How Much Tuberculosis in Children Must We Accept?

We have come a long way since the turn of the century, when tuberculosis was the leading cause of death in the United States. At that time, consumption was incurable and dreaded as much as AIDS (acquired immune deficiency syndrome) is today. Its victims were ostracized and sent into internal exile in sanatoria with a 50–50 chance of dying. The advent of effective anti-tuberculosis chemotherapy has changed all that and has revolutionized the approach to treatment and control of this disease. Tuberculosis is now curable and preventable. Its treatment has entered the mainstream of modern medicine, and patients can be managed successfully in an ambulatory setting.

Nevertheless, tuberculosis is still a formidable adversary in our society, causing substantial morbidity and mortality. In 1984, there were 22,255 reported cases and, in 1983, the most recent year for which mortality statistics are available, there were 1,779 recorded deaths. Particularly disturbing is the continued occurrence of tuberculosis in children. In 1984, there were 1,236 reported cases among children under age 15 years, including 759 cases among children under age five.

The occurrence of tuberculosis in children has double significance. First is the personal health impact to children who are afflicted by this potentially preventable disease. Second is the public health implication that ongoing transmission of tuberculous infection is still a problem within our society. The occurrence of disease in children, particularly children under age five, is perhaps the best indicator that tuberculosis patients are causing infection and disease not only in children, but also in persons of all ages. For this reason, tuberculosis in children may be defined as a sentinel health event—a preventable disease whose occurrence serves as a warning signal that the quality of preventive and/or therapeutic medical care may need to be improved. Just as illness in canaries who accompanied coal miners into the shafts foretold of impending danger, so too the occurrence of tuberculosis in children is a harbinger of continued risk to all. Unless we intervene, thousands of future cases will arise from the reservoir of persons currently infected.

In the past two decades, the number of cases in children under age 15 years has declined at an average annual rate of 7 per cent, while in patients of all ages it has declined at a rate of 4 per cent per year. At these rates, tuberculosis in this country will continue to be with us well into the 22nd century.

Must we accept such a pessimistic outlook? The answer must be No! It is appropriate, instead, for us to ask three other questions. *Can* we do more to control tuberculosis in children? *Should* we do more? *Will* we do more?

Concerning the first question, the answer is a resounding Yes! We can more fully use the existing tools of prevention and control. In this issue of the Journal, Nolan demonstrates this quite convincingly.[1] In his review of pediatric tuberculosis cases that occurred in selected counties in North Carolina over a five-year period, he demonstrated that fully 80 per cent of childhood cases were identified (most of whom were still in an asymptomatic stage of illness) through contact investigation. The source cases for 98 per cent of these children were adults, of whom 88 per cent lived in the same household.

While 80 per cent of Nolan's pediatric cases were identified by contact investigation, another 17 per cent were not diagnosed until they presented to a physician with clinical illness. Of these, 76 per cent had a source case identified by subsequent contact investigation. These childhood cases may have been potentially preventable if the source case could have been identified earlier and a thorough contact investigation performed.

The North Carolina data emphasize that it is extremely important for health care providers to rapidly report adults who are suspect cases to the health department and not to wait for bacteriologic confirmation of the diagnosis, which may take weeks. These data also underscore the importance of rapid, thorough contact investigation for identifying children with tuberculous infection and disease. During investigation of every adult case, there should be special emphasis on identifying all household members and other close contacts, especially children. Such assessment should involve site visits to the home and other places frequented by the case, with the express purpose of identifying all contacts at high risk and ensuring that these individuals are thoroughly evaluated for tuberculous infection or disease.

One-third of the North Carolina cases identified by contact investigation may have been potentially preventable, either by prescribing isoniazid prophylaxis or by monitoring and ensuring compliance with such preventive therapy. Nineteen per cent of the North Carolina cases identified by contact investigation had a negative tuberculin skin test at their initial encounter but were not placed on isoniazid chemoprophylaxis, pending follow-up skin testing three months after contact with the source case was broken. This practice is common in other states as well. National statistics show that in 1984 only 24 per cent of close contacts under 15 years of age whose initial tuberculin skin test reaction was nonsignificant were placed on preventive therapy. The North Carolina data reinforce other studies that show that persons, especially children, with nonsignificant tuberculin skin test reactions are indeed at risk for tuberculosis in the period immediately following exposure. Given the rare occurrence of isoniazid-induced hepatitis in children and the well documented risk of tuberculosis for such contacts, isoniazid preventive therapy should be prescribed for all childhood contacts, unless specifically contraindicated.[2–5]

Besides failure of health care providers to prescribe preventive therapy, failure to take the prescribed medication may have been a factor in the childhood cases reported by Nolan.[1] Fourteen per cent of the cases identified through contact investigation occurred among asymptomatic children who were placed on isoniazid chemoprophylaxis but developed signs of tuberculosis later. While these may have been true treatment failures, noncompliance with recommended treatment seems to be a more likely possibility. Perhaps there is a place for more formal monitoring of compliance among children placed on preventive therapy. Similarly, there may be a place for strategies for improving compliance, such as directly observed therapy in which the patient is observed to ingest the medication.

The findings from the North Carolina study suggest that tuberculosis in children can serve as a sentinel health event

for assessing the effectiveness of tuberculosis control strategies. Childhood tuberculosis cases could be analyzed to determine how and why they occurred, whether or not appropriate control methods were applied, and whether or not these methods were effective. Such a surveillance system might identify problem areas, such as: delays in diagnosis or institution of therapy, delays in reporting of adult cases and suspects to health departments, delays in completing contact investigations, incomplete investigations, failure to prescribe preventive therapy, and failure to monitor and ensure compliance. Since surveillance may be defined as information for action, an emphasis on rapid reporting in this sentinel surveillance system would encourage rapid intervention through timely contact investigation, prescription of preventive therapy, and monitoring and ensuring of compliance.

We also can improve the control of tuberculosis by developing better tools for diagnosis, treatment, and prevention. The current tools for diagnosis of tuberculous infection and disease—smear and culture techniques, tuberculin skin testing, and the roentgenogram—are updated versions of those available at the turn of the century. The biotechnological revolution needs to be unleashed on tuberculosis. There is particular need to devise simple and rapid tests for diagnosing infection and disease and to develop safer and shorter preventive therapy regimens.

Concerning the second question of *should* we do more, the answer again is Yes! As with all public health programs, tuberculosis control is based upon the concept of social justice. Tuberculosis takes its heaviest toll on minorities and the socioeconomically disadvantaged. In the period 1977–81, 80 per cent of childhood cases of tuberculosis in North Carolina occurred in non-Whites, and the incidence rate of non-Whites was 10 times that in Whites. The experience at the national level is similar. In 1984, 53 per cent of reported cases in children under 15 years of age occurred in non-Whites; and 25 per cent occurred in Hispanics, almost all of whom are reported as White. Thus, nearly 80 per cent of childhood tuberculosis cases in this country are reported in minority racial and ethnic groups. Furthermore, the incidence rate in non-Whites was five times that in Whites. To not pursue tuberculosis control aggressively—especially in children—is to give tacit approval to the perpetuation of inequalities in the health status among our people.

The third question of *will* we do more remains to be answered. The fear factor is no longer present with tuberculosis, as it was at the turn of the century. There is the common misconception that because drugs are available, tuberculosis is no longer a problem. The closing of the sanatoria and the mainstreaming of tuberculosis patients into society has also led to the illusion that the disease has disappeared. It is possible for tuberculosis patients to blend invisibly into society and avoid the stigma of the disease. Most Americans are in racial, ethnic, and socioeconomic strata that are less commonly afflicted, and they are thus unaware of the continued occurrence of tuberculosis. In view of these factors, maintaining commitment to tuberculosis control efforts can be difficult. Perhaps calling public attention to the problem of tuberculosis in children will help public health officials to obtain commitment for tuberculosis control efforts. Each case of tuberculosis in a child is a failure of the public health establishment to convince society that control of tuberculosis in children is a feasible goal deserving support. Achieving control and eventual eradication of tuberculosis in children will be a major test of will.

ALAN B. BLOCH, MD, MPH
DIXIE E. SNIDER, JR., MD, MPH

REFERENCES

1. Nolan RJ: Childhood tuberculosis in North Carolina: a study of the opportunities for intervention in the transmission of tuberculosis to children. Am J Public Health 1986; 76:26–30.
2. Benenson AS (ed). Control of Communicable Diseases in Man. 13 ed. Washington, D.C.: American Public Health Association, 1985.
3. American Thoracic Society/Centers for Disease Control. Treatment of Tuberculosis and Other Mycobacterial Diseases. Am Rev Resp Dis 1983; 127:790–796.
4. American College of Chest Physicians. National Consensus Conference on Tuberculosis. Chest (Supplement) 1985; 87:115S–149S.
5. Report of the Committee on Infectious Diseases. 19th ed. Evanston, Illinois: American Academy of Pediatrics, 1980.

Address reprint requests to Technical Information Services, Center for Prevention Services, Centers for Disease Control, Atlanta, GA 30333. Dr. Bloch is Chief, Statistics and Analysis Section, Program Services Branch, Division of Tuberculosis Control, Center for Prevention Services, Centers for Disease Control, Atlanta, GA 30333. Dr. Snider is Director, Division of Tuberculosis Control, Center for Prevention Services, CDC, Atlanta.