World Heart Federation Cholesterol Roadmap

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ABSTRACT

Background: The World Heart Federation has undertaken an initiative to develop a series of Roadmaps.

Objectives: The aim of these is to promote development of national policies and health systems approaches and identify potential roadblocks on the road to effective prevention, detection and management of cardiovascular disease (CVD) in low-and middle-income countries (LMIC), and strategies for overcoming these. This Roadmap focuses on elevated blood cholesterol, a leading risk factor for myocardial infarction, stroke, and peripheral arterial disease.

Methods: Through a review of published guidelines and research papers, and consultation with a committee composed of experts in clinical management of cholesterol and health systems research in LMIC, this Roadmap identifies (1) key interventions for primordial, primary and secondary prevention of CVD through detection, treatment, and management of elevated cholesterol and familial hypercholesterolemia (FH); (2) gaps in implementation of these interventions (knowledge-practice gaps); (3) health system roadblocks to treatment of elevated cholesterol in LMIC; and (4) potential strategies for overcoming these.

Results: Despite strong evidence of the importance of cholesterol levels in primary or secondary prevention of CVD, and the effectiveness of statin therapy for cholesterol lowering and reduction of CVD risk, gaps exist in the detection, treatment, and management of high cholesterol globally. Some potential roadblocks include poor access to laboratory facilities or trained professionals for cholesterol management, low awareness of FH among the general population and health professionals, unaffordability of statins for patient households, and low awareness of the importance of persistent adherence to lipid-lowering medication. Potential solutions include point-of-care testing, provision of free or subsidized lipid-lowering medication, and treatment adherence support using text message reminders.

Conclusions: Known effective strategies for detection, treatment, and management of elevated cholesterol and FH exist, but there are barriers to their implementation in many low-resource settings. Priorities for health system intervention should be identified at the national level, and the feasibility and effectiveness of proposed solutions should be assessed in specific contexts. Many solutions proposed in this Roadmap may apply to other cardiovascular conditions and present opportunities for integration of CVD care in LMIC.

In 2012, all member states of the World Health Organization (WHO) endorsed a historic target to reduce premature mortality from noncommunicable diseases (NCD) by 25% by 2025. This commitment was echoed by the United Nations Sustainable Development Goals in 2015, which include a target to reduce premature mortality from NCD by 30%. These targets are especially relevant to atherosclerotic cardiovascular disease (CVD), which is the leading cause of death globally and is increasing in prevalence in low- and middle-income countries (LMIC).

In support of reaching these targets, the World Heart Federation (WHF) has undertaken an initiative to develop a series of Roadmaps to promote development of national policies and health systems approaches; identify potential roadblocks on the road to effective prevention, detection, and management of CVD in LMIC; and provide strategies for overcoming these. These Roadmaps provide guidance for countries toward developing or updating national NCD programs using the framework provided by the WHO's Global Action Plan for the prevention and control of NCD

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2013 to 2020 [1,2]. Roadmaps dedicated to secondary prevention of CVD [3]; tobacco control [4]; raised blood pressure [5], rheumatic heart disease [6], and atrial fibrillation [7] have already been published. This Roadmap focuses on blood cholesterol. While most existing global data refer to total blood cholesterol (TC), this Roadmap will reflect a growing body of evidence on the risk associated with specific subtypes of cholesterol, for example, low-density lipoprotein cholesterol (LDL-C), or the ratio of apolipoprotein B ([apo B]; the main protein in LDL-C) to apolipoprotein A1 ([apo A-I]; the main protein in high-density lipoprotein cholesterol [HDL-C]).

THE RELEVANCE OF CHOLESTEROL TO THE GLOBAL BURDEN OF CVD

Reducing cholesterol-related CVD risk, namely risk associated with myocardial infarction, stroke, and peripheral arterial disease, plays a vital role in achieving the WHO 25 × 25 target for reducing premature mortality from CVD and other NCD. Worldwide, there are about 17 million deaths due to CVD each year [8], and international studies have suggested that elevated apo B/apo A-I is among the most important risk factors for myocardial infarction (MI) [9] and for ischemic stroke [10]. Research from 2008 suggested that the global average of TC showed little change in the preceding 3 decades, because of opposing trends: decreases in Australasia, North America, and Europe and increases in east and southeast Asia and Pacific [11]. Estimated average TC by country, for men and women, is shown in Figure 1 [12].

WHO has identified control of cholesterol, as part of a Total Risk Approach to the prevention of CVD, as a public health priority [13]. Cholesterol reduction is vital to both primary and secondary prevention of CVD; lowering cholesterol in those with established CVD, and those at high risk of developing CVD, is essential to reducing CVD morbidity and premature mortality globally. Low cost methods for identifying at-risk patients in LMIC exist [14,15], and treatment with cholesterol-lowering medications in the form of statins is cost-effective in these settings [16]. Nevertheless, while the prevalence of raised cholesterol and other CVD risk factors are all lower in LMIC compared with high-income countries (HIC), mortality from CVD is higher in LMIC, suggesting that detection and management of these risk factors together with the management of CVD is poorer in LMIC [17].

This Roadmap was developed through a review of published guidelines and research papers, and in consultation with an expert committee, composed of experts in clinical management of cholesterol and health systems research in LMIC. In the following sections, we outline essential strategies for measurement and management of cholesterol in the context of primordial prevention in populations, primary prevention in asymptomatic high-risk individuals, secondary prevention in patients with established CVD, and familial hypercholesterolemia (FH). We then identify potential roadblocks to implementation of evidence-based strategies in LMIC and propose solutions for overcoming these roadblocks.

MEASUREMENT AND MANAGEMENT OF BLOOD CHOLESTEROL

Primordial prevention for the general population

LDL-C contributes to the development of CVD, either on its own or in interaction with other cardiovascular risk factors. There is clear evidence of a strong positive association between LDL-C and coronary artery disease ([CAD]; the most common CVD) [18,19]. Whereas evidence of the impact of many lifestyle-related factors on TC and LDL-C is inconclusive, there is general consensus that aerobic physical activity may increase HDL-C [19,20], and diets low in saturated and trans fats, and higher in vegetables, can reduce TC and LDL-C levels in the blood [21,22]. Among the most common sources of trans fats are hydrogenated and partially hydrogenated oils often found in processed foods [23]. As such, a primary aim of public health interventions for reducing morbidity and mortality due to elevated LDL-C should be to encourage a healthy lifestyle among the general population, irrespective of individual cholesterol levels [24]. Various dietary guidelines exist, such as those from the European Society of Cardiology, that encourage a preference for whole grains, vegetables, legumes, fresh or frozen fruit, lean and oily fish and poultry, and nonfat dairy products (Appendix 1) [19]. However, some of these have been criticized for leading to carbohydrate-heavy diets. An in-depth review of current evidence concluded that the strongest evidence supports the traditional Mediterranean-type diet as a healthy dietary pattern to reduce CVD [25]. The Mediterranean diet consists of 40% to 50% carbohydrates from mainly complex carbohydrates such as vegetables, fruits, beans, and non-refined cereals; 15% to 20% protein, emphasizing lean and plant protein sources; and a high nut and olive oil content making up 16% to 21% monounsaturated fatty acids, 7% to 11% saturated fatty acids, and 5% to 7% polyunsaturated fatty acids. Based on that review, experts developed guidance for adapting the Mediterranean diet to other regions. This guidance has been included in Appendix 2. National dietary guidelines for prevention of CVD should reflect local food availability and customs.

Primary prevention

Risk assessment. Traditionally, primary prevention of CVD has focused on a "single-risk-factor" approach, which targets patients based on their levels of individual CVD risk factors, such as raised LDL-C or high blood pressure, but this approach has been progressively replaced in all contemporary CVD prevention guidelines with the Total Risk Approach based on absolute risk of developing CVD over a defined period of time [26-28]. The level of absolute risk used to define a "high risk individual" eligible for primary prevention, including the use of drug therapies, varies

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