

ALTERNATIVE DESIGNS AND METHODS FOR VENEREAL DISEASE CONTROL PROGRAMS¹

Mario Miranda C., M.D., M.P.H.;² Kenneth P. Latimer, B.A.;³
and Merlin L. Brubaker, M.D.⁴

The venereal diseases are becoming an increasingly serious public health problem whose control presents various difficulties. This study attempts to analyze the epidemiologic consequences of operational decisions made by health administrators seeking to introduce or modify venereal disease control programs.

Introduction

It is widely believed that the rising incidence of venereal diseases (especially syphilis and gonorrhea) observed in numerous countries over the past decade is likely to continue in coming years. This line of thought has encouraged health administrators to plan and implement measures that will broaden our knowledge of this problem and lead to more effective control.

In view of the need to revitalize and develop such programs in many parts of the Americas, some comments on difficulties revealed by past experience are in order. For one thing, the economic situation faced by developing countries limits the financial resources available for specific measures. For another—despite incomplete evidence—it seems likely that the major health problem posed by these diseases is itself aggravated by various environmental factors resulting from underdevelopment (1). Compounding this, the health service infrastructure, which is frequently inadequate and ill-supplied

with skilled technical personnel, tends to restrict the scope for effective action.

It is therefore not unusual to observe venereal disease control programs that, after operating for some years, have failed to make any impact on the problem—but that are nevertheless continued without change. This demonstrates how, as with any other health activity, cost-benefit relationships must be considered and all steps taken must be selected rationally and logically according to a scale of priorities and available resources.

Much has been written in recent years about control of these diseases. The current programs of developed countries with efficient health services and adequate resources have been adopted as models and have been delineated very clearly. There has nevertheless been an unintentional failure to stress the previous stages through which these programs have evolved in order to reach their present state. As a result, the programs of advanced countries have had at times unwarranted influence on program planning in developing countries that have very different epidemiologic situations and resource levels.

We therefore believe it useful to stand back and review the basic principles that should govern the methodology of venereal disease control, so that countries engaging in activities of this kind with limited resources at their disposal can obtain the maximum possible benefit from efforts they may propose to undertake.

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²Chief of Epidemiology, PAHO/WHO Zone V Sub-Office, Sao Paulo, Brazil.

³Chief, Epidemiology Section, Venereal Disease Branch, Center for Disease Control, United States Public Health Service, Atlanta, Georgia.

⁴PAHO/WHO Regional Adviser on Leprosy and Venereal Diseases, Washington, D.C.

A Brief History of Venereal Disease Control

The First International Conference on Venereal Disease took place at Brussels in 1847, but little could be done at the time except to encourage the suppression of prostitution and discuss broad social problems connected with venereal disease.

Arsenotherapy, introduced in 1910, often helped to reduce the further spread of infection, but was inadequate treatment for the infected individual. During and after World War I there were improvements in the methods of diagnosis, treatment, and control, partly owing to contributions by the Health Organization of the League of Nations and the International Union Against the Venereal Diseases. A few years later the Brussels Agreement of 1924, a major step toward international venereal disease control, provided medical care for merchant seamen on a global scale (2).

The widespread use of penicillin since World War II has significantly affected the prevalence of syphilis and its sequelae. While the venereal diseases still constitute a threat to public health, in certain nations the problem is less severe now than it was in the past. Mass serologic testing and simultaneous mass treatment campaigns have reduced syphilis prevalence to such a degree that in some areas the principal preoccupations have become case prevention and epidemiologic surveillance (3, 4).

Nations where venereal diseases have not posed a priority public health problem until now can certainly take advantage of the experience of those where it has. Hopefully, the costly trial and error needed for program development can be reduced by this process.

Extension of Communicable Disease Control and Eradication Techniques to the Venereal Diseases

Epidemiologic study of the communicable diseases lends prominence to a trio of causal factors: the agent, the host, and the environment. Eliminating the etiologic agent, inducing

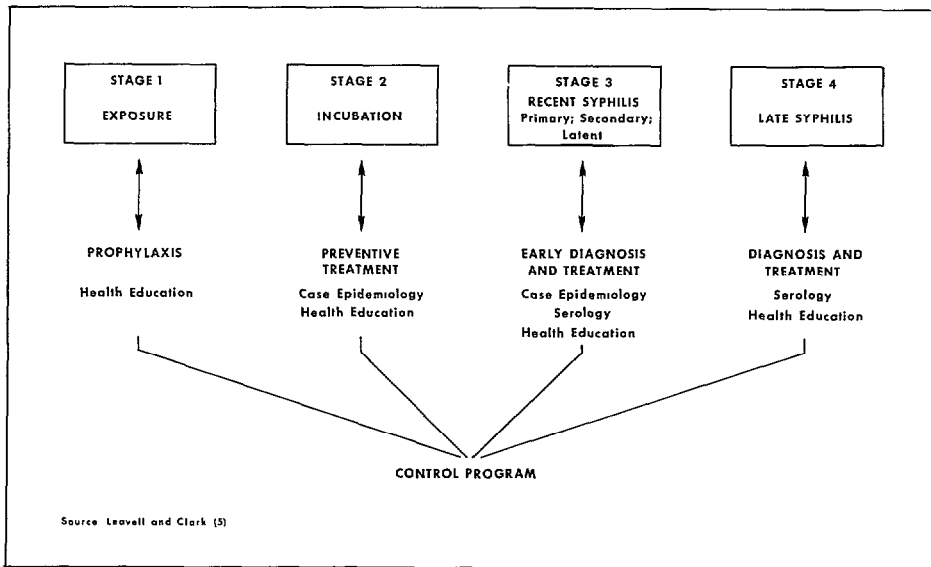
changes in host susceptibility, and modifying the environment (through sanitation, elimination of vectors, modification of peoples' attitudes, etc.) have been and continue to be the classic forms of communicable disease control. This general approach has proved very valuable in successfully combatting communicable diseases affecting large population groups (5).

The venereal diseases follow this communicable disease pattern, but they have special characteristics of their own that make control difficult (6). In the case of syphilis, for example, although penicillin represents an efficacious and selective therapeutic means of combatting the agent, *Treponema pallidum*, it is practically impossible to achieve eradication because of the large number of unreported cases in the community. Man is the sole host, but no vaccine has been found that makes him less susceptible to infection. And, because of the psychosocial environment, it is hard to influence the wide spectrum of factors favoring disease propagation—which range all the way from moral and religious principles to changing mental attitudes accompanying social development that are frequently linked to economic, cultural, or psychological currents. It is therefore desirable to have a clear idea of the various lines of attack open to a control program.

We should point out in passing that *incidence* is defined as the number of new cases occurring during a specified period (a year, for example), while *prevalence* refers to the total number of cases, new and old, existing at a particular time within a given community. Frequent reference will be made to these concepts in the pages that follow.

In dealing with such chronic diseases as syphilis or tuberculosis, the concept of prevalence is important because uncured cases comprise the reservoir that produces new cases; and if this reservoir of cases is substantial it may lead to large-scale transmission of the disease. It should also be stressed that high syphilis prevalence implies the existence of many long-established cases, a circumstance which raises the threat of those serious and debilitating cardiovascular, ocular, and nervous complica-

FIGURE 1—Natural history of syphilis and levels of prevention.



tions that give the disease such great social importance.

Campaigns against syphilis can have any of three aims: to reduce prevalence, to reduce incidence, and to prevent new cases from arising. There is a special strategy, a particular range of resources, and a proper time for each type of approach. Similarly, the costs and benefits of each type will differ.

Figure 1 shows the natural history of the disease schematically, indicating various lines of attack, their objectives, and the means to be employed. It should be noted that the actions at levels 1 and 2 are purely preventive in character. Action at level 3 is directed against incidence, and that at level 4 is designed to reduce prevalence.

The Need to Stress Venereal Disease Control Programs

Simply stated, the objectives of a disease control program are to eliminate human suffering, prevent the further spread of infection, and reduce the expenditures needed to adequately maintain patients with late manifestations.

It is readily acknowledged that control programs are expensive (7). Careful examination of the syphilis problem reveals that the means for eliminating syphilis do exist; and though these are costly they are less expensive in the long run than providing public support for those unfortunate persons with damaging manifestations of the disease. In other words, it costs less to control syphilis than to provide maintenance for infected persons (8).

Less is known about gonorrhea and its control; but experimental programs and emerging technology are soon expected to provide an effective framework of data to build on. Other venereal diseases can also be destructive and costly in terms of both human suffering and economics. As with syphilis and gonorrhea, the keys to control of chancroid, granuloma inguinale, and lymphogranuloma venereum are case-finding, case-prevention, surveillance, and health education.

Elements of a Control Program

Evaluation of the Problem

Before control measures begin, the situation

being confronted should be defined, and the available resources should be related to the magnitude of the problem. In the case of syphilis, as with an iceberg, only a small part of the problem is visible or apparent. However, this visible part can be evaluated by a survey of: (a) diagnosed cases of cardiovascular, ocular, and mental disorders caused by late syphilis; (b) results of laboratory serologic tests; (c) recent syphilis cases diagnosed in conformity with the *International Classification of Diseases*⁵; (d) cases of congenital syphilis (a significant indicator when positive); and (e) deaths from syphilis (9). (Data concerning a, b, d, and e help indicate prevalence, while data about c help to determine incidence.)

A more accurate indication of prevalence can be obtained by careful, statistically acceptable serologic sampling of either the whole population or selected population groups (10).

Diagnosis and Treatment Services

It is vital to have trained personnel able to provide medical care quickly and at times convenient for the patient. The appropriate drugs should be available, together with guidelines for diagnosis and treatment. It is also essential that these services be free. Whether or not major cities have specialized venereal disease centers, with their own premises and personnel, all health organizations should provide the means whereby both urban and rural populations can obtain effective diagnostic services and treatment for these diseases in any of the country's medical centers.

Laboratories

Ideally there should be an adequate number of laboratories located so that they facilitate the work of the physicians involved; i.e., they should be able to provide the physicians with timely reports. The laboratories may be re-

gional, local, or dedicated exclusively to serving one major diagnosis and treatment center. In general, they should have the facilities for conducting dark-field microscopic examinations and carrying out at least one routine test with non-treponemal cardiolipin antigen (such as quantitative and qualitative VDRL) using standardized techniques. Samples from problem cases should be forwarded to the central reference laboratory of the city or region so that a fluorescent antibody test (FTA-ABS) may be performed (11, 12). It is important that there be a systematic procedure for periodically evaluating the quality of each laboratory's work.

Data Registry System

This should include clinical case histories, serologic records, a record of epidemiologic activities, etc. and should have a central card index that consolidates information on all diagnosed cases and their contacts.

Serologic Case-Finding

It is important that serologic case-finding efforts be conducted on a continuous basis among persons who are sexually active and within groups that are frequently exposed to infection, e.g., pregnant women, military personnel, prostitutes, homosexuals, etc. This is an effective means of detecting late forms of syphilis and reducing prevalence, as already pointed out. Therefore, laboratories and blood-banks should report any and all positive serologic findings to the appropriate health authorities.

Health Education

This should be directed at the population at large, selected population groups, and those professional sectors concerned with diagnosis, treatment, and control. Among other points, emphasis should be placed on disease prevention, likely symptoms of infection, and the

⁵World Health Organization. *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, 1965 revision*, Vol. I and II, Geneva, 1967.

location of free diagnostic and treatment services.

Stimulation of Case-Reporting

This part of the program addresses itself to physicians, laboratories, and medical care centers; its aim is to improve the statistical basis for subsequent epidemiologic studies.

Investigation of Cases and Location of Contacts

These activities should be performed by specially trained personnel possessing the resources and facilities for rapid action. This permits prompt investigation of a case, localization and control of the contacts, and provision of any preventive treatment needed.

Periodic Program Evaluation

It is clearly essential that various available indicators be used to evaluate the impact of the measures taken.

Priorities and Options Available to Countries with Limited Resources

Taken together, the points that have just been mentioned constitute a complete venereal disease control program that is particularly suited to combatting syphilis. However, simultaneous and vigorous implementation of these measures requires both adequate budgetary resources and an infrastructure of health services and facilities that some countries do not yet possess to a sufficient degree. We therefore wish to stress those priorities that are particularly helpful in striving for the general objectives of a program of this kind:

1) Evaluation of the scope of the problem should clearly be the first step. If an adequate statistical background, including updated data, is not available, it is vital to obtain it by means of a simplified short-term survey that might last, say, six months. The establishment of free diagnostic and treatment centers, organization

of laboratories with uniform techniques, and operation of a simple data-recording system constitute the second step. Together these measures comprise a minimal venereal disease control program of the simplest kind. This sort of basic program should be part of the routine activities of all medical treatment centers in both urban and rural areas, regardless of size. In small cities and towns, where other venereal disease activities cannot be justified, this should constitute the standard program.

2) If serologic case-finding, community health education, and stimulation of case-reporting are added to the foregoing measures, this will constitute what may be called an intermediate program.

Many countries have achieved effective and satisfactory control of venereal diseases with these combined methods, applied in a uniform and continuous manner. In our view this represents the kind of program that can be carried out in most Latin American cities.

3) The final measure, included in what may be called a "complete" program, is epidemiologic study of individual cases designed to cut short the chain of infection. It draws more heavily than any of the other measures on the health infrastructure (13) and, to be effective, requires prior reduction of any substantial reservoir of cases. Otherwise the individual efforts made in questioning each patient and controlling each contact—a process that is by nature slow—are offset by the potentially rapid spread of the disease. It must also be remembered that efforts confined just to epidemiology can affect only disease incidence (i.e., new cases); such measures leave undisturbed the old cases which have not yet been treated, and thus cannot counteract the destructive processes that will eventually lead to incapacity and death (14).

The only successful models of effective case interview and contact tracing have operated in countries with advanced health services and relatively abundant resources. Invariably, in such instances, all the elements of the intermediate program just referred to had been satisfactorily implemented, sometimes over a period of

years, and were providing a continuous and solid basis for an epidemiologic program of this kind.

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It seems important to stress the sequence of the measures that have been discussed, since the success of each generally depends on effective implementation of the preceding ones. For example, a program of serologic investigation and case treatment loses its effectiveness if it cannot rely on efficient laboratories using standardized techniques, or if there are too few diagnostic and treatment centers to provide the patients with good medical care. Similarly, a program of epidemiologic investigation will prove to be an unjustifiable waste of resources without such prerequisites as an acceptable data registration system, full understanding of the existing problem, and periodic evaluation of the measures taken, to mention just a few.

This brings us back to the cost-benefit principle referred to at the outset. The health administrator is faced with a need to select the group of measures to be taken in the light of the seriousness of the problem and the means available. A minimal program will appear at first sight to be limited in its impact and easy to undertake. This is, however, not always the case; often it will be the only possible alternative, in addition to being the most economical. On the other hand, a complete program will be more ambitious in its objectives and more effective in its results, but will require a major investment of resources.

Statistical Considerations

The science of statistics is ever-changing, so it is essential that any system introduced lend itself to being changed, modified, altered, or even eliminated as the needs of the program demand. One must proceed cautiously and critically, otherwise a system may continue not because it serves a useful purpose, but simply because "it's always been done that way."

Statistics are used in a program for a variety of purposes, including the following: (1) To define the scope of a problem; (2) to provide continuous evaluation of programs and case-finding activities; (3) to measure improvements in the general situation; and (4) to evaluate research work.

Defining the Problem

Venereal disease morbidity statistics are used to measure the extent of the problem and to estimate incidence and prevalence trends for specific geographic and population groups, as well as for the nation as a whole. They are also used to project future trends that help guide health administrators in estimating a program's budgetary, personnel, and other needs.

Evaluating Programs

Continuous program evaluation is essential if optimum use is to be made of the available resources. Just because a program is initially successful does not mean it should continue indefinitely. For example, selective serologic surveys for syphilis are very effective when first introduced in an uncontrolled situation, but become less and less productive as more of the population at risk is tested and treated.

Similarly, the contact interview and tracing procedure can be examined to determine how effective it is on a national or local scale, as well as to judge the effectiveness of an individual official's work.

Measuring General Changes

Another function of statistics in a national program is to help measure the program's long-term effectiveness by providing such data as trends in syphilis-related deaths and changes in the rate of first admissions to mental hospitals due to syphilitic psychoses.

Clearly presented statistical data can also be helpful in obtaining appropriate allocations of funds in the annual budget. Progress reports from each national, state, or city project in

operation should be evaluated at regular intervals to assure that funds are being directed at the proper objectives and are producing the desired results.

Evaluating Research

In addition to "program" statistics, "research" statistics are an integral part of any program. These may arise from such activities as therapy evaluation studies, serologic evaluation surveys, and reviews of basic laboratory research. Statistical evaluation of new treatment schedules have produced therapy recommendations that have won widespread acceptance, and laboratory tests have been effectively evaluated for sensitivity, specificity, practicality, and economic feasibility. To cite an

example, cooperative efforts by WHO and many nations have made it possible to evaluate a large number of tests, and thereby to arrive at numerous standardized procedures for worldwide use (15).

The Need for Accuracy

These few simple points illustrate the significance of statistics in a venereal disease control program. We would like to go one step further and stress an obvious truth—that no statistical study can be any better than the basic data from which it is compiled. In order to obtain meaningful and well-balanced conclusions it is thus vital that instructions be clear and that the data be recorded accurately.

SUMMARY

This work outlines important epidemiologic and administrative concepts that can help provide effective orientation for venereal disease control programs, especially in developing countries.

The extensive use of penicillin has reduced the prevalence of syphilis and its sequelae, so that in many areas the main emphasis should now be placed on case prevention and epidemiologic surveillance. When effectively applied, such control measures yield important social benefits, among other things reducing the need to provide costly care and maintenance for patients with disabling sequela.

The history of syphilis control indicates the lines of attack available to any control program. The elements of such a program should be developed in a particular sequence designed to

achieve specific results; various groupings of these elements constitute minimum, intermediate, or complete programs. Each type of program applies to a different sort of situation and has its own special requirements, costs, and benefits. The range of choices presented here is based on logical priorities and provides health administrators with useful alternatives for action.

The importance of applying statistical methods to various control program activities is also analyzed. The authors stress that such methods should be used not only to help define the scope of the problem and make periodic evaluations of results, but also in determining progress achieved by various specific measures, presenting findings, and assessing the effect of clinical and laboratory investigations.

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