Preventing tuberculosis in household contacts crucial to protect children and contain epidemic spread

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Despite the launch of the ambitious End TB Strategy in 2014, tuberculosis remains the leading infectious cause of death globally.[1] Children with documented tuberculosis exposure or living in areas with uncontrolled tuberculosis transmission are at high risk of disease. Estimates are that about 1 million children develop tuberculosis disease every year, resulting in more than 200 000 tuberculosis-associated deaths.[1,2] Tuberculosis is now recognised as one of the top ten causes of under-5 mortality in tuberculosis-endemic areas.[3] Given the vulnerability of children to progress to tuberculosis disease after primary infection and the diagnostic difficulties in resource-limited settings, better use of preventive therapy is crucial.[4] Preventive therapy at a population level could theoretically eradicate the reservoir of latent tuberculosis infection from which future tuberculosis cases arise,[5] but this requires concomitant control of tuberculosis transmission to prevent reinfection. Dramatic and sustained reductions in tuberculosis incidence have been achieved in settings where community-wide active tuberculosis case finding was combined with treatment of latent tuberculosis infection.[6,7]

Treatment of latent tuberculosis infection (tuberculosis immunoreactivity in an asymptomatic person) at a population level is a daunting task given that a quarter of the world's population is estimated to have latent tuberculosis infection.[8] However, the fact that most tuberculosis disease manifests soon after infection, whether this is primary or reinfection, identifies household contacts as a particular risk group.[9] In vulnerable young children this window of risk is even shorter, with more than 95% of disease progression occurring within 1 year of primary infection.[4] These observations suggest that the individual risk-to-benefit ratio of treatment for latent tuberculosis infection is vastly different in someone with recent exposure than in someone with distant *Mycobacterium tuberculosis* infection. Household contact screening also provides a great opportunity for active case finding. A cluster randomised trial in Vietnam diagnosed 1788 cases per 100 000 population in the active household contact screening group, compared with 703 per 100 000 with passive case finding.[10]

Natural history descriptions identify tuberculosis prevention in household contacts as a key intervention to protect vulnerable young children and limit the number of secondary cases that sustain epidemic spread within communities.[4,9] This idea is supported by the most recent WHO guidance on treatment of latent tuberculosis infection, which encourages consideration of tuberculosis prevention in all infected household contacts irrespective of age.[11] However, despite the recognised importance of household contact management, implementation in tuberculosis-endemic settings remains poor because of the absence of adequate political commitment and domestic investment in contact tracing programmes.[12,13]

A mathematical modelling study by Peter Dodd and colleagues[14] in *The Lancet Global Health* provides the first global and national estimates of the impact of moving from zero to full coverage of tuberculosis household contact management for children. It includes a focus on exposed contacts who are younger than 5 years or living with HIV, as well as a more inclusive approach that also considers contacts aged 5–14 years who have a positive tuberculin skin test. The authors estimated the number of children in household contact with adults with pulmonary tuberculosis globally, and modelled morbidity and mortality outcomes with and without optimal contact management. Their findings suggest that full implementation of household contact management in children younger than 15 years could prevent 159 500 (75% uncertainty interval [UI] 147 000–170 900) tuberculosis cases and 108 400 (98 800–116 700) tuberculosis-associated deaths in children every year. Most of the deaths averted would be in children younger than 5 years living in tuberculosis-endemic areas. Additionally, providing preventive therapy to HIV-infected and TST-positive children aged 5–14 years would avert 94 710 (95% UI 84 700–103 700) tuberculosis cases, accounting for 59·4% of the 159 500 cases averted in all children younger than 15 years.

Although the modelling of an ideal scenario is unrealistic, it articulates the gains that are possible

and helps to focus efforts on reducing the barriers and inefficiencies encountered when putting theory into practice. Finding pragmatic context-specific solutions that include ongoing monitoring and analysis is crucial to encourage and guide optimal implementation. Using a combination of isoniazid and rifampicin for 3 months as preventive therapy offers a more convenient option than the traditional 6–9 months of isoniazid monotherapy. Given recent WHO endorsement of its use and the availability of quality-assured child-friendly fixed-dose combination tablets via the Global Drug Facility,[11] nothing should delay implementation of isoniazid and rifampicin use as preventive therapy. Use of long-acting rifapentine, taken once per week in combination with isoniazid, has also shown excellent efficacy and is well tolerated in children as young as 2 years.[15] The US Centers for Disease Control and Prevention encourages the use of 12 weekly doses of isoniazid and rifapentine for tuberculosis prevention, but the availability of rifapentine outside the USA is scarce. Global availability of rifapentine at an affordable price could be a game changer for household contact management.

Optimal household contact management should be an implementation research priority, given the reductions in tuberculosis-related disease and death, as well as epidemic control, that might be realised. Although Dodd and colleagues[14] modelled effects across the paediatric age range, the full effect of family-centred care, which includes active case finding and preventive therapy in adult contacts as well, was not considered. The complexity of a model to assess the effect of comprehensive household contact management (inclusive of all ages) is acknowledged, but would be highly informative given that it could be provided at minimal added cost.

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I declare no competing interests.

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