MEDICAL RESEARCH & ETHICS COMMITTEE
STUDY PROTOCOL

CAKNASTROK FOR STROKE CAREGIVERS IN MALAYSIA (CAKNASTROK): A FEASIBILITY CLUSTER RANDOMISED CONTROLLED TRIAL

NMRR ID	NMRR-24-01769-INT
Study type	Multicentre feasibility cluster randomised controlled trial
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Study population	Informal caregivers of stroke survivors
Study intervention	CaknaStrok Education Package (CEP) plus usual care
Comparator	Usual care

1. BACKGROUND AND RATIONALE

Stroke is a major cause of death and long-term disability. Stroke survivors with substantial functional dependence commonly require continuing assistance after hospital discharge, with a significant proportion of this care provided by family or informal caregivers. Caregivers may face difficulties in understanding stroke, providing daily care, supporting rehabilitation, managing medications and recognising complications, while also coping with emotional and practical demands.

Structured caregiver education and support may improve caregivers' knowledge, confidence and ability to manage stroke-related care. Mobile health technology provides an opportunity to extend caregiver education beyond the hospital and provide accessible information and support during the transition to home care. However, the feasibility of delivering a culturally tailored mobile health intervention together with a printed caregiver resource within routine Malaysian stroke services requires evaluation before a definitive effectiveness trial.

The CaknaStrok Education Package (CEP) was developed as a caregiver-centred educational intervention comprising the CaknaStrok mobile application and a printed caregiver guidebook. The package provides structured information and practical guidance relating to stroke caregiving, rehabilitation, nutrition, secondary prevention and caregiver self-care.

This Phase 3 study is designed as a feasibility cluster randomised controlled trial. The purpose is primarily to determine whether the trial procedures, recruitment, retention, intervention delivery and outcome assessment are feasible, and to obtain preliminary estimates of caregiver outcomes to inform the design of a future definitive trial.

2. STUDY OBJECTIVE

2.1 General Objective

To determine the feasibility of implementing the CaknaStrok Education Package among caregivers of stroke survivors in Malaysia and to obtain preliminary estimates of its potential effect on caregiver burden, quality of life and psychological well-being.

2.2 Specific Objectives

1. To determine the recruitment rate of eligible caregivers into the feasibility cluster randomised controlled trial.
2. To determine participant retention at Month 1, Month 2 and Month 3.
3. To determine the completion rate of the planned outcome measures at each assessment point.
4. To assess the feasibility of delivering the CaknaStrok Education Package to caregivers in participating hospitals.
5. To explore preliminary between-group changes in caregiver burden, quality of life and psychological well-being over three months.
6. To identify practical issues related to recruitment, intervention delivery, follow-up and outcome assessment that should be considered in a future definitive trial.

3. STUDY DESIGN

This is a multicentre, parallel-group, feasibility cluster randomised controlled trial. The hospital is the unit of randomisation. Six tertiary hospitals will participate, with three hospitals allocated to the intervention arm and three hospitals allocated to the usual-care control arm.

Participants will be recruited after cluster allocation and followed for three months. Outcomes will be assessed at baseline, Month 1, Month 2 and Month 3.

Cluster randomisation is used to minimise contamination because caregivers recruited within the same hospital may have contact with the same healthcare personnel and educational resources.

4. STUDY SETTING

The feasibility trial will be conducted in the following six tertiary hospitals:

- Hospital Sultanah Nur Zahirah (HSNZ), Terengganu
- Hospital Sungai Buloh (HSB), Selangor
- Hospital Sultanah Aminah (HSA), Johor
- Hospital Raja Perempuan Zainab II (HRPZ), Kelantan
- Hospital Seberang Jaya (HSJ), Penang
- Sarawak General Hospital (SGH), Sarawak

5. STUDY POPULATION

The study population comprises informal, unpaid caregivers of stroke survivors who are receiving care at the participating hospitals. The intended caregiver is a spouse, family member or relative who will provide ongoing care to the stroke survivor after discharge.

6. ELIGIBILITY CRITERIA

6.1 Inclusion Criteria

- Aged ≥18 years.
- Spouse, family member or relative of the stroke patient.
- Informal, unpaid caregiver of a patient diagnosed with acute stroke within 14 days of stroke onset.
- The stroke patient has a Modified Rankin Scale (mRS) score of 4–5.
- Present during the patient's hospital admission.
- No prior caregiving experience before the current stroke event.
- Residing at home with the stroke patient.

6.2 Exclusion Criteria

- Non-Malaysian/non-citizen.
- Maid, employee or paid caregiver.
- Unavailable during the study period or unable to complete the required follow-up.

7. SAMPLE SIZE

The planned sample size is 120 caregivers, with 60 participants allocated to the intervention arm and 60 to the usual-care control arm. The initial calculation using G*Power version 3.1.9.4 was based on repeated-measures within-between interaction for two groups across four measurement points (baseline, Month 1, Month 2 and Month 3), with α=0.05, 80% power and Cohen's d=0.35. The calculation produced 92 participants. Allowing for an anticipated 40% dropout by Month 3 resulted in a target of 120 caregivers.

Because randomisation is at hospital level, clustering was considered using six hospitals, approximately 20 caregivers per hospital and an assumed intracluster correlation coefficient of 0.01. The estimated design effect was 1.19, corresponding to an effective sample size of approximately 50 participants per arm. Recruitment is therefore planned at approximately 16–20 caregivers per hospital.

8. RANDOMISATION AND ALLOCATION

The six participating hospitals will be randomised in a 1:1 ratio to intervention or control. Randomisation will be performed at hospital level to minimise contamination between study arms.

The allocation will be balanced across the participating geographical and service settings. Three hospitals will be allocated to the intervention arm and three hospitals to the control arm.

Arm	Hospitals
Intervention	Hospital Sultanah Nur Zahirah; Hospital Sungai Buloh; Hospital Sultanah Aminah
Usual care	Hospital Raja Perempuan Zainab II; Hospital Seberang Jaya; Sarawak General Hospital

Participants will be analysed according to the allocation of their hospital cluster. Blinding of participants and site personnel is not feasible because the intervention involves access to a mobile application and printed educational material. Outcome assessment and statistical analysis will be blinded where feasible.

9. STUDY INTERVENTION

9.1 CaknaStrok Education Package

The intervention consists of the CaknaStrok Education Package (CEP), delivered in addition to usual care. The CEP combines the CaknaStrok mobile application with a printed caregiver guidebook.

9.2 CaknaStrok Mobile Application

The CaknaStrok mobile application is designed to support caregivers during the transition from hospital to home. The application is available in Malay, English and Mandarin and includes caregiving video guides, stress self-assessment, Barthel Index tracking, stroke-related resources and communication with the research team.

9.3 Printed Caregiver Guidebook

The printed CaknaStrok Caregiving Guidebook is provided in Bahasa Melayu. It contains six modules covering stroke knowledge, caregiving strategies, rehabilitation exercises, nutrition, secondary prevention and caregiver self-care.

9.4 Intervention Delivery

Caregivers in the intervention arm will receive a briefing and hands-on training on the CEP. The research team will assist with installation and orientation to the application and explain how to use the guidebook. The briefing and training may take up to one hour. Technical assistance will be provided when required.

Participants will continue to have access to the CEP at home for three months. Use of the intervention will not replace routine clinical care.

10. CONTROL GROUP – USUAL CARE

Participants in the control arm will receive usual care provided by the multidisciplinary stroke team during hospitalisation and at discharge. Usual care includes standard in-person caregiver education relating to post-stroke care, medication management, mobilisation assistance and follow-up plans. Education may be provided by relevant members of the multidisciplinary team, including doctors, nurses, physiotherapists, occupational therapists, pharmacists and dieticians.

The usual-care group will not receive the CaknaStrok Education Package during the three-month trial period. Where approved and operationally appropriate, access to the CEP may be offered after completion of the study.

11. STUDY PROCEDURES

11.1 Recruitment

Potentially eligible caregivers will be identified by the clinical/research team at the participating hospitals. Eligibility will be assessed against the prespecified criteria. The study will be explained to eligible caregivers and written informed consent obtained before study-specific procedures are undertaken.

11.2 Baseline Assessment

Following consent, baseline demographic and caregiving information will be collected. Participants will complete the baseline outcome measures before or at the start of the intervention according to the approved study workflow.

11.3 Follow-up

Participants will be followed for three months. Outcome assessments will be conducted at Month 1, Month 2 and Month 3. Reminders may be provided for scheduled assessments.

11.4 Assessment Schedule

Outcome/measure	Baseline	Month 1	Month 2	Month 3
MZBI	✓	✓	✓	✓
WHOQOL-BREF Malay	✓	✓	✓	✓
DASS-21	✓	✓	✓	✓
Recruitment/retention/completion	✓	✓	✓	✓
Intervention	✓	✓	✓	✓

delivery/engagement

12. OUTCOME MEASURES

12.1 Primary Feasibility Outcomes

- Recruitment rate: proportion of eligible caregivers who consent to participate, described overall and by site.
- Participant retention rate: proportion of enrolled caregivers completing scheduled follow-up at Months 1, 2 and 3.
- Outcome-measure completion rate: proportion of expected assessments completed for the planned outcome measures at each assessment point.

12.2 Secondary/Exploratory Outcomes

- Caregiver burden measured using the Malay Zarit Burden Interview (MZBI).
- Quality of life measured using the Malay WHOQOL-BREF.
- Psychological well-being measured using the Malay Depression Anxiety and Stress Scale-21 (DASS-21).
- Intervention delivery and engagement indicators, including training completion, application access and use of intervention components where available.

12.3 Measurement Instruments

The MZBI is a 22-item caregiver burden instrument, with each item scored from 0 to 4 and a total score ranging from 0 to 88; higher scores indicate greater caregiver burden.

The Malay WHOQOL-BREF comprises 26 items covering physical, psychological, social and environmental domains, with transformed domain scores interpreted such that higher scores indicate better quality of life.

The DASS-21 consists of Depression, Anxiety and Stress subscales and will be used to assess psychological symptoms.

13. STATISTICAL ANALYSIS PLAN

Statistical analyses will be performed using IBM SPSS Statistics. The analysis will distinguish feasibility outcomes from exploratory potential-effectiveness outcomes. As this is a feasibility trial with six clusters, interpretation will focus primarily on feasibility estimates, effect sizes and 95% confidence intervals rather than definitive evidence of effectiveness.

13.1 Analysis Populations

- Intention-to-treat population: all eligible enrolled caregivers analysed according to the allocation of their hospital cluster.
- Feasibility analysis population: participants contributing relevant recruitment, retention or outcome-completion information.
- Intervention-delivery population: participants allocated to the intervention arm for whom intervention delivery or engagement information is available.

13.2 Baseline Characteristics

Participant characteristics will be summarised by treatment arm and hospital cluster. Continuous variables will be presented using mean and standard deviation when approximately normally distributed or median and interquartile range when non-normally distributed. Categorical variables will be presented as frequencies and percentages.

13.3 Feasibility Analysis

- Recruitment rate will be calculated as the number of consented eligible participants divided by the number of eligible participants approached/identified, with site-specific summaries.
- Retention rate will be calculated at each follow-up point as the proportion of enrolled participants completing the scheduled assessment.
- Outcome completion will be summarised for each outcome measure at baseline and each follow-up point.
- Intervention delivery indicators will be summarised descriptively, including training completion, successful application access and available engagement indicators.
- Feasibility findings will be used to refine recruitment assumptions, retention strategies, intervention delivery procedures and outcome assessment procedures for a future definitive trial.

13.4 Analysis of Caregiver Outcomes

Longitudinal analyses will be conducted separately for caregiver burden, quality of life and psychological outcomes. Linear mixed models will be used where appropriate to account for repeated measurements within participants and clustering within hospitals.

The fixed effects will include treatment group, time and the treatment-group-by-time interaction. Hospital cluster and participant will be incorporated as random effects as appropriate to account for the clustered and repeated-measures design.

Effect estimates will be reported with 95% confidence intervals. Baseline covariates that are clinically relevant or materially imbalanced between groups may be included as adjustment variables.

13.5 Missing Data

The extent and pattern of missing data will be described. Mixed-model analyses will allow participants with incomplete repeated measurements to contribute available data under the missing-at-random assumption. Where appropriate, sensitivity analyses may be conducted using complete-case or alternative imputation approaches. Reasons for missing assessments and loss to follow-up will be documented where available.

13.6 Model Assumptions

Distributional assumptions and model diagnostics will be assessed. Where assumptions are substantially violated, appropriate transformations or alternative robust/non-parametric methods will be considered.

13.7 Statistical Significance

For exploratory inferential analyses, a two-sided p-value <0.05 will be considered statistically significant. Given the feasibility purpose of the study and the small number of clusters, p-values will not be interpreted in isolation; effect estimates and 95% confidence intervals will be emphasised.

No formal interim effectiveness analysis is planned.

14. DATA COLLECTION AND MANAGEMENT

Study data will be collected using study-specific case report/data collection forms and electronic questionnaires as applicable. Participants will be assigned unique study identification numbers. Identifying information will be kept separate from research data wherever feasible.

Electronic data will be stored in password-protected systems with access restricted to authorised study personnel. Hardcopy documents will be stored securely. Data quality checks will be performed before analysis.

15. RISK AND BENEFIT

15.1 Potential Risks

- Minimal physical risk is anticipated because the intervention is educational.
- Participants may experience temporary emotional discomfort when answering questions relating to caregiver burden, depression, anxiety or stress.
- Questionnaire completion may cause fatigue or inconvenience.
- Electronic intervention use may present a potential confidentiality/privacy risk.
- Participants may experience minor technical inconvenience when accessing the mobile application.

15.2 Potential Benefits

Intervention participants may benefit from structured information and practical guidance relating to stroke caregiving. Direct personal benefit cannot be guaranteed. The study may contribute to the development of improved caregiver support services and inform the design of a future definitive trial.

16. WITHDRAWAL

Participants may withdraw from the study at any time without providing a reason. Withdrawal will not affect their healthcare or relationship with the healthcare service. Where permitted, data already collected may be retained and analysed in accordance with the consent provided and applicable ethical requirements.

17. INFORMED CONSENT

Potential participants will receive a Participant Information Sheet explaining the study purpose, procedures, risks, benefits, confidentiality and voluntary nature of participation. Adequate opportunity will be provided for questions and consideration before written informed consent is obtained.

18. PRIVACY AND CONFIDENTIALITY

Participant names and identifying information will not be used in reports or publications. Study identification numbers will be used for research data. Access to identifiable information will be limited to authorised personnel. Any presentation or publication will report aggregate findings and will not identify individual participants.

Individual participant-level data are not planned to be routinely shared with other researchers. If data sharing is subsequently considered, only appropriately de-identified data will be considered and relevant ethical, institutional and regulatory requirements will be followed.

19. ETHICAL CONSIDERATIONS

The study will be conducted in accordance with the Declaration of Helsinki, Malaysian Good Clinical Practice requirements, applicable Medical Research & Ethics Committee (MREC) requirements and institutional policies. Participation is voluntary and participants may withdraw without penalty.

The control group will continue to receive usual care. The intervention is educational and is not intended to replace clinical management.

20. COMPENSATION / PARTICIPANT APPRECIATION

Participant appreciation and reimbursement will follow the arrangements approved for the study. The quantitative caregiver component provides RM70 for participation across the study assessments, and intervention-group caregivers receive RM50 for internet-data utilisation at the final follow-up, subject to the approved study arrangements.

21. STUDY DURATION

Each caregiver will participate for approximately three months following baseline assessment. The Phase 3 study was conducted during the approved study period ending in August 2025.

22. DISSEMINATION AND PUBLICATION

Study findings may be presented at scientific meetings and published in peer-reviewed journals. Individual participants will not be identifiable in any publication or presentation. Required permissions from the Ministry of Health Malaysia and other relevant authorities will be obtained where applicable.

23. PRINCIPAL INVESTIGATOR AND CONTACT

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APPENDIX 1 – STUDY FLOW

Hospital cluster selection and randomisation → Identification of eligible caregivers → Participant information and informed consent → Baseline assessment → Intervention + usual care OR usual care → Month 1 assessment → Month 2 assessment → Month 3 assessment → Data analysis → Feasibility assessment and recommendations for definitive trial.

DOCUMENT CONTROL NOTE: This protocol is intentionally restricted to Phase 3, the feasibility cluster randomised controlled trial. It does not describe the earlier qualitative needs assessment, mHealth acceptability study, or intervention development/validation phases. Before MREC submission, the protocol version/date, final site investigator list, exact compensation wording and any site-specific operational details should be checked against the approved NMRR/MREC documents.