Tuberculosis Epidemiology
Global and the U.S.
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TB Intensive
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Annie Kizilbash, MD, MPH has the following disclosures to make:

- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this educational activity
Objectives

- Global TB
- TB in the United States
- TB in the Heartland RMTCC (Regional Training and Medical Consultation Center) States
- TB in those who are foreign born
TB IN THE WORLD*

*We don’t know the epidemiology of TB in most of the world with certainty. In most of the world, TB is diagnosed on the basis of AFB smears without cultures, and treated without in vitro drug susceptibility results.

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Global Tuberculosis Report
WHO Report 2015

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<table>
<thead>
<tr>
<th>WHO REGION OR COUNTRY</th>
<th>NUMBER REPORTING DATA</th>
<th>NUMBER THAT REPORTED DATA</th>
<th>NUMBER MEMBER STATES</th>
<th>NUMBER THAT REPORTED DATA</th>
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<td>World</td>
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<td>205</td>
<td>194</td>
<td>185</td>
</tr>
</tbody>
</table>

* Countries that did not report by the deadline were mostly low-incidence countries in Western Europe.

Global Tuberculosis Report
WHO Report 2015
• The global burden of TB remains enormous
• TB infection – 1/3 of the world’s population

Global Tuberculosis Report
WHO Report 2015

Global Tuberculosis Report
WHO Report 2015

• The global burden of TB remains enormous
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9.6 MILLION
PEOPLE FELL SICK WITH
TB IN 2014

5.4 MILLION
2.3 MILLION
1 MILLION
Time to wake up to shocking toll of TB
By Eric Goosby
CNN: Wed October 28, 2015

Top 10 Countries with the highest NEW TB CASES – WHO Data from 2014

WHO Global Tuberculosis Report 2015
Top 10 Countries with the highest NEW TB CASES per 100,000– WHO Data from 2014

WHO Global Tuberculosis Report 2015

Timor-Leste
TB and HIV Coinfection

• 12% of the 9.6 million new TB cases were HIV +

• 3 out of 4 of all TB – HIV co infected patients worldwide reside in Africa.

• The proportion of TB patients known to be HIV + ranged from 6% in Eritrea to 73% in Swaziland
Epidemiology of Drug Resistant TB

Definitions of Drug Resistant Tuberculosis

- MDR TB: Resistant to INH and Rifampin
- MDR TB is the precursor of XDR TB
- XDR TB: MDR TB
  - PLUS
  - Resistance to a fluoroquinolone
  - Resistance to at least one of the following injectables:
    - Amikacin, Kanamycin, Capreomycin
Drug Resistant Tuberculosis
Creation of MDR & XDR TB

• The development of drug resistant TB results from suboptimal TB control and treatment practices
• Case identification and treatment response are based on AFB smears without confirmatory cultures or susceptibility testing
• Retreatment for treatment failure not based on in vitro susceptibility studies, rather, on fixed retreatment regimens
• MDR TB can spread like susceptible TB from index patient to contacts

PBS Frontline 3/25/14 – TB Silent Killer

- Estimated 480,000 MDR TB cases in 2014
  - > 50% cases in India, China and Russian Federation
- 111,000 started on MDR TB treatment
- 50% of patients were successfully treated
- 190,000 deaths from MDR TB

WHO Global Tuberculosis Report 2015
XDR TB
WHO Report 2015

• Extensively drug-resistant TB (XDR-TB) has been reported by 105 countries
• On average, an estimated 9.7% of people with MDR-TB have XDR-TB.
• Of 2,685 XDR-TB patients in 2012
  – 682 (26%) completed their treatment successfully
  – 510 (19%) treatment failed
  – 809 (30%) patients died
  – 684 (25%) were lost to followup
Global Tuberculosis Control
WHO Report 2015

- Conventional lab tests are sputum smear microscopy and culture and drug susceptibility testing – decades

- Rapid molecular tests recommended by WHO 2008

- Xpert MTB/RIF recommended by WHO in 2010
  - Guidelines for use expanded in 10/2013

Global Tuberculosis Control – WHO Report 2015
Global Tuberculosis Control – WHO Report 2015

Cost per Patient, 2014

- Drug-susceptible TB
  - US$ 100-1,000
- MDR-TB
  - US$ 6,826 in low-income countries to US$ 21,265 in upper middle-income countries.
TB Funding– WHO 2015

Global Tuberculosis Report
WHO Report 2015

- TB Incidence rate falls by 1.5% per year
- It will take 2 centuries to eliminate TB
Strategies include

- Active identification of TB cases and initiation of correct therapy
- Treatment of TB infection in close contacts and those at risk for disease progression
- Addressing some of the mechanisms that fuel tuberculosis – social, economic and environmental

Lancet – How to Eliminate Tuberculosis Series; Nov 2015

TB IN THE UNITED STATES
2015 United States TB Cases

– 9,563 TB cases reported

– 3.0 cases per 100,000 population

– After 22nd consecutive years of declining rates – a plateau has been reached in the incidence of TB

MMWR March 25, 2016

* Provisional National Tuberculosis Surveillance System data as of March 4, 2016. Updated data will be available in CDC’s annual TB surveillance report later this year (http://www.cdc.gov/tb/statistics/).
2015 TB Cases Reported by State

- California, Texas, New York and Florida accounted
- More than 500 cases each
- Approximately half the TB cases (4,839) in 2015

The Heartland National Tuberculosis Center serves: Arizona, Arkansas, Kansas, Louisiana, Missouri, New Mexico, Nebraska, Oklahoma, and Texas.

MMWR March 25, 2016
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MMWR March 25, 2016

Foreign born cases were 66.2% of TB cases in 2015
TB incidence among foreign-born persons in the United States is 13 times the incidence among U.S.-born persons.
### Foreign-born Persons with TB, Top Countries of Origin — United States, 2015

<table>
<thead>
<tr>
<th>Country</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>1,250</td>
</tr>
<tr>
<td>Philippines</td>
<td>819</td>
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<tr>
<td>Vietnam</td>
<td>513</td>
</tr>
<tr>
<td>India</td>
<td>578</td>
</tr>
<tr>
<td>China</td>
<td>424</td>
</tr>
</tbody>
</table>

MMWR March 25, 2015


MMWR March 21, 2014
Cases of TB often occur years after entry into the U.S.

Moving toward TB elimination: implementation of statewide targeted tuberculin testing in TN
(Cain et al, AJRCCM 2012)

- 2002-2006: 102,709 TST placed and read
- 9,090 + TST: 53% started treatment of whom 54% completed treatment (25% of total)
- Estimated 195 TB cases prevented over the 5 year study period
- The # of TST placed to prevent one TB case:
  - 150 for foreign born persons
  - 9,834 for persons without TB risk
- “Yield and cost-effectiveness are maximized by prioritizing foreign-born persons; a large population with high TB risk.”
- TB among U.S. foreign born person continues to decline.
- TB among U.S. born persons has stabilized.
- TB transmission in the U.S. continues to occur.
TB Case Rates by Race/Ethnicity,

- The incidence rate is highest among Native Hawaiian/Pacific Islanders and American Indian/Alaska Natives in U.S. born
- The incidence rate is highest among Asians in foreign born

TB Cases by Residence in Correctional Facilities, Age ≥15, United States, 1993-2014*

- No. of Cases
- Percent of Total Cases
TB Cases Reported as Homeless in the 12 Months Prior to Diagnosis, Age ≥15, United States, 1993-2014*
Estimated HIV Coinfection in Persons Reported with TB, United States, 1993 – 2014*

2015 – 5.6% of TB patients HIV co infected
Primary Isoniazid Resistance in U.S.-born vs. Foreign-born Persons, United States, 1993 – 2014*

XDR TB Case Count Defined on Initial DST* by Year, 1993 – 2014**
TB Elimination in the US

- Cases of TB among foreign born reflect the global burden of TB
- Elimination of TB in the U.S. will require additional strategies to reduce TB in the countries of origin and expand the treatment of latent TB among foreign born persons.
- More emphasis is also needed on interruption of the relatively limited, but persistent, ongoing TB transmission in the U.S. among other high risk populations

Thank you!