

## **Screening contacts of children with tuberculosis: an important and worthwhile part of case management**

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### **SUMMARY**

**The outcome of screening the household contacts of 49 newly diagnosed tuberculous children as currently practised in the Paediatric Unit of the Port Moresby General Hospital is described. The screening program generated 182 chest X-rays and 67 Mantoux tests. 32 (39%) of 83 child contacts and 11 (11%) of 99 adults were commenced on antituberculous therapy, and 2 children aged 6 months were started on INAH chemoprophylaxis. Adult contacts were identified in 11 (22%) of the 49 families screened. Such a program is an extremely important part of the case management of children with newly diagnosed tuberculosis and their families.**

### **Introduction**

Tuberculosis (TB) is now the second commonest reason for admission to the children's wards of Port Moresby General Hospital (1) and one of the leading causes of children's admissions to all Papua New Guinea's coastal hospitals (2). Whilst in many industrialized countries, TB is regarded as a disease primarily affecting adults and teenagers, it may be equally prevalent in children in deprived communities in these countries and in the communities of the nonindustrialized world. In the National Capital District of Papua New Guinea and surrounding area children under the age of 12 years account for one-third of the approximately 2000 newly reported cases each year (3).

Since sputum-positive adults are the prime source of spread of tuberculosis within the community and particularly within the family, family screening is a logical and firmly established - though not always practised - component of the management of newly diagnosed adult patients.

Infected children are not usually an important source of spread within the community or

family but they are indicators of an adult source of infection. In an area with a high prevalence of tuberculosis this source is most likely - but not necessarily - to be a household adult contact. Thus screening of the family or, rather, the household contacts of infected children, both to find the source of infection and to find other affected children in the family, would seem to be as important as screening the families of infected adults. It is, however, a laborious and time-consuming task which is at risk of taking second place to more immediately interesting clinical work.

This report describes our attempt to audit family screening as it is currently carried out in the children's TB section at Port Moresby General Hospital.

### **Methods**

The study was carried out between July and August 1994. 42 children in the children's TB ward and 7 children referred to the Paediatric TB Clinic in whom the diagnosis of TB was felt to be secure, on the basis of chest X-ray (CXR), Mantoux testing, gastric aspirates or a positive TB score (4), served as index cases. No attempt was made to select index children from particularly cooperative or motivated

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families, or from particular social or educational backgrounds. On registration a list of the family contacts - generally those living in the same house - was made and parents or guardians of the child encouraged to ensure that those named on the list had a chest X-ray and that all the children had a tuberculin skin test, which was done using 5 tuberculin units/0.1 ml of purified protein derivative-S (PPD-S) Mantoux testing, and a brief clinical assessment. CXRs of the children were read by ourselves. Those for adults were also initially read by ourselves and any adult whose CXR we felt to be either suspicious or definitely abnormal was referred to the adult TB clinic. Adults with a bad cough were asked to provide sputum samples for examination for acid-fast bacteria (AFB). The siblings and other child contacts screened were grouped by age into those less than 5 years, 5-10 years and 11-16 years (the age of 16 being chosen to correspond with school grade 10). Mantoux tests were recorded as positive (>15 mm induration in children with evidence of BCG vaccination, >5 mm in those without), negative, or not done or recorded. CXRs were

recorded as diagnostic, suspicious or normal. Children with suspicious CXRs were usually treated with a week of antibiotic therapy before having a repeat CXR. The number of contacts started on treatment as a result of our screening was recorded.

**Results**

Of the 49 index patients 29 were male. The mean age was approximately 3.8 years, and the median between 3 and 3.5 years. 30 children (61%) had pulmonary TB, 9 (18%) had CNS involvement, 2 bone, 2 miliary, 1 lymphatic and 1 pericardial; 4 children had more than one site involved.

83 siblings or child contacts and 99 adults (84 parents and 15 other close contacts) were screened (Figure 1). Of the 41 contacts less than 5 years, 9 (25%) of 36 tested were Mantoux positive. 7 of 41 (17%) were thought to have a diagnostic CXR and 17 (41%) to have a suspicious CXR. 20 (49%) were started on full TB treatment and 2 children, both aged 6 months, were commenced on INAH

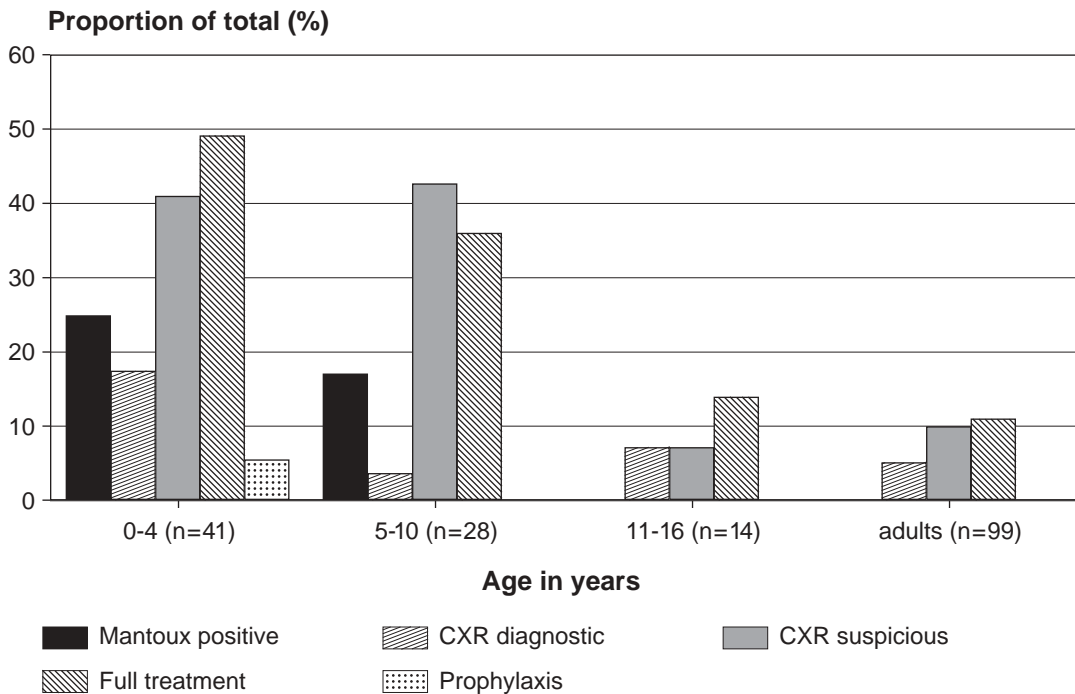


Figure 1. Outcome of screening child and adult contacts of children with tuberculosis.

prophylaxis (one of these patients had a negative Mantoux test and a normal CXR but was living in the ward).

Of the 28 child contacts aged 5-10 years 4 (17%) of 23 tested had a positive Mantoux test. 1 (4%) of 28 had a diagnostic and 12 (43%) a suspicious CXR. 10 (36%) were started on treatment.

Of the 14 older children, none of 8 tested were Mantoux positive. One of 14 had a diagnostic and one a suspicious CXR. 2 (14%) were started on treatment.

5 of the 84 parents were thought to have diagnostic and 10 to have suspicious CXRs. One of our 'new' cases was already on treatment, leaving 11 (13%) who were started on treatment. There were no new cases among the 15 other adult contacts screened.

Thus, household contact screening in a group of 49 children with tuberculosis generated a total of 182 CXRs and 67 Mantoux tests. 32 children - 39% of the 83 screened - were commenced on full antituberculous treatment and 2 on prophylaxis; 11 new adult contacts (11% of the 99 screened) were diagnosed as new cases of tuberculosis. Of the 49 families investigated 11 (22%) had adult contacts identified.

### Discussion

Whilst a sizeable literature exists concerning the screening of contacts of sputum-positive adults, that pertaining to the screening of contacts of children is scarce. In a recent Spanish study, screening of 714 contacts of 111 tuberculous paediatric patients resulted in the diagnosis of 41 new cases of tuberculosis and the administration of chemoprophylaxis to a further 126, giving a total of 167 (23%) receiving either prophylaxis or full treatment (5). This compares with 25% of the contacts screened (45/182) in our study, but the proportion diagnosed as probable new cases was considerably higher, with 32 (39%) of the 83 children and 11 (11%) of the 99 adults being commenced on full treatment and only 2 infants being commenced on INAH prophylaxis.

It is, perhaps, possible that our high pick-up rate for new cases is the result of 'selection' by

some of the parents of children perceived by them to be unwell. However, this is unlikely to be a major factor, given that the median age of our patients was between 3 and 3.5 years and that the mean number of children screened per family was 1.68.

It may be argued that we overdiagnosed tuberculosis in some of the child contacts and that some of the children should have been treated with prophylactic rather than full treatment. We would concede that this may be so - though not by a large margin. The diagnosis of primary and early progressive primary infection in otherwise well children is difficult. The Mantoux test can at best be used only as a guide. PPD solutions require careful storage and have a finite shelf life. Even with high quality PPD, a Mantoux test is only helpful if it is positive and in communities with a high infectious disease load and high levels of malnutrition, the test is often negative in infected children. Only 11 (34%) of the 32 children started on full treatment were Mantoux positive. 4 of these 11 had a diagnostic, 6 a suspicious and 1 a normal CXR. A suspicious CXR was an important factor in making the decision to start treatment. The interpretation of children's CXRs, in particular the definition of minor degrees of mediastinal enlargement and increased perihilar lung markings, is not entirely objective, but there was often supporting clinical evidence of infection such as enlarged cervical glands, or a history of prolonged cough.

It might have been expected that more of the child contacts would have qualified for prophylaxis with INAH rather than full treatment. The guidelines current at the time of the study indicated INAH prophylaxis for children less than 7 years of age with a positive Mantoux and no signs or symptoms. None of those screened qualified. Only 2 contacts, both aged 6 months and Mantoux negative, one with a normal, the other with a suspicious CXR, were commenced on prophylaxis. New guidelines from the Department of Health indicate prophylaxis for all asymptomatic children less than 5 years who are contacts of sputum-positive adults, irrespective of Mantoux status (6).

A recent study from Brussels, in which 28% of 1714 patients diagnosed as a result of a PPD

screening program were classified as symptomatic, 33% as asymptomatic and 35% as having dubious infection, illustrates some of the difficulties in making an accurate diagnosis in children, particularly in the early stages of primary infection (7). Diagnosis of TB in children is even more difficult in a rural setting and in the absence of CXR and Mantoux testing. In this situation, as well as in hospitalized malnourished children, the Paediatric TB Score Chart is helpful (8).

It is, in our opinion, far better to overdiagnose than to underdiagnose when screening for TB in an area of high prevalence. We could, perhaps, have adopted a policy of regular review of those children with suspicious findings, but there was no guarantee that the children would attend and the consequences of a missed diagnosis in children can be disastrous. At least 4% of children infected under the age of five years will develop either miliary TB or TB meningitis (9) and in a recently published series from Port Moresby 16.6% of 636 children had severe extrapulmonary TB (10).

In contrast to the children, the diagnosis of tuberculosis was suggested by appearance and symptoms and confirmed by CXR in virtually all the adult contacts started on treatment. Disappointingly, we were able to trace the likely adult source of infection in only 11 families. This, perhaps, reflects the high prevalence of tuberculosis within the community and the regular exposure of children to TB from adults other than their immediate family members (11). Widening the hospital-based screening process to include other adult contacts is impractical. It is likely to be more productive to encourage the families to do their own contact tracing, persuading those of their close relatives or friends who have symptoms and/or signs of TB to come for screening. This will involve, firstly, a considerable amount of community education about TB and, secondly, making sure that our health services are user friendly, so that people coming for screening are made welcome.

We do not know how many of the apparently healthy contacts we screened, if any, subsequently developed clinical tuberculosis. A study from England found that while 71% of

the positively diagnosed contacts of sputum-positive index patients were detected at the first visit, a further 19% became positive 6 months later, and 10% became positive within 16-24 months (12). The logistics of repeated screening of initially negative contacts within our context are somewhat daunting, but perhaps we should be working towards such a program. In the meantime it is most important that parents of children who are initially 'negative' should be informed that they are still at risk of developing the disease and should be encouraged to bring them back for review in the event of any suggestive signs or symptoms.

In conclusion, whilst screening the household contacts of newly diagnosed tuberculous children is both important and productive, it is only one part of the effort that needs to be made to find the source of infection within the community. Only a concerted effort at case finding and ensuring that treatment is completed will enable tuberculosis to be brought under control.

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