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Mobile phone text messaging for improving secondary prevention in cardiovascular diseases: A systematic review

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ABSTRACT

Objective: The aim of this study was to identify, retrieve, critically appraise and synthesize the existing mobile phone text messaging interventions that have been done for secondary prevention of cardiovascular disease (CVD).

Methods: A systematic review was conducted. The searching was conducted by using the MEDLINE, EMBASE, PsychINFO, CINAHL, PubMed and ScienceDirect databases. Nine randomized controlled trials (RCTs) were eligible and included.

Results: The preventive factors measured among studies varied. While the majority of studies examined medication adherence as a main outcome (4), the other 3 studies focused of CVD risk factors combining blood pressure (BP), smoking, body mass index (BMI), physical activity and dietary habits, only 2 studies examined both medication adherence and risk factor modification of CVD.

Conclusion: Even though mobile phone text messaging may be beneficial for the secondary prevention of CVD, reliable conclusions on the effects of text messaging cannot be drawn.

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Introduction

Cardiovascular disease (CVD) is the main cause of mortality and morbidity worldwide, and a significantly larger number of people die from CVD per year than from any other cause.¹ Approximately 17 million people worldwide die each year from CVD and according to the American Heart Association² this figure is expected to increase to more than 23 million by 2030. This increase in CVD has been related to successes in acute medical care, resulting in people living longer,³ together with genetic and environmental risk factors.⁴ An important proportion of the burden of CVD is preventable,⁵ therefore, effective secondary prevention manoeuvres can contribute to a reduction in coronary mortality and morbidity.⁶ These changes include changes to lifestyle; for instance, smoking cessation, weight reduction and prophylactic drug therapy such as angiotensin converting enzyme (ACE) inhibitors,

anti-platelet agents.⁷ Technology plays an important role in the prevention of CVD. Particularly, mobile health technologies have the potential to reduce the cost of healthcare and improve health research and outcomes (Kumar et al., 2013). According to International Telecommunications Union (ITU, 2016) there are more than 7 billion mobile cellular subscriptions in the world and it was found that half of the smartphone owners use their mobile phone to obtain health information (Fox and Duggan, 2012).

Mobile phone text messaging is a significant means of communication throughout the world,⁸ and in more recent times, the use of text messaging or short message service for disease management and prevention has increased.⁹ Communication between healthcare providers and patients may play a major role in supporting preventive healthcare including disease monitoring and education.¹⁰ For instance, text message reminders for self-monitoring; and patients may report the results of self-monitoring.¹¹ Relevant interventions provide health education to the patients, offer a way of peer to peer networking, supporting self-monitoring of disease and supporting adherence to medication or treatment through text messaging.⁸ Text messaging may also improve healthcare in other ways¹¹; It is fast, inexpensive and convenient. Transmitted messages can be stored.¹² Therefore, in order to promote prevention and management of

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CVD, the use of mobile phone text messaging might provide an effective and innovative approach.

A previous systematic review on mobile phone interventions examined prevention of cardiovascular diseases¹³; it included all mobile phone interventions together, but did not separately consider the use of text messages. There is no study that concentrates singularly on assessing effectiveness of mobile phone text messaging interventions, independent of other technologies and interventions such as email, telephone or video message. Although there are benefits of one form of communication modality over another depending on the aspect of communication being examined, there is some evidence that suggests that rapid viewing and response rates are higher with text messages when compared to email.¹⁴ Older people are more likely to possess and use text-enabled mobile phones compared to other internet-based technologies.¹⁵ Therefore for the population under examination a good proportion of them may not access technologies, such as video messaging and email. Given these discrepancies the results of the systematic review by Park et al. may not be a true representation of the utility of using text messages alone in secondary prevention of CVD. Therefore, the aim of this review was to identify, retrieve, critically appraise and synthesize the existing only mobile phone text messaging interventions other than multiple interventions that have been undertaken for secondary prevention of CVD.

Methods

The systematic review followed The Cochrane Handbook for Systematic Reviews of Interventions.¹⁶ Titles, abstracts and full texts were screened and reviewed by the first (EU) and second authors (EP), after selection criteria were applied in the search.

Identifying and defining the right, clear question is the first step and one of the most significant aspects of undertaking a systematic review (Aveyard, 2014). The purpose of research question is to guide the systematic review, hence, it must be well-defined, answerable and searchable (Ten Ham-Baloyi and Jordan, 2016). PICO format which is the significant components to facilitate the construction of answerable clinical questions (Sacket et al., 2005; Bragge, 2010). It includes following variables: population of interest (P), intervention (I), comparison (C) and the outcomes of interest (O). Therefore, Once the key elements of the question were specified, they were structured and divided into categories (PICO format) in order to develop an answerable clinical research question.¹⁶ The population was identified as (patients with cardiovascular disease), the intervention (healthcare related mobile phone text messaging), the comparison (usual care), and the outcome was to promote self-management of existing CVD and risk factor modification in patients with CVD (secondary prevention of CVD) (Table 1).

Following formulation using PICO the question produced is “does healthcare-related mobile phone text messaging improve secondary prevention in cardiovascular diseases?”.

Search strategy

In order to identify all clinical trials about the efficacy of mobile phone text messaging for secondary prevention of cardiovascular

Table 1
Breakdown of the review question into the PICO format

(P) Population	(I) Intervention	(C) Comparison	(O) Outcome
Patients with cardiovascular diseases	Health-care related mobile phone text messaging	Usual care	Cardiovascular disease secondary prevention outcomes

Table 2

Facet analysis and search strategy (a). Inclusion and exclusion criteria for selecting research papers (b)

a	
Population	Intervention
Cardiovascular Diseases (MeSH term)	AND Text messaging (MeSH term)
OR	OR
Coronary Artery Disease (MeSH term)	Short message ^a
OR	OR
Congenital Heart Defects (MeSH term)	Text message ^a
OR	OR
Hypertension (MeSH term)	Short message service
OR	OR
Heart Failure (MeSH term)	Mobile phone messaging
OR	OR
Heart Valve Diseases (MeSH term)	Mobile phone text messaging
OR	
Peripheral Arterial Disease (MeSH term)	
OR	
Stroke (MeSH term)	
b	
Inclusion	Exclusion
Studies in English and Turkish language	Studies assessing multiple modalities
Randomized controlled trials	Studies that involved teenagers and child populations
Studies published during the last 10 years (2006–2016).	
Male and female adult (≥18 years old) patients	
Studies that involved control group	
Studies that have both one way and two ways text messages	
Studies with mobile phone text messaging interventions	

^a truncation.

diseases, internet-based literature searching was performed. The searching was conducted by using the following six databases: MEDLINE via OVID, EMBASE via OVID, PsychINFO, CINAHL, PUBMED and ScienceDirect in order to identify comprehensive, published recent papers to provide the best evidence. A facet analysis was applied to provide a more focused search and to increase sensitivity (Table 2). Key terms associated with the research question were combined utilizing Boolean operator commands (OR, AND). Boolean operators were utilized to narrow and broaden the search field to obtain the best outcome. The Boolean operator ‘OR’ brings the all identified terms together in order to increase the sensitivity of the findings. In contrary, the Boolean operator ‘AND’ was used to increase specificity of the findings by narrowing down the search and identifying articles that addressed elements of the PICO. Truncation (*) was applied where appropriate to enhance the search.

Eligibility criteria

Male and female adult patients (≥18 years old) with any types of cardiovascular diseases were included in this review. Cardiovascular diseases could include acute coronary syndrome, high blood pressure, heart failure, stroke, heart valve and peripheral arterial diseases. Studies which were conducted among teenagers and children with for example congenital heart diseases were excluded.

Studies had to assess the effectiveness of mobile phone text messaging for secondary prevention of CVD. Studies utilizing both one way and two ways text messages were also included. Text messages that delivered a reminder to take medication or information regarding diet, exercise and smoking were considered a valid text message intervention. Studies assessing multiple modalities (website, email, apps, video, web portal, phone call), other than mobile phone text messaging were excluded. This is because studies assess

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