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I. Project Design for Public Health Research

HERMAN E. HILLEBOE, M.D., M.P.H., F.A.P.H.A.; GEORGE JAMES, M.D., M.P.H., F.A.P.H.A.; and JOSEPH T. DOYLE, M.D.

A pilot study is set up to work out a practical means for detecting preclinical heart disease in the community and to reveal what additional research may be needed for a mass attack upon coronary disease and hypertension. It is this sort of pioneering that tomorrow's public health administration will be based upon.

✢ The ability of official public health agencies to maintain their hard-won leadership is being challenged in many states by the change in the program content of public health from the acute communicable toward the chronic disabling diseases. Health departments cannot long continue to give highest priority to traditional programs in sanitation and communicable disease if these problems are largely under control. However, it is premature to launch broad community service programs for the "control" of diabetes, heart disease, and obesity based upon the few reported laboratory studies and pilot demonstrations. The chronic disease problem involves much more than the familiar problem of a single etiology, vaccine, or technical procedure which can be solved by a short series of discrete field tests. Health agencies cannot spend millions of dollars for widespread community services founded solely on early experimental findings, however promising.[1]

Before new resources can be added to the standard practices now employed in public health, possibilities for error must be narrowed by well planned critical studies. It is here that official public health agencies can contribute effectively to the process of change by initiating and carrying out those field research projects on chronic disease problems for which their experience, personnel, and special abilities are uniquely suited. Some of the recent discoveries of preventive medicine could be translated immediately into new cardiac services for citizens, but the discovery of promising "next steps" in the development and application of such knowledge is even more important.

Dr. Hilleboe is commissioner of health, and Dr. James is assistant commissioner, Program Development and Evaluation, New York State Department of Health, Albany. Dr. Doyle is director of the Cardiovascular Health Center. All the authors are also associated with the Albany Medical College, Albany, N. Y.

Health agencies can no longer regard research—especially such developmental and applied research—as outside their official responsibility.

To undertake projects of this scope, which are new to most public health workers, a Program Development and Evaluation unit was created in the Executive Division of the New York State Department of Health. The unit includes an epidemiologist experienced in local and state health activity, an administrative assistant trained in administrative analysis and personnel services, a public health statistician, and a research scientist versed in social science investigations in the health field. This new unit is charged, under the immediate direction of the commissioner of health, with organizing the development and evaluation of public health programs and research conducted in the State Health Department. It helps plan and develop new programs and assists in their integration with existing divisions and outside agencies. It studies serious health problems in the state which, at present, are not amenable to attack with available public health resources. It initiates and encourages studies to determine the yardsticks needed to measure progress in public health.

This is a paper on the methodology employed in the first research project developed by the new study unit in order to: (1) suggest a practical method of detecting preclinical and early clinical cardiac illness, and (2) point clearly to the additional research studies needed for a practical mass attack on coronary artery disease and hypertension.

Adult Heart Disease—Analysis of the Problem

Of every 100 deaths in New York State during 1952, 42 were due to heart disease; of these, 30 were caused by coronary heart disease, five by hypertension (Table 1), and the remainder by other diseases of the cardiovascular system (Table 2).[2] These diseases are not solely problems of the aged; in this state in 1952, one-fourth of all male

Table 1—Resident Death Rates per 100,000 Population by Sex and Age for Certain Specific Causes[2]—New York State (Exclusive of New York City)—1952

	Causes							
	Cardiovascular Renal Diseases		Diseases of the Heart		Arteriosclerotic Heart Disease Including Coronary Disease		Hypertension with Heart Disease	
Age	Male	Female	Male	Female	Male	Female	Male	Female
Less 5	5.9	3.6	1.5	0.8				
5- 9	3.0	3.5	1.2	1.0				
10–14	2.4	4.2	1.2	0.4	0.3	..	..	0.1
15–19	9.2	5.1	3.2	2.8				
20–24	17.7	8.3	9.1	5.4				
25–34	31.4	22.1	22.1	12.3	11.6	2.1	2.1	1.4
35–44	144.8	68.1	118.6	43.1	84.8	12.7	6.1	7.3
45–54	492.8	238.2	416.7	163.0	340.9	80.2	26.5	38.1
55–64	1,412.7	707.3	1,170.5	504.9	947.5	332.7	104.5	87.8
65–74	3,166.1	2,232.9	2,456.2	1,563.8	1,902.8	1,070.7	213.0	245.1
75+	8,811.7	8,065.8	6,243.1	5,403.0	4,354.9	3,493.5	520.4	666.1
Total	665.4	554.0	511.1	377.9	386.5	242.3	42.2	55.0

Table 2—Deaths in 100 (Proportional Mortality) Due to Certain Specific Causes by Sex, All Ages and Certain Age Groups, New York State (Exclusive of New York City)—1952

Cause	All Ages			Age 35–44			Age 45–54			Age 55–64		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Cardiovascular renal diseases	58	57	60	37	41	30	48	51	43	56	58	52
Vascular lesions affecting C.N.S.	11	9	13	5	4	6	6	5	9	9	7	12
Rheumatic fever	0.1	0.1	0.1	0.4	0.3	0.5	0.1	0.0	0.3	0.0	0.0	0.0
Diseases of the heart	42	44	41	28	34	19	38	43	29	44	48	37
Chronic rheumatic heart diseases	1	1	2	6	5	8	4	3	6	2	1	2
Arteriosclerotic heart disease including coronary disease	30	33	26	17	24	6	28	36	14	34	39	24
Nonrheumatic chronic endocarditis and other myocardial degeneration	6	5	6	1	1	1	2	2	2	3	2	3
Hypertension with heart disease	5	4	6	2	2	3	4	3	7	5	4	6
Hypertension without mention of heart disease	0.8	0.7	0.9	1	0.8	1	0.9	0.8	1.0	0.6	0.4	0.8
General arteriosclerosis	2	2	3	0.1	0.0	0.2	0.1	0.0	0.2	0.5	0.5	0.5
Other diseases of circulatory system	0.6	0.7	0.4	0.7	0.8	0.6	0.8	0.8	0.8	0.8	0.9	0.6
Chronic and unspecified nephritis	1	1	1	2	2	2	2	1	2	1	1	1
Tuberculosis	1	1	0.7	4	3	4	2	3	1	1	2	0.6
Malignant neoplasms	16	15	17	21	15	30	23	17	33	23	20	29
Accidents	5	6	4	12	16	7	6	8	3	3	4	2

deaths between ages 35 and 44 were caused by coronary heart disease. The best available data [3] indicate that if males free from heart disease at age 40 are followed for 20 years, 14 per cent will develop clinical coronary heart disease, and 4 per cent will die of this malady in that period.

In preparing to attack a massive public health problem, the total "need" must be divided into its component parts, so that we may concentrate our efforts to obtain specific results.[4, 5] For heart disease, the major components are coronary heart disease and hypertension. Further analysis points up the different mechanisms involved in various stages of coronary disease. Coronary insufficiency can follow any spasm, thickening, stiffening, or partial blockage which—singly or in combination—narrows the lumen of the coronary arteries. These mechanical changes affect the amount of oxygen carried to the heart muscle. Similar results will also follow certain systemic diseases, such as severe anemia, malnutrition, and diabetes. Coronary occlusion occurs when an artery becomes completely blocked and the heart muscle, deprived of oxygen, is usually permanently damaged. The seriousness of the infarct which follows such an occlusion is determined by the location and extent of the involvement.

Infarction not only follows a sudden occlusion of a coronary artery, but may also occur after a slow progressive narrowing of one or more branches, resulting in ischemia and necrosis. Blumgart [6] and Enos, et al.,[7] have shown from autopsy material on persons who died from noncardiac disease that marked narrowing, and even actual closure, may occur in several main branches of coronary arteries without a history of symptoms or signs of angina or myocardial failure. Blumgart further demonstrated that the majority of hearts of persons over 40 years of age showed evidence of coronary artery atherosclerosis. This evidence indicates that pathology alone does not explain coronary heart disease and that the classification and diagnosis of this disease is unusually complex and must be approached with great caution.

The patient's history is of prime importance in the detection and diagnosis of coronary disease. Frequently, it offers the only available evidence of disease in the face of negative physical and laboratory findings. When coronary insufficiency gives rise to the warning signs of angina, exertional dyspnea, or fatigue, an accurate diagnosis can lead to medical advice that results in a changed manner of living. Protection of the heart muscle against unnecessary strain and foreseeable stress may provide many additional years of life. Enlargement of the heart, as shown on simple screening tests such as fluoroscopy,[8] or x-ray films of various types,[9] may also suggest coronary insufficiency. Normal standards for heart size on x-ray exhibit considerable variation, but the electrocardiogram can give an electrical indication which has been accepted as a more reliable measure of ventricular hypertrophy.[10] Cardiac enlargement not due to hypertension or valvular defect always arouses suspicion of coronary disease.

The physical examination and special tests, such as the electrocardiogram and analysis of blood lipoproteins, may also provide evidence of coronary insufficiency, cardiac enlargement, hypertension, and peripheral vascular disease, either alone or in formidable combination. On the other hand, the only positive finding may be a vague history of pain referable to the chest. In such cases it is desirable to observe how the heart muscle reacts to increased work as measured by the electrocardiogram taken both before and after stress. Master's exercise test [11] is commonly used to detect impaired coronary efficiency.

Criteria for positive results have not yet been uniformly standardized and some cardiologists report that false-positive findings occur fairly frequently [12]; yet, the test is safe, inexpensive, and easy to perform. Similar exercise tests employing the treadmill appear effective.[13] Electrocardiograms taken before and soon after a meal of 900–1,500 calories have also been used to gain evidence of coronary insufficiency.[14]

Levy's anoxemia test [15] employs the principle of induced oxygen want to measure the functional efficiency of coronary circulation by means of the electrocardiogram before and after deprivation of oxygen in the respired air. Its disadvantages, according to some investigators, are its expense, the difficulty of controlling blood oxygen levels, and certain undesirable reactions, including anxiety in some of the persons tested. Its proponents point to the low number of false-positive results, while admitting that it fails to reveal many cases of coronary disease. Levy recommends that "for routine clinical purposes, the anoxemia test should be restricted to cases in which the diagnosis of coronary insufficiency is in doubt. Only a positive result is significant." The safety, reliability, or validity of other tests for coronary insufficiency, such as the ballistocardiogram, the flicker fusion, and the use of ergonovine are at present still controversial.

None of the tests described measures the degree of coronary insufficiency, identifies the nature of the primary cause, or suggests the probable cardiac future of a particular patient. When positive, however, these stress tests indicate a disturbance of myocardial function at the time of the test which should lead to the prompt institution of medical supervision and advice.

The mechanisms in hypertension include complicated combinations of neural, humeral, mechanical, and renal factors. Perera and Atchley [16] define hypertensive vascular disease as "a disorder in which the arterioles offer an abnormal but variable resistance to the flow of blood." A complex system of chemicals and mechanisms maintains arterial pressure. The intrinsic factors are output per minute, blood volume and viscosity, elasticity of the larger arteries, and the resistance of the peripheral arterioles. Extrinsic factors include respiration, central and peripheral neurogenic reflexes, chemical products, and noncardiovascular disease such as hyperthyroidism. Drugs and surgical therapies also affect blood pressure levels in varying degrees. Changes in intrinsic and extrinsic factors may be temporary or permanent in their effects.

The critical question remains: What is normal, and what is abnormal blood pressure? A scientific answer is not available, despite 50 years of experience in which millions of blood pressures have been taken and studied. In everyday practice, certain arbitrary standards are recommended by various medical experts.[17] Blood pressure is lower in children than in adults, tends to be higher in the obese, is lower among certain Indian tribes,[18] and fluctuates with the individual's health and the circumstances under which the reading is made. Opinions differ on whether variability of pressure in an individual is more significant than a single high reading and on whether those with higher levels within the normal range may run greater risk of hypertension.[19, 20] Under well defined conditions abnormal elevation of the diastolic pressure must be given the most weight in arriving at the diagnosis of hypertensive vascular disease. One should not merely label a person with elevated diastolic blood pressure as a case of hypertension until psychosomatic and environmental factors have been critically appraised and the cardiac, renal, and vascular complications carefully assessed.

Many persons with hypertension have no symptoms from the elevated blood pressure; if they are not alarmed by treatment and can make reasonable adjustments in their mode of life they seem to do well. A small proportion, however, do undergo rapid deterioration accompanied by renal failure, and progress to a fatal outcome despite all therapeutic efforts. For those who develop cardiovascular or renal complications, the physician can provide special therapy and medical supervision. No specific test is now available to differentiate these two general varieties of hypertension. Until more refined tests are discovered, measurement of blood pressure, as a simple screening test, should be applied at intervals on a mass basis to bring hypertensive suspects under medical supervision.

Method of Attack

For the past few years, the New York State Health Department has been dealing with the adult heart disease problem by postgraduate education of physicians, general community health education, consultative cardiology services in various clinics, nutrition programs, social work demonstrations, and public health nursing services. These activities, undertaken with limited funds on a demonstration basis, constituted only a modest start toward the prevention and control of heart disease. It was time for a direct approach which, although developed on a small scale, might lead directly to effective technics with which to help solve the riddle of heart disease.[21]

In June, 1952, the Program Development and Evaluation unit began a study to determine how the State Health Department could contribute to the science of preventive medicine in heart disease, hoping to parallel the extensive research being done in the clinical and experimental fields of the problem. Consideration began with the logical first step: What is a case? Coronary heart disease is primarily a clinical diagnosis, recognizable by symptoms of angina; hypertension encompasses many diseases, all characterized by a sign—increased diastolic blood pressure. Between symptom and sign, and the basic physiological mechanisms which might be involved, is a world of mystery. One way to explore this world is to apply periodically, to a series of "normal susceptibles," the best available technics for detecting these diseases.[22] With the passage of time, as symptoms or signs required to establish the diagnoses occur, the carefully compiled record of test results can then be analyzed for findings suggestive of a preclinical diagnosis.

Attempting an epidemiological study in the face of an inability to recognize cases before the onset of irreversible symptom-producing pathology is like attempting to solve the epidemiology of the streptococcus by a study limited to deaths from rheumatic fever. However, this is the fundamental problem in heart disease control, as it is in so many chronic diseases. An attack upon the problem of preclinical diagnosis will lead directly to further studies of preventive, case-finding, and therapeutic measures. Such an approach can bring additional dividends: the reliability of existing diagnostic tests can be checked; promising new tests can be evaluated, their practicability, cost and public acceptability assessed, and knowledge of their use disseminated among the medical profession; and satellite research projects developed around the "core" program can be promoted.

Keys [23] set down a challenge to future public health effort to heed the measurable differences found among normal, healthy individuals. Analysis must include an investigation of how these differences are associated with the later development of disease, variations

in time and place of occurrence, and with certain other environmental factors. The next step would then become the experimental attempt to modify these differences by manipulating the associated environmental factors in the hope of interfering with the development of the particular disease. Such an approach requires that the epidemiological method be applied in its broadest sense—and all present indications are that chronic diseases, with their multiple etiologies, must be considered from the standpoint of each of many environmental and inherited factors. This is, indeed, the field in which public health agencies are uniquely prepared to assume leadership.

As the program based on this approach evolved, it was found that all requirements could be met within the Albany area. A fair-sized, stable population of male adults, who could be examined periodically, was available among the State Civil Service Employees in Albany. A cooperative agreement with Albany Medical College provided a medical center which has clinical facilities to guide all clinical procedures and offer the cardiology staff active contact with other medical specialties. Endorsement of the county and state medical societies was granted this research project in which no treatment would be provided to the participants.

Program

Early Planning—A full six months was set aside for a review of existing knowledge and completion of the preliminary administrative plans. There were three essential parts to this review: (1) a study of the literature, (2) advice from consultants, and (3) visits to similar projects already in operation.

Collecting, indexing, and publishing 16,000 titles on hypertension, and preparing 1,500 abstracts consumed three years of the time of Clark's social science research team.[24] We desired to obtain all possible information about previous investigations into coronary disease, but did not wish to postpone actual research for so long a period. By dividing the task among the team members the major pertinent papers on coronary heart disease were identified and studied in six months, while other tasks necessary to the rapid development of the project were being performed. Clark's data [24] were reviewed for background material on hypertension.

Consultants, selected with care, are essential to help us review and criticize new public health programs. Not only can they relate important contributions to the subject and appraise the scientific merit of previous studies, but they can supply significant unreported experiences. For this project a formal advisory committee, composed of five noted internists and cardiologists, some with special experience in preventive medicine, was created. In addition, consultations were held with numerous other experts in epidemiology, laboratory, and clinical medicine, the basic medical sciences, and the social sciences. The advisory committee and the consultants help keep the project on a sound scientific basis and contribute practical suggestions for action.

Members of our team visited the cardiac disease detection programs in Framingham,[25] Minneapolis,[26] and Baltimore,[27, 28] and certain related experimental studies in New York City, Saranac Lake, Washington, D. C., Philadelphia, and Boston. These contacts create a mutual interest which should further the cause of research in heart disease. Several of the investigators visited have in turn inspected our new project. Channels for the exchange of information were opened that should benefit all the participants in the years ahead.

Project Design—To provide the care-

ful documentation necessary for effective communication among all involved, a project design for the proposed Cardiovascular Health Center (CVHC) was prepared. It went through three drafts, each being discussed thoroughly by a departmental committee of epidemiologists, internists, and experts in administrative planning and laboratory research. The project design describes the plan in considerable detail, discussing its objectives, stating basic assumptions to be considered, analyzing the attitudes of interested groups and key individuals, explaining how and why the study group was selected, outlining examination procedures and the organizational structure of the CVHC, and reviewing aspects of the general problem of adult coronary disease and hypertension. In all, the project design includes about 12,000 words; what follows is a very brief summary of this material.

The project design lists three main objectives: (1) to detect and follow coronary disease and hypertension among middle-aged male state employees, determining the incidence, prevalence, and progress of these diseases among the group; (2) to follow up all participants to determine the efficiency of various technics for detecting early coronary disease and hypertension; and (3) to develop and evaluate methods of applying them to large groups in the population. In addition, the Albany CVHC will contribute data to aid in later studies of the epidemiology of coronary disease and hypertension and will serve as a core operation about which teams of scientists can develop related projects. It will also notify the participants' own physicians of positive findings, thus leading to early application of preventive and therapeutic measures for the specific persons studied.

The list of basic assumptions included in the project design illustrates the basic policies which should govern the activities of public health agencies during this period of change of emphasis from acute communicable to chronic disabling diseases:

1. A systematic program to control and study coronary disease and hypertension is needed.
2. Some technics are available for detecting coronary disease and hypertension, and those accepted by medical authorities as the most suitable should be utilized.
3. A legitimate function of a state health department is to test the applicability and results of procedures which may help control coronary disease and hypertension, so that information obtained can be disseminated to benefit the state's physicians and especially their prospective patients.
4. The required physical facilities and skilled personnel are available locally, or obtainable if sufficient funds are supplied.
5. The attitude of state employees, physicians, and the general public are such that initial and continued participation and cooperation are assured.
6. It is worth while for private physicians to know when their patients have a heart ailment.
7. The health department has a responsibility to encourage development and validation of screening procedures for detecting heart disease.
8. Additional basic research studies utilizing the CVHC as a core activity will eventually assist in controlling heart disease in the state.

The project design describes in some detail how the attitudes of special groups and key individuals were appraised. An advance timetable of a step-by-step plan was prepared and followed, in order to insure the greatest possible support for the project. This plan emphasized four principles of human relations: (1) participants themselves must have a real part in the planning and execution; (2) word of mouth is a simple and successful means of communication; (3) small-group influence is an important motivation to action; and (4) the entire procedure—planning, executing and evaluating the program—involves health education for staff as well as for participants.

The participant group was selected carefully to provide a large enough population at risk, yet suitable for prolonged follow-up. Statistical predictions for meaningful data dictated a minimum starting sample of approximately 2,000 subjects. Since the risk of coronary heart disease is four times greater among adult males than among adult females, only males were included. This also simplifies the requirements of the examination facility. To limit participants to the very young group would diminish the annual yield of new cases; too many individuals in the older group would reduce the number of observations possible. Hence, a ceiling age of 54 was set. The Civil Service Department in New York State permits retirement with liberal benefits at age 55, so most workers have a strong reason to remain at least until that age. Many continue working until 60 or 65 (Table 3) to obtain additional benefits, and it should be possible to examine many of the age 54 group for another 10 years, if we find reason to do so. Retired participants can still be followed to some degree, since pension checks are mailed regularly. The Retirement System can notify the CVHC when pensioners die and cause of death can then be studied.

The younger age limit for participants was set at 40, because there were about 2,200 male state workers in the Albany area between the ages of 40 and 54. Taking a complete age-sex group as a sample simplified employee relations by establishing a natural, easily understood definition of an eligible subject. Admittedly, this study population is not a representative sample of middle-aged males in New York State. However, the group does include many economic and occupational groups in the general population. Moreover, coronary heart disease and hypertension are so common among all groups of adult males that it was felt that this particular population would be suitable to meet the stated objectives of the project.

Based on the experience of Morris with British physicians covered by disability insurance,[3] some crude estimates can be made (Table 4) of the number of cases of coronary disease which might develop during periodic study of our group of approximately 2,000 adult males. One might expect that between

Table 3—New York State Male Employees Working in Albany —Distribution by Age *

Age	Number		Per cent	
Total	6,010		100.0	
15–19	282		4.7	
20–24	485		8.1	
25–29	725		12.1	
30–34	627		10.4	
35–39	632		10.5	
40–44	842	2172	14.0	36.1
45–49	759		12.6	
50–54	571		9.5	
55–59	439		7.3	
60–64	400		6.7	
65–69	224		3.7	
70 and over	24		0.4	

* Estimated on the basis of reports received from 10 state departments

Table 4—Estimated Number of Cases and Deaths from Coronary Heart Disease Among Middle-Aged Male State Employees in Albany Based on Morris [3]

Age Group	Estimated Population	Cases in 5 years	Cases in 10 years	Cases in 15 years
Total	2,172	49	91	135
40–44 years	842	7	17	37
45–49 years	759	15	33	52
50–54 years	571	26	41	46

100 and 200 cases will occur during a 15-year period of observation. Also, to some degree, the data on the detection of preclinical coronary disease obtained from this study can be compared to findings obtained from other similar projects.[25, 26]

Examination procedures are limited to those tests shown to be effective in detecting clinical coronary disease and hypertension. Procedures used in the first examination include: a complete history and physical examination; blood cholesterol and serology; x-ray film of chest (14" x 17") PA and lateral; 12-lead electrocardiogram and Starr ballistocardiogram, both resting and after the Master double two-step test. A treadmill is also being used as a form of measured physical stress.

The director of the CVHC is identified in the project design as a competent cardiologist with training and experience in the development of team and individual projects in clinical research. A CVHC council governs the center's major policies. Its eight members are divided equally between the State Health Department and Albany Medical College and include the state commissioner of health and the assistant commissioners of Laboratories and Research, Medical Services, and Program Development and Evaluation, the dean of Albany Medical College, the professor of medicine, associate professor of medicine (Cardiology) and the professor of radiology. The formal advisory committee of outside consultants has already been mentioned. The basic staff of the CVHC consists of a full-time director, a consultant cardiologist, a nurse, two medical technicians, a secretary, a receptionist, and 200 physician-days per year of part-time service by qualified internists and cardiologists.

The project design also includes a review of the extent of the heart disease problem and the contributions the CVHC will attempt to make toward its ultimate solution; outlines current anatomical and pathological data in the field, with emphasis on those factors suitable for special study; reviews current literature on technics for diagnosis of early coronary disease and hypertension; describes related projects in other areas, including pertinent comments made by leaders of other study teams; and outlines tentative plans for reporting on the activities and general progress of the CVHC.

Early Operations—The director of the CVHC was secured to serve on the staff of the Albany Medical College as an assistant professor of medicine and to devote half-time to the routine operation of the CVHC and half to cardiological research and teaching. A contract was written with the Albany Medical College covering the project. The State Health Department will continue to meet the major share of the cost, but all quarters and facilities, consultants, and auxiliary services are supplied by the Medical College.

To test the reactions of prospective participants, the social scientist, administrative analyst, and a staff health educator met with about 40 nonmedical "eligible" employees of the State Health Department for an informal group discussion. It was pointed out that the examination was entirely voluntary and that findings on each participant would be sent only to the private physician designated. The individual testing procedures were explained and the routine procedures outlined. All present immediately indicated willingness to take part. Before the official opening a trial run was made on this same group of State Health Department employees. Each participant was interviewed informally afterward and some minor administrative and technical defects were promptly corrected.

On February 26, 1953, eight months after the first activities of the program development team, the center was for-

Table 5—Participation, by Eligible Persons, in the CVHC (February 8, 1954)

Number of Eligible Persons Contacted	Number Examined	Number Now Scheduled	Number Refusing	Per cent Refusing
1,344	1,102	72	170	12.6

mally opened. The governor of the state was the first official participant to receive the complete two-hour examination. Since the start, over 1,250 employees have passed through the CVHC. Personnel officers of state departments have supplied lists of eligibles and the health educator has assisted the center staff in contacting individual participants. Measures used to obtain the cooperation of eligible participants have so far been limited to distribution of a pamphlet and small group discussions. Notification of appointments is made by telephone and mail. The degree of success of these simple and direct recruitment methods may be seen in Table 5. Of the first 1,344 persons offered an appointment at the center, nearly 90 per cent are participating. Follow-up of those who refused appointments will be done later by health educators assigned to the project.

The attitude of the State Medical Society is illustrated by the following official comment which appeared recently in the New York State Journal of Medicine [29]:

> The essence of progress is change. New York State has, for many years, been in the forefront of progressive educational, social, health, and labor legislation. . . . It is therefore gratifying to record a further step in progress, the establishment of the Cardiovascular Health Center in Albany. Under the aegis of its Commissioner of Health, in conjunction with the Albany Medical College, New York State has again taken the lead in a program of controlled heart research. The plan is simple, direct, and practical. The aims of the Cardiovascular Health Center are clear. . . . Those of our readers who study the timely and important proposal for the study of coronary heart disease and hypertension will be well rewarded. . . . We are sure that this long-term study will be a success. We wish it well.

Two administrative changes were made in the procedures as the program developed. By improving the availability of the x-ray unit and by asking patients to complete a large portion of the history before reporting to the center, physician-time per patient has been reduced from two hours to one hour. An investigator skilled in lipoprotein chemistry has been recruited as director of the State Health Department's new protein laboratory and will initiate additional research studies in cardiovascular diseases. Several satellite projects by research groups composed of Medical College and Health Department personnel are already under way or are in the planning stage.

Postgraduate courses in adult heart disease are being held for physicians in the Albany area. The interest shown in this type of session indicates how official health agencies can play a useful role in providing general practitioners with refresher training in coronary disease and hypertension. No longer should public health agencies limit their interest in postgraduate medical education to traditional public health programs. Modern physicians, eager for new information in heart and other chronic diseases, are not interested in sessions on communicable diseases alone. Modern health departments must at least seek to keep up to date, and the field of chronic diseases is wide open if we wish to continue leadership in public health.

As part of the postgraduate education

program, courses in heart disease are being held for key members of the medical staff of the State Health Department. Through these sessions about 30 division and bureau directors are studying how their health programs might be broadened to include research and service aspects of heart disease. At the same time, the cancer and tuberculosis experts are studying ways in which the mass chest x-ray surveys might be of service to heart disease control, as well as to their own special fields.

Discussion

The art and science of public health must change with the progress of scientific medicine. Leadership for this change can come from within the profession itself, and can prove its effectiveness by the profession's initiative in discovering new methods of applying modern knowledge on a mass basis to the control of chronic diseases. What is needed in public health today is a pulling together of the specialties. The division of medicine into various compartments is not always in the patient's best interest and modern health programs involve many such divisions simultaneously. Teamwork in medicine is essential for the most precise diagnosis, the most effective treatment, and for a research approach to many chronic diseases, including coronary heart disease and hypertension.

The search for the etiology of heart disease and arteriosclerosis is being pressed throughout the country by hundreds of research groups. While these studies continue the official health agency should develop effective projects on a research basis for the application of existing knowledge, which at the same time will serve as a hub around which all phases of research can be maintained. Of practical importance to public health is the fact that tests are available for the detection of coronary disease and hypertension. By bringing significant numbers of persons under periodic cardiac examination, the applicability of these screening methods for mass use can be determined. As cases accrue in the study group, the comparative value of the various detection technics, singly or in combination, can be evaluated. During this process of determining the public health benefits and applicability of detection tests, annual complete heart examinations will be offered to a large number of people who would be unlikely to obtain them otherwise. This in itself is a significant contribution to the health of these people and the health education of their families. Persons with newly discovered enlarged hearts, hypertension, rheumatic hearts, arteriosclerosis, or diabetes will then have the best available opportunity to obtain modern medical care by their own physicians after the prompt diagnosis of early disease.

Public health agencies may continue to adhere to a scientific conservatism, but at the same time they must enter boldly into the experimental area by organizing skilled teams for carefully planned projects in clinical and field research. The Albany CVHC is developing entirely under such a plan, in a step-by-step process, beginning with a small but adequate study group, utilizing the best information from consultants in many fields, encouraging satellite projects in basic research, taking advantage of available resources, and welding the whole into a potentially effective frontal attack upon heart disease, the foremost public health problem of our time.

Summary

The steps in the development of the Albany CVHC are outlined to illustrate how modern public health agencies can maintain their leadership during the

present period when a basic change is occurring in the program content of public health. The method described made use of the best available experience and knowledge to appraise the coronary disease and hypertension problem, to generate an interest among public health physicians, and to lead to the formation of effective study teams. Emphasis is placed upon the need to seek out for each new health problem the particular research contribution which the health department can best perform. With its background in epidemiology, mass screening for disease, and postgraduate medical and health education, the New York State Health Department has initiated a program for the periodic examination of an adult population group as its first major effort in the field of coronary heart disease and hypertension.

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