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Did "Screeners" Increase Pediatric Tuberculosis Case Notification in Sindh, Pakistan?

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Abstract

To identify missing childhood Tuberculosis (TB) cases, "screeners" (hospital-based health workers trained to screen accompanying contacts of TB patients for symptoms) were introduced in eight tertiary care hospitals of Sindh, Pakistan in 2013. There was a 55% increase in childhood TB notifications in 2014 compared to 2012 in facilities with screeners (n = 8) compared to 40% increase in facilities without screeners (n = 22). This apparent association disappeared when stratified by presence of "trained pediatrician" whose introduction was associated with a massive increase in notifications while transfer was associated with a marked decrease. In conclusion, screeners were not associated with increase in pediatric TB case notifications.

Keywords

Childhood Tuberculosis, Pediatricians, Screener, Xpert MTB/RIF, SORT IT

1. Situation and Setting

Childhood Tuberculosis (TB) has received low priority globally for many years [1]. Pakistan has an estimated TB incidence of 270 per 100,000 population and ten percent of the estimated TB cases in 2015 were children [2]. Screening of household contacts of infectious index cases has been recommended for decades

but implementation has been limited [1] [3]. Most childhood TB cases are therefore either missed or detected late and passively among those seeking care at health facilities [4] [5]. To address this, several initiatives have been planned and implemented in Pakistan in the last five years—these include introduction of rapid diagnostics like Xpert MTB/RIF, expanding the scope of contact tracing to the immediate community beyond the household, engaging the private health sector through public-private mix initiatives, ensuring availability of a trained pediatrician in secondary and tertiary care facilities which account for most of pediatric TB case detection and so on.

One such intervention was introduction of "screeners" (trained health care workers deployed in selected secondary and tertiary care hospitals and dedicated to screen the accompanying contacts of diagnosed TB patients) in 2013, by the National TB Control Program of Pakistan and the Provincial TB Control Program (PTP) in Sindh province. In this paper, we aim to assess if introduction of "screeners" was associated with a change in childhood TB case notification in Sindh province, Pakistan.

Sindh province has 29 districts and a population of over 42 million [6]. The PTP is responsible for the TB control activities. There are 282 functional public and private basic management units for tuberculosis across the province. In each district, TB care is provided through a network of rural health centers, basic health units, and community-based lady health workers. There are 36 tertiary and secondary health care hospitals providing childhood TB management services. The algorithm for diagnosis of childhood TB is primarily clinical assessment performed by a physician at the hospital using a scoring chart formulated by Pakistan Pediatric Association (PPA) [7], based on the presentation of TB signs and symptoms, and test results of sputum or other specimens. The Xpert MTB/RIF® test was introduced in 2011 and is currently available at 20 sites across Sindh.

2. Aspect of Interest

In 2013 screeners were introduced at eight public tertiary and secondary care hospitals. The screeners were health workers (minimum qualification: graduation) selected from the community with 1 - 2 years of experience in Public health [8]. The screeners were trained on contact tracing and the revised programme guidelines [9] through frequent "on-spot trainings" and constant supervision and monitoring. The screeners were stationed close to chest departments and pediatric outpatient departments. They screened verbally the accompanying child contacts of TB patients for cough for 2 weeks or more, fever with night sweats and weight loss. The presumptive TB patients thus identified were referred to the physician for further examination.

We used an ecologic study design and compared the percent change in aggregate childhood TB cases notified before (2012) and after (2014) the intervention in facilities with screeners (n = 8) and those without screeners (n = 22). The study population included all pediatric TB cases notified at 30 selected health facilities in the years 2012 and 2014. The key exposure variables assessed were

presence of screeners, presence of Xpert MTB/RIF and presence of trained pediatrician. The source of data was the quarterly summary reports of TB case notification and programme management reports, which were verified by reviewing the TB register at the facilities. These aggregated data were double entered, validated and analysed using EpiData (v3.1 for entry and v2.2.2.183 for analysis).

Overall, there was a 55% increase in childhood TB notifications in facilities with screeners as compared to 40% increase in those without screeners, an apparent association (Table 1). There were variations in magnitude and direction of change, when disaggregated by sex, age and type of TB. Notably, there was a higher increase in the non-intervention sites in 0 - 4 year age group and the clinically confirmed pulmonary TB cases.

To understand this variation, we performed a stratified analysis by two key confounder variables (availability of Xpert MTB/RIF and availability of trained pediatrician) that were implemented around the same time as the intervention in question (Table 2). In facilities when Xpert was introduced in 2014, there was a higher increase in intervention sites compared to non-intervention sites (76% vs. 11%) although this was not consistent across other strata.

While introduction of a trained pediatrician was associated with a massive increase in notifications (154% in intervention sites versus 176% in non-intervention sites), the transfer of trained pediatricians was associated with a marked decrease in notification (−48% versus −61%) (Table 2). Thus, the apparent association between "screeners" and increase in childhood TB case notifications disappeared completely when stratified by availability of trained pediatrician.

Table 1. Percentage change in childhood TB case notification after introduction of health care facility based screeners in selected health care facilities of Sindh province, Pakistan.

Number of pediatric TB cases notified	Intervention hospitals (n = 8)			Non-Intervention hospitals (n = 22)		
	2012*	2014**	Percent change	2012	2014	Percent change
Total	728	1128	55%	1764	2465	40%
Sex						
Male	327	487	49%	832	1180	42%
Female	401	641	60%	932	1285	38%
Age						
0 - 4 years	203	324	60%	576	1234	114%
5 - 14 years	525	804	53%	1188	1231	4%
Type of TB						
Bacteriologically confirmed PTB	54	84	56%	134	162	21%
Clinically confirmed PTB	451	567	26%	1141	1836	61%
EPTB	223	477	114%	489	467	−4%
History of treatment						
New	717	1116	56%	1710	2422	42%
Previously treated	11	12	9%	54	43	−20%

TB = Tuberculosis, PTB = Pulmonary Tuberculosis, EPTB = Extra-pulmonary Tuberculosis. *Non-intervention year, **Intervention year.

Table 2. Percentage change in childhood TB case notification after introduction of health care facility based screeners, by presence of Xpert MTB/RIF and trained pediatrician, in selected health care facilities of Sindh province, Pakistan.

Total number of pediatric TB cases notified	Number of facilities	Intervention hospitals			Number of facilities	Non-Intervention hospitals		
		2012	2014	Percent change		2012	2014	Percent change
Total	8	728	1128	55%	22	1764	2465	40%
Xpert MTB/RIF								
Introduced in 2014	5	429	754	76%	2	187	208	11%
Present in 2012 and 2014	1	251	292	16%	1	190	225	18%
Absent in 2012 and 2014	2	48	82	71%	19	1387	2032	47%
Trained pediatrician availability								
Present in 2012 and 2014	2	337	400	19%	5	738	932	26%
Absent in 2012 and 2014	0	0	0	0%	6	139	130	−6%
Trained in 2013-14	5	259	659	154%	10	446	1231	176%
Withdrawn in 2014	1	132	69	−48%	1	441	172	−61%

3. Discussion

Our study did not find any association between screeners and increase in childhood TB case notification in Sindh province of Pakistan. The apparent association seen in crude analysis completely disappeared on stratified analysis and could be explained by the presence of a trained pediatrician working with the program [10], rather than by the screeners. Introduction of a trained pediatrician was associated with a massive increase in childhood TB notifications, even in sites without screeners, while transfer was associated with a massive decline (akin to cessation of exposure leading to decline in outcome, one of the criteria to assess causality).

Strength of this study was that we used programmatic data and thus reflects the ground reality. This might be a limitation too, as comparability of the sites with and without screeners could not be ensured. Furthermore, analysis was done on aggregate data using an ecological design and hence should be interpreted with caution. Future research should focus on assessing costs, provider and patient perceptions of feasibility and acceptability of screeners.

4. Conclusion

"Screeners" were not independently associated with an increase in childhood TB case notification. This needs to be taken into consideration by the NTP before making decisions on national scale-up of screeners. Availability of trained paediatrician must be ensured for better results.

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Author Contributions

The Principal Investigator implemented, analysed and wrote the first and subsequent drafts of the paper. All other authors contributed to the writing of the first and subsequent drafts. All authors read and approved the final paper.

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