



Lifestyle advice and interventions for cardiovascular risk reduction: A systematic review of guidelines



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ABSTRACT

Background: Lifestyle factors are important in preventing cardiovascular disease (CVD) development. We aimed to systematically review guidelines on primary prevention of CVD and their recommendations on lifestyle advice or intervention, in order to guide primary prevention programs.

Methods: Publications in MEDLINE, CINAHL over 7 years since May 3, 2009 were identified. G-I-N International Guideline Library, National Guidelines Clearinghouse, National Library for Health Guideline finder, Canadian Medical Association InfoBase were searched. On the February 8, 2017, we updated the search from Websites of organizations responsible for guidelines development.

Study Selection: 2 reviewers screened the titles and abstracts to identify Guidelines from Western countries containing recommendations for lifestyle advice and interventions in primary prevention of CVD.

Data Extraction: 2 reviewers independently assessed rigor of guideline development using the AGREEII instrument, and one extracted recommendations.

Results: Of the 7 guidelines identified, 6 showed good rigor of development (range 45–86%). The guidelines were consistent in recommendations for smoking cessation, limiting saturated fat and salt intake, avoiding transaturated-fat and sugar, with particular emphasis on sugar-sweetened beverages. Guidelines generally agreed on recommendations for physical activity levels and diets rich in fruit, vegetables, fish and wholegrains. Guidelines differed on recommendations for specific dietary patterns and alcohol consumption. Recommendations on psychological factors and sleep are currently limited.

Conclusions: Current guidelines agree on the importance of lifestyle in the prevention of CVD with consensus on most factors including physical activity, smoking cessation and diet, which should be actively integrated in cardiovascular risk reduction programs aiming to improve clinical outcomes.

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1.1. Introduction

Lifestyle factors such as smoking, high calorie diets, saturated fats, high salt intake, low intake of fruit and vegetables, psychological factors

Abbreviations: AGREE, Appraisal for Guidelines and Research Evaluation; ASCVD, Atherosclerotic cardiovascular disease; CKD, Chronic kidney disease; CVD, cardiovascular disease.

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and being sedentary are associated with cardiovascular disease (CVD) development [1]. It is estimated that about 60% of the CVD mortality decline over the 2 decades since the 1980's was attributable to a reduction in major CVD risk factors, primarily smoking. The remaining reduction was attributed to pharmacotherapy [2,3]. A more recent analysis confirms that improvements in a number of modifiable risk factors including smoking, cholesterol and blood pressure can explain much of the reduction in coronary heart disease mortality [4].

Lifestyle interventions play an important role in prevention of a number of CVD outcomes and its promotion has been emphasized in many prevention guidelines [5–8]. Despite this, most people in many Western countries do not meet the recommendations for diet and physical activity despite known health benefits including future CVD risk reduction [9]. Prevention of CVD is a rapidly evolving field and the potential for long term health care benefits from timely, personalized

risk factor assessment and intervention has been recognized, highlighted by both human and economic arguments of CVD prevention [5,10,11]. Recommended prevention strategies now predominantly use risk stratification based on absolute 10-year CVD risk prediction to guide management [12].

A systematic review from the US preventive Services Task Force concluded that counselling for diet and physical activity in persons with risk factors for CVD resulted in consistent improvements across various intermediate health outcomes up to 2 years follow up [9]. The recent American College of Cardiology (ACC)/American Heart Association (AHA) guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular disease (ASCVD) risk in adults emphasized that lifestyle modification remains a critical component of health promotion and ASCVD risk reduction, both prior to and in concert with the use of cholesterol lowering drug therapies [13]. Healthy diet or lifestyle modifications were recommended as background therapy in published randomized controlled trials (RCTs) of cholesterol-lowering drug therapy [14].

The aim of this systematic review was to identify similarities and differences among recommendations on lifestyle advice and interventions from recent guidelines addressing total CVD risk in the context of primary prevention. By a critical appraisal, we sought to guide clinicians and other health care professionals that are involved in primary prevention programs and counseling.

1.2. Methods

1.2.1. Data sources and guideline selection

We conducted a systematic review, using our previously published search strategy, for guidelines containing recommendations for lifestyle interventions for a primary prevention population [12] (see Supplementary text for search strategy). We looked at guidelines that dealt with total cardiovascular risk rather than specific to a single condition such as hypertension or hypercholesterolemia alone.

We performed a systematic literature search to identify appropriate guidelines [12]. We searched for published guidelines using MEDLINE and CINAHL between May 3, 2009 and June 30, 2016. We supplemented this by using guidelines specific databases; 1) The National Guideline Clearinghouse (US), 2) National Library for Health on Guidelines Finder (UK), 3) Canadian Medical Association InfoBase (Canada), and 4) G-I-N International Guideline Library (<http://www.g-i-n.net>). A search of a number of websites of guidelines development organizations was also carried out and updated on February 8, 2017 (see Supplementary Table A1 for list). Searches were limited to national guidelines from the United States, Canada, the United Kingdom, Australia and New Zealand and other international guidelines written in English.

1.2.2. Study selection

References meeting the Institute of Medicine definition of guidelines were included. Guidelines were excluded if they did not contain recommendations for the apparently healthy adult population, were entirely focused on a single condition (e.g. hypertension), were not produced on behalf of a professional organization or were not relevant to Western countries. Only guidelines produced from May 2009 with an Appraisal for Guidelines and Research Evaluation (AGREE) II rigor of development score over 40% were included to ensure appropriateness and relevance of the selected guidelines.

Table 1

Characteristics of 7 Guidelines for Total Cardiovascular risk.

Guideline	Organization responsible for guideline development	Country applied	AGREEII rigor score, %	Conflicts of interest
ESC [16], 2016	European Society of Cardiology	Europe	86	SCI ^a
NICE [7], 2014	National Institute for Health and Clinical Excellence	United Kingdom	86	EI, SCI ^{a,b}
NHMRC [8], 2012	National Health and Medical Research Council	Australia	85	EI, SCI ^b
ACC/AHA [6,13,30], 2013	American College of Cardiology/American Heart Association	United States	83	SCI ^{a,b}
CDC [31], 2011	Centres for Disease Control and Prevention	United States	65	EI, SCI ^{a,b}
JBS3 Board [5], 2014	British Cardiovascular Society	United Kingdom	45	SCI ^a
NZGP [32], 2012	New Zealand Guideline Group	New Zealand	20	EI, SCI ^c

Abbreviations: AGREEII, Appraisal of Guidelines Research and Evaluation II; EI, editorial independence declared; FIP, funding by industrial partner reported; SCI, statement about conflicts of interest of group members present; UK, United Kingdom.

^a Relationship with industry is reported by any group member.

^b A group member is reported recused when a relevant area is under discussion.

^c Conflicts of interest only available on request.

1.2.3. Data extraction and quality assessment

Titles and abstracts were assessed by 2 independent reviewers (MK and VB). Articles were excluded if both reviewers agreed they were not eligible. Discrepancies between reviewers were resolved by consensus. Both reviewers performed the final selection for full data extraction.

We utilized the 23-item AGREE II instrument to determine the rigor of development for each of the guidelines [15]. Two reviewers (MK and CVW) independently rated the 8 items on a 7-point Likert scale in accordance with the instructions of the AGREE II committee with particular emphasis on the rigor of development domain. Average rigor scores were obtained by expressing the sum of the individual scores as a percentage of the maximum possible score. Reproducibility of the 2 reviewers scores was very good, with an interclass correlation coefficient of 0.80 (comparing the agreement of the total rigor of development score obtained by the two reviewers, see Supplementary Table A2). Guidelines were ranked according to their scores. Editorial independence from the funding body, external funding and disclosure of relationships with industry were also assessed.

1.2.4. Data synthesis and analysis

One reviewer (MK) extracted all the relevant recommendations from the guidelines that had an AGREE II score of >40%. General lifestyle advice was the main emphasis of the data extraction. A recommendation matrix was produced. The matrix was divided into (1) a methods section, (2) target group and (3) recommended lifestyle advice.

1.3. Results

Our search retrieved 3560, of which 187 were potentially eligible (Fig. A1). On the basis of the abstract we excluded 133 articles. After we reviewed the full report 47 more were excluded. We included 7 guidelines on total lifestyle advice or intervention for total cardiovascular risk reduction. Table 1 summarises the selected guidelines with rigor scores and conflicts of interest.

Six of the 7 guidelines had a rigor score of 40% or greater. The guidelines originated from the USA (2 guidelines), UK (2), Australia (1) and Europe (1). Tables 2–4 summarise the guideline recommendations in a matrix along with levels of evidence stated in the guidelines where this was available. Table 2 provides a summary of the 6 guidelines with a rigor score of over 40%. We then provide a summary of the specific recommendations on diet (Table 3), physical activity, smoking, weight, psychological factors and sleep (Table 4). Supplementary Table A3 provides an abbreviated version of the recommendations included in the main tables providing easier reference for clinical practice.

1.3.1. Areas of agreement

Most of the guidelines identified high-risk categories of people that should receive intensive lifestyle counseling. This commonly included presence of

1. Diabetes – although no consensus exists as to which group of diabetics (examples include Type 1 diabetes or diabetes with an additional risk factor such as age >60, or microalbuminuria)
2. Chronic kidney disease (CKD) – the most common estimated glomerular filtration rate cut-off was <60 ml/min/1.73 m² with one guideline using <45 ml/min/1.73 m² (NVDP).

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