XDR-TB: Evolving Role of Public Health in Tuberculosis

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March 22, 2016

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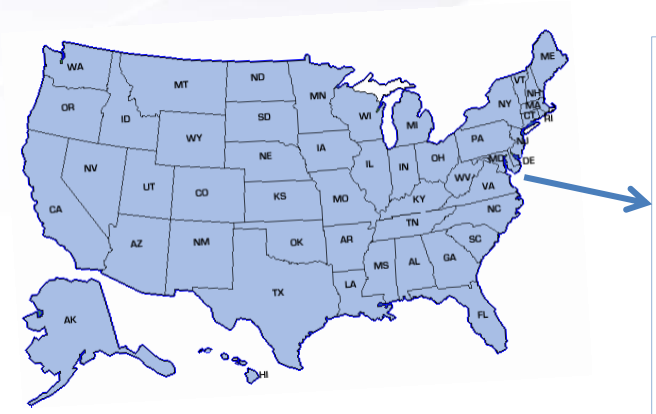

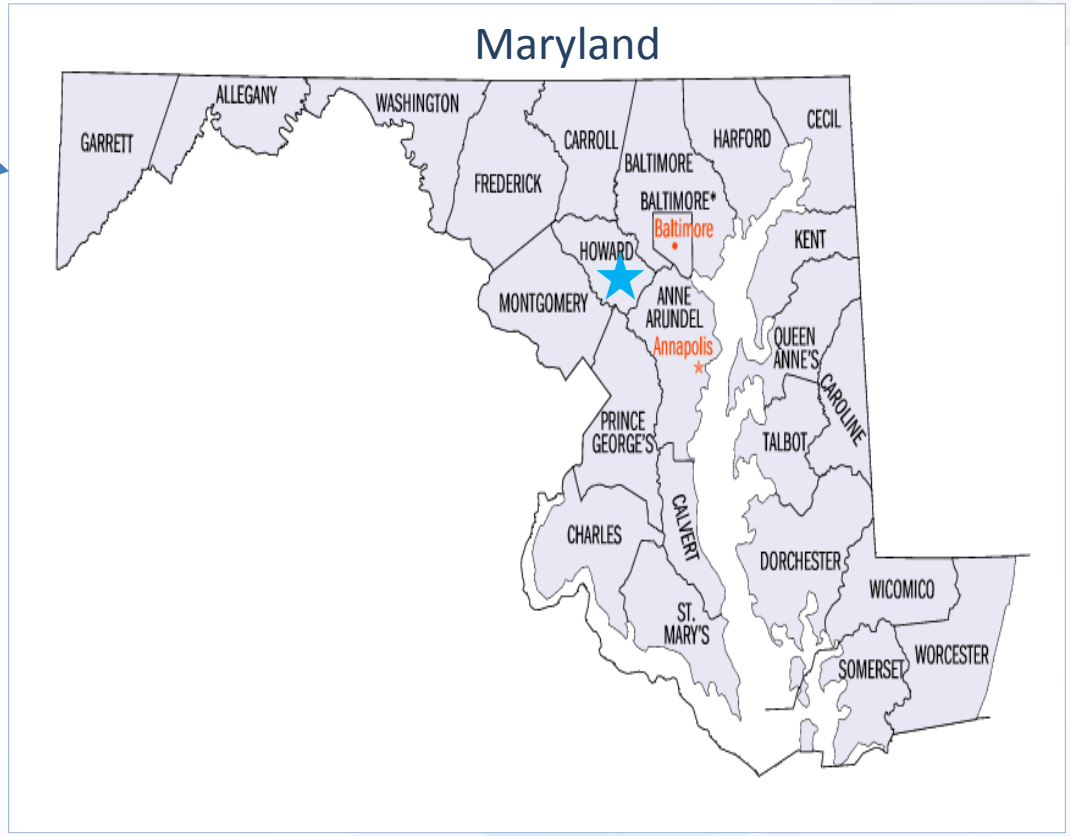

References: United State Census Map, 2015

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Howard County Demographics

- **Howard County is one of the wealthiest counties in the United States.**
- **Population of 304,000: 1 out of 6 residents is foreign born.**
- **95 % are High School graduates**
- **60 % are College/Professional graduates**

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Howard County TB cases

Year	Angola	China	Ethiopia	India	Iran	Korea	Malaysia	Mexico	Myanmar	Nigeria	Russia	Thailand	US	Vietnam	Total
2013	0	0	0	3	0	1	1	0	0	0	0	0	4	0	9
2014	1	2	0	2	0	0	0	0	1	0	1	0	2	0	9
2015	0	1	2	2	1	1	0	1	1	1	0	1	0	1	12

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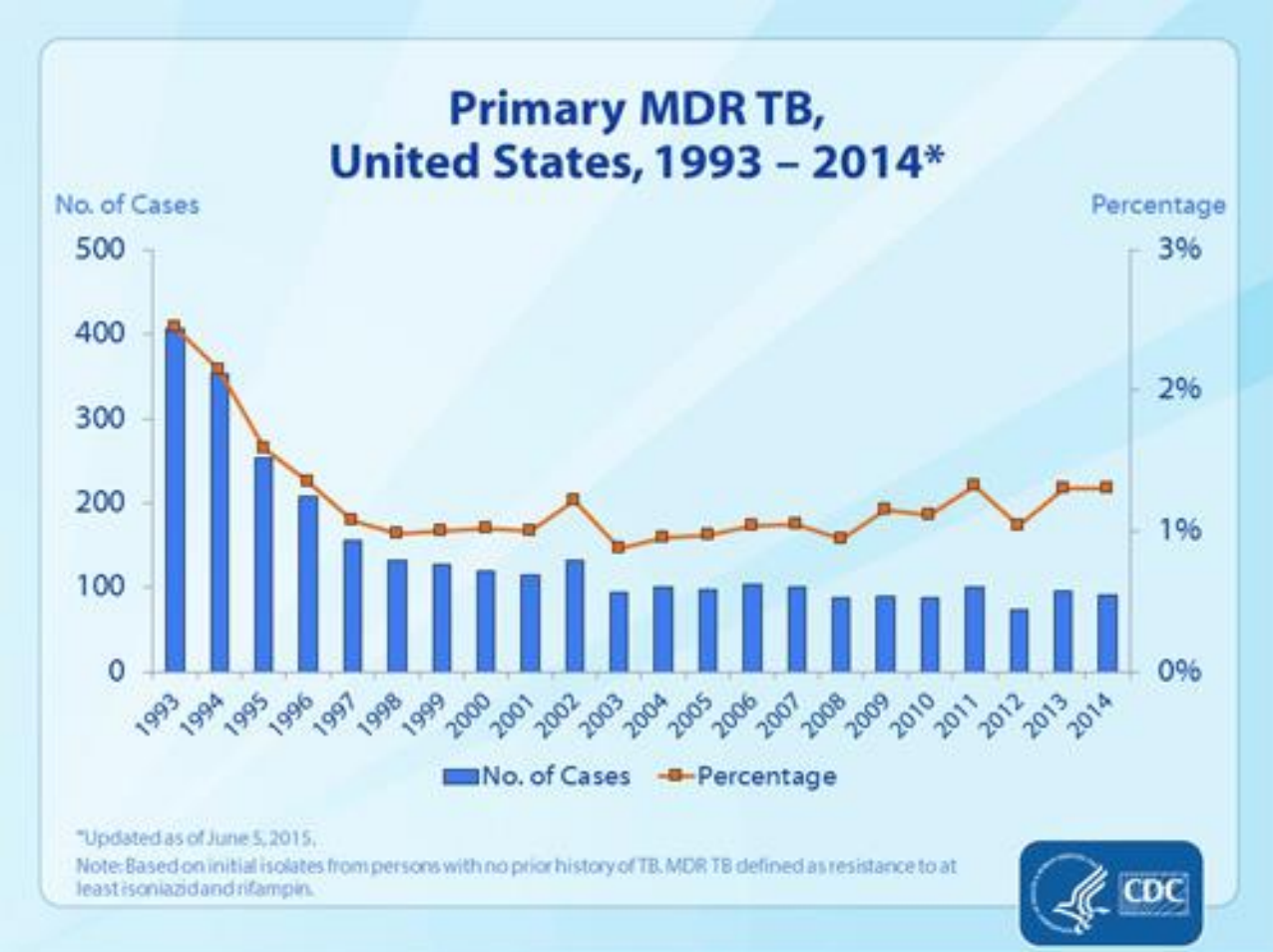
MDR-TB in the U.S.



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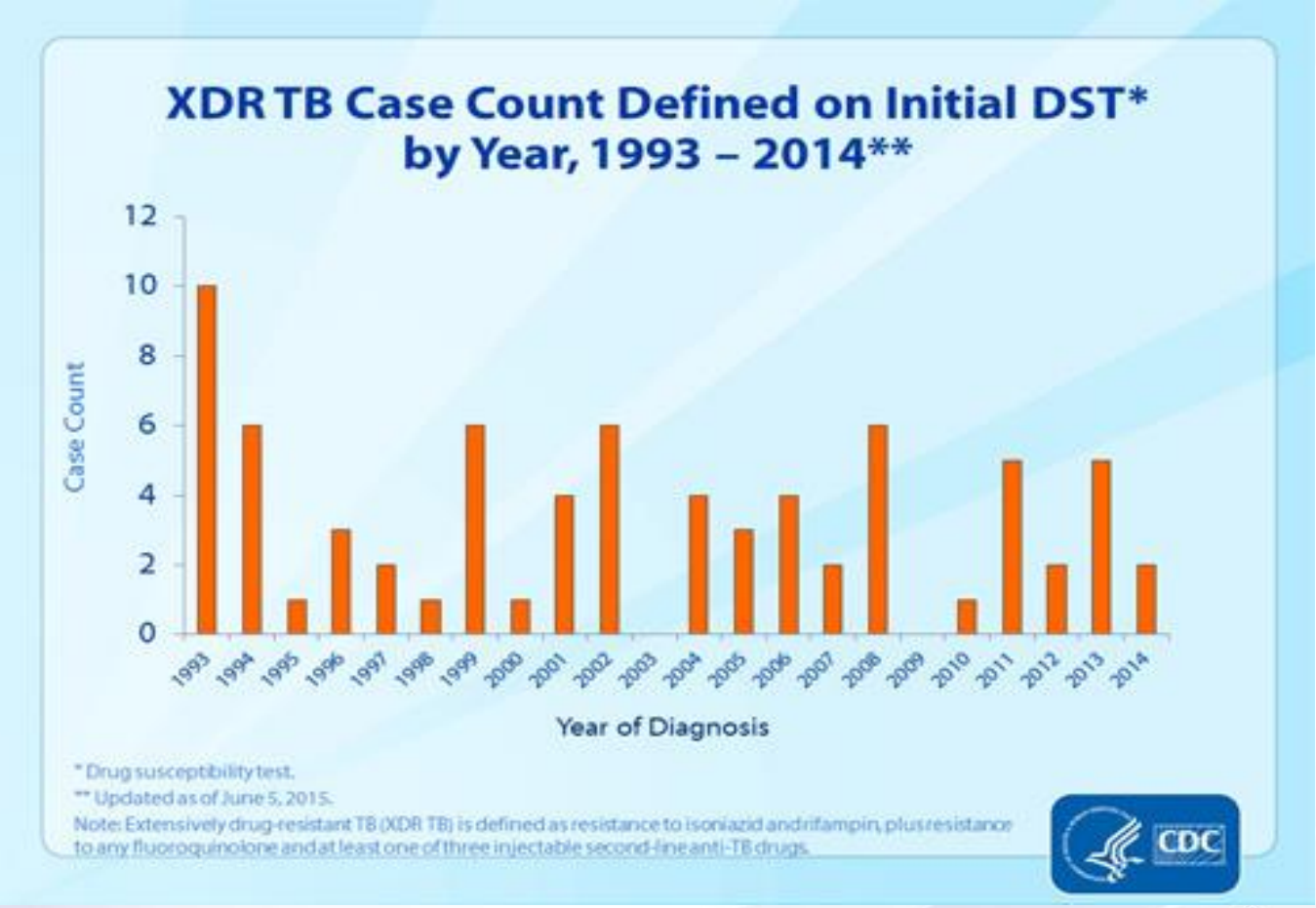
XDR-TB in the U.S.



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Pediatric XDR – TB Case Background

- Healthy U.S. born two-year-old of foreign-born parents
- Parents are healthcare professionals experienced with TB
- Traveled to India from 5/31/13 – 8/20/13
- Healthy household members: mother, father, five-year-old sibling
- U.S. daycare attendee before and after India trip

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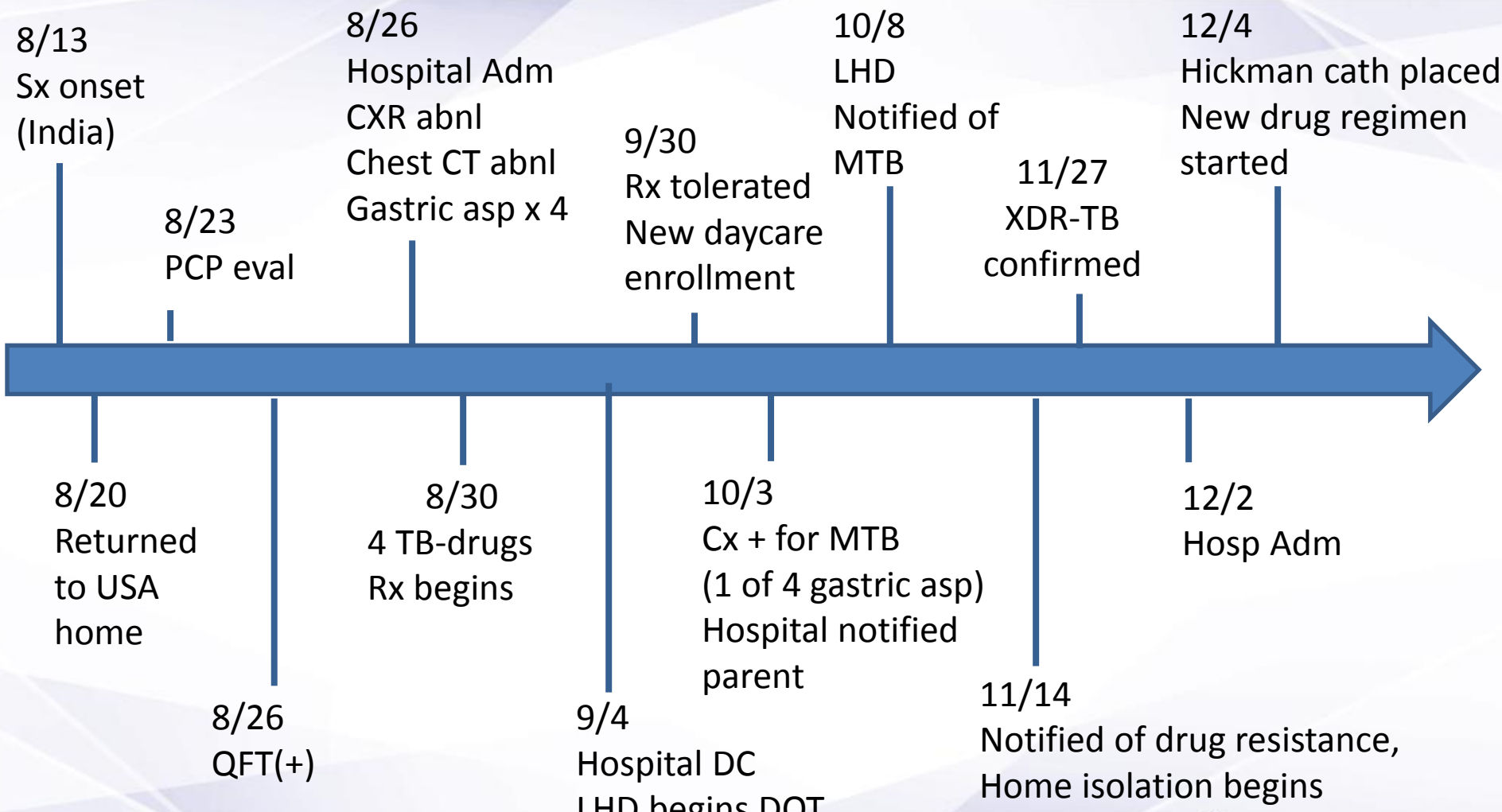
Pediatric XDR-TB Timeline



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Pediatric XDR-TB Case

XDR-TB Drug Resistance Profile

First-line drugs	Fluoroquinolone	Second-line drugs
Isoniazid	Moxifloxacin	Amikacin
Rifampin		Kanamycin
Pyrazinamide		Capreomycin
Ethambutol		

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Pediatric XDR-TB Regimen

Medication	Frequency
Streptomycin intravenous (25 mg/kg)	**Once daily**
Linezolid (20 mg/kg/day-divided dose)	**Twice daily**
PAS (150 mg/kg/day-divided dose)	**Twice daily**
Cylcoserine (20 mg/kg/day-divided dose)	**Twice daily**
Clofazimine (50 mg)	**Once daily**
Vitamin B_6 (12.5 mg)	**Once daily**

- Regimen changed during course of treatment based upon patient weight, drug levels, and ongoing consultations
- Total treatment period was 21 months

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Pediatric XDR-TB LHD Challenges

- **Care Coordination**
  - Family
  - Private provider
  - Local and state health departments and the CDC
  - Other academic faculty working in TB clinical practice and research

- **Public Health Responsibilities**
  - Consultations with local, state, federal, and international TB experts
  - DOT
  - Contact/Source case investigations

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Pediatric XDR-TB DOT Challenge

- Small LHD TB Program
- Special order medications
- Lack of DOT awareness and acceptance
- Multiple DOT visits
  - Morning visits 90 minutes
  - Evening visits 30-45 minutes
  - Residence 45 minutes from the LHD

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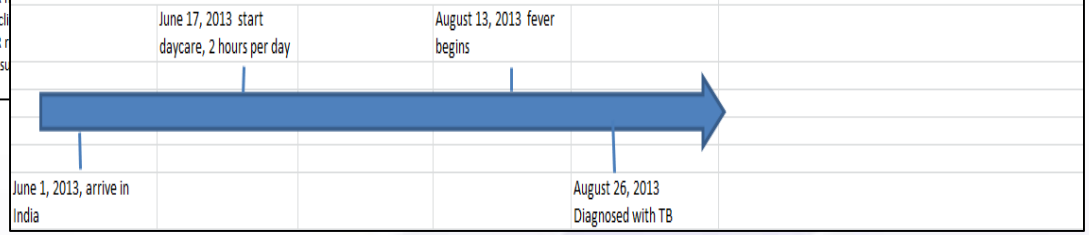
Pediatric XDR-TB Investigation Challenge

Index case information: Symptoms of fever began 8/13/2013.					
Presumptive diagnosis of TB 8/26/2013, abnormal CXR, QFT (+), fevers. MDR status known ~11/13/2013. Preliminary (MDDR) drug resistance known 11/22/2013					
Relationship to Case	Travel History	IGRA/TST	Imaging	Results reviewed	Comments
Father	India in 2011 for 3-4 weeks to visit family and friends. Traveled to and from India with kids in June 2013.	History of positive PPD (30mm) in 1998 at Hospital. QFT (+) 7/6/2011. Refused TLTBI.	CXR done 11/25/2013, per report is normal	CXR reviewed by CTBCP consultant, no evidence of TB.	Family members live in the Mumbai area; have never been treated for TB, none have symptoms. One brother lives out of state, and visits family about 1 x a year; no symptoms of TB. No visitors from India, or anywhere else, to home
Mother	India in 2011 for 3-4 weeks. No travel in the last year.	QFT (-) in Sept. and Nov.	None	Yes b	
Sibling (5 y.o.)	To India 5/31/2013 Returned 8/20/2013 India in 2011 for 3-4 weeks.	QFT (-) in Sept. and Nov. 2013 by LHD. TST (-)June 2013 in India per report from father. Rec'd BCG vaccine 6/10/2013 per report.	CXR done 12/14/2013	Yes b CXR r consu	
Self: Primary case (3 y.o.)	To India 5/31/2013 Returned 8/20/2013 India in 2011 for 3-4 weeks.	QFT (+) in Aug, pos. culture MTB: gastric aspirate TST (-) June 2013 in India per report from father. Rec'd BCG vaccine 6/10/2013 per report.			
Grandfather	To U.S. 9/7/2013 - 9/29/2013. Returned to U.S. 11/30/2013 - 12/29/2013 to care for index case.	QFT (+) in Sept.	CXR done in India 11/15/2013, per report is normal	Yes fo CXR h TB cli CXR r consu TB.	
Grandmother	No travel to U.S. in last 2 years.	Unknown	Unknown		May be traveling to U.S. late Dec./early Jan. to care for child for 2-3 months. Father denies any symptoms of TB or prior tx for TB. **Update:** Grandmother was not able to travel to U.S. due to an undescribed health problem.
Cook in grandparents house		Unknown	Unknown		Father denies cook has any TB symptoms
Driver for grandparents		Unknown	Unknown		Father denies cook has any TB symptoms
Day care in U.S.	Prior to travel to India				Decision was made by TB experts not to do a source case investigation at this daycare.
Day care in India:					Both children attended the day care in India from 6/17/2013 - 8/9/2013. Primary case attended 2 hours per day M-F, sibling attended 3 hours per day M-F. Siblings were in different rooms at day care. Father met the primary teacher for each child, stated he did not note symptoms of TB among the staff he met.

Timeline



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Strengths

- Federal, state, local agencies and private provider worked efficiently, collaboratively, and compassionately as a team
- Customized medications were facilitated
  - Patient had private health insurance
  - Hospital pediatric pharmacy prepared unit dosing and provided guidance for administering meds and for monitoring possible side effects
- LHD provided DOT twice daily 7 days a week
  - LHD funds used to hire agency nurse for evening and weekend DOT
- Child responded favorably to treatment

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Weaknesses

- **Multiple conference calls**
  - **Up to 24 people on initial calls**
    - **Numerous private and public health experts**
- **Varying and conflicting opinions expressed by experts**

  <u>Example</u>:
  - **Experts stated that child was not infectious**
  - **LHD was not using respiratory precautions BUT…**
    - **Airborne isolation was in place while patient was in the hospital, AND**
    - **Respiratory precautions ordered for pediatric home health team**
- **Funding was not readily available for specialized medications or staff overtime – private insurance and HO approved county funds to assist**

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Opportunities

- Positive culture allowing for susceptibility testing
- Family had health insurance
  - Allowed for purchase / preparation of medications
  - Paid for appointments including labs, vision, audiology and vestibular assessments, and consultations with specialists
- Private provider was open and willing to collaborate with LHD
- Medications were tolerated
  - Minimal side effects

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Threats

- **Toddler with XDR-TB**
- **Multiple Voices**
  - **Notoriety of diagnosis**
  - **Family priorities versus public health priorities**
- **DOT**
  - **Missed DOT doses extended treatment**
  - **Identifying funding for extensive DOT coverage**

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Lessons Learned

- **Collaboration is the key to treatment success**
- **Consider effects of long-term intense treatment on child and family**
  - **Length of treatment**
- **DOT Schedule:**
  - **Initial twice daily visits**
  - **Length of home visits due to IV therapy and spacing of medications**
  - **Consider DOT team – initially, various LHD nurses provided DOT**
  - **Adjust work schedules to provide DOT into evening hours and weekends**
- **Staff Awareness:**
  - **Resource packets**
  - **HD provided respiratory training for additional staff**
  - **Cultural Competency**
  - **Navigating the experts**

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Update on child with XDR

- Seen by private provider in October, 2015
- No symptoms of TB
- Bronze skin color from Clofazimine slightly improved – expect complete resolution to take several years
- TSH and free T4 is normal – off Synthroid
- Child is enjoying kindergarten, and gaining weight appropriately
- Next follow up in March, 2016

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Acknowledgements

- Maryland Department of Health and Mental Hygiene – Center for Tuberculosis Control Program (CTBCP)
  - Nancy Baruch RN, MBA, Maryland TB Controller
  - Maureen Donovan RN, MGA, Nurse Consultant
  - Lisa Paulos RN, MPH, Epidemiologist

- Howard County Health Department
  - Maura Rossman, M.D., Health Officer
  - Bernard Farrell, M.D., TB Clinician
  - Elizabeth Menachery, M.D., Medical Director
  - Andrea Raid, RN, Director of Communicable Disease
  - Dorothy Bauman, RN, Staff TB Control Nurse
  - Sandra Nicholas, LPN
  - Tial Zawkhai, LPN
  - Susan Bauhaus, RN
  - Wendy Kensie, RN, JPS
  - Fiori Tesfamariam, LPN
  - Marilyn Birkner, Clerical
  - Zakariya Kmir, HCPSS Gifted & Talented Program Student Intern

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Moving Forward

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Questions?

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