How do private practitioners in Pakistan manage children suspected having tuberculosis?

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Research article

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Abstract

Background:

Private providers provide a large portion of health care in Pakistan, including tuberculosis (TB). All TB patients are supposed to be reported to the National Tuberculosis Program (NTP), which provides drugs free of charge in addition to monitoring, supervision and support. Diagnosis of TB in children is difficult. We aimed to assess the private health care providers' investigation practices and management of childhood TB.

Methods:

This cross-sectional study was based on a national survey that measured under-reporting of children with TB in 12 selected districts in Pakistan from Apr-Jun, 2016. We explored the practices of private health care providers, like general practitioners, pediatricians, pulmonologists and chest specialists, involved in the diagnosis of TB in children under 15 years for investigating and managing children suspected having TB.

Results:

Among 6519 presumptive child TB cases, a total of 5193(79.7%) children under 15 years were diagnosed as TB by private health care providers during second quarter, 2016. Only 187(2.9%) were notified to NTP. The majority of presumptive child TB cases reported cough, fever, and failure to thrive; few had TB contacts with pulmonary TB patients. Failure to thrive, loss of body weight and absence of BCG scar was more common in female children. Private providers relied on chest X-ray in 46.1%, but tuberculin skin test and Gene-Xpert MTB/RIF testing was little utilized. Bacteriological confirmation was present in 7.6%, and clinical assessment was the only basis for diagnosis in 39.3%. Of children with presumptive TB, only 955(14.6%) children were treated by private provider, while 3121(47.9%) cases were referred for diagnosis and 2443(37.5%) were referred after diagnosis for treatment; among all the referred, 3812(68.5%) were sent for investigations to District TB Centre (NTP).

Conclusion:

This study showed that many private providers referred children suspected having TB to laboratories for further diagnosis, but cases identified in investigations were often not notified to the NTP. This problem needs to be resolved by strengthening the referral linkages between private health providers, NTP laboratories and treatment centres through capacity building and training of their staff.

Background

Tuberculosis (TB) among children is a big global challenge affecting mainly low- and middle income countries; in 2018 it is reported that 1.1 million children fell ill with TB, and 205 000 (18%) of them died[1]. Of the childhood cases, 75% occur in 22 high-burden countries that together account for 80% of the

world's estimated incident cases [2,3]. In global TB control children have a lower priority because they are considered less contagious and less important as a source of infection [3]. Globally childhood TB cases are under-reported much due to the difficulty of confirming the diagnosis. Some of the challenges related to assessing the actual magnitude of TB in children are poor implementation of the national guidelines, inappropriate diagnosis, inadequate drug regimens and lack of knowledge about case management [4]. As a notifiable disease in most countries, all diagnosed cases must be recorded and reported.

In Pakistan it is estimated that over 562,000 persons got TB in 2018, of whom 369,548 TB cases were notified; and among them 13% were children under 15 years. Private health care providers in Pakistan contributed 32% of all TB notifications [1]. During 2006-07, NTP Pakistan developed its national childhood TB policy guidelines in collaboration with Pakistan Pediatric Association (PPA), aiming to facilitate the pediatricians, physicians and other health workers to improve and standardize clinical decisions for investigating presumptive child TB cases (<15 yrs) in Pakistan; a score chart evaluates the likelihood of pulmonary and extra pulmonary TB based on clinical, histological and radiological features. [5] Currently, the PPA scoring chart is recommended by NTP to all pediatricians to help diagnose children with suspected TB, when presenting with prolonged or unexplained illness of more than 2 weeks. A flow chart for evaluation of a child with suspected TB is given in Fig 1.

A recent patient-pathway analysis in Pakistan confirmed the important role of the private sector in providing TB care in Pakistan, and highlighted the extent of utilization of private sector (85%) by the patients as entry points to care. [6] This is crucial for understanding the role of the private sector in the diagnosis and treatment of paediatric TB, and limited evidence is available on this issue [7,8]. Therefore, we aimed to assess the practices of private health care providers in investigation of children suspected having TB. Our specific objectives were, among patients under 15 suspected having tuberculosis in Pakistan, 1) to assess signs and symptoms that private health providers record; and 2) to assess investigation and referral practices.

Methodology

Design: This is a descriptive study based on a national child TB inventory in which a surveillance system was established among all non-NTP facilities in a sample of 12 districts across Pakistan from Apr- Jun, 2016 [9].

Setting:

Pakistan is the sixth most populous country of the world with estimated population in 2017 of 208 million, approximately 64% live in rural areas [10]. The public sector is the main source of preventive health care, and has primary, secondary and tertiary levels of care. Quality-assured diagnosis and treatment for TB is provided by NTP free of charge to patients through general facilities in all public and selected private sector facilities. TB services in Pakistan are integrated into the primary health care system at district level, and is coordinated at this level by the district TB coordinator to monitor, supervise and support all clinics reporting there, and this is monitored and evaluated by provincial and national

levels. Patients are reported from rural health centres and sub district hospitals to district hospitals, where coordinator usually is located. Other large private clinics engaged with NTP should report cases directly to Provincial TB Program.

Wealth distribution in Pakistan is very skewed, with higher proportion of lowest wealth quintile in rural settings. In rural Punjab 18% of population are in the lowest quintile, and 1% in urban Punjab; in rural Sindh 69% are in the lowest quintile and 6% in urban Sindh; in rural KPK 20% are in lowest quintile and 2.3% of urban KPK; in rural AJK 15% are in lowest quintile and 2% of urban KPK; in rural Balochistan 36% are in lowest quintile, and in urban Balochistan 11% are in lowest quintile; in GB 40% are in lowest quintile . [11]

Study site:

We selected 12 districts in Pakistan, with representation from all four provinces (Balochistan, KPK, Punjab and Sindh) and two regions (GB and AJK). Selection of districts was partly based on a sample proportional to population size of children [9]. Districts where security is an issue were excluded from the sampling frame. The study was carried out in all private health facilities that manage childhood TB in the 12 selected districts across Pakistan[9]. All non-NTP private facilities in the selected districts were mapped and consenting private health providers managing childhood TB in 12 districts across Pakistan were enrolled. Non-NTP private facilities refer to private facilities that have no formal collaboration with NTP.

Study population:

The study population was all children brought to a clinician who considered tuberculosis a potential diagnosis, like prolonged or unexplained illness of more than 2 weeks. All participants were identified by health care providers who were not engaged with NTP i.e. general practitioners, paediatricians, pulmonologists and chest specialists who were involved in child TB inventory study Apr – Jun, 2016. Out of all the health care providers who were mapped and requested to participate in the study 82% agreed.

Data collection:

A register for presumptive child TB cases was introduced to health facilities diagnosing childhood TB in order to record all information regarding history of presumptive TB cases as well as investigation and management. All health care providers who consented to participate in the study were briefed to capture the required information in the registers. Immediately following these instructions, and without piloting but with close follow up, the data collection was done for the period of 3 months (second quarter of 2016) and the management of child TB patients by non-NTP health care providers were recorded without changing their routine practice. To improve the accuracy and validity of the data, a mobile based data collection tool was used in this survey [12]. Data entry was done directly on mobile phones on site using an application developed by “Zong”. Field officers were provided mobile phones to enter the data when visiting the health facilities on a weekly basis. They were visited every 2 weeks by the district TB

coordinators along with a provincial coordinator, a supervisor and field officer to ensure the quality of data collected (completeness, correctness) for accurate record linkage, cross-checking the status of registration at NTP.

Variables and data collection tools:

The data collection tool was based on all information regarding the diagnosis and management practices by private healthcare providers concerning children with presumptive TB. Variables included age, sex, place, symptoms, investigations, recommendations given, and referral decision. Data quality audit of every record was conducted to ensure the validity of data by crosschecking from the hard copies.

Data Analysis:

Descriptive statistics was used to summarize the investigation, management and referral of children with presumptive TB by private providers. Cross tabulation was done to see the differences between children 0-4 and 5-14 years. Analysis was done in STATA version 14.

Results

Table 1 shows that 5193 children were diagnosed as TB in 12 selected districts of various population size. Many doctors (37.5%) referred diagnosed TB cases to NTP for further management, but few notified NTP if they initiated treatment themselves. A great variation exists between the districts in referrals (2.3-76.1%) and notification (0-18.5%) of child TB cases.

Table 2a shows signs and symptoms of children suspected having TB, by agegroup. We notice many have cough (92.1%), fever (89.0%), and failure to thrive (64.8%). Few reported contacts with a TB patient (11.9%). A BCG-scar was absent in 19.6% of children 0-4, 28.3% of children 5-11 and 37.4% of children 5-14, P = <.0001.

Table 2b shows signs and symptoms of children suspected having TB, by gender. Out of 6519 presumptive child TB cases, 6006 (92.1%) had reported history of cough more than two weeks i.e. 3904 (93.0%) males and 2102 (92.1%) females. Of the girls, a BCG-scar was absent in 742 (32.0%) compared to 1101 (26.2%) boys (P<0.0001). Moreover, the difference in cough, failure to thrive, enlarged lymph nodes and absence of BCG scar in male and female children were statistically significant (P > 0·05).

Table 3a shows investigations done on the 6519 children suspected having TB, by agegroup; 1564 (92.4%) children under five, 2545 (79.2%) children 5-11 and 1084 (67.2%) were diagnosed with tuberculosis: 4695 (72.0%) clinically and 498 (7.6%) bacteriologically verified. The most common investigation was chest X-ray (46.1%). Sputum smear was done on 14.3% among participants 0-4 years, 28.3% among participants 5-11 years and 723 (44.8%) among 12-14 years. Clinical assessment was the only investigation done on 49.8% of the children below 5 and bacteriological confirmation was more in children 5-11 years (6.3%) and children 12-14 (14.0%), <0.0001. Many children with presumptive TB were referred to district TB centre for diagnosis & treatment: 62.3% of children 0-4 years, 69.9% of children 5-11

and, 71.8% of children 5-14. Few children were notified to NTP (187 children, 2.9%), more girls than boys (4.9% vs.1.8%,). Out of the girls referred for diagnosis, patients notified to NTP were 16 (14.2%) of 0-4y, 54(47.8%) of 5-11y, and 43 (38.1%) of 12-14y. Among the boys referred for diagnosis those notified were 19(25.7%) of 0-4y, 36(48.6%) of 5-11y, and 19(25.7%) of 12-14y.

The management practices of child TB patients stratified by gender is given in Table 3b. Out of presumptive cases 80.6% of girls and 79.2% of boys were diagnosed with TB. Bacteriological confirmation was noted for 244 girls and 254 boys, but proportion bacteriologically positives out of all suspects was higher among girls (10.5%) than boys (6.0%). Few children were notified to NTP (187 children, 2.9%), more girls than boys (4.9% vs.1.8%,). A higher proportion of girls (35.8%) with presumptive TB children than boys (24.9%) were examined for sputum smear. Referral for diagnosis was more common for boys (50.6%) than girls (43.0%).

Discussion

Our study found that almost half of the private health care providers investigating children for TB had used chest X-ray. Once suspected for TB many were diagnosed (79.7%). Many doctors referred presumptive TB cases to NTP for further diagnosis and management; private doctors who started TB treatment rarely (2.9%) reported the cases to NTP if they initiated treatment.

This study indicated that diagnosis of childhood TB by private providers was mainly based on clinical features, radiography and microscopy, rarely tuberculin skin tests, histopathology and Gene-Xpert MTB/RIF. Other settings also show that TB diagnosis in children is often based on a combination of clinical symptoms and chest X-ray; this could be due to the lack of a simple and precise diagnostic tool especially at the peripheral level, or due to inadequate training and capacity of health care workers[13–19]. However, in Pakistan, the availability of diagnostic tools varies across the country, where chest X-ray and smear microscopy are almost universally available and used for TB diagnosis at peripheral level. Histopathology, tuberculin skin test, sputum culture and Gene-Xpert MTB/RIF were only available at laboratories of tertiary care hospitals. Gene-Xpert MTB/RIF testing of stool of suspects has been shown to be useful to identify children with TB [20], and could be a good addition to traditional tests, but in Pakistan limited availability of the test in rural areas makes it currently less universal.

An important finding of the study was that private health care providers referred many children with presumptive TB: 3121 (47.9%) for diagnosis and 2443 (37.5%) for treatment; and they initiated treatment on only 14.6% of the diagnosed cases. Of all the referred presumptive TB cases 3812 (68.5%) were referred for diagnosis to district NTP centres; only 2.9% of the referred cases were registered in the NTP registers. This gap in reporting treatment outside the NTP system could be due to several factors: poor interdepartmental coordination between the laboratory and the treatment centres; inadequate counselling of presumptive TB patients by the laboratory technicians; weak referral mechanisms [21–24]. The linkages between laboratories and treatment centres could be improved with regular weekly visits by district health coordinator to laboratories, and contacting the referring private doctor to discuss further

management according to NTP guidelines. Across Pakistan treatment services are also available in the public facilities that have diagnostic capacity. Perhaps due to lack of trust in public sector to provide quality care, few patients sought care in the public sector [6]. It is possible that some referred TB patients might not actually go to NTP, and perhaps received treatment in the private sector. A similar finding is also reported in a study from Indonesia, where only 2% of childhood TB cases recorded in hospital were reported to the NTP [25]. In Pakistan childhood TB is managed at various providers and various levels of the health care sector. There is an urgent need to improve linkages between NTP and other health care providers by engaging private sector through training and capacity building on national guidelines for managing childhood TB cases [26]. mHealth can potentially accelerate TB notification from the part of private sector that is not collaborating with NTP [27,28].

Almost all children had cough and fever and most had failure to thrive, which is consistent with the guidelines [26]. BCG vaccination is associated with decreased severity of tuberculosis[29] and BCG is part of child immunization program in Pakistan; absent BCG scar was more common in older children, which may reflect an improved Expanded *Programme* on Immunisation (EPI) program performance from 2012 to 2018; the percentage of fully immunized children aged 12-23 months increased from 54% in 2012-13 to 66% in 2017-18 [11]. Vaccination coverage inequalities exist at sub district levels, ranging from 58% to 85% in rural to urban areas and from 60% to 80% in lower to higher income quintiles [30].

In this study, we found that a higher proportion of adolescents reported respiratory symptoms, underwent sputum testing, and had more bacteriological confirmation. Adolescents are important for TB control and can contribute to substantial transmission in settings like schools. WHO suggests efforts to develop integrated family- and community-centered strategies to provide comprehensive and effective services at the community level to improve child and adolescents notification [31].

This study showed that failure to thrive and loss of body weight was more common in girls. This can be partly a biological difference and effect of culture and nutrition [32], but could also be partly because of confounding by age, as the girls diagnosed had a higher proportion of adolescents (28%) than the boys (16.9%). A study in India showed that the dietary intake of energy, iron, calcium and protein was significantly higher in boys than girls [33]. The slightly higher absence of BCG scar in girls could be explained by less care for girls in Pakistan, where a boy is usually more valued than girl. [34] Similar difference in non-utilization of child immunization are reported elsewhere. [35–37]. It may also be due to confounding by age, as the proportion of children with missing BCG scar is lower for younger than older children; hence a missing a scar was more common in adolescent girls, with a higher representation than boys.

Our study had several strengths. A major strength of this study is the large total sample with participants from all provinces, and we believe it may reflect the diverse situation in the country. In this study, validity of the data was ensured though data quality audit by crosschecking every record from the hard copies to remove inconsistencies. Also using mobile phone for data collection reduces data entry errors by eliminating one step for database creation. The study also had some limitations. Although a large total

sample, the number of clusters was limited to the number of provinces, giving lower precision, but it probably reflects fairly well the different situations in the country. Also, our study did not include actual observations through field assessments; the accuracy and completeness of the data could therefore not be totally ensured. High referral to NTP centres for diagnosis may be partly because the study was closely related to NTP, and data collectors from NTP visited the study sites twice a month, and this could affect reporting, like a Hawthorne effect. The “yield” of childhood TB (79.7%) in this study was high compared to other settings ranging from 2.1% to 19% [38–41]. One possible reason of this high yield is that private providers may have recorded mostly already diagnosed child TB cases on the provided registers due to workload and may have missed an unknown number of other presumptive TB cases. The yield varied among the districts, which may reflect variation in completeness reporting all “suspects”. Future research is recommended to further assess and verify these findings in the field.

Conclusion

This study showed that many private health care providers rely on NTP supported laboratories for diagnosis, but they often do not report the children diagnosed with TB to NTP. The private health providers often rely on chest X-ray in addition to clinical symptoms for diagnosis TB in children. The linkages between private providers, laboratory and NTP treatment centres should be strengthened through training.

Abbreviations

AJK: Azad Jammu & Kashmir; GB: Gilgit Baltistan; KPK: Khyber Pakhtunkhwa; NTP: National TB Control Program; PPA: Pakistan Pediatric Association; PP: Provincial TB Control Program; TB: Tuberculosis.

Declarations

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Author contributions:

AY is the principal author and conceived the idea of this paper. AY, SGH, RF were responsible for design, analysis. AY wrote first draft and developed the manuscript. All authors read and approved the final version.

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Availability of data and materials:

The datasets analyzed during the current study are not publicly available due to maintaining the confidentiality of participants keeping in view the ethical consideration for stigmatized infectious diseases i.e. TB but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

The ethical clearance (registration # NBC 192 given in 2015) was obtained from the Pakistan medical and Research Council, REK Vest in Norway (# 2018/56), as well as the WHO Ethics Committee for the East-Mediterranean region. Informed consent was waived by the ethics committee, as all data used had been previously collected during the child inventory study and did not pose any additional risks to the patients.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1: Presumptive tuberculosis patients under 15 years identified by private health providers in selected districts in Pakistan, 2016

Province	District	Population (<15 yrs)	CNR 2016	Presumptive child TB cases	Diagnosed TB	Referred to NTP	Notified to NTP (Project notification)
		N	per 100,000	n	n (%)*	n (%)*	n (%)*
All sites		8643221	193	6519 (0.08)	5193 (79.7)	2443 (37.5)	187 (2.9)
Punjab	Attock	483575	175	497 (0.10)	442 (88.9)	97 (19.5)	34 (6.8)
	Chiniot	362756	232	671 (0.18)	337 (50.2)	139 (20.7)	4 (0.6)
	Hafizabad	317804	219	874 (0.28)	555 (63.5)	32 (3.7)	12 (1.4)
	Vehari	837748	225	376 (0.05)	333 (88.6)	223 (59.3)	7 (1.8)
Sindh	Shikarpur	390208	126	623 (0.16)	394 (63.2)	128 (20.5)	2 (0.3)
	Hyderabad	650492	149	838 (0.13)	838 (100)	638 (76.1)	35 (4.2)
	Karachi	4366147	143	1041 (0.02)	942 (90.5)	737 (70.7)	12 (1.2)
KPK	Buner	211496	157	232 (0.11)	148 (63.8)	89 (38.4)	43 (18.5)
	Peshawar	843278	244	1034 (0.13)	999 (96.6)	340 (34.0)	36 (3.5)
AJK	Pallundary	97553	89.2	118 (0.12)	114 (96.6)	15 (12.7)	2 (1.7)
Balochistan	Jhal Magsi	46011	29	44 (0.10)	27 (61.4)	1 (2.3)	0 (0.0)
GB	Ghizer	36153	133	171 (0.47)	64 (37.4)	4 (2.3)	0 (0.0)

Footnotes: KPK=Khyber Pakhtunkhwa, AJK=Azad Jammu & Kashmir, GB=Gilgit Baltistan, CNR=Case Notification Rate (Routine Notification to NTP all forms)

* "Diagnosed TB by PP" with proportion out of all presumptive patients ("yield"). "Referred to NTP" with proportion out of all diagnosed patients. "Notified to NTP" with proportion out of all presumptive child TB patients.

Table 2a: Signs and symptoms of children with presumptive tuberculosis by age groups, recorded by private health case providers in 12 selected districts in Pakistan, 2016.

History and investigations		Total	0-4 years	5-11years	12-14years	p-value
		n(%)	n(%)	n(%)	n(%)	
Total	All presumptive cases	6519	1691	3214	1614	
Chest						
	Cough more than two weeks	6006 (92.1)	1560 (92.3)	2959 (92.1)	1487 (92.1)	0.974
	Failure to thrive	4210 (64.8)	1129 (66.8)	1947 (60.6)	1134 (70.3)	<0.0001
Systemic						
	Fever	5794 (89.0)	1538 (91.0)	2836 (88.2)	1420 (88.0)	0.038
	Loss of body weight	504 (7.7)	115 (6.8)	237 (7.4)	152 (9.4)	0.011
	Enlarged cervical lymph nodes	785 (12.1)	147 (8.7)	389 (12.1)	249 (15.4)	<0.0001
	BCG scar absent	1843 (28.2)	331 (19.6)	908 (28.3)	604 (37.4)	<0.0001
Meningitis						
	Signs of slow onset meningitis*	658 (10.1)	115 (6.8)	330 (10.3)	213 (13.2)	<0.0001
Contacts						
	Known pulmonary tuberculosis patient	778 (11.9)	234 (13.8)	391 (12.2)	153 (9.5)	<0.0001

*Symptoms regarded as slow meningitis include headache, vomiting, irritability, lethargy, neck stiffness, bulging fontanella, coma.

Table 2b: Signs and symptoms of children with presumptive tuberculosis by gender, recorded by private health case providers in 12 selected districts in Pakistan, 2016.

History and investigations		Total	Female	Male	p-value
		n(%)	n(%)	n(%)	
Total	All presumptive cases	6519	2320	4199	
Chest					
	Cough more than two weeks	6006 (92.1)	2102 (90.6)	3904 (93.0)	0.001
	Failure to thrive	4210 (64.8)	1644 (70.9)	2566 (61.1)	<0.0001
Systemic					
	Fever	5794 (89.0)	2039 (87.9)	3755 (89.4)	0.075
	Loss of body weight	504 (7.7)	196 (8.4)	308 (7.3)	0.110
	Enlarged cervical lymph nodes	785 (12.1)	322 (13.8)	463 (11.0)	0.001
	BCG scar absent	1843 (28.2)	742 (32.0)	1101 (26.2)	<0.0001
Meningitis					
	Signs of slow onset meningitis*	658 (10.1)	228 (9.8)	430 (10.2)	0.607
Contacts					
	Known pulmonary tuberculosis patient	778 (11.9)	258 (11.1)	520 (12.4)	0.121

*Symptoms regarded as slow meningitis include headache, vomiting, irritability, lethargy, neck stiffness, bulging fontanella, coma.

Table 3a: Management by private practitioners of children with presumptive tuberculosis, by age groups, in 12 selected districts in Pakistan, 2016

Practice of private health care providers		Total	0-4 years	5-11years	12-14years	p-value
		n(%)	n(%)	n(%)	n(%)	
Presumptive child TB		**6519**	**1691**	**3214**	**1614**	
Diagnosed TB						
	All	5193 (79.7)	1564 (92.4)	2,545 (79.2)	1084 (67.2)	<0.0001
	Bacteriologically positive	498 (7.6)	68 (4.0)	204 (6.3)	226 (14.0)	
	Clinically diagnosed	4695 (72.0)	1496 (88.5)	2341 (72.8)	858 (53.1)	
Notified	Notified to NTP	187 (2.9)	35 (2.1)	90 (2.8)	62 (3.8)	<0.0001
Investigation practices						
	Tuberculin Skin/PPD testing	219 (3.4)	45 (2.7)	112 (3.5)	62 (3.8)	0.1464
	Sputum Smear	1875 (28.8)	242 (14.3)	910 (28.3)	723 (44.8)	<0.0001
	X-ray	3005 (46.1)	683 (40.4)	1499 (46.6)	823 (51.0)	<0.0001
	X-pert test	324 (5.0)	34 (2.0)	146 (4.5)	144 (8.9)	<0.0001
	Granuloma/Histopathology	837 (12.8)	175 (10.4)	406 (12.6)	256 (15.9)	<0.0001
	Culture	152 (2.3)	13 (0.8)	73 (2.3)	66 (4.1)	<0.0001
Number of tests done						
	Only clinical assessment	2559 (39.3)	842 (49.8)	1219 (37.9)	498 (30.9)	<0.0001
	1 test	2217 (34.01)	574 (33.9)	1165 (36.3)	478 (29.6)	
	2 test	1270 (19.5)	223 (13.2)	617 (19.2)	430 (26.6)	
	3 tests or more	473 (7.3)	52 (3.1)	213 (6.6)	208 (12.9)	
Management practices						
	Referred for TB diagnosis	3121 (47.9)	842 (49.8)	1578 (49.1)	701 (43.4)	<0.0001
	Diagnosed and referred	2443 (37.5)	494 (29.2)	1293 (40.2)	656 (40.6)	
	Treated	955 (14.6)	355 (21.0)	343 (10.7)	257 (15.9)	
Place of referral						
(n=5564)	District TB Centre (NTP)	3812 (68.5)	832 (62.3)	2006 (69.9)	974 (71.8)	<0.0001
	Private laboratory	1190 (21.4)	388 (29.0)	561 (19.5)	241 (17.8)	
	Private specialist hospital/GP	562 (10.1)	116 (8.7)	304 (10.6)	142 (10.5)	

***1 test indicate only one test was performed for final diagnosed, 2 test refer 2 test was done for diagnosis etc.**

Table 3b: Management by private practitioners of children with presumptive tuberculosis, by gender, in 12 selected districts in Pakistan, 2016

Practice of private health care providers		Total	Female	Male	p-value
		n(%)	n(%)	n(%)	
Presumptive child TB		**6519**	**2320**	**4199**	
Diagnosed TB					
	All	5193 (79.7)	1869 (80.6)	3324 (79.2)	<0.0001
	Bacteriologically positive	498 (7.6)	244 (10.5)	254 (6.0)	
	Clinically diagnosed	4695 (72.0)	1625 (70.0)	3070 (73.1)	
Notified	Notified to NTP	187 (2.9)	113 (4.9)	74 (1.8)	<0.0001
Investigation practices					
	Tuberculin Skin/PPD testing	219 (4.7)	106 (4.6)	113 (2.7)	<0.0001
	Sputum Smear	1875 (28.8)	830 (35.8)	1045 (24.9)	<0.0001
	X-ray	3005 (46.1)	1127 (48.6)	1878 (44.7)	0.003
	X-pert test	324 (5.0)	154 (6.6)	170 (4.1)	<0.0001
	Granuloma/Histopathology	837 (12.8)	331 (14.3)	506 (12.1)	0.010
	Culture	152 (2.3)	67 (2.9)	85 (2.0)	0.03
Number of tests done					
	Only clinical assessment	2559 (39.3)	844 (36.4)	1715 (40.8)	<0.0001
	1 test	2217 (34.01)	699 (30.1)	1518 (36.1)	
	2 test	1270 (19.5)	543 (23.4)	727 (17.3)	
	3 tests or more	473 (7.3)	234 (10.1)	239 (5.7)	
Management practices					
	Referred for TB diagnosis	3121 (47.9)	997 (43.0)	2124 (50.6)	<0.0001
	Diagnosed and referred	2443 (37.5)	857 (36.9)	1586 (37.8)	
	Treated	955 (14.6)	466 (20.1)	489 (11.7)	
Place of referral					
(n=5564)	District TB Centre (NTP)	3812 (68.5)	1260 (68.0)	2552 (68.8)	0.136
	Private laboratory	1190 (21.4)	386 (20.8)	804 (21.7)	
	Private specialist hospital/GP	562 (10.1)	208 (11.2)	354 (9.5)	

***1 test indicate only one test was performed for final diagnosed, 2 test refer 2 test was done for diagnosis etc.**

Figures

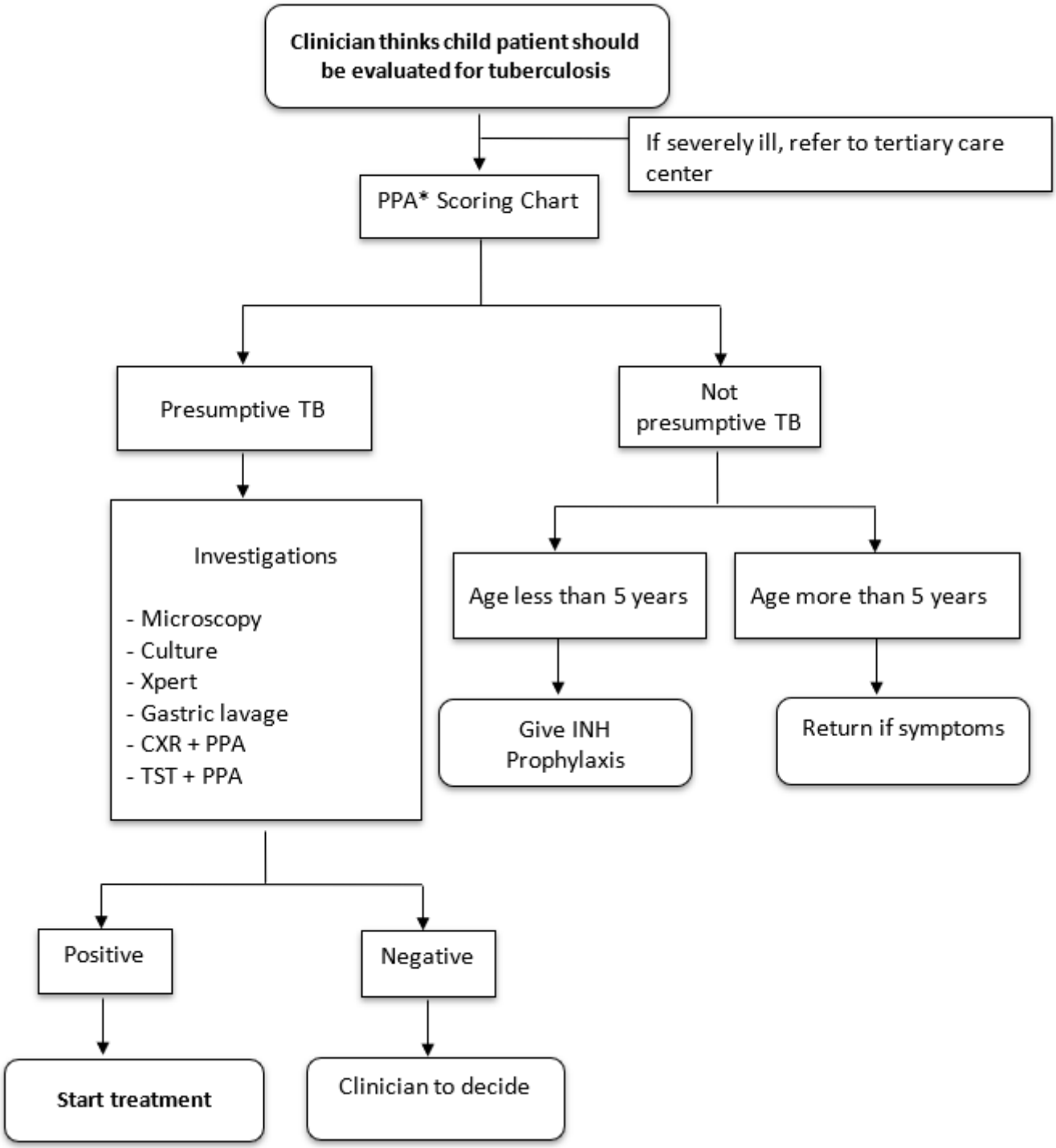

Figure 1

Figure 1. NTP Flow chart for evaluation of a child with suspected TB *PPA = Pakistan Paediatric Association