

Health promotion interventions post-stroke for improving self-management: A systematic review

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Abstract

Background: It is well-documented that women tend to be worse off post-stroke. They are often frailer, have less independence, lower functionality, increased rates of depression, and overall a lower quality of life. People who have had strokes benefit from rehabilitative support to increase their independence and reduce the risk of stroke recurrence. Despite the gender differences in the effects of stroke, interventions explicitly aimed at helping women have not been identified.

Purpose: This systematic review aimed to summarize the effectiveness of the health promoting behavioural interventions for reducing risk factors and improved self-management in women post-stroke, compared to usual care.

Method: Seven databases, Medline (Ovid), CINAHL, PsychInfo, Embase, PubMed, Scopus, and Google Scholar, were reviewed for randomized controlled trials covering post-stroke interventions. The following keywords were used: health promotion, secondary prevention, woman, women, female, sex difference, gender difference, after stroke, and post-stroke.

Results: Ten randomised controlled trials were found. These demonstrated common successful approaches for rehabilitation, but none specifically described health promotion strategies for women. Core components of successful programs appeared to be a structured approach, tailored to clientele and formalised support systems through their carer, family networks, or community engagement. Comprehensive reminder systems were successful for stroke risk reduction.

Conclusion: Women are disproportionately affected by stroke and are often in the frail category. Tailored structured health promotion programs with family and caregiver support combined with a comprehensive reminder system would appear to enable women post-stroke.

Keywords

After-stroke, health promotion, secondary prevention, treatment, cardiology, female

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Introduction

Stroke was the second major cause of death globally in 2016.¹ The risk of stroke recurrence is lowered with a reduction in high blood pressure (BP), reduced smoking, keeping cholesterol within a normal range, and increased physical activity.² When post-stroke patients were asked about these risks, only 22% were able to name four risk factors, and 8% were unable to name any.³ People were reluctant to adopt secondary prevention interventions post-stroke.^{4,5} Being female is a predictor for worse outcomes in stroke and rehabilitation.

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Studies show they are more dependent,^{6,7} their mobility, occupation, and leisure activities are more severely affected,^{6,8} and they have higher rates of depression and lower quality of life.⁹ There are also specific risk factors for women e.g., pregnancy, preeclampsia, gestational diabetes, oral contraceptive use, and hormone replacement therapy.¹⁰ Women also experience atrial fibrillation, diabetes mellitus, and hypertension more than men.¹⁰

There is a need to investigate the effectiveness of health promotion interventions that reduce risk factors post-stroke for gender-specific outcomes.¹¹ There is evidence that effective health promotion interventions support the growth of self-management; this develops people's awareness and ability to monitor their condition and choose a lifestyle that maintains a high quality of life.¹² Interventions that focus on improving problem-solving abilities, self-efficacy and resource utilisation show better outcomes.¹³ To date, no summary of the effectiveness of health population interventions in this high-risk population group has been located. This study aims to summarize the effectiveness of health promoting behavioural interventions for reducing risk factors and improved self-management in women post-stroke, compared to usual care.

Methods

The search strategy was developed with health librarian assistance. This was conducted through comprehensive searching in Medline (1999–2019) (Supplementary Table 1), PsychInfo, Embase, and CINAHL, with further searching in PubMed, Scopus, and Google Scholar. Reference lists from included studies were reviewed for additional papers. The inclusion criteria were: randomised controlled trials (RCT) in the English language, evaluating health promotion interventions delivered to women, post-stroke as secondary prevention aimed at decreasing risk factors for stroke recurrence e.g., normalising blood pressure, cholesterol; reducing smoking rates; improving physical activity, activities of daily living (ADL) and medication adherence. Exclusion criteria included: primary prevention for stroke studies, participants younger than 15 years, and those with 'transient ischemic attack' in their definition for stroke.

Two investigators (KT and BL) independently screened titles and abstracts for eligibility based on the PRISMA guidelines.¹⁴ Full-text articles were reviewed for those meeting the initial criteria; then, a discussion was held to reach a consensus on the final studies selected (Figure 1). The Johns Hopkins Nursing Evidence-Based Practice: Model and Guidelines¹⁵ were used to assess the methodological quality of each study by two investigators (KT and BL) independently, and

after discussion, a consensus was reached (Table 1). Data were extracted by KT using a table developed by the research team (Table 1). One investigator (BL) cross-checked the extracted data using the full-text of each study for accuracy. Where necessary, additional information was sought directly from authors.

A systematic approach was used for the synthesis of findings from the included studies. The characteristics of the studies examining the role of health promotion in the management of women after stroke were examined and presented in a narrative form. The heterogeneity of the studies ruled out meta-analyses. Similarities and differences were compared and grouped according to whether interventions were targeted at reducing risk or improved self-management. Quantitative data were reported in terms of risk reduction (e.g., blood pressure (BP), cholesterol, medication management) and indicators of improved self-management (e.g., ADL, physical activity).

Results

A total of 5758 titles were obtained from searches (Figure 1). Ten studies met the inclusion criteria (Figure 1). There were 3738 participants with ages ranging from 32 to 92 years. The mean age of participants was 67.6 years for nine of the studies. Participants were 43.2% female^{14–23} and were from diverse ethnic backgrounds (Table 1). No RCT post-stroke health promotion studies specifically targeted women, although all studies included women. Eight studies excluded those with serious comorbidities and those with aphasia/cognitive/psychiatric diagnosis or communication impairment.^{16–21,23,24} Interventions involved an individualised approach (six RCTs),^{16–18,22,23,25} or group (3 RCTs)^{18–20} approach to health promotion. One RCT combined both approaches.²⁴ (Table 1) Three of the studies targeted reduction in risk factors (e.g., BP, medication adherence),^{19–21} six on improved self-management (e.g., measured through ADL and physical performance),^{19–24} and one study targeted both²⁵ (Table 1). The quality of the RCTs ranged from Level 1B to Level 1A.

Discussion

This review aimed to source post-stroke health promotion interventions for risk reduction and improve self-efficacy management in women. However, although women after stroke were included in all the studies, no studies explicitly targeted women. The percentage of female participants in all the studies was also low (43.2%). This may be because eight studies^{16–21,23,24} had exclusions for those with severe comorbidities and aphasia/cognitive/psychiatric diagnosis or

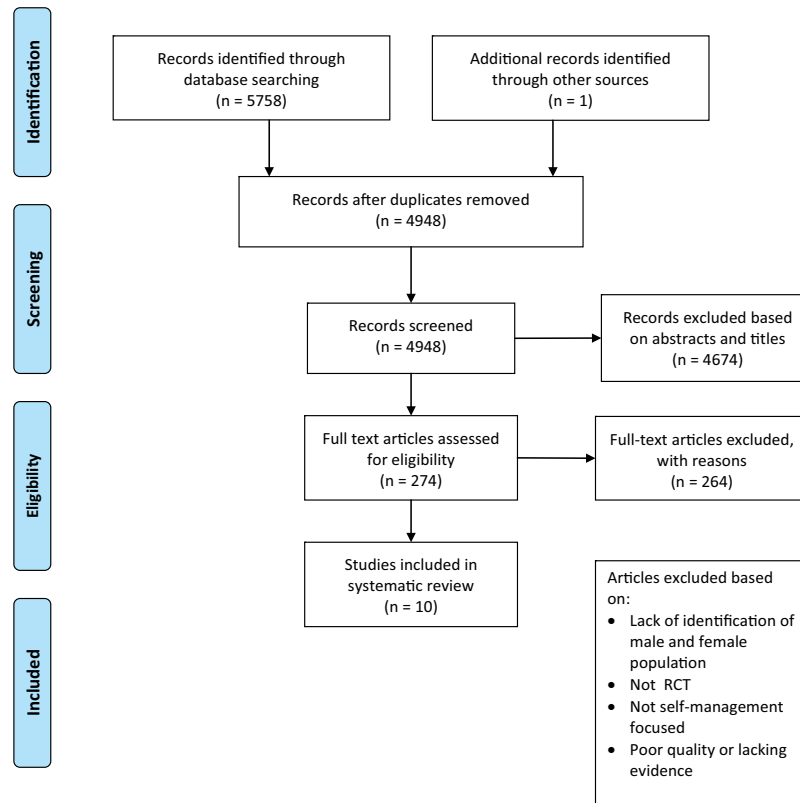


Figure 1. Prisma flow diagram of identification, screening, eligibility and inclusion of articles.

communication impairments, which would eliminate those who were frail. Studies show women are more dependent, and their mobility, occupation, and leisure activities are more severely affected.^{6–8} So, they are more likely to fall into this category and therefore not be included in these studies. However, two individually targeted interventions, with as few exclusions as possible,^{22,25} effectively improved participants' ADL and physical performance, implying that their approaches could be useful for the frail while meeting more women's needs post-stroke.

The four studies aimed at reducing risk factors used an individual, home-based approach. Two studies^{17,18} used a comprehensive reminder system through SMS messaging, and one used MI¹⁶ and were successful in eight weeks, three months, and nine months respectively. The fourth study²⁵ with few exclusion criteria was unsuccessful at reducing BP or smoking rates, suggesting that interventions to reduce risk factors are also more successful with the less frail. The seven interventions aimed at improving ADL and/or physical performance either used individual or group methodologies in the home or community settings. Six of these programs^{19–22,24,25} reported significant improvements in both self-efficacy and ADLs. These programs ranged

from 3–18 months, and four^{21,22,24,25} indicated sustained change was possible from 3–12 months after program completion. Core components of successful programs appeared to be a structured approach, tailored to clientele and formalised support systems through their carer, family networks, or community engagement. The study that focussed primarily on individual's improved physical performance²³ showed that although this significantly improved, it did not improve ADLs.

Combining a comprehensive reminder system through SMS messaging with a structured approach, tailored to clientele and formalised support systems for ADL and physical activity would appear to be a positive step forward. This type of method has been very successful with The Woman's Wellness after Cancer Program to improve outcomes and reduce risk factors following breast cancer treatment.²⁶

Strengths and limitations

A systematic search technique was utilised across seven different databases to collect all relevant studies. The key studies selected were RCT studies, a highly effective method for providing evidence,²⁷ and these ranged

Table 1. Characteristics and Results of Included Studies.

| Studies | Characteristics (IG vs CG) | Intervention | Results | Quality score |
|---|---|--|---|---------------|
| 1 Barker-Collo et al. ¹⁶ NZ Single-phase prospective phase III RCT Individual focus. | No., 386; IG, 193; CG, 193; Female = 35%, ≥ 16 years, First-ever stroke. No aphasia/ cognitive /psychiatric diagnosis nor communication impaired, in control of own medica- tion. Access to phone | Targeting: risk factors (-BP, cholesterol, new cardio- vascular events, & medica- tion adherence). Intervention: 4x sessions: 28 days, 3, 6 & 9 months. Program-Motivational Interviewing (MI) adminis- tered by trained research- ers under supervision of an MI trainer | Assessed at 12 months post- randomization BP-no significant differences between groups both dropped >15mgHg; Cholesterol-no significant changes. Medication adher- ence-significant difference (p = 0.005) at 9 months post-stroke. Death/Stroke/ TIA/MI-no significant differences | Level I, B |
| 2 Kamal et al. ¹⁷ Pakistan RCT; parallel-group, assessor- blinded superiority trial Individual focus. | No., 200, IG, 100; CG, 100; Age: 57.62 years vs 56.07 years; Female = 32.5%, >18 years; > 1 month since last stroke. No serious comorbidities/disabilities. Access to & able to receive, respond & reply to SMS in English or 2x Urdu scripts or via carer, at all times. | Targeting: risk factors-medi- cation adherence (MMAS); BP; Intervention: 16 cus- tomised SMS for each dose of medicine & 2x health messages/week, for 8 weeks. Staff trained and certified in good clinical practice. Based on social cognitive theory, the health belief model & Michie's taxonomy of behavioural change com- munication categories. | Assessed 2 months after being in the Clinical Trials Unit BP-DBP was 2.6 mmHg lower, p = 0.06. MMAS p = 0.00 High adher- ence with difficult dosing. | Level I, A |
| 3 Wan et al. ¹⁸ China RCT, parallel-group Individual focus. | No., 174; IG, 87; CG, 87; Age: 35-86 years; Female = 31.6%. BP >140/90 No serious aphasia comor- bidities/disabilities. Education ≥ middle school. Walk independently before stroke. Own mobile phone. | Targeting: risk factors-diet, BP, medication adherence & physical activity. Intervention: 1x face to face (20-30 minutes) before discharge; after discharge: -2x telephone at 1 week & 1 month (minimum 15 minutes)- multiple weekly SMS reminders for 3 months at baseline and 3 months after discharge, Program -CRS-HBM (comprehensive reminder system based on Becker's health belief model) pro- gram using a health belief education handbook to improve participants health behaviour. | BP-significant reduction <0.001, (< 140/90 mm H) Nutrition-significant difference p < 0.001, Low-salt diet-significant differ- ence p = 0.002, Medication adherence-signifi- cant difference p < 0.001 Physical performance (HPLP.II) Significantly better health behaviours for physical activity p < 0.001. | Level I, A |
| 4 Ertel et al. ¹⁹ USA Home-based RCT Group focus. | No., 291; IG, 146; CG, 145; Age: 69.3 years vs 70.2 years; Female = 48.8% No aphasia/serious disabil- ities. Not cognitive impaired before stroke. | Targeting: ADL, physical per- formance, frailty, cognition for group. Intervention: Weekly meet- ings (1 hour) for 12 weeks, then triweekly meetings for 12 weeks (16 times over 6 months) with a support system (primary caregiver, family, friends, professional caregivers) in their home. Lead by psy- chologist/ social worker | Assessed six months post- stroke. Mortality 47 months post- stroke. Improvement with fewer pre- existing chronic conditions only (p = 0.02) & non frail (p = 0.01). Cognitive scores-Associated with enhanced cognitive scores for males only (p = 0.04) & less severe strokes p = 0.03. | Level I, B |

(continued)

Table 1. Continued.

| Studies | Characteristics (IG vs CG) | Intervention | Results | Quality score | |
|---------|---|--|--|---|------------|
| 5 | Mayo et al. ²⁰ Canada - 11 x sites in 7 cities RCT to immediate or to four-month delayed entry. Group focus. | No., 186; IG, 93; CG, 93; Age: 65 vs 61 years; Female = 39.2% Within 5 years of stroke Brief MMSE score ≥ 14 Independent toileting Not in other programs. | trained in family systems & CBT. Content framed around 16 content areas associated with psychosocial adaptation to stroke. Targeting: ADL, Gait speed maximum for group. Intervention: Three hours 2x week for 3x 12-week blocks for 12 months. Program had continuous exercise component 45 minutes, 2x week. Structured community-based program-series of focus groups of stroke survivors within 5 years of stroke. Activities individually tailored-promoted learning, leisure & social activities. Led by recreation/exercise therapists/educators with healthcare & stroke experience who completed a 2-day training on educational based learning theory & CBT. Study coordinator monitored classes and web site available for sharing ideas. | (prespecified subgroup analysis) <i>Interaction between treatment and Frailty Index</i> -Significant for the outcomes of instrumental ADL ($P < 0.01$), physical performance ($P < 0.04$) and mortality ($P < 0.01$). <i>Mortality</i> -non-frail reduced risk of death ($p = 0.03$). Assessed at 12 months and 15 months. No differences between groups after 3 months so data were combined. <i>Reintegration to Normal Living</i> -significant increases all persons at 12 and 15 months. <i>Physical performance</i> -gait speed (ms-1) - comfortable' & fast -significant increases all, 12 and 15 months. <i>Health rating</i> -significant increases all, 12 and 15 months. | Level 1, B |
| 6 | Wolf et al. ²¹ USA Community-based RCT: A multisite, single-blind, & exploratory Group focus. | No., 185; IG, 99; CG, 86; Age: 32-92 years; >18 years; Female = 52% 3 months post-stroke Medically stable No aphasia/serious disabilities/cognitive impairment. | Targeting: ADL, Physical activity. small group (6-7) setting. Intervention: Sessions- 1/ week for 12 weeks, Program- with structured efficacy building process, focus on problem-solving & self-management. Based on chronic disease self-management program with emphasis on home, community & work management after stroke. Led by occupational therapist or peer who had completed the CDSMP facilitator training. | Assessed at baseline and post-intervention at 12 weeks & at 6-9 months after completing program. At 12 weeks significant improvements in health-related self-efficacy both within-group and between-groups for the following subcategories. Obtaining help from others ($p = 0.045, p = 0.007$); Manage disease in general ($p = 0.00, p = 0.001$); Do chores ($p = 0.001, p = 0.009$); Advocate for resources ($p = 0.002, p = 0.027$). <i>Physical performance</i> -Exercise regularly ($p = 0.008, p = 0.026$); On the long-term follow-up, no changes were significant | Level 1, A |

(continued)

Table 1. Continued.

| Studies | Characteristics (IG vs CG) | Intervention | Results | Quality score |
|---|--|---|--|---------------|
| 7 Johnston et al. ²² Scotland RCT. Individual focus. | No., 203; IG, 103; CG, 100; Age: 68.79 years vs 68.96; Female = 38.9% First stroke or recurrent stroke. Medically stable Few exclusions as possible Telephone access. | Targeting: ADL, & confidence in recovery. Focussed on patient with a primary carer. Intervention: 5 weeks-3 home visits to individual (week 1 & 2 & 5, Telephone contact week 3 & 4) based on a post-discharge workbook. Covered stroke & recovery, coping skills, self-management, task materials & included diary sheets, audiotape for simple relaxation & breathing exercises. Based on CBT techniques. | ($p > 0.05$)-the mean of all subcategories remained improved without significant decreases over time. Assessed at baseline, 8 weeks and 6 months from baseline. Patients and carers separately. Significant disability recovery with intervention ($p = 0.019$) at 6 months from discharge. Maintenance of confidence in recovery ($p = 0.001$) at 6 months from discharge. Workbook satisfaction higher for information and social support than for behavioural activities ($p = 0.019$) at 6 months from discharge. No significant effects on carer outcomes (distress/satisfaction of care). | Level 1, B |
| 8 Askim et al. ²³ Norway RCT from 2 centres, pragmatic single-blinded. Individual focus. | No., 380; IG, 186; CG 194; Age: 71.7 vs 72.3 years; Females = 39.2% Age ≥ 18 years First ever or recurrent stroke; No serious comorbidities/aphasia/cognitive impairment/disability/contraindication to motor training. | Targeting: ADL & physical activity. Intervention: Monthly individualized coaching by physiotherapist on physical activity-face to face (11x) & telephone (7x) 45 minutes for 18 months. Plus 45-60 minutes of vigorous activity 2-3/week by participant Plus physical activity 30 minutes/day. | Assessed at 6, 12 & 18 months-new cardiovascular events, serious falls, fractures, deaths. Significant difference for vigorous activity at 6, 12 & 18 months ($p = 0.009$, 0.016, & 0.033) Significant difference for moderate activity & walking at 6 months ($p = 0.005$) & 12 months ($p = 0.001$). CG significant difference. Timed Up & Go test ($p = 0.001$). | Level 1, B |
| 9 Chen et al. ²⁴ China RCT two-armed single-blinded prospective study. Individual & Group focus. | No., 144; IG, 72; CG, 72; Age: 65.92 vs 64.78 years. Female = 26.4% Age ≥ 18 years No serious comorbidities/aphasia/disability; communication difficulties. No pre-morbid dependence. Access to telephone. | Targeting: ADL, within patient's network of nurse, patient and carer. Intervention: 5x daily sessions as in-patient from day 3-7 (20 minutes/session). Second week 1x small group session (60 minutes with 6-8), 1x discharge instruction & plan. After discharge: 4x weekly telephone follow-ups (20-30 minutes). Nurse-led patient-centred self-management empowerment intervention based on key elements of a health empowerment model to promote knowledge and self-care skills, enhance self-efficacy, problem-solving skills and to set goals, | Assessed at baseline, on discharge and 1 & 3 months. Significant improvement at 3 months post-discharge ($p = 0.044$). Self-efficacy-Significant difference on discharge ($p = 0.014$), 1-month post-discharge ($p = 0.008$), and 3 months post-discharge ($p = 0.023$). Rehospitalization rate significantly lower at 3 months post-discharge ($p = 0.001$). | Level 1, A |

(continued)

Table 1. Continued.

| Studies | Characteristics (IG vs CG) | Intervention | Results | Quality score |
|--|--|--|---|---------------|
| 10 Harwood et al. ²⁵ NZ RCT prospective multicentred parallel 2x2 intervention. Individual focus. | No., 172; IG1, 48; IG2, 46; IG3, 39; CG, 39; Age: IGs 61.6 vs 61.1 vs 61.5 years; CG 61.3 years; Age: > 15 years Female=IGs: 41.6% vs 63% vs 53.8%; CG, 51.3%; Identified as Māori/Pacific. | frame a plan of action and utilize available resources. Targeting: Risk factors-BP, BMI, smoking rates, & ADL, physical performance, degree of disability, rehabilitation involvement. Three interventions: within a familiar cultural context (Māori/Pacific) IG1:- 1x DVD inspirational stories about stroke & stroke recovery x80 minutes long, left with person-viewed as many times as wished. IG2:-Take Charge Session (TCS) one 80x minute individualised assessment with structured ADL designed to engage patient & family with a goals based workbook. IG3:-both IG1 & IG2. | Assessed 12 months post-randomisation. BP=no significant difference. Smoking rates-no significant difference. Physical performance-IG2 (TCS) the most effective, (p = 0.004), at 12 months mRS > 2 IG2 (TCS) the most effective (p = 0.02) at 12 months Rehabilitation involvement-IG2 the most effective at 12 months (p = 0.03). | Level 1, B |

Abbreviations: ACS=Activity card sort, BIS=Barthel Index Scale, CBT=cognitive behavioural therapy, CDSES=Chronic Disease Self Efficacy Scale, CHAMPS=Community Healthy Activities Model Program for Seniors, CPI=Community Participation indicators, ESRS=Essen Stroke Risk Score, FAI=Frenchay Activities Index, FSS=Fatigue Severity Scale, HPLPII=Health Promoting Lifestyle Profile II, IPAQ=International Physical Activity Questionnaire, LDL=Low Density Lipoprotein, MAS=Motor Assessment Scale, MI=Motivational Interviewing, MMAS =The Morisky Medication Adherence Scale, mRS=modified Rankin Score, NIHSS=National Institute of Health Stroke severity scale, PBSI=Preference-Based Stroke Index, Physical Component Summary of the Short Form 36 (SF-36), PPT=Physical performance Test, PSSES=Participation Strategies Self efficacy scale, RNL=Reintegration to Normal Living; SIS=Stroke Impact Scale, SMS=Short Message Service, SSEQ=Stroke Self-Efficacy Questionnaire.

from high to good quality. Only four studies evaluated the effectiveness of interventions for reducing risk.

Future research implications

The next step would be to trial a health promotion program using these combined interventions focussing on women after stroke. Further good quality, larger RCTs in this population are also needed.

Conclusion

Women are disproportionately affected by stroke and are often in the frail category. Tailored structured health promotion programs with family and caregiver support combined with a comprehensive reminder system through SMS would appear to enable women post-stroke.

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All authors in the manuscript have agreed for authorship, read and approved the manuscript and given consent for the submission and subsequent publication of the manuscript.

Guarantor

Julia Slark.


Contributorship

Conceptualization: K.T. B.L., J.S.; methodology, K.T. B.L., C.W., & L.N.; formal analysis, K.T. B.L., & J.S.; investigation K.T. B.L., & J.S.; resources, K.T. B.L., C.W., & L.N.

writing—original draft preparation writing KT. B.L., C.W., & J.S.; and revisions, KT. B.L., C.W., L.N. & J.S.; supervision, J.S. All authors have read and agreed to the published version of the manuscript.

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