

Data-Based Planning for Educational Interventions Through Hypertension Control Programs for Urban and Rural Populations in Maryland

DAVID M. LEVINE, MD, ScD
 DONALD E. MORISKY, MSPH, ScD
 LEE R. BONE, BSN, MPH
 CAROL LEWIS, MSW, MPH
 WILLIAM B. WARD, DrPH
 LAWRENCE W. GREEN, DrPH

HYPERTENSION, OR HIGH BLOOD PRESSURE (HBP), remains one of the most prominent health problems in the United States and is estimated to affect some 60 million adults. It has major effects on cardiovascular and cerebrovascular morbidity and mortality, and it is responsible for the loss of productive years of work and increased costs of health care (1,2).

During the past 10 years, studies have demonstrated that more than 90 percent of persons with hypertension can have their blood pressure controlled if adequate health care is provided (3). Yet, despite medical advances in the detection, treatment, and control of HBP, large proportions of those with hypertension have either dropped out of care (4) or do not comply adequately with treatment regimens to achieve blood

pressure control (5). Moreover, estimates indicate that approximately 50 percent of persons found to have elevated blood pressures, particularly young males, are not getting into care (6).

In an effort to address this national problem, the National Institutes of Health in 1977 supported public health experiments in four States (Maryland, California, Connecticut, and South Carolina). The goal was to determine whether statewide efforts using existing resources, and coordinated by the State health departments, could improve high blood pressure control. In Maryland, the planning and monitoring of these activities has been carried out by a State coordinating council composed of an executive committee and 10 statewide standing committees. The 27-member execu-

Dr. Levine is a senior staff member of the Johns Hopkins Health Services Research and Development Center and professor and acting chairperson, Department of Behavioral Sciences, Johns Hopkins School of Hygiene and Public Health. Dr. Morisky is senior research associate of the center. Ms. Bone is a research associate in the Department of Health Services Administration, Division of Health Education, Johns Hopkins School of Hygiene and Public Health, and Ms. Lewis is evaluation specialist for the Community Hypertension Education Project and a doctoral student in the school's Department of Health Services Administration. Dr. Ward is chairperson of the Department of Health Education, University of South Carolina. Dr. Green is director of the Center for Health Promotion Research and Development and professor in the Department of Family Practice and Community Medicine, University of Texas Health Science Center at Houston. Mrs. Ruth B. Parry, research associate in the Community

Hypertension Education Project, provided technical assistance in the preparation of this manuscript. Dr. Donald Harting, Worcester County health officer, and Ms. Jane Apson, health educator, collaborated in the development of the rural community program. Dr. John Southard is principal investigator of the Maryland State High Blood Pressure Coordination Program. Dr. Aristide Apostolides and Dr. George Entwisle are principal investigators in the Maryland statewide household survey.

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Tearsheet requests to David M. Levine, MD, Department of Behavioral Sciences, Johns Hopkins School of Hygiene and Public Health, 615 North Wolfe St., Baltimore, Md. 21205.

tive committee, appointed by the State health department's project officer, includes the principal investigators for each subcontract and chairpersons of the standing committees. Those committees are organized along professional and functional lines. In addition, geographic dispersion of members was sought so that the scope of decisionmaking and activities would represent all areas of the State. The committees include those representing the professions of nursing, pharmacy, medicine, dentistry, and the functional areas consisting of public and patient education, worksite, church, and hospital.

The coordinating council developed a statewide implementation plan for blood pressure control to carry out two main goals:

1. To increase the proportion of controlled adult hypertensives by at least 10 percent in Maryland by 1982.

2. To reduce the number of persons in Maryland with diastolic blood pressure higher than 105 mm Hg by one-third by 1982.

As part of this statewide effort, the coordinating council recommended that targeted educational interventions be planned, implemented, and evaluated in two contrasting communities where the populations were at high risk of uncontrolled HBP and its cerebral, cardiac, and renal complications. Information gathered from these prototype communities was designed both to enhance the effect of improving HBP control in these two communities and to be shared with the statewide standing committees and the coordinating council in their development of guidelines for program implementation in their respective areas. The two communities recommended by the statewide executive committee were East Baltimore, an urban community of 71,000 persons, and Worcester County, a rural community of 30,000 on the Eastern Shore.

Methodology

Educational assessment: framework. The principles underlying the conceptualization and planning for these two demonstration projects have been based upon health education and organizational theories, and they have been used to create an overall framework for assessing individual, community, and organizational behaviors. Guided by these theories, planning has been based upon these three strategies:

1. defining the nature and extent of the problem at the individual, the organizational, and the community level;

2. identifying actual and potential resources to assist in coordinating the program; and

3. incorporating the community's goals and norms into the decisionmaking process.

A health education model (7) provided a useful framework for determining those factors which positively or negatively affect the behaviors that lead to health benefits. The framework used in this planning is called PRECEDE (an acronym for Predisposing, Reinforcing, and Enabling Causes in Educational Diagnosis and Evaluation). At the individual, community, and institutional levels, certain factors predispose, enable, and reinforce the initiation and continuation of behaviors that are conducive to blood pressure control. Some examples are given in the following list.

Predisposing factors—Items concerned with those patient characteristics which influence health behavior, for example, attitudes and beliefs.

Reinforcing factors—Items which identify those factors that strengthen positive health behavior or weaken negative behavior, for example, whether blood pressure is measured at every medical visit.

Enabling factors—Items which identify the availability and accessibility to health care, for example, sufficient time to discuss BP problems with the physician.

Educational assessment: data sources. Information collected for these projects was derived from a variety of sources; existing sources were used wherever possible. These included hypertension-related mortality rates by geographic area from the State vital statistics division (8), published reports and local surveys including educational approaches addressing community HBP control (9–11), and a three-community household survey in Baltimore City which provided sociodemographic and health care utilization data regarding the East Baltimore community (12).

Mortality data for diseases of the heart and vascular system are displayed in the table. When all rates were combined, Worcester County had the highest mortality rate, but Baltimore City was first for diseases of the heart for each of the 3 years preceding the education program.

Although both areas display similar hypertension-related mortality patterns, they differ considerably with respect to sociodemographic characteristics and health care use patterns. Compared with the State's population, the people of East Baltimore are somewhat younger, urban, and primarily black, and they live in a densely populated area; Worcester County residents are stabler, somewhat older, rural, and primarily white. Health care is predominantly institution based in the urban community (75 percent of the health care is provided

Diseases of the heart and vascular system for Baltimore City, Worcester County, and State of Maryland, 1974-76 deaths combined (rates per 100,000)

Cause of death	Baltimore City	Worcester County	Maryland
Diseases of the heart	444.43	430.18	305.99
Cerebrovascular disease	74.19	131.05	60.24
Arteriosclerosis	10.88	9.91	11.22
Hypertension	3.43	3.73	2.83
Other diseases of the arterioles and capillaries	17.03	9.92	10.96
All rates combined	576.84	584.75	391.24

SOURCE: Reference 8.

by the following institutions: a large teaching hospital, a community hospital, a community health care center, a health maintenance organization, and an outpatient, community-based, extended-care facility of the teaching hospital); but private practitioners or ambulatory care medical centers provide most of the medical services in the rural community.

The available information was useful first in defining the high-risk communities and then in providing the basis for an assessment of the health care problems related to high blood pressure. New information was obtained from a statewide household survey conducted by the Department of Social and Preventive Medicine of the University of Maryland School of Medicine in 1978-79 (13). This survey was designed to provide baseline data for program planning and evaluation. A followup survey is scheduled for 1982; it will assess changes in BP status and health care behaviors.

The sampling design in the 1978-79 survey was an equal probability sample of all Marylanders who resided in households and were 18 years of age or older. A total of 6,425 persons comprised the sample. No differences were noted between those in the sample and the State population with respect to any major socio-demographic variable (age, race, and sex). The data obtained from this survey consisted of limited medical histories, public and patient knowledge about HBP, attitudes and beliefs about HBP, relevant aspects of the provider-patient interaction, and availability and accessibility of health care. Blood pressure measurements were taken for each person interviewed (three were taken 1 minute apart, and the average of the last two measurements was used) allowing the computation of rates of awareness, treatment, and control of HBP, and extrapolation to the State population as a whole.

Data from the statewide household survey were helpful in establishing educational assessments for the planning of educational strategies in the two communities.

Because of the small numbers of persons interviewed in each area, however, additional data were gathered and an ongoing educational assessment process was initiated. Consistent with the statewide goal, local resources (such as trained high school students in the urban community and senior citizen groups in the rural community) were coordinated to gather some of these data.

Targeted telephone surveys, employing an age-sex quota sampling technique, were conducted. More than 400 residents in each community were interviewed to elicit information similar to that obtained in the statewide survey, without, of course, the opportunity to measure blood pressure.

Other sources of local data were hospitals' and community health centers' medical records. Reviews of random samples of records yielded baseline information on blood pressure control and appointment-keeping behavior. These data were used for planning; they will also be used for the final evaluation of these two projects.

Additional information was obtained from targeted interviews with health care providers, community leaders, and residents. The inclusion of these groups in the planning process facilitated community-provider linkages and the subsequent development of relevant, coordinated programs for HBP control. A task force in East Baltimore and an advisory counsel in Worcester County were formed to assure communication and orderly planning.

The data sources used in these two projects are shown in the list.

Data Sources and Information They Provided for the Educational Interventions Project

Existing Sources

- State Vital Statistics Division—cardiovascular mortality
Rudd, et al. reference 4 and Levine, et al. reference 11—compliance, appointment-keeping behavior, effectiveness of health education interventions
- German, et al. reference 12—availability, utilization of health care resources

New Sources

- Statewide household survey—prevalence, awareness, treatment, and control of HBP, knowledge, attitude, beliefs, and behavioral correlates of HBP
 - Targeted telephone survey—reported HBP prevalence, knowledge, beliefs, and practices related to HBP
 - Reviews of provider medical records—appointment keeping behavior, BP control rates of diagnosed hypertensive patients
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Findings

The PRECEDE planning model was used to analyze the items noted in the list that were correlated with variation in rates of awareness, being under care, appointment keeping, or BP control. Findings are presented in relation to the following three types of factors as noted previously.

Predisposing factors:

- understanding the asymptomatic nature of HBP,
- understanding adherence to the medical regimen.

Reinforcing factors:

- whether blood pressure is measured at every medical visit,
- whether the patient was told the exact blood pressure measurement and what the measurement meant,
- whether the provider ever made BP information available,
- whether the physician was too busy to spend time with the patient, and
- whether the provider ever asked the patient if there were problems with the blood pressure medication.

Enabling factors:

- the site where the blood pressure is usually measured—private physician's office or other,
- whether an appointment is necessary for a HBP visit and the last time that the blood pressure was measured.

Analysis of the data identified the following similar problems in the two communities.

1. Men under 50 years are least likely to be aware of their elevated blood pressure, be in care, and achieve blood pressure control.

2. Of hypertensive patients under care, about 40 percent demonstrate inadequate compliance with their therapeutic regimen. Previous studies indicate this problem to be related to inadequate patient-provider communication (such as confusion about specific regimens, taking medication based on how they feel, and lack of family and social support).

3. A large proportion of those surveyed incorrectly believe that people who have HBP often experience specific symptoms. The percentages of those surveyed in the two communities who expressed incorrect beliefs were as follows:

<i>Symptom</i>	<i>East Baltimore</i>	<i>Worcester County</i>
Headache	88	69
Dizziness	94	79
Nervousness or tension ...	86	73

Among the hypertensive population, those who believed in the symptomatology of HBP were less likely to see a physician about their HBP in the last 6 months

($X^2 = 5.9, P < .01$) and less likely to have their BP under control (pressures above 140 mm Hg systolic and/or above 90 mm Hg diastolic; $X^2 = 12.5, P < .01$).

4. The absence of internal coordination within institutions and community health centers results in a lack of standardized referral guidelines or systematic follow-up for persons with an elevated pressure. This lack of coordination is most pronounced in the urban community where an outpatient clinic or an emergency department focuses on acute illness or experiences considerable rotation of staff.

5. The absence of community-based organizational structures in each area to coordinate existing resources for HBP control.

6. The following factors were significantly correlated with hypertensive patients having seen their physician about their HBP in the last 6 months. These include those who were told their exact BP measurement and what it meant ($X^2 = 66.7, P < .001$); those who reported that their provider made HBP information available ($X^2 = 41.5, P < .001$); and those who reported that their physician was not too busy to spend time with them ($X^2 = 13.9, P < .001$).

In addition, there was a significant dropout problem in the urban community among two groups of patients. The first group consisted of those who had an initial blood pressure elevation and did not complete verification measurements. These people are usually young men seen in emergency rooms and outpatient departments where followup is absent. The second group were diagnosed hypertensives who, despite the provider institutions and followup attempts, did not continue in care. Statewide data would indicate that this is related to patients misbelieving that they no longer need to be in care or are cured. In the rural community, difficulty in achieving blood pressure control was more widespread than the problem of continuity of care.

Implementation in the urban community. Analyses of the community and provider data indicated the need for community outreach and followup. This outreach was intended to extend and enhance current provider efforts to increase the likelihood of returning dropouts to continuing care, as well as increasing the rates of those completing diagnosis and care after the discovery of an initial elevated blood pressure. The planning and implementation of these efforts has been carried out by the East Baltimore Community HBP Control Task Force consisting of representatives from the five major health care institutions, community leaders, and residents. Initial exploration indicated that the city health department was supportive of such a program, but the

department did not have the capacity to coordinate it. The task force's chairperson is a community leader who is also the assistant director of a decentralized city agency which defines and addresses community problems. Regular task force meetings over the past 3 years have provided an opportunity for the dissemination of the diagnostic findings, such as those factors related to increasing patients' adherence to the medical regimen, as well as findings from the program's activities which have resulted in modifications of the ongoing effort.

The East Baltimore Community HBP Control Task Force has developed protocols for followup and outreach, as well as guidelines and educational approaches tailored to patients at the various stages in identification and care. The approaches designed for this project build upon existing community resources and strengths in order to be more feasible, affordable, and likely to be continued. Because of these criteria and of community interest in HBP, persons already employed in city service agencies and schools and providing human services were further trained to measure blood pressures and provide educational counseling and outreach for persons referred to them from provider institutions. These persons function as "extenders of care" for the providers. Those referred are people who have not completed the initial screening and diagnosis process, patients who have dropped out of care, and those who would benefit from blood pressure monitoring and reinforcement; 10 female community health workers provide followup and outreach. Preliminary analysis of the data indicates that approximately 40 percent of those who have dropped out of care and had not previously returned to care, despite health care providers' efforts, have now returned to care.

In addition, targeted activities have been directed toward men aged 18 to 50 years. The approach has been to provide opportunities for these men to receive a free BP check and followup at worksites, recreation centers, or other places where they are likely to congregate and to assist the health care system to coordinate systematic referral and followup methods. Preliminary analysis indicates that this group is reachable; however, followup is often limited by their lack of telephones. Of those contacted for followup by telephone, more than 40 percent have completed the referral process. In addition, the provider institutions have improved their own systematic referral and followup mechanisms for persons with elevated blood pressures.

Implementation in the rural community. Because of their different educational diagnoses, the implementation of the BP control program in the rural community

has varied from that of the urban community. Program planning and implementation has been carried out by the local health department under the direction of the county health officer and an advisory council with members from the health department, representatives from agencies, and consumers. Among the agencies are the Rural Management of the Aged in the Community (MAC) Senior Program, volunteer fire departments, pharmacies, the department of social services, two ambulatory health care centers, the school system, the American Heart Association, and the local nursing school.

The health department has set up a coordinated system linking existing community sites (fire departments, MAC centers, and churches) which offer BP screening, followup, and monitoring. Statewide referral guidelines are followed by personnel at each of these sites. A worksite program, initiated by a nurse practitioner, has been especially effective in reaching target groups.

Educational efforts have been targeted to providers to increase physician awareness of the problem of inadequate BP control, despite the patient's being under care. In particular, the issues of blood pressure goal, the importance of provider-patient interaction, and the patient's compliance with medication taking and appointment keeping have been emphasized. Preliminary analyses indicate providers' acceptance and the feasibility of this approach. In addition, county pharmacies have implemented a prescription reminder system to increase compliance. A coordinated public information campaign via local media and radio broadcasts has reinforced compliance messages and informed the public of the availability of free BP measurements.

Evaluation planning. Evaluation was built into the conceptual framework and the implementation of the demonstration projects. This continuing evaluation process has influenced both the development and modifications of the approaches for HBP control. In addition, knowledge derived from the community interventions is shared with members on the State coordinating council for use in statewide program planning. The evaluation of these projects incorporates analysis of the processes (for example, the activities of the task force and advisory committee, the development of consensus on protocols, coordination activities, training of community health workers); impact (for example, the numbers of persons brought back into care); and outcomes (proportion of individuals achieving adequate blood pressure control).

The followup statewide household survey in Maryland will assess changes in the levels of awareness, treat-

ment, and control of high blood pressure; in patient knowledge, attitudes, and beliefs, and in patient, physician, and institutional practices. A second review of the health care institutions and of providers' medical records will provide information on appointment-keeping behavior and blood pressure control in the two communities.

Conclusion

In summary, we have described an approach to planning an educational interventions project that links the health care providers and the community, thereby allowing the programs to be carried out in consultation with the target populations. Based upon a multilevel diagnosis of the needs of individual persons, of the community, and of health care institutions, educational strategies were designed and implemented to influence the long-term care and management of uncontrolled HBP. Data-based planning has led to targeted educational interventions which maximize efforts by the community and health care institutions to develop a coordinated approach for the management and control of HBP in two communities with high-risk populations.

References

1. Kopstein, A. N.: Hypertension-related mortality by health service area 1968-72. National Center for Health Statistics, Statistical Notes for Health Planners, No. 11. Publication No. (PHS) 80-1237, September 1980.
2. Weinstein, M., and Stason, W.: Hypertension: a policy perspective. Harvard University Press, Cambridge, Mass., 1976.
3. Moser, M.: Management of essential hypertension. *In* Hypertension: a practical approach. Little, Brown and Company, Boston, 1975.
4. Rudd, P., et al.: Hypertension continuation adherence: natural history and role as an indicator condition. *Arch Intern Med* 139: 545-549, May 1979.
5. Sackett, D. L.: The magnitude of compliance and non-compliance. *In* Compliance with therapeutic regimens. Johns Hopkins University Press, Baltimore, 1976, pp 9-25.
6. Southard, J. W., et al.: Why Marylanders with elevated diastolic pressures are not controlled to 1979 and the implications of this for community planning. Paper presented at the National Conference on High Blood Pressure Control, Houston, Tex., Mar. 23-25, 1980. State of Maryland 1979-1982, Baltimore, September 1979.
7. Green, L. W., Kreuter, M. W., and Deeds, S. G.: Health education planning: a diagnostic approach. Mayfield Publishing Co., Palo Alto, Calif., 1980.
8. Maryland Center for Health Statistics, Department of Health and Mental Hygiene: Annual vital statistics reports, Maryland, 1974, 1975, 1976. Baltimore, April 1977, and January 1979.
9. Farquhar, J. W., et al.: Community education for cardiovascular health. *Lancet* 1: 1192-1196 (1977).
10. Borhani, N.: Implementation and evaluation of community hypertension programmes. *In* Epidemiology and control of hypertension, edited by O. Paul. Stratton Intercontinental Medical Book Corporation, New York, 1975, pp. 627-661.
11. Levine, D. M., et al.: Health education for hypertensive patients. *JAMA* 241: 1700-1703, Apr. 20, 1979.
12. German, P. S., et al.: Symposium: health care of the aged in four ambulatory care settings with a focus on the hypertensive patient. *Gerontologist* 15: 311-332 (1975).
13. Apostolides, A., Entwisle, G., and Su, S.: High blood pressure control in the State of Maryland. *Prev Med* 8: 124, March 1979.

SYNOPSIS

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As part of a statewide effort to coordinate existing resources for high blood pressure (HPB) control, a public health HPB control program was planned and implemented in two high-risk communities in Maryland. The selection of the two communities

was based on epidemiologic data. The planning of the educational intervention program in these communities (urban and rural) was guided by organizational theory and health education principles. The framework for development, implementation, and evaluation of the program utilizes an educational assessment model which identified factors that predispose, reinforce, and enable individual persons to practice positive health behavior.

Multiple data sources were used in assessing the extent of the problem and relevant approaches in the development of the coordinated HPB control program. These include statewide vital statistics and a random

statewide household survey to assess the prevalence rates of awareness, treatment, and control of HPB. To supplement these data, telephone surveys were carried out in the two communities to assess knowledge, beliefs, and practices related to HPB control. Medical record reviews provided baseline information on appointment keeping behavior and BP correlates of hypertensive patients.

The planning and implementation of the program was carried out under the direction of representatives of the health care systems, community leaders, and residents, and representatives of communitywide organizations involved in HPB control.