

Reducing Cardiovascular Mortality Through Prevention and Management of Raised Blood Pressure

A World Heart Federation Roadmap

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1. BACKGROUND

1.1. Importance of managing and preventing raised blood pressure

Prospective epidemiological data have shown that blood pressure has a graded, continuous adverse effect on the risk of various forms of CVD (including stroke, myocardial infarction, heart failure, peripheral arterial disease and end-stage renal disease).

'Raised blood pressure' is frequently considered to be any systolic blood pressure greater than 115 mmHg. It accounts for 45% of all heart disease deaths and 51% of all stroke-related deaths [1], which together are the biggest causes of morbidity and mortality worldwide [2,3,4]. Annually, there are >17 million deaths due to CVD worldwide, of which 9.4 million are attributable to complications of raised blood pressure [1].

This highlights the importance of both high-risk and population-based strategies in blood pressure management and control.

The level of raised blood pressure for which treatments have been shown to reduce clinical events in randomized trials is generally accepted as ≥ 140 systolic mmHg or ≥ 90 diastolic mm Hg and this level is therefore termed 'hypertension'. Hence, this condition relates to a relatively arbitrary blood pressure range, but for pragmatic and communication purposes, the term hypertension is used in this document. Classifications of the various commonly used levels of blood pressure are shown in Table 1.

The age-standardized levels of systolic blood pressure are dropping in some parts of the world [5]. However, despite international efforts, the size of the worldwide burden of complications of raised blood pressure in populations continues to rise; it is thought to have increased from 600 million in 1980 to 1 billion in 2008 [6], due to the expanding and ageing global population.

High-quality data are often not available on the prevalence of hypertension in low- and middle-income countries (LMICs), but similar high levels are found in HICs and LMICs. Nearly 80% of all cardiovascular mortality is estimated to occur in LMICs and this is

TABLE 1. Definitions of classes of raised blood pressure

Category	SBP (mmHg)		DBP (mmHg)
Optimal	<120	and	<80
Normal	120–129	and	80–84
High normal	130–139	or	85–89
Grade 1 hypertension (mild)	140–159	or	90–99
Grade 2 hypertension (moderate)	160–179	or	100–109
Grade 3 hypertension (severe)	≥ 180	or	≥ 110
Isolated systolic hypertension	≥ 140	and	<90

DBP, diastolic blood pressure; SBP, systolic blood pressure.

probably where the greatest burden of hypertension lies [7].

The WHO estimates that the prevalence of hypertension is highest in the African region – 46% of adults aged ≥ 25 years [1]. This compares with 35% in the Americas and other high-income countries and 40% in the rest of the world [1]. The PURE study also found a divergence in the prevalence of hypertension between high- and low-income countries, ranging from 26.4% in urban regions of high-income countries to 46.9% in rural upper-middle income countries [8].

Uncontrolled hypertension imposes an enormous economic burden on society. In addition to the direct costs associated with healthcare utilization (e.g., for the management of acute hemorrhagic stroke or myocardial infarction), hypertension is associated with substantial productivity losses resulting from disability and premature mortality. Productivity losses are particularly pronounced in LMICs, where weaker health systems lead to higher rates of uncontrolled hypertension and stroke and a greater likelihood of complications in younger individuals [9]. Hypertension is one of the most frequent reasons for consultation in primary care. Left untreated, it can lead to a range of devastating cardiovascular complications [1].

Dr. Prabhakaran receives grants for a training program of primary care physicians from multiple pharmaceutical sources (MSD and Abbott) to train primary care physicians in evidence-based management of diabetes and cardiovascular disease, and a grant for a community-based diabetes and hypertension program from Eli Lilly and Co. Dr. Poulter is on the executive board of the International Society of Hypertension, is the chair of the BHS Guideline Committee, and a member of the PASCAR African guideline committee. He has received research grants from Pfizer & Servier for hypertension-related research and received speaker honoraria from Servier & Lri-Therapharma for hypertension-related talks. The remaining authors report no relationships that could be construed as a conflict of interest.

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The World Heart Federation Raised Blood Pressure Roadmap focuses on hypertension. This is because randomized controlled trials have shown a reduction in CVD events when treating individuals with this level of blood pressure. We estimate that the greatest impact on the prevention of CVD events can be made among those in the hypertensive range in the short time that is available to achieve the NCD targets (up to 2025). However, this high-risk-orientated approach does not deny the critical importance of primordial prevention.

Given the apt description of hypertension as a ‘silent killer’ and the lack of awareness about raised blood pressure in LMICs, opportunistic screening and awareness are the key first steps to improving management and prevention. As a consequence, the known burden of people with hypertension will – paradoxically – show an initial rise due to improved screening processes. Hence, a reasonable target for this roadmap is a 25% increase in controlled blood pressure among individuals who have been diagnosed with hypertension.

For those diagnosed with hypertension, lowering blood pressure with drugs reduces the risk of subsequent cardiovascular events [10], including a 35–40% reduction in the risk of stroke and a 20–25% reduction in the risk of myocardial infarction and heart failure [11–13].

For individuals with hypertension or high normal blood pressure (Table 1), or those at an increased risk of raised blood pressure, lifestyle modification is recommended to reduce modifiable risk factors, along with advice for rescreening.

Modifiable risk factors associated with the development and maintenance of raised blood pressure include:

- Unhealthy diet, with high salt content or insufficient fruit and vegetables;
- Harmful use of alcohol;
- Physical inactivity; and
- Overweight and obesity.

Once raised blood pressure is established, control is often attenuated due to inadequate treatment, medication non-adherence and unhealthy diets and lifestyles.

1.2. The care gap

A ‘care gap’ refers to the discrepancy between best practice (based on high-quality evidence) and the care provided in usual clinical practice. It can include situations in which interventions with proven efficacy are under-utilized.

Care gaps are seen in practically all countries, including high-income countries. However, they are most marked in LMICs, particularly in rural and under-resourced settings.

1.2.1. Low awareness and control

The PURE study showed low levels of awareness, treatment and control of hypertension in all regions of the world (Table 2) [8].

Awareness in LMICs may be low in part because of the belief that hypertension is a disease of ‘rich countries’. Hence, screening programs may not exist. In addition, health systems in many LMICs are not equipped for the prevention and management of hypertension.

In high-income countries, the proportion of patients with undiagnosed raised blood pressure has declined in recent years. However, there remains a considerable unmet need. For example, in the US, the National Health and Nutrition Examination Survey found a growing gap between insured and uninsured adults, with the proportion of adults with hypertension who were uninsured rising from 12.3% in 1988–1994 to 17.4% in 2005–2010 [14].

A series of nationally representative cross-sectional studies in England showed that overall awareness, treatment and control of hypertension improved dramatically between 1994 and 2011 [15]. In 2011, 71% of people with hypertension were aware of it and 63% of treated patients achieved blood pressure control. Hence, despite the large unmet need, it is possible to substantially improve hypertension control at a national level in only a few years.

TABLE 2. Awareness, treatment and control of hypertension

Income level	N	Aware (%)	Treated (%)	Controlled (%)
High	6263	49.0	46.7	19.0
Upper middle	18,123	52.5	48.3	15.6
Lower middle	23,269	43.6	36.9	9.9
Low	10,185	40.8	31.7	12.7
Total	57,840	46.5	40.6	13.2

Hypertension defined as systolic blood pressure $\geq 140/90$ mmHg. Data from the PURE study [8].

1.3. Treatment cascade and the need to understand ‘the effect of health systems’

There are numerous reports and guidelines that outline optimal individual-level strategies for the management of hypertension. Most focus on the clinical evidence, which, although necessary, is not sufficient to implement optimal care. Health care professionals and patients exist within local, regional and national health systems that can contribute to differences in outcomes across populations. As shown in Figure 1, even when an intervention has proven efficacy in clinical trials, its real-life effectiveness will also rely on other health-system factors.

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