Contact Tracing in Children Exposed to an Index Case of Tuberculosis: The Need, the Challenge, and the Impact

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(See the Major Article by Triasih et al on pages 12–8.)

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The global prevalence of childhood tuberculosis is between 10% and 15% of the total tuberculosis burden, being 5% in low-burden countries and between 20% and 40% in high-burden countries [1]. According to the World Health Organization (WHO), there were approximately 530,000 new childhood (defined as ages 0–15 years) cases of tuberculosis (approximately 6% of total burden) and 74,000 childhood tuberculosis deaths (approximately 8% of total burden) among human immunodeficiency virus (HIV)-uninfected people in 2012 [1]. For control of the tuberculosis epidemic in children, WHO recommends the implementation of the “Three I’s” (intensified case finding, isoniazid preventive therapy [IPT], and infection control measures) and the early introduction of combined antiretroviral therapy. Passive case identification of childhood tuberculosis alone is an inadequate strategy to control the tuberculosis epidemic. Intensified active case finding of contacts of tuberculosis index patients and of high-risk groups are essential strategies to break the cycle of transmission.

In this issue of Clinical Infectious Diseases, the study by Triasih and colleagues tackles the important topic of contact tracing in children [2]. Although children are often not the source for transmission of the tuberculosis bacillus, contact tracing following identification of a tuberculosis index case is a useful strategy for the early recognition and treatment of tuberculosis in children and for the provision of prophylaxis for those cases with a high risk of disease progression. This is important in the fight to control the childhood epidemic of tuberculosis. In Vietnam, the use of symptoms to screen tuberculosis contacts showed a tuberculosis prevalence and incidence at 12-month follow-up of 734 per 100,000 and 180 per 100,000, respectively, while in Botswana, where 548 contacts of 163 pediatric index patients were screened, the incident rate of tuberculosis was 2.2%, the number needed to contact-trace for 1 positive case was 13.6 and the number needed to screen for 1 positive case was 46 [3, 4].

However, similar to all studies of childhood tuberculosis, this study is fraught with the challenge of not having a “rule-out” test for tuberculosis. Whereas the authors must be congratulated for undertaking a detailed clinical and radiological evaluation and tuberculin skin testing of contacts of the tuberculosis index patients and a 12-month follow-up of these contacts to rule out tuberculosis disease, they then use these findings to evaluate a symptom-based screening algorithm as a point-of-care test. In this lies a design flaw as they may have not ruled out tuberculosis disease by this means. Ideally, Triasih et al should have undertaken a detailed evaluation including sputum microscopy and culture and molecular testing of all cases and compared these outcomes with the symptom-based screening approach. Their suggestion of a symptom-based approach would be more compelling if none of the asymptomatic patients were microbiologically infected for tuberculosis at baseline or at follow-up. It is possible that asymptomatic children could have tuberculosis, as seen in the 2 older children during follow-up. This was masked in the case of younger children where routine IPT is administered to all nondiseased cases. Although the strength of the study was a follow-up of 12 months,
a period wherein most tuberculosis cases would have declared themselves, it is well known that cases of tuberculosis could occur after this period. It must be noted that a detailed microbiologic evaluation is also not a rule-out test for childhood tuberculosis but provides a more comprehensive approach. Whereas the microbiological evaluation alone tends to underdiagnose tuberculosis and the clinical approach of possible or probable tuberculosis tends to overdiagnose the condition, the true prevalence and incidence among contacts of tuberculosis index patients would lie between the estimates of these 2 extremes. For validation of a screening tool, however, a combination of 2 methods is essential so that no case is missed. Another major concern with this study is the inherent problem of using symptoms in both screening and evaluation of disease as this creates uncertainty with the clinical diagnosis. This circular argument would undoubtedly confirm that the proposed symptoms will be useful as a screening tool. However, what was useful from the Triasih et al study was that the lack of radiology or tuberculin skin testing should not be an impediment to contact screening and management.

Although it is recognized that a simple tool is required for contact tracing at the primary care level, the use of a molecular tool should be explored for children as a point-of-care test as it may provide a rapid and more reliable result, as shown in a recent adult study [5]. The GeneXpert MTB/RIF assay has a sensitivity of approximately 70% with a specificity of about 98% on sputum in children [6]. A major challenge for children would be obtaining a suitable sputum or gastric lavage sample. This is not insurmountable, as demonstrated by other community-based tuberculosis studies in which induced sputum was obtained [7]. The overall impact of such technology could have a major impact on the tuberculosis control program and may be cost effective.

Finally, the findings of this study indirectly support the current WHO policy to provide isoniazid to all asymptomatic contacts of tuberculosis index patients aged <5 years, which appears to be protective against progression of latent tuberculosis. IPT has been the cornerstone of the tuberculosis control program. In a meta-analysis of 10 320 patients, the pooled risk reduction of isoniazid prophylaxis in preventing tuberculosis disease was 0.65 (95% confidence interval [CI], .47–.89), with a 59% reduction in the development of incident tuberculosis disease [8]. There was no benefit of IPT among HIV-infected young infants (aged 0–4 months) and no significant overall risk reduction (0.58 [95% CI, .31–1.09]) in all-cause mortality [8]. Symptomatic contacts aged <5 years should, however, be referred for a full evaluation to exclude active disease before IPT is instituted. In older children (aged >5 years), who are contacts of tuberculosis index patients, for whom routine IPT is not routinely recommended, both symptomatic and asymptomatic contacts should be referred for a full evaluation and follow-up.

**Note**

**Potential conflict of interest.** Author certifies no potential conflicts of interest.

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**References**