Quality Assurance of sputum smear microscopy

Dr Ashwani Khanna
“Why Quality assurance for Sputum Smear Microscopy in RNTCP?”

**DOTS strategy:**

1. Political and administrative commitment

2. **Good quality diagnosis, primarily by sputum smear microscopy**

3. Uninterrupted supply of good quality drugs

4. Directly observed treatment (DOT)

5. **Systematic monitoring and accountability**
States supervised by NTI:
JK, RJ, WB, MH, MP, OR, JH, BI, KK
CTD: DDG(TB)
↓
NRL: Microbiologists & Sr. LTs’
↓
STDC/IRL: Microbiologists & LTs’
↓
DTC: DTO, MO(EQA), DEO
↓
TU: STLS
↓
DMC: LT
Diagnosis is modified

Persistent Cough for > 2 weeks

Smear Examination “Spot” & “Morning”

AFB, Grading, and Reporting; & Quality Assurance

Over-reliance on X-ray gone
REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME
Laboratory Form for Sputum Examination

Name of Referring Health Facility: __________________________ Date: ___________
Name of patient: _______________________________________ Age: ____ Sex: M ☐ F ☐
Complete address: _______________________________________

_____________________________________________________

Type of suspect / disease: ☐ Pulmonary
☐ Extra-pulmonary   Site: ____________________________

Reason for examination:
☐ Diagnosis
☐ Repeat Examination for Diagnosis
☐ Follow-up of anti-TB treatment

Patient’s TB No ____________

(Name and signature of referring person/ official)

If sputum sample are being transported:
Specimen identification No.: __________ Date of sputum collection: __________
Specimen Collector’s name and signature ________________________________

RESULTS (To be completed in the laboratory of DMC)
Name of DMC: _____________________________________________
Lab. Serial No.: ___________________________________________

<table>
<thead>
<tr>
<th>Date of examination</th>
<th>Specimen</th>
<th>Visual appearance (M, B, S)*</th>
<th>Results (Neg or Pos)</th>
<th>Positive (grading)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td></td>
<td></td>
<td>3+ 2+ 1+ Scanty**</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* M = Mucopurulent, B = Blood stained, S = Saliva
** Write actual count of AFB seen in 100 oil immersion fields

Date: _______________ Examined by (signature): _______________________

The completed form (with results) should be sent to the referring PHI within one day of the examination.
**Quality Assurance System** for TB Patient Diagnosis & Monitoring Avoids **False Positive** & **False Negative** Sputum Smear Microscopy Results

**IQC** - Internal Quality Control

**EQA** - External Quality Assessment

**QI** - Quality Improvement

Smear microscopy

TB patient
Three components of Quality Assurance System

I Internal Quality Control (IQC):

✓ Includes all means by which laboratory personnel performing TB smear microscopy control the process

✓ Involves checking of instrument, new lots of staining solutions, smear preparation, grading etc.

✓ It’s a systematic internal monitoring of working practices, technical procedures, equipment and materials including quality of stains.
Components of quality assurance system contd...

II  External Quality Assessment (EQA)

✓ A process to assess laboratory performance

✓ EQA includes on site evaluation of the laboratory to review

i. Quality control procedures

ii. process of smear microscopy

iii. random blinded rechecking of routine smears
Components of quality assurance system contd…

III Quality improvement ( QI ):

✓ A process by which all components of smear microscopy diagnostic services are carefully analyzed with the aim of looking for ways to permanently remove obstacles to success.

✓ Appropriate data collection, data analysis, correct interpretation of the results and creative problem solving are the key components of this process.

✓ Involves continued monitoring, identifying defects, followed by remedial action including retraining when needed, to prevent recurrence of problems.

✓ Relies on effective on site evaluation
The false results!

<table>
<thead>
<tr>
<th>LT’s Slide results</th>
<th>Controller’s Results (STLS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Positive</td>
<td><strong>True Positive</strong></td>
</tr>
<tr>
<td>Negative</td>
<td>False Negative</td>
</tr>
</tbody>
</table>

Smear Results

- **False Negative**: TB patient
- **False Positive**: Non-TB patient
Consequences of False Results in sputum smear microscopy

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>False Negative</strong></td>
<td><strong>False Positive</strong></td>
</tr>
<tr>
<td><strong>Patient suffers from TB symptoms</strong></td>
<td><strong>Patient is incorrectly recorded as TB case</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Patient is incorrectly recorded as “cured”</strong></td>
</tr>
<tr>
<td><strong>False Positive</strong></td>
<td><strong>False Negative</strong></td>
</tr>
<tr>
<td><strong>Patient continues to transmit the TB to contacts</strong></td>
<td><strong>Patient will receive the TB drugs unnecessarily</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Treatment is discontinued prematurely</strong></td>
</tr>
<tr>
<td><strong>False Negative</strong></td>
<td><strong>False Positive</strong></td>
</tr>
<tr>
<td><strong>Patient may be incorrectly Categorized as smear-negative</strong></td>
<td><strong>RNTCP resources are wasted</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Development and transmission of drug resistant organisms to contact</strong></td>
</tr>
<tr>
<td></td>
<td><strong>RNTCP resources are wasted</strong></td>
</tr>
</tbody>
</table>

Patients will lose confidence in RNTCP for TB control
<table>
<thead>
<tr>
<th>Reasons for False-negative Smear Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Improper storage of sputum specimens</td>
</tr>
<tr>
<td>- Inadequate sputum collection</td>
</tr>
<tr>
<td>- Too thin or thick smears</td>
</tr>
<tr>
<td>- Over-heating the slide, fixing</td>
</tr>
<tr>
<td>- Insufficient fixing</td>
</tr>
<tr>
<td>- Boiling Carbol Fuchsin</td>
</tr>
<tr>
<td>- Over De-colorization</td>
</tr>
<tr>
<td>- Improper storage of slides</td>
</tr>
<tr>
<td>- Inadequate examination</td>
</tr>
<tr>
<td>- Using saliva for smears</td>
</tr>
<tr>
<td>- Reading and reporting errors</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasons for False-positive Smear Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Faulty sputum collection (food particles or fibers)</td>
</tr>
<tr>
<td>- Using old scratched slides</td>
</tr>
<tr>
<td>- Using unfiltered Carbol Fuschin</td>
</tr>
<tr>
<td>- Insufficient de-colorization</td>
</tr>
<tr>
<td>- Contamination due to transfer of bacilli from one smear to another</td>
</tr>
<tr>
<td>- Not wiping the oil immersion lens after examination of a positive slide</td>
</tr>
<tr>
<td>- Reading and reporting errors</td>
</tr>
</tbody>
</table>
I. Internal Quality Control (IQC)
<table>
<thead>
<tr>
<th>Quality of..</th>
<th>Indicator / Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sputum Specimen</strong></td>
<td>Sputum: Saliva/Muco-purulent/Blood; min 10-20 Pus cells/field; time lapse between collection &amp; processing of sputum; labels on cups/slides/forms</td>
</tr>
<tr>
<td><strong>Smear Preparation</strong></td>
<td>New slides; Labeled with lab number; <strong>Size; Thickness; Uniformity</strong>; Back ground; gentle heat fixing</td>
</tr>
<tr>
<td><strong>Staining reagents</strong></td>
<td><strong>Potency/purity</strong>; label on bottle with name of reagent with date of preparation; leveled sink; QC of prepared Reagents-control smears</td>
</tr>
<tr>
<td><strong>Staining</strong></td>
<td>Over stained/under stained; over decolorized/under decolorized; over counter stained/under counter stained; <strong>Drying</strong>; As per RNTCP-SOP</td>
</tr>
<tr>
<td><strong>Microscopy &amp; smear examination</strong></td>
<td>Microscope: Eye piece/x100 Objective/light source/maintenance; Quality of immersion oil; Identification of AFB, results and grading; methods of removing the immersion oil/preservation &amp; storage serial as per lab register.</td>
</tr>
<tr>
<td><strong>Bio-safety &amp; Disinfections</strong></td>
<td>Safety of lab technician in sputum collection and processing; Disposal of sputum, sputum cups &amp; caps; inoculation loops or swab-sticks; used sputum smear slides; Work-bench</td>
</tr>
<tr>
<td><strong>Reporting of AFB Results</strong></td>
<td>Documentation of results; <strong>Prompt and correct reporting</strong> as per RNTCP guidelines without any clerical errors</td>
</tr>
</tbody>
</table>
Sputum containers
Sputum collection: outdoors with good ventilation
Specimen Quality

Purulent

Mucoid
Specimen Quality

Saliva or Induced sputum (?)  Blood stained
Labeling Specimen Container

Label on the side of the container
Labeling the slide with laboratory number
Smear: centre of the slide and 2x3cms
Pass the smear through the flame 2–3 times
Thickness of Smear: should be able to read print

5. Centrifuge at about 2,000 x gravity for 15 min.
6. Pour off the supernatant and retain the sediment.
7. Resuspend the sediment in several drops of water and prepare the smear.

...hypochlorite. This material and the crystals that form as the smear dries will wash off during staining, but the AFB will remain on the heat-fixed smear.

A direct or concentrated sputum smear should appear cloudy before staining. But it is too thick if you cannot read print in a newspaper through the smear when it is held 5 to 10 cm from the print. Smears that are too thick often wash off during staining or the...
Saliva Portion
AFB in Single Arrangement
Good Functional Binocular Microscope
Application of Oil
Use 100x objective to read the slide
Systematic Examination of Smears
Consistent Quality of Smears
Recording results in the TB laboratory register
Remove Oil from Smears
Use carbolic soap to wash hands
Storage of Smears
Report results correctly without any clerical errors
Dye Powder Specifications
Weighing Balance

- Fragile, precision instrument
- Handle with care
- Must be used on level surface
- Consult manual for operating instructions
Always add acid to water

It is an exothermic reaction – round bottom flask should be kept in a trough containing cold water

NEVER add water to acid
II. External Quality Assessment (EQA)

😊 Check infrastructure and IQC

😊 Panel testing of STLS

😊 Check Random Blinded Rechecking records
External Quality Assessment conducted through an On-Site evaluation

RBRC

Infrastructure & internal quality control

Panel testing

Operational problems

Technical problems

Solutions & QA DMC
### Structure of EQA

#### NRL

#### IRL

#### DTC

#### TU

#### DMC

### Functions of EQA

**OSE By NRL team – at least once a year**
- Panel testing of Microbiologist & LTs of IRL

**OSE By IRL team – at least once a year**
- Panel testing of all STLS

**OSE By DTO at least once in every month**
- Random Blinded Re-Checking of routine slides

**OSE By DTO at least once in Quarter**
- OSE By IRL team (sample of DMCs) during OSE of DTC
- OSE by STLS at least once every month
- Collection of Random Blinded Re-Checking of routine slides
- Unblinded rechecking (5+ves & 5-ves)
PROBLEM SOLVING

Step 1 Describe the problems
What is the problem? Where does the problem occur?
With whom does the problem occur? When and how often does the problem occur?
When did the problem start occurring?

Step 2 Identify possible causes by answering these questions
Whether the person is aware of the responsibility and has been told to complete the task? Does the person have the skill or knowledge to do the task?
Does the person want to do the task?
What are other obstacles preventing the person from doing the task?

Step 3 Identify and implement solutions. Solutions should
Remove (or reduce) the specific cause(s)
Be reasonable (affordable and realistic)
<table>
<thead>
<tr>
<th><strong>On-Site Evaluation of District Level Laboratory</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. General Information</td>
</tr>
<tr>
<td>II. Action required as per the previous visit</td>
</tr>
<tr>
<td>III. Current visit details</td>
</tr>
<tr>
<td>Infrastructure (lab/power/water/microscope)</td>
</tr>
<tr>
<td>Standard Operating Procedure</td>
</tr>
<tr>
<td>Adequate stock and supply of reagents/supplies</td>
</tr>
<tr>
<td>Disposal of infected material</td>
</tr>
<tr>
<td>Internal Quality Control</td>
</tr>
<tr>
<td>External quality control</td>
</tr>
<tr>
<td>IV. Onsite Panel slides rechecking</td>
</tr>
<tr>
<td>Assessment of EQA responsibilities of STLS</td>
</tr>
<tr>
<td>V. Blinded Re-Checking Results</td>
</tr>
<tr>
<td>VI. Summary &amp; Recommendations</td>
</tr>
</tbody>
</table>
Panel testing (proficiency testing)

- **Patient slide Panel**
  (No consistency of Smear background between grades)
- **Manufactured slide Panel**
  (Good consistency in the Smear background between grades)

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**How to make Test panel slides**

- **Negative**
  - Dilution: 1:1 → 1:2 → 1:4 → 1:10

- **Positive**
  - 40 AFB/f → 3+ 20/f → 2+ 5/f → 1+ 50/100f → Scanty 5/100f

- **Validate process**
**Whom to give panel test smears**

- All the STLS of the DTC during OSE by IRL team
- Microbiologist and LTs of STDC during OSE by the NRL

**How many panel test slides to give for testing**

One set of 5 slides per STLS e.g.,

a) 2 slides scanty, 1 Neg, 1 (1+), and 1 (scanty)

b) 1 scanty, 1 Neg, 2 (1+), and 1 (scanty)

c) 2 slides scanty, 1 Neg, and 2 (1+)
Identifying Good Quality DMC

- DMC LT handles < 20 slides/day and > 10 slides/week.
- Annual negative slides volume of DMC : 500 to 5000 slides.
- Slide Positivity Rate : 5% to 15%.
- Good functional Binocular Microscope.
- STLS/LT makes smears, grading and reporting according to RNTCP guidelines; No False Positive and Negative
- STLS/DTO maintains the sufficient stock of consumables like sputum cups, slides etc.,
- Completeness, Consistency, Credibility and timeliness of reports
### How many slides to check for Random blinded rechecking

<table>
<thead>
<tr>
<th>Number of negative slides in the DMC in a year</th>
<th>Slide positivity rate (SPR%)</th>
<th>2.5-4.9</th>
<th>5.0-7.49</th>
<th>7.5-9.9</th>
<th>10-14.9</th>
<th>≥15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual sample size of both positive and negative slides (Monthly sample size in parenthesis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>301-500</td>
<td>243 (21)</td>
<td>154 (13)</td>
<td>114 (10)</td>
<td>89 (8)</td>
<td>62 (6)</td>
<td></td>
</tr>
<tr>
<td>501-1000</td>
<td>318 (27)</td>
<td>180 (15)</td>
<td>128 (11)</td>
<td>96 (8)</td>
<td>66 (6)</td>
<td></td>
</tr>
<tr>
<td>&gt;1000</td>
<td>456 (38)</td>
<td>216 (18)</td>
<td>144 (12)</td>
<td>104 (9)</td>
<td>69 (6)</td>
<td></td>
</tr>
</tbody>
</table>
Lot quality assurance sampling

- Sensitivity: 80%
- Specificity: 100%
- Acceptance number: 0
- Confidence interval: 95%

<table>
<thead>
<tr>
<th>LT’s Slide results</th>
<th>Controller’s Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>True Positive</td>
</tr>
<tr>
<td>Negative</td>
<td>False Negative</td>
</tr>
</tbody>
</table>

Acceptance number:
Maximum number of false negative allowed beyond which there is no guarantee of quality.
The process of (Random Blinded Rechecking) RBRC

- DTO determines the sample size based on the previous years ANSV and SPR by the LQAS
- Instructs the STLS to pick up the required number of slides from each DMC
- STLS selects the required number of slides by circling the slide numbers in the TB lab register.
- LT picks up the selected slides and arranges it in a slide box and fills out the Annexure B (contains the LTs microscopy results)
- The Annexure B is sealed and handed over to the STLS along with the Slide box for RBRC.
The process of (Random Blinded Rechecking)

RBRC contd...

✓ STLS carries the sealed Annexure B along with the slide box to the DTC
✓ DTO receives the sealed Annexure B and slide boxes from all STLS
✓ Codes the slide boxes and allots them to STLS
✓ STLS reads the slides allotted to him/her and enters the result in Annexure C
✓ Annexure C is handed over to the DTO for crosschecking the results of the STLS and LT (from Annexure B)
✓ Umpire reading is called for if there are any discrepancies in the results. The errors are classified using Annexure D.
✓ One of the STLSs acts as the umpire. Both the results are known to the umpire, but the identity of the result is not revealed.
# Types and Classification of Errors

<table>
<thead>
<tr>
<th>Result being rechecked</th>
<th>Result of Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>Negative</td>
<td>correct</td>
</tr>
<tr>
<td>1-9 AFB/100 f</td>
<td>LFP</td>
</tr>
<tr>
<td>1+</td>
<td>HFP</td>
</tr>
<tr>
<td>2+</td>
<td>HFP</td>
</tr>
<tr>
<td>3+</td>
<td>HFP</td>
</tr>
</tbody>
</table>

Correct:
- No errors
- QE: Quantification error  Minor error
- LFN: Low False Negative  Minor error
- LFP: Low False Positive  Minor error
- HFN: High False Negative  Major error
- HFP: High False Positive  Major error
1) **Inspects microscope, supplies and laboratory**
2) **Re-examines 5 positive and 5 negative slides at the DMC***(un-blinded systematic crosschecking)*
3) **Gives feedback on quality of smear, stain, reading and reporting**
4) **Collects RBRC slides in serial order and LT results in sealed envelopes with Annexure B**
5) **The name of DMC, TU, District and month & year written on the slide box, and the sealed envelope.**

**STLS**

At least once in a month visits DMC
Conducts RBRC, monthly, for the previous month routine slides of DMC on the basis of which patients are diagnosed as TB positive or negative

1) DTO receives sealed envelopes with Annexure B and slide boxes
2) DTO codes and interchanges slide boxes among STLS, retaining sealed Annexure B in his possession
3) STLS read and record results for slides as per Annexure C - one slide box at a time at DTC
4) Umpire reading will be by another STLS and organized at DTC by the DTO
5) DTO/MO-TC evaluate results and give feedback to each MC under information to the CMO/Civil Surgeon
<table>
<thead>
<tr>
<th>TU</th>
<th>STLS</th>
<th>DMC</th>
<th>DMC box Code</th>
<th>DMC box code cross checked by STLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jan</td>
<td>Feb</td>
</tr>
<tr>
<td>Chinsura</td>
<td>Mr. Arup Sinharay</td>
<td>DTC(ISH)Chinsurah</td>
<td>A1</td>
<td>L1</td>
</tr>
<tr>
<td>Mohra</td>
<td>Mr. P.K.Das</td>
<td>Ahmedpur BPHC</td>
<td>B1</td>
<td>M1</td>
</tr>
<tr>
<td>Digsul</td>
<td></td>
<td>Mogra BPHC</td>
<td>A2</td>
<td>L2</td>
</tr>
<tr>
<td>Naldanga</td>
<td></td>
<td>Digsul PHC</td>
<td>A3</td>
<td>L3</td>
</tr>
<tr>
<td>Bandel ESI</td>
<td></td>
<td>Naldanga PHC</td>
<td>A4</td>
<td>L4</td>
</tr>
<tr>
<td>Ahmedpur</td>
<td>Mr. Rajib Nandy</td>
<td>Polba BPHC</td>
<td>C1</td>
<td>A1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Makalpur PHC</td>
<td>C2</td>
<td>A2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dhaniakhali RH</td>
<td>C3</td>
<td>A3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gurap PHC</td>
<td>C4</td>
<td>A4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chopa PHC</td>
<td>C5</td>
<td>A5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kamdevpur PHC</td>
<td>C6</td>
<td>A6</td>
</tr>
<tr>
<td>Tarakeshwar</td>
<td>Mr. Prasanta</td>
<td>Tarakeshwar PHC</td>
<td>Z1</td>
<td>X1</td>
</tr>
<tr>
<td>Talpur</td>
<td></td>
<td>Talpur</td>
<td>Z2</td>
<td>X2</td>
</tr>
<tr>
<td>Duttapur PHC</td>
<td></td>
<td>Duttapur PHC</td>
<td>Z3</td>
<td>X3</td>
</tr>
<tr>
<td>Haripal RH</td>
<td></td>
<td>Haripal RH</td>
<td>Z4</td>
<td>X4</td>
</tr>
<tr>
<td>Bandipur PHC</td>
<td></td>
<td>Bandipur PHC</td>
<td>Z5</td>
<td>X5</td>
</tr>
<tr>
<td>Uttarpura</td>
<td>Mr. Chinmoy Mondal</td>
<td>Uttarpura SGH</td>
<td>I1</td>
<td>S1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rishra ESOPD</td>
<td>I2</td>
<td>S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kanaipur BPHC</td>
<td>I3</td>
<td>S3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rajyadharpur PHC</td>
<td>I4</td>
<td>S4</td>
</tr>
</tbody>
</table>
On-site Evaluation: Frequency of visits

- **NRL**
  - By NRL team – at least once a year

- **IRL**
  - By IRL team – at least once a year

- **DTC**
  - By DTO at least once in every month
  - By IRL team – during annual district visit

- **TU**
  - By STLS – At least once in every month
  - By DTO and MO-TC at least once a quarter
  - By IRL team – during annual district visit (sample of)

- **DMC**
Periodic Reporting for EQA

a) EQA Reports
   - Monthly, quarterly
   - Yearly

b) QPMR

On-site evaluation reports
   i) a) Detail check-list (NRL, IRL, TU)
      b) Summary report
   ii) Quarterly report

Panel testing reports
On-site evaluation

RBRC reports
   - Monthly, annually

CTD
NRL
IRL
DTC
TU
TU
TU
DMC
DMC
DMC
DMC
## Microscopy Activities

c. Number of TB suspects whose sputum was examined for diagnosis

d. Out of (c), number of sputum smear positive patients diagnosed

e. Number of TB suspects subjected to repeat sputum examination for diagnosis

f. Out of (e), number of sputum smear positive patients diagnosed

g. Total number of sputum smear positive patients diagnosed (d + f)

## Laboratory Quality Control Network (Unblinded On-site supervision)

<table>
<thead>
<tr>
<th>Initial Reading</th>
<th>Total number of slides</th>
<th>Number of slides cross-checked by STLS</th>
<th>Supervisor reading</th>
<th>Total number of discordant slides</th>
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<td>Number of positives</td>
<td>Number of negatives</td>
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<td>Positive slides</td>
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<td>Negative slides</td>
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Name of Medical Officer Tuberculosis Control reporting (in Capital Letters): ——

Signature: ____________________________

Date: ____________________________
REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME
Quarterly Report on Programme Management and Logistics
District Level

Microscopy Activities

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<td>c.</td>
<td>Number of TB suspects whose sputum was examined for diagnosis</td>
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<td>d.</td>
<td>Out of (c), number of sputum smear positive patients diagnosed</td>
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<td>e.</td>
<td>Number of TB suspects subjected to repeat sputum examination for diagnosis</td>
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<td>f.</td>
<td>Out of (e), number of sputum smear positive patients diagnosed</td>
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<td>g.</td>
<td>Total number of sputum smear positive patients diagnosed (d + f)</td>
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Random blinded re-checking of routine slides at DTC
Number (%) of DMCs with High False Results (HFN and/or HFP results) in the year (January to December):

Name of District (Municipal) Tuberculosis Officer reporting (in Capital Letters) __________
Signature: ____________________
Date: _______________________
Annexure in EQA

- Annexure B: RNTCP smear results sheet for Blinded rechecking (RBRC) - to be filled in by the DMC LT

- Annexure C: RNTCP EQA of sputum microscopy; worksheet: blinded rechecking of DMC slides – to be filled in by the STLS

- Annexure D: RNTCP quality assurance report on sputum microscopy - to be filled in by the DTO

- Annexure E: District monthly report to IRL on blinded re-checking – to be compiled by the DTO and sent to the STDC

- Annexure F: On-site quarterly report of EQA from DTOs to IRL
Annexure in EQA contd …

- Annexure G: IRL annual report to CTD and NRL on RBRC
- Annexure H: EQA Guidelines (includes standards for reagents – potency correction, shelf life of prepared reagents)
- Annexure J: Technical specifications of Binocular microscopes
- Annexure K: Investigation of errors (includes possible causes for the errors and suggested investigation steps)
- Annexure L: possible reasons and suggested corrective actions for DMCs with unacceptable ANSV and SPR
- Annexure M: Tuberculosis monthly abstract – to be filled in by the LT and verified by the STLS
EQA Should Lead to Better Laboratory Performance

EQA → Identify Problems → Fix Problems