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Effectiveness of eHealth interventions targeted to improve medication adherence among older adults with mild cognitive impairment: a protocol for a systematic review and meta-analysis

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ABSTRACT

Introduction Medication adherence is a vital component of successful healthcare, yet poor adherence exists, especially in older adults with mild cognitive impairment. Therefore, this study seeks to conduct a systematic review of eHealth-based interventions aimed at improving medication adherence among older adults with mild cognitive impairment.

Methods and analysis An open electronic database search will be conducted in PubMed, CINAHL, PsycINFO, EMBASE and Cochrane library to identify potential studies till 2022. Two authors will independently screen the titles and abstracts, after which studies that will be eligible for full-text review will be independently assessed by two reviewers for inclusion. Studies will be selected if they evaluate eHealth interventions aiming to improve medication adherence among older adults with mild cognitive impairment. Data will be analysed by using the Comprehensive Meta-Analysis software V.3 and Review Manager (RevMan) software V.5. The authors will separately analyse each outcome measure, compute intervention effects and present them as relative risks with 95% CIs for dichotomous data. Continuous data will be presented as mean differences and standardised mean differences (if required) with 95% CIs. If substantive statistical heterogeneity is identified, we will consider the use of random-effects models that can be incorporated into the statistical analysis. We envisage that this review will adduce evidence on eHealth interventions that will improve medication adherence among older adults with mild cognitive impairment. The findings can also inform health professionals and other relevant stakeholders on current eHealth-based interventions that are used to improve medication adherence among older adults with mild cognitive impairment.

Ethics and dissemination Ethical approval is not required for systematic reviews. Findings will be disseminated widely through peer-reviewed publication and at conferences.

PROSPERO registration number CRD42021268665.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This review protocol reduces the possibility of duplication, provides transparency to the methods and processes that will be employed, ensures possible bias reduction and allows peer review.
⇒ This review will be reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.
⇒ The review will provide the highest level of evidence of eHealth interventions aimed at improving medication adherence among older adults with mild cognitive impairment.
⇒ Despite a robust search strategy and the use of multiple electronic databases, potentially relevant studies might be missed.

INTRODUCTION

Poor medication adherence is considered a major public health problem, which can result in hospitalisations, rehospitalisations and nursing home admissions.[1] Poor medication adherence can also put a financial burden on the healthcare system.[2] Medication adherence is described as taking the right prescribed medication and the right dose at the right time.[3] Medication adherence is a vital component of successful healthcare, yet poor adherence exists.[4] The poor, inconsistent and interrupted adherence behaviour has been shown to lead to negative consequences on care, especially for patients with serious health conditions and elderly patients.[2] Research evidence reveals that older adults are most vulnerable to poor medication adherence, and this is particularly due to advanced age,[5–8] forgetfulness, diminished visual acuity, poor coordination, decreased physical strength and changing medication schedules,[2 9 10] which are linked with multiple factors that are negatively associated with adherence. Also, mild cognitive impairment (MCI) in older adults has been found to be associated with poor medication adherence in most studies.[11–13] The strong

association between poor medication adherence and MCI among older adults, hints that cognitively impaired populations need additional support to adhere to medication regimens.[4] Therefore, it is evident that older adults need medication adherence technologies to help them not only with cognitive impairment or forgetfulness but also with other factors that are associated with poor medication adherence, such as polypharmacy. Existing medication adherence interventions in self-care settings require caregiver involvement, which is often disadvantaged by high-resource delivery needs and mostly impractical for everyday clinical practice settings.[2 14] Consequently, in the last two decades, advances have been taken to support medication adherence among older adults through different eHealth interventions.[2 15] These interventions are generally realised by using communications and information technology-driven electronic reminders to notify patients of the scheduled medication time to take the medication, including the dosage. Electronic reminders are automatically generated reminders that are sent, without any contact in person between the health professional and the patient.[2]

Due to the proliferation of mobile phones among the general population, phone calls and text message such as Short Message Service (SMS) reminders are some of the approaches that have been widely studied. Evidence from a systematic review shows that 18 out of 29 studies reported SMS-based interventions improved medication adherence among older adults.[16] Aside from mobile phone apps, in-home electronic reminder devices and portable reminder devices have been shown to increase medication adherence among older adults. For example, in a randomised controlled trial (RCT) of older adult patients, an automatic pill dispensing device with an audible medication-taking prompt was observed to be more effective in enhancing medication adherence compared with prefilled pillboxes after 6-month trial.[17]

In recent times, medication reminding services are now being integrated into smartphones, which could widely be accepted in the near future due to the numerous advantages associated with it. In-home reminder systems such as automatic pill dispensers are desirable for the growing population of elderly people within the communities. This kind of reminder system does not only remind the patient to take the medication, but also ensures that accidental overdose is avoided.[2]

Evidence-based knowledge is required on eHealth interventions designed to enhance adherence to medication among older adults with MCI. Several reviews have been conducted on interventions to improve adherence to medication among older adults with chronic conditions and the general population,[18–22] but the efficacy of these interventions in older adults with MCI is likely different. Also, there exist only two reviews of interventions designed for enhancing medication adherence among older adults with cognitive impairment,[23 24] but these studies did not focus on eHealth interventions. Therefore, this study seeks to conduct a systematic review of eHealth interventions aimed at improving medication adherence among older adults with MCI. This paper will provide the current trends of eHealth interventions that lead to the improvement of medication adherence among older adults with MCI and increase the opportunities for newer Information Communication Technologies to be accessed by patients.

METHODS AND ANALYSIS

This protocol is registered in the international prospective register for systematic reviews (PROSPERO) database, with registration number: CRD42021268665. This study protocol is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA) statement guide.[25] The proposed systematic review and meta-analysis will be reported in accordance with the PRISMA statement.[26]

Patient and public involvement

No patient will be involved in this study.

Information sources and search strategies

An open electronic database search will be conducted in PubMed, CINAHL, PsycINFO, EMBASE and Cochrane library to identify potential studies till 2022. The search strategy is being developed by the authors in consultation with a medical librarian at Yonsei University. The authors will use a combination of key search terms (ie, Medical Subject Headings) and will adapt the PubMed search strategies for the other databases. The proposed search strategies for the various databases are provided in an additional file (online supplemental appendix 1). The reference list of all the selected and relevant studies will be searched manually to identify additional studies. The snowballing technique will be used till no further study is identified. Other relevant sources will also be searched for additional studies.

Inclusion and criteria

Types of studies

We will include RCTs and quasi-experimental studies that report on medication adherence using eHealth intervention among older adults with MCI. Studies reporting on medication adherence, persistence or discontinuation specifically for MCI will be included. Studies involving RCTs that do not report on medication adherence and the use of technology as an intervention will be excluded. Narrative reviews, meta-analysis protocols and editorials will be excluded.

Types of participants

The reviewers will include studies with participants of 65 years and older, regardless of their race and ethnicity and living in the community with a primary diagnosis of MCI. Studies that include participants with severe cognitive impairment and other mental disorders will not be eligible for this review. Participants with ages less than 65 years or with no specific age defined will be excluded.

Participants with Mini-Mental State Examination (MMSE) ≥24 or equivalent on any cognitive assessment measure or cognitive impairment as a result of stroke will be excluded.

Types of interventions

The interventions of the experimental group will include eHealth interventions to promote adherence to prescribed, self-administered medications among older adults with MCI.

Types of outcomes

The primary outcome will be the change in medication adherence compared with the baseline readings taken prior to the intervention. The outcome will then be compared between treatment groups or the difference between the groups regarding the change in medication adherence. The outcome of medication adherence interventions will be measured by at least one of the following: self-report, pill count, pharmacy refill records and electronic medication monitors, that is, computerised database, pill dispenser and digital network.

Study selection

The PRISMA 2020 flow diagram will be used to guide the study selection process, showing details of the studies included and excluded at each stage. After the completion of the search, the citations of the articles will be imported to EndNote 20 reference manager for screening, removal of duplicates and storage. The reviewers will adopt a two-stage collective review process for screening and determining the inclusion and exclusion of studies. The first stage will involve two authors (JS and JJ) who will independently screen the titles and abstracts of the studies retrieved per the inclusion and exclusion criteria. Subsequently, studies eligible for full-text review will be retrieved and independently assessed by two reviewers for inclusion. The reviewers will discuss discrepancies, and if no consensus, a third reviewer will be consulted to adjudicate. The predefined exclusion criteria will be used to exclude studies with the reasons documented.

Data extraction and management

A standardised data extraction form will be developed by the authors for data entry to ensure accuracy and completeness. Two authors (JJ and AA) will independently extract data from the included studies. The data that will be extracted will include the first author and year of publication, country, study design, sample size, age, medication adherence (adherence and non-adherence), type of intervention, measure and outcome criteria. Authors of the studies will be contacted for missing or additional data. If possible, missing data will be calculated using the available information (eg, imputation). Within the data extraction form, all missing data will be reported and also on the risk of bias (RoB) table.

Assessment of risk of bias

The RoB assessment of the included studies will be assessed independently by two authors (JS and AA) using the Cochrane RoB 2.0 for RCTs[27] and the Risk of Bias Assessment Tool for Non-Randomised Studies (RoBANS) 2.0 for non RCTs.[28] The ROB 2 for RCTs will assess the following: (1) bias arising from the randomisation process; (2) bias due to deviations from intended interventions; (3) bias due to missing outcome data; (4) bias in the measurement of the outcomeb (5) bias in the selection of the reported results and (6) overall RoB. RoBANS 2.0 will be used to evaluate the quality of non-RCTs in eight areas: target group comparisons, target group selection, confounders, exposure measurement, blinding of assessors, outcome assessment, incomplete outcome data and selective outcome reporting. Each component of the RoB 2.0 and RoBANS 2.0 tools will be judged as low RoB, high RoB and unclear RoB.

Data analysis and synthesis

The extracted data will be explored to determine the characteristics of the included studies. The following information from the included studies will be summarised in a table: author, publication year, country, type of intervention, type of technology used, sample size and mean age of the population, intervention duration, provider and study outcome. After which the Comprehensive Meta-Analysis software V.3 and Review Manager (RevMan) software, V.5 will be used to measure the effect size of the included studies. If we observe different time points of measurement, we will compare the difference between the pretest and posttest, conducted immediately after the intervention. We will consider treatment effects using random effects models to reduce the effect of statistical heterogeneity on evaluation (ref; Cochrane handbook).[29]

The authors will separately analyse each outcome measure, compute intervention effects and present them as relative risks with 95% CIs for dichotomous data. Continuous data will be presented as mean differences and standardised mean differences (if required) with 95% CIs. If substantive statistical heterogeneity is identified, we will consider the use of random effects models that can be incorporated into the statistical analysis.

DISCUSSION

After an extensive literature review and to the best of our knowledge, this review is the first to assess eHealth-based interventions systematically and comprehensively on medication adherence among older adults with MCI. Our findings will highlight the current trends of technologies used to enhance medication adherence among older adults with MCI. Our study findings will also draw the attention of clinical practitioners and other relevant stakeholders to the current trends of eHealth interventions used to improve medication adherence among older adults with MCI. Though the researchers used a robust methodology, some potential limitations may eventuate. First, a potential limitation of this review could be the non-uniform reporting of medication adherence levels. Another limitation could be that identified studies might

be of low quality, which could impact the final reporting of the outcomes. Despite these limitations, we expect that the results of this study will inform medication education, physician practice guidelines and various quality improvement initiatives to address medication non-adherence among older adults with MCI. Any amendments that will be made to this protocol during the review will be outlined in PROSPERO and reported in the final manuscript.

Ethics and dissemination

Due to the nature of this study (systematic review), there are no ethical concerns; therefore, ethical approval is not required. Findings will be disseminated widely through peer-reviewed publication and at conferences.

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Contributors JS conceived the study. JS, JJ and AA designed the study protocol. JS and AA drafted the initial manuscript. JJ and AA critically revised the protocol for methodological and intellectual content. All authors read and approved the final version of the manuscript prior to submission.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

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