculaire cérébral (Stroke-Adapted Sickness Impact Profile), une échelle d'atteinte des objectifs (Goal Attainment Scaling) et une échelle de dépression gériatrique (Geriatric Depression Scale). Pour l'évaluation de la faisabilité, on a eu recours à des taux de participation, des groupes de discussion et des comptes-rendus des animateurs. Lors des séances sur le programme MOST avec Télésanté, un coanimateur était sur place, l'autre étaient présent par vidéoconférence.

Résultats : Le taux de participation des personnes atteintes d'AVC (83,9%; écart-type de 2,6) et des partenaires soignants/tes (76,7%; écart-type de 2,9), de même que l'expérience des participants et des animateurs ont confirmé la faisabilité de ce mode de prestation pour le programme. On a constaté un écart considérable entre les pointages obtenus selon l'échelle d'équilibre de Berg pour le groupe T-MOST, comparativement au groupe WLC (différence moyenne de $-4,27$, 95% CI de $-6,66$ à $-1,87$). Les participants ont signalé des avantages supplémentaires, y compris une motivation accrue et un plus grand degré de sensibilisation aux besoins du partenaire. Ils ont souligné que la vidéoconférence réduisait leur sentiment de solitude.

Conclusion : Il semble faisable d'offrir le programme MOST avec deux animateurs, l'un sur place, l'autre en vidéoconférence. De plus, les données préliminaires semblent indiquer que le programme est associé à un bien-être accru pour les personnes ayant souffert d'un AVC et leur partenaire

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soignant/e. Les professionnels offrant ces programmes d'autogestion devraient donc envisager de les diffuser à plus grande échelle en ayant recours à la vidéoconférence.

Mots clés : accident vasculaire cérébral, autogestion, participation, réintégration communautaire, télésanté

INTRODUCTION

Stroke has been referred to as a chronic disabling condition of sudden onset with often devastating and permanent consequences, including long-term impairments and limitations in activity and social participation.^{1,2} The incidence of stroke is approximately 180 per 100,000 population in Canada³ and 269 per 100,000 population in the United States.⁴ Following acute care and rehabilitation, many individuals continue to be dependent in basic and instrumental activities of daily living (ADL). Many have difficulty performing activities necessary for community reintegration, such as fulfilling family roles, completing chores, socializing, using transportation, and shopping.⁵ Stroke can also produce tremendous social disruption, including marital conflict and separation, relocation, and loss of work.⁶ Long-term participation outcomes for persons with stroke and their care partners, including quality of life, community reintegration, instrumental ADL, and mobility, are often poor, even when their observable impairments are mild.^{1,7–12} In the province of Ontario, Canada, guidelines for programmes to enhance community reintegration have been established.^{13–16} Development, delivery, and evaluation of services to meet these guidelines are now in the preliminary stages. Self-management is an approach to enhancing community reintegration that has demonstrated efficacy in improving well-being for many chronic conditions, such as diabetes¹⁷ and arthritis,¹⁸ and has recently been applied successfully to stroke.^{19,20}

Self-management has been defined as “learning and practicing the skills necessary to carry on an active and emotionally satisfying life in the face of a chronic condition.”^{21(p.11)} While traditional, didactic client-education programmes have demonstrated improvements in knowledge, they generally do not lead to changes in behaviour or to improvements in health status.^{21,22} However, a self-management approach, emphasizing the development of a daily routine of self-management activities—physical exercise, coping, self-efficacy, goal setting, and problem solving—is associated with improved health behaviours.²³

Moving On after STroke (MOST) is a self-management programme, initially developed in 1999 at Baycrest in Toronto, Ontario. MOST has undergone substantial process and outcome evaluation, has been found to meet the information needs of persons with stroke, and is associated with improved enrolment in community exercise programmes and with improved goal achievement.^{19,24}

The programme is designed to be implemented over 9 weeks with two sessions per week, each lasting 2 hours. Sessions consist of 1 hour of discussion followed by 1 hour of exercise (see Table 1 and Appendix). Participants learn about stroke-related issues but also, more importantly, learn problem-solving and goal-setting skills. The overall goal of the programme is to enhance self-confidence, well-being, and successful community participation by providing opportunities to share knowledge and to practice and develop problem-solving and self-management skills in a supportive environment with others living with stroke. MOST is delivered by two trained health professional facilitators.

Telehealth covers a range of health-related activities carried out over a distance by means of technology for the purpose of health care, health promotion, health education, health management, or health research.^{25,26} Numerous benefits of telehealth have been described, including improved access to health services, cost effectiveness, enhanced educational opportunities, improved health outcomes, better quality of care, better quality of life, and enhanced social support.²⁷ Telehealth techniques have been employed previously in patient education^{28,29} and self-management programmes,³⁰ as well as specifically with stroke^{31,32} and other neurological conditions.^{33,34}

Ontario is home to Canada's busiest telehealth network, the Ontario Telemedicine Network (OTN), formed by amalgamating several telehealth entities, including

Table 1 MOST Discussion Topics

Session	Topic
1	Why self-management? Why exercise?
2	Goal setting
3	Introduction to stroke
4	How stroke affects the way you feel
5	Understanding, communication, thinking, and behaviour
6	Relaxation
7	Daily activities and responsibilities
8	Effective communication with health professionals
9	Medical treatment and medications
10	Having fun and enjoying recreation
11	Community resources
12	With a little help from family and friends
13	Loving and caring
14	Nutrition
15	Sleep and pain
16	Alternative treatments
17	Community resources and review
18	Looking to the future

the Northern Ontario Remote Telehealth (NORTH) Network, which supported this study. This network makes use of live two-way videoconferencing to connect more than 100 sites across the province.³⁵ It was postulated that the MOST programme, with some adaptations, could make use of this resource, providing a means of disseminating a necessary programme to rural and remote communities.

The overall objective of this pilot study was to explore the feasibility of telehealth delivery of MOST. Specific objectives were

1. to investigate the efficacy of telehealth delivery of MOST in improving aspects of community reintegration and well-being in community-dwelling persons with stroke;
2. to explore participants' perceptions of the MOST programme delivered using telehealth; and
3. to explore the process of telehealth delivery of a stroke self-management programme.

METHODS

Study Design

A multi-component, exploratory study design was employed. To investigate the feasibility and benefits of telehealth delivery of MOST on aspects of community reintegration and well-being, a non-randomized experimental pilot study with a waiting-list control group was used. Perceived programme benefits were explored using facilitated post-programme focus groups for all participants. To explore the process of telehealth delivery, a programme evaluation model was employed, using attendance records and facilitator reflection logs.

Baseline (T1) information for persons with stroke and their care partners was collected by one of the investigators (DT) for both the intervention (T-MOST) and the waiting-list control (WLC) group within 6 weeks prior to implementation of Telehealth MOST. A second

assessment (T2) was conducted within 2 weeks of the T-MOST group's completing the programme. Immediately following T2, the programme was delivered to the WLC group. A third assessment (T3) was conducted within 2 weeks of the WLC group's completing the programme; however, these T3 findings were not relevant to the feasibility and preliminary effectiveness study and are therefore not presented here. Focus groups with all participants were conducted after the completion of both programmes (at T3). Reflective logs were completed by the facilitators after each session to capture information about the content of the discussion, technical issues, facilitation strategies used and their outcomes, and group dynamics. Figure 1 provides an overview of the study design.

Outcome Measures

The outcomes and corresponding measurement tools are presented in Table 2.

Community reintegration was assessed using the Reintegration to Normal Living Index (RNL).³⁶ The RNL consists of 11 items, each with three scoring levels (0 = no issues, 1 = partial issues, 2 = unable to fulfil); a maximum score of 22 indicates a poor level of reintegration. The RNL covers areas such as recreational and social participation, community mobility, family roles, and other relationships. It has high internal consistency and moderate interrater reliability and is correlated with measures of quality of life and well-being.³⁷

Well-being was assessed using the Stroke-Adapted Sickness Impact Profile (SA-SIP 30).³⁸ The SA-SIP is a 30-item self-report measure that assesses eight stroke-specific quality-of-life domains. The scale has homogeneity (Cronbach's $\alpha = 0.85$), has the same two dimensions as the original SIP, and explains 91% of the variation in scores of the original SIP in the same cohort of patients and 89% in a different cohort.³⁸

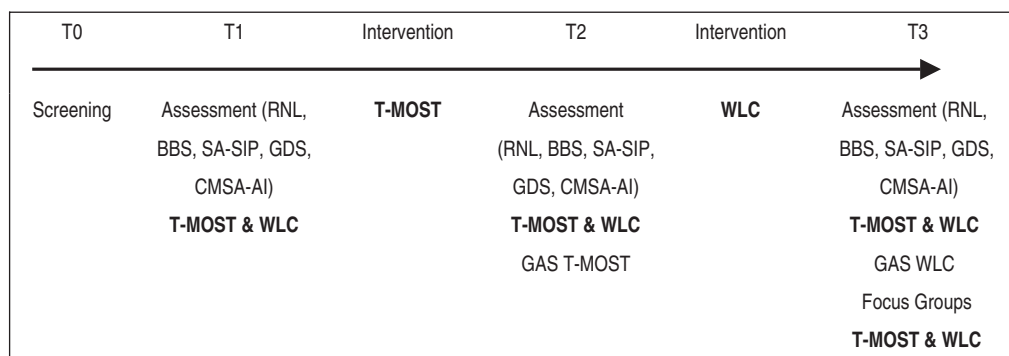


Figure 1 Study design

RNL = Reintegration to Normal Living Index; BBS = Berg Balance Scale; SA-SIP 30 = Stroke-Adapted Sickness Impact Profile; GDS = Geriatric Depression Scale; CMSA-AI = Chedoke-McMaster Stroke Assessment Activity Inventory; GAS = Goal Attainment Scaling; T-MOST = Intervention Group; WLC = Waiting List Control Group.

Table 2 Outcomes and Instrumentation

<i>Outcomes</i>	<i>Instrument</i>
Persons with stroke	
Community reintegration	Reintegration to Normal Living Index (RNL) ³⁶
Well-being	Stroke-Adapted Sickness Impact Profile (SA-SIP 30) ³⁸
Mood	Geriatric Depression Scale (GDS-15) ³⁹
Mobility	Berg Balance Scale (BBS) ⁴⁴ Chedoke-McMaster Stroke Assessment—Activity Inventory (CMSA-AI) ^{42, 43}
Client-selected goals	Goal Attainment Scaling (GAS) ^{49,59,60}
Perceived program benefits	Focus group
Care partners	
Perceived program benefits	Focus group
Process	
Telehealth feasibility	Attendance rates Facilitator logs Focus group

Mood was assessed using the Geriatric Depression Scale (GDS-15),³⁹ which consists of 15 yes/no questions and is scored out of 15, with high scores indicating low mood. Scores of 9 or more have 90% sensitivity and 80% specificity to detect depression in the elderly. The GDS has been validated for use in the community.⁴⁰

Mobility was assessed using the Berg Balance Scale (BBS)⁴¹ and the Chedoke-McMaster Stroke Assessment Activity Inventory (CMSA-AI).^{42,43} The BBS is a safe, simple, and brief balance measure for the geriatric population, predictive of community mobility and correlated with incidence of falls.⁴⁴ It consists of 14 functional balance and mobility items, each scored on a five-point scale; the maximum score of 56 indicates good balance. The BBS has high inter-test reliability (Spearman's $\rho=0.88$)⁴⁵ and has been widely validated.^{46,47} The CMSA-AI assesses gross motor function and walking. Scores can range from 14 to 100; higher scores indicate higher functioning. Although there are no published normative values, the measure is responsive to change in rehabilitation interventions.^{44,48}

Goal Attainment Scaling (GAS) is used as a programme activity to facilitate goal setting, skill mastery, and problem solving; it is also used as a programme outcome. Each participant sets one personal goal and provides individual indicators of goal achievement. Scaling of goal achievement allows comparison of personal goals between participants. This five-point scale uses pre-set statements about the level of goal achievement: “much less than expected,” “less than expected,” “expected,” “more than expected,” “much more than expected.”⁴⁹ The *expected level* of achievement is set at zero; participants who obtain a score of 0 or higher are considered to have achieved their goals. Goals are set at the beginning of the programme, and level of attainment is determined at the end. GAS has been shown to have high interrater

reliability (intraclass correlation coefficient=0.87) and validity and to be responsive to clinically important change.⁵⁰

Participants

Volunteer participants were recruited using a brochure describing the Telehealth MOST programme. Brochures were distributed to the acute-care stroke unit and the in-patient and outpatient stroke rehabilitation programmes in Thunder Bay, Ontario, as well as to a number of community facilities. Potential participants telephoned the Thunder Bay facilitator and took part in a screening interview by telephone to determine their eligibility for and interest in the programme. Individuals were invited to participate if they had a medical diagnosis of stroke, had completed active rehabilitation, and were living in the community. Eligible individuals received further explanation of the programme to ensure their understanding of the self-management model prior to study enrolment (T0). Exclusion criteria included cognitive impairments (defined as a score of more than five errors on the Short Portable Mental Status Questionnaire⁵¹) and severe aphasia limiting the ability to participate in assessments and group discussions; individuals were excluded if they met either of these criteria. Physician approval to participate in the self-paced exercise programme was also required. Written informed consent was obtained from all participants.

Intervention

The Telehealth MOST intervention was implemented using videoconferencing and made use of the existing telehealth network infrastructure and support systems. The study participants and the local facilitator were based at St. Joseph's Care Group, Thunder Bay, Ontario, while the second facilitator was remote, attending the group by videoconference from Baycrest, Toronto, Ontario. A Polycom Viewstation MP VS4000 (Polycom, Pleasanton, CA) with dual video output allowed simultaneous viewing of both sites. The study was approved by ethics review boards at both hospitals.

The MOST programme underwent minor modifications for telehealth delivery. The resource section in the participant manual was expanded to include local Thunder Bay community resources; the exercise component of the original MOST programme, which includes both land and pool exercises, was modified for logistical reasons to include only land-based exercises. (See Appendix for an overview of the exercise sessions, which were based on a well-described exercise programme by Eng.⁵²)

Facilitator training for the Telehealth MOST programme also underwent minor modifications. Training for MOST facilitators traditionally uses an apprenticeship model in which a trainee co-facilitates the programme

with an experienced facilitator. In the Telehealth MOST, the Toronto-based facilitator apprenticed with Baycrest MOST programme staff, while the Thunder Bay facilitator apprenticed during the programme delivery. As well, a facilitator training manual was developed. Finally, both facilitators were trained in the use of the videoconferencing equipment and conducted practice sessions.

Data Analysis

The quantitative data analyses were conducted using SPSS Version 12 (SPSS Inc., Chicago, IL) and included descriptive statistics, baseline comparison of T-MOST and WLC using both Mann-Whitney tests and chi-square analysis, and between-group comparisons of outcomes at T1 and T2. The focus-group sessions were audiotaped and subsequently transcribed. Content analysis was conducted using a directed approach, wherein the researchers specifically sought to explore programme expectations and perceived programme benefits.⁵³ Meaningful units of text were identified using line-by-line qualitative analysis⁵⁴ and were subsequently categorized as *programme expectations* and *programme benefits*. An additional category of *unexpected programme benefits* also arose during the analysis. The text was analyzed separately by two team members (DT, SM), each acting independently.⁵⁵

RESULTS

Participant Outcomes

The T-MOST group began with 10 participants with stroke and six care partners, and the WLC group with eight participants with stroke and two care partners. Two T-MOST couples discontinued, one for health reasons and one because of time constraints, leaving eight participants with stroke and four care partners. The T-MOST and WLC groups were compared for differences in gender, age, time since stroke, hemiplegic side,

marital status, living setting, living partners, vocation, finances, and education. The two groups were similar, except that WLC participants were more likely than T-MOST participants to be living alone. Table 3 presents the characteristics for both groups. No significant between-group differences were found at baseline for any of the outcome measures.

Table 4 provides T1 and T2 means for both groups, mean between-group difference, and 95% confidence

Table 3 Demographic and Functional Comparison of T-MOST and WLC Participants with Stroke (All Initial Participants)

Variable	Details	T-MOST n (%)	WLC n (%)	p*
Gender	Female	5 (50)	5 (62.5)	0.60
	Male	5 (50)	3 (37.5)	
Age (years)	Mean (SD)	61.8 (9.8)	65.6 (4.7)	0.06
Time since stroke (years)	Mean (SD)	4.1 (3.4)	3.2 (3.0)	0.49
Hemiplegic side	Right	3 (30)	4 (50)	0.39
	Left	7 (70)	4 (50)	
Marital status	Married	9 (90)	5 (62.5)	0.23
	Divorced	1 (10)	2 (25)	
	Widowed	0 (0)	1 (12.5)	
Living setting	House	9 (90)	6 (75)	0.40
	Apartment	1 (10)	2 (25)	
Living partner(s)	Family	10 (100)	5 (62.5)	0.034
	Alone	0 (0)	3 (37.5)	
	Partner	0 (0)	0 (0)	
Vocation	Homemaker	2 (20)	1 (12.5)	0.51
	Not working	1 (10)	0 (0)	
	Retired for age	3 (30)	5 (62.5)	
	Retired for disability	4 (40)	2 (25)	
Finances	Just enough	3 (33)	3 (37.5)	0.30
	Some extra	2 (22)	4 (50)	
	Plenty	4 (44)	1 (12.5)	
Education	Some high school	2 (20)	3 (37.5)	0.33
	Completed high school	2 (20)	3 (37.5)	
	Some post-secondary	3 (30)	0 (0)	
	Completed post-secondary	3 (30)	2 (25)	
	Completed post-secondary	3 (30)	2 (25)	

*Based on Mann-Whitney test for age and time since stroke, and chi-square tests for all others.

Table 4 Mean Outcome Scores and Changes in Scores for Persons with Stroke (Program Completers)

Outcome Measure (Range)*	Group	n	T1 Mean (95% CI)	T2 Mean (95% CI)	T1-T2 Between-Group Difference Mean (95% CI)**
BBS (0-56)	T-MOST	8	50.88 (46.37, 55.39)	53.00 (49.96, 56.04)	-4.27 (-6.66, -1.87)
	WLC	7	49.00 (40.26, 57.74)	46.86 (37.52, 56.20)	
RNL (22-0)	T-MOST	8	3.38 (1.42, 5.34)	2.38 (0.65, 4.11)	1.14 (-2.18, 4.46)
	WLC	7	1.57 (0.84, 2.30)	1.71 (0, 3.88)	
SA-SIP30 (30-0)	T-MOST	8	9.00 (5.99, 12.01)	7.13 (4.02, 10.24)	-0.55 (-3.05, 1.94)
	WLC	7	8.57 (5.29, 11.85)	6.14 (2.73, 9.55)	
GDS (15-0)	T-MOST	8	3.88 (1.47, 6.29)	1.88 (0.57, 3.19)	1.14 (-0.79, 3.08)
	WLC	7	2.43 (0.96, 3.89)	1.57 (0.73, 2.41)	
CMSA-AI (14-100)	T-MOST	8	88.38 (79.34, 97.42)	89.75 (82.07, 97.43)	-1.23 (-6.80, 4.34)
	WLC	7	88.29 (75.93, 100.65)	88.43 (73.71, 103.15)	

*Score ranges are given from worst to best.

**Between-group CIs based on independent samples t-test of T1-T2 differences comparing T-MOST to WLC.

BBS = Berg Balance Scale; RNL = Reintegration to Normal Living Index; SA-SIP 30 = Stroke-Adapted Sickness Impact Profile; GDS = Geriatric Depression Scale; CMSA = Chedoke-McMaster Stroke Assessment Activity Inventory; T-MOST = intervention group; WLC = waiting list control group.

Table 5 Goal Attainment Scaling (GAS) Post Intervention for Both Groups

	<i>T-MOST</i> (<i>n</i> = 8)	<i>WLC</i> (<i>n</i> = 7)	<i>Combined</i> (<i>n</i> = 15)
GAS Mean (SD)	0.38 (1.41)	0.43 (1.5)	0.40 (1.4)
# Goals achieved	5/8	5/7	10/15

intervals for all values. The confidence interval (−6.66 to −1.87) for the mean BBS between-group difference does not contain 0, indicating a statistically significant between-group difference for that measure. No other significant between-group differences were found.

The goals set by participants focused primarily on physical activities and social participation. Two examples from this group were (1) to improve the ability to walk around a city block and (2) to communicate in a more respectful way with a spouse. Table 5 gives mean GAS scores for T-MOST and WLC groups and for both groups combined. As individual goal setting is done as part of the intervention, the WLC group's level of goal attainment was not measured until T3; therefore, the two groups were not compared on this outcome at T2.

Perceived Programme Benefits

Focus groups exploring programme expectations and perceived programme benefits were held for each group after both groups had completed the programme (T3). Separate focus groups were held for participants with stroke and for care partners, for a total of four focus groups. The findings of the two focus groups for participants with stroke were combined, as were the findings of two care-partner focus groups. All available care partners were invited to attend the focus groups, whether or not they had actually participated in the MOST sessions. In total, 13 persons with stroke and eight care partners participated.

The focus-group participants described a number of expectations they had of Telehealth MOST prior to beginning the programme, as well as the benefits they perceived after programme completion. The most commonly reported prior expectations of participants with stroke and care partners were that they would be involved in challenging exercises, increase physical strength, meet with others, learn from others with stroke, gain general knowledge, help others, and help improve the programme. Some care partners also expected that the person with stroke would learn to do more for him- or herself and would learn to “move on.” In general, participants' expectations about the programme were met; the main exceptions were the participants with stroke who were hoping for a more individualized exercise programme that would meet

more personal needs, as reflected in the following comments:

I thought that the exercise program was going to be a little bit more extensive, . . . I pulled through it [the stroke] a lot better than some other people, so I could have maybe did a little more rigorous exercise. (T-MOST Participant with Stroke #7)

For myself, I think I was doing a light workout with this group. I was holding back. (WLC Participant with Stroke #2)

Both participants with stroke and their care partners described numerous benefits of the MOST programme. The most commonly discussed benefits were information sharing, participation in exercise, increased motivation and determination, a sense of comfort from the realization that they were not “on their own,” understanding the needs of their care partners, a sense of making a contribution to the community by helping others, and a decreased sense of isolation through peer support received from the group, either in person or via videoconferencing:

I thought it was a very interesting program, because when I got out of the hospital, you hadn't had a chance to really meet a whole lot of stroke survivors and talk to them: what's in common, what isn't, what's been affected by their stroke, and what's been affected by your own stroke; to pass on the information to them, and receive some information from them. So far as I'm concerned, it's a very good program, and if it stretches out into the area, talking to you on the TV was like you being here. (T-MOST Participant with Stroke #3)

While the benefits reported by participants with stroke matched their reported expectations, there did appear to be some unexpected benefits for the care partners. Some care partners reported that the participants with stroke appeared to gain insight and self-awareness and that they became more aware of the needs of care partners:

I sensed when he came back, there was a lot of, Think about how you behave this week, and how did you behave last week. And his growth of insight into his abilities and what he could do, and what he had to work on grew from this course, and this was a wonderful thing for us. I think knowing what you can do, and the effort to try to do something extra, it's a real balance to do this, and safely. This program did help us this way. It helped us be able to talk about it. (T-MOST Caregiver #7)

I do find he's a little bit easier to live with since he's been coming here, and he realizes that he's not the only one in the world that's had a stroke. (WLC Caregiver #1)

Process Findings: Attendance and Feasibility of Videoconference Delivery

Attendance rates are reported for T-MOST and WLC groups combined. Participants with stroke attended 83.9% of sessions (15/18 sessions \pm 2.6, range 11–18), and care partners attended 76.7% of sessions (13.8/18 sessions \pm 2.9, range 10–16).

Feedback on the videoconferencing aspect of the programme was provided by participants through focus groups and by facilitators through reflection logs containing notes on each session.

Both facilitators reported that some learning was required to be able to co-facilitate at a distance using videoconferencing, mostly to become accustomed to the delay between speaking and being heard. However, they reported that after two or three sessions they felt the co-facilitation was flowing well, almost as if they were in the same room together. The facilitators had a scheduled telephone meeting once a week, for about 30 minutes, to plan the flow of upcoming sessions and to discuss any issues that had arisen in the previous group session. This planning and debriefing time is beneficial even with MOST delivered in person in Toronto. The difference is that in Toronto the discussion could take place immediately after a session without the need to extend the 150-minute telehealth appointment. There were minor technical problems in two of 36 sessions, which were quickly corrected by the NORTH Network support staff.

During the focus groups, programme participants commented on the videoconferencing aspect of the programme. Participants reported that by allowing the Toronto-based MOST programme to be delivered in Thunder Bay, the videoconferencing decreased their sense of isolation and allowed for sharing of information across a large geographical distance:

Because we're away from the Greater Toronto Area, we appreciate anything like that . . . it is a wonderful thing, because people are isolated out here. It's one of our greatest problems, is isolation. (T-MOST Caregiver #7)

Participants also provided ideas for expanding the videoconferencing aspect of the programme and suggested that videoconferencing could also be used to include other participants with stroke who live in more remote areas, and not only to connect a remote facilitator:

It's a very good program and if it stretches out into the area, talking to you on the TV was like you being here . . . If you can put care out . . . to the district, and hook up with a whole bunch of these smaller places that don't have ten stroke victims in one day, and only have a few of them in a couple of months, and you can hook up with these people so they don't have to travel. And as you know, in Northern Ontario, we travel miles and miles to get

anywhere. And for the people coming in from the north, it's a much more convenient for them just to get it by TV instead of them packing up, coming here—some people just can't do it after a stroke. (T-MOST Participant with Stroke #3)

DISCUSSION

This controlled pilot study has demonstrated that the use of videoconferencing to facilitate and deliver the MOST self-management programme is feasible and that the programme is associated with improvements in balance, support, and insight for participants with stroke. Previously, MOST was available only in Toronto, a densely populated urban area; the videoconference dissemination of MOST to a northern Ontario community provided an efficient means of filling an important service gap in the continuum of stroke care. Participants appreciated the provision of this community reintegration self-management programme, otherwise unavailable in Thunder Bay. The opportunity to share with others in a similar situation during this phase of the stroke continuum was valued.

The telehealth delivery of MOST in this project used videoconferencing through the existing infrastructure and support of the NORTH Network. One facilitator was located in Toronto, at the centre where the MOST programme was developed, while the study participants and a local facilitator were at a centre in Thunder Bay, Ontario. Technical support was provided through a toll-free help line and on-site technicians at both sites.

There were very few technical problems, and none that jeopardized programme delivery. Videoconference facilitation requires additional skills to address technical issues and facilitate group cohesion across the technological distance.⁵⁶ Successful facilitation strategies using videoconference have previously been reported;⁵⁷ in these studies, however, the participants were connected via videoconferencing, while in the current study the focus was on the impact of co-facilitation using videoconferencing on feasibility and participant benefits. Our study found that co-facilitation through videoconferencing was learned very quickly. Early in programme delivery, it became apparent that many co-facilitation techniques used in face-to-face encounters need to be modified for use in videoconferencing; for example, the use of eye contact as a means of communication between facilitators at a distance was virtually impossible. In addition, the delay in sound transmission made it challenging for the off-site facilitator to discourage side conversations and read facial expressions. The local facilitator was better able to provide such feedback in a timely manner, and she therefore took on this role. Participants in the programme, both those with stroke and their care partners, were able to share information; they considered

the remote facilitator part of the group and felt that the videoconferencing decreased their sense of isolation. The facilitators scheduled weekly telephone meetings to review past sessions and to prepare for upcoming sessions, which allowed them to develop an effective team approach to group facilitation, and both reported being comfortable in their roles as co-facilitators.

Attendance rates were high, with participants attending more than 80% of the sessions. This rate is comparable to the attendance rate achieved in the non-telehealth MOST programme,¹⁹ suggesting that attendance was not affected by the telehealth environment.

Findings related to outcomes such as balance confidence and participation, as well as perceived benefits, were similar to previous studies with MOST, recognizing that the small sample size may have increased the potential of a Type II error. Results from this study will help to guide future power calculations for larger studies. The WLC group showed deterioration in their BBS scores during the waiting period, while the T-MOST group improved, accounting for the between-group difference noted for this measure. These findings suggest that the programme had a positive impact on this outcome, through a combination of preventing further decline and improving balance performance. Furthermore, following the intervention, participants in both groups described numerous programme benefits—most commonly, a decreased sense of isolation, information sharing, improved motivation through goal setting, a sense of making a contribution to the community by helping others, participation in exercise, increased sense of autonomy, comfort in being part of a group, and learning the needs of their life partners. As well, participants set meaningful personal goals, and two-thirds of participants achieved their goals by the end of the programme.

Although a formal cost-effectiveness analysis was not completed, providing this programme to participants in Thunder Bay is inherently more cost effective than arranging for the same participants to attend an 18-session programme in Toronto. The long-term cost effectiveness of providing MOST to participants in Thunder Bay, in the absence of any post-rehabilitation community self-management and exercise programming, is beyond the scope of this study.

The primary limitation of the present study was the small sample size. In addition, the internal validity of the study was limited by the non-randomized distribution between the two groups and by recruitment strategies biased toward those already participating in the community. Sample-size estimation indicated that in order to detect a difference of one-half of a standard deviation on the RNL, 63 subjects per group would be necessary to achieve 80% power ($\alpha = 0.05$) for a 2-tailed *t*-test, based on our calculated pooled standard deviation of 2.68.⁵⁸ With a total sample size of 15, the current study clearly did not have sufficient power to determine a

between-group difference in the RNL score, if, in fact, one existed. However, the integration of the quantitative outcome data, the process information, and the qualitative findings from participants and facilitators provide very valuable learning for future programming. Findings are in alignment with those of earlier MOST studies, also primarily exploratory in nature.^{19,24}

The study design, comparing an intervention and waiting-list control group both using videoconference delivery of the intervention, does not allow for comparison of videoconference versus face-to-face delivery of MOST. Unfortunately, the MOST programme had been provided only in large urban areas; adding the rural/remote versus urban comparison to the current study would have posed additional sample-size challenges, and was not within the scope of this study.

In addition, measured and unknown baseline differences between the groups might have been corrected with randomized assignment. Although recruitment strategies targeted acute-care, rehabilitation, outpatient, and community centres, participants were recruited on a first-come-first-serve basis, with the result that a large proportion of study participants were already actively participating in community fitness, swimming programmes, or stroke support groups where programme pamphlets were on display. Some improvements seen in the original MOST evaluation, including a higher number of MOST participants attending formal exercise classes after the programme,¹⁹ were not replicated in this study. Timing of the programme was designed to accommodate equipment bookings and programme facilitators rather than clients. The location of the hospital was chosen for convenience and to meet equipment needs for videoconferencing; it is recommended that future programmes be offered at community centres to further facilitate community reintegration.

CONCLUSIONS

The MOST programme can be delivered with a facilitator connected by videoconference, and has the potential to improve well-being in community-dwelling persons with stroke and their care partners.

The Telehealth MOST project suggests that existing programmes can be shared across vast distances, regions, and institutions. MOST was developed and evaluated over a period of several years at Baycrest in Toronto; coordination and collaboration between two of Ontario's stroke regions (the North East GTA Stroke Region in southern Ontario and the Northwestern Stroke Region in northwestern Ontario), two health care organizations, and the NORTH Network led to successful integration of the MOST programme into a northern Ontario community, over a distance of 1,700 km.

Results from this study have led to further adaptations and a more extensive evaluation: a larger-scale

randomized controlled trial is currently underway in northern Ontario, using videoconferencing to connect participants from remote areas directly with participants and facilitators in a more urban area. Whereas previous MOST studies have been largely exploratory, this study will be more definitive, with a sample size aimed to achieve 80% power ($\alpha = 0.05$), reducing the chances of a Type II error. This next study will allow for further dissemination of this necessary programme to smaller communities with limited resources and a smaller prevalence of persons living with stroke.

KEY MESSAGES

What Is Already Known on This Subject

MOST is a stroke-specific self-management programme associated with improved enrolment in community exercise programmes and goal achievement.^{19,24} A formal needs analysis identified a gap in post-rehabilitation community self-management and exercise programming in Thunder Bay, an area with an extensive, well-established telemedicine videoconferencing infrastructure.

What This Study Adds

In addition to improvements in balance for participants living with stroke, implementation of the MOST self-management programme delivered via videoconferencing was associated with improvements in aspects of well-being in persons with stroke and their care partners. In addition, videoconferencing does not appear to be a barrier to participation in this 9-week programme. Based on the findings of this study, practitioners delivering self-management programmes may wish to consider wider dissemination using videoconferencing.

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Appendix 1 Exercise Component

<i>Component</i>	<i>Equipment</i>	<i>Procedure</i>
Warm-up	chairs, music	5 minutes: Marching on the spot in standing or sitting; L/E stretching—hamstrings, Achilles, sitting hip rotator stretch; neck and trunk stretching—flexion, extension, rotation, rhomboid stretch; U/E stretching—shoulder flexion, rotation, elbow/wrist/finger extension
Cardio class	pre-measured walking circuit, stair component for participants able to tolerate greater levels of difficulty	40 minutes: Measured indoor walking circuit, with signage indicating landmark distances as possible (i.e., 10 m, 50 m, etc). Circuit includes a stair component for participants able to tolerate higher levels of participation. Other cardiovascular equipment may be available in the exercise room. Clients log the distance walked, number of flights of stairs climbed, and time spent on any cardio equipment. The physiotherapist, volunteers, and willing care partners provide assistance/supervision as necessary.
Balance and strength class	chairs, stools of varied heights, tape or chalk lines on the floor, Theraband, tape player, music	40 minutes: Class modified from an existing program. ³⁵ Can be run as a class or a circuit with five stations, 7–8 minutes for each section or per station. <ol style="list-style-type: none"> 1. <i>Slow movements</i>: challenging base of support, holding on to back of chair if required (e.g., lunges with arms reaching, weight-shifting in different directions, single-leg balancing) 2. <i>Agility</i>: holding the back of a chair if required and/or with supervision of facilitator, volunteer, or care partner if necessary; quick steps forward, backward and lateral, stepping up on a stool and over or back down again, moving feet around a pattern 3. <i>Functional Strengthening L/E</i>: repetitive rise from a low chair, adding stools of varying heights to increase difficulty, rise up on toes, back on heels or walk on heels, step up on a stool front and side, progress stool height and number of repetitions 4. <i>Functional Strengthening and Dexterity U/E</i> (in sitting): elbow flexion/extension, using Theraband when appropriate; shoulder flexion/extension/abduction/adduction/rotation, using Theraband when appropriate; wrist, dexterity—thumb to each finger tip as rapidly as possible, unilateral and bilateral, finger nose, air writing with finger, hand, arm, figure 8 on flip chart, hand writing, hand, wrist, and elbow stretching 5. <i>High-level balance skills</i>: tandem walking, varied length of steps, braiding, stepping over obstacles, walking
Cool-down	Equipment and procedures as per warm-up above.	

Each session consisted of both warm-up and cool-down, and either a cardiovascular class or a balance/strengthening class.