

TREPONEMATOSIS ERADICATION, WITH SPECIAL REFERENCE TO YAWS ERADICATION IN HAITI *

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SYNOPSIS

This paper outlines the general administrative and therapeutic principles governing yaws eradication campaigns, with particular reference to the operational problems encountered in Haiti. The ways in which those problems were solved are described in the course of a relatively detailed account of the yaws eradication programme which began in that country in 1950 and which has now reached the end of the "mopping-up" phase. The author points out that lessons learnt in this mass treatment campaign can usefully be applied to eradication programmes against other diseases.

In December 1942, the treponemicidal action of the newly discovered antibiotic, penicillin, was, for the first time, reported by Mahoney, and this set the wheels in motion for one of the most concentrated attacks on syphilis. Step by step the conventional lines of treponematoses therapy were changing, and so we observe some years later that one single injection of penicillin is sufficient to cure syphilis and other treponematoses. In the meantime, better preparations of this antibiotic made possible a reappraisal of the conservative principles of treponematoses control. So many countries after the Second World War were facing a rise in their venereal disease rates that it became imperative to formulate a new philosophy of attack on the treponematoses.

The development of the idea of treponematoses eradication is undoubtedly associated with the days when the Pan American Sanitary Bureau became very active in promoting co-ordinated health action at the international level, and when the World Health Organization came to life. Against these facts as background, the yaws eradication programme in Haiti was established, organized, and is being carried on to a successful conclusion.

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Yaws in Haiti

In Haiti, an independent country of the West Indies, occupying one-third of the island of Hispaniola, of about 10 000 square miles (25 900 km²) and 3.5 million people, yaws has existed for many years, and various health administrations have tried to cope with the problem, with different degrees of intensity. In 1949, it was known that—leading even malaria, tuberculosis, enteric diseases, and malnutrition—yaws was the major public health problem which had to be conquered before the country could undertake other health programmes essential for a vigorous economic plan. Precise figures, i.e., prevalence rates and ratios, detailed census figures, etc., would have been of comparative value, but were not available. However, according to all reliable sources, the prevalence of yaws in Haiti was between 40% and 60%, representing a serious epidemic menace. It is our considered opinion that the only other accomplishment to be reported today, had any costly surveys been conducted, would be the numerical element of statistical comparison between an unknown base figure and the progress to be reported in November 1955. Moreover, there were, at the time, certain published statements regarding the prevalence of yaws in Haiti. Strong⁴ wrote: "In Haiti, it has been estimated that 80% of the rural population are infected, and during a number of years mass treatment was given annually to some four hundred thousand cases". McKinley² stated that "100,000 cases of framboesia had been reported, the majority from rural districts." During 1943, 48759 cases were reported to the health authorities, 32 195 in 1944, and 11 679 during the period January-July 1945. Duvalier,¹ in 1945, reported "that 97,299 patients attended one rural clinic in Haiti from March 1943 to March 1944".

Administrative Considerations

Objective

There can be but one objective in a yaws programme—eradication. By eradication of yaws we mean a complete disappearance of all infectious cases from a country and the non-appearance of any primary autochthonous case after the intensive campaign efforts have been terminated; in other words, the complete interruption of transmission. This objective can be attained if suitable techniques are put into effect, as will be described below. Although the differences between an eradication programme and a control programme may seem to be only of degree, if we examine them carefully we will observe the tremendous public health and economic importance of an eradication programme. These differences may be tabulated as follows: ^a

^a This tabulation has been adapted from document No. 1 of the Co-ordinating Office for Malaria Eradication Programme, Pan American Sanitary Bureau.

<i>Elements</i>	<i>Control programme</i>	<i>Eradication programme</i>
1. Objective	To reduce morbidity.	To prevent the occurrence of any new cases of yaws.
2. Area of operations	Accessible zones, areas of yaws prevalence of high social, political and economic importance.	All the areas where cases occur.
3. Minimum quality of work	Good: reduction of number of cases.	Perfect: all infectious cases must be eliminated (which implies the treatment of contacts), and the chain of transmission must be stopped.
4. Duration of operations	Permanent.	Programme finishes when infectious yaws no longer exists. To be successful it must be an expanding programme to clean up all areas from which re-infection can occur.
5. Economic factors	Treatment measures applied in those areas where the cost is justified by the economic importance of the local area; expenditures must be continued indefinitely (recurrent service).	Treatment measures have to be applied in all areas and will rapidly reduce expenditures, representing a capital investment rather than a recurrent expense.
6. Case-finding	Important in all phases of the programme.	Important especially in the final stages of the programme.
7. Serological diagnosis	Important in all phases (and expensive).	Not important in mass phases.
8. Imported cases	Of relative interest.	Vital after mass treatment has stopped.
9. Epidemiological investigation of individual cases	Very expensive and seldom conducted.	Vital in spite of expense, especially in last phase of the programme; only measuring rod of eradication.
10. Administrative evaluation of the programme	Measurement of accomplishment (reduction in morbidity).	Measurement of what remains to be done.
11. Epidemiological evaluation	Reduction of serological rates.	Disappearance of primary autochthonous cases as proved by the yaws "intelligence service".

Extent of the problem

It is important to recognize the several factors involved where yaws is a serious problem—such as the number of cases, the distribution of cases, the clinical characteristics, etc.—in order to be able to plan the measures and procedures applicable to a particular area or country.

In certain countries, the problem is minimal and, consequently, the number of staff and the extent of the area of operations can be correspondingly adjusted to those particular needs; in other countries, the yaws

cases only appear in certain tropical areas along the river banks and it would, of course, be futile to treat the entire population of the country. There are also areas with a high prevalence of non-infectious yaws cases without public health significance, which should be dealt with in yet different fashion. All these factors need to be carefully studied and evaluated before proceeding to establish a certain pattern, which may be right for one place but highly unsuitable for another.

Reconnaissance

Once the extent of the problem has been more or less determined, it is of the utmost importance to visit all the country where the work is to proceed. Frequently one encounters a load of data at the central headquarters which are not corroborated by hard "shoe and sole" investigation.

The local customs, and grudges, should be recognized very early in order to adjust the administrative procedures of the programme to them.

Method of work

In treponematoses campaigns there are four generally accepted methods of work:

- (1) from permanent dispensaries;
- (2) from ambulatory clinics;
- (3) from mobile (trailer-type) clinics; and
- (4) house-to-house work.

Permanent dispensaries are the oldest approach to the treatment problem but could not be used in Haiti because they are not suitable for rural areas, since they are very expensive to maintain and the peasants in Haiti would not readily attend them.

Mobile clinics were not satisfactory for yaws eradication in Haiti because the prevalence was too high to achieve a full coverage with this particular approach.

The *mobile (trailer-type) clinic* would have been too expensive for this mass campaign and would not have proved satisfactory in Haiti, where there are few highways.

The *house-to-house method* of work, which implies that *every single dwelling* must be visited and all persons must be examined and treated, is the method of choice. It is the only way to ensure that the objective of eradication will be attained; and in the final analysis it is more economic, since areas which have been completely covered will need only epidemiological spot surveys to check the appearance of any new case.

Training of personnel

This is of vital importance to the success of any public health programme, but in eradication work, when only perfection can be accepted, it is of the greatest value to give adequate training to the personnel in the field and in the central headquarters. Once personnel have been selected and recruited, intensive training must be given, which should include the following subjects:

- (a) technique of intramuscular injection;
- (b) minimum technique of asepsis;
- (c) "rough" diagnosis of yaws;
- (d) health education;
- (e) driving a car and horseback riding;
- (f) general topography of the area;
- (g) map-reading;
- (h) preparation of reports.

In most countries highly trained personnel are not plentiful, and sub-professional personnel must be used in almost every stage of the operations, under continuous careful supervision.

Refresher courses in all the subjects listed above, as well as frequent visits by the field personnel to central headquarters for revision of established techniques and procedures, are necessary. Sub-professional personnel of supervisory calibre should also be trained in order to prepare them for their more complex and exacting tasks.

Personnel and finance

Normally, one person at the central headquarters should be made responsible for personnel and finance. The complexity of the personnel and financial procedures should be reduced to the minimum compatible with efficiency in the field; however, a close control must always be exercised to avoid loss of money, lack of discipline, and bad public relations. All personnel must be fully aware of the personnel and financial policies which will enable them to follow these procedures without error. This is particularly important for those working far from the central headquarters.

Supply and transport

This is another vital element in the planning and operation of a yaws eradication programme. Certain basic principles may be mentioned:

- (a) early preparation of a complete list of supplies;
- (b) selection of supplies, equipment, and transportation suitable for the areas of operations;

- (c) establishment of a central warehouse with adequate stock cataloguing;
 - (d) periodic inventory checks;
 - (e) establishment of regional warehouses;
 - (f) central garage with a reliable mechanical service;
 - (g) adequate control systems for the utilization of fuel and lubricants;
- and
- (h) establishment of a supply-line with adequate checks, avoiding any breakdown along the way.

Supplies and transport equipment are expendable but extremely difficult and sometimes impossible to replace in less developed countries.

Mapping, marking, and statistics

The work of the treatment inspectors in the field largely depends on a full knowledge of the routes, location of villages, and location of houses. If every house of a country is to be covered, it is necessary to adopt suitable means of pin-pointing them. A cartographical section must be organized at headquarters to do the initial work, but the chief inspector should be responsible for the accuracy of the subsidiary maps and for their duplication and distribution to all treatment inspectors.

Each house will have to be marked and numbered for its identification later on by the chief inspectors and other supervisory personnel. A great deal can be learnt from other eradication programmes, such as the *Aedes aegypti* campaign.

Statistics cannot be improved once they have been collected erroneously by the operational unit. Consequently, continuous checks must be made on the accuracy of data obtained by treatment inspectors, chief inspectors, liaison inspectors, and general inspectors.

It is also important, as described below, that the record data be sent to central headquarters on fixed dates without fail, so that full and comprehensive statistical reports can be prepared.

Reports

It has been stated that anything worth doing routinely is worth routine reporting and, consequently, field reports, as far as practicable, should reflect the daily happenings, which in this particular case are: name of locality visited; number of houses visited; number of houses found closed; number of persons present in the house; number of persons absent; number of persons treated as cases; number of persons treated as contacts; and amount of penicillin used. Substantially, this is the basic information which should be reported daily, and then compiled weekly and monthly, so that

at the central level there is always a clear picture of what is going on, and where and how the operations are progressing.

Reports are not usually sufficiently used as planning and operational tools, but a careful study of field reports should enable the directors of a campaign to detect any failures, imperfections in the work, and misrepresentation of facts. Corrective action should follow this report analysis.

Reports must be compiled in such a way that they can be easily compared from one period to the next; they should be modified as soon as conditions in the field warrant any changes, in order to reflect what is happening.

Supervision

In any eradication campaign, whether it be against *Aedes aegypti*, malaria, or yaws, close supervision at every level of operations is essential.

One of the differences between control and eradication is that the minimum quality of work acceptable may be good in the former but must be perfect in the latter. In eradication work there are no half-way accomplishments: the campaign is either a 100% success or a failure. Therefore, a pyramidal type of organization is necessary, so that a group of treatment inspectors (who represent the minimum administrative unit) should be supervised by a chief inspector; three, and no more than five, chief inspectors should be supervised by a general inspector; a group of the latter will be supervised by the general chief inspector, who in turn will be supervised by the medical officer in charge of field operations. This implies that every person has a definite area of responsibility.

It is important to convey to supervisory personnel the idea of guidance, advice, and example, rather than the idea, frequent in certain areas, that supervision means inspection and penalties if the work is not satisfactory.

Logistics

Once all the administrative factors have been considered, the field operation must be so organized that the equipment and supplies, the personnel, and the patients should, without fail, meet at a particular dwelling at a given time. In other words, the entire administration of a yaws eradication programme must be geared to the systematic coverage of every house in a community, and all persons—cases or contacts—must be examined and treated.

If any deviation from the procedures regarding personnel, transport, and other equipment is allowed, then not all the houses and persons will be covered and the work will fall short of the objective. The final result of these deviations will be delays in the achievement of the coverage of houses and communities, failures to meet the time-tables for a country,

and, at times, the necessity for a complete re-coverage of a particular community which was not 100% treated. For these particular purposes liaison inspectors primarily in charge of feeding the supply-line must be employed to avoid any breakdowns along the way. There can be no compromise in this.

Evaluation

In a yaws eradication programme there are certain ways of measuring the progress of the campaign and of determining its end. The epidemiological investigation of individual cases is vital in the last phase of the mass campaign, when there are so few cases occurring that it must be known where they occur in order to establish focal coverage by special treatment squads.

The epidemiological intelligence service of a yaws campaign is primarily concerned with checking all new cases in order to determine whether they are reinfections, imported cases, or autochthonous cases which were missed during the intensive mass coverage. The epidemiological intelligence service should be organized on a permanent basis until the campaign ends, under the direction of a physician fully acquainted with the darkfield examination technique and who will have at his disposal a group of inspectors to visit houses on a random basis, in order to ascertain, epidemiologically and clinically, whether the cases are primary or imported.

Therapeutic Considerations

It has been fully demonstrated that penicillin is the therapeutic agent of choice for the treponematoses. Although a few years ago there was justification for pilot studies in order to determine the minimum dose of penicillin for the treatment of infectious yaws, today there is evidence that

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