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The effect of short message system (SMS) reminder on adherence to a healthy diet, medication, and cessation of smoking among adult patients with cardiovascular diseases

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ABSTRACT

Background: Cardiovascular Disease is the leading cause of death worldwide. Non-adherence to a recommended regimen among patients with Cardiovascular Diseases represents a significant problem which could lead to an increase in Cardiovascular Diseases.
Purpose: This study aimed to assess the effects of Short Message System (SMS) reminders on adherence to a healthy diet, medication, and cessation of smoking among adult patients with Cardiovascular Diseases.
Methods: Randomized controlled trial design with three groups was used for this study. A non-probability convenient sample of 160 patients was recruited in this study. The participants were assigned randomly to an experimental group (received SMS regarding adherence to a healthy diet, medication, and smoking cessation), placebo group (received general messages) and control group (routine care). Morisky 8-Item Medication Adherence Scale (MMAS), Mediterranean Diet Adherence Screener (MEDAS), and Readiness to Quit Ladder, were used to assess patients' adherence to medication, adherence to Mediterranean diet, and smoking cessation, respectively. The outcomes were assessed at the beginning of the study and three months later, following completion of the intervention.
Result: One way ANONVA was used to assess the study hypothesis. Significant differences between study groups found in terms of adherence to medication ($p = .001$) and adherence to a healthy diet ($p = .000$); however, no significant difference was found between groups, in terms of intention to quit smoking, and/or the number of cigarettes smoked ($p = .327$), ($p = .34$), respectively.
Conclusion: It is documented that SMS is effective in improving adherence to a healthy diet and medication. SMS could be a promising solution for management of different chronic diseases.
Implication of the study: It is recommended to apply Short Message System (SMS) via cellphone services to improve patient's adherence to a healthy diet and medication. However, further research is needed to support the effectiveness of SMS.

1. Introduction

Cardiovascular Diseases (CVDs) are a group of disorders of the heart and blood vessels which include coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism [1]. CVDs are the leading cause of morbidity and mortality worldwide, accounting for approximately 31% of deaths. [1]. In addition to death, cardiovascular diseases can lead to serious disabilities, illnesses, a decrease in the quality of life, and a substantial economic burden [2]. Low and middle-income countries are mostly affected with CVDs; in which it is the cause of over 75% of deaths [1,3]. Jordan, one of these countries, has a high prevalence of CVDs, which accounts for 40% of deaths, making CVDs the leading cause of death [4].

Progression of treatment, pharmacologically, surgically, and rehabilitation programs increase CVDs patients' survival rate [5]. Patients are discharged within an average of five days [6,7], and the healing process after discharge demands an effective care plan, particularly, for patients who have been newly diagnosed with CVDs. After discharge, patients encounter a challenging time, and lifestyle changes such as adherence to a healthy diet, medication, and smoking cessation are crucial. Adherence to these recommendations is associated with a decrease in readmission and mortality rate. Adherence is defined as "the degree to which patients follow

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the recommendations of medication, diet, and lifestyle modifications recommended by health care providers", which is essential for successful treatment outcomes [8]. However, few people adhere to the recommended guidelines, because adherence to these recommendations is difficult, and influenced by many factors including health beliefs (risk perception, perceived benefit, and disadvantage of treatment), in addition to self-efficacy [9].

Non-adherence is a widespread problem that leads to harmful consequences, especially when coupled with the high prevalence of CVDs and its burden [10,11]. Non-adherence is considered one of the most important obstacles for successful treatment, and threatens health by increasing the development and progression of CVDs, as well as causing a substantial economic burden [10,12]. The scope of non-adherence in the Middle East is close to a global percentage. The percentage of non-adherence among different groups of patients in the Middle East ranges from 1.4–88% [13].

Non-adherence in Jordan, one of the Middle Eastern countries, is a significant issue, especially in the absence of cardiac rehabilitation programs, and the practically nonexistent communication between patient and healthcare provider. A cross-sectional study conducted in Jordan to assess the prevalence of adherence to medication among 902 patients with chronic diseases, in two Jordanian hospitals, using Morisky Medication Adherence Scale. It was found that 73.4% had a low adherence to medication [14]. For smoking, in a study which included 300 Jordanian patients with CVDs, 48.3% of patients were smokers before the occurrence of their disease, only 29.7% quit smoking after the occurrence of CDVs, while 60.7% continued smoking [15].

To decrease the effects of CVDs and prevent its progression or future cardiovascular events, rehabilitation programs and rehabilitation centers were established worldwide. Few people however, attend these programs regularly [16]. Many obstacles hinder patients' attendance to these programs, including logistic barriers like transportation difficulties, financial costs, embarrassment, and accessibility to health care services [17]. Therefore, more feasible, economic, and individualized treatment tailored for patient care is required as an alternative. Using technology, specifically tele-nursing, would be beneficial for patient care and follow up.

Tele-nursing as part of telehealth, which is the use of telecommunication and information technology for delivering nursing care at a distance [18]. It is economical, feasible, and provides uniqueness of care for every patient. Mobile is one of the tele-health services which would help in delivering health care services to patients. The use of mobiles in the health sector is also increasing [19].

Many studies assessed the impact of using telenursing applications such as using the Short Message System (SMS) to improve adherence among patients, with chronic diseases like diabetes mellitus, asthma, and chronic obstructive pulmonary disease (COPD) and found to be effective in improving health outcomes [20–23]. A meta-review of 11 systematic reviews reported that SMS is a promising method of technology for management of chronic diseases and improves outcomes [24]. However, there are no studies in Jordan that assess the effect of SMS on improving patients' outcomes.

In Jordan, following discharge, no home care is available, so SMS could be an accessible way to improve patients' discharge plan. Forgetfulness is the most reported reason for non-adherence and reminders are among the suggested ways to improve adherence [14]. In Jordan, 95% of Jordanians owned a cell phone [25]. Mobile is used for many purposes including texting, taking pictures, and seeking political and health information. The purpose of the study was to assess the effect of Short Message System (SMS) reminders regarding a healthy diet, medication, and smoking cessation adherence among adult patients with CVDs.

1.1. Theoretical framework

Self-Regulation Theory (SRT) was used as a theoretical framework to guide this study [26]. SRT is a theory about coping with healthcare experiences. Self-Regulation Theory (SRT) is based on assumptions of patients, their role in healthcare, and the acceptance of this role from health care providers (HCPs). Per SRT, the patients can adopt health promoting behaviors by themselves or with support from HCPs. The main role of HCPs is to provide information to the patients. The eventual outcomes to be achieved are to maintain usual activities of the patients and help patients to be emotionally comfortable [26].

CVDs represent a stressful event in the patient's life, so the role of the HCPs is to help the patients adapt to this stressful event, and maintain usual activities while complying with reasonable lifestyle changes. SRT can be useful for use in this study by reminding the patients, via SMS, to adhere to the recommended regimen. Reminding patients would help the patient to make decisions about self-care and follow the recommendations. Listing instructions about self-care activities like medication, diet, physical activity, and smoking cessation on discharge could be ineffective without further follow up. Facing a health scare like CVDs can put patients in stressful situations, forcing patients to either choose to cope with this event by maintaining life activities and adhere to recommendations of healthcare providers, or concentrate on their emotional responses (fear or stress) and not taking their medication, continuing smoking and eating an unhealthy diet. The role of health care providers is to provide information for patients, which could be achieved by sending SMS to remind patients of times to take medication, maintain a healthy diet, and smoking cessation. This would help distracted patients from their subjective interpretation of their experience.

Per SRT, the information to be given to patients should be phrased in a way that increases their confidence in their ability to cope with the event. In addition, this information should be tailored based on an individual's need. The final goal to be achieved is coping with the event in a way that would lead to maintaining life activities and adhering to the recommendation of heath care providers [26].

1.2. Research hypothesis

There is a relationship between SMS reminders related to CVDs regimen, and patients' adherence to a healthy diet, medication, and cessation of smoking.

2. Methods

2.1. Design

We used a randomized controlled trial design with three groups: a control group that received routine care which included arranged cardiac clinic physician visits, doing some diagnostic procedures and lab tests and prescription of usual medication taken. The placebo group, which received daily general messages, including advice about health in addition to routine care, and an experimental group, in addition to routine care, received reminder text messages via cellphone for medication, included the rights of medication administration including drug name, dose, rout, and time. Participants were followed up with after three months.

2.2. Setting

The study was conducted in a university teaching affiliated hospital in the North of Jordan, whereby 80% of patients with CVDs visit this hospital and other public hospitals in the region [27]. The