The Search for Strategies to Control Hypertension

Theodore A. Kotchen

Hypertension is a major contributor to the global disease burden.1 The worldwide prevalence of hypertension is estimated to be ~26%, totaling ~1 billion people. Because a larger proportion of the world’s population is expected to be older in 2025, hypertension prevalence is projected to increase to ~29% in the next 15 years.2 Currently, in the United States, approximately 73 million Americans have hypertension. Despite this “epidemic,” the US age-adjusted mortality rates for stroke and coronary heart disease decreased by 60% and 53%, respectively, between 1960 and 1994. Cardiovascular mortality has continued to decline since 1994, although at a less steep rate. It is likely that increased availability and utilization of effective antihypertensive agents have contributed to these favorable trends. In clinical trials of antihypertensive therapy, there has been a 35% to 40% reduction in stroke incidence, a 20% to 25% reduction in myocardial infarction, and a more than 50% reduction in the incidence of heart failure.3 Nevertheless, blood pressure remains uncontrolled in large numbers of people, even among those taking antihypertensive medications, and cardiovascular disease remains the most frequent cause of mortality.

Based on National Health and Nutrition Examination Survey data, the age-adjusted hypertension prevalence in the United States has gradually increased over the past two decades (Table), possibly as a consequence of increasing obesity rates.4,5 From 1999 to 2000 and 2007 to 2008, hypertension awareness, treatment, and control rates have improved considerably, and it appears that the Healthy People 2010 goal of controlling blood pressure in 50% of all individuals with hypertension has been achieved. However, despite the availability of effective antihypertensive medications, the documented beneficial effect of lifestyle modifications, national guidelines for hypertension management, and the overwhelming evidence for the cardiovascular protective effect of hypertension control, blood pressure remains uncontrolled in 50% of adults with hypertension. Inadequate diffusion of recommended treatment guidelines into the population is both a scientific and public health concern. At the time when Claude Lenfant was director of the National Heart, Lung, and Blood Institute, he expressed the concern that the potential benefits of clinical research are lost in the translation into clinical practice.6 An Institute of Medicine report, Crossing the Quality Chasm, states that “between the health care we have and the care we could have lies not just a gap, but a chasm.”7

Strategies to further improve hypertension control rates are more apt to be successful if they are responsive to the factors that contribute to the gap (or chasm) between knowledge and clinical practice. On a conceptual level, Berwick has described “3 basic clusters” that influence the rate of spread or diffusion of innovation: (1) perceptions of the innovation; (2) characteristics of the people who adopt the innovation, or fail to do so; and (3) conceptual factors, especially involving communication, incentives, leadership, and management.8 Translated into practical terms, barriers to hypertension control may be related to patients, providers, and/or health care systems (eg, inertia of health care providers, inadequate access to medications, nonadherence to treatment, lack of self-management support, lack of social support, and differences in culture-based health perceptions).9

In this issue of Circulation, Pladevall et al report the results of a multicenter trial in Spain to evaluate a strategy for improving hypertension control by improving medication adherence.10 Physicians were randomized either to an intervention group or a control group. Those in the intervention group were to provide a 3-pronged intervention to their “high-risk” patients: (1) counting pills during physician visits; (2) designating a family member to support adherence behavior; and (3) providing an information sheet about their blood pressure medications to patients. Patients in both the intervention and control groups were provided Medical Events Monitoring Systems to monitor adherence. The intervention lasted 6 months, and the mean duration of follow-up was 39 months. Analyses were based on 875 patients (457 and 418 in the control and intervention arms, respectively) of 79 physicians. At 6 months, intervention patients had lower mean systolic (148.9 versus 151.1 mm Hg, \(P=0.008\)) and diastolic (81.9 versus 83.0 mm Hg, \(P=0.013\)) blood pressures; intervention patients were less likely to have uncontrolled blood pressure (the primary end point) and were more likely to be adherent to medications (a secondary end point). After 5 years there was no group difference in a composite end point of all-cause mortality and cardiovascular–related outcomes.

The investigators are to be commended for evaluating a hypertension control strategy that includes both physicians and patients. There were modest advantages to the 6-month intervention in terms of blood pressure control and adherence to medications. Although the components of the intervention were not evaluated separately, the composite intervention should be relatively easy to implement in routine clinical practice. In addition to physicians, other health care providers...
The lack of benefit of the intervention on the composite end point of all-cause mortality and cardiovascular-related outcomes is not surprising. Potentially, group differences between control and intervention patients may have been minimized by the control subjects’ participation in the adherence-monitoring protocol. Indeed, adherence rates were 89% in control patients. Based on the relatively small number of participants and short duration of follow-up, the study was not powered to address this endpoint. Additionally, although not addressed in the manuscript, it would be of interest to know if improved adherence was sustained beyond the 6-month intervention; group differences of systolic blood pressure were intermittently statistically significant, and group differences in diastolic blood pressure were <1 mm Hg.

Results of the Pladevall study are consistent with a recent report of Glynn et al, which was based on a review of 72 trials of interventions used to improve control of blood pressure in patients with hypertension.11 The Glynn report concluded that an organized system of regular review and follow-up allied to antihypertensive drug therapy reduced blood pressure and all-cause mortality in several trials. Self-monitoring of blood pressure and appointment reminders had variable effects. Trials of educational interventions, directed at patients or health professionals, by themselves seemed to have limited effectiveness.

A number of additional and complimentary approaches for controlling hypertension have recently been evaluated. Several recent studies have documented the effectiveness of community health workers in the care of people with hypertension, including blacks.12,13 Community health workers can bridge cultural and social gaps between health care providers and the patients they serve. As recently reported, the effectiveness of community health workers was evaluated in 8 randomized trials focusing on poor, urban blacks.13 Significant improvements in controlling blood pressure were reported in 7 of these 8 trials. Community health workers are recognized in the Patient Protection and Affordable Care Act as important members of the healthcare workforce.14

Blacks have a particularly high rate of uncontrolled hypertension. Based on recent National Health and Nutrition Examination Survey data, the age-adjusted prevalence of hypertension is 39.1% in non-Hispanic blacks and 28.5% in non-Hispanic whites.1,5 Blood pressure is controlled in only 52.4% of blacks treated for hypertension and in 28.9% of all blacks with hypertension. Although hypertension treatment rates are greater in blacks than in whites, among treated hypertensives, control rates are higher for whites.4 This suggests that more emphasis is needed on developing effective treatment strategies for blacks. Accordingly, in 2008, the International Society of Hypertension in Blacks convened a panel of clinicians and researchers to develop recommendations for addressing hypertension-related health disparities by promoting better hypertension management in blacks. The panel recommended culturally sensitive lifestyle interventions that emphasize patient self-management supported by providers, family, and the community.15

In addition to focusing on individual patients, effective hypertension prevention and control will require population-based strategies, including interventions directed at systems improvement. Populations most likely to be affected by hypertension (eg, older populations and blacks) might be selectively targeted for these strategies. An increasing number of successful, community-based hypertension control programs have been implemented in the United States and elsewhere.16–18 The elements of successful programs include the active involvement of both the health care system and nonhealth partners (eg, food manufacturers, industry, education, recreation, urban planners, and fiscal policy experts), coordinated multilevel interventions that target individuals, the social environment, the physical environment, relevant public policies, and a sufficient “dose” of the intervention.19 However, these approaches have not been widely applied to the general population and have not been incorporated into clinical practice.

Both at the individual patient level and at the population level, comprehensive hypertension control strategies might address overall cardiovascular disease risk rather than an exclusive focus on blood pressure. For example, hypertension is frequently associated with obesity, dyslipidemia, and insulin resistance. Obese individuals have a 3.5-fold increased likelihood of having hypertension20,21, and 60% of hypertensive adults are more than 20% overweight. It has been estimated that 60% to 70% of hypertension in adults may be directly attributable to adiposity.20 Consequently, hypertension control strategies might incorporate lifestyle interventions that include nutrition, physical activity, and appropriate drug treatment of other risk factors.

In summary, improving blood pressure control in the 50% of US adults with uncontrolled hypertension would be expected to significantly improve cardiovascular mortality. The study by Pladevall et al provides useful guidance that may assist health care providers in implementing strategies to

### Table. Trends in Hypertension Prevalence, Awareness, Treatment, and Control in the U.S.*

<table>
<thead>
<tr>
<th>Period</th>
<th>Hypertension Prevalence (%)</th>
<th>Awareness (%)</th>
<th>Treatment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988–1991</td>
<td>25.0</td>
<td>69.2</td>
<td>52.4</td>
</tr>
<tr>
<td>1991–1994</td>
<td>25.0</td>
<td>67.8</td>
<td>52.0</td>
</tr>
<tr>
<td>1999–2000</td>
<td>28.7</td>
<td>68.9</td>
<td>58.4</td>
</tr>
<tr>
<td>2007–2008</td>
<td>29.0</td>
<td>80.7</td>
<td>72.5</td>
</tr>
</tbody>
</table>

*Data derived from Hajjar and Kotchen4, Copyright © 2003, American Medical Association and Egan et al5, Copyright © 2010, American Medical Association.
improve adherence to antihypertensive drug therapy. Unfortunately, by itself, improving compliance with antihypertensive drug therapy in “high-risk” patients with uncontrolled hypertension may have only a limited impact on population-based, hypertension-related cardiovascular morbidity and mortality. There is a compelling need to identify additional patient-based and population-based hypertension prevention and control strategies. In addition to pharmacological therapy for hypertension, reduction of hypertension-related cardiovascular disease will also require developing culturally sensitive strategies leading to behavioral and environmental changes that address overall cardiovascular disease risk and facilitate adoption of health-promoting lifestyles.

Disclosures

None.

References


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