

# Obstacles to Eradicating Congenital Syphilis

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**C**ONGENITAL syphilis is one of the most completely preventable of all serious diseases. Its epidemiology and pathogenesis are so thoroughly understood and available methods of prevention, diagnosis, and treatment are potentially so excellent that eradication seems to be a practical goal.

There has been much progress toward this goal. In fact, Nelson and Struve (1), on the basis of a careful study in Baltimore, conclude that the number of infants born with syphilis probably cannot be reduced any further—until there is less syphilis among adults or until more mothers seek and obtain early prenatal care.

This conclusion may be applicable to many communities. However, it is likely that in others the effectiveness of control activities aimed directly at congenital syphilis could be improved relatively cheaply. For this reason a brief review of the general problem seems indicated. A few of the most pertinent and recent papers are cited, and findings of a recent study in North Carolina are summarized in some detail.

## Epidemiology

Syphilis may be transmitted from mother to fetus between the fifth month of pregnancy and

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the day of delivery. The father does not transmit infection to his unborn child except indirectly when he is the source of the mother's infection. If a pregnant woman has untreated primary or secondary syphilis the fetus will be infected in almost 100 percent of cases. Chances for infection of the fetus decrease with increasing duration of the maternal infection.

## Clinical Aspects

Penicillin treatment of the pregnant woman is extremely effective in the prevention of congenital syphilis. Once adequate treatment has been received, it is no longer considered necessary to re-treat the mother during every pregnancy, if she can be followed closely (2).

Diagnosis of syphilis in infancy is often difficult. There may be no physical signs of the disease. The serologic test for syphilis (STS) is often negative until 3 or 4 months of age. On the other hand, nonsyphilitic infants of syphilitic mothers (usually with treated or old infections) may be seropositive from birth until 3 months of age because of transplacental transfer of maternal reagin. Nonsyphilitic infants also may develop biological false positive serologic tests during the fifth month of life or after. This is thought to be due usually to an immunization procedure or an acute infection (3).

Penicillin is the agent of choice for the treatment of congenital syphilis. The patient is more likely to become seronegative if he is treated before age 2 and preferably in the first 6 months of life. Interstitial keratitis remains a difficult complication to prevent or to treat.

Recently cortisone has been used as an adjuvant in treatment (2).

### **Incidence and Prevalence**

There are a number of defects in the statistical indexes currently used for the measurement of congenital syphilis in a population (1, 4).

The rate of discovery of infected children age 0-1 per 1,000 live births is one index of trend. This should be made specific for race. In comparing rates, allowances must be made for differences in the age distribution of the mothers, and for differences in the effectiveness of case finding among infants.

For the study of trends over long periods of time, attack rates can be obtained by assigning cases discovered at any age to the year of birth before computations are made. To obtain an accurate rate for any one year it is necessary to revise the rate over the period of the following several years.

At present, about 13,000 cases of congenital syphilis are reported each year in the continental United States, and it is estimated that there is a residue of 100,000 undiscovered cases in our child population, age 0-10. Congenital syphilis is primarily a regional problem. During 1941-49, one-half of all cases were reported from 13 southern States which together include only about one-fourth of the total population of the country (5).

The total number of reported cases has remained constant since 1944. In fiscal year 1951, 6.4 percent of reported cases were age 0-1 at time of discovery, 7.2 percent were age 1-4, 17.1 percent were age 5-9, 0.3 percent were under 10 but of unknown age, and 69 percent were age 10 and above (6). These are the first figures on the age distribution of reported cases that have been available for the country as a whole. It is not known whether this age distribution has been constant from year to year or has been changing. Therefore, the number of children now being born with syphilis cannot be estimated.

The residue of undiscovered cases may be shrinking because of case-finding efforts and because fewer infected infants are born. If so, the constant level of reported cases could be accounted for by the success of the case-finding

program among older children. However, it is possible that in at least some communities, the residue of undiscovered cases is being at least partially replenished by significant numbers of syphilitic newborn infants, few of whom are diagnosed in infancy.

### **Missed Control Opportunities**

The North Carolina Syphilis Studies has developed a simple classification of the types of opportunities which professional health workers have for bringing about the eradication of congenital syphilis. In studying histories of cases discovered in any community, opportunities which have been missed can be tabulated. This will reveal weaknesses of the local control program and suggest where emphasis needs to be placed. Similar classifications could be developed for the study of problems in the control of acquired syphilis and other diseases of public health importance.

Each instance in which there was an opportunity to prevent congenital syphilis or to treat is at an earlier date is counted as a missed "control opportunity." Control opportunities are classified into five types: detection; prevention; contact tracing; treatment; and follow-up (see figure).

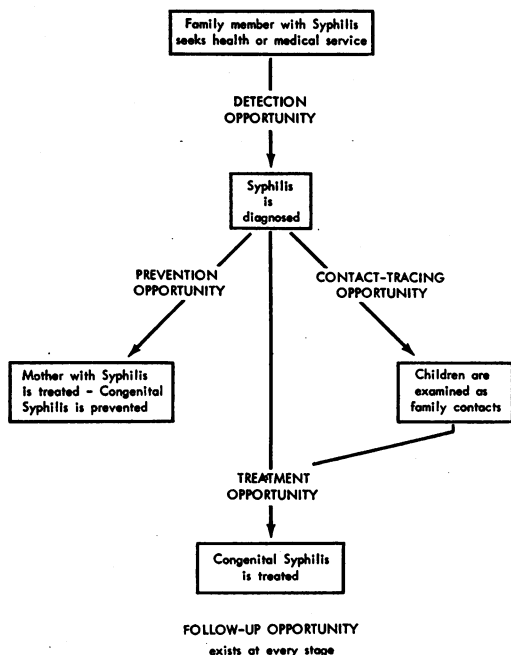
Assume that there is a family consisting of mother, father, and two children. Both parents have had syphilis and both children have had congenital syphilis. All members of the family have now received adequate treatment. The family history is to be reviewed beginning at the time when infection first entered the family and ending at the time when all members of the family had finally been treated.

If the history showed that any family member was given health or medical service at a time when syphilis could have been detected by STS, history or physical examination, or both, this event will be considered a detection opportunity. There may or may not have been a clue suggesting syphilis, but syphilis would have been detected if suspected.

If one member of the family was found to have syphilis, other types of control opportunities were immediately presented, depending on the circumstances.

If the mother was found to have syphilis

Comprehensive Management of Familial Syphilis  
and types of CONTROL OPPORTUNITIES that may be missed



before either or both children were born, there was a "prevention opportunity." If the mother had been given adequate antisyphilitic treatment during or before pregnancy, congenital syphilis could have been prevented.

If, after the birth of a congenital syphilitic child, the mother, father, or other child was found to have syphilis, there was a "contact-tracing opportunity."

If either child was found to have syphilis, there was a "treatment opportunity." Again the indicated action here was skillful and adequate administration of antisyphilitic drugs.

Finally, "follow-up opportunities" occurred at any point where follow-up was needed to keep the family under observation until needed services had been given.

This classification was used in the study of 60 cases of congenital syphilis discovered in four North Carolina counties during the period 1946-50.

Ages of the 60 patients at time of final discovery ranged from 1 month to 24 years with a median age of 8 years. Their histories demonstrate weaknesses of control programs in years past. During recent years momentous changes have taken place in control methods.

Hence it cannot be assumed that present weaknesses are the same as those demonstrated. On the other hand, it cannot be assumed that they are different. The failures of today's control efforts will not all be revealed for many years hence.

Data for family histories were collected as follows:

Health department and hospital records on family members were reviewed and abstracted.

Mothers and other responsible family members were interviewed personally.

Private physicians were interviewed or sent letters of inquiry.

The register of STS reports and birth reports maintained for the four counties by the North Carolina Syphilis Studies was searched for data on each family.

Altogether, for the 60 cases studied in this fashion, 348 missed control opportunities were identified. The least number for any case was 1; the greatest number was 18. The table presents the number and relative frequency with which each type of control opportunity had been missed.

**Number and types of control opportunities missed prior to adequate treatment of 60 cases of congenital syphilis**

Types of control opportunity	Number	Percent
Detection opportunities.....	199	57.2
Prevention opportunities.....	12	3.4
Contact-tracing opportunities.....	85	24.4
Follow-up opportunities.....	46	13.2
Treatment opportunities.....	6	1.7
Total.....	348	99.9

Slightly more than one-half of the total (57.2 percent) were detection opportunities, about one-fourth (24.4 percent) were contact-tracing opportunities, and about one-eighth (13.2 percent) were follow-up opportunities. In only 18 instances did the difficulty center around the problems of drug administration (missed prevention and treatment opportunities). The usual difficulty was that a mother or child would fail to complete an arsenical-bismuth schedule of treatment despite definite efforts at follow-

up. With penicillin therapy, this type of problem should be even more rare.

### *Detection Opportunities*

Detection opportunities had been overlooked in the following ways:

1. Mothers were allowed to go through pregnancy and delivery without an STS having been done. Reasons were that the mother received no prenatal care at all, the physician did no STS as part of prenatal care or at time of delivery, or a midwife attendant failed to have her patient examined at a physician's office or health department clinic.

The prenatal STS is universally recognized as an indispensable technique in congenital syphilis control. Much faith has been placed in the value of "prenatal blood-testing laws." As of May 1950, 40 States had such laws (5).

There is little accurate information as to how effective the prenatal laws are when not supplemented by other educational techniques. In a few States, for example, California, studies have indicated that a prenatal STS was done in well over 90 percent of pregnancies (7).

North Carolina's prenatal law went into effect in January 1940. A study was made recently of over 16,000 pregnancies occurring in three rural North Carolina counties during 1941-49. An STS during pregnancy or at time of delivery had been done in only 54 percent of pregnancies. For women hospitalized for delivery the figure was 69 percent; of women delivered at home by physicians, 42 percent were tested; 40 percent of women delivered at home by midwives were tested. Over the period of 9 years, there was only a small increase in the proportion of women receiving tests (unpublished data, North Carolina Syphilis Studies).

The State health department in South Carolina also found in 1948 and 1949 that significant numbers of pregnant women were not being tested despite the prenatal law of 1946. Ball's paper (8) describes how an effective educational campaign based on this study was developed among physicians, midwives, and health department personnel.

2. Mothers were infected after a negative prenatal STS had been obtained.

A maternal infection, reinfection, or relapse

late in pregnancy may be overlooked because of reliance on earlier negative tests. Because of this possibility, some authorities have suggested that at least two prenatal STS should be done routinely—one early in pregnancy and one late in the third trimester or at delivery. However, increasing the number and types of routine diagnostic tests definitely costs both time and money. Also, unless it can be assured that each pregnant woman gets at least one STS, it may be unrealistic to advocate repeat tests as a routine measure. Fiumara (9) makes the practical suggestion that the STS be repeated late in pregnancy if the mother is single, divorced, or separated, has a past history of any venereal disease, or is thought to have been promiscuous.

3. Parents and children were given miscellaneous health or medical services and syphilis could have been detected had specific examinations been made.

Usually the doctor or nurse had no reason to suspect syphilis. It would not be fair to say that a routine STS should have been done in each of these instances. However, in many instances vital information was on record that should have caused the doctor or nurse to suspect syphilis, but this information was not available and was not even known to exist. The reason for this was that responsibility for the family's health services had been divided among different professional workers who were not in close communication. The needed records (containing data on previous diagnosis or suspicion of syphilis in the family) were in other departments of the same agency or in other agencies or offices.

4. Only very rarely was evidence found that detection opportunities had been missed through failure to recognize clinical signs of congenital syphilis.

Some congenital syphilitic children show no definite signs or stigmata of their disease. The authors feel it is questionable whether doctors or nurses, other than venereologists, should try to keep the less common signs and stigmata in mind as an aid to case finding. It would be of much more value if doctors and nurses could be familiar with the syphilis history of the mother of each child served. Unfortunately, this objective may be very difficult to achieve.

### *Contact-tracing Opportunities*

Usually no explanation could be found as to why contact-tracing opportunities had been missed. In some instances, the physician or nurse may simply have been in the habit of concentrating on the individual patient's needs, to the exclusion of the family's needs. Occasionally, a parent's statement that a child was well was accepted in lieu of an actual examination. In still other instances, known infection of the father or known congenital infection of a sibling was overlooked as a clue pointing to an undiscovered case. (Although the infected mother is the most important clue, she may have been successfully treated and have a negative STS. Or the child may not be living with his mother. Clues presented by other infected family members thus can be of vital importance.)

In studying a series of 50 cases of congenital syphilis diagnosed in various parts of the country, Bauer and Shortal (10) also found that children were often not examined as family contacts when the mother was found to have congenital syphilis.

### *Follow-up Opportunities*

The most frequent type of situation in which follow-up opportunities were missed was one in which a family member was suspected of having syphilis, but the diagnosis was never completed. For example, a blood test would be taken, the report would be positive, the family member would not return for the report, and no follow-up effort would be made. In other instances the family was lost from observation after mother or child had begun treatment; again, no follow-up effort was made. Finally, some families were lost in the process of referral from one institution or private physician to another. These families were not followed to the point where the referring institution or physician knew that the family member had reached his destination and received the service for which he was referred. In many of these instances, parents and children were at least partially at fault for not cooperating with their medical advisers. However, "lack of cooperation" would at best be only a partial explanation, since action on the part of the private

physician or health department was clearly indicated.

### **Integration vs. Fragmentation of Services**

A study done in Boston several years ago demonstrated that fragmentation of health services to families resulted in serious problems in congenital syphilis control (11). The present study confirmed this.

One likely explanation for omission of contact tracing would be that the health care of the family was not an integral unit. Omission of follow-up suggests that even the health care of the individual was often a series of separate episodes. Detection opportunities sometimes were missed because useful information was scattered among agencies and professional persons who were not in communication.

This is a basic problem, and a solution is needed in attempts to manage a great many diseases other than congenital syphilis. A solution would require coordinative efforts within offices and also between offices. At times, record systems based on individual patients or disease categories rather than on families are a serious handicap and may need to be redesigned. To improve communication between offices, it may be possible to work out arrangements for convenient and ethical exchange of information by health workers serving the same family, for example, the public health nurse and the private physician.

### **Summary**

There has been remarkable progress in the control of congenital syphilis, so much so that in some areas it is doubtful whether expansion of programs can be justified. However, in other areas the effectiveness of control efforts can probably be increased with little added expense.

Weaknesses of control programs can be studied by reviewing histories of recently treated cases and tabulating all control opportunities which were missed prior to diagnosis, a technique that could also be modified for use in the study of other venereal disease control problems.

Using this technique, a careful study was

made of 60 cases of congenital syphilis brought to treatment in a four-county area in North Carolina.

Judging from this series of cases, one would expect to find in many communities that more emphasis was needed on the following activities:

1. Making the initial step of detecting a case of syphilis in a family.
2. Following the chain of infection until all infected family members were located.
3. Keeping the family under observation until the possibility of future congenital infections was eliminated and any child already infected was treated.

The actual process of administering anti-syphilitic treatment to infected mothers or children presents only minor problems today.

In some areas, many women still go through pregnancy and delivery without being given a serologic test for syphilis, despite laws requiring this procedure.

Mothers may be infected late in pregnancy with resultant infection of the fetus. This dangerous possibility may be overlooked if an earlier prenatal STS was negative.

Fragmented, poorly integrated health and medical services to syphilitic families appear to present a basic problem to which there is no ready or certain solution.

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## Children's Bureau Appointment

The appointment of Dr. Helen Witmer, Ph.D., as director of its division of research was announced in September by the Children's Bureau of the Social Security Administration, Federal Security Agency. A teacher, author, and a participant in many social research studies and projects, Dr. Witmer was director of fact-finding for the Midcentury White House Conference on Children and Youth. She directed a study of current mental health promotion programs for the National Institutes of Health, Public Health Service, before joining the staff of the Children's Bureau in 1951.