Review article

Internet programs targeting multiple lifestyle interventions in primary and secondary care are not superior to usual care alone in improving cardiovascular risk profile: A systematic review

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ABSTRACT

Objective: To review the effects of Internet delivered multiple modifiable lifestyle interventions complementary to usual care on cardiovascular risk factors in the primary and secondary healthcare setting.
Method: PubMed, EMBASE.com, CINAHL, PsycINFO, and the Cochrane Library were searched up to June 2012 for English written studies that 1) addressed multiple lifestyle interventions, 2) used Internet intervention through websites or email, 3) included at least one usual care group not using Internet, 4) aimed to improve any of cardiovascular risk factors and 5) targeted patients aged 18 or older.
Results: Our systematic search yielded 1857 citations of which 9 were selected for this review. Three studies reported significant differences in weight loss in favor of the intervention group and five studies reported non-significant differences between groups. From the 7 studies reporting on blood pressure (BP) measurements, two found significant improvement in favor of the intervention group, while the other studies found no significant differences. Only one study found a significant improvement of LDL-C in the intervention group compared to usual care. Another study found a significant improvement of HDL-C in the usual care group compared to the intervention group.
Conclusion: The addition of a multiple modifiable lifestyle Internet intervention in primary or secondary care is not superior to usual care with respect to prevention and treatment of cardiovascular risk factors. However, an Internet delivered program does have the potential of being successful in reducing the number of doctor's visits and may therefore be cost-effective when applied in large scale.

1. Introduction

Presently, non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes, cancer and chronic respiratory diseases are the main cause of death worldwide [1]. Death under 60 years of age due to NCD ranges from 13% to 41% respectively in high- and low-income countries. In 2008, NCDs accounted for 89% of all deaths in the Netherlands, of which 31% was due to cardiovascular diseases and diabetes [2].

Acute vascular events increase not only mortality, but also morbidity leading to chronic and invalidating complications. The consequent need for chronic medical care increases the burden on the healthcare budget. It has been predicted that the incidence of cardiovascular disease and related costs are going to increase even further in the future [3].

Fortunately, most cardiovascular diseases are largely preventable by minimizing risk factors such as high blood pressure (BP), tobacco use, raised blood glucose, physical inactivity, overweight and obesity.

Unfortunately, conventional healthcare provided by hospital outpatient departments (OPDs) or general practitioners (GPs) does not seem sufficient enough in proper treatment of these patients, since many do not reach their treatment goals such as adequate BP reduction [4] or blood glucose control [5]. In diabetic patients, intensifying treatment with tight glucose regulation, strict drug regimes and behavior modification has been shown to decrease vascular complications and mortality [6]. However, due to the expected increase in chronic healthcare consumption and imposed cost savings in healthcare, it does not seem feasible to provide intensive coaching/treatment for the majority of patients at-risk for cardiovascular diseases. Therefore, reorganization of the healthcare system with the aim of increasing efficiency using novel and innovative methods seems necessary.

An example of a relatively new concept is the use of Internet and related technologies to deliver health services at distance, providing a promising method to maintain frequent contact between healthcare workers and patients, without overburden of existing healthcare facilities. In addition, this type of healthcare can augment patient involvement and increase personal motivation to manage their own health.

In the last decade, there has been a continuous stream of publications regarding the use of Internet in the prevention and treatment of

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cardiovascular diseases [7]. Many studies investigated the effect of Internet delivered interventions on single risk behaviors such as physical activity [8], smoking cessation [9], alcohol consumption [10] and dietary intake [11]. However, cardiovascular diseases are generally related to a combination of multiple interrelated lifestyle risk factors which potentiate each other. Therefore, it can be said that cardiovascular prevention programs should focus more on multiple lifestyle interventions rather than a single intervention [12,13]. To date, the effect of multiple lifestyle interventions in primary and secondary care is unclear. Evidence suggests that multifactorial lifestyle programs have small effects on the separate risk factors but that they are beneficial on major clinical outcomes because of their synergistic or summative effect [14]. A disadvantage of multiple lifestyle interventions is that it might be burdensome and overwhelming for patients [15,16]. Nevertheless, it has been demonstrated that simultaneously delivered lifestyle interventions can be equally successful as sequential delivered lifestyle interventions in obtaining multiple behavior change [17].

We conducted a systematic review with the aim of evaluating whether Internet delivered care complementary to usual care improves cardiovascular outcomes. Because we believe that cardiovascular diseases need an integrated approach, we focused on original research articles that studied the effect of Internet-based multiple lifestyle interventions on cardiovascular outcomes on top of usual care (the conventional care delivered at the OPD), compared to patients receiving usual care alone.

2. Methods

2.1. Data sources and search terms

A comprehensive search was performed in the bibliographic databases PubMed, EMBASE.com, CINAHL (via EBSCO), PsycINFO (via EBSCO) and the Cochrane Library (via Wiley) up to June 25th, 2012. The search combined three topics: 1) prevention of cardiovascular disease, 2) lifestyle interventions, and 3) Internet. These topics were searched using controlled vocabulary (MeSH in PubMed, Emtree in EMBASE.com, etc.) and filtered to identify randomized controlled trials (RCTs) or case–control studies, meta-analysis, practice guidelines and (systematic) reviews. Meta-analysis, guidelines and reviews were included in the search to obtain additional information on this topic. Only free text terms were used in the Cochrane Library. The full search strategy is included in the appendix.

2.2. Selection criteria

Studies eligible for inclusion in this review were RCTs or case–control studies that (1) addressed multiple lifestyle interventions in two or more of the following domains: physical activity, dietary behavior, alcohol use and smoking; (2) targeted adult patients in a primary or secondary healthcare setting with the aim of improving cardiovascular risk factors and preventing cardiovascular events; (3) included at least one group of patients receiving an 'Internet-based' intervention, which we defined as using either Internet websites or email contact for information exchange, data transfer, feedback and/or communication; (4) included a 'usual care' control group defined as routine care received by patients in any primary or secondary healthcare setting; and (5) targeted improving cardiovascular risk profiles measured by at least one of the following outcome measures: weight (kilograms, kg), body-mass index (BMI, kg/m^2), blood pressure (BP; mm Hg), and laboratory investigations including total cholesterol (TC; millimoles per liter, mmol/L), triglycerides (TG; millimoles per liter, mmol/L), low-density lipoprotein cholesterol (LDL-C; millimoles per liter, mmol/L), high-density cholesterol (HDL-C; millimoles per liter, mmol/L), blood glucose (millimoles per liter, mmol/L) or hemoglobin A1C (HbA1c; %) levels. Primary outcome measurements had to be evaluated at baseline and during a predefined follow-up period.

We excluded studies for this review if they: (1) included 'usual care' services that already incorporated Internet-based interventions in primary or secondary care delivery; (2) included patients aged 18 years or under; (3) were non-English articles; and (4) included pregnant woman. Book chapters, abstracts from conference proceedings, and dissertations were also excluded.

3. Results

3.1. Study selection

The search resulted in 1857 citations from which 122 were initially selected by a single reviewer based on title and abstract. Of these publications, 114 were excluded for several reasons: Studies not conducted in a primary or secondary healthcare setting (n = 37), without a 'usual care' control group (n = 10), without a control group at all (n = 6), comparison of Internet-based intervention to another technological intervention (Internet of telephone) (n = 23), Internet interventions for use by physicians or nurses only (n = 5), non-cardiovascular risk factor outcome measures (n = 9), manuscripts describing only the protocol without the results (n = 11), used data from identical study populations (n = 3), telephone-based intervention (n = 2), Internet intervention merely at baseline (n = 2), single cardiovascular risk factor interventions (n = 4), and full text article not available (n = 2). One publication in-press was also added to the selection. As a result, nine publications were found eligible for inclusion in this review. See flow-chart in Fig. 1.

3.2. Characteristics of the reviewed studies

Studies were published between 2003 and 2012. A total number of 2008 patients were enrolled in the nine studies at the time of inclusion with an average age of 54.9 years (range 45.3–62.0 years). The average intervention duration was 8.2 (range 2 to 12) months. Primary outcome measures of the studies were weight loss (n = 2) [18,19], cardiovascular disease risk management (n = 4) [20–23], hypertension control (n = 2) [24,25], and diabetes management (n = 1) [26]. Mean lost to follow-up during the study period in the control groups was 14.6% (range 0–34.0%) and in the intervention groups 14.5% (range 0–29.3%).

3.2.1. Usual care

In all studies, usual care was defined as current standard healthcare services in the OPD. For a majority of the studies, patient visit frequencies were determined by the treating physician and therefore not further specified [18–24,26]. In the study of Park et al. [25], the usual care group was seen by the same hypertension specialist as the intervention group with a frequency of one or two times in 8 weeks. Adherence to standard of care was reported in only one article [24], and the primary care visits in this study were not different between usual care patients and both intervention groups, with an average of 3 visits in one year time.

3.2.2. Internet interventions

There was between study heterogeneity with regard to intervention intensity, and all studies used a unique Internet program design. Comparably, all Internet programs were designed for individual counseling with a personal login menu for each participant, allowing convenient and easy access. However, most studies advised patients to regularly use the website, varying from once every two weeks to at least three times a week (Table 1).

Program adherence varied among the studies. Two studies reported that respectively 47% and 49% of patients never used the website [19,20]. Two studies did not report about the usage of the Internet program [25,26]. The other studies achieved their login goal on average [18,21–24], however two of these studies also reported on login