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Conceptualization, Development and Implementation of a Model Physical and Cognitive Geriatric Rehabilitation Program among Community-Dwelling Older Adults in Nigeria: A Study Protocol

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Abstract

Geriatric rehabilitation provides older adults with opportunities to maintain functional independence, autonomy, and quality of life through structured physical and cognitive support. In Nigeria, community-dwelling older adults often encounter barriers to accessing rehabilitation services because of limited resources, highlighting the need for contextually appropriate and effective rehabilitation models. However, the conceptualization, development, and implementation of an integrated physical and cognitive geriatric rehabilitation program have not been empirically investigated among this population. This study protocol aims to present a comprehensive framework for designing, developing, and implementing a model physical and cognitive geriatric rehabilitation program for community-dwelling older adults in Nigeria. The study adopts an embedded mixed-methods approach comprising three sequential phases: a cross-sectional survey, a phenomenological inquiry, and a randomized controlled trial. Quantitative data will be analyzed using IBM SPSS version 25 through descriptive and inferential statistics, while frequencies and

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percentages will be used to summarize participants' sociodemographic characteristics. As a protocol, the study provides a structured methodological basis for examining the feasibility and potential effectiveness of a geriatric rehabilitation model tailored to the Nigerian context. The proposed program is expected to contribute to geriatric care by supporting evidence-informed rehabilitation practices that promote physical functioning, cognitive health, autonomy, and quality of life among older adults.

Keywords: Geriatric Rehabilitation; Community-Dwelling Older Adults; Cognitive Rehabilitation; Physical Rehabilitation; Study Protocol

INTRODUCTION

The trend of population ageing is occurring in both high-income countries (HIC) as well as low and middle-income countries (LMIC) (United Nations, 2020). By 2050, estimates suggest that older persons will constitute 21.5% of the global population, doubling from 12.3% in 2015 (WHO, 2015). In the near future, four out of every five older persons aged 60 and over globally will reside in LMIC (United Nations, 2019). Similarly, by 2030 older persons in the African region will rise to 105 million and up to 220 million by 2050 (Cadmus, Adebusoye, Owoaje, 2023).

Aging process is characterized by declining function, functional weakness, which predisposes older individuals to compromised health status, frailty, multiple functional declines, non-communicable diseases and disability-adjusted life (Santos, Petrica, Serrano, Batista and Honório, 2021). Older adults are prone to common clinical conditions of geriatric syndromes which do not fit into discrete disease categories (Noguchi et al, 2016). In Nigeria, the prevalence of co-morbidities among the older persons was 60.30 %, with hypertension ranked higher (64.8%), low back pain (42.2%), osteoarthritis (33.8%) and incontinence (0.1%) respectively (Kassim, Awotidebe, Akindele and Oyeyemi, 2024).

The common geriatric syndromes in primary healthcare encompass a range of conditions, including malnutrition, visual and hearing impairments, urinary incontinence impaired balance, gait, falls, polypharmacy and osteoporosis (Senn and Monod, 2015). Geriatric syndromes are multifaceted and they can individually or collectively impact quality of life in older adults (Tshitenge and Kebaabetsw, 2024; Kojima, Iliffe, Jivraj and Walters, 2016). Studies have reported the impact of frailty (Bulut, Soysal and Isik, 2018), functional

independence (Chttrakul, Siviroj, Sungkarat and Sapbamrer, 2020) cognitive impairment (Koc, 2014) and depression (Mohammed, Zaki and Mostafa, 2021Grover, Malhotra, 2015) on quality of life of older adults.

Geriatric rehabilitation (GR) enables older persons to have the opportunity for a more active and independent life, contributing to the maintenance of their autonomy and better quality of life (Cress et al., 2005). It is a care designed for the needs of older adults at risk of geriatric syndromes in a goal-oriented process that enables individuals to reach or maintain their optimal level of physical, cognitive, communicative, emotional and social competences (vanBalen et al., 2019). This care encompasses activities like exercise interventions, counseling and lifestyle modification, mostly provided in in-patient hospitals (Grund et al., 2020) and now beginning to focus on out-patient (by inter-professional team who work jointly to deliver person-centered care among older adults Achterberg, Cameron, Bauer and Schols, 2019).

Researchers and clinicians are becoming interested in structured geriatric rehabilitation as an approach for managing the consequences of geriatric syndromes; this is largely because of the aging needs and evidence for benefits of the intervention in older persons (McAuley et al., 2015). GR is mostly provided in inpatient hospitals or skilled nursing homes. However, GR is evolving internationally and is currently been offered at home, and in outpatient settings through a specialized multidisciplinary team (known as ambulatory or outpatient geriatric rehabilitation, OGR) (vanBalen et al, 2019). In Nigeria, rehabilitation service regarding the needs of older adults is under-prioritized within the national health care framework due to inadequate coverage under the National Health Insurance Authority (NHIA).

The NHIA currently provides only a minimal number of rehabilitation sessions often capped at five which are grossly inadequate to manage long-term. Importantly, these limited rehabilitation sessions were also limited to personnel of public and corporate agencies while majority were excluded. Hence, the rehabilitation needs of older adults are increasingly unmet due to this policy vacuum. Therefore, conceptualization, development and implementation of a model physical and cognitive Geriatric Rehabilitation program among community-dwelling older adults in Nigeria is critical to informing inclusive, context-specific and improving access to rehabilitation for Nigeria's aging population.

Objectives

The objectives of this protocol were:

1. To aassess the prevalence of geriatric syndromes such as frailty, functional performance, depression, and cognitive impairment among community-dwelling older adults. Thereby, identify their geriatric rehabilitation needs and accessibility to existing rehabilitation services
2. To explore the perspectives of physiotherapists regarding physical and cognitive geriatric rehabilitation, and to systematically review the existing literature on the effectiveness of physical and cognitive geriatric rehabilitation interventions for the development of a model physical and cognitive geriatric rehabilitation among community-dwelling older adults.
3. To implement the program through pilot testing in order to determine its preliminary effectiveness on frailty, functional performance, depression, cognitive impairment and quality of life among community-dwelling older adults.

METHODS

Design

The study design was an embedded mixed-method design that will consists of three phase studies in one, the studies are; cross-sectional survey, phenomenology and randomized controlled trial.

Data Collection Procedure

Prior to the commencement of the study informed consent was obtained from each of the participants. A preforma comprising of twelve items pertaining to socio-demographic, socioeconomic and anthropometric data (such as age, gender, marital status, level of education, occupation, and financial status, use of assistive device, weight, height and BMI) was administered to the participants. The height of the participants will be measured in meters using standometre. The weight of the participants will be measured using a bathroom weighing scale and was recorded to the nearest kilograms. Body Mass Index (BMI) of the participants was calculated using the formula weight (kg)/height (m^2), where a BMI of less than 18.5 was classified as underweight, 18.5 to <25 as normal, a BMI

of 25.0-29.9 will be classified as overweight while a BMI of 30 is classified as obesity (WHO, 1995).

Translation of the Data Collection Instrumentations

A translation of the questionnaires will be done in the languages department, Saadatu Rimi College of Education, Kumbotso Campus, Kano state. The sentences were translated forward and backward by the team of translators from both Hausa and English units of the department. Each translated questionnaire was tested in a pilot study to establish its content validity and internal consistency. The Hausa translated versions of Fried Frailty Phenotype (to assess frailty), Mini Mental State Examination (to assess mental health), Lawton Instrumental Activities of Daily Living (IADL) Scale (to assess functional performance) and WHOQOL-BREF (to assess QoL) was administered to the participants respectively.

Phase 1: Conceptualization of Physical and Cognitive Geriatric Rehabilitation Model

A community-based cross-sectional survey was conducted from 20th January, 2026 to 20th February, 2026. The ample size was calculated using the formula $N = Z^2 * P (1-P) / D^2$ (Daniel, 1999)

Where;

$Z=1.96$

P= prevalence of frailty among community-dwelling adults in Central Mahalapye Sub-District, Botswana.

P= (47.1%) (Tshitenge and Kebaabetswe, 2024).

P= 47.1/100 = 0.471;

D= 0.05 (precision error)

$N = Z^2 * P (1-P) / D^2$

$= (1.96)^2*0.471(1-0.684)/ (0.05)^2$

$=228.7.$

An attrition rate of 30% of 228.7 was added to the calculated sample size and the sample size will be 228.7 + 68.6 = 297.3 and this will be rounded up to the nearest whole number, and therefore, the sample size of the study will be 297.

The study employed a convenience sampling technique to select participants from the eight area districts of Dawakin Kudu local government. To enhance participants' recruitment and ensure broader coverage, snowballing was employed as a supplementary strategy. Initial respondent identified through convenience sampling were asked to refer to other eligible individuals within their network for inclusion into the study.

Data Analysis Procedure

Descriptive statistics in form of frequencies and percentages was used to summarize the socio-demographic information (age, gender, marital status, educational status, income level, religion, employment status, living status and purchasing needs) and prevalence of geriatric syndromes. Chi-square statistics was used to analyze the association between geriatric syndromes, demographics variables and anthropometric characteristics of the participants (weight, height and BMI). All statistical analysis were performed using SPPS version 25 at 95 % confidence interval.

Phase 2: Development of Physical and Cognitive Geriatric Rehabilitation Model

A model physical and cognitive geriatric rehabilitation program was developed using a multi-factorial approach to geriatric rehabilitation interventions on frailty, functional performance, mental health and quality of life. This approach was comprised of a systematic review of literature and qualitative study on physiotherapists respectively. A systematic literature review of relevant interventions to address frailty, functional performance, mental health and quality of life in older adults will be conducted, and insights were gained from the perspectives and experiences of physiotherapists involved in managing older adults with geriatric syndromes regarding their rehabilitation circumstances.

Step I: Systematic Review of Literature

The aim of this systematic review is to develop a geriatric rehabilitation intervention by assessing evidence on the effectiveness of a model physical and cognitive geriatric rehabilitation on quality of life in older adults with fall, frailty, declined functional performance and mental health.

Search Strategy

Databases PubMed, Google scholar, Medline, AJOAL and Embase will be systematically searched from January 2005 to date. This will be to identify English articles on the effectiveness of a model physical and cognitive geriatric rehabilitation on quality of

life in older adults with frailty, declined functional performance and mental health. The search strategy will be performed by the principal investigator (M. K) using the keywords comprising of "physical geriatric rehabilitation", "cognitive geriatric rehabilitation", "quality of life", "frailty", "functional performance", and "mental health". In this search strategy, keywords will be combined using MeSH terms using the Boolean operation "and."

Selection of Studies and Data Extraction

A data extraction form will be used to extract data on: study characteristics (authors, publication year, country, type of study, care setting, study population, and outcome measures); patient characteristics (mean age, rehabilitation setting); and description of the geriatric rehabilitation interventions. The title and abstracts of all potentially relevant studies will then screen by the principal investigator and the supervisor (M.K and A.W.A.) independently. Next, full texts will be obtained and will be review by the same authors. Studies that did not meet the inclusion criteria will be excluded.

Disagreements between the two authors will be discussed until a consensus is reached. If a disagreement could not be resolved, a third reviewer will be consulted. The quality of included studies will be assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al, 2018), which will allow quality assessment across different study designs. Quality assessment will be carried out by the principal instigator (M.K.), and 10% of the included studies will be selected at random and additionally assessed by the supervisor (A.W.A.) to check for the inter-rater reliability.

Data Analysis and Data Synthesis

Studies that reported outcomes related to effectiveness and included a control group will be presented using a harvest plot. In the harvest plot, geriatric syndromes and quality of life outcomes will be described and will be color coded based on the effectiveness of the geriatric rehabilitation. For each study, the bars in the harvest plot will indicate the total results for the geriatric rehabilitation interventions, and the height of the bars represented the methodical quality based on the MMAT. When a study reported multiple consistent results within the same geriatric rehabilitation intervention, the results will be combined in 1 bar. If a study reported conflicting results within the same geriatric rehabilitation intervention, both results will be presented.

Step II: Qualitative study on Physiotherapists

The aim of this qualitative study is to explore the perspectives of physiotherapists for the development of a model physical and cognitive geriatric rehabilitation intervention among older adults with frailty, declined functional performance and mental health. The research design of this step will be a phenomenology to explore the perceptions and experiences of physiotherapists for the development of a model physical and cognitive geriatric rehabilitation intervention among older adults with frailty, declined functional performance and mental health.

Data Collection Procedure

Prior to the commencement of the study, inquiries from the heads of the Department of Physiotherapy will be made to enable access to targeted physiotherapists based on the inclusion criteria. Sixteen participants as used in the study of Ritchie, Miller and Smiciklas-Wright (2005), will be enrolled for the study and data collection process will stop when the interview reached a data saturation. The participants will be enrolled using criterion-based approaches to purposive sampling. The qualitative data will be collected using a semi-structured interview (Britten, 1995) as contained in the interview guide.

A semi-structured questions-based interview guide for the use in the study was developed using the fourteen domains of the theoretical domains framework (TDF), in order to identify the barriers to and facilitators of access and implementation of geriatric rehabilitation among older persons. This development was based on a previous study on application of TDF to explore the barriers and facilitators of physical activity among university staff and students (Ndupu et al., 2023). The interview guide comprised of fourteen questions on the perceptions and experiences of the physiotherapists regarding the barriers and facilitators of development and implementation of geriatric rehabilitation among older persons. .

The interviews will be conducted one-on-one and in English language, the contents of these semi-structured interviews will be rooted in the 14-domains of the validated TDF version (Atkins et al, 2017). Each interview will last for between forty-five minutes to one hour. Throughout the interview process, notes will be recorded, behavioral patterns will be observed, and active listening skills will be used to ensure that the participants' story and what they will be telling me are understood. The data collected including recordings of the

interviews, behavior observations, notes sheets and Audio recordings will be immediately transcribed, deidentified, and subsequently saved in the digital audio recorder.

Data analysis procedure

The data will be analyzed via the six phases of thematic analysis as outlined in Braun and Clarke (Braun and Clarke, 2006).

- First, at the descriptive level, an inductive open coding approach will be deployed as there was no prior code list.
- Second, the transcripts will be read repeatedly to become conversant with the subjects and get a further understanding of the interview.
- Third, some seemingly relevant codes will be explored further before coding with SPSS.
- Fourth, concise labels (coding) will be given to data substantial to the overall research question, given the literal meaning of words and sentences and concepts derived from the data.
- Fifth, at the interpretative level, themes will be generated by pondering how clusters of codes related to the research question. Incorporating constant comparison, codes that will be connected by strong concepts will be organized into a coding tree of parent and child codes. Associations between the research question and the coding tree will be explored using a thematic map. Themes will be built by collating and determining the central message a group of relevancoded data or categories of interest implied, which will assume a concise and informative theme. To ensure rigor, my supervisor will review the themes for validity, correspondence with coded excerpts and the complete data set, the nature of each theme, and its relationship with other theme

Phase 3: Implementation of a Model Physical and Cognitive Geriatric Rehabilitation Program

The research design of this study will be a randomized controlled trial study to determine the effectiveness of a model physical and cognitive geriatric rehabilitation on frailty, functional performance, mental health and quality of life among community-dwelling older adults. This study will follow the guidelines of Consolidated Standards of

Reporting Trials (CONSORT) statement for reporting randomized trials (Schulz, Altman, Moher, 2010).

Inclusion Criteria of the participants

1. Older adults aged 60 years with frailty, decline functional performance and mental health
2. Participants must be conscious and oriented in people, place and time
3. Participants must declared voluntary consent
4. Participants must beable to understand instructions in Hausa
5. Participants those are able to come to the training location independently or with the support of their caregivers

Exclusion Criteria of the participants

1. Participants with visual and hearing impairments (self-reported or a visit to the hospital and/or physician's diagnosis)
2. Participants with fever, altered mental status, dizziness and unintended weight loss
3. Participants that are non-ambulant or suffer serious musculoskeletal problem eg severe back pain, severe neck pain, severe bilaterally knee osteoarthritis
4. Participants with upper limb amputation
5. Participants who are residents of geriatric homes

Sample Size and sampling technique

The sample size for the study will be 30 participants adopted from the study of el Hadouchi et al., (2023), a pilot and feasibility study on Power training in older adults. The intervention group will receive a model physical and cognitive geriatric rehabilitation while the control group will receive usual care. Therefore, both control and intervention groups will have equal allocation of 15 participants respectively. Random sampling technique will be use to allocate the participants into intervention and control group by random allocation and concealment.

The randomization with an allocation ratio of 1:1 using a computer-generated permuted block randomization sequence, with randomly selected block sizes of lengths 2 and 4, will be performed by a biostatistician who will not be involved in the assignment of

participants to groups. Participants' allocation sequence will be concealed in sequentially numbered, opaque, sealed envelopes. The allocation list will be stored in a safe deposit box in a central office in the study area. Neither principal researcher who will be enrolling participants nor research assistants will have influence on group allocation.

The research assistants will conduct the baseline assessments in the participant's home prior to randomization. The participants will be urged not to reveal their group allocation to the research assistants during follow-up assessments. All assessments of primary and secondary outcomes will be performed by assessors blinded to group allocation. The success of the research assistants' blinding will be recorded. Researcher conducting data entry and data analysis will be blinded to group allocation.

The research assistants will be selected from among community health workers from the study areas, this is because by virtue of their training and qualifications, they are aware of certain illness that affects older person and have basic knowledge on their medications. These individuals will undergo a 3-day extensive training on the geriatric rehabilitation module, exercise administration, exercise risks management and exercise screening and prescription which will be specifically tailored to the purpose of this study.

Data Collection procedure

A preforma comprising of twelve items pertaining to sociodemorgraphic, socioeconomic and anthropometric data (such as age, gender, marital status, level of education, occupation, and financial status, assistive device, weight, height and BMI). All participants in this study will undergo baseline evaluations to determine their conformity with the inclusion and exclusion criteria. Participants that comply with the criteria will further be assessed using the data collection instruments before and after the intervention period. A general assessment to be performed will comprise of the collection of socio-demographic data, anthropometric data, and presence of frailty, declined functional performance and mental health respectively.

The participants will receive a model physical and cognitive geriatric rehabilitation program, the intensity of the interventions will be based on what will be tolerated by the each participant as contained in the recommendations manual of the American College of Sports Medicine for exercise and physical activity with the older persons (Chodzko-Zajko et al, 2009). Another assessment will be carried out at the completion of the intervention;

the outcome of the intervention will be compared with the baseline outcome measures using statistical analysis.

Data analysis procedure

A Shapiro-Wilk test will also be used to test for normality of this data, because the data sample size is less than 30. Descriptive statistics inform of frequencies, percentages, means and standard deviations will be used to analyze the socio-demographic information (age, gender, marital status, educational status, income level, religion, employment status, living status and purchasing needs). If the distribution is normal, paired students t-test will be used to determine the mean difference between the QoL scores and geriatric rehabilitation continuous outcomes between the pre-test and post-test groups.

If the distribution is not normal, Wilcoxon-sign rank test will be used to determine the mean difference between the QoL scores and geriatric rehabilitation continuous outcomes between the pre-test and post-test groups. McNemar's test will be used to determine the mean difference between the QoL scores and geriatric rehabilitation categorical outcomes between the pre-test and post-test groups. All statistical analysis will be performed using SPPS version 25 at 95% confidence interval and a significance level of less than 0.05.

DISCUSSION

This study protocol will provide an insight of the conceptualization, development and implementation of a model physical and cognitive geriatric rehabilitation program among community-dwelling older adults in Nigeria. Nigeria has a vibrant pluralistic healthcare system; yet, geriatric care and rehabilitation services are mostly available in secondary and tertiary healthcare centers of most urban areas. In many rural and semi-urban areas in Nigeria, older adults tend to be deprived of geriatric rehabilitation services for varied reasons ranging from availability, affordability, and cultural congruence to accessibility, cost, and belief that these services are unusual.

Some older adults and their family members believed that aging is a natural process caused by advanced age and as such there is no need to offer rehabilitation services while at home or after discharge from conventional hospital. Some of these reasons have led to less patronage of the available rehabilitation services in Nigeria. In an era where the national

rehabilitation policy is at the berg of being domicile gradually to mainstream healthcare system, it is important to investigate and document the conceptualization, development and implementation of a model physical and cognitive geriatric rehabilitation program among community-dwelling older adults in this resource-constraint environment.

The study will provide information on the conceptualization, development and implementation of a model physical and cognitive geriatric rehabilitation program. It will explore the perceptions and experiences of physiotherapists who provided the rehabilitation services, review literature on available evidences of geriatric rehabilitation and develop a rehabilitation model. The study will also determine the outcomes of geriatric rehabilitation in Nigeria after 8-week follow-up. This study will inform clinical practice of geriatric rehabilitation in Nigeria and may improve older adults' management in rural and peri-urban settings.

CONCLUSION

The results will provide a comprehensive overview and insight into geriatric rehabilitation in Nigeria in terms of conceptualization, development and implementation, incorporating both physiotherapists and caregivers into geriatric rehabilitation journey. It will bring out the clinical and research implications of the current overview of the conceptualization, development and implementation of a model physical and cognitive geriatric rehabilitation program in Nigeria by gathering data from literature, health professionals and community-dwelling older adults.

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