



# **Pediatric TB Case Presentation**

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# Incidence of Tuberculosis

- In 2020, there were 317 cases of TB disease among children ages 14 years or younger in the United States. This accounted for 4% of all people reported with TB nationally.
- The toddler/preschool group (age 1–4 years) comprised 38% of pediatric TB cases.
- 35 cases of Tuberculosis were reported in Wisconsin in 2020.
- Racine County had 4 cases in 2020.

[dhs.wi.gov/tb/index](https://dhs.wi.gov/tb/index)

[Wisconsin Tuberculosis Cases by Public Health Region and by County 2011-2020](#)

[Children](#) | [TB in Specific Populations](#) | [TB](#) | [CDC](#)



# Case Patient

- 21 month old
- Hispanic male
- City of Racine resident
- Single family house
- Lives with his mom, baby sister, maternal grandmother, grandfather, aunt, aunt's boyfriend
- He does not attend daycare
- Cousins come to his house daily for child care
- Grandma and Grandpa care for him during day
- His dad lives in the city but does not see him everyday

# Clinical Presentation of Patient

- 2/25/20 – Pneumonia & ear infection diagnosed at local hospital ER; treated with antibiotics.
- 4/22/20 – Presents to ER, no improvement in cough or fever. Pneumonia persists, new antibiotic regimen initiated.
- 4/30/20 – Reevaluated for continued symptoms.



# Admitted to Children's Hospital of Wisconsin



- 5/3/20 – Presented to Children's Hospital of Wisconsin (CHW) for IV antibiotics. History of cough and fever for 2 months and weight loss, with tachycardia.



# Clinical Presentation Inpatient



- Persistent RML pneumonia, hilar adenopathy, declining growth and fevers.
- Mother reports that child seems to have a headache and light sensitivity since 5/3/20. When he is awake, he covers his head with a blanket.

# Stroke



- 5/7/2020 – Developed acute neurologic changes of left eye deviation, prompting further investigation.
- Subsequently diagnosed with small vessel acute ischemic stroke (L P1), diffuse meningeal enhancement, and mycotic aneurysms vs meningeal nodules.



# Inpatient Course of Events



- Infectious work-up revealed positive Quantiferon test, consistent with a presentation of pulmonary and CNS disseminated tuberculosis.
- Dysphagia, difficulty speaking and swallowing.
- Lumbar puncture performed; CSF samples sent for testing.





# Diagnosis of TB Meningitis & Stroke

## Quantiferon Plus Blood test:

5/4/20 collected,  
5/8/20 resulted:

- Positive
- TB NIL Value (IU/mL) 0.05
- TB 1 Ag-NIL Value (IU/mL) 0.87
- TB 2 Ag-NIL Value (IU/mL) 0.45
- Mitogen-NIL Value (IU/mL) 1.19

## Smear/Pathology/Cytology of Tissue

CSF (Cerebral spinal fluid)

- Culture of Tissue and Other Body Fluids: Positive for Mycobacterium Tuberculosis
- Nucleic Acid Amplification Negative



# Tuberculosis meningoencephalitis

## Complications

- Small vessel acute ischemic stroke (L P1),
- Esotropia of left eye
- Nasogastric tube feedings initiated due to poor oral intake
- Tuberculous meningitis, although seen in all age groups, has a peak incidence in childhood (particularly 0-4 years of age) in high prevalence areas.
- In low prevalence areas, it is more frequently encountered in adolescents and adults.

# Treatment of TB

## Inpatient treatment initiated 5/8/2020

- Isoniazid (INH) 110mg/ml daily route: NG tube
- Rifampin (RIF) 150mg Twice daily route: NG tube
- Pyrazinamide (PZA) 35mg/kg daily route: NG tube
- Amikacin (AMIK) 300 mg injection IV daily till 5/17/20
  - Ethambutol (ETH) 200 mg NG substituted for Amikacin on 5/17/20

## Treatment at discharge 5/24/20

- INH (given daily till 6/10/2021)
- RIF (given daily till 6/10/2021)
- PZA (given daily till 7/8/2020)
- ETH (given daily till 7/8/2020)





# Treatment of TB Meningitis

- Enlarged ventricles.
- Inpatient treatment started 5/7/21 for the Meningoencephalitis:
- Prednisolone 2mg/kg/day for 2 months.
- Outpatient treatment continued, tapered doses of prednisolone till 8/10/2020.
- Tapering of dose was based on improving hydrocephalus using quick brain MRI studies .





# Contact Investigation

- Mother tested on 5/8/2020:
  - IGRA Negative
  - Chest X-ray WNL (Negative)
- Household members and close contacts contacted by the City of Racine Health Department on 5/8/2020.



# Contact Investigation: 12 close contacts identified

## Quantiferon Negative for Household contacts

- Maternal Grandmother (49 yo)
- Maternal Grandfather (49 yo)
- Maternal Great Aunt ( 41 yo)
- Aunt boyfriend (25 yo)
- Maternal Aunt (18 yo)
- Sister (6 weeks old) Not tested



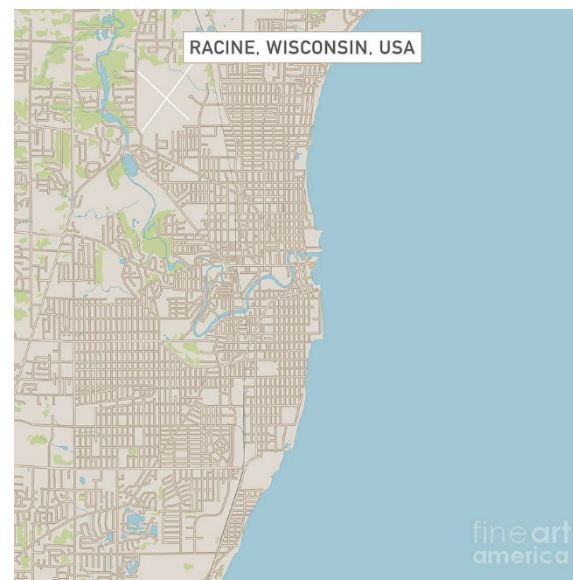
<https://theoldhouselife.com/>



# Contact Investigation, cont.

## Non Household Contacts

- Father
- Paternal Grandfather
- Father's ex-partner and children
- Paternal Uncle and Aunt (next door neighbors)
- Paternal Aunt and children
- Cousins who stay at his house during the day for childcare



# Symptomatic Close Contacts

## Father

- Reports no recent pneumonia.
- US Born
- Hispanic
- History of travel to Mexico every fall for a couple months.
- Abnormal Chest X-ray 5/9/2020
- Quantiferon Gold – TB Gold 5/9/2020: Positive
- Sputum Sample 5/12/20 collected by RHD
  - MTB Complex DNA detected
  - AFB Smear Positive
  - Rare (1-9 acid fast bacilli per 100 oil immersion fields)





# Symptomatic Close Contacts, cont.

## Paternal Uncle:

- No travel to Mexico lately.
- US Born
- Hispanic
- Diagnosed with pneumonia 5/4/2020 with abnormal chest X-ray.
- Presented to ER on 5/9/20 with continued fever and SOB discloses nephew being treated for TB.
- Close contact with child multiple times in past months.
- Hospitalized for 13 days. Thoracentesis of 1.5 L fluid on 5/10/20. VATS pleural biopsy also performed. Pleural fluid consistent with TB.
- Positive TB skin Test: 18 mm  
Indeterminate Quantiferon Gold
- Negative AFB for pleural fluid and tissue samples.



# Directly Observed Therapy

## Public Health Response:

- Daily Observed Therapy with child
- Liquid medications given through NG
- Pills were crushed and mixed with water and given through NG.
- Once NG tube was removed, child took medication with syringe by mouth (pills still crushed and mixed with water)



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# Directly Observed Therapy for Active Cases and Close Contacts

- Father received DOT for active TB for 6 months (extended because of failure to comply).
- Uncle received DOT for active TB for 6 months.
- Second Cousin (teenager) treated weekly for 12 weeks also received DOT.
- Ex-partner of father treated for LTBI. At the time she was postpartum. DOT for 1 week then filled prescription for client every month for 4 months.
- Step siblings, two children ages 5 and 3 years old, treated DOT for 2 months, Monday – Friday.

# Directly Observed Therapy for Close Contacts, cont.

- Infant sister (6 weeks of age) had negative chest X-ray. Prophylactic treatment, started INH for 6 months.
- 2 young cousins who spend the day with active case (same daycare at Grandma's house) also treated with DOT, M-F. Ages: 1 and 3 years old.





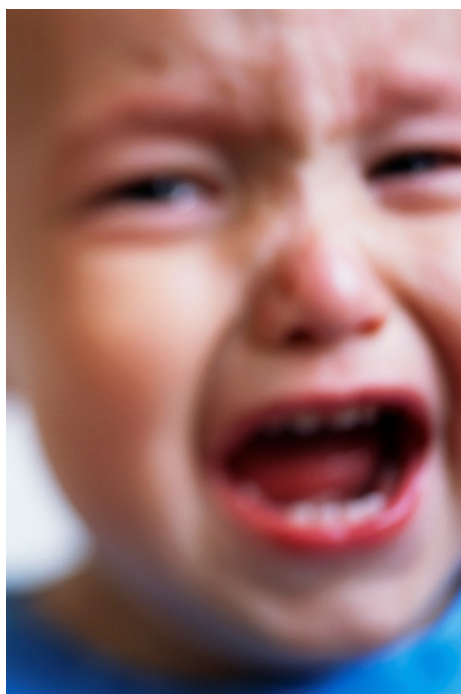


# Racine Public Health Nurse (PHN) Activities

- Family was very helpful, especially as the child was afraid of healthcare staff after his hospitalization.
- Initially, child was seen 7 days a week for 4 weeks for DOT.
- After the initial month, PHNs administer therapy 5 days a week, M-F.
- Weekends are administered by family.
- In summary: PHN distributed medicine to 5 children daily (close contacts to index case).
- Pills were crushed and mixed with Oreo filling and then put back into cookie. Kids ages 2-7 do well with this method.
- Younger children (under 1 year old) took liquid form and usually do very well with it.



## Racine PHN Activities, cont.



- Once index case no longer had NG tube and started to feel better, we encountered the challenge of giving him oral medications.
- He didn't like to take his medications so there was a lot of crying each morning.
- Offered support and encouragement to family as it was very trying for them to see him upset after being so sick.

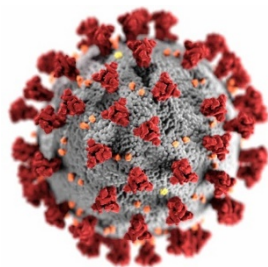
## Racine PHN Activities, cont.

- Eventually child became accustomed to the nurse visits and took oral meds quickly and without protest.
- Crushed and mixed the INH tablets with sterile water; given orally via syringe.
- Rifampin comes as a thicker red liquid; given the same way.
- As doses changed due to his weight, the consistency became a challenge in administering. The foamy semi-liquid was difficult to draw up.
- DHS TB personnel and Aurora Pharmacists came up with a plan so the medication was not so foamy and was easier to measure and administer.



## Racine PHN Activities, cont.

- In early January, the mother tested positive for COVID-19.
- She was the only person caring for her children as everyone else in the household self isolated away from her.
- PHN encouraged mom to get child tested when he spiked a fever and experienced nausea & vomiting.
- Child tested positive for COVID-19.
- Eventually the entire household tested positive.
- PHN no longer does home visits but does direct video observation therapy (DVOT) via phone over Facetime.





## Racine PHN Activities, cont.

- During the holidays, PHN gave gift cards to the parents of index case. Cards were made available from the TB incentive program.
- DVOT continued for most of the therapy due to COVID-19 pandemic.
- Child started to resist medications again, so PHN delivered and visited child once a week with small toys, books, chocolates, and cupcakes as incentives for a job well done.
- Resistance continued until near the end of treatment.
- During daily video chats, PHN continued to assess overall health of child, offering education and support and asking family if they had any questions or concerns.



# Treatment completed after 12 months of DOT

## DOT/VDOT:

- Treatment started in hospital on 5/8/2020.
- 237 observed doses.
- 5.6 weeks of 7 day/week DOT.
- 50 weeks of 5 day/week DOT /VDOT.
- Mom administered weekend and holiday doses; these did not count toward the DOT requirements.
- Treatment ended 6/10/2021.



# End of Treatment Celebration



Last day of treatment  
was celebrated with  
cake and dinosaur toys.





# Moving Forward

- Child's IGRA and TST will remain positive throughout his life.
- If he needs TB screening to be cleared for work or school in the future, he will need symptom assessment and chest X-ray.
- PHN has kept in touch with family for child's birthday and recently to get an update. He is doing great!



**October 2021**