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# **Research Article**



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# UKMStrokIT: A web-based educational package tool for longer-term care of stroke patients: a pilot randomized controlled trial

Maisarah Z, Nik Nur AMR, Chan ZN, Ahmad TMJ, Reenjaniswari M, Saharuddin A and Aziz NA\*

Department of Family Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Centre, Malaysia

# Abstract

**Background and aims:** Stroke is a debilitating chronic illness in which patients' education and rehabilitation play major role in managing stroke patients in community. UKMStrokIT is a newly developed web-based educational intervention aiming to improve stroke knowledge, functional improvement and quality of life among stroke patients.

Materials and methods: A pilot randomized controlled trial involving a total of 30 patients were recruited from Primer Clinic and Physiotherapy Unit of Universiti Kebangsaan Malaysia Medical Centre (UKMMC). Face and content validation were conducted among experts and carer, with verbal response given to researchers. Patients were randomized to either control or intervention group using single blinded randomization technique with computer-generated random number. The control group received pamphlets and intervention group received three sets of videos. Pre and post assessments were done using Modified Barthel Index (MBI) questionnaire, Quality of Life Questionnaire and 25-item stroke knowledge questionnaire. Open-ended questions were included to assess participants' experiences using UKMStrokIT. Analyses were done using descriptive analysis and paired t-test. Intention-to-treat analysis approach was used.

**Results:** A total of 113 stroke patients were approached with 30 patients remained after exclusion criteria. For both MBI and QOL score, the degree of improvement was not statistically significant for video and control group. However, our results showed that there was a statistically significant improvement among video group (p=0.015) as compared to control group (p=0.592) for stroke knowledge score.

**Conclusion**: Video-based intervention seems to provide better understanding among stroke patient in the community compared to pamphlets. QOL and stroke knowledge showed improvement in both groups after getting some form of stroke knowledge, however it was more apparent in those received video-based intervention.

# Introduction

Stroke is widely recognized as an endpoint of cardiovascular risk factors namely hypertension, diabetes, dyslipidaemia, obesity and smoking [1]. It also associated with modifiable life-style behavior such as smoking, diet high in sodium and sugar-sweetened beverages, diet low in fiber, and increased alcohol consumption [2]. Globally, stroke is the second most common cause of deaths worldwide, after ischemic heart disease and it is the third most common cause of disabilities. Global Burden of Ischemic and Hemorrhagic Study done over the period of 1990 to 2013, reported of 25.7 million stroke survivors worldwide with developing countries showed a significant increase in both DALYs (Disability-adjusted Life Year) and mortalities in both ischemic and hemorrhagic stroke cases compared to developed countries [2]. In Malaysia, stroke is one of the top five leading causes of death after ischemic heart disease, septicemia, malignant neoplasms, and pneumonia. Since 2005, the percentage of deaths attributed to stroke in general hospitals has ranged from 6.6% to 8.4% [3].

Comprehensive stroke care can be referred as a continuous social and medical support to the stroke patient and their families until they can regain back their functions and re-integrate back into community [4]. The components of comprehensive stroke care may differ from regions and the availability of resources, nonetheless the core components comprises of primary prevention, acute stroke care, further rehabilitation, longer-term stroke care, and community reintegration [5]. Each segment requires professionals from different fields of expertise, but working together in a multi-disciplinary manner. For instance, the public health specialists mainly facilitate the overall stroke prevention programs in a district whilst physiotherapists and other rehabilitation clinicians commonly manage stroke patient's rehabilitation sessions. Concurrently, the continuous medical care and psychosocial needs of the patient and the family are managed simultaneously by the family medicine specialists. Hence, not only it involves a multidisciplinary approach but requires inter-disciplines communication as to ensure a comprehensive stroke care can be provided to the stroke survivors.

Continuous education to the survivors and families plays an important role in ensuring the success of the comprehensive stroke care. Several studies had looked into the roles of educational tool in longer-term stroke care management with various outcomes. Kim, *et al.* [6] studied the usage of web-based stroke education program

\*Correspondence to: Prof Dr Noor Azah Aziz, Department of Family Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Centre, Malaysia, Tel: 60193209306; E-mail: azah@ppukm.ukm.edu.my

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focusing on recurrence prevention behaviors among stroke patients. The video simulation intervention successfully improved the rate of fruit and vegetable consumption among subjects from 64.1% to 74.7% in the intervention group, and there was a significant difference in the rate of change between the two groups (P = 0.018). The findings demonstrated the feasibility and potentially effective intervention in terms of promoting lifestyle changes for stroke patients. Another study conducted in New Zealand using a DVD of inspirational stories and 'Take Charge Session' as method of self-directed rehabilitation. Positive findings from the study showed decreased dependence of stroke patients on others (Modified Rankin Score > 2) in 'Take Charge Session' intervention group (OR) 0.42, 95% CI 0.2 to 0.89, P = 0.023). 'Take Charge Session' intervention was also associated with better score on Carer Strain Index (-1.5 points, 95% CI -2.8 to -0.1, P = 0.034). This conclude that self-directed rehabilitation intervention may lead to a clinically significant improvement in health-related quality of life, reduced dependence of stroke patients on carer and improvement in the strain experienced by carers [7]. Nonetheless, both studies had looked into a piecemeal segments of the comprehensive stroke care which in turns justifiable as the longer-term stroke care is broad and complex. The educational tools were also based on the needs of the particular cohort populations.

Thus, our aim was to develop a web-based education for stroke patients in a Malaysian setting, and to assess whether it brings better improvement to enhancing patient's knowledge, lifestyle, physical activities and overall health. Our objective is to evaluate the impact of web-based education program that has been developed in this study (UKMStrokIT) on stroke knowledge, functional improvement and quality of life (QOL) by those using intervention as compared to standard care.

# Materials and methods

#### Study setting

This study was a single-blinded randomized controlled trial, comparing video based educational kit (UKMStrokIT) and conventional educational method used in the clinic. Subjects were recruited from patients who underwent follow-up at long-term stroke clinic of UKM Medical Centre Primary Care Clinic and outpatient physiotherapy unit in the UKM Medical Centre Kuala Lumpur Malaysia. The long-term stroke clinic is a specialized service for stroke patients and the carers who have been discharged for hospital follow up or who are referred from neurology, rehabilitation or private sector for continuing follow up. The outpatient physiotherapy unit caters for the post-discharged until two years' post-stroke patients.

## Participants

The inclusion criteria for this study were: (i) diagnosed with stroke at least 6 months or above with mild to moderate disabilities (recorded last 3 to 6 months Barthel Index of MBI more than or equal to 61), (ii) lived at home and not institutionalized, (iii) able to use smartphone or computer (patient or carer), (iv) have an access to internet and (v) able to understand Malay or English. Given the circumstance that patient was unable to use Internet or smartphone, but there was a designated carer to help, then the patient was too included in the study. The exclusion criteria were: (i) severe disability with MBI less than 61, (ii) was not willing to participate and patients with visual impairment, for example, cataract and diabetic retinopathy. Eligible patients were identified with the help of treating interdisciplinary team. Caregivers were required to have no notable disability and able to instruct patient for the video exercise. Potential participants from the Klinik Primer PPUKM Cheras and Physiotherapy Unit registry were identified using both the inclusion and exclusion criteria. Those shortlisted were contacted to explain about the study, and if patient was agreeable, informed consent was obtained.

#### Assessments and outcomes

Baseline assessments (pre-assessment) involved three sets of questionnaires, which were as follows:

(i) Modified Barthel Index to measure functional capabilities, consisting of 10 questions relating to activities of daily living (feeding, transferring from chair to bed, grooming, toilet use, bathing, mobility, using stairs, dressing, bowel control and bladder control).

Each domains was scored separately and the total points range from 0 to 100 [8].

- (ii) Stroke Specific Quality of Life Questionnaire to measure quality of life, consisting of 49 questions grouped in 12 domains (energy, family role, language, mobility, mood, personality, self-care, social role, thinking, memory, vision, upper extremities, work and productivity). Each domain was rated on 1 -5 Likert Scale, with scores range from 0 – 260 [9].
- (iii) Stroke Knowledge Questionnaire to measure stroke knowledge and risk factors for stroke, a locally developed questionnaire assessing knowledge of stroke warning signs and symptoms, risk factors for stroke, emergency telephone in Malaysia, treatment for stroke and source of information. All questions were assessed using fill in the blanks section which one (1) mark was given to correct answer [10].

#### Intervention

Participants were allocated into control and intervention groups using single blinded randomization technique (stratified into 1:1 ratio) by using the computer generated random number in the block of 6. Participants received conventional care and structured educational material as according to control and intervention group, respectively. Three sets of materials were sent to patients in the span of five weeks (sent every two-weekly) through WhatsApp messaging app. Outcome assessments (post-assessment) was then administered using the same set of questionnaires within a week after the end of intervention period. This was done via WhatsApp messaging app or through call, by a different researcher, whom was blinded to the group allocation.

Participants from the intervention group received a total of three facilitated, expert based educational videos covering the topics of (1) general knowledge on stroke, (2) physical exercises and (3) selfmanagement for stroke patients. The videos were developed from established materials including references from home-based taskoriented exercise training for stroke [11], UK NICE guidelines on stroke rehabilitation in adults [12] and HOPE: A Stroke Recovery Guide guidelines [13] were used. Content experts from each field were also consulted to assess the suitability of the videos including Family Medicine Consultants and nurse coordinators from the Long-Term Stroke Clinic, physiotherapists and patients' support group for stroke (KEKASIH). These videos were then face validated by carers not involved in the study to assess the suitability and appropriateness of the video. As for the control group, the patients received the usual standard care given by member of long-term stroke care during patient's follow up. These included verbal health education and pamphlets.

The patients or carers were given phone number for support system and technical help. Each videos was around 3 to 5 minutes duration, demonstrated with Bahasa Melayu and English subtitles. Patient and carer have repeated access to the videos once it was sent to them. The outcome measurement was done via phone or WhatsApp messaging app. The study was reviewed and approved by Research Ethics Committee of Pusat Perubatan Universiti Kebangsaan Malaysia. The participants were assured of their confidentiality prior to study. Informed written or verbal consent was obtained at the start of research.

#### Sample size & statistical analysis

The study was initially determined to have sample size of 74 (with 37 participants in each group), with SD of 9.9 and power of 0.8, and at the 5% significance level. However, due to participants' reluctance to commit to the study and difficulties with Internet and smartphone access resulted in only 30 participants being recruited. Intention to treat analysis approach was used. Statistical analysis was carried out using SPSS 21. Paired T-test was used to compare pre and post intervention score of the same group (both intervention and control groups).

# Results

### **Baseline characteristics**

A flow chart study of participants was shown in Figure 1. There were 150 stroke patients' data collectively obtained from Klinik Primer PPUKM Cheras and Physiotherapy Unit PPUKM, in which 90 stroke patients were shortlisted after screening, by which 30 stroke participants were recruited. However, four stroke participants (video group, n=3; control group, n=1) did not complete the questionnaire or dropped out from the study but were analysed using intention-to-treat analysis approach.

The mean age of the participants in video and control group were 59.4 (9.44) years and 60.2 (8.30) years respectively. The majority of participants were male (73.3%) and Malay (76.7%) in both groups. Detailed socio-demographic characteristics of participants are shown in Table 1.

# Differences within and between groups from baseline to follow-up

**Functional status:** There was 5.6% improvement in MBI scores within video group, and 2.4% for the control group. However these changes were statistically not significant video group: [Pre - 91.3 (15.98) vs. Post– 93.5 (10.76), p value – 0.529; control group: Pre – 92.1 (11.74) vs. Post – 92.0 (10.99), p value 0.975] (Figure 2). No significant difference was found between groups at the end of study period video group: 91.3 (15.98), control group: 92.0 (10.99); p value 0.308.

**Quality of life:** Both groups showed improvement after intervention with the video-intervention demonstrated a 10-points increase (180.4 to 190.53; p-value: 0.494) compared to only a 4-points increase in the control group (170.6 to 174.73; p-value: 0.543).Comparison between groups demonstrated that those allocated to intervention group had 9.4% higher in QoL score although statistically it was not significant (p: 0.308).

Knowledge on stroke: Both groups demonstrated an increased in score after intervention, with video-interventional group showed significant improvement of 4-points changes after intervention (14.67 to 18.27; p-value: 0.015) compared to control-group (16.73 to 17.53; p-value: 0.592). **Table 1.** Demographic characteristics of participants (n=30)

Characteristics		Means ± SD <sup>a</sup>	n (%)	P value	
Age, years					
	Video	$59.4 \pm 9.44$		0.807	
	Control	$60.2\pm8.30$			
Gender					
Male	Video		9 (60)		
	Control		13 (6.7)		
Female	Video		6(40)		
	Control		2 (13.3)		
Race					
Malay	Video		13 (86.7)		
Malay	Control		10 (66.7)		
Chinese	Video		2(13.3)		
	Control		4 (26.7)		
T. J	Video		0 (0)		
Indian	Control		1 (6.6)		
Stroke duration, y	/ears				
	Video	$2.2\pm2.07$		0.001	
	Control	$2.1 \pm 2.28$		0.901	

<sup>a</sup>Standard deviation

For QOL and knowledge scores, both assessments showed improvement after intervention in the video-intervention group compared to the control group. The data shown in Table 2 were translated into chart as below (Figure 2).

# Discussion

This paper focused on the effectiveness of video-intervention (UKMStrokIT) on three domains; namely stroke knowledge, functional status and quality of life, in comparison to control group. UKMStrokIT was developed as a form of engaging educational material, delivered via Internet, which was hoped to be more convenient for stroke patients. To our knowledge, this pilot project is the first to use comprehensive video intervention for stroke patients in the community. Previous literatures regarding video-intervention had looked into different individual components of stroke care namely acute stroke care [14], behavioural motivation (6) or physical exercise [15], which might not adequately cover all aspects of longer-term stroke care.

Based on our analysis, it was found that there is a statistically significant improvement (p: 0.015) in stroke knowledge for video group in comparison to control group. Moreover, the video intervention group showed 24.5% improvement post intervention compared to 4.78% in control group (p=0.592), which is five times more in video group than control group. This demonstrated the effectiveness of using multi-media medium in increasing patients' understanding in terms of symptoms of stroke, risk factors and emergency contact number compared when using pamphlet alone. Our hypothesis is that stroke patients and their caregivers are more receptive on using multi-media medium rather than the traditional paper and writing medium. This could be due to the reason that video is more interactive, interesting and hence able to re-enforce what has been learnt or taught during clinic consultation. The visual demonstration shown in the video could be understood more easily rather than from a reading material. Kim, et al. [4] study also showed improvement in patient's stroke knowledge for groups introduced to web-based education in comparison to control group, whereby patients' adherence to medication improved.

Although our numbers for both groups were small, but the results from knowledge and quality of life domains demonstrated both interesting and confirmative findings on earlier theory on







Figure 2. Comparing functional status, quality of life and stroke knowledge at baseline and post intervention between groups

Table 2. Pre and post-assessment comparison for video and control group

V		Mean ± SD	95%CI		P value
variables			Lower	Upper	
MBI		'		1	
Video group	Pre- assessment	$93.47 \pm 10.76$	87.51	99.43	0.520
	Post- assessment	$91.33 \pm 15.98$	82.49	100.18	0.529
Control group	Pre- assessment	$92.07 \pm 11.74$	85.57	98.57	0.075
	Post- assessment	$92.00 \pm 10.99$	85.92	98.08	0.975
QOL		· · · · ·			·
Video group	Pre- assessment	180.40	153.65	207.15	0.404
	Post- assessment	190.00	165.15	215.96	0.494
Control group	Pre- assessment	170.60	145.43	195.77	0.543
	Post- assessment	174.73	154.32	195.15	
Stroke knowledge		· · ·			
Video group	Pre- assessment	14.67	12.27	17.06	0.015
	Post- assessment	18.27	16.12	20.42	0.015
Control group	Pre- assessment	16.73	14.26	19.21	0.502
	Post- assessment	17.53	14.92	20.16	0.392

comprehension and reading abilities after stroke. It is widely acknowledged that people after stroke often experienced cognitive impairments in terms of short-term attention spans and memory loss, impaired ability to take in new information and difficulty in store previously learned information [16]. Leff AP [17] has also reinforced this fact by addressing the needs for stroke providers to recognize the possibility of stroke survivors experiencing reading impairment or 'acquired alexias' after stroke. Acquired alexia that occurs either alone (only reading) or often occurring as alexia with agraphia (together with hearing, speaking or writing) may explained the difficulties of stroke survivors trying to understand or retain the information given by stroke providers during their clinical consultations. Hence, there is a possibility that stroke survivors may find using pamphlets as educational material difficult, especially those with right brain lesions. Given the mean age of our patients of 59.9 and 60.2 years old respectively, many of them might already have other visual impairments such as myopia, cataracts and others; having to read small prints and comprehend the contents might be a daunting task for them. Thus, video-intervention might provide a better alternative in stroke education as the sounds and visual would be better received rather than texts alone.

On the other hand, there was no improvement for both video and control groups in term of functional outcomes. In this study, Modified Barthel Index was used as the outcome assessment, by which subjects were assessed at three weeks post-interventional period. The lack of changes in the MBI scores could be attributed to several factors. Firstly, our study involved respondents who have already beyond active rehabilitation phase (six months and above) hence most had reached plateau in the improvement of functional status, or having minimal changes that can only be assessed over longer period of time. Secondly, the small number of subjects might have resulted in insignificant cumulative changes of functional scores to evaluate the effect. In the review, it is reported that many interventional studies assessing functional status were beneficial to the patients in terms of functional improvement, however many lacked adequate time and small sample size to evaluate the effect, as in our study. In conclusion, although this study used only a small number of patients to assess the feasibility of using alternative video-based intervention as an educational tool for longer-term stroke patients in the community, the observed results are encouraging especially in improving knowledge and quality of life. This trial will also be a good foundation for future trials to assess the feasibility of video-intervention for stroke patients with alexia issues.

The strength of this study is this is the first local study that introduced video as a form of educational material for stroke patients. Furthermore, the content of the video suited for patient needs. The study design using structured methodology which is randomized controlled trial reduce chance of bias. Our study has several limitations. First, we have inadequate sample size that reduces by 50% of intended numbers. The sample size calculated for each arm was 37 subjects but sample size for this study is 15 subjects in each arm. This is due to patient withdrawal. There were several reasons for patient withdrawal namely, restriction of time on patient behalf, difficulty in assessing the materials given, and carer was unable to show and practice with patient in cases where patient depends heavily on carer.

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# Funding and conflicts of interest

No financial support and sponsor. There are no conflicts of interest.

# How does this paper make a difference to general practice?

- Video-based intervention can be used as a knowledge tool for stroke patients in the clinic or community.
- Video-based intervention can be applied in other chronic diseases that require complex consultation.

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