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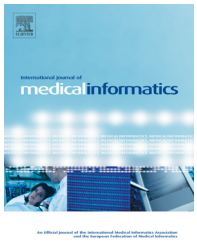

Needs analysis and development of a tailored mobile message program linked with electronic health records for weight reduction

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ABSTRACT

Objective: We developed and pilot-tested a personalized text messaging service program based on data from electronic health records (EHRs) and lifestyle questionnaires for weight control.

Methods: In the health promotion center of a hospital, 340 participants with a body mass index (BMI) greater than 25 were recruited and surveyed for the development of a text messaging program. After developing the interface linking the EHRs with personalized text messages for weight loss, we pilot-tested this program in 102 participants for its feasibility, acceptability and satisfaction.

Results: According to the needs analysis, the participants desired additional information about personalized nutrition and exercise. We selected many variables from the EHRs and questionnaires to create text messages with a more personalized program. After a 1-month trial of the text messaging program, the participants' satisfaction score was 7.9 ± 1.5 and recommendation score was 7.5 ± 1.8.

Conclusions: A personalized short message service (SMS) linked with EHRs was feasible, and the pilot test showed high satisfaction and recommendation scores. Further evaluation using a well-designed trial will be needed.

1. Introduction

The prevalence of obesity is rapidly increasing in Korea and affects 36.5% of men and 26.4% of women, according to the 5th Korean National Health and Nutrition Examination Survey conducted in 2010. Obesity is also associated with increased risks of ischemic heart disease, stroke, diabetes, cancer, depression and low self-esteem [1]. Lifestyle modifications, such as diet, exercise and behavioral changes, are considered to be the first option for weight control [2]. However, the management of obesity remains challenging and

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frustrating to both health care providers and patients. Limitations in time, health counselors and costs can be barriers to effective weight management in primary care practice.

In 2010, the cellular phone penetration rate was more than 100% in Korea. Additionally, worldwide mobile phone subscriptions reached 6 billion in 2011 according to a report by Ericsson, a Swedish provider of telecoms and data communication systems [3]. Among mobile phone users, 81.9% use the phone to text message. Text messaging is instant and inexpensive and can be used by elderly persons with limited access to the internet, and its cost is lower than that of web-based programs. Thus, text message services can be an effective tool to help patients achieve weight control in clinical practice. Haapala et al. [4] investigated the effectiveness of a program providing minimal advice and maximum contact and connectedness via text messaging and found it to be effective in short- and long-term weight loss. A randomized controlled trial on the effectiveness of a short message service (SMS) in weight loss [5] also found that this approach was an effective tool for weight loss.

In addition to the ease of use of the mobile communication environment, electronic health record (EHR) systems have been adopted and used by 50% of tertiary teaching hospitals and 35% of general hospitals in Korea [6]. Therefore, linking a personalized text message service developed and used for weight management with EHR systems could save time and effort and help patients make sustainable lifestyle changes for weight management.

The purpose of this study was to first investigate the needs analysis and design of a text messaging service for weight loss in obese patients and to then pilot test the feasibility, acceptability and satisfaction of the text messaging service linked with the EHRs according to the needs analysis.

2. Methods

2.1. Study participants

From September 2009 to February 2010, subjects with a body mass index (BMI, kg/m^2) greater than 25 were recruited from a university hospital health promotion center. In the health promotion center, periodic health examinations and cancer screening tests are performed on asymptomatic healthy individuals.

A total of 340 subjects participated in the survey regarding the needs analysis and design of the text messaging service for weight loss. All anthropometric measurements were performed with light clothes and without shoes under room temperature conditions at the same location. Blood pressure was measured twice in the right arm using an automatic manometer (BP-8800, Colin Medical Technology Corporation, Louisville, USA) in the sitting position after resting for 10 min. The subjects also underwent laboratory examinations to measure the levels of fasting glucose, cholesterol, triglycerides, HDL cholesterol, HDL cholesterol and uric acid, as well as renal and liver function tests (Toshiba TBA 200FR chemistry analyzer, Tokyo, Japan). The study flow is presented in Fig. 1.

This study was performed at Seoul National University Bundang Hospital and subjects gave informed consent to it.

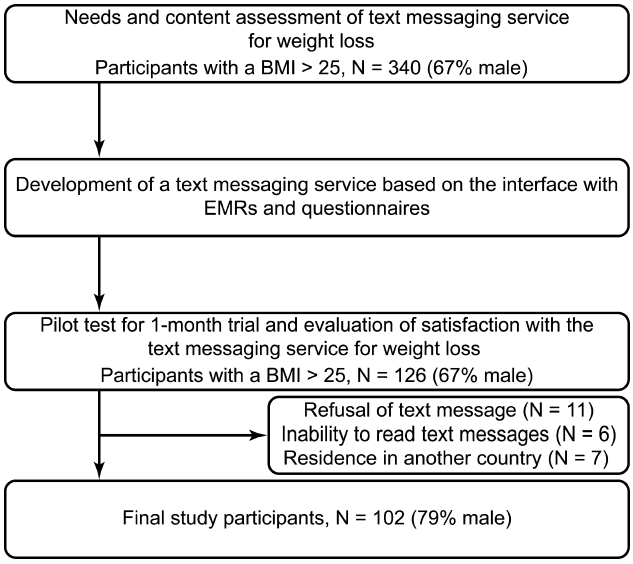

Fig. 1 – Flow diagram of the study flow.

This study was approved by the Institute Review Board of Seoul National University Bundang Hospital, number B-0908/082-114.

2.2. Patient's perspectives and needs analysis of text messaging in weight management

The subjects completed self-administered questionnaires composed of three parts. The first part included obesity-related lifestyle factors, such as drinking patterns, eating speed [7], regularity of meals, response to eating cues, preference for salt intake [8,9], preference for fat intake [10], preference for carbohydrate intake and perceived stress score according to the modified Brief Encounter Psychosocial Instrument (BEPSI) scale [11]. Subjects who exercised three or more times per week for >30 min were categorized as the regular exercise group, and those who exercised less than three times per week were considered the non-exercise group.

The second part of the questionnaire related to the design and content of the text messages; preferences for the content regarding nutrition, exercise or educational materials about the participants' laboratory results; preferences for other programs, such as internet websites, email consultations or direct call services from health care providers; frequency of text messages per day and per week and the preferred time to receive text messages.

The third part of the questionnaire concerned the patients' sociodemographic characteristics and underlying medical conditions. Information about smoking, drinking, past medical illnesses and current medication history was collected. Smoking status was categorized as current smoker, ex-smoker or non-smokers according to the patient's answer. Alcohol consumption was categorized into three groups: low risk (total alcohol intake $\leq$40 g/d), medium risk (40 g/d < total alcohol intake $\leq$60 g/d), and high risk (total alcohol intake > 60 g/d) [12].