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ECONOMIC IMPACT OF VENEREAL DISEASE

by

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Probably no other disease, communicable or chronic, has been as widely studied as syphilis. Yet, although the etiologic agent is known, an effective form of therapy and proven epidemiological methodology are available, syphilis appears to be increasing throughout the world. Despite all the efforts made to combat the disease, syphilis continues to be a major health problem in most countries today.

Many health officials consider that gonorrhoea is now out of control and has reached epidemic proportions in many parts of the world. In some countries it is now the most prevalent communicable disease. Development of resistance to penicillin and some other antibiotics by circulating strains of the gonococcus, in some countries, is a cause for concern.

The International Union against the Venereal Diseases and the Treponematoses, at its 26th General Assembly in 1969, discussed the global epidemic of the venereal diseases and passed resolutions urging nations throughout the world to give increasing attention to the control of the venereal diseases. But today, the problems involved in the control of the venereal diseases are increasingly more complex to cope with and thus are economically more costly to solve. Yet, the economic impact of controlling the venereal diseases shows that it is a profitable public investment. The economic impact of not controlling the venereal diseases creates a significant, non-recoverable drain or loss of resources for the individual as well as for society.

In the United States of America the national venereal disease control program has effected a significant economic impact on the national economy. Although it is not possible to estimate the total savings, some economic benefits can be determined.

Before determining the economic impact of venereal disease, perhaps, the elements of a venereal disease control program should be outlined first. Such a program is directed toward detection and treatment of existing cases to prevent spread from infected to noninfected persons and to prevent progression into disability and death. For the purpose of brevity, only the elements of a syphilis control program will be outlined. Accordingly, a syphilis control program should include the following elements:

1. Syphilis control begins when free treatment facilities and laboratory services for both dark field and serology examinations are made available to the public.

2. A control program must have adequate and effective records and reports to provide information needed to measure progress and to plan for future needs.

3. Methods for casefinding and prevention are needed, and include:

a) Serologic screening tests, which are used to detect cases of untreated syphilis.

b) Epidemiology - the prompt interviewing of all reported infectious cases - which is needed to determine and to secure treatment, if necessary, of the source and possible spread of infections involved.

c) Educational programs which are needed to increase the public's awareness of the signs and symptoms of syphilis and to encourage those infected and those who may have been exposed to syphilis infection to seek medical attention early and voluntarily.

Through serologic screening and epidemiology, infection can be prevented by treatment of persons in the infectious stage before they spread the disease. Through epidemiology, disease can be prevented by treatment of spread cases which are in the incubation stage. And finally, from a preventive point of view through epidemiology, but mainly through serologic screening, the late crippling manifestations and deaths due to syphilis can be prevented by treatment of the disease during the latent stage. Thus, control efforts may be directed toward the detection and treatment of existing cases to prevent the spread from infected to noninfected persons and/or to prevent progression into disability and death.

In general, no control program, or inadequacies in program elements designed to detect syphilis infections during the infectious stages of the disease, would contribute to further spread of the disease in the population and to an increasing number entering into the latent stage of the disease. Inadequacies in program elements designed to detect and treat syphilis infections during the latent stages would lead to an increasing number progressing into disability and death. The number of infant deaths due to syphilis and the number born with congenital syphilis would also be expected to increase.

Economic costs are related to where and to what degree the elements of a syphilis control program are implemented. Consequently, the costs of an inadequate syphilis control program would be those associated with an increasing number of new cases of syphilis occurring, and the costs associated with an increasing number progressing into disability and death. The extent of these costs would depend upon the particular control elements involved, as well as the operational level for each element. Since syphilis is a communicable disease, a rise or decline in the number of infections occurring during one time period has an effect on the amount of illness, incapacitation, and deaths due to syphilis, as well as on economic costs, in the next and subsequent time periods.

The idea of measuring the economic benefits of a program against the economic costs of engaging in that program is far from new. To those who control public funds, one of the most persuasive arguments for the granting of money for health services is that society (city or state or nation) will get a substantial return in terms of savings in preventing first admissions to mental institutions and in costs of hospitalization, in the savings in preventing deaths due to a disease, and in physician-time that does not need to be spent in treating a preventable disease.

For example, if the syphilis death rates were still at the 1939 level when our control program was initiated, some 22,000* persons would have died from syphilis during 1968 (most recent year for which data is available), instead of 2,381. In other words, it is estimated that about 19,600 lives were saved from premature death in a single year (1967) as a result of the improvement in syphilis mortality conditions since 1939.

Statisticians in the United States of America have estimated that after reported syphilis deaths have been adjusted for labor force participation, by sex and by age, the lifetime earnings lost amount to \$26,455 per syphilis death. Applying this figure against the 19,600 lives saved from premature death produces benefits or savings to the nation of over one-half billion dollars annually.

Another example of benefits from past expenditures for the control of syphilis may be derived from the economic savings in hospital maintenance costs for patients with syphilitic psychoses. For example, if the rate of first admissions to mental institutions because of syphilitic psychoses was still at the 1939 level of 6.6 per 100,000 population, some 13,000 persons with neurosyphilis would have been admitted to mental hospitals during 1967 (most recent year for which data is available), instead of 162. The difference between these two figures represents the estimated number of first admissions saved or prevented in a single year (1967), namely 12,800. It has been estimated that such patients will require maintenance in a mental hospital for about five years. Thus, the savings of hospital maintenance cost during just one year is estimated at 64,000 hospital years. Since the hospital maintenance of patients with syphilitic psychoses currently costs \$3,226 per patient per year, the benefits or savings derived from preventing these persons from developing neurosyphilis amounts to over \$206 million per year. If the same assumptions were applied over the 28-year period from 1940 to 1967, the benefits to the taxpayer in institutional care alone would amount to a multibillion dollar savings.

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The expected number of deaths due to syphilis was adjusted downward according to the comparability ratios for the Fifth, Sixth, and Seventh Revisions of the International Classification of Diseases.

In addition to the above savings, many other benefits of an indeterminate value were achieved by reducing the loss of productivity and income for persons prevented from working by the disabling and crippling effects of cardiovascular and neurosyphilis, reducing the loss of productivity and earnings due to time lost from work for diagnostic and treatment purposes, and by reducing welfare payments needed to support families when the head of a household was disabled by cardiovascular syphilis or was unable to work because of psychoses due to syphilis. However, using the results obtained from a unique study on the development of late manifestations of untreated syphilis carried out in Norway by Professor E. Bruusgaard,* it has been estimated that through operation of the syphilis control program since 1940, some 234,000 persons have been saved from developing cardiovascular syphilis and that some 15,000 have been saved from developing syphilitic blindness. The extent of such benefits has not been determined.

Also, venereal disease was once a major cause of blindness. Ophthalmia neonatorum, blindness in babies resulting from infection (usually with gonorrhea) by the mother during birth, was reported as causing 28.2 per cent of blindness in a sample group of children in schools for the blind in 1907. By 1954-55, the percentage of ophthalmia neonatorum cases among new pupils entering schools for the blind had dropped to 0.1 per cent. This reduction was brought about largely through legislative measures that required the use of prophylactic drops in the eyes of newborn babies to prevent this disease.

During 1940, syphilis (interstitial keratitis) was responsible for an estimated 7.9 per cent of all legal blindness in the United States of America. By 1957, the percentage was down to 3.8. Syphilis as a cause of blindness for children of school age accounted for 5.2 per cent of all cases in 1933-1934 and for 1.4 per cent in 1954-55. In 1954-55, syphilis, as a cause of blindness among new pupils accounted for only 0.6 per cent of the total cases. Further reductions of blindness caused by venereal disease are expected in the future.

Preventive public health procedures combined with legislative backing have almost eliminated gonorrhea and syphilis as causes of blindness. Legislation requiring the use of prophylactic drops in the eyes of newborn babies was important in reducing the number blinded by gonorrhea. Legislation in many States requiring premarital and prenatal examinations for venereal diseases, especially syphilis, helped greatly in reducing syphilis infections as a cause of blindness and as a cause of death among infants.

* E. Gurney Clark and Niels Danbolt, "The Oslo Study of the Natural Course of Untreated Syphilis: An Epidemiologic Investigation Based on a Restudy of the Boeck-Bruusgaard Material," Journal of Chronic Diseases, 2:311-344 (Sept. 1955); and Medical Clinics of North America, 48:613-623 (May 1964).

Reducing the prevalence of blindness caused by venereal disease greatly reduces sociological and economic losses, both to the individual and to society. Benefits accrued through a reduction of blindness caused by venereal disease would include increased earning power for the individual, increased manpower for industry, a decrease in the cost for educating the blind, and a decrease in the economic aid for the blind. The extent of such benefits is unknown.

Although their economic values have not been determined, these additional benefits are pointed out to emphasize the fact that the savings estimated and presented above are incomplete and represent only a part of the potential economic impact of syphilis. Even so, when consideration is given to just the two examples cited above showing benefits derived from the prevention of premature deaths and psychoses due to syphilis, it is sufficient to demonstrate that the economic impact of past syphilis control programs amounts to savings in excess of \$700 million annually. Since 1940, the cumulative savings from just these two items alone would amount to a multi-billion dollar benefit. Clearly, large economic gains may be achieved through prevention of spread of disease and by a reduction in the number that potentially might progress into disability or death.

Investment in syphilis control has shown a profit over the years in the United States of America. Disability and death due to syphilis have been greatly reduced. Yet, the fight against the Treponema pallidum is continuing. Soon, it is hoped, syphilis will be forced into the ranks of smallpox and typhoid, diseases brought under control - with surveillance programs carried out to prevent the return of such diseases to the category of a major public health problem.

However, currently, syphilis is still a serious health problem in our country. About 540,000 persons in the United States of America are estimated to require treatment for syphilis at the present time. These persons must be found and brought to treatment as soon as possible to prevent the development of disability or premature death from syphilis. If they are not treated, the economic loss to the nation in terms of mental hospital care and revenue loss will be quite large.

From the results of the Bruusgaard study on untreated syphilis, it was determined that if the present reservoir of 540,000 cases of syphilis is not treated, late manifestations would develop and could be expected to include:

23,800 (4.4 per cent) with diffuse meningovascular
syphilis or general paresis;

41,000 (7.6 per cent) with complicated cardiovascular
syphilis; and

2,700 (0.5 per cent) with optic atrophy due to syphilis

The expected incidence of other late but generally less serious complications of syphilis have not been estimated.

Overall, it is estimated that about 124,000 (23 per cent)* of the untreated syphilis population will die primarily as a result of syphilitic disease.

Using the above estimates of expected late manifestations, anticipated losses can be calculated in terms of institutional maintenance costs and of lifetime earnings that will be lost if the present reservoir of syphilis cases is not found and treated. For example, the maintenance of persons in tax-supported mental institutions with psychoses due to syphilis is estimated to cost \$3,226 per person per year. The 23,800 neurosyphilis cases developing from the untreated reservoir would have an average stay of five years in mental institutions. This would result in 119,000 years spent in these institutions at a maintenance cost of \$384 million. The lifetime earnings that will be lost from the estimated 124,000 premature deaths due to syphilis are estimated at over \$3.2 billion. The additional economic impact or loss of earnings during the years of incapacitation for the 41,000 persons developing cardiovascular disability and the 2,700 persons disabled by syphilitic blindness is unknown. Considering just the potential losses to the nation in terms of hospital care and lifetime earnings lost, this represents a potential loss to the nation of over \$3.5 billion for these persons.

Faced with potential economic costs such as those outlined above, it would appear wise to make a substantial investment now in a control program to eliminate the syphilis reservoir at a fast rate and thus avoid the economic impact of such losses.

As in most countries, resources in the United States of America are limited. Therefore, each element of our control program is continually assessed to assure the maximum impact on the problem with the resources available. In fact, it is estimated that for every dollar expected to be invested for syphilis control during the next five-year period, very definite benefits will accrue through reduced costs due to syphilis.

Further reduction of the late manifestations of untreated syphilis will depend upon the detection of the reservoir of unknown syphilis infections in the population. From the public health point of view, a large proportion of the reservoir must be found immediately after onset of the disease when the individuals are actually infectious. From the economic point of view, cases must be found before the late manifestations of untreated syphilis become evident through the destruction of blood vessels, nerve cells, or bones. Thus, to effectively prevent the spread of and to reduce the reservoir of unknown

* Dr. William J. Brown, et al, Syphilis and Other Venereal Diseases (Harvard University Press, Cambridge, Massachusetts, 1970). P. 105.

syphilis infections in the population, there must be an epidemiological surveillance program designed to provide an early interception of source and spread infections. This procedure will greatly curtail the spread of syphilis infections in the community. Public education, designed to inform the public of the signs and symptoms of syphilis infections and to motivate persons infected with syphilis to seek medical attention immediately, will also help reduce the spread of syphilis in the community. In addition, there must be serologic screening programs to detect the reservoir of unknown syphilis infections for casefinding, leading to effective treatment, before the late manifestations of untreated syphilis occur.

The current methods of syphilis control combined with an available and effective therapy appear sufficient to completely eliminate syphilis as a crippling and as a cause of death in the United States of America. The elimination of syphilis requires adequate resources and personnel, the active support of the public, and the active cooperation and participation of the medical forces of the community. The degree to which these elements are present in a community's syphilis control program will determine how quickly syphilis will be eliminated.

Before closing, the problem of gonorrhoea should be briefly reviewed. The economic impact of gonorrhoea is assuming a greater magnitude in the United States of America. Currently, about 570,000 cases of gonorrhoea are reported annually and this number is increasing at a rate of about 15 per cent per year. Furthermore, the number of cases actually treated each year is estimated at 1.8 million cases. While not definitive, certain liabilities or losses may be associated with these 1.8 million cases. For example, there are costs associated with laboratory tests, with the physician time needed for the diagnostic and treatment purposes, and the losses associated with reduced productivity and time lost from work while seeking medical attention. Even conservative estimates on such items for 1.8 million cases indicate that gonorrhoea is a multi-million dollar liability to the United States of America.

Currently resources allocated to control gonorrhoea are being directed to studies designed to answer questions and to fill in technical gaps in our knowledge about the disease. Studies are being conducted to determine the clinical course of the disease and how this relates to the spread of the disease, methods of testing large numbers of people, manpower requirements needed for interviewing and contact tracing, how to effectively screen only high-risk groups, and what levels of activity are required to effect a decline in the incidence of gonorrhoea. Such studies should provide answers to some of the basic questions about the disease therapy, and various components of control activities. Future investments of resources for the control of gonorrhoea will be based on answers gleaned from such studies. In this way, we hope to assure the maximum impact on the gonorrhoea problem with the resources available.

In addition to the economic benefits discussed above, it should be mentioned that human beings saved from the ravages of venereal disease will be able to live happy productive lives instead of being disabled by, or dying from, venereal disease. Thus, the human values of venereal disease control are beyond the realm of cost estimates, but they should not be overlooked when evaluating the benefits of venereal disease control programs.

In summary, investments in venereal disease control have had a multi-billion dollar beneficial economic impact in the United States of America. The benefits discussed are mainly the savings from costs eliminated by preventing mental disability and premature deaths due to syphilis. There are other types of disabilities for which data are not available, and other types of economic losses which have been prevented and thus saved.

Current estimates indicate there is still a large number of persons who might potentially develop disability or premature death from syphilis. These persons must be found and brought to treatment. If not, the economic losses to the nation in terms of hospital care and revenue loss may well total in the billions of dollars for these persons. This liability will not be allowed to occur. Resources will be concentrated in the fight against venereal disease so that, as in the past, the economic impact to the nation will be a profit rather than a loss.