Objectives

- Available laboratory methods at WA PHL for diagnostic and reference specimens
- WAC Notifiable Conditions for laboratories reporting TB results
- Future plans for Whole Genome Sequencing at WAPHL
WA PHL Tuberculosis Unit

- Reference laboratory for WA
- Perform the full scope of laboratory testing
  - Confirmation of active TB disease by Microscopy and NAAT
  - Drug sensitivity testing (first and second line)
  - Send outs to CDC and Genotyping
  - Monitor culture conversion during treatment

Methods Utilized in TB Lab

- Microscopy
  - First test
  - The burden of infection
  - Can’t distinguish between live and dead cells or TB and other mycobacteria

- NAAT
  - Real time PCR
  - Confirms the presence of TB and/or MAC DNA
  - Limit of detection for TB
    - 1 copy of IS6110 per 5uL of specimen
  - Frequency
    - 3 times/week
    - 2 specimens for every new patient
Methods Utilized in TB Lab cont.

- **AFB Culture Identification**
  - Identification of MTBC, MAC, MGO, and MKA
- **Drug Sensitivity Testing (DST)**
  - Culture based MGIT sensitivities
    - SIRE/PZA
  - Agar proportion plate sensitivities
    - Confirmation of resistance to first line drugs (SIRE)
    - Additional testing to second line EA, AM, OFX, PAS
- **Send out services**
  - MDDR at CDC
  - Genotyping at Michigan State Laboratory

WAC Requirements for Tuberculosis

- **Notifiable conditions:**
  - Suspected or confirmed cases of selected diseases or conditions that are legally required to notify public health authorities at their local health jurisdiction (WAC 246-101)
  - [https://www.doh.wa.gov/ForPublicHealthandHealthcareProviders/NotifiableConditions](https://www.doh.wa.gov/ForPublicHealthandHealthcareProviders/NotifiableConditions)
- **Notifiable conditions for laboratories** - WAC 246-101-201

<table>
<thead>
<tr>
<th>Notifiable Condition</th>
<th>Time Frame for Notification</th>
<th>Notifiable to Local Health Department</th>
<th>Notifiable to Department of Health</th>
<th>Specimen Submission to Department of Health (Type &amp; Timing)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mycobacterium tuberculosis</em> (Tuberculosis)</td>
<td>2 business days</td>
<td>√</td>
<td>√</td>
<td>Culture (2 business days)</td>
</tr>
<tr>
<td><em>Mycobacterium tuberculosis</em> (Tuberculosis) (Antibiotic sensitivity for first isolate)</td>
<td>2 business days</td>
<td>√</td>
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</tbody>
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Challenges with Timely and Relevant Reporting

- Most commercial labs have electronic laboratory reporting (WDRS)
- Some still rely on faxing
- Over report: microscopy, AFB culture positives, QFT
- Under report – out of state testing
  - Important to understand the workflow for the laboratory
  - Delayed reporting
- The labs are not required to report to LHJs
  - Healthcare provider is
- WA PHL TB Lab reports directly to TB program and LHJs via auto faxing

WGS

- Whole Genome Sequencing
  - Obtaining DNA sequences for an organism
- Why?
  - Comparing an entire DNA sequence among different strains
  - Detect mutations that confer drug resistance
  - Identify the organism to the species level
- APHL/CDC award to WAPHL
  - Optimize WGS directly from primary positive cultures
Future Plans for WGS and TB Lab

- Perform WGS on 250 MGIT isolates and submit data to CDC
- Build WGS infrastructure at WAPHL for:
  - Data analysis
  - Specimen type: diagnostic vs TB culture
  - Testing algorithm
- TB Lab
  - Decrease culture incubation from 8 to 6 weeks (eliminate LJ)
  - Eliminate Streptomycin and add high concentration INH to MGIT sensitivities

Definitions

- NAAT – Nucleic Acid Amplification
- TB – Tuberculosis
- MTBC – M. tuberculosis complex
- MAC – M. avium complex
- MGO – M. gordonae
- MKA – M. kansasii
- MGIT – Mycobacteria Growth Indicator Tube
- SIRE/PZA – Streptomycin, Isoniazid, Rifampin, Ethambutol, Pyrazinamide
- EA – Ethionamide
- WGS – Whole Genome Sequencing
Questions?

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