

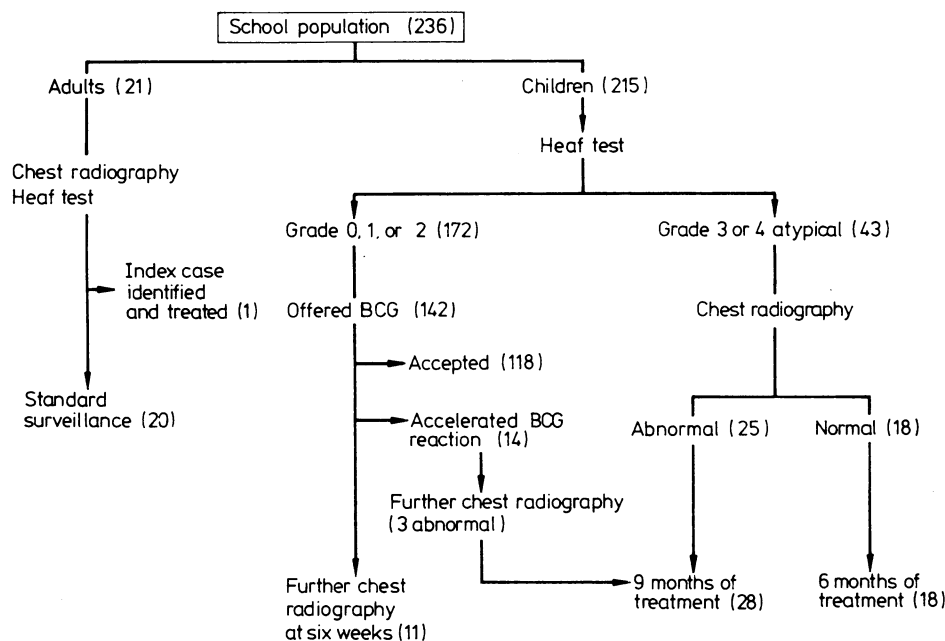
Lesson of the Week

Tuberculosis in a primary school: the Uppingham outbreak

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Primary tuberculosis in white children in the United Kingdom is uncommon. This view was supported by a survey by the Medical Research Council of notifications of tuberculosis.¹ We describe an outbreak of tuberculosis in a primary school in Leicestershire that occurred during the period of this survey. The children affected were all white, lived in a semirural community, and attended a local primary school.

Although primary tuberculosis in white children in the United Kingdom is uncommon, outbreaks may occur. All cases of tuberculosis must be reported so that the source of infection may be identified



Management of school population during outbreak of tuberculosis. (Figures in parentheses are numbers in each group.)

The outbreak and its management

The first case was probably a 9 year old pupil who developed erythema nodosum in July 1978. She yielded positive results on tuberculin testing and was treated outside the Leicestershire Area Health Authority with anti-tuberculous chemotherapy, but the case was not notified. She made a complete recovery. In December 1978 a second child was seen, also outside Leicestershire, with erythema nodosum and a strongly positive reaction to a Heaf test, but the illness was thought initially not to be tuberculosis. In mid December a third child became unwell and developed a cough. His illness

progressed with fever, lethargy, and headache. He was admitted to yet another hospital and subsequently transferred to a neurological centre, where tuberculosis meningitis was correctly diagnosed at the beginning of January 1979.

The head teacher of the school gave this information to the Leicestershire Area Health Authority on 8 January 1979. Four more children presented to the local general practice with vague respiratory symptoms and yielded strongly positive results on tine testing. Finally, another child became ill at the end of January 1979 and was admitted to the Leicester Royal Infirmary on 2 February, where tuberculosis meningitis was confirmed.

By this time it was apparent that an outbreak of tuberculosis had occurred, and a plan of management was agreed between the clinicians and community health staff (figure). The objectives were to identify and treat the index patient and to screen all children attending the school. Clinical medical staff would travel to Uppingham and use the surgery of the local practice to treat the patients affected. This minimised travel for young children in the difficult winter of 1979 and simplified follow up arrangements. Children receiving treatment were examined at intervals of three months. A chest radiograph marked the end of treatment (after six or nine months), and all patients were offered further chest radiography one year after treatment was

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completed. Three years after the outbreak most of those who showed negative reactions to Heaf testing were retested by an experienced observer.

Results

A member of the teaching staff was quickly identified as the index case. Her chest radiograph showed multiple small cavities at the left apex, and a direct smear of sputum yielded positive results. *Mycobacterium tuberculosis* was subsequently cultured and shown to be fully sensitive to chemotherapy. She was treated with rifampicin and isoniazid for nine months, supplemented with ethambutol (15 mg/kg body weight) for the first two months. After three months a direct smear and culture of sputum yielded negative results, and a chest radiograph 13 months after treatment was started showed fibrotic inactive changes at the left apex. Chest radiographs were obtained in all other members of staff, and none showed evidence of a tuberculous infection.

Of the children, 23 yielded strongly positive results on Heaf testing with an abnormal chest radiograph. Eighteen children yielded strongly positive results on Heaf testing alone (grade 3 or 4 or atypical). Most of the radiological abnormalities were primary complexes. In addition, two children had primary complexes and tuberculous meningitis. Fourteen children out of 118 given BCG vaccinations had an accelerated reaction, of whom three developed a primary complex. Thus 46 children were treated with antituberculous drugs from a school population of 215 (21%). Their ages ranged from 6 to 11, and the table shows their distribution by class. Class 2 was taught by the index patient and was separated from class 3 by a mobile partition. The rooms were open plan, allowing free mixing between these two classes. It is clear from the distribution of infection that the index case was correctly identified.

In the children treated symptoms were usually mild or absent. Thirteen with a primary complex had mild respiratory symptoms compared with three in the group given chemoprophylaxis. Similarly, physical signs were scanty. One child had erythema nodosum and one splenomegaly. Choroidal tubercle was sought in every child but was not found. In contrast, the two children with tuberculous meningitis were obviously ill and showed signs of meningeal irritation. One developed hemiparesis, and a culture of cerebrospinal fluid yielded tubercle bacilli. Both children with meningitis recovered, one retaining a residual hemiparetic deficit. After the children with meningitis were excluded treatment was standardised to rifampicin and isoniazid. Rifampicin was given in a dose of 10-15 mg/kg body weight, usually as an elixir. Isoniazid was given in a dose of 10 mg/kg body weight, and special arrangements were made to manufacture an elixir. Children with an abnormal chest radiograph were treated for nine months; those with a positive reaction on Heaf testing were treated for six months. No child had a proved adverse reaction to this regimen. At the end of treatment all were judged clinically and radiologically healed.

One year after completing treatment all patients were offered further chest radiography. Thirty two accepted, 11 declined, and three had left the area. All were judged to be free of active disease by an independent radiologist. In five cases there was well defined calcification. In November 1981, 107 children of the original 142 who had yielded negative results in response to Heaf tests and who had not received treatment were retested. Of the children in this group, 118 had accepted BCG vaccination when their initial Heaf test yielded negative results. On retesting 47 had a grade 1 or 2 response and one a grade 4 reaction; this last child remained under surveillance but had a normal chest radiograph and remained clinically well. No further clinical problems occurred in the five years after the initial outbreak.

Distribution of 46 children treated with antituberculous drugs between seven school classes

No of school class:	1	2*	3	4	5	6	7
No of children in class treated:	3	18	13	3	2	3	4

*Taught by teacher in index case. Classes 2 and 3 mixed freely.

Discussion

Outbreaks of tuberculosis continue to be reported from areas of high prevalence especially in unvaccinated contacts.² Tuberculosis in schools was described before this outbreak³ and more recently among children after apparently minimal exposure.⁴ The outbreak reported here occurred in an area of low prevalence but after prolonged and close contact with an infectious patient. This patient's symptoms were minimal and had developed in the previous three months. She had a cough, which she attributed to smoking, but her sputum was positive on smear testing, and she was thus an ideal vehicle for the dissemination of tubercle bacilli.

Previous advice from the Department of Education and Science recommended that teachers should undergo chest radiography on entry into the profession and at intervals of three years.⁵ This advice was later rescinded in a code of practice recommended by the British Thoracic Society.⁶ We would question, however, the proposal to screen only children in the year taught by an identified infectious patient, especially in open plan primary schools, as a considerable number of our cases came from other years (table). Because our index patient entered the service as a temporary teacher she escaped routine chest radiography initially as this group was not included in previous regulations. Problems with this outbreak were accentuated by the variety of centres to which children were initially referred and by the failure of clinicians to notify cases. It is a statutory requirement that doctors report all cases of tuberculosis. Thus notifications must include not only patients who may infect others but any patients in whom an active lesion calls for treatment. It is well known that primary tuberculosis is not infectious but apparently less well known that notification is nevertheless mandatory so that identification of the source of infection may be attempted. The only patients for whom notification is unnecessary are those receiving chemoprophylaxis. Ambiguities on a national scale shown in the survey by the Medical Research Council¹ prompted the Joint Tuberculosis Committee to propose an amended code of practice.⁷

For screening we found the Heaf multiple puncture test quite acceptable, although care was required in young children as there were occasional problems in interpreting reactions. Twelve children had an atypical reaction with satellite lesions scattered a few centimetres away from the site of puncture. Subsequent retesting elicited a strongly positive reaction in most cases, but not all atypical responses could be accounted for by faulty technique. In cases of doubt chest radiography and repeat testing were the rule. The practice of giving children who show negative results on Heaf testing early BCG vaccination is quite acceptable, provided that the importance of the occasional accelerated reaction is fully recognised. Our decision to treat the children with two drugs may be considered to be contentious. We based the duration of treatment on a modification of trials of short course chemotherapy,⁸ reducing the period of treatment to six months for the group needing chemoprophylaxis. We believe that our results and lack of side effects justified this decision. Spot urine and blood tests suggested a high degree of compliance. Routine monitoring of liver function was not carried out. Although most children with a primary complex show spontaneous healing, a risk of disseminating remains,⁹ exemplified by our two children with tuberculous meningitis. Only these two children were treated in hospital, while the remainder were managed on an outpatient basis and were kept away from school for periods of only four to six weeks.

Finally, the public relations aspect of managing this type of epidemic is vital. People still fear tuberculosis, and this outbreak suggests that these fears are occasionally justified.

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