Ohio TB Cluster OH_0066

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Objectives

- Describe 5 year outbreak of TB in southwestern Ohio and Indiana
  - 3 Homeless shelters involved
- Use of Homeless Management Information Service (HMIS) to investigate TB outbreaks
  - Potentially exposed residents
  - Self-identification as HIV-infected
- TB control in homeless shelters
TB incidence in Cincinnati and Hamilton County, Ohio averaged 6.75 and 3.33 per 100,000 residents, respectively, between 1990 and 2010.
During three separate years, TB rates have been heavily influenced by cases with matching MTB genotypes among homeless Hamilton Co. residents.
# Homeless Shelters and TB

- Poor nutrition
- Alcohol and drug use
- Crowding

1994 – 2003 in US

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>TB cases among homeless</td>
<td>6 %</td>
</tr>
<tr>
<td>Male</td>
<td>87%</td>
</tr>
<tr>
<td>HIV-infected</td>
<td>34%</td>
</tr>
</tbody>
</table>

Haddad JAMA 2005 293:2762

- Increased risk of both:
  - Endogenous reactivation of remote TB infection
  - Acquisition of new infection among shelter clients

Nardell NEJM 1986 315 1570-5
MTB genotyping among homeless Cincinnati residents

- In 1990, 11 MTB’s matching RFLP’s
  - Tuberculosis Among Residents of Shelters for the Homeless, Ohio, 1990
  - *MMWR* December 20, 1991 / 40(50);869-871,877
  - These MTB organisms were not recoverable for subsequent genotyping
    - No genotyping of our isolates until 1999

- Different genotypes were found in the two subsequent outbreaks
  - PCR 00874 in 1999 = OH_0009
  - PCR 00021 in 2007 = OH_0066
National genotyping surveillance coverage has increased substantially since NTGS started in 2004

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>51%</td>
<td>64%</td>
<td>68%</td>
<td>80%</td>
<td>80%</td>
<td>86%</td>
<td>89%</td>
</tr>
</tbody>
</table>

70,683 isolates with genotyping results

58,513 patients have genotyping results

MIRU2 added in 2009

--Smita Ghosh MS
National Tuberculosis Genotyping Service
August 2011
PCR 00021 = OH_0066

- Clustered strain identified in Illinois, early 1990’s
- Greenwood, Mississippi cluster in 2000-01
  - Generally following the I-55 corridor

<table>
<thead>
<tr>
<th></th>
<th>MO</th>
<th>OH</th>
<th>IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005 (cum.)</td>
<td>15</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2006-2010</td>
<td>9</td>
<td>23</td>
<td>4</td>
</tr>
</tbody>
</table>

--All match by spoligotyping and MIRU
--Missouri RFLP IS6110 has 12 bands
--Mississippi RFLP IS6110 has 14 bands
--Both RFLP types present in Illinois
--Belongs to EuroAmerican TB lineage

--Lauren Cowan, CDC
Index Case, October 2006

- Source case was a 39 yo AA male from Missouri who died of newly diagnosed active pulmonary TB in a Kansas City hospital on 17 January 2007
- Spent 18 consecutive nights at HS-A (Cincinnati), October 12 to 29, 2006
- Spent time at HS-B (Dayton), November, 2006
- Rx’d for “pneumonia” at a Homeless Clinic (Dayton) on 6 November 2006 (no CXR done)
Sentinel case

- 46 yo AA male with asthma
- HIV disease, CD4 15 (2%) chronically homeless, staying at HS-A (Cincinnati)
- Hosp. 28 Dec. 2006 with fever, wheezing, had clear CXR, FOB was AFB neg.,
- This is post-FOB film
- Post-FOB sputa had many AFB, and both were culture + MTB on 10 Jan. 2007
Canaries in the Coal Mine

- 4 other HIV-infected men with CD4 counts <200 from HS-A were diagnosed with active pulmonary TB in January and February 2007
- Missouri interviewed family during contact investigation of Index case
- Contacted Ohio early March 2007
PCR00021 cases, 2007-11
Ohio and Indiana

- 27 cases so far in OH_0066/IN_0069
- Median age 47 years, range 20-59

**Demographics**
- Black/AA n=20; White n=7
- Male n=26; Female n=1
- Homeless n=24
- Unknown if homeless n=3
  - Marion Co. Ohio x2, IL prisoner dx’d in IN

- 8 in HIV-infected persons
  - 6 dx’d with TB < 5 mos. after exposure
  - 2 dx’d with TB ~18 mos. after exposure
HS-A Cincinnati

HS-B Dayton

HS-C Indianapolis

11

5

3

1

4
3 HIV negative PPD converters from HS-A dx’d active pulm TB <2 years

- **53 yo AA male alcoholic**
  - Lingular infiltrate ~4 mos. after exposure
  - Initially Dx’d CAP
  - Found at homeless shelter in No. Kentucky

- **42 yo AA male substance abuser**
  - Scattered patchy densities on CXR May 2007
  - Moved to HS-C (Indianapolis)
  - Wishard Memorial Hosp. x3 mos. in late 2008

- **59 yo AA male, refused TLTBI Jan. 2007**
  - Normal CXR @18 mos. then multifocal inf. @2 yrs
  - Dx at Chillicothe CI, Ohio in late 2008
PCR00021 cases, 2007-11
Ohio and Indiana, cont’d

- 47 yo AA male HIV+ CD4 = 279 (21%)
  - Exposed at HS-A in October 2006
  - Mass sup. seg. RLL with R hilar LAN in Jan. 2007
  - FOB in Butler Co., Ohio dx’d TB in Sept. 2007
  - Finally consistent DOT in jail there Dec. 2007

- 36 yo W male HIV+ CD4 = 461 (33%)
  - Probably exposed in 2008 in Indianapolis while homeless
  - Chest CT in 8-08 had 5 mm RUL density
    - Done for c/o R sided chest pain
  - Dx’d TB in Ham. Co. 8-09 with cavitary RUL
Epidemic Curve for PCR00021 (OH_0066)

State: OHIO
County: ALL
Spoligotype: 776137607760771
Interval: Year
Date Range: 01/01/2006 - 10/07/2011
Number of cases: 25
MIRU: 224226153324
X-axis: Count Date
DataType: Count Date

*Note: 'County: ALL' refers to all the counties in the state.*
Problem: HIV and TB are bad for each other and they hang out together.
Rifamycins for HIV-infected patients with tuberculosis disease

- Rifamycins are inducers of hepatic enzymes
  - cytochrome P (CYP) 450
  - uridine diphosphate gluconyltransferase (UGT) 1A1

- Rifampin with Efavirenz, nonnucs
  - Increase Raltegravir dose to 800 mg bid

- Rifabutin with
  - Raltegravir: Rifabutin 300 mg/day and no dose adjustment for Raltegravir
  - Protease inhibitors: use 150 mg qOD
  - Maraviroc: depends on other drugs
  - Etravirine, Rilpivirine: not much info yet
### Experience with Rx of HIV-TB

Low CD4 count, ongoing unstable housing, and substance abuse issues

<table>
<thead>
<tr>
<th>CD4 (%)</th>
<th>Rifamycin/TB &amp; HIV regimen</th>
<th>AFB Cultures</th>
<th>Duration Rx</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 (2%)</td>
<td>RBT+PZA+EMB PI-based</td>
<td>Neg. sputa 4&amp;8 weeks</td>
<td>Took ~8 m. for 90 DOT</td>
<td>AST/ALT ↑ so INH dc’d</td>
</tr>
<tr>
<td>141 (23%)</td>
<td>RIPE Refused ART</td>
<td>Neg. sputa 2 weeks</td>
<td>Took ~7 m. for 90 DOT</td>
<td>Mycetoma</td>
</tr>
<tr>
<td>8 (1%)</td>
<td>RBT/IPE + PI, not taking so RIPE</td>
<td>Neg. sputa 2 weeks</td>
<td>Took ~8 m. for 90 DOT</td>
<td>Missing doses in jail</td>
</tr>
<tr>
<td>17 (5%)</td>
<td>RBT/IPE + PI, plt so IPE x 5 m.</td>
<td>Cx + 6 w. Neg. 7&amp;8</td>
<td>Took 9 m. for 130 DOT</td>
<td>PN so Moxi + Rif x 4m.</td>
</tr>
<tr>
<td>8 (1%)</td>
<td>RBT/IPE + PI</td>
<td>Cx + 8 w. Neg. 10 w.</td>
<td>Took 9 m. for 130 DOT</td>
<td>? was he taking PI</td>
</tr>
</tbody>
</table>
By 2004, HUD was directed by Congress to work with jurisdictions to gather homeless data. An HMIS is a tool that communities can use to collect ongoing data on homeless persons who use service programs. Without an HMIS, advocates and planners are forced to rely on point-in-time census counts to estimate the size of local homeless populations. One-time unduplicated counts of homeless individuals and families tend to over-represent those with the most chronic problems while under-representing those facing time-limited situational crises.
A chronically homeless individual

- currently defined by the U.S. Department of Housing and Urban Development (HUD) as:
  “an unaccompanied homeless individual with a disabling condition who has either been continuously homeless for a year or more, or has had at least four episodes of homelessness in the past three years.”
Residence at HS-A from 12 to 29 October 2006:  n = 651

34% shared 1 or 2 nights with index case
62% shared <7 nights with index case
TB Contact Investigations in Homeless Shelters: Difficult

- Transient shelter residence
- Signs and symptoms screening
  - Baseline weight?
  - Everybody coughs all winter long
- Mandatory TB screening difficult
  - Hard to enforce without staff
  - Resistance to excluding anyone
  - Public health vs. civil liberties
    - Self-neglect from MH, SA issues
HIV and TB in a homeless shelter: Contact investigation

- Complete extent of HIV infection status among the TB-exposed homeless was not known.
- HMIS of the Cincinnati/Hamilton County Continuum of Care contained confidential information about disabling conditions in the chronically homeless including:
  - Self-identified diagnosis with AIDS or having tested positive for HIV
  - 2.5% [135 of 7298] unduplicated persons in 2007
The Homeless Management Information System (HMIS) of the Cincinnati/Hamilton County Continuum of Care (CoC) is **VESTA**:

- owned and developed by The Partnership Center, Ltd. (PCL) and administered by the Cincinnati/Hamilton County Continuum of Care for the Homeless, Inc. under the support and guidance of the local HMIS Advisory Committee.

- The system contains confidential data about homeless persons within the CoC jurisdiction and is subject to strict privacy and confidentiality standards as set forth by the U.S. Department of Housing and Urban Development and overseen by the HMIS Advisory Committee.
Pursuant to those standards and consultation with HUD, Washington office and local legal counsel, the Cincinnati/Hamilton County CoC HMIS Advisory Committee released a TB Control Policy.

This permitted release of information requested by the County TB Control Program to the Health Commissioner in a manner consistent with strict confidentiality standards.
A high attack rate among HIV-infected homeless individuals exposed to TB was found using HMIS information.

- A list of 13 self-identified HIV-infected shelter residents who had shared at least one night with the decedent was available 2 months after the Index patient’s death.
- Primary care physicians of 8 were alerted to the fact that they have been exposed to tuberculosis, require TB screening, and that each should be offered treatment of latent TB infection (TLTBI) after appropriate evaluation to rule out active tuberculosis.
- This information was useful in case detection, contact investigation, and in offering preventive treatment.
### Table 1. HIV-associated multidrug-resistant tuberculosis (MDR-TB) outbreaks in industrialized countries, 1988–1995.

<table>
<thead>
<tr>
<th>Location, date [reference]</th>
<th>Patients with MDR-TB</th>
<th>Time to death, median, weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total, no.</td>
<td>HIV infected, %</td>
</tr>
<tr>
<td>Hospital (Florida), 1988–1990 [25]</td>
<td>65</td>
<td>93</td>
</tr>
<tr>
<td>Hospital (New York City), 1989–1990 [26, 27]</td>
<td>51</td>
<td>100</td>
</tr>
<tr>
<td>Hospital (New York City), 1990–1991 [27, 28]</td>
<td>70</td>
<td>95</td>
</tr>
<tr>
<td>Hospital (New York City), 1991–1992 [27, 29]</td>
<td>32</td>
<td>91</td>
</tr>
<tr>
<td>Hospital (Madrid, Spain), 1991–1995 [31]</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>Hospital (Buenos Aires, Argentina), 1994–1995 [32]</td>
<td>68</td>
<td>100</td>
</tr>
<tr>
<td>Prison system (New York State), 1990–1991 [33]</td>
<td>42</td>
<td>98</td>
</tr>
</tbody>
</table>
We can & must **ALWAYS THINK TB** when designing HIV treatment strategies & clinical facilities *anywhere on earth*

- particularly in countries with high TB incidence/prevalence
Confidentiality: HIV & TB

- AIDS is a reportable disease in every state.
  - The requirements for reporting HIV infection differ from state to state.
  - HIV reports are held in strictest confidence & in many jurisdictions are protected by statute from subpoena.

- TB disease is reportable in every state.
  - Each state’s disease surveillance is encrypted.
Confidentiality: HIV & TB

- Because HIV infection & AIDS can have serious implications for TB control, some health jurisdictions have specific rules & regulations for the sharing of information between TB & HIV/AIDS programs.
- For clinical care purposes, HIV-related information should be shared between TB health care workers & other health care workers in accordance with state & local laws.
Good afternoon, Molly.

SYSTEM MESSAGES

ACTIVE CLIENTS QUICK LIST
+ Fuzzy6613
+ Imogen6179
+ Milo3357
+ Paisley2773
+ Palma0323
+ Perryce6089
+ Persimmon7121
+ Philippa5693
+ Psalms5531
+ Rhododendron0849
+ Ruby1667

ERROR ALERTS
Note that error alert checking is not instantaneous. If you correct data causing an error alert, it may take 20 minutes or more for the alert to clear.

No error alerts logged for any user in current program

INCOMPLETE INTAKES AND EXITS

USER AGREEMENT
Your HMIS user agreement will expire on 12/31/2010. What's a user agreement vs. a digital certificate?

DIGITAL CERTIFICATE
Digital certificate not required. What's a digital certificate vs. a user agreement?
It is feasible to include information about TB exposure and need for TB screening into HMIS records of homeless individuals.
HMIS

- Identify/develop tools to track and communicate with homeless persons and service providers
  - Across shelters in your region
- Promote & utilize records of shelter residence during potential exposures
- Active participation in local Homeless Coalition
- Annual renewal of HMIS license fees & compliance with user requirements
TB and homeless shelters: Goals

- Early identification and effective treatment of active TB cases among homeless shelter residents
- Hospitalization in an acute-care or long-term-care facility or appropriate housing for such patients with active TB until they are no longer infectious or, ideally, until completion of therapy
- Directly supervised therapy until completion of treatment for active TB
- Directly supervised preventive therapy for shelter residents at high risk for TB
- Awareness of HIV-infection status for appropriate selection and monitoring of TB treatment and preventive therapy
- Appropriate ventilation and other environmental control measures in shelters
- Routine surveillance of shelter staff for tuberculous infection
- Close cooperation between programs and staff operating homeless shelters and the health department for ongoing control of TB among homeless populations.
TB Control and Homeless Shelters: Lessons Learned

- Organization and training of shelter staff varies
  - Limited on site medical care
  - Staff may not be available or licensed to drive clients to clinic for CXR’s and medical evaluation
  - Portable CXR’s may be poor quality

- Not all shelters require TB screening
  - Offer incentives to place/read TST’s
TB Control in Homeless Shelters

- Education for Shelter Workers
- Long-term relationship
  - TB Control staff and shelter staff
- Consistent TB testing
  - Outreach worker
  - Record keeping
- Epi-Links made through TB genotyping show missed opportunities for TLTBI and early case detection
Shelters and TB: What Staff Need to Know, 2nd Ed.

- Designed for homeless shelter staff, *Shelters and TB: What Staff Need to Know* is an 18-minute training video about how to prevent the spread of TB in homeless shelters.
- After viewing this video and accompanying viewer’s guide, the user will be able to describe:
  - what TB is
  - how it is spread
  - what to do when staff suspects someone with TB
  - how to develop and implement a TB infection control policy
  - how shelters and health departments can work together to create a healthy and safe environment for staff and clients