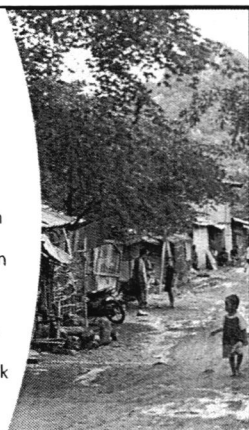


Multi Drug-Resistant Tuberculosis Outbreak: A Preventable Emergency

Laura Andersen, MPH, Nora
Moore, MSc, Lynne Ogawa MD

Brief history of tuberculosis (TB) in the Hmong Community

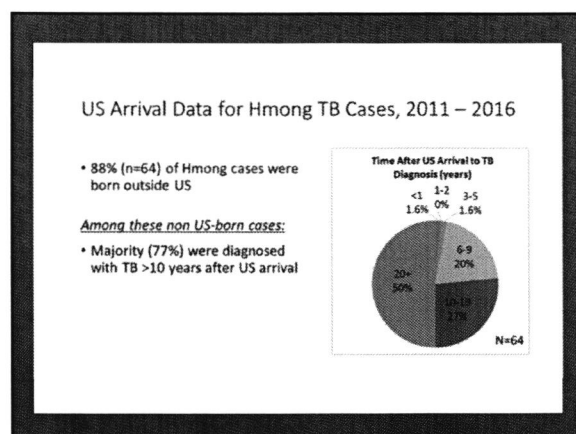
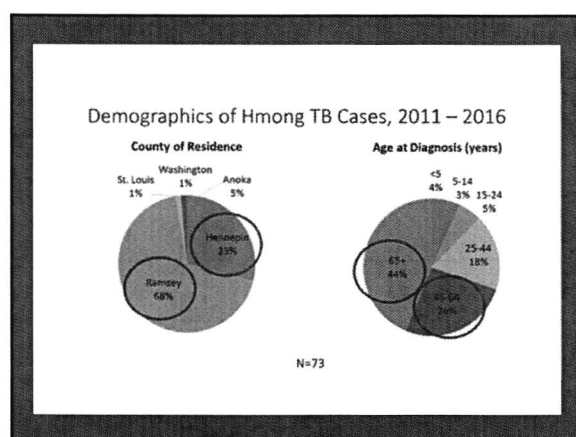
- Hmong – ethnic group from mountainous regions of China, Vietnam, Laos, Burma, & Thailand
- After helping the US in the Vietnam War, Laotian Hmong fled to Thailand; US resettlement started in 1975
- “Over 85% of refugees originate from, and remain within, countries with high burdens of TB [...] Refugees are at particularly high risk of developing TB.” – World Health Organization

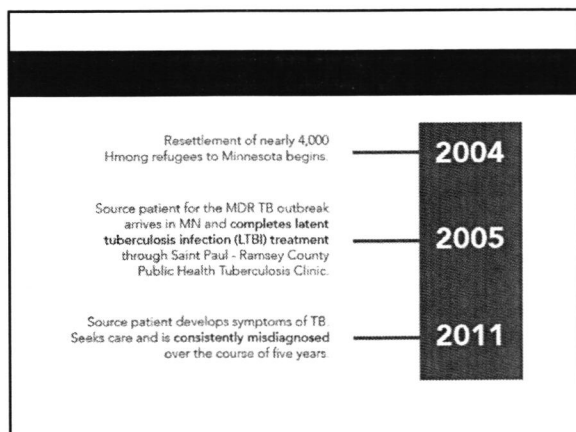


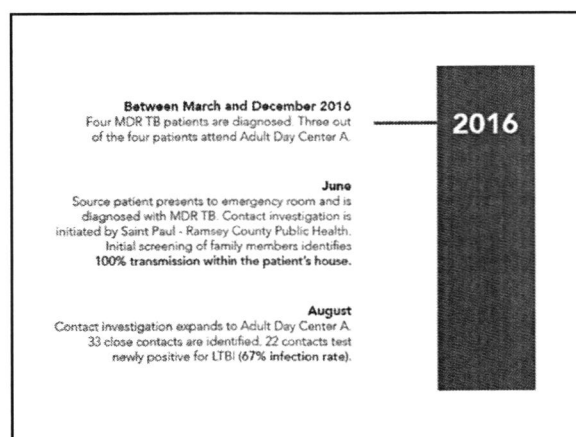
TB among Hmong refugees arriving in MN

Country of Origin	Year of US Arrival					
	1999-2008		2009-2014		Total	
	Screened	TB Infection* (%)	Screened	TB Infection* (%)	Screened	TB Infection* (%)
Sierra Leone	11,200	1,244 (11%)	2,175	1,497 (69%)	13,375	2,741 (20%)
Burma	2,375	108 (5%)	9,094	541 (6%)	11,469	1,551 (13%)
Laos (Hmong)	5,056	790 (15%)	115	9 (8%)	5,171	799 (15%)
Ethiopia	3,380	1,962 (58%)	761	287 (38%)	4,141	2,249 (54%)
Laos (Other)	2,234	1,299 (58%)	77	270 (35%)	2,311	1,569 (68%)
Iran	76	30 (39%)	1,184	174 (15%)	1,260	204 (16%)
Guatemala	65	33 (51%)	1,387	277 (20%)	1,452	310 (21%)
Other	1,112	1,941 (17%)	1,125	73 (6%)	2,237	2,014 (90%)
Total	15,771	12,419 (79%)	14,211	3,961 (28%)	29,982	16,379 (55%)

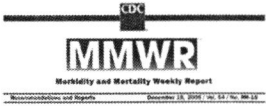
*Screened for TB during post-arrival refugee health assessment, generally initiated within 90 days of U.S. Arrival
**Latent TB Infection (N=16,038) or active TB disease (N=438)







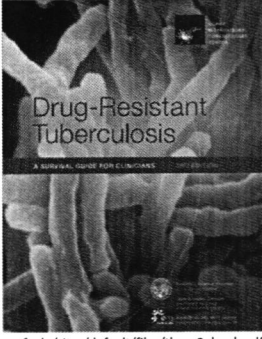
Contact Investigation Resources



Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis
Recommendations from the National Tuberculosis Controllers Association and CDC

Guidelines for Using the QuantiFERON®-TB Gold Test for Detecting Mycobacterium tuberculosis Infection, United States

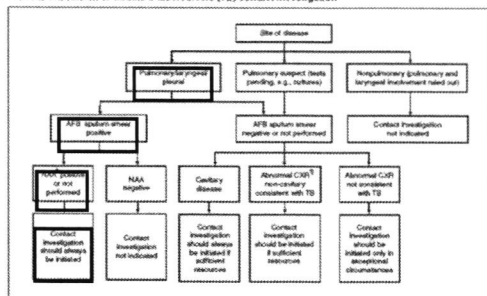
<https://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf>



Drug-Resistant Tuberculosis
A SURVIVAL GUIDE FOR CLINICIANS

https://www.currytbcenter.ucsf.edu/sites/default/files/tb_sg3_book.pdf

FIGURE 1. Decision to initiate a tuberculosis (TB) contact investigation



* Acid-fast bacilli.
† Nucleic acid assay.
‡ According to CDC guidelines.
§ Chest radiograph.

Index Case: initiating a CI

<https://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf>

Initial Results

Senior Center 1 st Ring	Type of Contact	Number Identified, n	Previously Positive, n	Newly Positive, n (%)
	Household	7	0	7 (100)
	Card Player	10	3	7 (100)
	Lunch table	10	0	5 (50)
	Staff	13	3	8 (80)
	Total	40	5	27 (77)

February

Fifth MDR TB case identified. Genetic testing closely matches source case, but there is **NO** link identified to Adult Day Center A.

2017

March

CDC EPI-AID arrives and recommends screening every attendant of Adult Day Center A who spent **>= 6 hours** with source patient.

Determining Infectious Period

TABLE 2. Guidelines for estimating the beginning of the period of infectiousness of persons with tuberculosis (TB), by index case characteristics¹

Characteristic			
TB symptoms	AFB ² sputum smear positive	Cavitary chest radiograph	Recommended minimum beginning of likely period of infectiousness
Yes	No	No	3 months before symptoms onset or first positive finding (e.g., abnormal chest radiograph) consistent with TB disease, whichever is longer
Yes	Yes	Yes	3 months before symptoms onset or first positive finding consistent with TB disease, whichever is longer
No	No	No	4 weeks before date of suspected diagnosis
No	Yes	Yes	3 months before first positive finding consistent with TB

SOURCE: California Department of Health Services Tuberculosis Control Branch, California Tuberculosis Controllers Association. Contact investigation guidelines. Berkeley, CA: California Department of Health Services, 1999.

¹ Acid fast bacilli.

<https://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf>

Index Case Infectious Period:

3/10/11 to 6/17/16

- 6/2011, Pre-operative CXR: Consolidation in LUL
- 7/2011, Chest CT: Left lung opacity c/w dense pneumonia
- 6/2013, Seen for cough: Dx bronchitis, given macrolide
- 10/2013, CXR for shortness of breath: Infiltrate in LLL and LUL
- 1/2015, Clinic visit for cough, SOB, night sweats, wt loss. **CXR & CT ordered, referred to pulm but didn't go.**
- 2/2015, Chest CT: Decreased size of opacity, but now cavitary

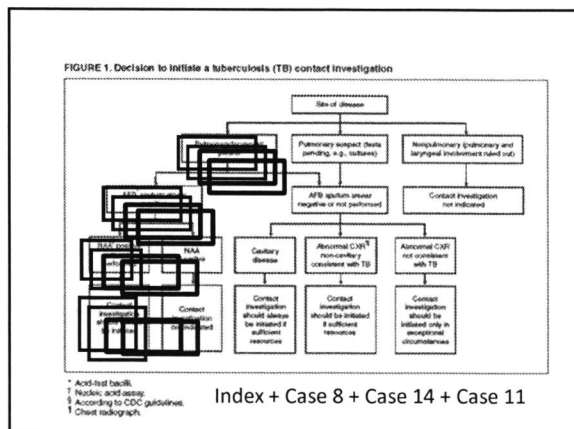
April
Sixth MDR TB case identified with a confirmed link to Adult Day Center A.

May
Mass screening at Adult Day Center A occurs over two days. 88 people are screened by a team including Ramsay County nurses, community paramedics, laboratory staff and contracted X-ray technicians. **40 people are recommended for further evaluation.**

June - September
Four additional MDR TB cases identified. **All attended Adult Day Center A.**

September
Second mass screening at Adult Day Center A occurs. 51 people are screened. 19 people are recommended for further evaluation. By the end of September there are **10 MDR TB patients** all with similar genetic links and eight with attendance at Adult Day Center A.

2017

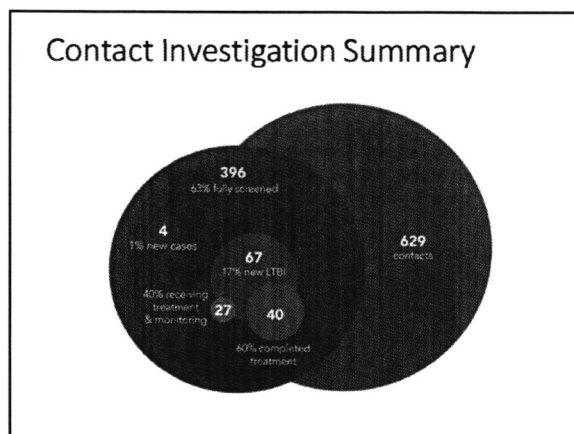


April
 11th MDR TB outbreak case identified. Patient is the nephew of the source patient. He was not identified in contact investigation.

August
 Post-exposure screening continues. 64 out of 391 people are diagnosed with LTBI and an additional 63 people require treatment and follow up due to previous LTBI, TB disease and/or immunocompromising conditions.

December
 An additional 2 MDR TB cases are identified. Both had connections to Adult Day Center A and were being actively monitored by Saint Paul - Ramsey County Public Health.

2018



Outbreak Case Characteristics

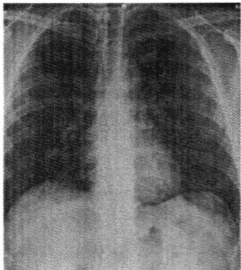
- Total of 13 cases in outbreak
 - 3 close contacts of index case at senior center
 - All (100%) residents of Ramsey County
 - 77% (10/13) common senior center exposure
 - Average age: 67 (range 33-96 years)
 - 12/13 (92%) born outside the U.S.: Laos (11/13); Thailand (1/13)
 - 38% (5/13) were in the Wat refugee camp in Thailand
 - Years in the U.S. at TB diagnosis— average: 23, range 11-37 (1 n/a US born)
- 54% (7/13) had co-morbidities increasing risk of TB
 - Diabetes, kidney disease: most common; 1 HIV+
- 77% (10/13) had pulmonary TB

Our patients...

Comorbidities (diabetes, HIV)
"Diagnosis denial"
Varying familial support
Inadequate financial support
Mental health concerns
Unstable housing
Chemical dependency
Insecure housing
Developmental disabilities

MDR Case Review

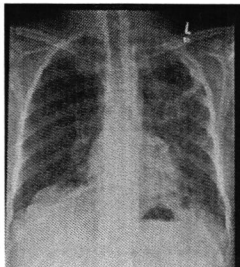
- **Case A**
 - 33 yrs. old U.S. born male
 - No co-morbidities
 - Staff at Adult Day Care Center A
 - Identified initially as new LTBI; tried/failed moxi and levo
 - Moved to active monitoring
 - Routine visit he was found to have weight loss but no other symptoms and this CXR



MDR Case Review

• Case B

- 73 yrs. Old, non-US born
- Wat Tham Krabok Camp resident
- Previously treated for INH resistant active TB in 2007
- Multiple co-morbidities
- Card player at Adult Day Care Center A
- Identified initially as previously diagnosed active TB disease
- Chronic abnormal CXR
- Refused contact, follow up and active monitoring



Providers who see patients as "more than" their TB... have better treatment outcomes



ADVOCATE FOR FAMILY INVOLVEMENT



ADVOCATE FOR DIFFERENT MEDICATIONS



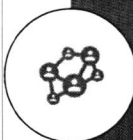
DELAY ONSET OF TREATMENT UNTIL DRUG SENSITIVITY TESTING RESULTS ARE AVAILABLE



IDENTIFY HUMAN/SOCIAL SUPPORTS AS PART OF TREATMENT

Strengthen relationships with community partners and providers

- Trainings to providers, multiple publications/presentations at conferences like this one
- Meetings with two healthcare systems to explore possible alternative to prolonged hospitalizations
- Working toward interconnectivity with other county services and more interagency collaboration



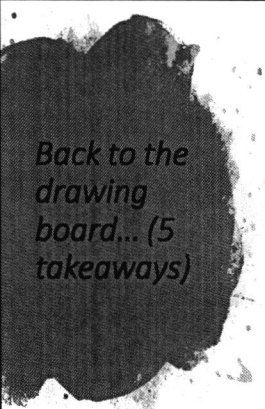
	2016	2017	2018	2019	Total from 2016 to date
Total MDR TB cases	0	8	10	4	22
Total Hmong MDR TB cases	5	8	7	3	23
Hennepin County	0	0	1	1	2
Ramsey County	5	8	6	2	21
Washington County	1	0	0	0	1
Link to Ramsey senior center	3	6	2	0	11
Died – all causes	3	3	1	0	7
Died from TB	1	2	0	0	3
Outbreak cases = related cluster of Hmong MDR TB (based on WGS, epidemiology, and clinical information)**	4	6**	3	0	13**
Ramsey County	4	6	3	0	13
Link to senior center	3	5	2	0	10
Died – all causes	2	2	1	0	5
Died from TB	0	1	0	0	1

Guidelines will be written, broken, and re-written

- ▲ High prevalence of disease prior to outbreak investigation
- Need for multiple screenings, post-exposure = 8 to 10 weeks after last exposure
- ⌚ Intensity and duration of contact with index case unknown
- ? Underlying immunocompromising conditions unknown, at least, at first
- 👤 Large no-show rate for clinic appointments

Back to the drawing board... (5 takeaways)

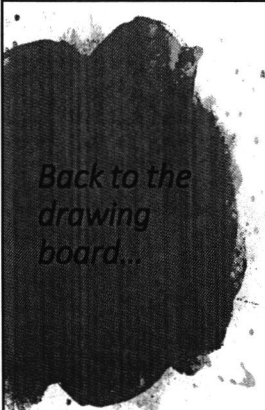
- Forget about controlling the message.
- Provide some data, not too much. Provide it regularly, internally and externally.
- Before the outbreak:
 - Know your healthcare providers
 - Know your mental health supports
 - Know your community engagement specialists
- Hire staff from the communities most impacted by your work.
- Know your own value. Do not be afraid to ask questions.



Back to the drawing board... (5 takeaways)

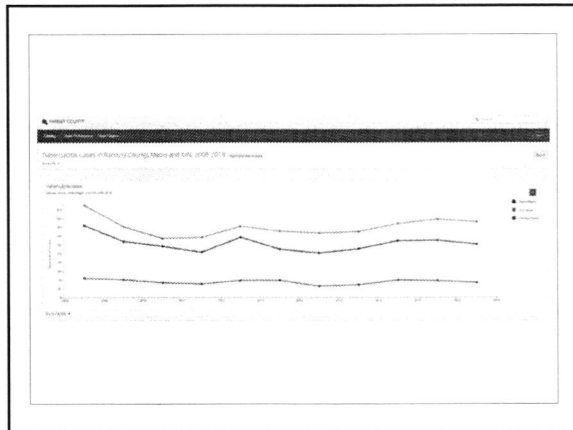
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What are the signs and symptoms?

Some symptoms of TB are feeling weak, tired, losing weight, having a fever, chills, night sweats, chest pain, cough, breathing problems. The main symptom of TB is coughing for more than three weeks.

How can you find out if you have TB?

When someone has an infectious case of TB diagnosed, our staff talk to the individual and family members to look for others who may have been exposed. These individuals are not contagious, but they have had prolonged, close contact at home, at work, or in social settings. These contacts are evaluated for signs of TB, tested for TB, and treated if necessary.

What if you are treated?

Most cases of TB are treated with a combination of four drugs: isoniazid, rifampin, pyrazinamide, and ethambutol. Treatment usually lasts for 6 to 9 months. Some cases of TB are treated with a combination of two drugs: isoniazid and rifampin. Treatment usually lasts for 9 to 12 months. Some cases of TB are treated with a combination of three drugs: isoniazid, rifampin, and pyrazinamide. Treatment usually lasts for 6 to 9 months.

What if you are not treated?

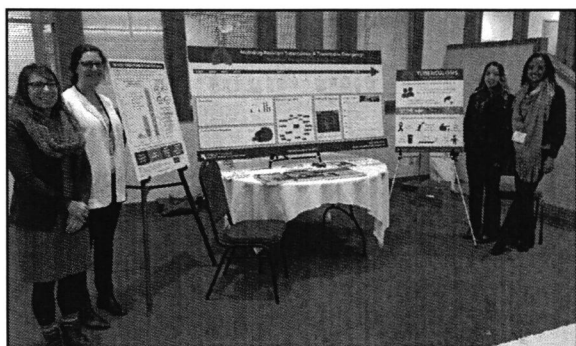
Untreated TB can lead to serious complications, including damage to the lungs and other organs. It can also be spread to others. Untreated TB can also lead to death.

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Ramsey County staff presenting,
Community Health Conference 2018

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- MDR-TB screening and treatment guidelines, developed in consultation with national experts *(but applied differently by different providers... and jurisdictions)*
- Tracking of hundreds of contacts for 2+ years thru internal clinic and community clinics in and out of jurisdiction
- Ongoing challenges around communicating risk exposure with an airborne infectious disease
- Avoiding/addressing staff burnout
- Knowing the risk factors our Hmong elders contend with *(and what that means for progression to active disease)*

- Prevention-oriented grant funding to address high rates of diabetes among Hmong community partners
- Stronger screening and referral protocols in local correctional health facilities and in community shelters
- Sharing electronic health record with social services
- Addressing our 340B status to provide more access to medications
- Tracking and improving our LTBI outcomes



Questions?
