

# Unmasking childhood tuberculosis in Pakistan: efforts to improve detection and management

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## SUMMARY

Childhood tuberculosis (TB) is getting increasing global attention, as tuberculous infection and TB disease in children indicate ongoing transmission in the community. In this note from the field, we highlight issues in child TB detection, management and prevention; child TB underdiagnosis, under-reporting and lack of integration

with the National TB Programme are the main challenges faced in rural settings in Pakistan. We provide examples of solutions to overcome some of these challenges and enable early TB diagnosis, effective management and disease prevention in children.

**KEY WORDS:** innovations; child TB notification

DESPITE INCREASING GLOBAL attention on the challenges of child tuberculosis (TB) management and prevention, the need to enhance child TB case detection efforts and build partnerships at regional and national levels to address the wide policy practice gaps in high TB burden countries remains.<sup>1</sup> Children who failed to obtain a correct diagnosis were reported in autopsy studies that found TB in 8% of non-human immunodeficiency virus-infected children who died from respiratory diseases in five African countries.<sup>2</sup> The emerging threat of drug-resistant TB is another major challenge to global TB control efforts.<sup>3</sup> Pakistan ranks fourth among the world's high TB burden countries, with a TB incidence and prevalence of respectively 275 and 342 per 100 000 population in 2013.<sup>4</sup> Findings from an inventory study conducted in Pakistan indicated that TB under-reporting, mostly from the private sector, was as high as 27% in children.<sup>5</sup>

## ASPECT OF INTEREST

### *Indus Hospital TB Programme*

In 2008, a child TB programme was initiated at The Indus Hospital, Karachi (population 23.7 million), the single largest private child TB reporting centre in Pakistan. All services, including testing, are provided free of charge; the TB programme is linked to Pakistan's National TB Programme (NTP), which ensures availability of free paediatric TB drugs. Children with symptoms suggestive of TB, recent contact with a TB patient or presumed to have TB disease based on investigations are referred to the Indus Paediatric TB Clinic by the hospital's family medicine, paediatric medicine, paediatric surgery and

orthopaedic surgery departments, the malnutrition clinic, the immunisation centre and in-patient wards. Over 40 paediatricians and general physicians serving the surrounding population refer children to the Indus TB Clinic. The linkage of services with community physicians was achieved under a TB REACH project when incentives such as cash transfers, mobile top-ups and clear referral systems for accessing free services at Indus Hospital were provided. There has been a steady increase in the number of children diagnosed with TB, with a three-fold increase in child TB notifications in 2011 following the involvement of private practitioners and advertising of free TB services through local cable networks and billboards (Figure).<sup>6</sup>

### *Isoniazid preventive therapy programme*

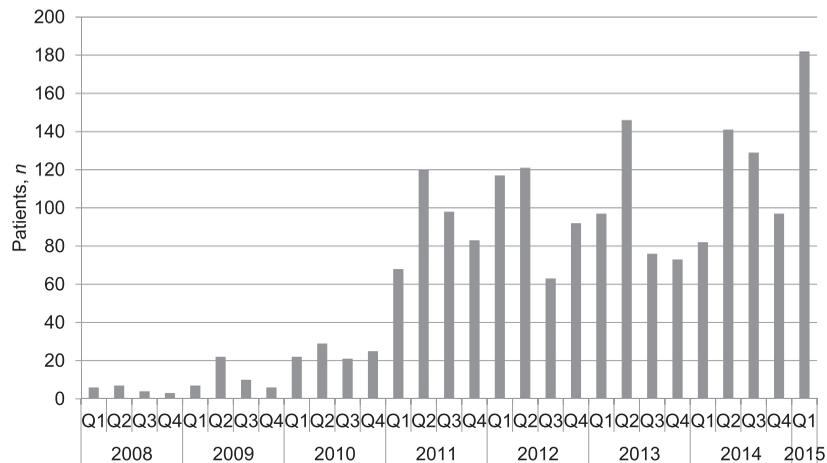
When a new bacteriologically confirmed TB patient is registered and started on treatment, the physician and counsellor encourage his/her family to bring all contacts with symptoms and children aged 0–4 years living in the household for evaluation. We found that of 5000 bacteriologically positive adult TB patients registered and treated, only 256 child contacts aged <5 years were brought in for an initial evaluation. With an average of 3.3 children per household, we expected at least one child per household to be aged <5 years and eligible for evaluation.<sup>7</sup> Of those children started on isoniazid preventive therapy (IPT), only 32.6% completed treatment.<sup>8</sup>

### *Drug-resistant tuberculosis contact management programme*

The Indus Hospital drug-resistant TB (DR-TB) programme has enrolled and treated over 2500 adults. We

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**Figure** Paediatric tuberculosis patients enrolled by quarter, Indus Hospital Tuberculosis Clinic, 2008–2015. Q = quarter.

found high TB prevalence among children living with DR-TB patients and have been able to start them on early and effective treatment.<sup>7</sup> Of the 47 children treated with DR-TB at Indus, 10 were diagnosed through contact evaluation.

#### *Child TB screening programme in Jamshoro, rural Pakistan*

Jamshoro, located 1.5 h away from Karachi, has a population of 1.1 million, with 76% living in rural areas. The Indus Hospital team started a mass child TB screening programme at three public hospitals in Jamshoro 2014. The project involved training young, energetic community members to perform child TB screening, training doctors and health care personnel in child TB diagnosis and management, and provision of free testing (X-rays, ultrasounds, Xpert<sup>®</sup> MTB/RIF [Cepheid, Sunnyvale, CA, USA], fine-needle aspiration/histopathology, computed tomography scans, tuberculin skin test) and child TB drugs for treatment. We found an increase of 110% ( $n = 159$  in the first quarter [Q1] of 2015 after project implementation compared to  $n = 78$  in Q1 2014) in child TB notifications after 3 months of active screening.

#### *Planned and ongoing local innovations for enhancing child TB detection and management*

- 1) Our greatest barrier to effective contact management is getting families to the health centre for evaluation. We plan to engage a dedicated contact management team composed of a health worker, driver and vehicle that will visit newly diagnosed patients at home and transport all consenting adults and children to and from the health centre for evaluation. We expect that with thorough counselling and local advertising about the advantages of early diagnosis and post-exposure

treatment in children, the families will feel empowered

- 2) Current guidance regarding DR-TB prevention is watchful waiting; however, several observational studies have shown that IPT is well-tolerated and effective.<sup>9,10</sup> We aim to start post-exposure treatment in children living in DR-TB households through a pilot project that will include IPT for children aged <5 years and treatment of latent tuberculous infection in those aged 5–18 years.
- 3) Our reverse contact tracing project, one of the three case-finding strategies in Jamshoro's mass child TB screening programme (the other two are verbal screening and contact tracing), found a TB disease prevalence of 19.5% among other children in households of children diagnosed with TB (and no known source case). In an effort to find the potential adult source case, we have started routine chest X-ray screening of parents accompanying a child newly diagnosed with TB.
- 4) Our mobile phone applications have been useful in closing the gap between community physicians and the TB programme.<sup>6</sup> Doctors in rural hospitals discuss difficult patients via Skype or WhatsApp with a paediatric TB consultant at the Indus Hospital. Android tablets were provided to local physicians during child TB training under the child TB screening project.
- 5) Integrated Management of Childhood Illnesses screeners and Expanded Programme for Immunization workers at The Indus Hospital have been trained to screen children for TB symptoms.
- 6) The provision of new paediatric fixed-dose combination (FDC) pills, based on current World Health Organization guidance, is critical to private paediatrician buy-in, as their current preference is to use separate drug formulations, leading to poor treatment adherence in children.

The Indus team has helped a private hospital to acquire TB reporting status and paediatric FDC supply through the NTP.

## CONCLUSION

Child TB management in high-burden settings is challenging, and solutions need to be adapted to local needs. We have shown examples of local innovations that are implementable and may be effective in similar settings.

*Conflicts of interest:* none declared.

## References

- 1 Graham S M, Grzemska M, Brands A, et al. Regional initiatives to address the challenges of tuberculosis in children: perspectives from the Asia-Pacific region. *Int J Infect Dis* 2015; 32: 166–169.
- 2 Bates M, Mudenda V, Mwaba P, Zumla A. Deaths due to respiratory tract infections in Africa: a review of autopsy studies. *Curr Opin Pulm Med* 2013; 19: 229–237.
- 3 Abubakar I, Zignol M, Falzon D, et al. Drug-resistant tuberculosis: time for visionary political leadership. *Lancet Infect Dis* 2013; 13: 529–539.
- 4 World Health Organization. Global tuberculosis control report, 2014. WHO/HTM/TB/2014.08. Geneva, Switzerland: WHO, 2014.
- 5 Fatima R, Harris R, Enarson D, et al. Estimating tuberculosis burden and case detection in Pakistan. *Int J Tuberc Lung Dis* 2014; 18: 55–60.
- 6 Khan A J, Khowaja S, Khan F S, et al. Engaging the private sector to increase tuberculosis case detection: an impact evaluation study. *Lancet Infect Dis* 2012; 12: 608–616.
- 7 Amanullah F, Ashfaq M, Khowaja S, et al. High tuberculosis prevalence in children exposed at home to drug-resistant tuberculosis. *Int J Tuberc Lung Dis* 2014; 18: 520–527.
- 8 Jafri R, Malik A A, Hussain H, et al. IPT uptake among child contacts of TB patients: Experience from the Indus Hospital TB program, Karachi, Pakistan. *Int J Mycobacteriol* 2015; 4 (Suppl 1): S104–S105.
- 9 Bamrah S, Brostrom R, Dorina F, et al. Treatment for LTBI in contacts of MDR-TB patients, Federated States of Micronesia, 2009–2012. *Int J Tuberc Lung Dis* 2014; 18: 912–918.
- 10 Seddon J A, Hesselting A C, Finlayson H, et al. Preventive therapy for child contacts of multidrug-resistant tuberculosis: a prospective cohort study. *Clin Infect Dis* 2013; 57: 1676–1684.

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**RESUME**

La tuberculose (TB) de l'enfant suscite de plus en plus d'attention dans le monde à mesure que nous réalisons que l'infection et la maladie tuberculeuse de l'enfant indiquent que la transmission se poursuit au sein de la communauté. Dans cette note venant du terrain, nous mettons en lumière les problèmes liés à la détection de la TB de l'enfant, à sa prise en charge et à sa prévention ; en effet, le sous-diagnostic de la TB de l'enfant, sa sous-

déclaration et son manque d'intégration dans le Programme national contre la TB sont les principaux défis dans les zones rurales du Pakistan. Nous donnons des exemples de solutions pour surmonter quelques-uns de ces défis et permettre un diagnostic précoce de la TB ainsi qu'une prise en charge et une prévention efficaces chez les enfants.

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**RESUMEN**

La tuberculosis (TB) de los niños ha cobrado un mayor interés en todo el mundo al reconocer que la infección y la enfermedad tuberculosa en este grupo de edad es un reflejo de la transmisión continua en la comunidad. En el presente informe del terreno se destacan algunos problemas de la detección, el tratamiento y la prevención de la TB en los niños, de los cuales el

infradiagnóstico, la subnotificación y la falta de integración al Programa Nacional contra la TB constituyen las principales dificultades de los entornos rurales en Paquistán. Se proponen ejemplos de soluciones que pueden contribuir a superar algunos de estos aspectos y favorecer el diagnóstico temprano, el tratamiento eficaz y la prevención de la TB en los niños.

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