

# Global survey of current practice in management of hypertension as reported by societies affiliated with the international society of hypertension

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**Objectives:** The International Society of Hypertension (ISH) surveyed trends in the management of hypertension worldwide, as reported by its affiliated societies.

**Methods:** A formal questionnaire was emailed in December 2011 to 90 national and regional societies affiliated with the ISH, from 77 countries. Responses received by June 2012 were analysed.

**Results:** Thirty-one societies responded (nine high-income, 17 upper-middle-income, five lower-middle/low-income countries). Twenty-one reported use of national guidelines, three used regional and 17 used 'international guidelines', two-thirds used mercury, aneroid and semi-automatic sphygmomanometers and half used ambulatory blood pressure monitoring. Exercise, salt restriction and weight reduction were recommended by 31, 27 and 26 nations, respectively, but less for other diets, smoking cessation and alcohol restriction. Almost all nations used angiotensin-converting enzyme inhibitors (ACEI), angiotensin receptor blockers (ARB), calcium channel blockers and diuretics.  $\beta$  Blockers were only recommended for patients with coronary disease. ACEI and ARB were preferred for patients with diabetes, renal disease and metabolic syndrome. Combination treatment was recommended by all, for initiation of treatment by most, and in fixed-dose formulation by half. Most used a threshold of 140/90 mmHg to initiate drug treatment in uncomplicated patients but only half retained the threshold of 130/80 mmHg for high-risk patients. Differences in treatment patterns across regions or across high, middle and low-income countries were minimal.

**Conclusion:** There was surprising consistency across countries from different regions and with varying degrees of affluence. There was a trend towards more conservative thresholds and targets than those recommended by JNC7 or ESH/ESC 2007. Combination therapy was favoured by all, but  $\beta$  blockers were restricted to patients with coronary heart disease.

**Keywords:** blood pressure-lowering therapy, blood pressure measurement, blood pressure thresholds and targets, lifestyle measures, management of hypertension

**Abbreviations:** ABPM, ambulatory blood pressure monitoring; ACEI, angiotensin-converting enzyme inhibitors; ARB, angiotensin receptor blockers; BP,

blood pressure; CCB, calcium channel blockers; D, diuretic; ESC, European Society of Hypertension; ESH, European Society of Hypertension; HT, hypertension; ISH, International Society of Hypertension; JNC7, the seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure; RAS, renin-angiotensin system; RASi, renin-angiotensin system inhibitor

## INTRODUCTION

The recommendations for the management of hypertension are enshrined in guidelines written by expert groups appointed by national and regional authorities around the world [1–5]. Some are appointed by health authorities and others by professional medical bodies such as societies of hypertension. These guidelines tend to be updated every 3–5 years and often lag well behind current trends reflecting the most recent evidence from large scale randomized trials, observational studies or meta-analyses. Indeed many studies, published in the last few years, have challenged well entrenched practice, including the use of certain drug classes such as  $\beta$  blockers or diuretics [6–8]. They have also challenged the accepted thresholds for initiating blood pressure (BP)-lowering treatment and the BP targets for this treatment, in both uncomplicated and high-risk patients groups with various grades of hypertension [9–13].

The Forum of the International Society of Hypertension (ISH) brings together national and regional societies of hypertension, leagues against hypertension and councils

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for high BP research affiliated with the ISH. There are currently 90 such professional expert bodies from 77 countries affiliated with the ISH. They represent wealthy nations, low-income and middle-income settings and all continents. In the absence of other authoritative documentation of changes in clinical practice for the management of hypertension, the ISH Forum set out to survey these trends by consulting its affiliated national and regional societies. The results of this survey carried out in the first 6 months of 2012 are reported here.

## METHODS

This is a cross-sectional survey of national and regional societies affiliated with the ISH. In December 2011, 84 national and six regional societies from 77 countries were invited to participate in the survey using a formal questionnaire. The questionnaire surveyed current use of national, regional and international guidelines, current practice in BP measurement, current recommendations on lifestyle measures, preferred BP-lowering drugs, preferred combinations of drugs, and BP thresholds and targets (see Text Document, Supplemental Digital Content 1, which is the questionnaire used for the survey).

### Statistical analysis

Data were recorded as number of societies in the affirmation for each item and/or percentage positive out of all responding societies. Mean values and ranges were also shown for BP thresholds and targets. Subgroup analysis was conducted according to levels of affluence defined according to the World Bank definitions [14,15] (high-income, upper-middle-income, and combined lower-middle and low-income countries) and trends in percentage across subgroups were evaluated using a logistic regression model. Results were also analysed according to regions [Asia (Bangladesh, China, India, Japan, Philippines, South Korea, Taiwan and Vietnam), Middle East and North Africa (Iran, Lebanon, Libya, Turkey), Europe (Bosnia and Herzegovina, Bulgaria, Italy, Lithuania, Netherlands, Romania, Russia, Serbia, Sweden, Switzerland, and the United Kingdom of Great Britain and Northern Ireland) and Latin America (Argentina, Brazil, Venezuela and the Latin American Society)] and were compared using the  $\chi^2$  test. *P* value less than 0.05 was considered statistically significant. All analyses were performed using SAS version 9.2 (SAS Institute Inc., Cary, North Carolina, USA).

## RESULTS

Thirty-one responses were received between January and June 2012 covering all continents and including nine societies from high-income countries, 17 from upper-middle-income countries and five from lower-middle or low-income countries as defined by the World Bank [14,15]. Responding societies affiliated with International Society of Hypertension are as follows:

1. Argentine Society of Hypertension
2. Bosnia & Herzegovina Working Group on Arterial Hypertension

3. Brazilian Society of Hypertension
4. British Hypertension Society
5. Bulgarian Hypertension League
6. Chinese hypertension league
7. High Blood Pressure Research Council of Australia
8. Hypertension Canada
9. Hypertension Committee of the NHF of Bangladesh
10. Indian Society of Hypertension
11. Isfahan Cardiovascular Research Institute (Iran)
12. Italian Society of Hypertension
13. Japanese Society of Hypertension
14. Korean Society of Hypertension
15. Latin American Society of Hypertension
16. Lebanese Hypertension League
17. Libyan Cardiac Society
18. Lithuanian Hypertension Society
19. Netherlands Society of Hypertension
20. Philippine Society of Hypertension
21. Romanian Association of Hypertension
22. Russian Antihypertensive League
23. Serbian Society of Hypertension
24. Sudanese Society of Hypertension
25. Swedish Society of Hypertension, Stroke and Vascular Medicine
26. Swiss Society of Hypertension
27. Taiwan Hypertension Society
28. Turkish Association of Hypertension Control
29. Turkish Society of Hypertension and Renal Disease
30. Venezuelan Society of Hypertension
31. Vietnamese Society of Hypertension

Twenty-one of 31 societies reported use of national guidelines, three used regional and 17 used 'international guidelines', alone or as supplementary guidelines.

Approximately, two-thirds reported use of mercury, aneroid and semi-automatic sphygmomanometers and half reported use of ambulatory BP monitoring (ABPM) (Table 1). However, the great majority (27 countries) indicated that decision-making was based on clinic BP. This was supplemented by home BP and ABPM in about half (Table 1).

There was much variation in recommendations for lifestyle measures, with 31, 27 and 26 nations recommending physical exercise, dietary salt restriction and weight reduction programs, respectively, with much smaller numbers for other dietary programs, for alcohol moderation,

**TABLE 1. Blood pressure measurement in responding countries**

	N (%) <sup>a</sup>
Methods commonly used for measurement of BP	
Mercury manometer	21 (68)
Aneroid manometer	20 (65)
Semi-automatic method	20 (65)
ABPM	16 (52)
BP measures recommended for decision making	
Clinic BP	27 (87)
Home BP	15 (48)
ABPM	19 (61)

ABPM, ambulatory blood pressure monitoring; BP, indicates blood pressure.  
<sup>a</sup>Percentage out of 31 responding societies.

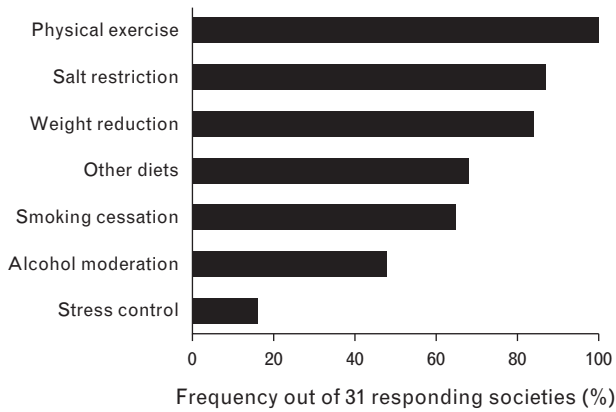


FIGURE 1 Lifestyle measures recommended in responding countries.

for smoking cessation or for stress control programs (Fig. 1). Almost all societies reported extensive use of the four major drug classes for uncomplicated patients with hypertension – angiotensin-converting enzyme inhibitors (ACEI), angiotensin receptor blockers (ARB), calcium channel blockers (CCB) and diuretics but 12 of 31 did not recommend  $\beta$  blockers (Fig. 2). CCB and diuretics were heavily favoured for use in the elderly, whereas  $\beta$  blockers were not used at all in this group (Fig. 2). Inhibitors of the renin–angiotensin system (RAS) were clearly preferred for patients with diabetes, with chronic kidney disease or with the metabolic syndrome, whereas  $\beta$  blockers were universally recommended in patients with coronary heart disease (Fig. 2). Renin inhibitors and  $\alpha$  blockers were only recommended by three and two societies, respectively, for use in uncomplicated patients with hypertension, whereas  $\alpha$  blockers were also recommended for use in patients with urinary tract problems.

The majority of nations favoured the combination of RAS inhibitors with either CCB (27/31) or with diuretics (22/31) for uncomplicated patients, but a strong majority preferred the combination of CCB with RAS inhibitors for patients with type 2 diabetes (Table 2). Only three nations reported continuing use of the old favourite combination –

$\beta$  blockers with diuretics. Although 27/31 nations favoured the use of drug combinations to initiate treatment there was considerable variation in recommendations for the use of fixed-dose (single pill) combinations.

The majority of national societies (28/31) retained the threshold of 140/90 mmHg for initiating drug therapy in uncomplicated hypertension, but only half (18/31) retained this threshold for elderly patients, whereas many preferred a higher threshold of 150/90 mmHg or higher for this group (11/31). There was considerable variation in the threshold preferred for initiating treatment in high-risk groups, such as those with coronary disease, stroke or type 2 diabetes (Table 3). Although many maintained the previously preferred threshold of 130/80 mmHg, many moved to more conservative thresholds such as 140/90 mmHg or 135/85 mmHg (Table 3). There was also some variation in the preferred targets for BP lowering. Whereas the targets of less than 140/90 mmHg was largely retained for uncomplicated patients with hypertension, and that of less than 130/80 mmHg was still preferred by many for patients with type 2 diabetes, there was a clear move to more conservative targets for patients with coronary disease and those with stroke (Table 3).

Analyses according to levels of affluence did not reveal significant differences except for use of ABPM (eight of nine in high-income, seven of 17 in upper-middle-income and one of five in lower-middle and low-income countries,  $P=0.02$  for trend) and recommendations on alcohol moderation (seven of nine, seven of 17 and one of five, respectively,  $P=0.04$  for trend) and on use of CCB for obese patients (two of nine, nine of 17 and four of five, respectively,  $P=0.04$  for trend). There were also no significant differences between regions except for the use of national guidelines (seven of eight in Asia, zero of five in Middle East and North Africa, eight of 11 in Europe and three of four in Latin America,  $P=0.01$ ), use of diuretics for uncomplicated hypertension (seven of eight, two of five, 11 of 11 and three of four, respectively,  $P=0.03$ ), use of CCB for coronary heart disease (seven of eight, zero of five, four of 11 and three of four,  $P=0.01$ ) and use of combination therapy of CCB with diuretic for uncomplicated hypertension (four of eight, zero of five, one of 11 and zero of four,  $P=0.04$ ).

## DISCUSSION

There was a remarkable degree of consistency across 31 affiliated societies that responded to this ISH survey on the management of hypertension. This was true both across regions and across variations in income levels.

All nations recommended lifestyle measures for the management of hypertension, but salt restriction, physical exercise and weight reduction were used by the majority, whereas other behavioural modalities such as moderation in alcohol intake, smoking cessation and stress control were used less frequently, even though most are recommended by the major international guidelines [1–5].

With regards to drug treatment, it is clear that  $\beta$  blockers are no longer regarded as first-line drugs across the world (Fig. 2). Indeed, they are virtually not recommended for elderly patient, or those with diabetes, renal disease, stroke

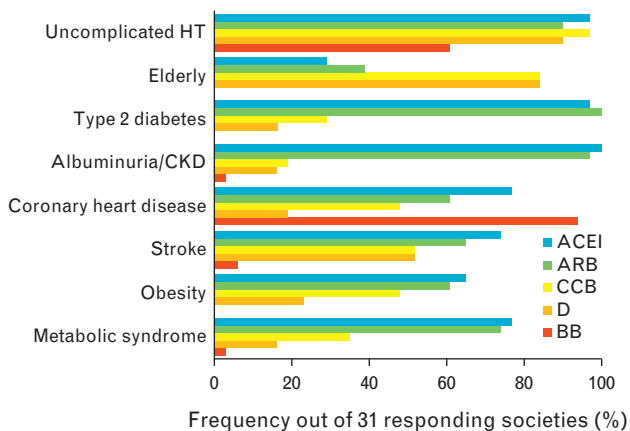


FIGURE 2 Preferred treatment for various populations receiving blood pressure-lowering drugs. ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB,  $\beta$  blocker; CCB, calcium channel blocker; CKD, chronic kidney disease; D, diuretic; HT, indicates hypertension.

**TABLE 2. Preferred combinations of blood pressure-lowering drugs**

Groups	N (%) <sup>a</sup>				
	RASI/CCB	RASI/D	CCB/D	CCB/BB	D/BB
Hypertensive patients	27 (87)	22 (71)	5 (16)	6 (19)	3 (10)
Patients with type 2 diabetes	26 (84)	12 (39)	1 (3)	0 (0)	0 (0)

BB,  $\beta$  blocker; CCB, calcium channel blocker; D, diuretic; RASI, indicates renin-angiotensin system inhibitor (angiotensin-converting enzyme inhibitor or angiotensin receptor blocker).  
<sup>a</sup>Percentage out of 31 responding societies.

or the metabolic syndrome. These changes seem to be preceded by revision of the British recommendations in 2006 [16] and are in part driven by recent meta-analyses which suggested that  $\beta$  blockers are less effective in preventing cardiovascular disease, particularly in older patients [6–8]. Their one undisputed role is for patients with coronary disease where they were recommended by 29 of 31 societies. On the contrary, diuretics are still used by the vast majority for uncomplicated and for elderly patients, although they appear to be avoided in high-risk groups such as those with diabetes, renal disease and coronary disease (Fig. 2). Inhibitors of the RAS, both ACEI and ARB, are uniformly preferred for patients with diabetes or with renal disease, and used extensively across all other groups except the elderly (Fig. 2).

Combination treatment is also uniformly favoured in principle. The most common preferences are for inhibitors of the RAS in combination with either CCB (especially in type 2 diabetes) or with diuretics, clearly demonstrating the influence of large randomized trials such as ACCOMPLISH [17], ADVANCE [18] and PROGRESS [19]. While most societies supported the use of combinations to initiate treatment, there was greater variation in attitudes and recommendations for the place of single pill or fixed-dose

combinations. Despite the consistency of support for the use of combination therapy around the world, it is ironic that one of the biggest dilemmas in our field continues to be the great gap between evidence and practice, with very low levels of achievement of recommended BP targets worldwide [20–25]. It is possible, of course, that the recent debates about recommended BP target levels will prolong and exacerbate this unsatisfactory level of BP control at global level [9–13].

In most nations, thresholds for initiation of BP-lowering treatment vary according to presence or absence of cardiovascular risk factors and/or target organ diseases. There are also variations in BP targets across patients groups with different risk profiles (e.g. diabetes, coronary heart disease and stroke). It is for these reasons that most of the current guidelines for management of hypertension recommend therapeutic approaches based on absolute risk of cardiovascular disease as well as on BP levels [1,3–5]. For high-risk patients with coronary heart disease, stroke or type 2 diabetes, only half retained the BP threshold and target of approximately 130/80 mmHg. The trend towards more conservative thresholds and targets may reflect the recent publication of observational data from large-scale studies [9–13] as reflected in the reappraisal of European guidelines on hypertension management [26].

**TABLE 3. Blood pressure thresholds and targets for blood pressure-lowering drugs**

Groups	Mean mmHg	Most common value		Range mmHg
		mmHg	N (%) <sup>a</sup>	
<b>Thresholds</b>				
Uncomplicated HT	142/90	140/90	28 (90%)	140/90 to 165/90
Elderly	145/90	140/90	18 (58%)	140/90 to 165/85
Coronary heart disease	136/86	140/90	12 (39%)	130/80 to 160/90
Stroke <sup>b</sup>	137/86	130/80	11 (35%)	130/80 to 150/90
		140/90	14 (45%)	
Type 2 diabetes	132/83	130/80	8 (26%)	130/80 to 140/90
		140/90	16 (52%)	
Adolescents <sup>c</sup>	141/89	140/90	11 (35%)	120/80 to 160/90
<b>Blood pressure targets</b>				
Uncomplicated HT	139/88	140/90	22 (71%)	130/80 to 150/85
Elderly	143/89	140/90	15 (48%)	135/85 to 150/90
Coronary heart disease	136/84	130/80	13 (42%)	120/80 to 180/90
Stroke	138/86	140/90	11 (35%)	120/80 to 180/90
		130/80	13 (42%)	
Type 2 diabetes	131/82	130/80	9 (29%)	120/80 to 140/90
		140/90	16 (52%)	
Adolescents <sup>d</sup>	131/83	140/90	5 (16%)	120/70 to 140/90

HT, indicates hypertension.

<sup>a</sup>Percentage out of 31 responding societies.

<sup>b</sup>2 (6%) have no threshold.

<sup>c</sup>4 (13%) use age-specific percentile value and 12 (39%) did not specify the value.

<sup>d</sup>3 (10%) use age-specific percentile value and 13 (42%) did not specify the value.



Of particular interest was the consistency of findings across countries with very different levels of income. The exceptions were in the use of ABPM, and the recommendations for moderation in alcohol intake, both of which were much less common in low resource settings, and in the use of CCB for obese patients, which was much less common in affluent nations. Although the limited use of ABPM in low resource settings is readily understood, the reasons for the other two findings are less obvious. Consistent findings were also observed across different geographical regions. The exceptions were low use of national guidelines and use of diuretic for uncomplicated hypertension in Middle East and North Africa, and high use of CCB for coronary heart disease and combination of CCB with diuretic for uncomplicated hypertension in Asia. Use of national guidelines is likely to be associated with their availability and high use of CCB for coronary disease in Asia may be related to higher prevalence of vasospastic angina in the region [27]. For the other two findings, however, the reasons for the difference are not clear.

This report has a number of strengths. It was compiled using data provided by senior office bearers within expert societies, from a wide range of regions and resource settings. It also has some limitations including the fact that in most instances it reflects the impressions formed by senior office bearers, rather than facts based on hard national data. Furthermore, the response rate was disappointing with only 31 out of 90 societies responding, and there were very few responses from low-income countries.

In conclusion, this ISH survey drew on the goodwill of its affiliated societies and the responses indicate broad consistency in the management of hypertension across countries differing widely in culture, in economic circumstances and in geographical location. There was a clear tendency towards more conservative BP thresholds and targets for BP lowering therapy. The use of  $\beta$  blockers has become much more limited, being mainly reserved for patients with coronary heart disease. Drugs from the other four major classes (ACEI, ARB, CCB and diuretics) appear to be recommended in line with the available evidence. There is a clear need for simple and practical guidelines suitable for use in low-income setting across the world, particularly countries that lack the resources to develop their own national recommendations.

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We appreciated the responses from the 31 affiliated societies that completed the survey as listed here: Argentine Society of Hypertension, Bosnia and Herzegovina Working Group on Arterial Hypertension, Brazilian Society of Hypertension, British Hypertension Society, Bulgarian Hypertension League, Chinese Hypertension League, High Blood Pressure Research Council of Australia, Hypertension Canada, Hypertension Committee of the NHF of Bangladesh, Indian Society of Hypertension, Isfahan Cardiovascular Research Institute (Iran), Italian Society of Hypertension, Japanese Society of Hypertension, Korean Society of Hypertension, Latin American Society of Hypertension, Lebanese Hypertension League, Libyan Cardiac

Society, Lithuanian Hypertension Society, Netherlands Society of Hypertension, Philippine Society of Hypertension, Romanian Association of Hypertension, Russian Antihypertensive League, Serbian Society of Hypertension, Sudanese Society of Hypertension, Swedish Society of Hypertension, Stroke and Vascular Medicine, Swiss Society of Hypertension, Taiwan Hypertension Society, Turkish Association of Hypertension Control, Turkish Society of Hypertension and Renal Disease, Venezuelan Society of Hypertension, and Vietnamese Society of Hypertension.

## Conflicts of interest

There are no conflicts of interest.

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## Reviewers' Summary Evaluations

### Reviewer 1

The present report of the International Society of Hypertension (ISH) collected information about the trends of hypertension management worldwide by using data reported in a formal questionnaire filled by 31 of the affiliated Societies, with a predominance of middle-income countries. The results reflect uniformity across the countries in the criteria to select the antihypertensive drugs and the recommendation of combined therapy. More discrepancies exist at the time to choose the therapeutic BP goals. Such degree of concordance in antihypertensive treatment among the different countries reflects that the surveys using questionnaires to scientific societies only reflect the opinion

of specialists and may not be the real practice in the countries.

### Reviewer 2

The International Society of Hypertension should be praised for this initiative, which provides interesting information on what hypertension scientific societies from different countries around the world recommend for the treatment of high blood pressure. It would be important for this approach to be adopted regularly in the future. Of course, the information concern the position of scientific societies and not what is actually done at different country levels. It would be meritorious if ISH could use its Forum of national societies to approach also this issue.