**Acid-fast Bacilli (AFB) Smear Grade Standardization in Los Angeles County, California**

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**BACKGROUND:**

- Detection of acid-fast bacilli (AFB) in stained smears provides a presumptive diagnosis of TB disease. Also, the quantitative result of the smear is a critical clinical and epidemiologic component in assessing the patient’s infectiousness. For instance, a positive AFB result triggers more stringent infection control procedures, and raises the priority for contact investigation.

- The Los Angeles County (LAC) Tuberculosis Control Program (TBCP) receives over 16,000 AFB smear reports from various laboratories each year, including more than half from LAC Public Health Laboratory (PHL). Because there is no standard language or scale required for an AFB smear report, many reports do not include clear information on qualitative interpretation (positive/negative/doubtful), smear grade, method and/or magnification used.

- Also, the LAC TB Registry Information System (TRIMS) did not capture the ‘doubtful’ smear category, such that any report with ‘AFB seen’ was recorded as ‘positive’, regardless of quantity.

- The LAC PHL will be using a new microscope with a 250 magnification for AFB smear microscopic examinations. The doubtful/inconclusive smear result will be included in the report.

- The **goal of this review** was to improve AFB smear grade data based on reports received from different laboratories.

**METHODS:**

- In 2014, the LAC TBCP compared the AFB smear grading guidelines from the:
  - American Thoracic Society (ATS),
  - Clinical Microbiology Procedures Handbook,

- Using data from our TRIMS registry database:
  - examined the smear grade data from 2010 to mid-2014 (n=72,873), and
  - manually reviewed a stratified random sample of laboratory reports (n=90) with unclear smear quantities reported.

**AFB Smear Grade Categories Grid**

<table>
<thead>
<tr>
<th>Category</th>
<th>Smear Method (AKA) [Magnification]</th>
<th>Reported to LAC_TBCP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>QUALITATIVE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>1+ (rare) 1–9 AFB/100 fields</td>
<td>1+, rare, 1+ AFB</td>
</tr>
<tr>
<td></td>
<td>2+ (few) 1–9 AFB/10 fields</td>
<td>2+, few, some, 2+ AFB</td>
</tr>
<tr>
<td></td>
<td>3+ (moderate) 1–9 AFB/field</td>
<td>3+, moderate, mod</td>
</tr>
<tr>
<td></td>
<td>4+ (numerous) &gt; 9 AFB/field</td>
<td>4+, many, numerous, num.</td>
</tr>
<tr>
<td>Negative</td>
<td>&lt;leave blank&gt; No AFB/300 fields</td>
<td>Negative</td>
</tr>
<tr>
<td>Doubtful/Repeat Test</td>
<td>1-2 AFB/30 fields (Fluochrome)</td>
<td>Very few, Doubtful, Scanty, Very Rare</td>
</tr>
<tr>
<td></td>
<td>or 300 fields (Carbolfuchsin)</td>
<td></td>
</tr>
<tr>
<td>Not Done</td>
<td>&lt;leave blank&gt; QNS, Insufficient</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>&lt;leave blank&gt;</td>
<td></td>
</tr>
</tbody>
</table>

**RESULTS:**

- The 3 guidelines reviewed were similar in their classification schemes and categories except for:
  1) Clinical Microbiology Procedures Handbook does not have a ‘doubtful’ category.
  2) ATS does not have a x450 magnification classification scheme for fluorochrome, and
  3) Kent/Kubica includes a ‘doubtful’ category for fluorochrome at x450 magnification.

- Our manual review revealed reports that noted a ‘doubtful’ qualitative smear interpretation but were recorded as ‘positive’ because the report noted that AFB were seen.

**CONCLUSIONS:**

- This review spurred the addition of a ‘doubtful’ qualitative smear category to our database, to capture doubtful smears appropriately.

- To encourage clearer reporting of laboratory diagnostic data, we revised our Confidential Laboratory Report (CLR) form to include a doubtful smear result, and to replace the free text box with checkboxes for smear grade (1+,2+,3+,4+).

- Improving the reporting of AFB smear grade data will positively impact patients, providers, and TB Control programs, as these data are used to:
  - Determine appropriate infection control procedures (e.g., isolation of patients, placement in TB housing);
  - Determine the duration of the infectious period, and prioritization for contact investigations;
  - Monitor the progress of patients on treatment.

**Old CLR Form**

**New CLR Form**

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