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The Search for Strategies to Control Hypertension

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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 U.S., approximately 73 million Americans have hypertension. Despite this "epidemic", the U.S. 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%–40% reduction in stroke incidence, a 20%–25% reduction in myocardial infarction, and more than a 50% reduction in the incidence of heart failure (3). Nevertheless, blood pressure remains uncontrolled in large numbers of persons, even among those taking antihypertensive medications, and cardiovascular disease remains the most frequent cause of mortality.

Based on NHANES data, the age adjusted hypertension prevalence in the U.S. has gradually increased over the past two decades (Table 1), possibly as a consequence of increasing obesity rates (4,5). Between 1999–2000 and 2007–2008, 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 a 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: a) perceptions of the innovation; b) characteristics of the people who adopt the innovation, or fail to do so: c) 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, e.g., inertia of health care providers, inadequate access to

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medications, non-adherence 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 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 received and were to provide a three pronged intervention to their "high risk" patients: a) counting pills during physician visits; b) designating a family member to support adherence behavior; c) 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 vs. 151.1 mmHg, p=0.008) and diastolic (81.9 vs. 83.0 mmHg, p= 0.013) blood pressures; intervention patients were less likely to have uncontrolled blood pressure (the primary endpoint) and were more likely to be adherent to medications (a secondary endpoint). After 5 years there was no group difference in a composite endpoint 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 (including pharmacists) might assist with this intervention. The lack of benefit of the intervention on the composite endpoint 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 <1mmHg.

Results of the Pladevall study are consistent with an earlier report of Fahey at el, which was based on a review of 56 trials of interventions used to improve control of blood pressure in patients with hypertension (11). The Fahey report concluded that an organized system of regular review 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 African Americans (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 African Americans (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).

African Americans have a particularly high rate of uncontrolled hypertension. Based on recent NHANES data, the age adjusted prevalence of hypertension is 39.1% in non-Hispanic blacks and 28.5% in non-Hispanic whites (4,5). 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 African Americans. 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 might be selectively targeted for these strategies, e.g., older populations, African Americans. An increasing number of successful, community-based hypertension control programs have been implemented in the U.S. and elsewhere (16–18). The elements of successful programs include the active involvement of both the health care system and non-health partners (e.g., food manufacturers, industry, education, recreation, urban planners, fiscal policy experts); coordinated multilevel interventions that target individuals, the social environment, the physical environment, and 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 hypertension (20,21); 60% of hypertensive adults are more than 20% overweight. It has been estimated that 60–70% of hypertension in adults may be directly attributable to adiposity (20). Consequently, hypertension control strategies might incorporate lifestyle interventions that include nutrition and physical activity, and appropriate drug treatment of other risk factors.

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

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Table 1

Trends in hypertension prevalence, awareness, treatment, and control in the U.S.*

	1988–1991	1991–1994	1999–2000	2007–2008
Hypertension Prevalence (%)	25.0	25.0	28.7	29.0
Awareness (%)	69.2	67.8	68.9	80.7
Treatment (%)	52.4	52.0	58.4	72.5
Control				
Among those treated (%)	46.9	43.6	53.1	69.1
Among all with hypertension (%)	24.6	22.7	31.0	50.1

* adapted from references 4 and 5