
Hypertension Control Programs In Occupational Settings

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HYPERTENSION REPRESENTS AN AREA OF HEALTH where a modest investment ought to yield a great benefit, if indeed an ounce of prevention is worth a pound of cure. Cardiovascular disease, including 600,000 heart attack deaths and 60,000 stroke deaths, was the leading cause of death and disability in the nation in 1976 (1). In that year, these cardiovascular diseases consumed, in direct and indirect costs, some \$50 billion or 20 percent of all health-related expenditures.

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Although the causes of the major cardiovascular diseases—heart attack and stroke—are not entirely understood, certain conditions or characteristics are known to increase the likelihood of their occurrence. The major known risk factors are a family history of premature vascular disease, smoking, hyperlipidemia (high blood fats), and hypertension. Of these, hypertension has the strongest association with subsequent cardiovascular catastrophes, such as heart attack and stroke, and is most responsive to available interventions.

During the past generation, substantial progress has been made in defining the natural history of high blood pressure and in developing effective means of treatment. Blood pressure elevation usually is first detected during the fourth or early fifth decade of life. Although this disease usually has no symptoms, early detection and treatment can reduce the incidence of cardiovascular death and disability.

Unfortunately, the best current information is that the majority of those with high blood pressure are not receiving effective therapy. A national antihypertension campaign, however, has altered substantially the nature

of the problem. In contrast to the situation of only a decade ago when perhaps one-half of all hypertensives were undetected, now more than 80 percent of those afflicted are aware of their conditions and fully two-thirds are receiving treatment. The glaring defect in the current situation is the widespread failure of the health care system to achieve and maintain long-term blood pressure control after patients begin treatment. As many as half of the patients who begin treatment for hypertension do not remain under care or do not adhere adequately to therapeutic recommendations.

In an effort to bridge the gap between the technical potential and the actual achievement of blood pressure control, a variety of structural and educational strategies have been developed and evaluated both in occupational and other settings. In this paper, we review (a) several types of hypertension control programs that have been tested in occupational settings and (b) the results of a series of studies conducted in occupational and other settings to determine effective educational methods for helping patients to maintain their hypertension medication regimen.

STRUCTURES FOR CONTROL PROGRAMS

Hypertension control activities in occupational settings have been underway for a number of years. Medical, economic, social, and logistical imperatives have produced several approaches to achieving blood pressure control. Because the knowledge that blood pressure reduction can lessen the risk of cardiovascular disease is so recent and adequate implementation and analysis of health care delivery programs require so much time, information about blood pressure control activities at workplaces is incomplete. Nevertheless, a number of well-documented studies have accumulated sufficient evidence to show that control efforts in occupational settings offer considerable promise of contributing to workers' wellness.

Two major categories of efforts to promote blood pressure control at the worksite are (a) detection of hypertensive employees at the worksite and referring them to community resources for continuing treatment—a systematic followup program has been an integral component of these programs—and (b) provision of antihypertensive therapy at or near the worksite. In several instances, the two patterns have been combined.

Detection, Referral, and Followup

Chicago Heart Association Project. The workplace was perhaps first used as a means of casefinding and referral in the mid-1960s. The Chicago Heart Association, in collaboration with 84 industries, systematically screened some 37,714 (55 percent) eligible employees (2). Hypertension was detected in 19 percent of these employees, but at the time of screening it was being controlled satisfactorily in fewer than 15 percent. Although 65 percent of these hypertensives actually saw a referral physician, followup for the group as a whole revealed that they had not achieved significant improvement in blood pressure control after 5 years.

The directors of the Chicago project concluded that their initial approach—merely advising screenees with elevated blood pressure levels to see a physician—was not sufficient to produce and maintain the necessary long-term therapy. Therefore, in 1969, they began another approach to detection and referral of hypertensive employees. This approach substantially increased communication between hypertensive workers and staff of the hypertension control program because it included additional contact with those with elevated blood pressure readings at the first screening. Laboratory tests were performed, and the results were given to the hypertensive employees for transmission to their physicians. Also, a health educator spoke with each of these employees, and five 1-hour classes on cardiovascular disease were offered to the affected workers at their workplaces.

Unfortunately, the response to this second strategy was as unimpressive as the response to the first approach. Fewer than half of the hypertensive employees actually visited a physician, and 2 years later only one-half of those who sought care had achieved and maintained control of their blood pressure.

The results of the Chicago project suggest that although workplace screening might be a convenient and economical way to detect hypertension, it does not necessarily lead to either participation in treatment or to improved control of blood pressure. Simple referral to customary sources of care does not seem to effect the change in behavior necessary to achieve these goals.

Michigan Worker Health Program. Investigators at the University of Michigan developed a worksite hypertension control program based on a coordinated detection, referral, and followup campaign (3). This program, carried out in collaboration with labor unions and management in several work settings, included maintaining contact with both the worker and his or her physician after screening revealed elevated blood pres-

sure. As much effort as necessary to produce effective referral was expended. Followup efforts were conducted primarily by mail and telephone. As a result, 88 percent of all identified hypertensives actually consulted a physician. Thereafter, contact with both patients and physicians was maintained at semiannual intervals. With followup data available for up to 2 years, more than 80 percent of the successfully referred employees maintained satisfactory blood pressure control.

The factor that distinguishes the Michigan program from less successful programs is the project staff's systematic and diligent followup of both patients and physicians. It seems that this approach is more likely to produce blood pressure control than simple referral without vigorous followup.

The Burlington Industries Program. A third approach to detection, referral, and followup is represented by a program initiated by Burlington Industries in 1974 (4). A well-planned educational program for management and workers resulted in 100 percent participation in the screening component of this program. Appointments were made with a physician chosen by each worker having an elevated blood pressure. The workers' physicians received a letter containing a record of the blood pressure readings and an offer to provide the worker with blood pressure checks, education, and other services at the worksite in cooperation with the physician. The workers who participated thus continued as patients of their personal physicians for treatment of hypertension, but received supplementary services from the worksite hypertension program to monitor their blood pressure and to help them continue in treatment and maintain their medication regimens. About one-half of the referred employees were approved by their physicians for participation in the cooperative care component of this program. No data on blood pressure control were available from this pilot study, but long-term contact with hypertensive employees and communication between the worksite program staff and community physicians have been found in other studies, such as the Michigan Worker Health Program, to be effective approaches. The Burlington study demonstrated the feasibility of close cooperation between community physicians, hypertensive employees, and staffs of worksite hypertension control programs.

Occupationally Based Treatment

Several investigators have designed comprehensive programs for the detection and treatment of hypertension in the occupational setting. One such program, developed by Cornell University Medical College for the United Storeworkers Union in New York City, detected

and treated hypertensive employees at Gimbels and Bloomingdale's department stores (5). Since 1973, some 15,000 employees have been screened. The prevalence of hypertension was 15 percent; about 1,500 identified hypertensive workers are now receiving care at 1 of 11 union-provided treatment locations. The program uses a health team approach; a nurse, supervised by a physician, provides care according to a systematic protocol. There is no direct cost to the patient for visits, drugs, or laboratory tests. Patients' adherence to treatment has been high, with attrition amounting to less than 10 percent per year. Satisfactory blood pressure control has been achieved and maintained by 80 percent of the program's active patients. Preliminary data suggest that absenteeism and hospitalization have declined for treated patients.

Recent studies have demonstrated that equally satisfactory results can be achieved for employee groups treated at an offsite union health center clinic. This experience suggests that a rigid therapeutic approach, reliance on a health team, removal of personal financial impediments, emphasis on patient participation in the treatment process, and the provision of all services within a socially cohesive institution are individually or together more important determinants of outcome than the physical location of the treatment facility.

Programs in Progress

The projects just described, and other similar ones, have stimulated the establishment of a variety of formal demonstration and evaluation projects designed to measure the relative merit of these various approaches. The University of Michigan, in collaboration with the Ford Motor Company, has established three distinct intervention programs that include two methods for detection and referral and one for onsite treatment at three automotive plants. No intervention is planned for a fourth plant so that results can be compared with those of the experimental locations. The Westinghouse Electric Company recently was awarded a contract by the Department of Health, Education, and Welfare to undertake a prospective analysis of different approaches to antihypertensive therapy in various plants. The University of Maryland also has been awarded a grant by DHEW to conduct a study of blood pressure control for State employees. It is expected that prospective collection of economic and medical data will permit accurate assessment of the relative merits of the various approaches being tested.

Understandably, insurance companies also have become interested in the development of programs to encourage blood pressure control activities in industry. The Blue Cross Association, with support from the Na-

tional Heart, Lung, and Blood Institute, has developed a strategy through which it hopes to demonstrate that industrial blood pressure control activities can be stimulated by the educational efforts of local company representatives. The Massachusetts Mutual Life Insurance Company in Springfield has instituted an occupationally sponsored program in which education, detection, and followup of hypertensives is carried out at the worksite and community physicians provide treatment. An additional feature of this program has been the assumption of full costs by the company. Physicians provide information on patient status through the billing process so that vigorous patient followup is assured and accurate cost-benefit analysis is feasible.

A variety of worksite-based programs to detect, refer, follow up, and treat hypertension among employees have been initiated in different kinds of occupational settings. In many cases their experience has been long enough to permit some outcome analysis. The results have been sufficiently encouraging to justify their expansion. Studies now underway should clarify the relative merits of the different occupational programs, as well as provide an accurate definition of their medical and cost-benefit implications for industry.

EDUCATIONAL STRATEGIES

The National Heart, Lung, and Blood Institute has sponsored 11 studies to test various strategies for improving compliance of patients with blood pressure control (6,7). The principal investigators of these studies met several times over the course of their 3-year grants. In sharing and exchanging their experiences and findings, the investigators arrived at several conclusions that are particularly relevant for occupational health applications. (The results of these studies have not yet been published.)

Health Care Providers

Increased contact time. In all 11 studies it was found that short-term improvement in blood pressure control can be achieved by almost any intervention that provides more time for discussion between a health care provider and a hypertensive patient. This finding suggests that periodic blood pressure counseling, even without a highly structured educational or behavioral intervention, could possibly be a cost-beneficial activity of worksite health programs. We offer this possibility with trepidation in view of the various types and designs of the studies on which it is based. Nevertheless, there are theoretical explanations for the phenomenon of reduced blood pressure resulting from such generalized intervention. Most such explanations can be cate-

gorized as experimental effects or placebo effects (8). Since all the studies from which this observation was drawn were experimental, reduced blood pressure could result from the patients knowing that they were being observed and therefore taking greater care to bring their pressure down by compliance during the period of the study.

Some of the studies, however, used resident staff of the clinical setting rather than research staff to conduct the interventions, thereby minimizing the possibility that the patients would respond on the basis of knowing they were part of an experiment. The second explanation is that the mere process of being under more intensive care and observation resulted in a reduction of blood pressure without necessarily increasing compliance or other behavioral changes. Such a placebo effect is well documented in relation to a wide range of phenomena, including blood pressure.

Increased number of contacts. A second observation from many of the studies was that the frequency and continuity of contact between patient and health care provider resulted in greater blood pressure control. This observation is similar but it is in partial contrast to the first observation, which was concerned more with amount of time and intensity of each contact as opposed to the number and variety of contacts over time. The Johns Hopkins data revealed an effect from the number of contacts, but it was not the number of contacts alone that accounted for this effect; rather, it was the combination of content and contact resulting in more opportunities for and types of repetition and reinforcement of behavioral changes (9). In the University of California study in Oakland, a similar contact-content difference was found between home visits and regular contacts with clinic personnel (10,11). Again, the advantage of the worksite is obvious. With regular and appropriately spaced contacts at the worksite, the schedule of behavioral change can be paced and tailored to the abilities and motivation of the worker and reinforced over time by subsequent contacts.

Active patient participation. A third generalization drawn from these studies suggests another level of intervention. The 11 studies appear to have achieved varying levels of blood pressure control, depending on the extent to which patients were actively rather than passively involved in setting goals for their own blood pressure control or behavioral change. Some of the most dramatic effects were achieved, for example, in small studies in which each patient literally contracted with the health care provider for behavioral and blood pressure achievements that would be rewarded by the

provider with tangible goods such as trading stamps, a book, or a ticket to a sporting event (12-14). In the Johns Hopkins study in Baltimore it was noted that of three kinds of intervention the one that required the greatest amount of participation by the patients, as distinct from provider-initiated contact, resulted in the greatest reduction in blood pressure (15).

Social Support

A fourth common observation in most of the 11 studies was that the involvement of a significant other person in addition to the patient and the provider was helpful in reducing blood pressure at least temporarily. Two of the University of Michigan studies were designed specifically to test the hypothesis that the enlistment of a partner in blood pressure control would have this effect. Perceived social support was significantly increased, and preliminary analyses suggested that blood pressure control corresponded with social support (16-18 and personal communication about NIH grant No. HL18418 from R. D. Caplan, Research Center for Group Dynamics, Institute for Social Research, Ann Arbor, Mich., 1978). The North Carolina study at Chapel Hill successfully mobilized the effect of social support through family members or friends who were trained to measure the patient's blood pressure and by home visits by a pharmacist or nurse (19). The Johns Hopkins study also stimulated such social support through home visits (20). The potential of the worksite as a more convenient place than the home to mobilize social support for blood pressure control suggests an even greater potential for achieving this effect with co-workers in occupational health programs.

Self-Monitoring of Blood Pressure

Some of the studies found an added effect when patients were given the opportunity to monitor their blood pressure and to keep records of changes (13,18,19,21,22). This effect is believed to operate through another form of direct feedback and reinforcement. When the changes in blood pressure are more visible and accessible to the patients, they can adjust a variety of lifestyle habits according to the trends and changes in their blood pressure. Some of these changes may not have been so obvious to the health care provider, much less the patient, without such direct feedback. Thus, the workplace could be a setting in which the development of self-monitoring skills with accessible resources should be easier than in most medical sites or homes (21).

COMMENTS

From the work reviewed, it is clear that hypertension control programs that are focused primarily on detection

of elevated blood pressure are unlikely to achieve benefits sufficient to justify their costs. Programs that include efforts to ensure completion of referrals may achieve this intermediate objective, but they do not address the problem of patients' failure to stay in treatment or to adhere to medication regimens—the additional steps necessary to achieve blood pressure control.

Programs that include some form of long-term contact with hypertensive employees appear to be successful in achieving blood pressure control. The success of these programs is enhanced by contact with the hypertensive worker's personal physician or by the provision of services for the patient at the worksite, or both. The findings on the effectiveness of increased intensity, variety, and number of contacts and on the effectiveness of social support are consistent in studies of program structures and of patient education strategies.

The experiences of the programs reviewed afford some warnings and some encouragement. The cautionary conclusions come from the poor results and short-lived effects of simplistic screening, referral, or educational programs that have no followup and reinforcement over time. The encouraging signs come from worksite programs that are more intensive—they involve hypertensive employees in their own care and vigorously maintain contact with these employees over time. Additional encouragement is drawn from the results of recent studies of educational interventions in clinical settings. Their methods could be used and probably their effective results could be achieved in occupational settings.

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