Screening for Chronic Disease With a Mobile Health Unit

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SYSTEMATIC screening of all persons 40 years of age and older to detect incipient chronic disease and disability and to bring these persons under medical supervision is advantageous to the community and to the individual. In the District of Columbia, chronic illness is a critical factor contributing to the ever widening group of dependent families. Not only is illness most frequent in families of low income, but it is this group which is driven, by economic necessity, to postpone seeking medical service until a condition is acute. Extensive medical care and hospitalization are only a part of the resulting costs, since assistance is generally required to maintain the family as well.

The savings to be derived from the early detection and treatment of chronic diseases will be reflected in the continued productivity of the wage earner and family, in the forestalling of costly hospitalization, and in the attendant social and economic gains of a family that can remain together and be financially independent. Benefits will be accrued in the reduction in premature deaths and in the relief and rehabilitation of those for whom the progression of disability is halted. The tremendous relief of human suffering cannot be evaluated.

First priority for community screening is coverage of areas which include families with the smallest financial resources. In the District of Columbia, a third of the population live in areas where the median family income is less than $4,900 a year. Among this group are more than 92,000 persons 40 years of age and older. By conservative estimates more than 900 of them have undetected diabetes, 1,800, undiagnosed glaucoma, 60, untreated tuberculosis, and many have other unsuspected potentially disabling conditions.

The District of Columbia Department of Public Health has responsibility, within the resources available, for providing comprehensive medical care for the medically indigent and public health services for the whole community. The department presently can meet only a small part of the need for extension of health screening services. Public health nurses who observe persons with symptoms suggestive of disease make referrals to physicians and to the department's medical services. Aside from D.C. General Hospital, the department of public health's major examination and treatment center is the Northwest Central Clinic. Services provided at the clinic are primarily to persons referred through the department of public welfare, and limitations of staff and facility preclude the health screening of the neighborhood population for anything other than venereal disease and tuberculosis.

The central core of the city and the entire northeast quadrant, where there are rapidly growing concentrations of families of low income, have no public health facility for general screenings. Thus, the department's existing facilities are not well located to serve the needs for intensive screening operations, and an accumulation of unmet needs for other physical

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facilities in the District of Columbia has deferred the authorization of capital outlay for new health centers.

Study Plan

Early in 1963 the District of Columbia Department of Public Health developed jointly with the Public Health Service a plan for a 5-year study, using a trailer owned by the Service and previously operated in another State. The trailer, 43 feet long and 8 feet wide, had been specially designed and equipped. The object of this study was to determine whether or not a mobile health screening facility is a practical means for early detection of chronic disease among adults of the District. It was estimated that an average of 50 persons per day, 7 persons an hour, could be screened in the examination center. Approximately 12,500 persons per year could be examined.

The department of public health maintains the trailer and provides the necessary staff and materials for its operation. The chief of the department's bureau of chronic disease control has administrative responsibility for the study.

Study results are reviewed by the Public Health Service and the department at least once a year to determine if modifications are needed or if the study should be terminated.

Procedure

Population to be screened. We proposed to make intensive, systematic efforts to assist persons 40 years of age and older not already under medical supervision to obtain health screening examinations.

In order to screen the maximum number of persons it was planned to move the health examination center bus from one location to another. Systematic neighborhood screening and followup would be started in those sections of the city where the lowest incomes are reported. The target group in these areas is composed of 42,000 men and 50,000 women. There are 29,000 white and 63,000 nonwhite persons.

Screening procedures. Screening procedures include selective medical history and physical inspection; height and weight determinations; vision and hearing testing; tonometry for detection of glaucoma; chest X-ray for evidence of tuberculosis and other pathology of the chest, such as cancer and heart abnormalities; recording of blood pressure and obtaining an electrocardiogram for detecting cardiovascular ailments; and analysis of blood samples for indications suggestive of diabetes, anemia, and syphilis.

Followup

It was estimated that three-fifths of those persons 65 years and older screened and one-fourth of all others would require some followup. Those whose test results suggest a disease or disability are notified and referred for diagnosis and treatment to their private physician, who is sent the findings. These physicians are contacted later to ascertain findings and recommendations. Patients with no other medical resources available are assisted in receiving medical care through the regular facilities of the department. Definitive diagnosis and treatment are provided for them at D.C. General Hospital and at the contract hospitals.

Staffing

One physician, four technicians, and one record-receptionist proved the ideal complement for maximum use of the mobile health examination facility. The physician supervises all the test procedures, is responsible for taking the blood pressure, performs the physical inspection, and ECG. He interprets test results and makes decisions on referrals. The four technicians conduct the vision and hearing tests, take blood samples and X-rays, do tonometry tests, and carry out those laboratory procedures which can be completed at the test site. The record-receptionist assists in obtaining selected health data from each patient and records height and weight measurements. She maintains records for recheck, referral, and followup.

Basic to the entire operation is the willingness of people to take the screening examination. Two community health workers persuade area residents of the advantages of a health screening examination and organize the neighborhood for optimum scheduling of appointments.

Screening examinations must be continuous to achieve the best results. If persons fail to ap-

pear or if they come in bunches, costs go up and effectiveness diminishes. Interest must be stimulated and sustained week in and week out, block by block. The efforts of the community workers and the schedule of the mobile health examination facility (11 a.m. to 7 p.m., Tuesday through Saturday) are geared to hours when the wage earner, his spouse, and the aged can use the facility. At each location, the public health nurse is a focal point for referral.

It was essential to have chronic disease advisers who are physicians to assure that all persons with findings suggestive of chronic disease would be followed through to definitive diagnosis and treatment by their own physicians or by public health facilities. The three chronic disease advisers locate persons who do not obtain a confirmation diagnostic test, who fail to report to their private physician, or who do not show up for diagnosis and treatment, and assist them in carrying out plans for the indicated medical procedure.

The division of biostatistics of the District of Columbia Department of Public Health established a system for counting numbers of persons screened and recording the test results, diagnosis, and disposition. The bureau of laboratories and pharmacies supervises and assists with laboratory procedures.

Budget

The annual cost of such an operation for the District was as follows:

Item	*Cost*
Personnel	$75,100
1 Physician or 2 part-time physicians 20–40 hours	12,000
4 Technicians	20,000
1 Record receptionist	4,250
1 Community health worker	6,600
1 Community health worker	5,600
1 Chronic disease adviser	8,450
2 Chronic disease advisers	11,200
Personnel benefits	7,000
Other expenses	5,550
Cost of moving between locations—2 moves at $25	50
Operating costs (supplies, laundry, maintenance, cleaning, except electricity)	4,500
Promotional materials and mailing	1,000
Total	80,650

This would bring the calculated cost to less than $7 per person screened. For the period January 1 through June 30, 1963, the project was financed from funds available from the chronic disease and heart control programs. For fiscal year 1964, additional resources were utilized from funds made available to the District from Medical Assistance to the Aged.

Evaluation

Records were devised to permit analysis of the following data by areas of the city: (*a*) proportion of the number of persons 40 years of age and older received screening examinations; (*b*) demographic characteristics of the population screened; (*c*) proportion of persons screened found to have a diagnosis of one or more previously unknown conditions; (*d*) proportion of persons with diagnosed conditions who received some medical assistance through treatment or rehabilitation; (*e*) reasons for not receiving treatment; (*f*) proportion of the persons screened under supervision of private physicians, under health department supervision, or no supervision for the past 24 months; and (*g*) costs per person screened and per new diagnosis.

Program in Operation

The mobile health unit began actual operation on April 23, 1963. We were fortunate in being able to recruit the personnel to man the unit quite rapidly, and although there have subsequently been a number of personnel changes, by and large, staffing has not been troublesome.

During the year, April 23, 1963–April 30, 1964, a total of 7,269 persons were screened at the unit; the female to male ratio was approximately 4 to 3. This total was considerably less than our original estimate of 12,500 persons per year.

Of this number, 5,801 were referred because of some apparent difficulty found and for 2,658 of these persons, followup was completed by the end of the year. The median age for persons screened was 51.9 years. The most common abnormalities were: high blood pressure, obesity, abnormal electrocardiogram, loss of hearing, and suspicion of glaucoma. Followup by

Number of completed followups of possible abnormalities and confirmed diagnoses of previously unknown conditions, District of Columbia mobile health unit, Apr. 23, 1963–July 1, 1964

Examination	Followup completed	Confirmed previously unknown diagnosis
Height and weight	1,060	151
Blood pressure	1,243	279
Visual acuity	574	180
Audiometry	741	258
Oral cavity	148	27
Neck	40	15
Heart sounds	253	55
Blood sugar	176	54
Serology	525	69
Hemoglobin	184	88
Tonometry	714	134
Electrocardiogram	947	353
Chest X-ray	450	143
Total	7,055	1,806

physicians has been very satisfactory and approximately 75 percent of all patients screened and found to have an apparent abnormality were seen by their private physicians, the remainder being sent to public clinics (see table).

While it is true that a considerable number of conditions were previously known to screenees' physicians, a substantial number of diagnoses were new to both physicians and patients.

Our original concern that patients would not take advantage of the screening facilities proved groundless. The response was excellent; in fact, almost throughout the year patients have had to be scheduled by appointment. Whether this response can be attributed to the vigorous health education drive carried out in the community by the health department staff using various resources and devices known to health education personnel, or whether it can be attributed to a combination of factors, it is difficult to say. Nevertheless, there has been little difficulty in attracting persons to the unit. There have been a number of newspaper accounts of the unit's activities, and representatives of press, radio, and television attended the brief ceremony marking the anniversary of the unit's inception.

Although we had anticipated moving the trailer once a month, it has been located in only three places in the city during the first year of operation because of the demand for services. The trailer is not small, and it is not as easy to move as some of the smaller trailers which health departments have commonly used in mass chest X-ray screening, for example.

Breakdown of equipment was minimal although some parts of the unit will need to be replaced in future years. Maintenance costs for calendar year 1964 amounted to $2,745.

At the meetings with representatives of the Public Health Service held at the expiration of 6 months and 1 year of the unit's operation, it was agreed that use of the facility had been a success. At the first meeting the apparently high prevalence of glaucoma found was questioned. However, this statistic was thoroughly checked and was found to be accurate.

Summary

During the year April 23, 1963–April 30, 1964, a total of 7,269 persons over 40 years of age were screened by a mobile health unit at 3 locations in the District of Columbia.

Of this number 5,801 were referred because of some apparent difficulty and for 2,658 of these, followup was completed within a year. The median age of screenees was 51.9 years. The most common abnormalities were high blood pressure, obesity, abnormal electrocardiogram, loss of hearing, and suspicion of glaucoma. Approximately 75 percent of persons screened and found to have an apparent abnormality were seen by their private physicians; the remainder were sent to public clinics.

Health educators were responsible for persuading persons to visit the specially equipped bus and chronic disease advisers followed patients through to definitive diagnosis.