



EAN/AFAN : 12 th Regional Teaching Course in sub-Saharan Africa

Post-stroke care for low resources setting

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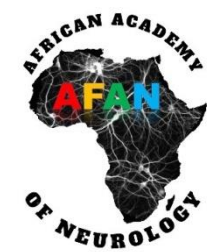
Executive Board Neurosonology research group WFN



Disclosure

- **Nothing to disclose**





Global, regional, and national burden of stroke, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016



GBD 2016 Stroke Collaborators*

Summary

Background Stroke is a leading cause of mortality and disability worldwide and the economic costs of treatment and post-stroke care are substantial. The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) provides a systematic, comparable method of quantifying health loss by disease, age, sex, year, and location to provide information to health systems and policy makers on more than 300 causes of disease and injury, including stroke. The results presented here are the estimates of burden due to overall stroke and ischaemic and haemorrhagic stroke from GBD 2016.

Methods We report estimates and corresponding uncertainty intervals (UIs), from 1990 to 2016, for incidence, prevalence, deaths, years of life lost (YLLs), years lived with disability (YLDs), and disability-adjusted life-years (DALYs). DALYs were generated by summing YLLs and YLDs. Cause-specific mortality was estimated using an ensemble modelling process with vital registration and verbal autopsy data as inputs. Non-fatal estimates were generated using Bayesian meta-regression incorporating data from registries, scientific literature, administrative records, and surveys. The Socio-demographic Index (SDI), a summary indicator generated using educational attainment, lagged distributed income, and total fertility rate, was used to group countries into quintiles.

Findings In 2016, there were 5·5 million (95% UI 5·3 to 5·7) deaths and 116·4 million (111·4 to 121·4) DALYs due to stroke. The global age-standardised mortality rate decreased by 36·2% (–39·3 to –33·6) from 1990 to 2016, with decreases in all SDI quintiles. Over the same period, the global age-standardised DALY rate declined by 34·2% (–37·2 to –31·5), also with decreases in all SDI quintiles. There were 13·7 million (12·7 to 14·7) new stroke cases in 2016. Global age-standardised incidence declined by 8·1% (–10·7 to –5·5) from 1990 to 2016 and decreased in all SDI quintiles except the middle SDI group. There were 80·1 million (74·1 to 86·3) prevalent cases of stroke globally in 2016; 41·1 million (38·0 to 44·3) in women and 39·0 million (36·1 to 42·1) in men.

Interpretation Although age-standardised mortality rates have decreased sharply from 1990 to 2016, the decrease in age-standardised incidence has been less steep, indicating that the burden of stroke is likely to remain high. Planned updates to future GBD iterations include generating separate estimates for subarachnoid haemorrhage and intracerebral haemorrhage, generating estimates of transient ischaemic attack, and including atrial fibrillation as a risk factor.



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Global Stroke Burden

- 80.1 Million prevalent cases , 13.7 Million new stroke cases , 5.5 Million deaths
- Recent stroke projections forecast a worldwide rise to 200 million disability adjusted life years lost per annum by 2030.
- **Stroke incidence and mortality in low to middle income countries have now exceeded those in high income countries (over 85% of stroke mortality worldwide) .**
- Urgent need to develop informative, accessible and cost-effective forms of support .

Lancet 2019

We are facing worldwide Pandemic of stroke



Sub-Saharan Africa



- Sub-Saharan Africa is home to nearly **one billion** people .
- There is **47** countries in sub-Saharan Africa, including :**6** central, **17** eastern, **6** Southern, and **18** Western .




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REVIEW PAPER

WILEY

The epidemiology of stroke in Africa: A systematic review of existing methods and new approaches

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Accurate epidemiological surveillance of the burden of stroke is direly needed to facilitate the development and evaluation of effective interventions in Africa. The authors therefore conducted a systematic review of the methodology of stroke epidemiological studies conducted in Africa from 1970 to 2017 using gold standard criteria obtained from landmark epidemiological publications. Of 1330 articles extracted, only 50



Stroke burden in Africa

- Age-standardized annual stroke incidence rate of up to **316** per 100,000 population
- Age-standardized prevalence rates of up to **981** per 100,000 in Africa.
- Stroke case fatality rates of up to **43%** in Africa.



Epidemiological transition

- Unchecked industrialization and a rise in many modifiable vascular disease risk factors.
- Smoking, harmful use of alcohol
- Physical inactivity
- Unhealthy diets resulting in an increased prevalence of hypertension, diabetes, and obesity
- Racial (? Genetic factors : gene – environment interactions)

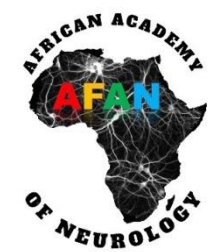


Stroke Care Phases

World Stroke Organization (WSO) Stroke Services Framework which consists of six phases of the continuum of stroke care:

- Systems for stroke recognition and response
- Hyper acute stroke care
- Acute inpatient care
- **Stroke rehabilitation**
- Secondary stroke prevention
- Longer-term stroke recovery.





Review



Stroke care in Africa: A systematic review of the literature

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Jeanne N Kagwiza², Olivia Wu⁵ and Peter Langhorne¹

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Abstract

Background: Appropriate systems of stroke care are important to manage the increasing death and disability associated with stroke in Africa. Information on existing stroke services in African countries is limited.

Aim: To describe the status of stroke care in Africa.

Summary of review: We undertook a systematic search of the published literature to identify recent (1 January 2006–20 June 2017) publications that described stroke care in any African country. Our initial search yielded 838 potential papers, of which 38 publications were eligible representing 14/54 African countries. Across the publications included for our review, the proportion of stroke patients reported to arrive at hospital within 3 h from stroke onset varied between 10% and 43%. The median time interval between stroke onset and hospital admission was 31 h. Poor awareness of stroke signs and symptoms, shortages of medical transportation, health care personnel, and stroke units, and the high cost of brain imaging, thrombolysis, and outpatient physiotherapy rehabilitation services were reported as major barriers to providing best-practice stroke care in Africa.





Table I. Availability of information reported by stroke care phase from the publications by year

WSO template	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Systems for stroke recognition and response	2	2	0	1	3	0	2	3	2	1	16
Hyperacute stroke care	1	1	0	0	1	2	1	2	2	1	11
Acute inpatient care	2	2	0	0	1	0	0	1	1	0	7
Stroke rehabilitation	0	1	0	0	1	2	0	1	0	2	7
Secondary stroke prevention	0	1	0	0	0	0	0	0	1	2	4
Longer-term stroke recovery	0	1	0	0	0	0	0	0	0	0	1



- The proportion of patients reported to receive inpatient physiotherapy rehabilitation was greatest in South Africa (98%) and smallest in Rwanda (40%)
- **Low attendance rates to outpatient physiotherapy rehabilitation :**
 - Lack of finances
 - Patient migration to other areas
 - living a long distance from the hospital
 - lack of continuity of care



Stroke Rehabilitation

- **In patient**
- **Home- Based Rehab**
- **Community-based programs**

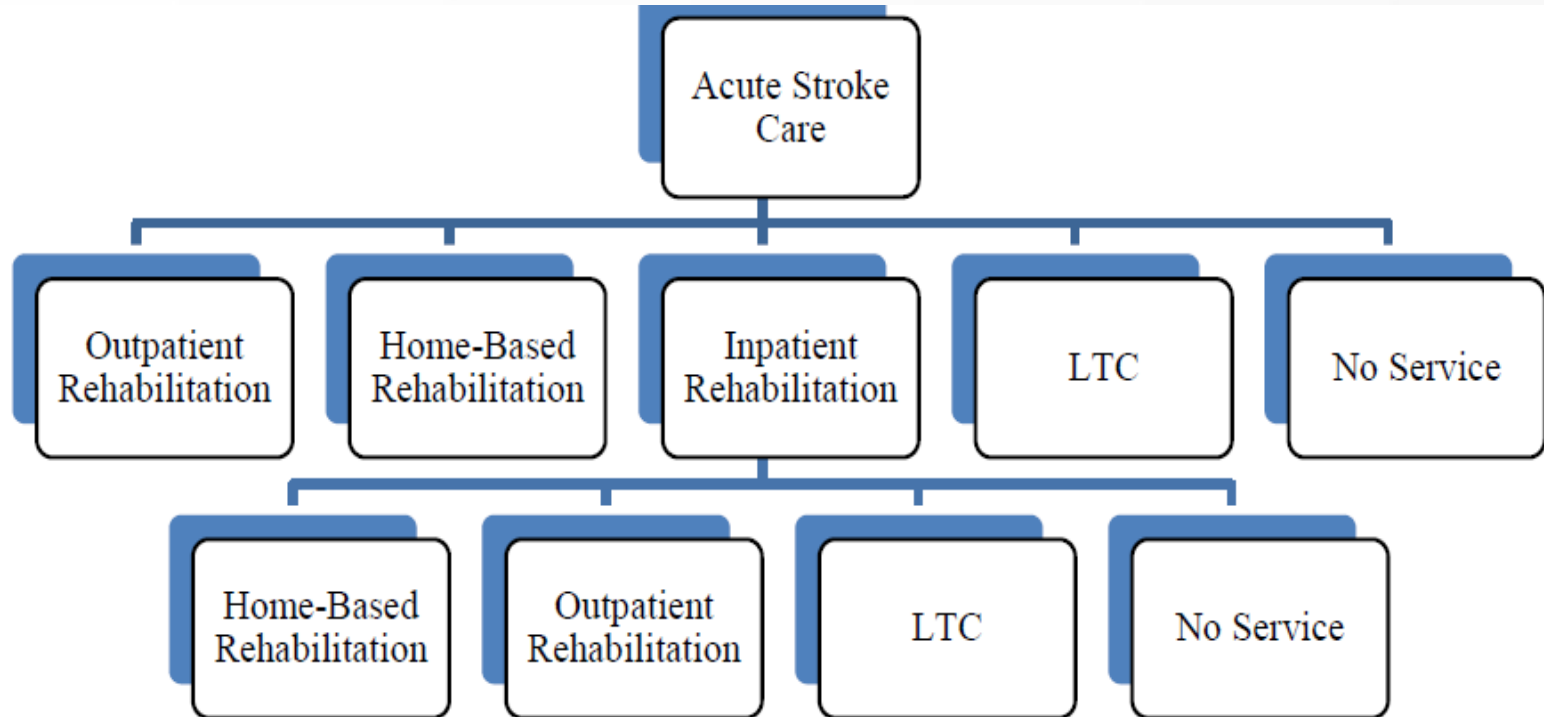


Stroke Rehabilitation

- **Physiotherapy:** facilitate the improvement of mobility and physical activity
- **Occupational therapy:** identification, engagement, and improved function in activities of daily living
- **Speech-language therapy:** the treatment of language, speech, voice and communication disorders
- **Therapeutic Recreational therapy:** the incorporation of recreation and leisure as essential components to improved quality of life
- **Registered Nurse:** provision of basic medical support and health education



Stroke Patient pathways



Barriers to Stroke Rehabilitation

- 1-Poor physician **knowledge**.
- 2-lack of **rehabilitation component** in the standard of care.
- 3-The **long interval** from stroke onset to admission to rehabilitation.
- 4-The infrequent, **unskilled**, and short-lived provision of rehabilitation care.
- 5-Inadequate public insurance or **financial support** for rehabilitation care.



Barriers to Stroke Rehabilitation

6-Transportation

7-Distance

8-Time constrains

9-Weather

10-Resources

11-The current stroke rehabilitation focuses on improving motor deficit; It ignores cognitive, emotional, and communicative skills.



What is the best model for stroke rehab in less wealthy areas?



Home or Hospital for Stroke Rehabilitation? Results of a Randomized Controlled Trial I: Health Outcomes at 6 Months

Craig Anderson, PhD; Sally Rubenach, MSocSc; Cliona Ni Mhurchu, PhD; Michael Clark, PhD; Carol Spencer, BAppSc (OT); Adrian Winsor, FAFRM

Background and Purpose—We wished to examine the effectiveness of an early hospital discharge and home-based rehabilitation scheme for patients with acute stroke.

Methods—This was a randomized, controlled trial comparing early hospital discharge and home-based rehabilitation with usual inpatient rehabilitation and follow-up care. The trial was carried out in 2 affiliated teaching hospitals in Adelaide, South Australia. Participants were 86 patients with acute stroke (mean age, 75 years) who were admitted to hospital and required rehabilitation. Forty-two patients received early hospital discharge and home-based rehabilitation (median duration, 5 weeks), and 44 patients continued with conventional rehabilitation care after randomization. The primary end point was self-reported general health status (SF-36) at 6 months after randomization. A variety of secondary outcome measures were also assessed.

Results—Overall, clinical outcomes for patients did not differ significantly between the groups at 6 months after randomization, but the total duration of hospital stay in the experimental group was significantly reduced (15 versus 30 days; $P < 0.001$). Caregivers among the home-based rehabilitation group had significantly lower mental health SF-36 scores (mean difference, 7 points).

Conclusions—A policy of early hospital discharge and home-based rehabilitation for patients with stroke can reduce the use of hospital rehabilitation beds without compromising clinical patient outcomes. However, there is a potential risk of poorer mental health on the part of caregivers. The choice of this management strategy may therefore depend on convenience and costs but also on further evaluations of the impact of stroke on caregivers. (*Stroke*. 2000;31:1024-1031.)

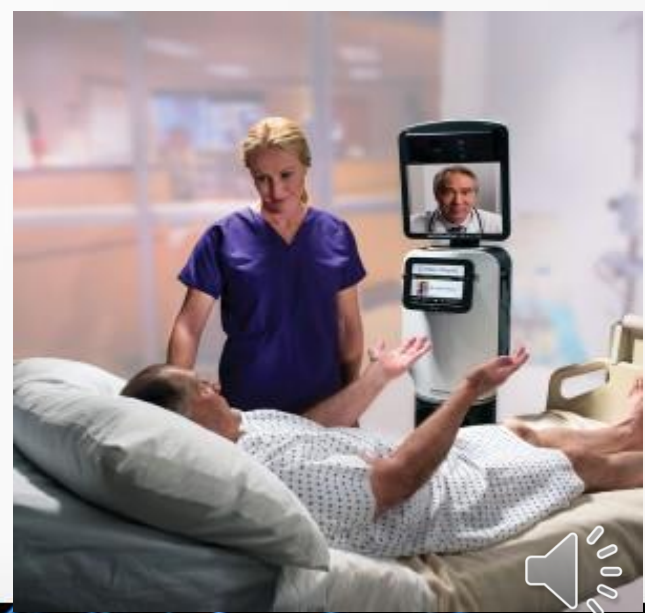
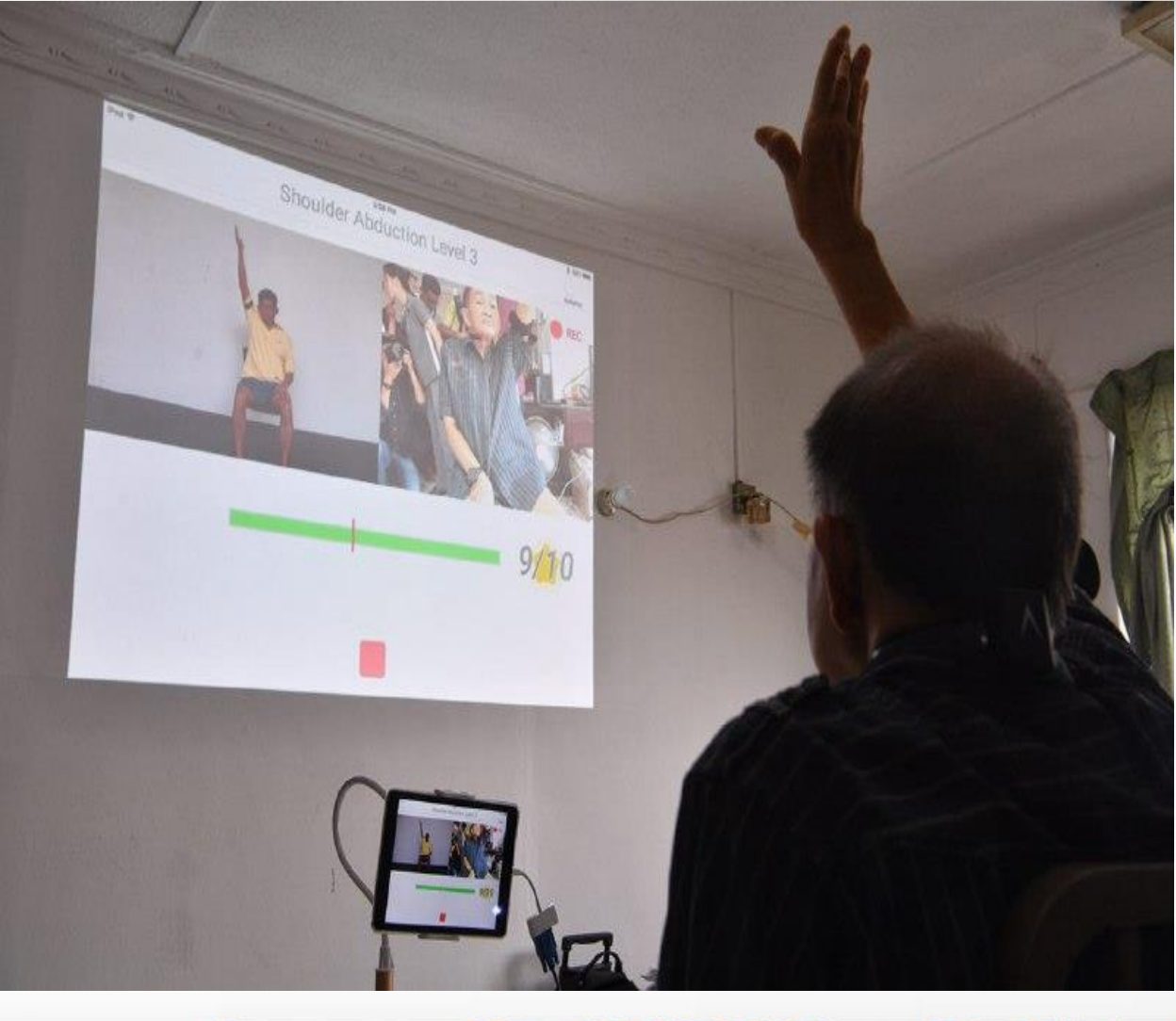
Key Words: caregivers ■ neuropsychological tests ■ randomized controlled trials ■ rehabilitation ■ stroke management

- The early hospital discharge and home-based rehabilitation scheme was less costly (\$8040) than conventional hospital rehab with community care (\$10,054) for patients with stroke.
- A policy of early hospital discharge and home-based rehabilitation for patients with stroke can reduce the use of hospital rehabilitation beds without compromising clinical patient outcomes.

(**Anderson et al, Stroke 2000**)

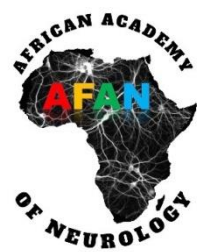


Tele-Rehabilitation





Telemedicine in post Stroke Rehabilitation



RESEARCH

Systematic review

► Telerehabilitation in stroke care – a systematic review

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Summary

We conducted a systematic review of telerehabilitation interventions in stroke care. The following databases were searched: Medline, Embase, DARE-NHSEED-HTA (INAHTA) and the Cochrane Library. Nine studies, all published after 2000, were included in the review. A wide variety of telemedicine interventions in post-stroke rehabilitation care was identified. Four studies had been carried out in the USA, two in the Netherlands, two in Italy and one in China. There were four randomized controlled trials and one qualitative analysis. Four studies used an observational study design/case series. Home-based telerehabilitation interventions showed promising results in improving the health of stroke patients and in supporting caregivers. Telemedicine systems based on a virtual environment for upper extremity exercise can improve the physical health of stroke patients. Health professionals and participants reported high levels of satisfaction and acceptance of telerehabilitation interventions. There was no evidence regarding the effects on resource utilization or cost-effectiveness. Most studies showed promising results, although overall, the quality of the evidence on telerehabilitation in post-stroke care was low.



Telemedicine in post Stroke Rehabilitation

Table 1 General characteristics of the studies reviewed

Author, year, country	Study design	Objective	Settings	Technology
Boter, 2004 ¹² Netherlands	RCT	To explore the effectiveness of a distant nursing care programme based on telephone contacts	Hospital and patients at home	Telephone consulting
Buckley, 2004 ¹¹ USA	Case series	To explore the receptiveness, use and acceptance of telehealth by caregivers of stroke patients in home setting	Hospital and patients at home	Videophone consulting
Grant, 2002 ⁹ USA	RCT	To quantify the impact of social problem-solving telephone partnerships on primary family caregiver of stroke survivors living at home	Hospital and patients with caregivers at home	Telephone consulting
Holden, 2007 ³ USA	Case series	To explore the effectiveness of a remote interactive virtual environmental-based telerehabilitation system	Hospital and patients at home	Virtual environment-based sensor motion system integrated with videoconsulting system
Huijgen, 2008 ¹³ Netherlands	RCT	To investigate the feasibility of a telerehabilitation intervention for arm/hand function training	Three hospitals and patients at home	A portable device that allows patients to extend rehabilitation treatment for their upper extremity. The system allows two-way video consulting
Lai, 2004 ⁴ China	Case series	To explore the feasibility of using videoconferencing for community-based stroke rehabilitation	Hospital and a community centre for seniors	Two-way audio-videoconsulting
Pierce, 2004 USA ¹⁰	Qualitative analysis	To explore the feasibility of providing Internet-based education and support to caregivers	Rehabilitation centre caregivers at home	Online care web platform. Internet access via television (WebTV)
Piron, 2004 ¹⁵ Italy	Case series	To explore the effectiveness of a virtual environmental-based telerehabilitation system for upper extremity training	Hospital and patients at home	Virtual environment-based motor telerehabilitation and videoconsulting system
Piron, 2009 ¹⁴ Italy	RCT	To explore the effectiveness of a virtual environmental-based telerehabilitation system for upper extremity training	Hospital and patients at home	Virtual environment-based motor telerehabilitation and videoconsulting system



Telemedicine in post Stroke Rehabilitation

- **The feasibility, effectiveness, cost-effectiveness and quality of tele-rehabilitation interventions in post-stroke care.**
- **The effect of post-stroke tele-rehabilitation initiatives on health outcomes, health-care processes, the use of health resources, and user/patient satisfaction and Acceptance.**
- **Six studies reported user and patient satisfaction of telemedicine interventions in stroke rehabilitation settings.**
- **Overall, participants, caregivers and health professionals were satisfied and accepted the use of telerehabilitation services**



Family-led rehabilitation after stroke in India (ATTEND): a randomised controlled trial



The ATTEND Collaborative Group*

Summary

Background Most people with stroke in India have no access to organised rehabilitation services. The effectiveness of training family members to provide stroke rehabilitation is uncertain. Our primary objective was to determine whether family-led stroke rehabilitation, initiated in hospital and continued at home, would be superior to usual care in a low-resource setting.

Methods The Family-led Rehabilitation after Stroke in India (ATTEND) trial was a prospectively randomised open trial with blinded endpoint done across 14 hospitals in India. Patients aged 18 years or older who had had a stroke within the past month, had residual disability and reasonable expectation of survival, and who had an informal family-nominated caregiver were randomly assigned to intervention or usual care by site coordinators using a secure web-based system with minimisation by site and stroke severity. The family members of participants in the intervention group received additional structured rehabilitation training—including information provision, joint goal setting, carer training, and task-specific training—that was started in hospital and continued at home for up to 2 months. The primary outcome was death or dependency at 6 months, defined by scores 3–6 on the modified Rankin scale (range, 0 [no symptoms] to 6 [death]) as assessed by masked observers. Analyses were by intention to treat. This trial is registered with Clinical Trials Registry-India (CTRI/2013/04/003557), Australian New Zealand Clinical Trials Registry (ACTRN12613000078752), and Universal Trial Number (U1111-1138-6707).

Findings Between Jan 13, 2014, and Feb 12, 2016, 1250 patients were randomly assigned to intervention (n=623) or control (n=627) groups. 32 patients were lost to follow-up (14 intervention, 19 control) and five patients withdrew (two intervention, three control). At 6 months, 285 (47%) of 607 patients in the intervention group and 287 (47%) of 605 controls were dead or dependent (odds ratio 0·98, 95% CI 0·78–1·23, p=0·87). 72 (12%) patients in the intervention group and 86 (14%) in the control group died (p=0·27), and we observed no difference in rehospitalisation (89 [14%] patients in the intervention group vs 82 [13%] in the control group; p=0·56). We also found no difference in total non-fatal events (112 events in 82 [13%] intervention patients vs 110 events in 79 [13%] control patients; p=0·80).

Interpretation Although task shifting is an attractive solution for health-care sustainability, our results do not support investment in new stroke rehabilitation services that shift tasks to family caregivers, unless new evidence emerges. A future avenue of research should be to investigate the effects of task shifting to health-care assistants or team-based community care.

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ATTEND STUDY

- ATTEND was a prospectively randomized open trial with blinded endpoint (PROBE) done across 14 hospitals in India.
- It involved training family members to provide a simplified version of evidence-based rehabilitation
- A written intervention guide was available for the coordinators and an intervention manual for the patient and caregiver
- The primary outcome was death or dependency at 6 months defined as 3-6score on MRS



ATTEND STUDY

mRS score: 0 1 2 3 4 5 6

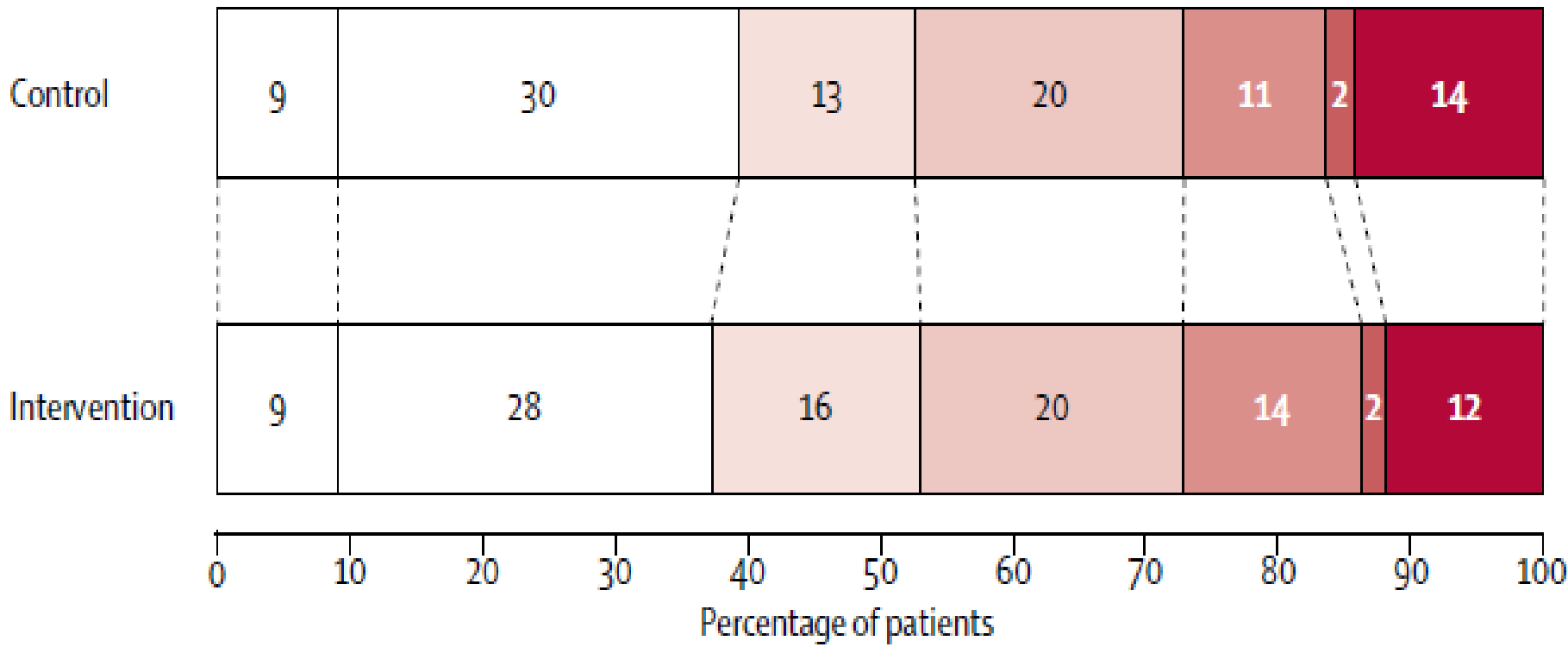


Figure 2: Patients achieving each mRS score at 6 months
mRS=modified Rankin Scale.

Attend collaborative group Lancet 2017

Stroke Self-Management and Rehabilitation Trial (SMART-DVD): An International, Multi-Site Pilot Trial

Special issue article

CLINICAL
REHABILITATION

Determining the feasibility and preliminary efficacy of a stroke instructional and educational DVD in a multinational context: a randomized controlled pilot study

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Objective:

To assess the feasibility of conducting a randomized controlled trial of an instructional and educational stroke DVD and determine the feasibility and preliminary efficacy of this intervention in a multinational context.



SMART Study design & Participants



SMART Collaborators Map:

-  Emory University, USA
-  Dalhousie University, Canada
-  University of Glasgow, UK
-  Cairo University, Egypt
-  India
 - * G.B.Pant, New Delhi
 - * Christian Medical College, Ludhiana
-  Sri Lanka
- Australia:**
 -  Griffith University
 -  Monash University
- New Zealand:**
 - * NISAN
 - * Waikato Hospital
 - * North Shore Hospital
 - * Palmerston North Hospital

- **Design:** Non-funded, international multicenter pilot randomized controlled trial of intervention versus usual care.
- **Participants:** Community-living adults up to three years post stroke with moderate to severe disability and their nominated informal caregivers.



Patient recruitment and study protocol

- 14 recruitment sites were established across eight countries.
- Recruitment was achieved at nine (64%) sites.
- 66 patients were recruitment over 16 months .
- Patients randomized to intervention (n = 34) and control (n = 32) groups.

Reasons for non-recruitment included:

- Administrative delays (ethics)
- Inadequate resourcing (non-funded trial)
- Non-English-speaking patients
- Clash with changing treatment guidelines

All other study processes successfully implemented at international level (localized randomization, intervention delivery, screening tests, baseline and follow-up assessments)



Intervention Group

- Role model observational learning tool DVD offering >40 care and rehabilitation techniques Based on best available evidence
- Features people from a variety of ethnic backgrounds
- Baseline assessment at 4 weeks – 9 months post-stroke
- Weekly Phone Assessments
- Two-month follow-up assessment



Intervention

Six Segments:

1. Understanding Stroke
2. Early Care and Hygiene
3. Rehabilitation Exercises
4. Moving Around
5. Coping with Stroke Aftermath
6. Experience of Caregivers



Usual Care Group

- Receive usual care
- No Weekly Phone Call
- Baseline Assessment
- Two-month follow-up assessment
- Option to access treatment DVD after participation in the trial has ended



Study Endpoints

- **Primary endpoint:** implementation of study processes at all sites
- **Secondary endpoints:** Process measures about benefits of the intervention, barriers to adherence, suggested improvements, and preliminary efficacy at 3-months



Primary Endpoint

Feasibility of setting up and running study centres.

Location	Total centres (N = 14)	Total participants (N = 68)	Recruiting sites, N (%)	Non-recruiting sites, N (%)	Reasons for non-recruitment
New Zealand	4	17	4 (100.00)	0 (0.00)	–
Australia	2	10	1 (50.00)	1 (50.00)	External delays in obtaining ethical approval
Nigeria	2	4	1 (50.00)	1 (50.00)	Predominantly non-English-speaking patients
India	2	8	1 (50.00)	1 (50.00)	Inadequate financial resourcing
The United Kingdom	1	0	0 (0.00)	1 (100.00)	Clash with changing treatment guidelines
Canada	1	18	1 (100.00)	0 (0.00)	–
The United States	1	11	1 (100.00)	0 (0.00)	–
Egypt	1	0	0 (0.00)	1 (100.00)	Inadequate financial resourcing

Clinical Rehabilitation, 2018

Feasibility of patient processes, by group

Patient process, n (%)	Intervention (n = 34)	Control (n = 32)
Acceptance of randomization	34 (100.00)	32 (100.00)
Request to withdrawal	0 (0.00)	0 (0.00)
Completed two-month follow-up	23 (67.65)	31 (96.87)
Lost to follow-up	11 (32.35)	1 (3.13)



Preliminary clinical efficacy

		Intervention ^a (n = 23)	Control ^a (n = 30)
Outcomes	Categories	N (%)	N (%)
Mobility (EQ-5D-5L)	No change	9 (39.13)	16 (53.33)
	Improvement	12 (52.17)	11 (36.67)
	Worse	2 (8.70)	3 (10.00)
Self-care (EQ-5D-5L)	No change	12 (52.17)	18 (60.00)
	Improvement	10 (43.48)	7 (23.33)
	Worse	1 (4.35)	5 (16.67)
Usual activities (EQ-5D-5L)	No change	9 (39.13)	13 (43.33)
	Improvement	13 (56.52)	13 (43.33)
	Worse	1 (4.35)	4 (13.33)
Pain/discomfort (EQ-5D-5L)	No change	10 (43.48)	14 (46.67)
	Improvement	7 (30.43)	12 (40.00)
	Worse	6 (26.09)	4 (13.33)
Anxiety/depression (EQ-5D-5L)	No change	18 (78.26)	19 (63.33)
	Improvement	1 (4.35)	6 (20.00)
	Worse	4 (17.39)	5 (16.67)
Disability (mRS) ^b	No change	8 (36.36)	8 (29.63)
	Improvement	13 (59.09)	17 (62.96)
	Worse	1 (4.55)	2 (7.41)
General health (GHQ-28) ^c	No change	0 (0.00)	0 (0.00)
	Improvement	16 (76.19)	21 (75.00)
	Worse	5 (23.81)	7 (25.00)
Depression (CES-D) ^d	No change	6 (26.09)	10 (37.04)
	Improvement	5 (21.74)	9 (33.33)
	Worse	12 (52.17)	8 (29.63)



Clinical messages from SMART-DVD

- An instructional and educational intervention focusing on common problems post stroke and delivered by DVD may be acceptable, with a range of benefits reported by stroke patients and/or their family caregivers.
- Instructional and educational interventions must be individualized to meet the needs, and learning preferences of stroke patients and their family caregivers.



Conclusion

- There are some attractive and equal alternatives for in hospital and community based stroke rehabilitation.
- Home-Based Rehabilitation is a feasible and cost-effective measure for stroke rehab and recovery in LMIC and improves outcomes, eliminates wait times, saves money
- Tele-Rehabilitation has significant improvement with acceptable level of satisfaction for both patient and caregiver
- An instructional and educational intervention focusing on common problems post stroke and delivered by DVD may be acceptable, with a range of benefits reported by stroke patients and/or their family caregivers.





STAY SAFE AND HEALTHY

