Current Experience in Multiphasic Health Examinations*

Orientation and Background

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In the past twelve months, multiphasic health examination, multiphasic screening, or multiple screening, as it is variously called, has gained currency in the public health lexicon. Will multiple screening eventually become an effective public health procedure, or will it end as an obsolete term in the dictionary—like fomites or miasma—with no more practical value than the magic formula "abracadabra"? The answer to this question depends upon the frame of mind in which all health officials, their staffs, and the medical profession approach multiple screening. In my opinion, the concept of multiple screening has a brilliant future, but the only valid approach at the present time is experimental.

Multiple screening has emerged as an experimental procedure from several well known public health practices. The basic origin of the procedure is the use of mass laboratory testing in exposed population groups as a means of controlling epidemics. Another basis of the multiple screening idea is the routine health inspection of certain population groups, such as school children and industrial workers. The modern concept of case finding, however, has been the principal stimulus to the development of multiple screening. Whereas mass testing was at first applied only to exposed groups in outbreaks of infectious disease, case finding now implies the search for disease of continuously high prevalence in large general population groups. Thus, the use of diagnostic techniques has shifted from a rear-guard action against epidemics to an offensive against certain chronic diseases—tuberculosis, syphilis, diabetes, heart disease, and so on.

It is safe to say that never has a mass case finding operation been 100 per cent accurate, for no test has been developed that is "foolproof." Yet no physician or medical scientist should regret the mass application of diagnostic techniques any more than he does their application to single patients. Without the persistent analysis of specimens collected from ex-

posed population groups in epidemics of typhoid fever, diphtheria, scarlet fever, and amebic dysentery, for example, we would not have discovered the "carrier state" in these infections. Without the mass application of tuberculin testing, the Schick test, the Dick test, and others, our knowledge of immunology and allergy would be far less advanced than it is today. In many cases, epidemiological studies including such tests have made it possible for public health administrators to simplify and make more effective their control procedures. Mass application of serodiagnosis in syphilis control has likewise stimulated improvement of techniques to the point where the proportion of false positives can be negligible. I say "can be" because even with a high degree of sensitivity and specificity, a test can fail by reason of poor performance.

The health inspection of school children and industrial workers has been an accepted public health method for many years. As performed in the schools, the examination has been superficial in most cases and has not included the use of specific diagnostic techniques. In the past ten years, many large industrial establishments have incorporated serodiagnosis of syphilis and chest x-rays in their preemployment examinations of workers. Workmen's compensation laws have stimulated the performance of relatively thorough physical examinations in plants maintaining a medical service. The majority of industrial workers, however, being employed in small establishments, receive superficial health inspection, or none at all.

During the past two years, the Public Health Service has participated in six community demonstrations designed to integrate certain case finding techniques and certain features of the health examination into a single operation, for application to general population groups. These multiphasic demonstrations have been conducted under various auspices, and under widely varying conditions.

There are, however, certain factors common to all six of the programs which will be described by the other speakers. For example, all six have been conducted in cooperation with state and local medical societies. Persons presenting themselves for examination have done so voluntarily, and those found to require medical care have been referred to local physicians or other sources approved by the medical profession.

It will be seen that there have been marked variations in these demonstrations: variations in purpose, organization, operational methods, type of public appeal, number of techniques employed, number of persons examined, and average time required to put a person through the examination. Under such varying conditions, it should not be surprising that preliminary tabulations will also show marked variability in the findings.

The Public Health Service believes that a certain amount of variety is desirable in the current stage of multiphasic programs. We should, however, include in our plans long-term studies to determine the relative effectiveness of the different methods employed. We should be prepared to discard the ineffective and should seek at all times more efficient methods.

Perhaps the most significant variant in the programs to be discussed is the difference in basic purpose. It is true that all six were undertaken as experiments in the multiphasic procedure; that is, to combine various techniques into a single operation requiring a minimum of professional personnel. What is the basic aim of the procedure, though? Two of the programs are being conducted for the purpose of raising the level of preventive medical services to the people of the community. The other four were conducted for the purpose of mass case finding. Such a difference in aim is found to affect the methods of organiza-
tion and operation, as well as the type of public appeal. It may be that variations in purpose will thus affect the ultimate results.

We should be aware of these differences as we follow the reports on the six programs. We will note, for example, that two of the programs have been established as regular health services. The other four were conducted as "one-time" affairs following the pattern of earlier mass case finding campaigns in syphilis control and tuberculosis control, singly or in combination. The two programs established as regular health services are conducted in permanent clinical facilities; the multiple screening campaigns were conducted in temporary facilities, varying from trailers parked at different sites in the community to department stores.

Besides the differences in the numbers and types of techniques employed, we will note also a marked difference in average amount of time devoted to the examination of a patient. The average time in the programs conducted in permanent clinical facilities is two to three times as long as that in the multiple screening campaigns. Perhaps one is justified in naming the former programs "multiphasic health examinations," since they include a careful medical examination and are available for periodic check-ups.

Intensive publicity campaigns have been necessary in the mass multiple screening programs, because each was set up to operate for a limited period. As a result, large numbers of persons have presented themselves for examination. On July 1, 1950, a total of more than half a million persons had passed through the multiple screening lines in Richmond, Va., Atlanta, Ga., the State of Alabama, and Hartnett County, N. C. Obviously, the four populations from which the total was drawn possess varied demographic characteristics. Students of the recorded findings, however, are faced with serious questions as to whether the persons who responded to the public appeal constitute a group representative of the total population in which the program operated, or even of those socio-economic segments most likely to have a high prevalence of undetected, untreated disease. It may be that the type of public appeal has had a selective influence. Thus it is difficult to draw valid conclusions as to the prevalence of the pathologies under study.

These issues are important from the public health point of view. If the primary goal of a multiple screening program is to discover the largest number possible of hitherto unknown cases, with a minimum of expense and effort, then our planning and operations must be directed to reach the groups most likely to yield results. If a secondary aim is to determine more accurately the prevalence rates of certain diseases and defects, then we should reinforce the data from multiple screening programs with sample studies of the "screened" populations to determine the reliability of the findings. Such studies should provide a means of correcting the screening data so as to yield reasonably accurate prevalence rates. Several communities are conducting such appraisals, and the Public Health Service is conducting a post-survey study of this type in Atlanta, Ga.

Multiple screening appears to offer many opportunities for increasing the efficiency and economy of early case finding and for expanding its scope. The specificity and sensitivity of some of the screening devices are still low and yield some false positives. The blood sugar determination for diabetes is in this category. As yet, we have no reliable device for detecting cancer which meets the ideal operational requirements of a large multiple screening campaign. Only small pilot explorations are in order at the present time for the application of cytologic tests, for example, in the dis-
covery of cancer of the lungs and uterus. Multiple screening programs have not yet devised a procedure determining the proportion of false negatives—a weakness which must ultimately be corrected. We need to do much hard, well controlled work to improve our techniques and tests.

The effectiveness of any case finding program depends upon the proportion of cases brought under treatment. A one-time case finding campaign for conditions like heart disease, diabetes, obesity, and other physical defects, however, has almost no effect on the number of new cases that will occur the following year, even if a high proportion of the newly discovered patients receives appropriate care. In contrast, effective screening of syphilis and tuberculosis is a valuable control method, since every case brought under treatment removes a source of infection from the population.

A question which yet remains unanswered—and it is indeed a serious one—concerns the ability of current private and public resources for medical care to handle the large numbers of persons referred to them for diagnosis and treatment in the wake of a mass multiple screening campaign. We hope to get some answers to this question in the follow-up of recent programs.

Still not specifically answered is a question of major concern to health officers. “How much does multiple screening cost?” The question itself has many ramifications. The unit cost per confirmed positive case is likely to be two to three times the unit cost per person screened. Moreover, the costs are dependent upon the number and type of techniques applied, the amount of free help provided in the way of facilities, voluntary personnel, and so on. Another factor to be considered in one-time multiple screening operation is the cost of processing “rediscovered” cases; that is, patients who are already known to the health department and are receiving treatment, but still are showing positive reaction to a test such as serodiagnosis of syphilis.

I have purposely raised these questions and pointed out these issues. The Public Health Service has an active interest in multiple screening and we are promoting programs in several communities. We do feel, however, that many of the procedures are experimental. In a recent issue of Public Health Reports,¹ Dr. J. W. Mountin has explored this whole problem in detail and has raised many more specific questions than I can do at this time.

There is a continuing need for basic and applied studies leading to additional and more effective diagnostic techniques adaptable to mass application. There is need for research in methods of organization, administration, technical operations, and statistical control. There is need for studies of the socio-economic effects of multiple screening programs, and for carefully planned and thoroughly applied techniques of appraisal and evaluation.

If the multiphasic health examination or the multiple screening campaign is to be woven into the fabric of public health, it must be directed toward the basic goal of raising the level of preventive medicine in the community. A multiphasic program can be a powerful force for integrating preventive and curative medical services; or it can be an equally potent divisive force, weakening both essential types of service by its effects on public opinion and attitudes. If the program does not satisfy basic needs and desires of the people, the people will lose faith in their public health services or their private medical services, or both.

In these initial stages of experiment, of trial and error, therefore, it is essential that all responsible persons think through a proposed multiphasic program to its logical, long-range conclusions. The focus of thought is the patient—the human being, sick or well, in his total
environment; the prime consideration is for the physical, mental, and social problems of each individual who presents himself voluntarily to his health department as a "guinea pig" in this new way of "processing" his blood, heart, lungs, eyes, ears, and so on.

Multiple screening is such a promising public health procedure that all of us are anxious for it to have the best possible opportunity to yield its fullest potential results. Unquestionably, it has captured the imagination of public health workers and the general public; for the demand for multiple screening programs is already outstripping public health resources.

Moreover, the concept of multiple screening is basically sound and fits admirably with the current trend in public health work generally, toward a unity and greater integration of programs than we have had in the past. Multiple screening offers a type of activity in which specific disease control programs can be welded into an integrated approach to the solution of health problems. Because of these potential values, discussions such as the American Public Health Association has arranged can be of the greatest possible assistance in increasing understanding of the procedure and in stimulating all of us to further its development on the soundest possible basis.

REFERENCE

How Prevalent Is Chronic Disease?

The Hunterdon County (N.J.) Medical Center, now in process of construction and organization, has been given a grant of $60,000 by the Commonwealth Fund for a study of the incidence of disabling chronic illness in a rural population. Based on plans developed by the National Commission on Chronic Illness, it will attempt to find out how many persons are chronically ill and what the needs are for hospital beds, home care programs, rehabilitation, and other community services. The director of the Hunterdon Medical Center, Ray E. Trussell, M.D., will direct the study.

A similar study is to be made in an urban area for which a preliminary grant of $10,000 has been made to the Commission on Chronic Illness by the U. S. Public Health Service. These two pilot studies are expected to provide yardsticks and develop methods for determining incidence of long-term illness and the related community needs.