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The effects of direct and indirect burden of care on the quality of life of end-stage renal disease (ESRD) patients and their caregivers: A mixed-method study protocol

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ABSTRACT

Introduction: The number of patients in Malaysia requiring dialysis is expected to rise substantially in the future due to aging population and rising prevalence of diabetes mellitus and hypertension. Hence, more individuals will be expected to adopt the caregiver role in the future. The upward trends of end-stage renal disease (ESRD) and caregiving for dialysis patients have imposed detrimental consequences on both the patients and their caregivers in terms of their psychological well-being and quality of life. Despite the current circumstances, there remains a dearth of study in Malaysia exploring the psychosocial factors specifically on the economic impacts of ESRD management.

Methods and analysis: This two-phase sequential explanatory mixed method design, incorporating a quantitative design in Phase 1 and a qualitative study in Phase 2, will be conducted in four governmental hospitals along with 10 other non-governmental organisations or private dialysis centres within the Klang Valley vicinity. Phase 1 consists of a cross-sectional survey in three main sections: demographic details, economic assessment, and psychological assessment will be conducted among 236 pairs of patient-caregiver dyad. 30 participants will be recruited in Phase 2 to undergo a focus group discussion. Participants will be recruited through referral from nephrologists or nurses in the nephrology unit. Descriptive statistics, Pearson correlation, one-way ANOVA and multiple regression analyses will be utilised for data analysis in Phase 1. Thematic analysis with open and axial coding will be employed in Phase 2 to determine the codes and themes elicited from the focus group discussion.

Ethics and dissemination: The National Medical Research and Ethics Committee (MREC) and the research ethics committee of Tuanku Muhriz UKM Chancellor's Hospital (HTCM) and University of Malaya Medical Centre (UMMC) have approved the proposed study. Findings will be published in peer-reviewed scientific journals and presented in national or international conferences with minimal anonymised data.

ARTICLE SUMMARY

Strengths and limitations of this study

- This study will be the first in Malaysia to utilise the sequential mixed method approach for examining the psychosocial factors and quality of life of both haemodialysis and peritoneal dialysis patients and their caregivers.
- The inclusion of both patients and caregivers in the study will serve to provide more comprehensive and holistic perspectives, regarding the management of ESRD in Malaysia.
- This research will scrutinise the financial and economic burden, as well as the complications involved in the management of ESRD, to provide a comprehensive finding on their impact on the quality of life of the participants.
- The study is restricted to within the Klang Valley vicinity; hence, the findings obtained may not apply to ESRD patients and caregivers located in other Malaysian states.
- The restricted dissemination of paper-and-pen or web-based questionnaires to within a population of participants who are able to communicate or read in the Malay language, may lead to the omission of unique perspectives from the non-Malay literate population.

Keywords: Burden of care, quality of life, end-stage renal disease (ERSD), patient, caregiver

INTRODUCTION

According to the Global Burden of Disease, chronic kidney disease (CKD) is ranked among the top 20 causes of death, and is currently a significant public health concern.[1] CKD is regarded as a high-stress illness due to the chronicity of the disease, as well as the long-term treatment required,[1] where end-stage renal disease (ESRD) is considered the last stages of CKD.[2] In Malaysia, the incidence and prevalence of patients with ESRD have been on an upward trend for the past 20 years.[3] The number of Malaysians with CKD is projected to significantly increase in the future, due to the ageing population and the increasing prevalence of diabetes mellitus (DM) and hypertension. It has been established that CKD is profoundly associated to DM and hypertension.[2] In 2018, the 24th Report of the Malaysia Dialysis and Transplant Registry revealed that over the preceding 10 years, the acceptance rates for both haemodialysis (HD) and peritoneal dialysis (PD) have nearly doubled, while the prevalence rate has increased by more than two-fold. A total of 39,711 patients received dialysis treatment in 2016, with 35,781 and 3930 patients on HD and PD respectively. Meanwhile, the prevalence rate of HD and PD stood at 1159 per million population, and 127 per million population respectively.[4] If the present trend remains unchecked, it can be anticipated that by 2040, there will be more than 106,000 Malaysian ESRD patients requiring dialysis. With this projected prevalence, the cost, with regards to the health care system, is estimated to be RM 3.21 billion.[3]

It is to be expected that with the rising number of renal failure patients,[5] more individuals will adopt the caregiver role in the future. The caregiver of a patient refers to those who are actively involved in helping patients cope and manage their chronic illness during the course of their treatment.[6] The incidence and prevalence of ESRD give rise to negative effects on the psychological well-being of both ESRD patients and their caregivers,[7-11] as well as their quality of life.[12,13] In comparison to their caregivers, ESRD patients are more prone to depression, and a lower quality of physical and psychological well-being.[10] According to Goh and Griva,[9] the prevalence of depression among ESRD patients was estimated to be around 20% to 30%, whereas their anxiety ranged between 12% and 52%. The contributing factors toward the lower quality of life among dialysis patients have been identified as the increasing prevalence of depression, anxiety, and suicidal ideation.[14] On the other hand, caregivers for patients (especially those under dialysis treatment) are subjected to a great workload, as they shoulder most of the responsibilities.[7] Caring for ESRD patients often involve great physical, emotional, and economic demands.[15] It has been established that compared to individuals who are not caregivers, caregivers of chronic patients are four times more likely to be diagnosed with depression, and three times more likely to seek help for anxiety issues.[16] Also, caregivers for dialysis patients are reported to have a lower quality of life, compared to caregivers for non-dialysis patients.[13]

Despite the current situation, there remains a dearth of research on the psychosocial factors and the economic impact of ESRD on the patients and caregivers in Malaysia. Studies focusing on the well-being of Malaysia's ESRD patients are sorely lacking, and in the case of caregivers, almost non-existent. Therefore, there is a need for further investigations in this area, particularly with regards to the patients' and caregivers' quality of life, the care burden, as well as issues related to depression, anxiety, the coping mechanism, and social support. Another neglected area has to do with the financial and economic sustainability required by ESRD patients and caregivers, with regards to the management of the disease. To the best of our knowledge, thus far, no studies have been conducted in the Southeast Asian region on the economic costs incurred by ESRD patients and their caregivers. In view of this situation, this study delves into the impact of the psychosocial factors and burden of care on the quality of life of ESRD patients and their caregivers.

Study Objectives

Phase 1 of this study focuses on the following objectives:

1. To investigate the relationship between psychosocial factors (depression, anxiety, coping strategies, social support, care burden, economic burden) and quality of life, with regards to caregivers and patients with ESRD.
2. To compare the psychosocial factors and quality of life between haemodialysis patients and their caregivers with peritoneal dialysis patients and their caregivers.
3. To determine the predictors (demographic, psychosocial and socioeconomic factors), that can lead to quality-of-life improvement among caregivers and patients with ESRD.

Phase 2 of this study focuses on the following objective:

1. To explore the perceptions of ESRD patients and their caregivers, with regards to the impact of the economic burden they have to endure, on their quality of life.

METHODS AND ANALYSIS

Design and methods

Phase 1 of this undertaking involves the use of a sequential explanatory mixed methods design with quantitative data collection, while Phase 2 involves a qualitative study.[17] In Phase 1, the researchers will conduct a cross-sectional survey study among ESRD patients and their caregivers. A cross-sectional approach is preferred, as this approach is time-saving, in terms of questionnaire distribution and information collection from a sizeable number of participants.[18] Meanwhile in Phase 2, a qualitative study involving focus group discussions will be conducted among the ESRD patients and their caregivers. The focus group discussion approach can give rise to a fruitful and in-depth understanding of an individual's experiences and perceptions towards a certain phenomenon.[19] Furthermore, in comparison to individual interviews with participants, focus groups have the tendency to provide more ideas and information.[20] Focus group discussions allow participants to consider and share their perspectives regarding the economic burden they take on when it comes to ESRD management, as well as the impact of this illness on their quality of life. For this undertaking, a sequential explanatory design is used to substantiate the findings from the quantitative study by providing supporting evidence from the qualitative study findings.[21] The data findings from the quantitative and qualitative studies will be integrated to provide a holistic insight into the psychosocial factors and quality of life experienced by ESRD patients and their caregivers undergoing different treatment modalities.

Study setting

The investigation will be conducted in the nephrology unit of the Tuanku Muhriz UKM Chancellor's Hospital (HTCM), Selayang Hospital (HSEL), Kuala Lumpur Hospital (HKL), and the University of Malaya Medical Centre (UMMC), along with ten other non-governmental organisation (NGO) or private dialysis centres in the Klang Valley.

Patient and public involvement

One patient, one caregiver, one health psychologist, and two formal care providers (namely a nephrologist and a dialysis nurse) will be recruited to form the advisory committee. This committee will be tasked with reviewing the protocol, as well as structuring the interview schedule and questionnaire to provide the design for the study. During the course of this undertaking, the advisory committee will also be referred to for advice and feedback, whenever necessary.

Participants and recruitment

Participating ESRD patients will be recruited through referrals from nephrologists, or nurses in the nephrology units, while the caregivers will be recruited through referrals from the ESRD patients themselves. This sampling method will ensure that data accumulation from the participants is effective, efficient, and cost-effective.[22] ESRD-diagnosed patients, eligible for participation in this study, need to be above 18 years of age, and currently receiving treatment in a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. It is also essential that the participants are able to communicate and read in Bahasa Malaysia, the national language of Malaysia. Patients exhibiting severe mental illness, or those who have undergone a kidney transplant, will be excluded from the study. As for the recruitment of caregivers, it is essential that they be above 18 years of age, and are verified as the family caregiver of an ESRD patient currently undergoing dialysis treatment in a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. It is also required that the caregiver has undergone the experience of accompanying the ESRD patient for dialysis treatment at least once, and is able to read as well as communicate in Bahasa Malaysia. Formal caregivers, caregivers of patients who have undergone a kidney transplant, or caregivers of patients exhibiting severe mental illness symptoms, will be excluded from the study.

Sample size

Phase 1: Quantitative study

The calculation for the proposed quantitative study sample size is based on the multiple linear regression formula by Tabachnick and Fidell,[23] which is expressed as $N > 50+8m$, where m is the number of predictors. Based on this formula, the recommended number of participants is 98 pairs of patients and caregivers. Taking into consideration the drop-out rate, unresponsive surveys, and incomplete submission of data by participants, the sample size for this undertaking will be increased by 20%.[24,25] Consequently, 118 pairs of haemodialysis patients-caregivers and 118 pairs of peritoneal dialysis patients-caregivers (N=236 pairs) will be recruited for the quantitative study.

Phase 2: Qualitative study

For the qualitative study, the researchers will conduct six focus group discussions, with each group comprising five participants.[26-28] Hence, 30 participants (15 patients and 15 caregivers) will be involved in the focus group discussion, or until data saturation is deemed achieved. This process is typical for qualitative studies, whereby the emphasis is on the arrival at saturation point. The saturation point is arrived at when no new information, ideas or themes are forthcoming from the participants.[29]

Instruments

Phase 1: Quantitative study

The web-based or paper-based questionnaire to be distributed to the participants consists of three sections: demographic sheet, economic assessment and psychological assessment. The demographic information of ESRD patients and caregivers, which will be collected through the questionnaire, covering age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, CKD staging, method of dialysis, duration of dialysis, frequency of dialysis, frequency of hospital follow-up, frequency of hospitalisation, and duration of care extended by caregivers. Economic assessment, the second section of the questionnaire, covers the participants' source of funding, direct monthly cost, indirect weekly cost (time), and perceived economic/ financial burden.

Psychological assessment, the final section of the questionnaire, consists of six scales. However, the coping strategy scale and the burden of care scale differs between patients and caregivers. The coping behaviour among the ESRD patients will be evaluated by the Malay version of Brief Coping Orientation to Problems Experienced (Brief-COPE) inventory. The inventory comprises 28 items with 14 dimensions: self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame.[30] The Malay version of Brief-COPE, validated through Malaysian breast cancer women patients, is reported to have good internal consistency (α=.51 to .99).[31] Meanwhile, the Caregiver Cope (Cg Cope) questionnaire, developed by Ibrahim and colleagues [32] will be used to assess the coping strategies employed by caregivers of ESRD patients. This questionnaire consists of 19 items with six domains of coping strategies. Namely, these domains are distraction, caring for patient, venting, religion, recreation, and social support. Participants will rate based on the 5-point Likert scale (1 = I have never done this, 5 = I do this very frequently). The validation study conducted among caregivers of schizophrenia patients in Malaysia yielded Cronbach's alpha values ranging between .54 and .82.[32]

In order to assess their perception of the care burden on their caregivers, the Self-Perceived Burden Scale (SPBS) will be distributed to the ESRD.[33] The SPBS, which consists of 10-items, is rated by way of a 5-point Likert scale (1 = Not at all, 5 = All of the time). The Malay translated 10-item SPBS utilised in Ting et al.'s study[34] revealed this scale to be valid and reliable for urology cancer patients (α=.99). As for the caregiver burden, this will be examined by the 22-item Zarit Burden Interview (ZBI).[35] Participants will rate their burden on a 5-point Likert scale (0 = Rarely, 4 = Nearly always). In Malaysia, the Malay version of ZBI (MZBI) was validated through family caregivers to cancer patients, with the scale delivering a high internal consistency (α=.89).[36]

The 19-item Medical Outcome Study (MOS) Social Support Survey developed by Sherbourne and Stewart[37] will be used to examine the participants' perception of social support. This brief, multidimensional, self-administered scale, rated with the use of a 5-point Likert scale (1 = None at all, 5 = Available at all times), measures four categories of social support: informational, instrumental, positive social interactions, and affectionate support. In Malaysia, the Malay version of the MOS Social Support survey was validated through a sample of HIV patients. This Malay version of the survey portrayed good psychometric properties, with high Cronbach's alpha for all the subscales (α >.87) and for the overall scale (α =.96).[38]

The General Anxiety Disorder-7 (GAD-7), a screening tool and severity indicator developed by Spitzer et al,[39] will be used to assess the generalised anxiety disorder among the participants. The scale contains 7 items, and is rated with the use of the 4-point Likert scale (0 = Not at all, 3 = Nearly every day). The Malay version of GAD-7, validated through female patients in a government-funded primary care clinic, delivered good internal consistency reliability (α =.74).[40] The participants' severity of depression will be assessed through the Patient Health Questionnaire-9 (PHQ-9).[41] The PHQ-9 consists of 9 items and is rated using the 4-point Likert scale (0 = Not at all, 3 = Nearly every day). In Malaysia, the questionnaire was validated through female patients in a primary care clinic, and the Malay version of PHQ-9 showed good internal reliability (α =.70).[42]

The 36-item Short Form Survey (SF-36) will be utilised to assess the health-related quality of life of the participants. The SF-36 consists of eight subscales, measuring different domains of health-related quality of life. Namely, these subscales are physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). Also, two component scores are derived from the eight subscales. These are the physical component summary (PCS), which consists of PF, RP, BP, and GH, as well as the mental component summary (MCS), which consists of VT, SF, RE, and MH.[43] The Malay version of SF-36, validated through post-coronary artery bypass grafting surgery (CABG) patients, delivered good internal consistency reliability, with Cronbach's alpha values ranging from .73 to .90 for the subscales.[44]

Phase 2: Qualitative study

A focus group discussion schedule will be developed, based on a literature review and expert input by nephrologists in the research team. The questions for the focus group discussion will be tailored to elicit responses from ESRD patients and caregivers regarding the economic burden they shoulder and its effect on their quality of life. The focus group discussion will be divided into six sections: demographic details, source of ESRD treatment funding, direct costs of ESRD management, indirect costs of ESRD management, economic burden experienced by them, and lastly, their perception of quality of life.

Data collection

Phase 1: Quantitative study

Conventional paper-and-pencil/web-based questionnaires will be utilised. Potential participants, identified through referrals from nephrologists or nurses in the nephrology units, will be approached for recruitment during their dialysis treatments in the respective hospital/dialysis centre. Potential caregiver participants can be approached while they are waiting for their patients' treatment to be completed. For the caregivers who are not present during the patients' treatment, the researchers will call them up, or meet up with them during the patients' next treatment in the respective hospitals/dialysis centres. The recruitment process progresses with the researcher briefing the caregiver and patient on the aims and procedures of the study. Potential participants who respond in the affirmative, with regards to whether he/she has been previously diagnosed with severe mental illness, will be excluded from the study. Potential participants will be given ample time to consider their involvement in the study. Upon receiving their consent, the participants will be provided with a questionnaire, which can be filled out in approximately 30 minutes. The researchers will entertain any questions the participants may have regarding the questionnaire. The completed questionnaires will be kept securely for the data analysis process. Subject withdrawal criteria include a whereby the participant voluntarily withdraws his/her consent to participate in the study, or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention during the course of the survey, or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. As the sample size calculation takes into consideration the participant drop-out rate, participants who withdraw from the study will not be replaced.

Phase 2: Qualitative study

Potential participants will be approached either during their hospital/dialysis centre visitation or at an appointed time most convenient to them. The researchers will provide the caregivers and patients a briefing on the aims and procedures of the study. Potential participants who respond in the affirmative with regards to whether he/she has been previously diagnosed with severe mental illness will be excluded from the study. Participants will be given sufficient time to consider their participation in the focus group discussion. The discussion will be held at a designated date, time, and venue decided by the researchers and the discussion is anticipated to go on for an hour. The discussions will be recorded and data will be transcribed verbatim, after which the recording will be deleted, in keeping with established ethical standards. Subject withdrawal criteria include a situation whereby the participant voluntarily withdraws his/her consent to participate in this study, or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention during the course of the survey or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. The arrival at data saturation point is not affected by the withdrawal of a participant(s) who will not be replaced.

Data analysis

Phase 1: Quantitative study

IBM Statistical Package for the Social Sciences (SPSS) software for Windows, version 23 [45] will be used to process the data. Descriptive statistics, Pearson correlation, ANOVA and multiple regression analysis will be utilised for data analysis. Statistical significance will be set at .05. Descriptive statistics will be used to analyse and summarise the respondents' data while Pearson correlations will be used to investigate the relationship between psychosocial factors (depression, anxiety, coping strategies, social support, care burden, and economic burden) and quality of life of the participants. ANOVA will be conducted to compare the psychosocial factors and quality of life between haemodialysis patients and their caregivers and peritoneal dialysis patients and their caregivers. And lastly, multiple linear regression analysis will be utilised to examine the predictors (demographic, psychosocial factors and socioeconomic) which can lead to an improvement in the participants' quality of life.

Phase 2: Qualitative study

Thematic analysis will be conducted with the use of NVivo software for Windows version 11 (update 4).[46] Open and axial coding will be utilised in the thematic analysis, to determine the codes and themes from the focus group discussion. This will serve to facilitate an in-depth examination of the perception of the economic burden faced by the participants in the management of ESRD and its impact on their quality of life.

ETHICS AND DISSEMINATION

Ethical considerations

The researchers will adhere to the principles of the Declaration of Helsinki [47] and the Malaysian Good Clinical Practice Guidelines.[48] During the data collection process, the privacy of the participants is protected through the separation of the informed consent forms from the questionnaire responses. All documents will be deposited in a secured cabinet and all data will be stored in a password protected computer to which only the researchers have access. All documents and data will be stored for a period of seven years, after which they will be shredded and deleted. No participant identifiers (name, identity card number, address, phone number, etc) will be traceable and a unique study ID will be assigned. No medical records will be accessible. Participants will have no access to any personal information, and to ensure the element of anonymity, they will not be informed of the study findings.

Dissemination

The findings from this study will be published in peer-review scientific journals and at national or international conferences. Minimal anonymised data uploaded as supplementary material for review purposes in scientific journal publications or conferences will adhere strictly to the ethical principles stipulated. Only group data will be published and no personal identifier will be collected or made public. Relevant permissions from all parties involved will be obtained prior to any publication. The findings from this study can serve as a guide for Malaysian policymakers, health care providers and society during their efforts to improve the quality of life of caregivers and ESRD patients through the engagement of effective and holistic interventions.

Author contributions

All authors were involved in writing the study protocol. SYC and NI drafted the manuscript. CSS, NA, RI and AHAG provided critical revision and feedback of the manuscript. All authors have read and approved the final manuscript.

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Competing interest

The authors declared that there is no conflict of interest.

Ethics approval

The work has been approved by the Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the research ethics committee of Tuanku Muhriz UKM Chancellor's Hospital (HTCM) [UKM PPI/111/8/JEP-2021-078] and the University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346]. Also, relevant permissions and approvals from the hospital directors of Selayang Hospital (HSEL) and Kuala Lumpur Hospital (HKL) have been obtained.

Provenance and peer-review

Not commissioned, externally peer reviewed.

Data sharing statement

Not required as this study is a study protocol.

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The effects of direct and indirect burden of care on the quality of life of patients with end-stage renal disease and their caregivers in the Klang Valley, Malaysia: Protocol for a mixed-methods study

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The effects of direct and indirect burden of care on the quality of life of patients with end-stage renal disease and their caregivers in the Klang Valley, Malaysia: Protocol for a mixed-methods study

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ABSTRACT

Introduction: The number of patients in Malaysia requiring dialysis is expected to rise substantially in the future due to the ageing population and increasing prevalence of diabetes mellitus and hypertension. Hence, more individuals will be expected to adopt the caregiver role in the future. The upward trends of end-stage renal disease (ESRD) and caregiving for dialysis patients have detrimental consequences on both the patients and their caregivers regarding their psychological well-being and quality of life. Despite the current circumstances, there remains a dearth of study in Malaysia exploring the psychosocial factors, specifically on the economic impacts of ESRD management.

Methods and analysis: This two-phase sequential explanatory mixed-methods design, incorporating a quantitative design in Phase 1 and a qualitative study in Phase 2, will be conducted in four governmental hospitals along with ten other non-governmental organisations or private dialysis centres within the Klang Valley vicinity. Phase 1 consists of cross-sectional survey that will be conducted among 236 pairs of the patient-caregiver dyad. 30 participants will be recruited in Phase 2 to undergo focus group discussion. Participants will be recruited purposively through inclusion and exclusion criteria. Descriptive statistics, Pearson correlation, ANOVA, and regression analyses will be utilised for data analysis in Phase 1, whereas thematic analysis with open and axial coding will be employed in Phase 2.

Ethics and dissemination: The National Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the research ethics committee of Tuanku Muhriz UKM Chancellor's Hospital (HTCM) [UKM PPI/111/8/JEP-2021-078] and University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346] have approved the proposed study. Participants informed consent in both studies will be obtained beforehand, and no personal identifiers will be obtained from the participants to protect their anonymity. Findings will be

published in peer-reviewed scientific journals and presented in national or international conferences with minimal anonymised data.

ARTICLE SUMMARY

Strengths and limitations of this study

- This study will be the first in Malaysia to utilise the sequential mixed-methods approach to examine the psychosocial factors and quality of life of patients undergoing haemodialysis and peritoneal dialysis treatments and their caregivers.
- The inclusion of both patients and caregivers in the study will provide more comprehensive and holistic perspectives regarding ESRD management in Malaysia.
- This research will scrutinise the psychological well-being, financial burden, and complications involved in ESRD management to provide a comprehensive finding on their impact on the participant's quality of life.
- The study is restricted to the Klang Valley vicinity; hence, the findings may not apply to patients with ESRD and their caregivers in other Malaysian states.
- The restricted dissemination of paper-and-pen or web-based questionnaires to within a population of participants who can communicate or read in the Malay language may lead to the omission of unique perspectives from the non-Malay literate population.

Keywords: Burden of care, quality of life, end-stage renal disease (ESRD), patient, caregiver

INTRODUCTION

According to the Global Burden of Disease, chronic kidney disease (CKD) is ranked among the top 20 causes of death and is currently a significant public health concern.[1] CKD is regarded as a high-stress illness due to the chronicity of the disease and the long-term treatment required,[1] where end-stage renal disease (ESRD) is considered the last stage of CKD.[2] In Malaysia, the incidence and prevalence of patients with ESRD have been an upward trend for the past 20 years.[3] The number of Malaysians with CKD is projected to significantly increase in the future due to the ageing population and the increasing prevalence of diabetes mellitus (DM) and hypertension. It has been established that CKD is profoundly associated with DM and hypertension.[2] In 2018, the 24th Report of the Malaysia Dialysis and Transplant Registry revealed that over the preceding ten years, the acceptance rates for both haemodialysis (HD) and peritoneal dialysis (PD) have nearly doubled, while the prevalence rate has increased by more than two-fold. A total of 39,711 patients received dialysis treatment in 2016, with 35,781 and 3930 patients on HD and PD, respectively. Meanwhile, the prevalence rate of HD and PD stood at 1159 per million population and 127 per million population, respectively.[4] If the present trend remains unchecked, it can be anticipated that by 2040, there will be more than 106,000 Malaysian patients with ESRD requiring dialysis. With this projected prevalence, the cost of the health care system is estimated to be RM 3.21 billion.[3]

It is to be expected that with the rising number of renal failure patients,[5] more individuals will adopt the caregiver role in the future. The caregiver of a patient refers to those actively involved in helping patients cope and manage their chronic illness during their treatment.[6] The chronicity of kidney failure and various treatment complications posed significant changes in patients' lifestyles, leading to caregivers experiencing a high care burden.[7] Care burden is common among caregivers and typically refers to the kind of distress comprising of physical, psychological, social, and financial aspects faced by caregivers as the result of caregiving.[8,9] Care burden can also be in the direct and indirect burden of care, whereby the direct burden of care refers to the monetary costs of treatment. In contrast, the indirect burden refers to the caregivers' psychological well-being and quality of life.

On the other hand, ESRD is highly burdensome in patients ’daily lives and time-consuming, especially among elderly HD patients, resulting in patients experiencing frustration and causing patients to perceive that they are a burden to their family members.[10] Thus, self-perceived burden arises when care recipients possess feelings of dependence, frustration, and anxiety, leading to guilt for the caregiver’s hardship.[11] The incidence and prevalence of ESRD give rise to adverse effects on the psychological well-being of both patients with ESRD and their caregivers,[12-16] and their quality of life.[9,17] Compared to their caregivers, patients with ESRD are more prone to depression and a lower quality of physical and psychological well-being.[15] According to Goh and Griva,[14] the prevalence of depression among patients with ESRD is estimated to be around 20% to 30%, whereas their anxiety ranged between 12% and 52%. The contributing factors toward the lower quality of life among dialysis patients have been identified as the increasing prevalence of depression, anxiety, and suicidal ideation.[18] In contrast, perceived social support served as a protective factor against the low quality of life among patients.[19,20] High perceived social support could reduce the risk of hospitalisation among haemodialysis patients by 15%, along with improving their quality of life.[21] On top of that, a conducive environment helps haemodialysis patients to take a more positive attitude towards their disease, including improving their coping strategies.[22]

Caregivers for patients (especially those under dialysis treatment) are subjected to a significant workload, as they shoulder most of the responsibilities.[12] Caring for patients with ESRD often involve tremendous physical, emotional, and economic demands.[23] Care burden among caregivers is often inter-related with socio-demographics (age, gender, ethnicity, marital status, education, employment, income and religion/spirituality) of caregivers and patients, disease-related factors (treatment modality, frequency of weekly dialysis sessions, duration and frequency of dialysis, duration of illness, comorbidity, level of patient's dependency), situational and relational factors (relationship to the patient, the duration of caregiving), environmental factors including social support and psychological factors including depression and anxiety.[24] Past literature showed evidence that caregivers who seek social support from family and friends experienced a lesser burden of care than caregivers without solid support networks[25]. Due to the reason that social support can diminish the impact of emotional care burden and stress by providing a solution to the problem, a distraction from the issue, or facilitating healthy behaviours needed.[26,27] Similarly, Nagarathnam, Sivakumar, and Latheef,[28] stated that seeking social support was the dominant coping mechanism in caregivers of renal replacement therapy. Also, it has been established that caregivers of chronic patients are four times more likely to be diagnosed with depression and three times more likely to seek help for anxiety issues than individuals who are not caregivers.[29] Notably, caregivers for dialysis patients are reported to have a lower quality of life than caregivers for non-dialysis patients.[17] In addition, the quality of life of caregivers with patients undergoing haemodialysis was reported to be lower in all aspects compared to the general healthy population; however, the quality of life of these caregivers was higher than the patients under their care. [9]

Despite the current situation, a dearth of research still exists, particularly on the psychosocial factors and the economic impact of ESRD among patients and caregivers in Malaysia. Studies focusing on the well-being of Malaysian patients with ESRD are sorely lacking, and in the case of caregivers, almost non-existent. Therefore, there is a need for further investigations in this area, particularly regarding the patients' and caregivers' quality of life, care burden, depression, anxiety, coping mechanisms, and social support. Another neglected area has to do with the financial and economic sustainability faced by patients with ESRD and their caregivers regarding the management of this disease. To the best of our knowledge, thus far, no studies have been conducted in the Southeast Asian region on the economic costs incurred by patients with ESRD and their caregivers. Given this situation, this study delves into examining the relationships between the psychosocial factors and quality of life of patients with ESRD and their caregivers. Apart from that, this study will examine the comparison between patients undergoing haemodialysis treatment and their caregivers with patients undergoing peritoneal dialysis treatment and their caregivers to assess the impact of differences in treatment modalities on their psychosocial factors and quality of life. Besides that, the associations between demographic, psychosocial factors, socioeconomic factors and quality-of-life among caregivers and patients with ESRD will be examined. Lastly, the impact of psychological well-being and economic burden faced by the patients and caregivers towards their quality of life will be explored in-depth within this study.

Study Objectives

Phase 1 of this study focuses on the following objectives:

1. To investigate the relationships between psychosocial factors (depression, anxiety, coping strategies, social support, care burden, economic burden) and quality of life among caregivers and patients with ESRD.
2. To compare the psychosocial factors and quality of life between patients undergoing haemodialysis and their caregivers with patients undergoing peritoneal dialysis and their caregivers.
3. To determine the variables (demographic, psychosocial and socioeconomic factors) associated with quality-of-life among caregivers and patients with ESRD.

Phase 2 of this study focuses on the following objective:

1. To explore the perceptions of patients with ESRD and their caregivers regarding their psychological well-being and their economic burden in the management of ESRD and its impact on their quality of life

METHODS AND ANALYSIS

Design and methods

This study involves the usage of a sequential explanatory mixed methods design and methodological triangulation with Phase 1 involving quantitative data collection, while Phase 2 involves a qualitative study.[30] Generally, the explanatory design is used when researchers need qualitative data to expand on or explain initial quantitative findings[31] or when quantitative results are required to direct the selection of participants for a qualitative study.[32] Thus, the qualitative data collection emerges from and is linked to the quantitative results.[33] Therefore, a sequential explanatory mixed-methods study design is imperative in this study due to the rigidness of the questionnaire in Phase 1 in eliciting more in-depth information specifically on the psychological well-being and financial factors faced by the participants. Thus, Phase 2 will be conducted to elicit more in-depth information from the participants and better understand the study phenomena overall. Doyle, Brady, and Byrne stated that sequential explanatory mixed-methods design is used to substantiate the findings from the quantitative study by providing supporting evidence from the qualitative study findings.[34] On the other hand, methodological triangulation involving mixed-methods design increases the credibility and validity of research findings.[35] In Phase 1, the researchers will conduct a cross-sectional survey study among the patients with ESRD and their caregivers. A cross-sectional approach is preferred, as this approach is time-saving in terms of questionnaire distribution and information collection from a sizeable number of participants.[36] Meanwhile, in Phase 2, a qualitative study involving focus group discussions will be conducted among the patients with

ESRD and their caregivers. The focus group discussion approach can give a fruitful and in-depth understanding of an individual's experiences and perceptions towards a specific phenomenon.[37] Furthermore, compared to individual interviews with participants, focus groups tend to provide more ideas and information.[38] Focus group discussions allow participants to consider and share their perspectives regarding the psychological well-being and economic burden they take on when it comes to ESRD management and the impact of these on their quality of life. The data findings from Phase 1 and Phase 2 of the study will be integrated to provide a more holistic and comprehensive insight into the psychosocial factors and quality of life experienced by patients with ESRD and their caregivers undergoing different treatment modalities through the process of triangulation. This mixed-method integration technique will be able to answer the study's objectives.[30] Also, it is beneficial in confirming findings, more comprehensive data, increased validity, and enhanced understanding of studied phenomena through the role of triangulation in the mixed-methods study.[39]

Study setting

The investigation will be conducted in the nephrology unit of the Tuanku Muhriz UKM Chancellor's Hospital (HTCM), Selayang Hospital (HSEL), Kuala Lumpur Hospital (HKL), and the University of Malaya Medical Centre (UMMC), along with ten other non-governmental organisation (NGO) or private dialysis centres in the Klang Valley. The hospitals were chosen purposively based on their location in the Klang Valley and are specialist hospitals, non-governmental organisations (NGO), and private centres offering dialysis treatment for patients with ESRD.

Milestones and timelines

The literature review for this study has been completed. The current status of this research is in the pilot testing stage. The pilot study is expected to be completed in two months to test the instruments' validity and reliability for quantitative data collection in the main study.

Quantitative data collection will take approximately three months to be completed, and qualitative data collection will commence once the quantitative data collection is finalised for a duration of two months. The expected timeline for this study will take approximately seven months to complete, with the final manuscript is expected to be completed in October 2022.

Patient and public involvement

One patient, caregiver, health psychologist, and two formal care providers (namely, a nephrologist and a dialysis nurse) will be recruited to form the advisory committee. This committee will be tasked with reviewing the protocol and structuring the interview schedule and questionnaire to provide the design for the study. The advisory committee will also be referred to for advice and feedback whenever necessary throughout this study.

Participants and recruitment

Patients with ESRD and their caregivers will be recruited in dyads in both phases of studies. Specifically, potential patients in Phase 1 will be recruited purposively through referrals from nephrologists or nurses in the nephrology units. In contrast, the caregivers in Phase 1 will be recruited purposively through referrals from the patients themselves. This sampling method will ensure that data accumulation from the participants is effective, efficient, and cost-effective.[40] Whereas, for Phase 2, participants will be a subset of Phase 1 participants. Participants in Phase 1 will be selected purposively to share their views on their psychological well-being, financial burden, and quality of their life in focus group discussions to ensure that different perspectives are represented. The demographic variables to be considered are age groups (young adults, middle-aged adults, and older adults) and sex (male and female). The inclusion and exclusion criteria will be utilised within the overall eligible population to ensure that the samples fulfil our study aims. Inclusion and exclusion criteria for both phases are similar. Patients have to fulfil these criteria; ESRD-diagnosed patients, eligible for participation in this study, need to be above 18 years of age, and currently receiving treatment in a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley to be eligible to participate in the study. It is also essential that the participants can communicate and read in Bahasa Malaysia, the national language of Malaysia. All patients diagnosed with ESRD and their caregivers are welcome to participate in this study. There is no restriction on the initiation of patients' dialysis to recruit a wide range of study participants. However, patients exhibiting severe mental illness, or those who have undergone a kidney transplant, will be excluded from the study. As for the recruitment of caregivers, they must be above 18 years of age and are verified as the family caregiver of an ESRD patient currently undergoing dialysis treatment in a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. It is also required that the caregiver has undergone the experience of accompanying the ESRD patient for dialysis treatment at least once and can read and communicate in Bahasa Malaysia. Formal caregivers, caregivers of patients who have undergone a kidney transplant, or caregivers exhibiting severe mental illness symptoms, will be excluded from the study.

Sample size

Phase 1: Quantitative study

The proposed quantitative study sample size calculation is based on the multiple linear regression formula by Tabachnick and Fidell[41], which is expressed as $N > 50+8m$, where m is the number of predictors. This study will include six predictors (depression, anxiety, coping strategies, social support, care burden, economic burden) and based on the sample size calculated by Tabachnick and Fidell, it is estimated to be 98 participants. However, due to dyads of participants being recruited, thus, 98 pairs of patients and caregivers is assumed. On the other hand, sample size estimation is also calculated via power analysis using G* Power programme for F test (multiple linear regression: fixed model, R2 deviation from zero) with an effect size of 0.15 (medium), α at 0.05, power at 0.80 and six predictors. Similarly, the power analysis estimated a minimum sample size of 98, which corresponds to the sample size estimation by Tabachnick and Fidell [41]. For this study, considering the drop-out rate, unresponsive surveys, and incomplete submission of data by participants, the sample size for this study will be increased by 20%.[42,43] Hence, 118 pairs of haemodialysis patients-caregivers and 118 pairs of peritoneal dialysis patients-caregivers (N=236 pairs) will be recruited for the quantitative study, which is equivalent to a total of 472 participants.

Phase 2: Qualitative study

Qualitative study typically emphasises data saturation, where the saturation point is achieved when no new information, ideas or themes are forthcoming from the participants. [44] Data saturation can be identified within five[45] or three to six focus group discussions[46] with a minimum of four to a maximum of twelve participants in a group.[47] This process is typical for qualitative studies, whereby the emphasis is on arrival at saturation point. Therefore, based on past literature, the researchers will conduct six focus group discussions, with each group comprising five participants at least for this qualitative study. Hence, a minimum of 30 participants (15 patients and 15 caregivers) will be involved in the focus group discussion.

Instruments

Phase 1: Quantitative study

The web-based or paper-based questionnaire to be distributed to the participants consists of three sections: demographic sheet, economic assessment, and psychological assessment (Table 1).

Table 1

Summary of instruments for patient and caregiver

	Patient	Caregiver
Demographic information	Age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers.	
Economic assessment	Source of funding, direct monthly cost, indirect weekly cost (time), and perceived economic/ financial burden.	
Psychological assessment		
Coping behaviour	Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE)	Caregiver Cope (CgCope™)
Perceived burden	Self-Perceived Burden Scale (SPBS)	Zarit Burden Interview (ZBI)
Social support	Medical Outcome Study Social Support Survey (MOS-SSS)	
Anxiety	General Anxiety Disorder-7 (GAD-7)	
Depression	Patient Health Questionnaire-9 (PHQ-9)	
Quality of life	Short Form Survey (SF-36)	

Demographics information

The demographic information of the patients and their caregivers, which will be collected through the questionnaire, covering age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers.

Economic assessment

The second section of the questionnaire, the economic assessment, covers the participants' source of funding, direct monthly cost, indirect weekly cost (time), and perceived economic/ financial burden.

Psychological assessment

The final section of the questionnaire consists of six scales regarding psychological assessment. However, the coping strategy scale and the burden of care scale differs between patients and caregivers. The coping behaviour among the patients will be evaluated by the Malay version of the Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE). The inventory comprises 28 items with 14 dimensions: self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame.[48] The Malay version of Brief-COPE, validated through Malaysian breast cancer women patients, has good internal consistency (α=.51 to .99).[49] Meanwhile, the Caregiver Cope (CgCope^{TM}) questionnaire, developed by Ibrahim and colleagues [50], will be used to assess the coping strategies employed by the caregivers. This questionnaire consists of 19 items with six domains of coping strategies. Namely, these domains are distraction, caring for patient, venting, religion, recreation, and social support. Participants will rate based on the 5-point Likert scale (1 = I have never done this, 5 = I do this very frequently). The validation study conducted among caregivers of schizophrenia patients in Malaysia yielded Cronbach's alpha values ranging between .54 and .82.[50]

To assess their perception of the care burden on their caregivers, the Self-Perceived Burden Scale (SPBS) will be distributed to the ESRD.[11] The SPBS, which consists of 10-items, is rated by a 5-point Likert scale (1 = Not at all, 5 = All of the time). The Malay translated 10-item SPBS utilised in Ting et al.'s study[51] revealed this scale to be valid and reliable for urology cancer patients (α=.99). As for the caregiver burden, it will be examined by the 22-item of Zarit Burden Interview (ZBI).[52] Participants will rate their burden on a 5-point Likert scale (0 = Rarely, 4 = Nearly always). In Malaysia, the Malay version of ZBI (MZBI) was validated through family caregivers to cancer patients, with the scale delivering a high internal consistency (α=.89).[53]

The 19-item Medical Outcome Study Social Support Survey (MOS-SSS) developed by Sherbourne and Stewart[54] will be used to examine the participants' perception of social support. This brief, multidimensional, self-administered scale, rated using a 5-point Likert scale (1 = None at all, 5 = Available at all times), measures four categories of social support: informational, instrumental, positive social interactions, and affectionate support. In Malaysia, the Malay version of the MOS-SSS was validated through a sample of HIV patients. This Malay version of the survey portrayed good psychometric properties, with high Cronbach's alpha for all the subscales (α >.87) and the overall scale (α =.96).[55]

The General Anxiety Disorder-7 (GAD-7), a screening tool and severity indicator developed by Spitzer et al.,[56] will be used to assess the generalised anxiety disorder among the participants. The scale contains 7 items and is rated using the 4-point Likert scale (0 = Not at all, 3 = Nearly every day). The Malay version of GAD-7, validated through female patients in a government-funded primary care clinic, delivered good internal consistency reliability (α =.74).[57]

The participants' severity of depression will be assessed through the Patient Health Questionnaire-9 (PHQ-9).[58] The PHQ-9 consists of 9 items and is rated using the 4-point Likert scale (0 = Not at all, 3 = Nearly every day). In Malaysia, the questionnaire was validated through female patients in a primary care clinic, and the Malay version of PHQ-9 showed good internal reliability (α =.70).[59]

The 36-item Short Form Survey (SF-36) will be utilised to assess the health-related quality of life of the participants. The SF-36 consists of eight subscales, measuring different domains of health-related quality of life. Namely, these subscales are physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). Also, two-component scores are derived from the eight subscales. These are the physical component summary (PCS), which consists of

PF, RP, BP, and GH, and the mental component summary (MCS), which consists of VT, SF, RE, and MH.[60] The Malay version of SF-36, validated through post-coronary artery bypass grafting surgery (CABG) patients, delivered good internal consistency reliability, with Cronbach's alpha values ranging from .73 to .90 for the subscales.[61]

Phase 2: Qualitative study

A focus group discussion schedule will be developed, based on a literature review and expert input by nephrologists in the research team. The questions for the focus group discussion will be tailored to elicit responses from the patients with ESRD and their caregivers regarding their psychological well-being and economic burden they faced, and its impact on their quality of life. The focus group discussion schedule will be piloted among caregivers and patients to examine the clarity and feasibility of the questions. The focus group discussion will be divided into five sections: demographic details, source of ESRD treatment funding, direct and indirect costs of ESRD management, the impact of their psychological well-being towards their quality of life, and lastly, the impact of economic burden experienced by them towards their quality of life.

Data collection

Phase 1: Quantitative study

Conventional paper-and-pencil/web-based questionnaires will be utilised. The response rate of participants who responded positively out of those potentially eligible participants who are invited to be involved in the study will be recorded. Potential participants (patients), identified through referrals from nephrologists or nurses in the nephrology units, will be recruited during their dialysis treatments in the respective hospital/dialysis centre. In contrast, potential participants (caregivers) will be approached whilst waiting for their patient's treatment to be completed. For the caregivers who are not present during the patients' treatment, the researchers will call them up or meet up with them during the patients' subsequent treatment in the respective hospitals/dialysis centres. The recruitment process progresses with the researcher briefing the caregiver and patient on the aims and procedures of the study. Potential participants who respond in the affirmative regarding whether they have been previously diagnosed with severe mental illness will be excluded from the study. Potential participants will be given ample time to consider their involvement in the study. Upon receiving their consent, the participants will be provided with a questionnaire, which can be filled out in approximately 30 minutes. The researchers will entertain any questions the participants may have regarding the questionnaire. The completed questionnaires will be kept securely for the data analysis process. Subject withdrawal criteria include a situation whereby the participants voluntarily withdraws their consent to participate in the study or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention during the course of the survey or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. As the sample size calculation considers the participant drop-out rate, participants who withdraw from the study will not be replaced.

Phase 2: Qualitative study

The response rate of participants who responded positively out of those potentially eligible participants who are invited to be involved in the study will be recorded. Potential participants from Phase 1 will be recruited purposively based on the inclusion and exclusion criteria. The researchers will provide the caregivers and patients with a briefing on the aims and procedures of the study. Participants will be given sufficient time to consider their participation in the focus group discussion. The discussion will be held at a designated date, time, and venue decided by the researchers and is anticipated to last for an hour. The discussions will be recorded, and data will be transcribed verbatim, after which the recording will be deleted, in keeping with established ethical standards. Subject withdrawal criteria include a situation whereby the participants voluntarily withdraws their consent to participate in this study or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention during the course of the discussion or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. The arrival at the data saturation point is not affected by the withdrawal of a participant(s) who will not be replaced.

Data analysis

Phase 1: Quantitative study

IBM Statistical Package for the Social Sciences (SPSS) software for Windows, version 23[62] will be utilised to process the data. Descriptive statistics, Pearson correlation, ANOVA and multiple regression analysis will be utilised for data analysis. Statistical significance will be set at .05. Descriptive statistics will be used to compute frequencies, percentages, means, and standard deviation, summarising the respondents' data. Pearson correlations will be conducted to examine the relationships between psychosocial factors (depression, anxiety, coping strategies, social support, care burden, and economic burden) and participants' quality of life. To examine the impact of differences in treatment modalities towards the participants' psychosocial factors and quality of life, ANOVA will be conducted between haemodialysis patients and their caregivers and peritoneal dialysis patients and their caregivers. A multiple regression model will be fitted to examine the association between psychosocial factors, socioeconomic factors and quality of life, whilst adjusting for potential confounding factors such as demographic factors (occupation, monthly household income, relationship with patient/caregiver, and method of dialysis).

Phase 2: Qualitative study

Thematic analysis will be conducted using NVivo software for Windows version 11 (update 4).[63] The researchers will conduct thematic analysis to determine the codes and themes from the focus group discussion. Main ideas will be derived through open coding, and the themes will be generated through axial coding based on the focus group discussion undergone by the participants. This qualitative study will facilitate an in-depth examination of the participants' perception of their psychological well-being and economic burden in the management of ESRD and its impact on their quality of life. Triangulation will be utilised in this research using multiple data sources from participants to develop a comprehensive understanding of the study phenomena. Triangulation has been viewed as a qualitative research strategy to test validity by converging information from different sources.[64] The data findings from the qualitative study will be integrated with quantitative study findings to answer the study's objectives and have holistic insight into the study phenomena.

IMPLICATIONS OF THE STUDY

To our best knowledge, there is a lack of study focusing on the ESRD population in Malaysia. Therefore, this study will be a pioneering study to include mixed methods of quantitative and qualitative study designs to evaluate the psychosocial factors and quality of life of patients with ESRD and their caregivers. Apart from that, this study incorporated both the perspectives of patients and caregivers, hence providing a more in-depth understanding and overview of the psychological well-being and financial burden they have to face in terms of illness management and the impact of these on their quality of life. Through this study, future researchers might have an enhanced understanding of this study phenomena and may navigate them to develop an intervention programme focusing on the well-being of the patients and their caregivers. Also, the current study will examine the comparison of psychosocial factors and the quality of life between patients undergoing HD treatment and their caregivers with patients undergoing CAPD treatment and their caregivers. With this comparison being made, this study will provide society and policymakers with a better understanding of the treatment modalities that have a better impact on the psychological well-being and quality of life of both the patients and caregivers. Also, this study can provide an in-depth insight into the financial burden the patients and caregivers have to face in the management of this illness. Thus, it might contribute crucial knowledge to the Malaysian government and non-governmental organisations in providing aid to those who are financially burdened.

ETHICS AND DISSEMINATION

Ethics approval

The work has been approved by the Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the research ethics committee of Tuanku Muhriz UKM Chancellor's Hospital (HTCM) [UKM PPI/111/8/JEP-2021-078] and the University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346]. Also, relevant permissions and approvals from the hospital directors of Selayang Hospital (HSEL) and Kuala Lumpur Hospital (HKL) have been obtained.

Ethical considerations

The researchers will adhere to the principles of the Declaration of Helsinki[65] and the Malaysian Good Clinical Practice Guidelines.[66] The participants' privacy is protected during the data collection process by separating the informed consent forms from the paper-based questionnaire responses. All documents will be deposited in a secured cabinet, and all data will be stored in a password-protected computer to which only the researchers have access. All documents and data will be stored for seven years, after which they will be shredded and deleted. No participant identifiers (name, identity card number, address, phone number) will be traceable, and a unique study ID will be assigned. No medical records will be accessible.

Participants will have no access to any personal information, and to ensure the element of anonymity, they will not be informed of the study findings.

Dissemination

The findings from this study will be published in peer-review scientific journals and at national or international conferences. Minimal anonymised data uploaded as supplementary material for review purposes in scientific journal publications or conferences will adhere strictly to the ethical principles stipulated. Only group data will be published, and no personal identifier will be collected or made public. Relevant permissions from all parties involved will be obtained before any publication. The findings from this study can serve as a guide for Malaysian policymakers, health care providers, and society to improve the quality of life of patients with ESRD and their caregivers through the engagement of constructive and holistic interventions.

Author contributions

All authors were involved in writing the study protocol. SYC and NI drafted the manuscript. CSS, NA, RI and AHAG provided critical revision and feedback of the manuscript. All authors have read and approved the final manuscript.

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Competing interest

The authors declared that there is no conflict of interest.

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Data sharing statement

Not required as this study is not a clinical trial study protocol.

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The effects of psychosocial and economic factors on the quality of life of patients with end-stage renal disease and their caregivers in the Klang Valley, Malaysia: Protocol for a mixed-methods study

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The effects of psychosocial and economic factors on the quality of life of patients with end-stage renal disease and their caregivers in the Klang Valley, Malaysia: Protocol for a mixed-methods study

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ABSTRACT

Introduction: The number of patients in Malaysia requiring dialysis is expected to rise substantially in the future due to the ageing population and increasing prevalence of diabetes mellitus and hypertension. Hence, more individuals will be expected to adopt the role of caregivers in the future. The upward trend of end-stage renal disease (ESRD) and caregiving for dialysis patients has detrimental consequences for both patients and caregivers in terms of their psychological well-being and quality of life. Despite the current circumstances, there are very few studies in Malaysia that have explored the psychosocial factors, specifically on the economic impact of the management of ESRD.

Methods and Analysis: This two-phase sequential explanatory mixed-methods design, incorporating a quantitative design (Phase 1) and a qualitative study (Phase 2), is to be conducted in four government hospitals and ten other non-governmental organisations or private dialysis centres within the Klang Valley, Malaysia. A cross-sectional survey (Phase 1) involving 236 pairs of the patient-caregiver dyad, while focus group discussions (Phase 2) involving 30 participants. The participants for both phases will be recruited purposively using inclusion and exclusion criteria. Descriptive statistics, , independent sample *t*-tests, multiple regression and thematic analysis will be utilised for the data analysis in Phase 1 and Phase 2, respectively.

Ethics and Dissemination: Approval for the proposed study has been obtained from the National Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the Research Ethics Committee of Hospital Canselor Tuanku Muhriz UKM (HCTM) [UKM PPI/111/8/JEP-2021-078] and University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346]. The informed consent of the participants for both studies will be obtained beforehand, and no personal identifiers will be obtained from the participants to protect their

anonymity. The findings will be published in peer-reviewed scientific journals and presented in national or international conferences with minimal anonymised data.

ARTICLE SUMMARY

Strengths and limitations of this study

- This study will be the first in Malaysia to utilise the sequential mixed-methods approach to examine the psychosocial factors, economic factors, and quality of life of patients undergoing haemodialysis and peritoneal dialysis treatments and their caregivers.
- The inclusion of both patients and caregivers in the study will provide more a comprehensive and holistic perspective of the management of ESRD in Malaysia.
- This research will scrutinise the psychosocial well-being, economic burden, and complications involved in ESRD management to provide a comprehensive finding on their impact on the quality of life of the participants.
- The study will be restricted to the vicinity of the Klang Valley, so the findings may not be applicable in other Malaysian states; restricted dissemination of the paper-and-pen or web-based questionnaires to a population of participants who are able to communicate or read in the Malay language may lead to the omission of unique perspectives from the non-Malay literate population.
- Purposive sampling will be used to recruit the participants for the survey, and the recruitment method is not intended to ensure a representative sample. As such, the findings from the quantitative survey will have limited generalisability.

Keywords: Burden of care, quality of life, end-stage renal disease (ESRD), patient, caregiver

INTRODUCTION

According to the Global Burden of Disease, chronic kidney disease (CKD) is ranked among the top 20 causes of death, and is currently a significant public health concern.[1] CKD is regarded as a high-stress illness due to the chronicity of the disease and the long-term treatment required,[2] where end-stage renal disease (ESRD) is considered as the last stage of CKD.[3] In Malaysia, the incidence and prevalence of patients with ESRD have been showing an upward trend for the past 20 years.[4] The number of Malaysians with CKD is projected to significantly increase in the future due to the ageing population and the increasing prevalence of diabetes mellitus (DM) and hypertension. It has been established that CKD is profoundly associated with DM and hypertension.[3] In 2018, the 24th Report of the Malaysian Dialysis and Transplant Registry revealed that over the preceding ten years, the acceptance rate for both haemodialysis (HD) and peritoneal dialysis (PD) has nearly doubled, while the prevalence rate has increased by more than two-fold. A total of 39,711 patients received dialysis treatment in 2016, with 35,781 and 3930 patients being on HD and PD, respectively. Meanwhile, the prevalence rate of HD and PD stood at 1,159 per million population and 127 per million population, respectively.[5] If the present trend remains unchecked, it is anticipated that by 2040, there will be more than 106,000 Malaysian patients with ESRD requiring dialysis. With this projected prevalence, the cost to the healthcare system is estimated to be RM 3.21 billion.[4] It is to be expected that with the rising number of renal failure patients,[1] more individuals will be adopting the caregiver role in the future. Caregivers refers to those who are actively involved in helping patients to cope with and manage their chronic illness during their treatment.[6] The chronicity of kidney failure and various treatment complications bring about significant changes in the lifestyles of patients, leading to caregivers having to shoulder a high burden of care.[7] This burden of care is common among caregivers, and it typically refers to the kind of distress, comprised of physical, psychological, social, and financial aspects, faced by them as a result of caregiving.[8-9]

ESRD is highly burdensome in the daily lives of patients and is also time-consuming, especially among elderly HD patients, resulting in patients experiencing frustration and causing them to perceive that they are a burden to their family members.[10] This self-perceived burden arises when the recipients of care possess feelings of dependence, frustration, and anxiety, leading to guilt about the hardship being imposed on the caregiver.[11] The incidence and prevalence of ESRD have adverse effects on the psychological well-being of both patients and their caregivers,[12-16] and their quality of life.[9, 17] Compared to their caregivers, patients with ESRD are more prone to depression and a lower quality of physical and psychological well-being.[15] According to Goh and Griva,[14] the prevalence of depression among patients with ESRD is estimated to be around 20% to 30%, whereas their level of anxiety ranges between 12% and 52%. Depression and anxiety symptoms occur more frequently among patients undergoing dialysis than patients who have undergone kidney transplantation.[18] Patients under peritoneal dialysis have also been reported to have significantly higher levels of depression symptoms than those on haemodialysis.[19] Conversely, a qualitative study conducted by Avdal et al.[20] showed evidence that both haemodialysis and peritoneal dialysis patients frequently experience depression along with other psychological problems, such as decreased social support, burnout, despair, and anxiety. Apart from these, patients and their caregivers have to face high treatment costs, out-of-pocket costs, and other comorbidities that arise, which can be overwhelming and cause those in low or middle-income families to bear a financial burden.[21] In Malaysia, the cost of haemodialysis and peritoneal dialysis per patient per year stands at RM 39,791 and RM 37,576, respectively.[22] Based on past literature in other countries, the high treatment costs have led to numerous caregivers having to suffer a financial burden and to willingly mortgage their valuable items to cover those costs.[23-24] In contrast to these studies, Mohd Fadzli, Mohd Rasani and Keng[21] stated that Malaysian patients and caregivers who are reportedly being fully-funded for their treatment may not face a financial burden, but those belonging to low-income families experience a tremendous financial burden. Mixed findings have been reported when comparing the quality of life of haemodialysis and peritoneal dialysis patients. Al Wakeel et al.[25] and Hsu et al.[26] found that peritoneal dialysis patients have a better quality of life than those on haemodialysis. Alternatively, Gonçalves et al.[27] concluded that haemodialysis has a better significant influence on the quality of life of patients compared to peritoneal dialysis as the physical functioning and emotional functioning aspects have been reported to be higher among haemodialysis patients. Meanwhile, De Abreu et al.,[28] Griva et al.,[19] and Iyasere et al.[29] suggested evidence that there is no significant difference between the levels of quality of life between the two different dialysis modalities. Generally, the factors contributing to a lower quality of life among dialysis patients have been identified as the increasing prevalence of depression, anxiety, and suicidal ideation.[30] In contrast, perceived social support serves as a protective factor against a low quality of life among patients.[31-32] A high perception of social support can reduce the risk of hospitalisation among haemodialysis patients by 15%, along with improving their quality of life.[33] On top of that, a conducive environment helps haemodialysis patients to take a more positive attitude towards their disease, including improving their coping strategies.[34]

Caregivers for patients (especially those under dialysis treatment) are subjected to a significant workload, as they shoulder most of the responsibilities.[12] Caring for patients with ESRD often involves tremendous physical, emotional, and economic demands.[35] The burden of care among caregivers is often inter-related with the socio-demographics (age, gender, ethnicity, marital status, education, employment, income and religion/spirituality) of the caregivers and patients, disease-related factors (treatment modality, frequency of weekly dialysis sessions, duration and frequency of dialysis, duration of illness, comorbidity, level of patient’s dependency), situational and relational factors (relationship to the patient, the duration of caregiving), environmental factors, including social support, and psychological factors including depression and anxiety.[36] Past literature has shown evidence that caregivers who seek social support from family and friends experience a lesser burden of care than caregivers without solid support networks.[37] This is because social support can diminish the impact of the emotional burden and stress of care by providing solutions to problems, distractions from issues, or facilitating the required healthy behaviours.[38-39] Similarly, Nagarathnam, Sivakumar, and Latheef[40] stated that seeking social support is the dominant coping mechanism in caregivers of patients undergoing renal replacement therapy. Also, it has been established that caregivers of chronic patients are four times more likely to be diagnosed with depression and three times more likely to seek help for anxiety issues than individuals who are not caregivers.[41]

There is a high correlation between the psychological well-being of caregivers and patients. Gerogianni et al.[13] stated that caregivers have higher levels of anxiety and depression when dialysis patients under their care are having high levels of anxiety and depression. In line with this study, Bardak et al.[42] reported that depressive symptoms are higher among caregivers of haemodialysis patients than among caregivers of peritoneal dialysis or kidney transplant patients. Monárrez-Espino, Delgado-Valles and Ramírez-García[43] reported a similar result, whereby caregivers of peritoneal dialysis patients have better psychological well-being in terms of anxiety and depression compared to caregivers of haemodialysis patients. Due to the reason that patients under haemodialysis treatment were perceived to be more difficult to care for compared to patients under treatment for other modalities.[15] In contrast, Cantekin, Kavurmacı, and Tan[44] suggested evidence that a higher burden of care was observed among caregivers of peritoneal dialysis patients than caregivers of patients undergoing haemodialysis treatment. This study was in line with the study conducted by Al Wakeel and Bayoumi[45], whereby the burden of care among the peritoneal dialysis group of caregivers was significantly higher than those in the haemodialysis group. The educational level, age, health, and capability of the patient with regard to self-care serve as the determinants of the burden of care among caregivers.[44-45] Notably, caregivers of dialysis patients reportedly have a lower quality of life than caregivers of non-dialysis patients.[17] The quality of life of caregivers with patients undergoing haemodialysis was reported to be lower in all aspects compared to the general healthy population; however, the quality of life of these caregivers was higher than the patients under their care.[9] Since caregivers of haemodialysis patients experience a high burden of care, this will have a negative effect on their quality of life.[46] Conversely, Monárrez-Espino, Delgado-Valles and Ramírez-García[43] concluded that there is no significant difference in terms of quality of life between caregivers of haemodialysis and peritoneal dialysis patients.

Despite the current situation, there is still a dearth of research, particularly with regard to the psychosocial factors and the economic impact of ESRD among patients and caregivers in Malaysia. Studies focusing on the well-being of Malaysian patients with ESRD are sorely lacking, and almost non-existent in the case of caregivers. Therefore, there is a need for further investigations to be carried out in this area, particularly with regard to the quality of life, burden of care, depression, anxiety, coping mechanisms, and social support of patients and their caregivers. Another neglected area has to do with the economic burden faced by patients with ESRD and their caregivers with regard to the management of this disease. As far as is known, thus far, no studies have been conducted in the Southeast Asian region on the economic costs incurred by patients with ESRD and their caregivers. Given this situation, this study will delve into a comparison of the psychosocial factors, economic factors, and quality of life of patients with ESRD and their caregivers. Apart from that, the associations between demographic factors, psychosocial factors, economic factors and quality-of-life among caregivers and patients with ESRD will be examined. Lastly, the perception of psychosocial well-being and economic burden along with their quality of life will be explored in-depth in this study.

Study Objectives

Phase 1 of this study focuses on the following objectives:

1. To compare the psychosocial factors, economic factors, and quality of life between caregivers of patients undergoing haemodialysis and caregivers of patients undergoing peritoneal dialysis.
2. To compare the psychosocial factors, economic factors, and quality of life between patients undergoing haemodialysis and patients undergoing peritoneal dialysis.
3. To determine the variables (demographic, psychosocial and economic factors) associated with quality of life among caregivers of patients with ESRD.
4. To determine the variables (demographic, psychosocial and economic factors) associated with quality of life among patients with ESRD.

Phase 2 of this study focuses on the following objective:

1. To explore the perceptions of patients with ESRD and their caregivers regarding their psychosocial well-being and economic burden in the management of ESRD and its impact on their quality of life

METHODS AND ANALYSIS

Design and Methods

This study involves the use of a sequential explanatory mixed methods design incorporating methodological and investigator triangulation. Phase 1 of the study involves the collection of quantitative data, while Phase 2 has to do with a qualitative study.[47] Generally, an explanatory design is used when researchers need qualitative data to expand on or explain their initial quantitative findings[48] or when quantitative results are required to direct the selection of participants for a qualitative study.[49] Thus, the collection of qualitative data emerges from and is linked to the quantitative results.[50] Therefore, due to the rigidness of the questionnaire in Phase 1, a sequential explanatory mixed methods study design is imperative in this study to elicit more in-depth information, specifically on the psychosocial well-being and economic factors faced by the participants. Thus, Phase 2 will be conducted to elicit more in-depth information from the participants and to gain a better overall understanding of the phenomena being studied. Doyle, Brady, and Byrne[51] stated that a sequential explanatory mixed methods design is used to substantiate the findings from a quantitative study by providing supporting evidence from the findings of a qualitative study. However, triangulation involving a mixed methods design increases the credibility and validity of the research findings.[52] In Phase 1, a cross-sectional survey will be conducted among patients with ESRD and their caregivers. A cross-sectional approach is preferred as it saves time in terms of the distribution of questionnaires and the collection of information from a sizeable number of participants.[53] Meanwhile, in Phase 2, a qualitative study will be conducted involving focus group discussions among patients with ESRD and their caregivers. A focus group discussion approach can give a fruitful and in-depth understanding of an individual's experiences and perceptions of a specific phenomenon.[54] Furthermore, compared to individual interviews with participants, focus groups tend to provide more ideas and information.[55] The focus group discussions will enable the participants to consider and share their perspectives regarding the psychosocial well-being and economic burden they have to undertake when it comes to the management of ESRD and the impact of these on their quality of life. The data findings from Phase 1 and Phase 2 of the study will be integrated through the triangulation process to provide a more holistic and comprehensive insight into the psychosocial factors, economic factors and quality of life experienced by caregivers and their ESRD patients undergoing different treatment modalities. This mixed methods integration technique will be able to answer the objectives of this study.[47] Also, the role of triangulation in the mixed methods study will be beneficial in confirming the findings, providing more comprehensive data, increasing the validity, and enhancing the understanding of the phenomena being studied.[56]

Study Setting

The investigation will be conducted in the nephrology units of Hospital Canselor Tuanku Muhriz UKM (HCTM), Hospital Selayang (HSEL), Hospital Kuala Lumpur (HKL), and the University of Malaya Medical Centre (UMMC), along with ten other non-governmental organisations (NGOs) or private dialysis centres in the Klang Valley, Malaysia. The hospitals were chosen purposively based on their location in the Klang Valley, and are specialist hospitals, non-governmental organisations (NGO), and private centres offering dialysis treatment for patients with ESRD.

Milestones and Timelines

The literature review for this study has been completed, and currently, this research is in the pilot testing stage. The pilot study to test the validity and reliability of the instruments for the quantitative data collection in the main study is expected to be completed in two months. The quantitative data collection will take approximately three months to be completed, and the qualitative data collection, which will last for two months, will commence once the quantitative data collection is finalised. The expected timeline for the completion of this study is approximately seven months, with the final manuscript expected to be completed in October 2022.

Patient and Public Involvement

One patient, caregiver, health psychologist, and two formal care providers (namely, a nephrologist and a dialysis nurse) will be recruited to form the Advisory Committee. This committee will be tasked with reviewing the protocol and structuring the interview schedule and questionnaire to provide the design for the study. The Advisory Committee will also be referred to for advice and feedback, whenever necessary, throughout this study.

Participants and Recruitment

Patients with ESRD and their caregivers will be recruited in dyads in both phases of the study. Specifically, potential patients in Phase 1 will be recruited purposively through referrals from nephrologists or nurses in the nephrology units. In contrast, the caregivers in Phase 1 will be recruited purposively through referrals from the patients themselves. This sampling method will ensure that the data accumulated from the participants will be effective, efficient, and cost-effective.[57] However, the participants in Phase 2 will be a subset of the participants in Phase 1. The participants in Phase 2 will be selected purposively to share their views on their psychosocial well-being, economic burden, and quality of life in focus group discussions to ensure that different perspectives are represented. The demographic variables to be considered are age group (young adults, middle-aged adults, and older adults), and gender (male and female). A set of inclusion and exclusion criteria will be utilised within the overall eligible population to ensure that the samples fulfil the aims of this study. The inclusion and exclusion criteria for both phases are similar. Patients have to fulfil these criteria: ESRD diagnosis, above 18 years old, Malaysian nationality, and currently receiving treatment at a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. It is also essential that the potential participants are able to communicate in and read Bahasa Malaysia, the national language of Malaysia. All patients diagnosed with ESRD and their caregivers are welcome to participate in this study. There is no restriction on the duration of the patients' initiation to dialysis in order to recruit a wide range of study participants. However, patients exhibiting severe mental illness or those who have undergone a kidney transplant will be excluded from the study. As for the recruitment of caregivers, they must be above 18 years of age and verified as the family caregiver of an ESRD patient currently undergoing dialysis treatment at a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. The caregiver is also required to have undergone the experience of accompanying the patient for dialysis treatment at least once, and must be able to read and communicate in Bahasa Malaysia. Formal caregivers, caregivers of patients who have undergone a kidney transplant, or caregivers exhibiting symptoms of severe mental illness will be excluded from the study.

Sample Size

Phase 1: Quantitative Study

The proposed quantitative study sample size calculation is based on the multiple linear regression formula by Tabachnick and Fidell,[41] which is expressed as $N > 50 + 8m$, where m is the number of predictors. This study will include six predictors (depression, anxiety, coping strategies, social support, burden of care, and economic burden), and the sample size, based on the calculation by Tabachnick and Fidell,[58] is estimated to be 98 participants. However, as the participants are to be recruited in dyads, it is assumed that there will be 98 pairs of patients and caregivers. Besides that, the estimated sample size is also calculated via a power analysis using the G* Power programme for the F test (multiple linear regression: fixed model, R^2 deviation from zero) with an effect size of 0.15 (medium), α at 0.05, power at 0.80 and six predictors. Similarly, the power analysis estimated a minimum sample size of 98, which corresponded with the estimated sample size by Tabachnick and Fidell.[58] For this study, taking into consideration the drop-out rate, non-response rate, and incomplete submission of data by participants, the sample size for this study has been increased by 20%.[59-60] Hence, 118 pairs of haemodialysis patients-caregivers and 118 pairs of peritoneal dialysis patients-caregivers (N = 236 pairs), which is equivalent to a sample size of 472 participants, will be recruited for the quantitative study.

Phase 2: Qualitative Study

A qualitative study typically emphasises data saturation, where the saturation point is achieved when no new information, ideas or themes are forthcoming from the participants.[61] Data saturation can be identified within five[62] or three to six focus group discussions[63] with a minimum of four and a maximum of twelve participants in a group.[64] This process is typical for qualitative studies, whereby the emphasis is on arriving at the saturation point. Therefore, based on past literature, six focus group discussions will be conducted in this research, with each group being comprised of at least five participants for this qualitative study. Hence, a minimum of 30 participants (15 patients and 15 caregivers) will be involved in the focus group discussions.

Instruments

Phase 1: Quantitative Study

The web-based or paper-based questionnaire to be distributed to the participants consists of three sections: demographic sheet, economic assessment, and psychosocial assessment (Table 1).

Table 1

Summary of instruments for patient and caregiver

	Patient	Caregiver
Demographic information	Age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers.	
Economic assessment	Source of funding, monthly cost, weekly cost (time), and perceived economic burden.	
Psychosocial assessment		
Coping behaviour	Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE)	Caregiver Cope (CgCope^{TM})
Perceived burden	Self-Perceived Burden Scale (SPBS)	Zarit Burden Interview (ZBI)
Social support	Medical Outcome Study Social Support Survey (MOS-SSS)	

Anxiety	General Anxiety Disorder-7 (GAD-7)
Depression	Patient Health Questionnaire-9 (PHQ-9)
Quality of life	Short Form Survey (SF-36)

Demographic information

The demographic information of the patients and their caregivers, which will be collected through the questionnaire, covers age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers.

Economic assessment

The second section of the questionnaire, the economic assessment, covers the source of funding, monthly cost, weekly cost (time), and perceived economic burden of the participants.

Psychosocial assessment

The final section of the questionnaire consists of six scales for the psychosocial assessment. However, the coping strategy and burden of care scales differ between patients and caregivers. The coping behaviour among the patients will be evaluated by the Malay version of the Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE), which is comprised of 28 items with 14 dimensions: self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame.[65] The Malay version of the Brief-COPE, which has been validated by Malaysian breast cancer women patients, has good internal consistency (α=.51 to .99).[66] Meanwhile, the Caregiver Cope (CgCope^{TM}) questionnaire, developed by Ibrahim and colleagues,[67] will be used to assess the coping strategies employed by the caregivers. This questionnaire consists of 19 items, with six domains of coping strategies, namely, distraction, caring for the patient, venting, religion, recreation, and social support. The participants will be rated based on a 5-point Likert scale (1

= I have never done this; 5 = I do this very frequently). The validation study conducted among caregivers of schizophrenia patients in Malaysia yielded Cronbach's alpha values ranging between .54 and .82.[67]

To assess the self-perceived burden among patients with ESRD, the Self-Perceived Burden Scale (SPBS) will be distributed to the patients.[11] The SPBS, which consists of 10 items, is rated by a 5-point Likert scale (1 = Not at all; 5 = All the time). The Malay version of the 10-item SPBS utilised in the study by Ting et al.[68] revealed that this is a valid and reliable scale for urological cancer patients (α = .99). Meanwhile, the care burden on caregivers will be examined by 22 items in the Zarit Burden Interview (ZBI).[69] The participants will rate their burden on a 5-point Likert scale (0 = Rarely, 4 = Nearly always). In Malaysia, the Malay version of the ZBI (MZBI) has been validated by family caregivers of cancer patients, with the scale delivering a high internal consistency (α = .89).[70]

The 19-item Medical Outcome Study Social Support Survey (MOS-SSS) developed by Sherbourne and Stewart[71] will be used to examine the participants' perception of social support. This brief, multidimensional, self-administered scale, rated using a 5-point Likert scale (1 = None at all; 5 = Available at all times), measures four categories of social support: informational, instrumental, positive social interactions, and affectionate support. In Malaysia, the Malay version of the MOS-SSS has been validated through a sample of HIV patients. This Malay version of the survey portrayed good psychometric properties, with high Cronbach's alpha values for all the subscales (α >.87) and the overall scale (α =.96).[72]

The General Anxiety Disorder-7 (GAD-7), a screening tool and severity indicator developed by Spitzer et al.[73], will be used to assess the generalised anxiety disorder among the participants. The scale contains 7 items and is rated using a 4-point Likert scale (0 = Not at all; 3 = Nearly every day). The Malay version of the GAD-7, which has been validated through female patients in a government-funded primary care clinic, delivers a good internal consistency reliability (α = .74).[74]

The participants' severity of depression will be assessed through the Patient Health Questionnaire-9 (PHQ-9).[75] The PHQ-9 consists of 9 items and is rated using a 4-point Likert scale (0 = Not at all; 3 = Nearly every day). In Malaysia, the questionnaire has been validated through female patients in a primary care clinic, and the Malay version of the PHQ-9 shows a good internal reliability (α = .70).[76]

The 36-item Short Form Survey (SF-36) will be utilised to assess the health-related quality of life of the participants. The SF-36 consists of eight subscales for measuring different domains of health-related quality of life, namely, physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). Also, two main component scores are derived from the eight subscales. These are the physical component summary (PCS), which consists of the PF, RP, BP, and GH, and the mental component summary (MCS), which consists of the VT, SF, RE, and MH.[77] The Malay version of the SF-36, which has been validated by post-coronary artery bypass grafting surgery (CABG) patients, delivers good internal consistency reliability, with Cronbach's alpha values ranging from .73 to .90 for the subscales.[78]

Phase 2: Qualitative Study

A focus group discussion schedule will be developed, based on a literature review and expert input by nephrologists in the research team. The questions for the focus group discussions will be tailored to elicit responses from the patients with ESRD and their caregivers regarding their psychosocial well-being and the economic burden being faced by them, and its impact on their quality of life. The focus group discussion schedule will be piloted among the caregivers and patients to examine the clarity and feasibility of the questions. The focus group discussions will be divided into five sections: demographic details, source of ESRD treatment funding, costs of ESRD management, the impact of their psychosocial well-being on their quality of life, and lastly, the impact of the economic burden experienced by them on their quality of life.

Data Collection

Phase 1: Quantitative Study

Conventional paper-and-pencil/web-based questionnaires will be utilised. The response rate of the participants who respond positively out of those potentially eligible participants who are invited to be involved in the study will be recorded. Potential participants (patients), identified through referrals from nephrologists or nurses in the nephrology units, will be recruited during their dialysis treatments in the respective hospitals/dialysis centres. In contrast, potential participants (caregivers) will be approached whilst waiting for their patients' treatment to be completed. For the caregivers who are not present during the patients' treatment, the researchers will call them up or meet with them during the patients' subsequent treatment at the respective hospitals/dialysis centres. The recruitment process will progress with the researcher briefing the caregivers and patients on the aims and procedures of the study. Potential participants who respond in the affirmative as to whether they have been previously diagnosed with severe mental illness will be excluded from the study. Potential participants will be given ample time to consider their involvement in the study. Upon receiving their consent, the participants will be provided with a questionnaire, which can be completed in approximately 30 minutes. The researchers will entertain any questions the participants may have regarding the questionnaire. The completed questionnaires will be kept securely for the data analysis process. The criteria for the withdrawal of a subject include a situation whereby the participant voluntarily withdraws his/her consent to participate in the study or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention to do so during the course of the survey or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. As the calculation of the sample size takes into account the drop-out rate for participants, those who withdraw from the study will not be replaced.

Phase 2: Qualitative Study

The response rate of participants who respond positively out of those potentially eligible participants who are invited to be involved in the study will be recorded. Potential participants from Phase 1 will be recruited purposively based on the inclusion and exclusion criteria for Phase 2 study. The researchers will brief the caregivers and patients on the aims and procedures of the study. Participants will be given sufficient time to consider their participation in the focus group discussions. The discussion will be held at a designated date, time, and venue to be decided by the researchers, and is anticipated to last for an hour. The discussions will be recorded, and the data will be transcribed verbatim, after which, the recording will be deleted, in keeping with established ethical standards. The subject withdrawal criteria include a situation where the participant voluntarily withdraws his/her consent to participate in this study or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention to do so during the course of the discussion or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. The arrival at the data saturation point will not be affected by the withdrawal of a participant(s), who will not be replaced.

Data Analysis

Phase 1: Quantitative Study

The IBM Statistical Package for the Social Sciences (SPSS) software for Windows (version 27)[79] will be utilised for the data processing, while descriptive statistics, independent sample *t*-tests and multiple regression analyses will be utilised for the data analysis. The statistical significance will be set at .05, and descriptive statistics will be used to compute the frequencies, percentages, means, and standard deviation, and to summarise the data from the respondents. To answer Objectives 1 and 2, which are to examine the differences in the treatment modalities on the participants' psychosocial factors, economic factors and quality of life, independent sample *t*-tests will be conducted between caregivers of haemodialysis and peritoneal dialysis patients (Objective 1) and between haemodialysis and peritoneal dialysis patients (Objective 2).

To answer Objectives 3 and 4, two multiple linear regression models will be fitted to examine the association between the psychosocial factors (depression, anxiety, coping strategies, social support, burden of care, and self-perceived burden), economic factors and the quality of life of caregivers (Objective 3) and patients with ESRD (Objective 4), whilst adjusting for potential demographic and clinical confounding factors (age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers) (Figure 1).

Phase 2: Qualitative Study

This qualitative study will facilitate an in-depth examination of the participants' perception of their psychosocial well-being and economic burden in the management of ESRD and its impact on their quality of life. A thematic analysis approach will be employed to analyse the data from the focus groups.[80-81] The data from the focus groups will be audio recorded and then transcribed accordingly. A copy of the transcripts will be given to the participants involved in the focus groups for feedback and approval before the analysis is carried out. For storage purposes, the data will be kept in a safety cabinet with a passcode, and only the research team will have access to the stored data. An initial reading of the focus group transcripts will be carried out. The transcripts will be re-read and coded individually to identify the key components of the psychosocial well-being, economic burden, and quality of life of participants. The data will be analysed by a team of researchers using NVivo software for Windows (version 11) (update 4).[82] The coding process begins with open coding by coding lines, statements and/or paragraphs. The data analysis will be considered to have reached saturation point when no new categories emerge. Each transcript will be coded and recoded several times.[81]

Next, a cross-validation to check the coding and transcripts will be undertaken by an independent rater, who will be provided with six interview transcripts. The independent rater's task will have to conduct a thematic analysis and check the appropriateness of that analysis. The independent rater's feedback will be compared with the identified themes. Any disagreements that may emerge in terms of sub-themes and themes will be discussed with the independent rater, and will be resolved through discussions with the independent rater and feedback from the research team.

Triangulation

Triangulation will be used in this research to gain a more accurate understanding of the phenomena being studied, i.e., the psychosocial well-being, economic burden and the impact of these on the quality of life of caregivers and patients. These phenomena will be examined from different methodological angles using quantitative and qualitative methods.[83]This approach will provide the means to verify and/or interrogate the data, thereby increasing the confidence in the results. Therefore, two types of triangulations will be involved. The first type is data triangulation using different approaches (quantitative and qualitive designs) in which information will be gathered from different sources, namely the participants (caregivers and patients), discussions and feedback from the research team, and with the participation of an independent rater or checker for the analysis. The second type is investigator triangulation, in which different investigators (i.e., student researchers, supervisors) will be involved in the data collection and an independent rater will participate in the data analysis. The use of two or more investigators independently can lead to more valid and reliable data,[84] and checking for divergences between researchers will result in minimal divergence, i.e., reliability.

IMPLICATIONS OF THE STUDY

As far as is known, there is a lack of studies focusing on the ESRD population in Malaysia. Therefore, this will be a pioneer study that includes mixed methods of quantitative and qualitative study designs to evaluate the psychosocial factors, economic factors, and quality of life of patients with ESRD and their caregivers. Apart from that, this study incorporates the perspectives of both the patients and caregivers, hence providing a more in-depth understanding and overview of the psychosocial well-being and economic burden being faced by them in terms of illness management and the impact of these on their quality of life. Garnering the perspectives of both the caregivers and patients and examining the factors associated with their quality of life will further the understanding that caregivers and their patients function as an interdependent unit rather than as separate entities. Therefore, intervention programmes addressing the psychosocial and economic well-being of ESRD patients and their caregivers should be carried out together. Additionally, study variables of populations within different treatment modalities, namely haemodialysis and peritoneal dialysis, can be examined, thus, providing a wider range of perspectives. Individuals who are choosing or are advised to take up haemodialysis or peritoneal dialysis will be able to understand the psychosocial and economic burdens of each treatment modality, and its impact on their quality of life. This will better prepare them to face these difficulties. Through this study, future researchers will have an enhanced understanding of these phenomena and may be able to navigate them to develop intervention programmes that focus on the well-being of the patients and their caregivers. From the perspective of hospitals, patient education programmes can be shaped based on the information obtained to prepare and support individuals who plan to or are undergoing the two treatment modalities. By making a comparison between haemodialysis and peritoneal dialysis, this study will provide society and policymakers with a better understanding of the treatment modalities so as to have a better impact on the psychosocial well-being and quality of life of both the patients and caregivers. Also, this study can provide an in-depth insight into the psychosocial and economic burden faced by the patients and caregivers in the management of this illness. Thus, it might contribute crucial knowledge to the Malaysian government and non-governmental organisations in providing aid and resources on a macro level to those who are financially burdened and improvise the quality of life of both patients with ESRD and their caregivers.

ETHICS AND DISSEMINATION

Ethics Approval

The work has been approved by the Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the research ethics committees of Hospital Canselor Tuanku Muhriz UKM (HCTM) [UKM PPI/111/8/JEP-2021-078] and the University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346]. Also, the relevant permission and approvals have been obtained from the directors of Hospital Selayang (HSEL) and Hospital Kuala Lumpur (HKL).

Ethical Considerations

The researchers will adhere to the principles of the Declaration of Helsinki[85] and the Malaysian Good Clinical Practice Guidelines.[86] The privacy of the participants will be protected during the data collection process by separating the informed consent forms from the paper-based questionnaire responses. All the documents will be deposited in a secure cabinet, and all the data will be stored in a password-protected computer to which only the researchers will have access. All the documents and data will be stored for seven years, after which they will be shredded and deleted. No participant identifiers (name, identity card number, address, phone number) will be traceable, and a unique study ID will be assigned. No medical records will be accessible. Participants will have no access to any personal information, and to ensure the element of anonymity, they will not be informed of the study findings.

Dissemination

The findings from this study will be published in peer-review scientific journals and at national or international conferences. Minimal anonymised data will be uploaded as supplementary material for review purposes in scientific journal publications or conferences, and these will adhere strictly to the ethical principles stipulated. Only group data will be published, and no personal identifier will be collected or made public. The relevant permission will be obtained from all the parties involved before any publication. The findings from this study can serve as a guide for Malaysian policymakers, healthcare providers, and society to improve the quality of life of patients with ESRD and their caregivers through the engagement of constructive and holistic interventions.

Contributors

All authors were involved in writing the study protocol. SYC and NI drafted the manuscript. CSS, NA, RI and AHAG provided critical revision and feedback of the manuscript. All authors have read and approved the final manuscript.

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Competing interests

The authors declared that there is no conflict of interest.

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Figure – legend

Figure 1. Analytic plan for Objective 3 and Objective 4 of the study. Two multiple linear regression models will be fitted to examine the association between the psychosocial factors (depression, anxiety, coping strategies, social support, burden of care, and self-perceived burden), economic factors and the quality of life of caregivers (Objective 3) and patients with ESRD (Objective 4), whilst adjusting for potential demographic and clinical confounding factors (age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers).

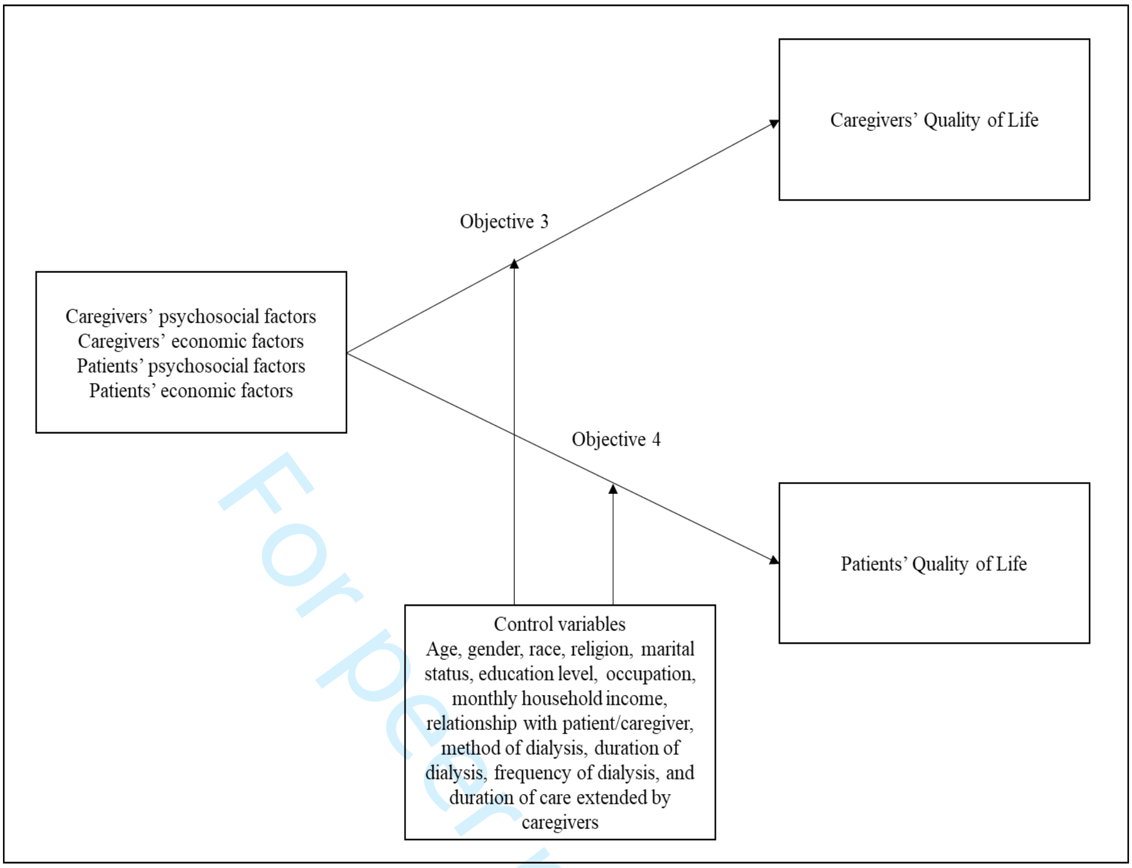

Figure 1. Analytic plan for Objective 3 and Objective 4 of the study

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The effects of psychosocial and economic factors on the quality of life of patients with end-stage renal disease and their caregivers in the Klang Valley, Malaysia: protocol for a mixed-methods study

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The effects of psychosocial and economic factors on the quality of life of patients with end-stage renal disease and their caregivers in the Klang Valley, Malaysia: protocol for a mixed-methods study

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ABSTRACT

Introduction: The number of patients in Malaysia requiring dialysis is expected to rise substantially in the future due to the ageing population and increasing prevalence of diabetes mellitus and hypertension. Hence, more individuals will be expected to adopt the role of caregivers in the future. The upward trend of end-stage renal disease (ESRD) and caregiving for dialysis patients has detrimental consequences for both patients and caregivers in terms of their psychological well-being and quality of life. Despite the current circumstances, there are very few studies in Malaysia that have explored the psychosocial factors, specifically on the economic impact of the management of ESRD.

Methods and analysis: This two-phase sequential explanatory mixed-methods design, incorporating a quantitative design (Phase 1) and a qualitative study (Phase 2), is to be conducted in four government hospitals and ten other non-governmental organisations or private dialysis centres within the Klang Valley, Malaysia. A cross-sectional survey (Phase 1) will include 236 patient-caregiver dyads, while focus group discussions (Phase 2) will include 30 participants. The participants for both phases will be recruited purposively. Descriptive statistics, independent sample t-tests, and multiple regression analysis will be used for analyses in Phase 1, and thematic analysis will be used in Phase 2.

Ethics and dissemination: Approval for the study has been obtained from the National Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the Research Ethics Committee of Hospital Canselor Tuanku Muhriz UKM (HCTM) [UKM PPI/111/8/JEP-2021-078] and University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346]. The informed consent of the participants will be obtained beforehand, and no personal identifiers will be obtained from the participants to protect their anonymity. The findings will be published in peer-reviewed scientific journals and presented in national or international conferences with minimal anonymised data.

ARTICLE SUMMARY

Strengths and limitations of this study

- This study will, to our knowledge, be the first in Malaysia to utilise the sequential mixed-methods approach to examine the psychosocial factors, economic factors, and quality of life of patients undergoing haemodialysis and peritoneal dialysis treatments and their caregivers.
- The inclusion of both patients and caregivers in the study will provide more a comprehensive and holistic perspective of the management of ESRD in Malaysia.
- This research will scrutinise the psychosocial well-being, economic burden, and complications involved in ESRD management to provide a comprehensive finding on their impact on the quality of life of the participants.
- The study will be restricted to the vicinity of the Klang Valley, so the findings may not be applicable in other Malaysian states; restricted dissemination of the paper-and-pen or web-based questionnaires to a population of participants who are able to communicate or read in the Malay language may lead to the omission of unique perspectives from the non-Malay literate population.
- Purposive sampling will be used to recruit the participants for the survey, and the recruitment method is not intended to ensure a representative sample—as such, the findings from the quantitative survey will have limited generalisability.

Keywords: Burden of care, quality of life, end-stage renal disease (ESRD), patient, caregiver

INTRODUCTION

According to the Global Burden of Disease, chronic kidney disease (CKD) is ranked among the top 20 causes of death, and is currently a significant public health concern.[1] CKD is regarded as a high-stress illness due to the chronicity of the disease and the long-term treatment required,[2] where end-stage renal disease (ESRD) is considered as the last stage of CKD.[3] In Malaysia, the incidence and prevalence of patients with ESRD have been showing an upward trend for the past 20 years. [4] due to the ageing population and the increasing prevalence of diabetes mellitus (DM) and hypertension [3]. In 2018, the 24th Report of the Malaysian Dialysis and Transplant Registry revealed that over the preceding ten years, the acceptance rate for both haemodialysis (HD) and peritoneal dialysis (PD) has nearly doubled, while the prevalence rate has increased by more than two-fold. A total of 39,711 patients received dialysis treatment in 2016, with 35,781 and 3930 patients being on HD and PD, respectively.If the present trend remains unchecked, it is anticipated that by 2040, there will be more than 106,000 Malaysian patients with ESRD requiring dialysis. With this projected prevalence, the cost to the healthcare system is estimated to be RM 3.21 billion.[4] It is to be expected that more individuals will be adopting the caregiver role in the future due to the rising number of renal failure patients.[1]

Caregivers refers to those who are actively involved in helping patients to cope with and manage their chronic illness during their treatment.[5] The chronicity of kidney failure and various treatment complications bring about significant changes in the lifestyles of patients, leading to caregivers having to shoulder a high burden of care.[6] This burden of care is common among caregivers, and it typically refers to the kind of distress, comprised of physical, psychological, social, and financial aspects, faced by them as a result of caregiving.[7-8] The care burden among caregivers is often inter-related with the socio-demographics (age, gender, ethnicity, marital status, education, employment, income and religion/spirituality) of the caregivers and patients, disease-related factors (treatment modality, frequency of weekly dialysis sessions, duration and frequency of dialysis, duration of illness, comorbidity, level of patient's dependency), situational and relational factors (relationship to the patient, the duration of caregiving), environmental factors, including social support, and psychological factors including depression and anxiety.[9] Past literature has shown evidence that caregivers who seek social support from family and friends experience a lesser burden of care than caregivers without solid support networks.[10] This is because social support can diminish the impact of the emotional burden and stress of care by providing solutions to problems, distractions from issues, or facilitating the required healthy behaviours.[11-12] Similarly, Nagarathnam, Sivakumar, and Latheef[13] stated that seeking social support is the dominant coping mechanism in caregivers of patients undergoing renal replacement therapy. Also, it has been established that caregivers of chronic patients are four times more likely to be diagnosed with depression and three times more likely to seek help for anxiety issues than individuals who are not caregivers.[14]

There is a high correlation between the psychological well-being of caregivers and patients. Gerogianni et al.[15] stated that caregivers have higher levels of anxiety and depression when dialysis patients under their care are having high levels of anxiety and depression. In line with this study, past studies also reported that caregivers of haemodialysis have deteriorated psychological well-being compared to caregivers of peritoneal dialysis or kidney transplant patients.[16-17] Due to the reason that patients under haemodialysis treatment were perceived to be more difficult to care for compared to patients under treatment for other modalities.[18] In contrast, Al Wakeel and Bayoumi[19] and Cantekin, Kavurmacı, and Tan[20] suggested evidence that a higher burden of care was observed among caregivers of peritoneal dialysis patients than caregivers of patients undergoing haemodialysis treatment. The educational level, age, health, and capability of the patient with regard to self-care serve as the determinants of the burden of care among caregivers.[19-20] Notably, caregivers of dialysis patients reportedly have a lower quality of life than caregivers of non-dialysis patients.[21] The quality of life of caregivers with patients undergoing haemodialysis was reported to be lower in all aspects compared to the general healthy population due to the high burden of care[22]; however, the quality of life of these caregivers was higher than the patients under their care. [8] Conversely, Monárrez-Espino, Delgado-Valles and Ramírez-García[17] concluded that there is no significant difference in terms of quality of life between caregivers of haemodialysis and peritoneal dialysis patients.

Generally, ESRD is highly burdensome in the daily lives of patients and is also time-consuming, especially among elderly HD patients, resulting in patients experiencing frustration and causing them to perceive that they are a burden to their family members.[23] This self-perceived burden arises when the recipients of care possess feelings of dependence, frustration, and anxiety, leading to guilt about the hardship being imposed on the caregiver.[24] The incidence and prevalence of ESRD have adverse effects on the psychological well-being of both patients and their caregivers,[15, 18, 25-27] and their quality of life.[8, 21] Compared to their caregivers, patients with ESRD are more prone to depression and a lower quality of physical and psychological well-being.[18] The prevalence of depression among patients with ESRD is estimated to be around 20% to 30%, whereas their level of anxiety ranges between 12% and 52%.[26] Depression and anxiety symptoms occur more frequently among patients undergoing dialysis than patients who have undergone kidney transplantation.[28] Also, patients under peritoneal dialysis have also been reported to have significantly higher levels of depression symptoms than those on haemodialysis.[29] Conversely, a qualitative study showed evidence that both haemodialysis and peritoneal dialysis patients frequently experience depression along with other psychological problems, such as decreased social support, burnout, despair, and anxiety.[30] Apart from these, patients and their caregivers have to face high treatment costs, out-of-pocket costs, and other comorbidities that arise, which can be overwhelming and cause those in low or middle-income families to bear a financial burden.[31] Based on past literature in other countries, the high treatment costs have led to numerous caregivers having to suffer a financial burden and to willingly mortgage their valuable items to cover those costs.[32-33] In contrast to these studies, Mohd Fadzli, Mohd Rasani and Keng[31] stated that Malaysian patients and caregivers who are reportedly being fully-funded for their treatment may not face a financial burden, but those belonging to low-income families experience a tremendous financial burden. Mixed findings have been reported when comparing the quality of life of haemodialysis and peritoneal dialysis patients. Al Wakeel et al.[34] and Hsu et al.[35] found that peritoneal dialysis patients have a better quality of life than those on haemodialysis. Alternatively, Gonçalves et al.[36] concluded that haemodialysis has a better significant influence on the quality of life of patients compared to peritoneal dialysis as the physical functioning and emotional functioning aspects have been reported to be higher among haemodialysis patients. Meanwhile, several past literatures have suggested evidence that there is no significant difference between the levels of quality of life between the two different dialysis modalities [29, 37-38]. The factors contributing to a lower quality of life among dialysis patients have been identified as the increasing prevalence of depression, anxiety, and suicidal ideation.[39] Conversely, perceived social support serves as a protective factor against a low quality of life among patients.[40-41] A high perception of social support can reduce the risk of hospitalisation among haemodialysis patients by 15%, along with improving their quality of life.[42] Also, a conducive environment helps haemodialysis patients to take a more positive attitude towards their disease, including improving their coping strategies.[43]

Despite the mixed findings, there is still a dearth of research, particularly with regard to the psychosocial factors and the economic impact of ESRD among patients and caregivers in Malaysia. Studies focusing on the well-being of Malaysian patients with ESRD are sorely lacking, and almost non-existent in the case of caregivers. Therefore, there is a need for further investigations to be carried out in this area, particularly with regard to the quality of life, burden of care, depression, anxiety, coping mechanisms, and social support of patients and their caregivers. Another neglected area has to do with the economic burden faced by patients with ESRD and their caregivers with regard to the management of this disease. As far as is known, thus far, no studies have been conducted in the Southeast Asian region on the economic costs incurred by patients with ESRD and their caregivers. Given this situation, this study will compare the psychosocial factors, economic factors, and quality of life of patients with ESRD undergoing HD and PD treatment modalities and their caregivers. Apart from that, the associations between demographic factors, psychosocial factors, economic factors and quality of life among caregivers and patients with ESRD will be examined. Lastly, the perception of psychosocial well-being and economic burden in the management of the illness and its impact on the quality of life of patients with ESRD and their caregivers will be explored in-depth.

Study objectives

Phase 1 of this study focuses on the following objectives:

1. To compare the psychosocial factors, economic factors, and quality of life between caregivers of patients undergoing haemodialysis and caregivers of patients undergoing peritoneal dialysis.
2. To compare the psychosocial factors, economic factors, and quality of life between patients undergoing haemodialysis and patients undergoing peritoneal dialysis.
3. To determine the variables (demographic, psychosocial and economic factors) associated with quality of life among caregivers of patients with ESRD.
4. To determine the variables (demographic, psychosocial and economic factors) associated with quality of life among patients with ESRD.

Phase 2 of this study focuses on the following objective:

1. To explore the perceptions of patients with ESRD and their caregivers regarding their psychosocial well-being and economic burden in the management of ESRD and its impact on their quality of life

METHODS AND ANALYSIS

Design and methods

This study involves the use of a sequential explanatory mixed methods design incorporating methodological and investigator triangulation. Phase 1 of the study involves the collection of quantitative data, while Phase 2 has to do with a qualitative study.[44] Generally, an explanatory design is used when researchers need qualitative data to expand on or explain their initial quantitative findings[45] or when quantitative results are required to direct the selection of participants for a qualitative study.[46] Thus, the collection of qualitative data emerges from and is linked to the quantitative results.[47] Therefore, due to the rigidness of the questionnaire in Phase 1, a sequential explanatory mixed methods study design is imperative in this study to elicit more in-depth information, specifically on the psychosocial well-being and economic factors faced by the participants. Thus, Phase 2 will be conducted to elicit more in-depth information from the participants and to gain a better overall understanding of the phenomena being studied. Doyle, Brady, and Byrne[48] stated that a sequential explanatory mixed methods design is used to substantiate the findings from a quantitative study by providing supporting evidence from the findings of a qualitative study. However, triangulation involving a mixed methods design increases the credibility and validity of the research findings.[49] In Phase 1, a cross-sectional survey will be conducted among patients with ESRD and their caregivers. A cross-sectional approach is preferred as it saves time in terms of the distribution of questionnaires and the collection of information from a sizeable number of participants.[50] Meanwhile, in Phase 2, a qualitative study will be conducted involving focus group discussions among patients with ESRD and their caregivers. A focus group discussion approach can give a fruitful and in-depth understanding of an individual's experiences and perceptions of a specific phenomenon.[51] Furthermore, compared to individual interviews with participants, focus groups tend to provide more ideas and information.[52] The focus group discussions will enable the participants to consider and share their perspectives regarding the psychosocial well-being and economic burden they have to undertake when it comes to the management of ESRD and the impact of these on their quality of life. The data findings from Phase 1 and Phase 2 of the study will be integrated through the triangulation process to provide a more holistic and comprehensive insight into the psychosocial factors, economic factors and quality of life experienced by caregivers and their ESRD patients undergoing different treatment modalities. This mixed methods integration technique will be able to answer the objectives of this study.[44] Also, the role of triangulation in the mixed methods study will be beneficial in confirming the findings, providing more comprehensive data, increasing the validity, and enhancing the understanding of the phenomena being studied.[53]

Study setting

The investigation will be conducted in the nephrology units of Hospital Canselor Tuanku Muhriz UKM (HCTM), Hospital Selayang (HSEL), Hospital Kuala Lumpur (HKL), and the University of Malaya Medical Centre (UMMC), along with ten other non-governmental organisations (NGOs) or private dialysis centres in the Klang Valley, Malaysia. The hospitals were chosen purposively based on their location in the Klang Valley, and are specialist hospitals, non-governmental organisations (NGO), and private centres offering dialysis treatment for patients with ESRD.

Milestones and timelines

The literature review for this study has been completed, and currently, this research is in the pilot testing stage. The pilot study to test the validity and reliability of the instruments for the quantitative data collection in the main study is expected to be completed in two months. The quantitative data collection will take approximately three months to be completed, and the qualitative data collection, which will last for two months, will commence once the quantitative data collection is finalised. The expected timeline for the completion of this study is approximately seven months, with the final manuscript expected to be completed in October 2022.

Patient and public involvement

One patient, caregiver, health psychologist, and two formal care providers (namely, a nephrologist and a dialysis nurse) will be recruited to form the Advisory Committee. This committee will be tasked with reviewing the protocol and structuring the interview schedule and questionnaire to provide the design for the study. The Advisory Committee will also be referred to for advice and feedback, whenever necessary, throughout this study.

Participants and recruitment

Patients with ESRD and their caregivers will be recruited in dyads in both phases of the study. Specifically, potential patients in Phase 1 will be recruited purposively through referrals from nephrologists or nurses in the nephrology units. In contrast, the caregivers in Phase 1 will be recruited purposively through referrals from the patients themselves. This sampling method will ensure that the data accumulated from the participants will be effective, efficient, and cost-effective.[54] However, the participants in Phase 2 will be a subset of the participants in Phase 1. The participants in Phase 2 will be selected purposively to share their views on their psychosocial well-being, economic burden, and quality of life in focus group discussions to ensure that different perspectives are represented. The demographic variables to be considered are age group (young adults, middle-aged adults, and older adults), and gender (male and female). A set of inclusion and exclusion criteria will be utilised within the overall eligible population to ensure that the samples fulfil the aims of this study. The inclusion and exclusion criteria for both phases are similar. Patients have to fulfil these criteria: ESRD diagnosis, above

18 years old, Malaysian nationality, and currently receiving treatment at a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. It is also essential that the potential participants are able to communicate in and read Bahasa Malaysia, the national language of Malaysia. All patients diagnosed with ESRD and their caregivers are welcome to participate in this study. There is no restriction on the duration of the patients' initiation to dialysis in order to recruit a wide range of study participants. However, patients exhibiting severe mental illness or those who have undergone a kidney transplant will be excluded from the study. As for the recruitment of caregivers, they must be above 18 years of age and verified as the family caregiver of an ESRD patient currently undergoing dialysis treatment at a hospital, an NGO establishment, or a private dialysis centre in the Klang Valley. The caregiver is also required to have undergone the experience of accompanying the patient for dialysis treatment at least once, and must be able to read and communicate in Bahasa Malaysia. Formal caregivers, caregivers of patients who have undergone a kidney transplant, or caregivers exhibiting symptoms of severe mental illness will be excluded from the study.

Sample size

Phase 1: Quantitative study

The proposed quantitative study sample size calculation is based on the multiple linear regression formula by Tabachnick and Fidell,[55] which is expressed as $N > 50 + 8m$, where m is the number of predictors. This study will include six predictors (depression, anxiety, coping strategies, social support, burden of care, and economic burden), and the sample size, based on the calculation by Tabachnick and Fidell,[55] is estimated to be 98 participants. However, as the participants are to be recruited in dyads, it is assumed that there will be 98 pairs of patients and caregivers. Besides that, the estimated sample size is also calculated via a power analysis using the G* Power programme for the F test (multiple linear regression: fixed model, R^2 deviation from zero) with an effect size of 0.15 (medium), α at 0.05, power at 0.80

and six predictors. Similarly, the power analysis estimated a minimum sample size of 98, which corresponded with the estimated sample size by Tabachnick and Fidell.[55] For this study, taking into consideration the drop-out rate, non-response rate, and incomplete submission of data by participants, the sample size for this study has been increased by 20%.[56-57] Hence, 118 pairs of haemodialysis patients-caregivers and 118 pairs of peritoneal dialysis patients-caregivers (N = 236 pairs), which is equivalent to a sample size of 472 participants, will be recruited for the quantitative study.

Phase 2: Qualitative study

A qualitative study typically emphasises data saturation, where the saturation point is achieved when no new information, ideas or themes are forthcoming from the participants.[58] Data saturation can be identified within five[59] or three to six focus group discussions[60] with a minimum of four and a maximum of twelve participants in a group.[61] This process is typical for qualitative studies, whereby the emphasis is on arriving at the saturation point. Therefore, based on past literature, six focus group discussions will be conducted in this research, with each group being comprised of at least five participants for this qualitative study. Hence, a minimum of 30 participants (15 patients and 15 caregivers) will be involved in the focus group discussions.

Instruments

Phase 1: Quantitative study

The web-based or paper-based questionnaire to be distributed to the participants consists of three sections: demographic sheet, economic assessment, and psychosocial assessment (Table 1).

Table 1. Summary of instruments for patient and caregiver participants

	Patient	Caregiver
Demographic information	Age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers.	
Economic assessment	Source of funding, monthly cost, weekly cost (time), and perceived economic burden.	
Psychosocial assessment		
Coping behaviour	Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE)	Caregiver Cope (CgCope^{TM})
Perceived burden	Self-Perceived Burden Scale (SPBS)	Zarit Burden Interview (ZBI)
Social support	Medical Outcome Study Social Support Survey (MOS-SSS)	
Anxiety	General Anxiety Disorder-7 (GAD-7)	
Depression	Patient Health Questionnaire-9 (PHQ-9)	
Quality of life	Short Form Survey (SF-36)	

Demographic information

The demographic information of the patients and their caregivers, which will be collected through the questionnaire, covers age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers.

Economic assessment

The second section of the questionnaire, the economic assessment, covers the source of funding, monthly cost, weekly cost (time), and perceived economic burden of the participants.

Psychosocial assessment

The final section of the questionnaire consists of six scales for the psychosocial assessment. However, the coping strategy and burden of care scales differ between patients and caregivers.

The coping behaviour among the patients will be evaluated by the Malay version of the Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE), which is comprised of 28 items with 14 dimensions: self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame.[62] The Malay version of the Brief-COPE, which has been validated by Malaysian breast cancer women patients, has good internal consistency (α=.51 to .99).[63] Meanwhile, the Caregiver Cope (CgCope™) questionnaire, developed by Ibrahim and colleagues,[64] will be used to assess the coping strategies employed by the caregivers. This questionnaire consists of 19 items, with six domains of coping strategies, namely, distraction, caring for the patient, venting, religion, recreation, and social support. The participants will be rated based on a 5-point Likert scale (1 = I have never done this; 5 = I do this very frequently). The validation study conducted among caregivers of schizophrenia patients in Malaysia yielded Cronbach's alpha values ranging between .54 and .82.[64]

To assess the self-perceived burden among patients with ESRD, the Self-Perceived Burden Scale (SPBS) will be distributed to the patients.[24] The SPBS, which consists of 10 items, is rated by a 5-point Likert scale (1 = Not at all; 5 = All the time). The Malay version of the 10-item SPBS utilised in the study by Ting et al.[65] revealed that this is a valid and reliable scale for urological cancer patients (α = .99). Meanwhile, the care burden on caregivers will be examined by 22 items in the Zarit Burden Interview (ZBI).[66] The participants will rate their burden on a 5-point Likert scale (0 = Rarely, 4 = Nearly always). In Malaysia, the Malay version of the ZBI (MZBI) has been validated by family caregivers of cancer patients, with the scale delivering a high internal consistency (α = .89).[67]

The 19-item Medical Outcome Study Social Support Survey (MOS-SSS) developed by Sherbourne and Stewart[68] will be used to examine the participants' perception of social support. This brief, multidimensional, self-administered scale, rated using a 5-point Likert scale (1 = None at all; 5 = Available at all times), measures four categories of social support: informational, instrumental, positive social interactions, and affectionate support. In Malaysia, the Malay version of the MOS-SSS has been validated through a sample of HIV patients. This Malay version of the survey portrayed good psychometric properties, with high Cronbach's alpha values for all the subscales (α >.87) and the overall scale (α =.96).[69]

The General Anxiety Disorder-7 (GAD-7), a screening tool and severity indicator developed by Spitzer et al.[70], will be used to assess the generalised anxiety disorder among the participants. The scale contains 7 items and is rated using a 4-point Likert scale (0 = Not at all; 3 = Nearly every day). The Malay version of the GAD-7, which has been validated through female patients in a government-funded primary care clinic, delivers a good internal consistency reliability (α = .74).[71]

The participants' severity of depression will be assessed through the Patient Health Questionnaire-9 (PHQ-9).[72] The PHQ-9 consists of 9 items and is rated using a 4-point Likert scale (0 = Not at all; 3 = Nearly every day). In Malaysia, the questionnaire has been validated through female patients in a primary care clinic, and the Malay version of the PHQ-9 shows a good internal reliability (α = .70).[73]

The 36-item Short Form Survey (SF-36) will be utilised to assess the health-related quality of life of the participants. The SF-36 consists of eight subscales for measuring different domains of health-related quality of life, namely, physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). Also, two main component scores are derived from the eight subscales. These are the physical component summary (PCS), which consists of the PF, RP, BP, and GH, and the mental component summary (MCS), which consists of the VT, SF, RE, and MH.[74] The Malay version of the SF-36, which has been validated by post-coronary artery bypass grafting surgery (CABG) patients, delivers good internal consistency reliability, with Cronbach's alpha values ranging from .73 to .90 for the subscales.[75]

Phase 2: Qualitative study

A focus group discussion schedule will be developed, based on a literature review and expert input by nephrologists in the research team. The questions for the focus group discussions will be tailored to elicit responses from the patients with ESRD and their caregivers regarding their psychosocial well-being and the economic burden being faced by them, and its impact on their quality of life. The focus group discussion schedule will be piloted among the caregivers and patients to examine the clarity and feasibility of the questions. The focus group discussions will be divided into five sections: demographic details, source of ESRD treatment funding, costs of ESRD management, the impact of their psychosocial well-being on their quality of life, and lastly, the impact of the economic burden experienced by them on their quality of life.

Data collection

Phase 1: Quantitative study

Conventional paper-and-pencil/web-based questionnaires will be utilised. The response rate of the participants who respond positively out of those potentially eligible participants who are invited to be involved in the study will be recorded. Potential participants (patients), identified through referrals from nephrologists or nurses in the nephrology units, will be recruited during their dialysis treatments in the respective hospitals/dialysis centres. In contrast, potential participants (caregivers) will be approached whilst waiting for their patients' treatment to be completed. For the caregivers who are not present during the patients' treatment, the researchers will call them up or meet with them during the patients' subsequent treatment at the respective hospitals/dialysis centres. The recruitment process will progress with the researcher briefing the caregivers and patients on the aims and procedures of the study. Potential participants who respond in the affirmative as to whether they have been previously diagnosed with severe mental illness will be excluded from the study. Potential participants will be given ample time to consider their involvement in the study. Upon receiving their consent, the participants will be provided with a questionnaire, which can be completed in approximately 30 minutes. The researchers will entertain any questions the participants may have regarding the questionnaire. The completed questionnaires will be kept securely for the data analysis process. The criteria for the withdrawal of a subject include a situation whereby the participant voluntarily withdraws his/her consent to participate in the study or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention to do so during the course of the survey or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. As the calculation of the sample size takes into account the drop-out rate for participants, those who withdraw from the study will not be replaced.

Phase 2: Qualitative study

The response rate of participants who respond positively out of those potentially eligible participants who are invited to be involved in the study will be recorded. Potential participants from Phase 1 will be recruited purposively based on the inclusion and exclusion criteria for Phase 2 study. The researchers will brief the caregivers and patients on the aims and procedures of the study. Participants will be given sufficient time to consider their participation in the focus group discussions. The discussion will be held at a designated date, time, and venue to be decided by the researchers, and is anticipated to last for an hour. The discussions will be recorded, and the data will be transcribed verbatim, after which, the recording will be deleted, in keeping with established ethical standards. The subject withdrawal criteria include a situation where the participant voluntarily withdraws his/her consent to participate in this study or when the principal investigator, for any reason, ends the participation. Participants are free to withdraw from the study at any time by stating their intention to do so during the course of the discussion or by emailing the principal investigator, whose email address and telephone number are included in the informed consent form. The arrival at the data saturation point will not be affected by the withdrawal of a participant(s), who will not be replaced.

Data analysis

Phase 1: Quantitative study

The IBM Statistical Package for the Social Sciences (SPSS) software for Windows (version 27)[76] will be utilised for the data processing, while descriptive statistics, independent sample *t*-tests and multiple regression analyses will be utilised for the data analysis. The statistical significance will be set at .05, and descriptive statistics will be used to compute the frequencies, percentages, means, and standard deviation, and to summarise the data from the respondents. To answer Objectives 1 and 2, which are to examine the differences in the treatment modalities on the participants' psychosocial factors, economic factors and quality of life, independent sample *t*-tests will be conducted between caregivers of haemodialysis and peritoneal dialysis patients (Objective 1) and between haemodialysis and peritoneal dialysis patients (Objective 2).

To answer Objectives 3 and 4, two multiple linear regression models will be fitted to examine the association between the psychosocial factors (depression, anxiety, coping strategies, social support, burden of care, and self-perceived burden), economic factors and the quality of life of caregivers (Objective 3) and patients with ESRD (Objective 4), whilst adjusting for potential demographic and clinical confounding factors (age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers) (Figure 1).

Phase 2: Qualitative study

This qualitative study will facilitate an in-depth examination of the participants' perception of their psychosocial well-being and economic burden in the management of ESRD and its impact on their quality of life. A thematic analysis approach will be employed to analyse the data from the focus groups.[77-78] The data from the focus groups will be audio recorded and then transcribed accordingly. A copy of the transcripts will be given to the participants involved in the focus groups for feedback and approval before the analysis is carried out. For storage purposes, the data will be kept in a safety cabinet with a passcode, and only the research team will have access to the stored data. An initial reading of the focus group transcripts will be carried out. The transcripts will be re-read and coded individually to identify the key components of the psychosocial well-being, economic burden, and quality of life of participants. The data will be analysed by a team of researchers using NVivo software for Windows (version 11) (update 4).[79] The coding process begins with open coding by coding lines, statements and/or paragraphs. The data analysis will be considered to have reached saturation point when no new categories emerge. Each transcript will be coded and recoded several times.[78]

Next, a cross-validation to check the coding and transcripts will be undertaken by an independent rater, who will be provided with six interview transcripts. The independent rater's task will have to conduct a thematic analysis and check the appropriateness of that analysis. The independent rater's feedback will be compared with the identified themes. Any disagreements that may emerge in terms of sub-themes and themes will be discussed with the independent rater, and will be resolved through discussions with the independent rater and feedback from the research team.

Triangulation

Triangulation will be used in this research to gain a more accurate understanding of the phenomena being studied, i.e., the psychosocial well-being, economic burden and the impact of these on the quality of life of caregivers and patients. These phenomena will be examined from different methodological angles using quantitative and qualitative methods.[80]This approach will provide the means to verify and/or interrogate the data, thereby increasing the confidence in the results. Therefore, two types of triangulations will be involved. The first type is data triangulation using different approaches (quantitative and qualitive designs) in which information will be gathered from different sources, namely the participants (caregivers and patients), discussions and feedback from the research team, and with the participation of an independent rater or checker for the analysis. The second type is investigator triangulation, in which different investigators (i.e., student researchers, supervisors) will be involved in the data collection and an independent rater will participate in the data analysis. The use of two or more investigators independently can lead to more valid and reliable data,[81] and checking for divergences between researchers will result in minimal divergence, i.e., reliability.

ETHICS AND DISSEMINATION

Ethics Approval

The work has been approved by the Medical Research and Ethics Committee (MREC) [NMRR-21-1012-59714] and the research ethics committees of Hospital Canselor Tuanku Muhriz UKM (HCTM) [UKM PPI/111/8/JEP-2021-078] and the University of Malaya Medical Centre (UMMC) [MREC ID NO: 202178-10346]. Also, the relevant permission and approvals have been obtained from the directors of Hospital Selayang (HSEL) and Hospital Kuala Lumpur (HKL).

Ethical considerations

The researchers will adhere to the principles of the Declaration of Helsinki[82] and the Malaysian Good Clinical Practice Guidelines.[83] Partipants will be required to provide informed consent. The privacy of the participants will be protected during the data collection process by separating the informed consent forms from the paper-based questionnaire responses. All the documents will be deposited in a secure cabinet, and all the data will be stored in a password-protected computer to which only the researchers will have access. All the documents and data will be stored for seven years, after which they will be shredded and deleted. No participant identifiers (name, identity card number, address, phone number) will be traceable, and a unique study ID will be assigned. No medical records will be accessible. Participants will have no access to any personal information, and to ensure the element of anonymity, they will not be informed of the study findings.

Dissemination

The findings from this study will be published in peer-review scientific journals and at national or international conferences. Minimal anonymised data will be uploaded as supplementary material for review purposes in scientific journal publications or conferences, and these will adhere strictly to the ethical principles stipulated. Only group data will be published, and no personal identifier will be collected or made public. The relevant permission will be obtained from all the parties involved before any publication. The findings from this study can serve as a guide for Malaysian policymakers, healthcare providers, and society to improve the quality of life of patients with ESRD and their caregivers through the engagement of constructive and holistic interventions.

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Contributors

All authors were involved in writing the study protocol. SYC and NI drafted the manuscript. CSS, NA, RI and AHAG provided critical revision and feedback of the manuscript. All authors have read and approved the final manuscript.

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Competing interests

The authors declared that there is no conflict of interest.

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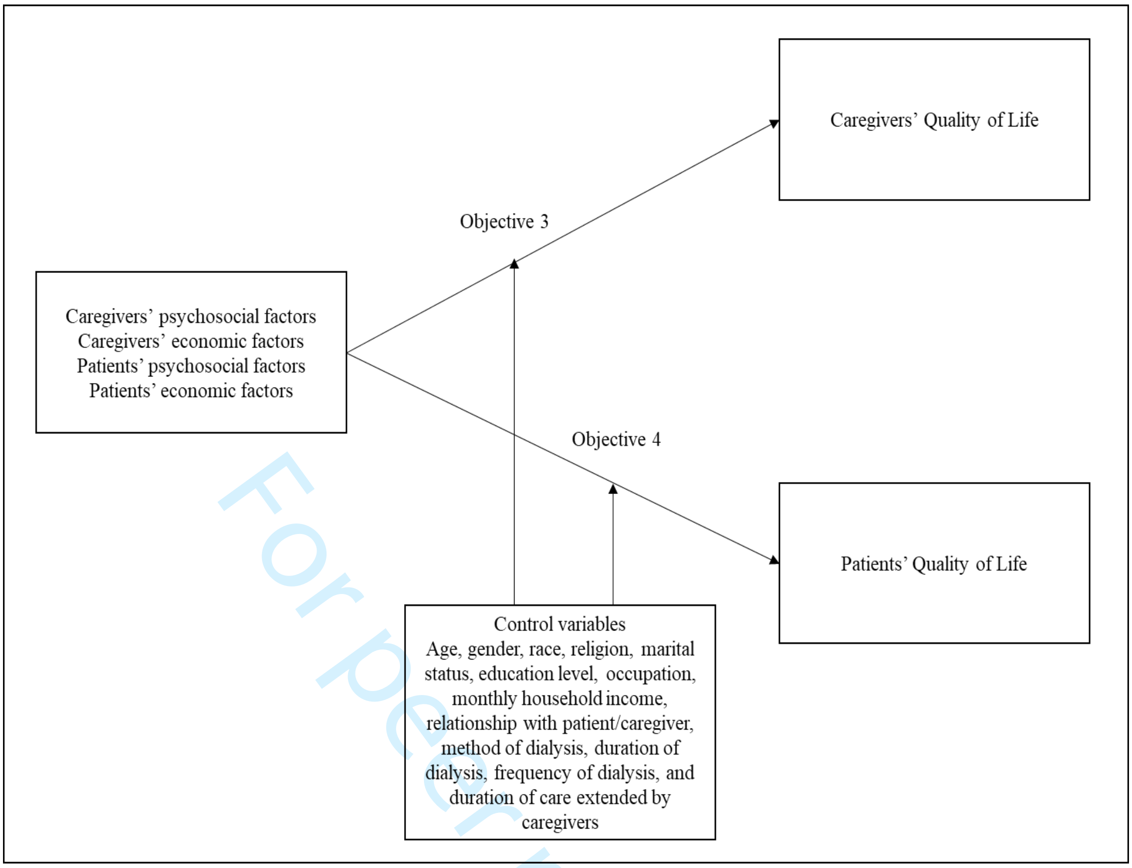
Figure – legend

Figure 1. Analytic plan for Objective 3 and Objective 4 of the study

Two multiple linear regression models will be fitted to examine the association between the psychosocial factors (depression, anxiety, coping strategies, social support, burden of care, and self-perceived burden), economic factors and the quality of life of caregivers (Objective 3) and patients with ESRD (Objective 4), whilst adjusting for potential demographic and clinical confounding factors (age, gender, race, religion, marital status, education level, occupation, monthly household income, relationship with patient/caregiver, method of dialysis, duration of dialysis, frequency of dialysis, and duration of care extended by caregivers).



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