Control Rates of Hypertension in North America

Frans H.H. Leenen, Ernesto L. Schiffrin

Despite the extensive evidence from epidemiological studies showing that hypertension is a major risk factor for premature cardiovascular morbidity and mortality and from randomized clinical trials showing that this risk can be markedly reduced by antihypertensive drug therapy, hypertension is generally considered to be poorly managed. Surveys performed in the 1990s reported low rates for awareness, treatment, and control of hypertension. Since better once-daily antihypertensive drugs with less adverse effects have become available and both healthcare providers and the general public appear to place more emphasis on prevention of cardiovascular disease, one may expect these advances to translate not only into more awareness of the presence of hypertension but also into better treatment and control rates. Indeed, successive reports from National Health and Nutrition Examination Survey (NHANES) reported progressive improvement in awareness, treatment, and control rates, up to 80.7%, 72.5%, and 50.1%, respectively, for the 2007–2008 survey.2 Two recent Canadian surveys reported even more substantial improvements in treatment and control rates in the general hypertension population. First, a survey in Ontario, the largest province of Canada, with an adult population of ~8 million, reported 86.3% awareness, 80.5% treatment, and 64.0% control rates.2 Then, a Canada-wide survey provided similar high rates: 83.4%, 79.9%, and 65.9% for awareness, treatment, and control rates for adults with hypertension, 20 to 79 years of age.3 These rates are only 10% to 25% below the “optimal” rates that one may expect in a cross-sectional survey. The results from NHANES and the 2 Canadian surveys would suggest that substantial progress has been achieved in recent years in the management of hypertension in North America. Both awareness and treatment rates show only modest differences between the United States and Canada, whereas control rates appear ~15% higher in Canada. An increase in focus on risk factor management, as reflected in awareness and treatment rates of hypertension, appears, therefore, similarly apparent in the 2 countries. The somewhat higher apparent rate of control in Canada may be because of differences in methods of survey or populations studied. Higher control rates may reflect better treatment-to-goal, perhaps reflecting a universal access, publicly funded healthcare system in Canada compared with the often more limited (at least up to the present) insurance system existing in the United States.4,5 However, a publicly funded healthcare system, per se, is clearly not sufficient considering the persistent low control rates in Europe, eg, 28% in England.6 Methodological aspects may also contribute to the difference in control rates in the United States versus Canada. In NHANES, blood pressure (BP) was measured by physicians, who provide higher values than measurements by nurses, which would underestimate control rates,7 and BP was measured by mercury sphygmomanometer with ≤3 readings, omitting the first reading if possible.1 The Canadian surveys used specially trained nurses and an automated device, the BpTRU, with 6 measurements, omitting the first reading as well. This device has been well validated.8 In addition, in the Ontario survey, in a subset of participants values obtained with the BpTRU were compared with those obtained by mercury sphygmomanometer in the same session.8 Linear regression analysis was used to provide a “correction factor” to compare data with other surveys using the standard technique. One may debate whether this correction factor (140 mm Hg with mercury sphygmomanometer versus 138 mm Hg on BpTRU) is sufficient to make comparisons with other surveys, such as NHANES, valid. As recommended recently by the 2010 Canadian Hypertension Education Program guidelines,9 135/85 mm Hg by automated device may be equivalent to 135/85 mm Hg on awake ambulatory BP and to 140/90 mm Hg by manual approach in the office by nurse or physician (eg, References9 and10). These cutoffs are of course rather arbitrary and do not necessary reflect optimal treatment, particularly for subgroups with, for example, cardiovascular or renal disease or diabetes mellitus. BP values obtained by the BpTRU in the absence of an observer do appear to better reflect mean awake ambulatory BP than those by observers in an office-clinic setting.8,11 Studies are ongoing comparing BPs measured by BpTRU with those measured by ambulatory monitoring and by nurse/physician-measured sphygmomanometer, which may definitively establish the relationship between these different measurements of BP, and which should be the cutoffs to be used for the BpTRU (for recent review, see Reference11).

Use of a lower cutoff of 135/85 mm Hg obviously changes the rates. The Table shows a comparison of the rates obtained in the Ontario survey when using the adjusted values with 140/90 mm Hg as the cutoff versus the rates obtained when using unadjusted BpTRU values with 135/85 mm Hg as the cutoff. Prevalence of hypertension increases from 21.3% to 24.5%, still well below the 29.0% in the recent NHANES. On the other hand, control rates decrease fairly substantially from...
Table. Prevalence of Hypertension and Hypertension Control Among Ontario Survey on the Prevalence and Control of Hypertension Participants by Age and Sex Using 2 Cutoffs for Hypertension

<table>
<thead>
<tr>
<th>Variable</th>
<th>Prevalence of Hypertension %</th>
<th>Hypertension Control %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted BpTRU†</td>
<td>BpTRU‡</td>
</tr>
<tr>
<td>BP cut-off, mm Hg</td>
<td>≥140/90</td>
<td>≥135/85</td>
</tr>
<tr>
<td>Overall population</td>
<td>21.3±1.5</td>
<td>24.5±1.7</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to 39</td>
<td>3.4±1.2</td>
<td>5.3±1.3</td>
</tr>
<tr>
<td>40 to 59</td>
<td>22.6±2.5</td>
<td>27.7±2.9</td>
</tr>
<tr>
<td>60 to 79</td>
<td>51.6±5.6</td>
<td>53.1±5.7</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23.8±2.4</td>
<td>27.8±2.5</td>
</tr>
<tr>
<td>Female</td>
<td>19.0±2.0</td>
<td>21.2±2.3</td>
</tr>
</tbody>
</table>

Values are mean±SE unless otherwise specified. *Data show estimate with coefficient of variation >0.33. †Adjusted BpTRU percentages were reported previously.‡ BpTRU cutoff 135/85 mm Hg, as recommended in 2010 Canadian Hypertension Education Program guidelines.9

65.7% to 50.2%, the latter very similar to those reported by NHANES. Breakdown by sex shows higher control rates in women, and breakdown by age shows higher control rates with increasing age, from only 24.2% in the younger age group to 59.4% in the older age group. To a lesser extent, this pattern was also found in NHANES.

Altogether, it is apparent that different definitions for hypertension when using an automated device, such as the BpTRU, have a modest impact on prevalence rates for hypertension in Canada but a more marked impact on control rates. The latter is more apparent in younger subjects, for example, in the 40- to 59-year age group, control rates decrease from 66% to 46%, but in the 60- to 79-year age group they decrease only from 67% to 59%, suggesting that uncontrolled younger subjects are closer to the cutoff.

Irrespective of the cutoff one uses for the BpTRU, control rates of hypertension, based on national surveys of US and Canadian populations, have markedly improved in both the United States and Canada to ≥50%. If one considers that these survey data reflect single visits in a strange environment, and another ~15% of hypertensives are within a few millimeters of mercury of the target, actual control rates may well be in the 60% to 70% range. Nonetheless, 30% to 40% uncontrolled hypertension, higher in the younger population, still reflects a large burden for future cardiovascular disease, which needs to be addressed. Moreover, prevalence of hypertension is not decreasing, and population strategies toward prevention of hypertension deserve higher priority. Multi-prong strategies to lower salt and calorie intake and increase physical activity levels appear critical in this regard.

Sources of Funding
F.H.H.L.’s work is supported by Canadian Institutes of Health Research grants MOP66669, MOP13182, and MOP74432; and by Heart and Stroke Foundation of Ontario grant NA6410; E.L.S.’s work is supported by Canadian Institutes of Health Research grants MOP37917, MOP82790, and MOP102606; a Canada Research Chair from the Canada Research Chair Canadian Institutes of Health Research/Government of Canada Program; and the Canada Fund for Innovation. Ontario Survey on the Prevalence and Control of Hypertension was supported by a contract from the Heart and Stroke Foundation of Ontario.

Disclosures
F.H.H.L.’s work is supported by the Pfizer Chair in Hypertension Research, an endowed chair supported by Pfizer Canada.

References
Control Rates of Hypertension in North America
Frans H.H. Leenen and Ernesto L. Schiffrin

Hypertension. 2010;56:571-572; originally published online August 9, 2010;
doi: 10.1161/HYPERTENSIONAHA.110.157818

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://hyper.ahajournals.org/content/56/4/571

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Hypertension can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Hypertension is online at:
http://hyper.ahajournals.org//subscriptions/