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Effectiveness of eHealth interventions in improving medication adherence among patients with cardiovascular disease: A network meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2023120063

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 December 2023 and was last updated on 15 December 2023.

INTRODUCTION

Review question / Objective (1) Participants: patients were diagnosed with CVD, including hypertension, ischaemic heart disease, myocardial infarction, acute coronary syndrome, heart failure, and peripheral arterial disease, and was in home rehabilitation period; (2) Types of interventions: included trials must consist of at least one types of eHealth intervention, such as telephone supported, combined intervention (more than two type of eHealth interventions), mobile phone applications (APP), telemonitoring and short messaging service (SMS). (3) Comparison: the comparative arm can be any intervention (such as eHealth interventions, standard care, usual care or placebo); (4) Outcomes: the primary outcome was medication adherence. Adherence was defined as the extent to which an individual's medication taking behavior aligns with the agreed upon recommendations provided by a healthcare provider. Systolic and diastolic blood pressure represented secondary outcomes; (5) Design: RCTs.

Condition being studied Electronic health (eHealth) has gained interest recently due to its potential to provide preventive care in a variety of settings. eHealth has been defined as the utilization of medical knowledge to enhance the health of patients via electronic communications and information technology, including but not limited to video conferences, telephone supported, and telemonitoring. The advantages of eHealth care are promoting health behaviors in real time to adapt to changes in personal health behaviors, nursing needs, goals and resources. eHealth technology also has the potential to deliver evidence-based guidance in an engaging and user-friendly format, thus decreasing health care costs. Several studies have demonstrated that applications, text messages and telephone calls may be of great significance in improving the

medication compliance of patients, respectively. At the same time, eHealth interventions can also promote lifestyle and behavior changes, and better maintain blood pressure and blood lipids within the target range.

However, with such a broad range of eHealth technologies available, few studies pay attention to integrating these eHealth interventions for ranking their effectiveness hierarchically. Most of systematic reviews focus on assessing the effect of a single intervention approach, but the results of them have been inconsistent. To the best of our knowledge, there is only one meta-analysis did include more than one eHealth interventions, but it did not focus on the topic of promoting behavior change, specifically medication adherence. Therefore, it is necessary to emphasize the importance of updating the existing overview in this field. To fill these gaps, our key aim was to conduct a network meta-analysis (NMA) on the existing evidence to rank the effects of various eHealth interventions in medication adherence among convalescent patients with CVD, so as to provide evidence for clinical practice and health policies.

METHODS

Search strategy #1 (Cardiovascular Disease[Mesh])) OR (Disease, Cardiovascular[Title/Abstract]) OR (Cardiac Events[Title/Abstract])) OR (Adverse Cardiac Event[Title/Abstract]))) OR (Coronary Heart Disease[Mesh]) OR (Coronary Disease[Title/Abstract])) OR (Angina Pectoris[Title/Abstract])) OR (atrial fibrillation[Title/Abstract])) OR (myocardial infarction[Title/Abstract])) OR (myocardial ischemia[Title/Abstract])) OR (heart failure[Title/Abstract])) OR (stroke[Title/Abstract])) OR (Cerebrovascular Disorders[Title/Abstract])) OR (peripheral arterial disease[Title/Abstract])) OR (peripheral vascular disease[Title/Abstract]))
#2 (telemedicine[Mesh]) OR (Telemonitoring[Title/Abstract])) OR (telephone[Title/Abstract])) OR (eHealth[Title/Abstract])) OR (Telehealth[Title/Abstract])) OR (mHealth[Title/Abstract])) OR (Mobile Health[Title/Abstract])) OR (Virtual Medicine[Title/Abstract])) OR (Medicine, Virtual[Title/Abstract])) OR (smartphone[Mesh])) OR (smart phone[Title/Abstract]) OR (Phones, Smart[Title/Abstract])) OR (Mobile Applications[Mesh])) OR (Mobile Apps[Title/Abstract])) OR (Portable Software Apps[Title/Abstract])) OR (Text Messaging[Mesh]) OR (text messages[Title/Abstract])) OR (Texting[Title/Abstract])))
#3 (randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR clinical trials as topic[mesh:noexp] OR randomly[tiab] OR trial[ti]) NOT (animals [mh] NOT (humans [mh] AND animals[mh]))
#4 (Medication Adherence[Mesh]) OR (Medication Compliance[Title/Abstract])
#5 #1 AND #2 AND #3.

Participant or population Patients were diagnosed with CVD, including hypertension, ischaemic heart disease, myocardial infarction, acute coronary syndrome, heart failure, and peripheral arterial disease, and was in home rehabilitation period.

Intervention Types of interventions: included trials must consist of at least one types of eHealth intervention, such as telephone supported, combined intervention (more than two type of eHealth interventions), mobile phone applications (APP), telemonitoring and short messaging service (SMS).

Comparator Comparison: the comparative arm can be any intervention (such as eHealth interventions, standard care, usual care or placebo).

Study designs to be included Randomized controlled trial.

Eligibility criteria We defined the target trials according to predetermined selection criteria based on the PICOS criterion.

Information sources Pubmed, Cochrane, Web of Science, Embase, China National Knowledge Infrastructure Library, Chinese Biomedical Literature Database, Chinese Scientific Journal database and WanFang databases.

Main outcome(s) Outcomes: the primary outcome was medication adherence. Adherence was defined as the extent to which an individual's medication taking behavior aligns with the agreed upon recommendations provided by a healthcare provider. Systolic and diastolic blood pressure represented secondary outcomes.

Data management Endnote.

Quality assessment / Risk of bias analysis We assessed the methodological quality of the included RCTs using the Cochrane Collaboration's Risk of Bias approach. Studies were categorized into low, high, or unclear risk of bias based on the following criteria: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment,

incomplete outcome data, selective reporting and other bias.

Strategy of data synthesis We initially conducted a conventional pairwise meta-analysis, with cross-comparisons available for each pairing. The extent of heterogeneity in the included studies was assessed through I2 quantitative analysis, with estimated values of 25%, 50%, and 75% indicating mild, moderate, and high heterogeneity, respectively. We created a network plot to visually represent the evidence base, where various treatment types are represented as nodes, and the strength of evidence is indicated by the connecting lines between relevant nodes. Given that effect sizes pertained to continuous outcomes, we adopted the standardized mean difference (SMD) and 95% confidence interval (CI) to ensure adequate comparability. When essential data, such as means, standard deviations, or sample sizes, were absent in the included literature, we derived alternative values from other available statistics, including standard errors, confidence intervals, or other relevant statistical measures.To summarize the hierarchy of interventions, we employed surface under cumulative ranking curve (SUCRA) values. SUCRA scores range from 1 to 0, with a higher SUCRA score indicating a greater likelihood that the intervention method is the most effective.

Subgroup analysis We conducted pertinent subgroup analyses based on key features during the intervention period. Studies were grouped based on gender, duration of intervention, and theory of intervention.

Sensitivity analysis We will conduct a sensitivity analysis based on the results.

Language restriction English and Chinese.

Country(ies) involved China.

Keywords eHealth, medication adherence, cardiovascular diseases, network meta-analysis.

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