Study Protocol

Digital Dyadic Empowerment Program on Lifestyle Modification for Chronic Kidney Disease Management

Official Title for Year 4 Study:

Digital Dyadic Empowerment Program (DDEP) on Lifestyle Modification for Chronic Kidney Disease Management: A Randomized Controlled Trial

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Responsible Party:

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Collaborators:

National Health Research Institutes, Taiwan

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Digital Dyadic Empowerment Program (DDEP) on Lifestyle Modification for Chronic Kidney Disease Management: A Randomized Controlled Trial

Objective

The purpose of this randomized controlled trial is to examine the synergistic long-term effects of the Digital Dyadic Empowerment Program (DDEP) compared to routine care among patients with chronic kidney disease (CKD). Specifically, the study aims to evaluate the program's impact on patients' kidney function, health-promoting lifestyle behaviors, and the dyads' relationship quality over time.

Design

A randomized controlled trial (RCT) will be conducted to test the effect of the Digital Dyadic Empowerment Program (DDEP) compared to routine care, with a single follow-up assessment at 6 months post-baseline. This RCT will adhere to the Consolidated Standards of Reporting Trials (CONSORT) 2010 statement (Moher et al., 2010) and the CONSORT-EHEALTH guidelines for digital health intervention evaluation (Eysenbach & CONSORT-EHEALTH Group, 2011) to ensure rigorous reporting and transparency in the study design and outcomes.

Participants

Patients aged over 20 years and diagnosed with CKD at stage 1 to 5 for at least six months will be recruited with the following inclusion criteria: (1) patients can identify a helpful significant other, and both parties are willing to participate; (2) patients are able to communicate in Mandarin or Taiwanese. Patients will be excluded if (1) the significant other is a health care provider, (2) either the patient or significant other has a known mental illness diagnosis, (3) the patient is currently receiving renal replacement therapies, or (4) neither the patient nor the significant other uses a smartphone or the LINE messaging app. Patients who

do not meet the smartphone or LINE app requirement will be excluded, as they would be unable to receive the intervention in the experimental group, ensuring rigorous randomization.

Setting

Subject will be recruited from outpatient clinics from a medical center in Southern Taiwan.

Sample Size

The estimated number of dyads will be based on the results of the Year 3 feasibility study, as a reference for calculating the effect and the rate of sample lost to follow-up. In the feasibility study, 60 dyads were recruited, and 55 completed the 3-month follow-up, resulting in a retention rate of 91.67%, which exceeds the 12-month retention rate of 64% reported by Teng and colleagues (2013) in a lifestyle modification program. For the formal RCT, the follow-up period has been shortened to 6 months. Efforts will be made to minimize attrition, targeting a dropout rate below 10%. Power analysis calculations, using G*Power software, indicate that for an effect size of 0.25 and a power of 0.8, a sample size of 76 dyads would be required. Adjusting for a 10% dropout rate, 84 dyads would be needed. To further safeguard against potential attrition and maintain robust subgroup analyses, the target recruitment will be 104 dyads. Considering the recruitment efficiency demonstrated in the feasibility study, the plan to recruit 104 dyads remains feasible and appropriate to ensure sufficient power for detecting intervention effects.

Measurements

Data collection will consist of the following instruments: Demographics (e.g., age, gender, education level) and Disease Related Characteristics (e.g., estimated glomerular filtration rate [eGFR], CKD stage), TTM staging Inventory, Dyadic Adjustment Scale-7 (DAS-7), and Health Promoting Lifestyle Profile-II Chinese version revised (HPLP-IICR).

Procedure

Patients who meet the inclusion criteria will be referred to the study by nephrology outpatient clinic physicians at the study site. Patients attending their routine clinic visit to the nephrology clinic will be identified as potential subject if they meet the inclusion criteria. Dyads will be randomly assigned to either the experimental group or the control group using a pre-generated randomization list prepared via R programming's sample function and by a research assistant.

After assignment, the dyads will proceed to baseline assessment, which will include collecting demographic information, TTM stage of change, and other selected measures such as DAS-7 and HPLP-IICR. The dyads will complete the instruments in a private room, requiring approximately 15 minutes. Dyads assigned to the intervention group will receive the DDEP revised based on findings from year 3. This intervention will include the installation and usage of a digital platform to facilitate health-promoting behaviors and monitor outcomes. Control group participants will receive routine care without access to the DDEP platform during the study period but may join the platform after the study concludes.

Outcome measures will be evaluated at baseline (T0) and six months post-baseline (T1). Participants will be compensated with a small gift after completing each data collection session.

Data Analysis

Descriptive statistics will be conducted to summarize demographic and clinical characteristics. For ordinal outcome variables, such as CKD stage and TTM stage of change, Fisher's exact test will be used to examine the association between group assignment and pre-to-post change categories (e.g., reverse, maintain, or progress for CKD; advance, maintain, or regress for TTM).

Generalized Linear Mixed Models (GLMM) will be used to analyze differences between groups on continuous outcome indicators, considering the repeated-measures design of the study (Sharpe & Cribbie, 2023). The fixed effects in the models will include measurement time point (baseline and 6 months) and the interaction of group assignment (experimental vs. control) with time point, while random effects will include intercepts and time points to account for individual variability. Missing data will not be imputed. Analyses will be performed using IBM SPSS Statistics software (version 25.0). Statistical significance will be determined using a two-tailed p-value of < 0.05.

A sensitivity analysis will be conducted to assess the robustness of findings under different analytic assumptions (Thabane et al., 2013). Specifically, per-protocol (PP) analysis will compare results for intention-to-treat (ITT) or modified intention-to-treat (mITT) groups (Ahn & Kang, 2023; McCoy, 2017). For experimental group participants, a sub-group analysis will classify participants as high or low platform users (based on a platform usage rate threshold of 50%) to explore the potential moderating effects of intervention adherence.

References

Ahn, E., & Kang, H. (2023). Intention-to-treat versus as-treated versus per-protocol approaches to analysis. *Korean Journal of Anesthesiology*, *76*(6), 531–539. https://doi.org/10.4097/kja.23278

Eysenbach, G., & CONSORT-EHEALTH Group (2011). CONSORT-EHEALTH: Improving and standardizing evaluation reports of Web-based and mobile health interventions. *Journal of Medical Internet Research*, *13*(4), e126. https://doi.org/10.2196/jmir.1923

McCoy, C. E. (2017). Understanding the intention-to-treat principle in randomized controlled trials. *The Western Journal of Emergency Medicine*, *18*(6), 1075–1078. https://doi.org/10.5811/westjem.2017.8.35985

Moher, D., Hopewell, S., Schulz, K. F., Montori, V., Gøtzsche, P. C., Devereaux, P. J., Elbourne, D., Egger, M., Altman, D. G., & Consolidated Standards of Reporting Trials Group (2010). CONSORT 2010 Explanation and Elaboration: Updated guidelines for reporting parallel group randomised trials. *Journal of Clinical Epidemiology*, *63*(8), e1–e37. https://doi.org/10.1016/j.jclinepi.2010.03.004

Sharpe, D., & Cribbie, R. A. (2023). Analysis of treatment-control pre-post-follow-up design data. *The Quantitative Methods for Psychology*, *19*(1), 25–46. https://doi.org/10.20982/tqmp.19.1.p025

Teng, H.-L., Yen, M., Fetzer, S., Sung, J.-M., & Hung, S.-Y. (2013). Effects of targeted interventions on lifestyle modifications of chronic kidney disease patients: randomized controlled trial. *Western Journal of Nursing Research*, *35*(9), 1107–1127. https://doi.org/10.1177/0193945913486202

Thabane, L., Mbuagbaw, L., Zhang, S., Samaan, Z., Marcucci, M., Ye, C., Thabane, M., Giangregorio, L., Dennis, B., Kosa, D., Borg Debono, V., Dillenburg, R., Fruci, V., Bawor, M., Lee, J., Wells, G., & Goldsmith, C. H. (2013). A tutorial on sensitivity

analyses in clinical trials: The what, why, when and how. *BMC Medical Research Methodology*, *13*, 92. https://doi.org/10.1186/1471-2288-13-92

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Human Study Amendment Approval

Date:2025.01.03

Title: Digital Dyadic Empowerment Program on Lifestyle Modification for Chronic Kidney Disease Management

Protocol No/IRB No:/B-ER-110-110

Period of Project: From 2022.01.01 to 2025.12.31

Period of Approval: From 2022.01.01 to 2025.12.31

Content/Version:

1. Protocol:Version: 4, Date: 2024.12.13
2. Informed Consent Form:Version: 6, Date: 2024.12.13
3. Questionnaire(caregiver):Version: 3, Date: 2024.12.13
4. Questionnaire(patient):Version: 3, Date: 2024.12.13
5. Amend Co-Researcher: Add Zi-Rui Tay
6. Amend Co-Researcher: Jung-Jung Liang, Wei-Tung Kao withdraw from study
7. Amend Period of Project to 2025.12.31

Institute: National Cheng Kung University

Investigator: Prof. Miao-Fen Yen (Department of Nursing)

Note: If this amendment is related to the clinical trial contract (such as articles or budgets), please contact the Clinical Trial Center.

Approved Number of Participants:NCKUH 358 Persons.

The Institutional Review Board of National Cheng Kung University Hospital (NCKUH) is organized and operated according to the laws and regulations of ICH-GCP and of Central Competent Authorities.

This research(4th Amendment) is reviewed by the Institutional Review Board(B159) and approved by NCKUH IRB on 2025.01.03.

Regarding a multi-year research, please submit the Interim Report before **2025.10.31.** If the approval of the interim report is not granted on its expiration date, in addition to necessary actions to maintain the safety of participants, the research is suspended.

According to Ministry of Health and Welfare and related regulations, follow-up procedures and requirements are as below:

1. Researches that need to be reviewed by the Ministry of Health and Welfare must obtain approval from the Ministry of Health and Welfare before being implemented.
2. All the amendments to the research project should be re-submitted and approved during the original approval period by the NCKUH IRB before implementation.

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3. If the PI does not submit the interim/closure reports on time, NCKUH IRB will suspend PI's rights of applying all new researches.
4. For researches that have been approved by NCKUH IRB, if the implementation has not started or continues to be implemented for some reason, an application for withdrawal/termination should be applied; for completed researches, the closure report should be submitted within three months after the expiration of the research execution period.
5. Regardless of whether the research is in progress or after the research is completed, if any adverse reactions occur to participants, they must be reported in accordance with GCP regulations.

Yours sincerely,
Ting-Tsung Chang M.D.
Chairman

Institutional Review Board
National Cheng Kung University Hospital