MEASURE TO IMPROVE DETECTION OF SMEAR POSITIVE CASES UNDER RNTCP: COMPARISON OF COUGH ≥ 2WEEKS VS ≥3 WEEKS

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ABSTRACT:

Background: Tuberculosis (TB) remains the number one killer infectious disease-affecting adults in developing countries. The change in duration of symptoms from two weeks or more under RNTP to three weeks or more under RNTCP was a retrograde and untenable step, made without any indigenous research support. Objectives: To estimates the prevalence of chest symptomatic among adult outpatients attending health facilities. To compare the efficiency of sputum examination in detecting smear positive TB cases among TB suspects with cough for ≥2 weeks or ≥3 weeks. Method: A cross-sectional study carried out at the 2 TU (5 DMC) of Vadodara corporation, Vadodara. Participants: sputum positive pulmonary tuberculosis patients. Results: The study conducted in the fourth quarter included 143 (23.1 percent) smear positive cases of TB. Thus 23.1% of the population was infected in contrast to 2-3 percent in developed countries. There was a 30.1% increase in the number of individuals with chest symptoms (from 475 to 618) and a 19.2% increase in the detection of smear positive cases (from 125 to 149) when ≥ 2 weeks instead of ≥ 3 weeks was used as the criterion for case finding. Conclusion: Using cough ≥ 2 weeks as the criterion for screening patients for sputum microscopy, instead of using ≥ 3 weeks as the screening criterion.

Key words: Tuberculosis, RNTCP, ≥2 weeks or ≥3 weeks cough

INTRODUCTION:

The 1990 World Health Organization (WHO) report on the Global Burden of Disease ranked TB as the seventh most morbidity-causing disease in the world, and expected it to continue in the same position up to 2020¹. Each year, 8.74 million develop tuberculosis and nearly 2 million die. This means that someone somewhere contracts TB every four seconds and one of them dies every 10 seconds². WHO’s 2006 report on Global Tuberculosis Control published on March 24th, World TB Day, once again ranks India as the world’s most heavily affected country. It was estimated that there were 1.8 million new TB cases in India in 2004; that is, one in five of all cases worldwide.
Roughly, 330,000 people died with TB in 2004 - nearly 1000 people every day. These figures put India some way ahead of the second-ranking country, China, which had about 1.3 million new episodes of TB in 2004. In 1993, WHO declared TB a global emergency and devised the directly Observed Treatment - Short Course (DOTS) strategy and recommended that all countries adopt this strategy. The strategy is built on five pillars, viz. political commitment and continued funding for TB control programmes, diagnosis by sputum smear examinations, uninterrupted supply of high quality anti-TB drugs, drug intake under direct observation, and accurate recording and reporting of all registered cases. The change in duration of symptoms from two weeks or more under NTP to three weeks or more under RNTCP was a retrograde and untenable step, made without any indigenous research support. In addition, the RNTCP recommends examination of three sputum smears for diagnosis. This may not be practicable under all conditions, especially in difficult areas. It further adds to the laboratory workload, cost of diagnosis and causes inconvenience to patients as well as for the health system.

MATERIAL AND METHODS:

A cross sectional analysis of the chest symptomatics attending the five selected DMCs was carried out in the fourth quarter in the year 2006 and all Sputum Positive cases of Pulmonary TB attending chest OPD formed the 143 study sample. Data were collected with the help of pretested, semi-structured schedule, having following components:

1. General profile of the patent - age, sex, religion, education, occupation, and percapita monthly income of the family
2. Chief complaints - If a patient mentions cough as one of the complaints, history of cough was elicited by asking, ‘How many days have you had a cough?’ The duration of cough was categorized into the following intervals: 1–6, 7–13, 14–20, 21–27 and >28 days. Patients currently on TB treatment attending health facilities for follow-up were excluded. All new adult outpatients with cough >2 weeks were referred for sputum examination. A sputum specimen was collected on the spot from each patient; the patient was then instructed to return on the following day for examination of an overnight specimen and to provide a second spot specimen.

The smears were processed and read by trained laboratory technicians. Data thus collected were compiled and analysed by appropriate statistical technique.

Calculation for the number of positive cases missed (only an estimated number) was also taken into consideration. This was calculated assuming that these individuals with chest symptoms had an equal probability of being positive at the missed examinations as those who had actually undergone sputum examination.

Procedure used to estimate the number of ‘missed’ smear-positive cases among individuals with chest symptoms who failed to give the required number of sputum specimens. First, among individuals with chest symptoms who provided three sputum specimens, the probability of obtaining a positive smear was calculated separately for males and females by age group and health facility. The probabilities were then calculated for the groups who failed to provide the required number of sputum samples. This can be noted as follows:
Group 1 ‘-nn’ = 1st smear negative and 2nd and 3rd smear not given  
Group 2 ‘--n’ = 1st and 2nd smears negative and 3rd smear not given  
Group 3 ‘nnn’ = all three smears not given.

To obtain the expected number of positives (P1) for the first group, the following formula was used:

\[ P_1 = s_1 \times \left( \frac{m_1}{t_1} \right) \]

Where;  
\( s_1 \) = number of individuals with chest symptoms in Group 1  
\( m_1 \) = number of individuals with chest symptoms with a negative 1st smear and positive 2nd or 3rd smear  
\( t_1 \) = number of individuals with chest symptoms who gave three smears with a negative first smear.

\[ P_1 = s_1 \times \left( \frac{m_1}{t_1} \right) \] was added to the observed cases to obtain total cases.

Similarly, for Group 2 (P2):

\[ s_2 \] = number of individuals with chest symptoms in Group 2  
\[ m_2 \] = number of individuals with chest symptoms with a negative 1st and 2nd smear negative and a positive 3rd smear  
\[ t_2 \] = number of individuals with chest symptoms who gave three smears with negative 1st and 2nd smears.

\[ P_2 = s_2 \times \left( \frac{m_2}{t_2} \right) \] was added to the observed cases to obtain total cases.

Similarly, for Group 3 (P3):

\[ s_3 \] = number of individuals with chest symptoms in Group 3  
\[ m_3 \] = number of individuals with chest symptoms who gave three smears with at least one positive smear  
\[ t_3 \] = number of individuals with chest symptoms who gave three smears.

\[ P_3 = s_3 \times \left( \frac{m_3}{t_3} \right) \] was added to the observed cases to obtain total cases.

RESULTS AND DISCUSSION:

This was a cross-sectional study primarily done at the five selected DMCs under the Vadodara Municipal Corporation. There were 618 chest symptomatics (CS) examined in the fourth quarter of 2006 of the total OPD of 4044.

Among the total number of 618 chest symptomatic, 143 (23.1%) chest symptomatic were positive for TB with an evident history of cough more than two weeks or three weeks and a series of other symptoms. Thus, about 23.1% of the population was infected in contrast to 2-3% in developed countries.

Overall, 475 (11.7%) of 4044 new adult outpatients had cough ≥ 3 weeks; of these, 26.3% (125) had a positive sputum.

There were significant differences in sputum positivity rate among the five DMCs, reason being higher number of patients attend the OPD of Gotri DMC. Gotri DMC is the only TB Sanatorium in the city that provides more than 100 indoor beds along with facilities for sputum microscopy, X-ray and an emergency ward for TB patients. Majority of the OPD is of chest symptomatics who suspect themselves of having TB unlike routine OPDs of the rest four DMCs. This is the reason that most of the cases coming to this DMC are passively detected for TB.

Increase in no. of individuals with chest symptoms = \[ \frac{618 - 475}{475} \times 100 = 30.1\% \]
Increase in sputum positivity = $\frac{149 - 125}{125} \times 100 = 19.2\%$

This study tries to emphasize that performing sputum microscopy among outpatients with cough ≥ 2 weeks can improve the detection of smear-positive TB cases. Sputum positivity among patients with ≥ 2 weeks cough was 24.1%, nearly as high as the sputum positivity (26.3%) among patients with ≥ 3 weeks cough.
### Table - 1: Proportion of outpatients with chest symptoms and sputum positivity rate at the five DMCs

<table>
<thead>
<tr>
<th>DMCs</th>
<th>New adult outpatients</th>
<th>Cough ≥ 2 Weeks</th>
<th>Cough ≥ 3 Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS* N (%)</td>
<td>S +ve cases N</td>
<td>Sputum positivity rate (%)</td>
</tr>
<tr>
<td>Gotri</td>
<td>542</td>
<td>352 (64.9)</td>
<td>129 (36.6)</td>
</tr>
<tr>
<td>ESIS</td>
<td>1617</td>
<td>117 (7.2)</td>
<td>5 (4.3)</td>
</tr>
<tr>
<td>Navayard</td>
<td>298</td>
<td>31 (10.8)</td>
<td>2 (6.5)</td>
</tr>
<tr>
<td>Jubelibaug</td>
<td>1097</td>
<td>66 (6.01)</td>
<td>8 (12.1)</td>
</tr>
<tr>
<td>Fatehpura</td>
<td>490</td>
<td>52 (10.6)</td>
<td>5 (9.6)</td>
</tr>
<tr>
<td>Total</td>
<td>4044</td>
<td>618 (15.3)</td>
<td>149 (24.1)</td>
</tr>
</tbody>
</table>

*Including all cases ≥ 3 weeks

θ After accounting missing cases

CS = chest symptoms; S +ve = smear-positive.
Table - 2: Sputum Positivity Rate Related to Duration of Cough

<table>
<thead>
<tr>
<th>5 DMCs</th>
<th>New adult outpatients</th>
<th>Cough ≥ 2 Weeks</th>
<th>Cough ≥ 3 Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS* N (%)</td>
<td>S +ve cases n</td>
<td>CS* N (%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4044</td>
<td>618 (15.3)</td>
<td>475 (11.7)</td>
</tr>
</tbody>
</table>

30.1% Increase in number of Individuals with Chest Symptoms &
19.2% Increase in Sputum Positivity with ≥ 2 Weeks cough

Thus, using ≥ 2 weeks instead of ≥ 3 weeks as the criterion for screening patients for sputum microscopy, there was a 30.1% increase in the number of individuals with chest symptoms (from 475 to 618) and a 19.2% increase in the detection of smear-positive cases (from 125 to 149).

Table-3 presents the estimated daily workload of sputum smear microscopy in the laboratories. Using cough ≥ 2 weeks as the criterion for screening patients for sputum microscopy, the estimated number of smears per day at each DMC was 16 slightly higher than 12, using cough ≥ 3 weeks as the screening criterion.

Table - 3: Estimated Workload per Microscopy Centre per day by Duration of Cough and Type of Health Facility

<table>
<thead>
<tr>
<th></th>
<th>Cough ≥ 2 weeks</th>
<th>Cough ≥ 3 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>New adult outpatients per day (n)</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Outpatients with cough (%)</td>
<td>15.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Patients with cough per year (* n)</td>
<td>1239</td>
<td>948</td>
</tr>
<tr>
<td>Smear positive examined per year (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. For diagnosis (three smears per patients)</td>
<td>3718</td>
<td>2843</td>
</tr>
<tr>
<td>2. For follow up ≠</td>
<td>929</td>
<td>711</td>
</tr>
<tr>
<td>3. Total</td>
<td>4647</td>
<td>3554</td>
</tr>
<tr>
<td>Average Smears per day</td>
<td>15</td>
<td>12</td>
</tr>
</tbody>
</table>

*Assuming 300 working days in a year
≠ 25% of those for diagnosis (6)

The average daily workload in the laboratories increased marginally that may not be of concern, except at heavily utilized health facility like Gotri DMC. Additional potential advantages of revising the screening criterion to ≥ 2 weeks’ cough may be reduced delays in diagnosis and prevention of missed opportunities of diagnosis due to non-return of patients or switching over of...
patients to private health care systems. In this study, 23.1% (143/618) of individuals with chest symptoms had cough for ≥ 2 weeks but < 3 weeks. Two thirds of individuals with chest symptoms seek care within 2 weeks of onset of cough, only 8–23% of these, subsequently return to a governmental health facility. Conservatively estimating that 50% of patients with 2–3 weeks' cough would not return to a governmental health facility, a policy of screening patients with ≥ 2 weeks' cough could potentially lead to an additional yield of 50 smear-positive cases.

SUMMARY AND CONCLUSUSION:
1. The study conducted in the fourth quarter (three months) included 143 (23.1%) smear positive cases of TB. Thus 23.1% of the population was infected in contrast to 2-3% in developed countries.
2. There was a 30.1% increase in the number of individuals with chest symptoms (from 475 to 618) and a 19.2% increase in the detection of smear positive cases (from 125 to 149) when ≥ 2 weeks instead of ≥ 3 weeks was used as the criterion for case finding.
3. Using cough ≥ 2 weeks as the criterion for screening patients for sputum microscopy, the estimated numbers of smears per day at each DMC was 16 slightly higher than 12, using cough ≥ 3 weeks as the screening criterion i.e. <5 additional sputum smears to be done each day.

RECOMMENDATION:
The study underscores the importance of actively eliciting cough history from all out-patients, regardless of their initial complaints, and the findings suggest that detection of smear-positive cases can be substantially increased by revising the screening policy for sputum microscopy among out-patients from cough of ≥ 3 weeks to ≥ 2 weeks. Mid-course revision of the screening policy is logistically difficult on a countrywide basis during this rapid DOTS expansion phase. However, it would be valuable to perform a pilot study of the feasibility and effectiveness of the revised policy in one or two states, so that concrete information will be available on which to base a policy change after full DOTS expansion is achieved.

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