7 Cardiovascular disease

Priority interventions

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This is one of two chapters on cardiovascular disease (CVD). Chapter 6 focuses on CVD burden, epidemiology and risk factors.

Rationale

Around 50–60% of the decline in age-standardized ischaemic heart disease (IHD) mortality in the last few decades (at least in high-income countries) can be attributed to a multiple risk factor reduction through population-level interventions while around 40–50% is from treatment.[1] This means that improving CVD public health requires both interventions in multiple sectors aimed at reducing risk factors in the entire population and health care interventions among individuals with NCD or at high risk.

Since atherosclerosis starts at a young age (fatty streaks and increasing arterial thickness – the precursors to atheroma are already present in coronary arteries of a significant proportion of children and adolescents), it is important to aim at reducing risk factors from early life for both physiological reasons (atherosclerosis accumulates in arteries over time and is largely not reversible) and behavioural reasons (many behaviours are acquired early in life; they tend to track over age and it is challenging for individuals to modify them when they become internally ingrained). The large proportion of sudden deaths (which are largely due to IHD),[2] i.e. before a person can receive care, further emphasizes the importance of primary prevention.

Hence, CVD (and indeed NCD) public health programmes must therefore act across the full range of modifiable risk factors and start from an early age if CVD risk factors levels are to be maintained at low levels throughout the life-course or, when elevated, managed effectively (Chapter 37 on the life-course approach). The majority of the WHO best buys and effective interventions have an impact on CVD or their risk factors (as well as on several other NCDs).

Interventions at the population level

These interventions aim at reducing the exposure to modifiable CVD risk factors in the whole population and require action across multiple sectors.

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A list of the main modifiable CVD risk factors and their potential importance in contributing to CVD incidence (i.e. population-attributable fractions) is described in the previous chapter. A number of interventions are described in more detail in chapters on specific CVD risk factors (e.g. hypertension, blood lipids, tobacco, diet and physical inactivity). The examples below are adapted from Disease Control Priorities 2.[3] It is important to note that the WHO Global NCD Action Plan, in addition to highlighting specific cost-effective interventions to reduce CVD risk, also draws attention to the broader upstream actions on environmental and socio-economic factors ('the causes of the causes'). These are described in more detail in Chapter 17 on social determinants and in other chapters (whole-of-government response, fiscal measures, law, etc.).

- *Policy to increase/decrease access, availability or exposure to healthy/unhealthy foods or products*
  - Alter the content of foods and beverages (e.g. salt, trans-fats, saturated fats and sugar in selected foods).
  - Limit marketing, supply and availability of unhealthy foods.
  - Ban smoking or alcohol use in selected premises.
- *Policies around transportation to improve active mobility*
  - Limit the role of private vehicles and develop the use of public transport to promote active mobility (e.g. walking/cycling).
  - Promote healthy cities, e.g. structures that promote physical activity for all such as green spaces.
- *Economic/fiscal policies to increase/reduce the demand/supply of healthy/unhealthy items*
  - Differential tax rates/subsidies on healthy foods vs unhealthy energy-dense ones.
  - Excise taxes on tobacco, alcohol, sugar drinks.
- *Initiatives at the community level*
  - Most effective when multifaceted, involving the community and culturally acceptable.
  - Dose and duration of interventions should be large enough and sustained over time.
- *Educational programmes*
  - Increasing population awareness of NCDs and their risk factors through the media and in different settings (e.g. schools, workplaces).

Several WHO technical packages have been developed to support countries reduce CVD risk factors at the population level, and these are described in relevant chapters in this book.

Interventions at the individual level

A number of WHO best buys and other recommended interventions are available to identify, diagnose and treat individuals at risk of CVD or with established CVD, including at the primary health care level.

1. *WHO best buys for CVD*
   - Drug therapy (including glycaemic control for diabetes and control of hypertension) using a total CVD risk approach and counselling to individuals who have had a heart attack or stroke and to persons with high risk (≥ 30%) or moderate to high risk (≥20%) of a fatal or non-fatal CVD event in the next ten years. This intervention is feasible, to different extents, in all resource settings, including by non-physician health workers. This should also include treatment to lower blood cholesterol, in line with the WHO HEARTS package and recommendations from a number of heart societies. The threshold for defining CVD risk can be set at lower levels to enable greater numbers of people to receive treatment where resources allow (see the section below on the total risk approach and CVD risk scoring). Other chapters describe interventions to reduce individual CVD risk factors, e.g. hypertension (Chapter 8), diabetes (Chapter 9), and dyslipidaemia (Chapter 20).
2. *WHO effective interventions for CVD*
   - Treatment of new cases of acute heart attack with antiplatelet therapy (low dose aspirin and/or clopidogrel), thrombolysis, or primary percutaneous coronary interventions – the approach taken will be dependent on the capacity of the health system.
   - Treatment of acute ischemic stroke with intravenous thrombolytic therapy where capacity exists to diagnose ischemic stroke. A number of specialized centres use mechanical thrombectomy to remove the obstructing blood clot.
3. *Other WHO-recommended interventions*
   - Treatment of congestive cardiac failure with angiotensin-converting-enzyme inhibitor, beta-blocker and diuretic.
   - Cardiac rehabilitation post-myocardial infarction.
   - Antiplatelet therapy (e.g. low-dose aspirin) for ischemic stroke.
   - Care of acute stroke and rehabilitation in stroke units.

Detailed guidance for implementing the above interventions has been developed by WHO and authoritative professional bodies.

Key issues that policymakers and programme managers need to be aware of are given below.

Total absolute risk approach and CVD risk scoring

The total risk approach is an important principle when it comes to the management of CVD as it recognizes that the risk of developing CVD is determined by the combined effect of cardiovascular risk factors, which often commonly coexist and act multiplicatively. An individual with several mildly raised risk factors may be at a higher total risk of CVD than someone with just one elevated risk factor. Conversely, CVD total risk can be reduced equivalently by reducing any of the modifiable risk factors, irrespective of their baseline

values. A number of CVD risk stratification charts (risk calculators) are available to determine the ten-year risk of a cardiovascular event (e.g. Framingham, SCORE, QRISK, AHA/ACC and WHO).[4,5] Important considerations with regard to CVD risk charts are:

- Risk calculators should aim to obtain the optimal ratio of the size of the population needing treatment for the greatest impact on reducing subsequent CVD events, and minimize the number of eligible patients that need to be treated (NNT) to prevent one CVD event given the limited resources available in a particular country (i.e. identify those individuals who will benefit most from therapy in terms of absolute CVD risk reduction).[6]
- Age alone contributes up to 80% of the predictive value of any given CVD risk score.[7] Risk scores over periods longer than ten years, for example 30 years, can be useful to assess more accurately long-term or lifetime CVD risk in younger individuals (e.g. aged <40 years).[8,9]
- CVD risk scores perform accurately to predict the average underlying CVD risk in the population, but they perform less well at the individual level because not all risk factors are included in a given risk prediction score, the associations between risk factors and CVD are relatively weak, and risk scores results are simplified into only two categories ('at risk' vs 'not at risk') while the relation between risk factors and CVD is graded. This highlights the need for an ever more accurate assessment of CVD risk at an individual level, where relevant and possible, that takes into account other risk factors, health conditions and measurements (e.g. family history, psychosocial wellbeing, kidney function, coronary artery calcium).
- As total CVD risk varies significantly between populations and over time (often as much as a 3% annual decrease in some countries), risk prediction scores need to be developed or validated, and regularly recalibrated, to the relevant population.

Individuals with a previous CVD hard outcome ('secondary prevention')

Individuals who have established IHD or stroke are at very high risk of subsequent CVD events and death. These people are the top priority for receiving treatment and lifestyle advice to reduce their risk: risk stratification charts are not required. However, despite their risk, many studies, including in high-income countries, have shown that these individuals are not receiving adequate treatment, including antiplatelet therapy, beta-blockers, and blood pressure/blood cholesterol-lowering medications, despite their high efficacy to reduce recurrent CVD and the possibility of prescribing these fairly simple and safe therapies in primary care.[10]

Fixed-dose medication combination (polypill). There has been significant interest in simple treatments that can be widely used to reduce the risk of

CVD events among individuals at high risk.[11] Fixed-dose combination drug regimens, also known as polypills, are options that along with non-pharmacological approaches can be used for both primary and secondary prevention.[12] Polypills generally contain three to five different medications combined in one daily pill (e.g. two to three different blood pressure lowering drugs, a statin and – in some cases – aspirin, at full or half dose). Clinical trials in several countries have shown that polypills improve adherence to treatment, lower risk factor levels and decrease CVD mortality.[13] Polypills are also a cost-effective way of delivering treatment and are more straightforward for the prescriber, especially in primary health care and among non-physician health professionals.

Health care packages for CVD

WHO has developed the HEARTS[14] package to support countries to strengthen primary health CVD management. HEARTS includes six modules: (i) healthy-lifestyle counselling; (ii) evidence-based treatment protocols; (iii) access to essential medicines and technology; (iv) risk-based CVD management; (v) team-based care; and (vi) systems for monitoring. The HEARTS technical package is part of the broader Global Hearts Initiative, which includes the MPOWER package for tobacco control in line with the WHO Framework Convention on Tobacco Control, the ACTIVE package for increasing physical activity, the SHAKE package for salt reduction, and the REPLACE package to eliminate industrially produced trans fat from the global food supply. A WHO package of essential noncommunicable (PEN) disease interventions aimed at low- and middle-income countries has also been developed to support countries improve the coverage of appropriate services for people with NCDs in primary care settings.[15]

Detailed guidelines on CVD prevention and management are also regularly issued by other well-recognized public health bodies (e.g. the American Heart Association, the European Society of Cardiology as well as by many national health authorities).

Monitoring

Achieving all nine targets in the WHO Global NCD Action Plan will have an impact on CVD. The majority of the 25 indicators of the WHO Global Monitoring Framework (Chapter 35 on accountability) are therefore key in monitoring and evaluating processes towards a reduction in CVD. Population-based surveys of risk factors among adults (e.g. STEPS) and children (e.g. GSHS) are central to the surveillance of CVD risk factors (i.e. their prevalence and awareness/treatment/control levels). Regular assessment of health care services, including how patients with CVD are managed, is also important using tools such as SARA. These are described in more detail in Chapter 5 on surveillance tools. Vital statistics are important in assessing CVD deaths at a population level but are resource-intensive.

Notes

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