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Health

Descriptive Case Study of Indiana TB and COVID-19 Coinfections

2020-2021

Sarah Bennett and Petia Boykova

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Presenters



Petia Boykova
CDC Reporting Team
Public Health Investigator (PHI)



Sarah Bennett
CDC Reporting Team
Epidemiologist



Purpose/Background



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Purpose

- COVID-19 and tuberculosis (TB) are two major infectious diseases posing significant public health threats, and their coinfection makes the situation worse.
- COVID-19 patients with preexisting comorbidities are at greater risk for death, but few studies have involved COVID-19 patients coinfecting with other respiratory infectious disease.
- National total TB case count decreased by 20 percent in 2020 compared to 2019
 - Largest decrease in 10-year period

Background Information

- Small study
 - 63 COVID-19, 10 TB/COVID-19, and 11 LTBI-COVID-19
- Tested blood in a lab to look at the immune response and found that patients who have been coinfectd have a lower ability to build an immune response to SARS-CoV-2
- We don't have a lot of data on this!



Methods



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State Surveillance Systems

Surveillance systems we use to conduct investigations and collect and store our data:

- NBS
 - Electronic Disease Reporting System
 - The NEDSS base system
- Microsoft Dynamics
 - Another platform to complete contract tracing activities
- CareWeb
 - Medical record search engine

Methods

What does our data include?

- Our data include 2020 and 2021 data where a confirmed COVID-19 investigation and TB investigation exists in our state surveillance system, NBS.
- We use NBS to house tuberculosis and COVID-19 investigations
 - NBS tracks all infectious diseases

Methods

How were COVID-19 data collected?

- From March 2020 to early May 2020, local health departments (LHDs) investigated all COVID-19 investigations.
 - NBS
 - Paper forms for patient interviews
 - Medical record reviews
- In late May 2020 and onward, all COVID-19 investigations were investigated by the centralized contact tracing team at the Indiana Department of Health (IDOH).
 - All data was stored in Microsoft Dynamics
- **How were TB data collected?**
 - All TB investigation data were collected by LHDs

Breakdown of Stats

- Demographics
- Hospitalizations
- Deaths
- Pre-existing medical conditions
- Symptoms
- Reinfections
- TB therapy start date vs COVID investigation start date
- Phases

Methods

Calculations to support analysis

- Descriptive Statistics
- Difference in time from TB therapy start date to COVID-19 investigation start date, and vice versa
- Median and mean

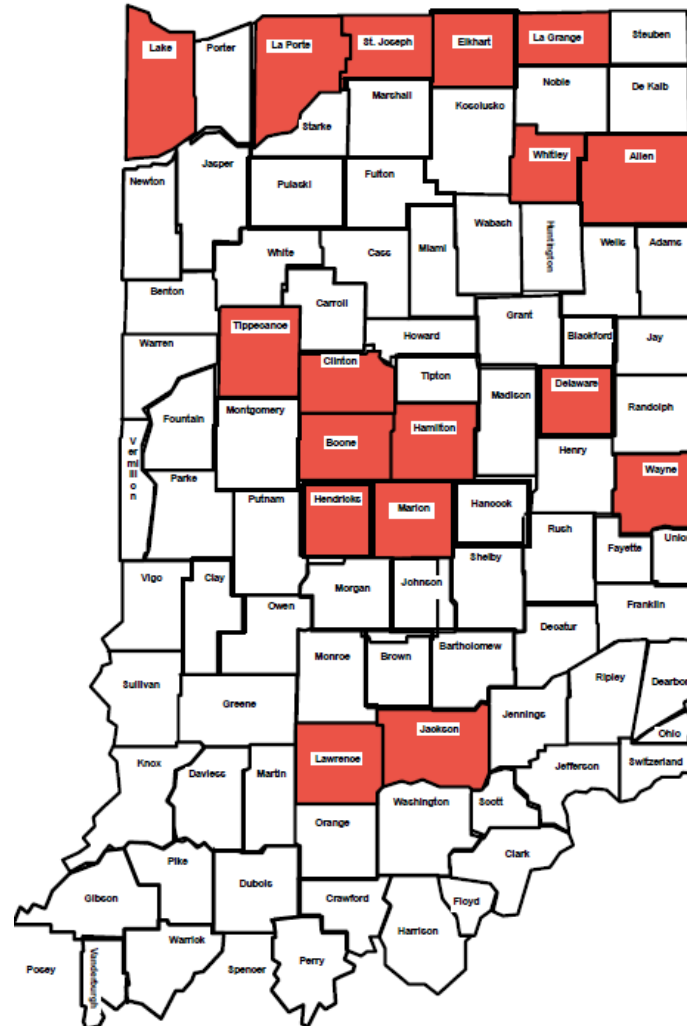


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Main Findings

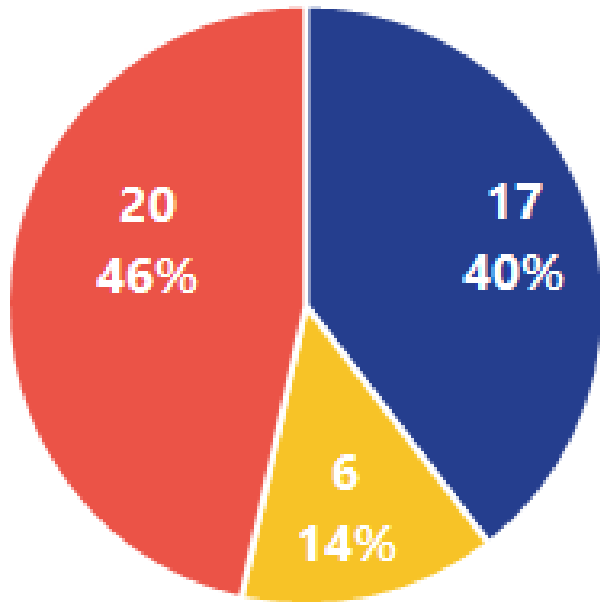
County Map

- The highlighted counties are the counties where coinfections were identified



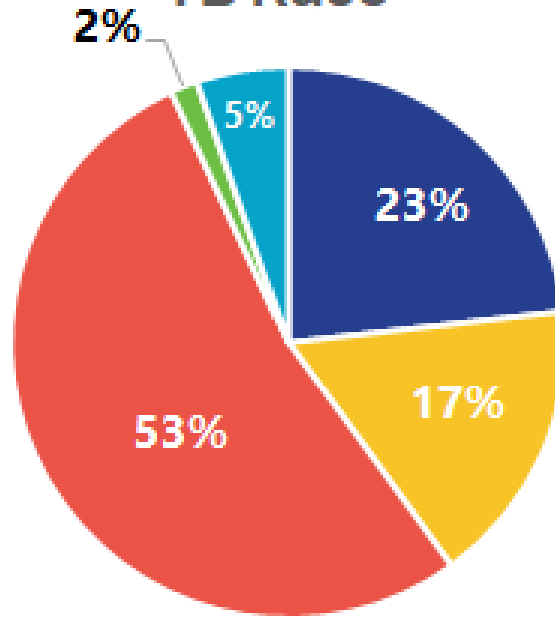
Race

Coinfection Race



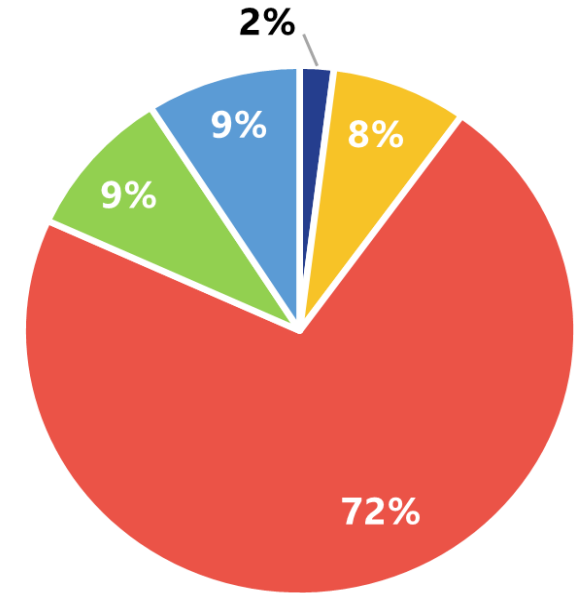
- Asian
- Black or African American
- White

TB Race



- Asian
- Black or African American
- White
- Other
- Unknown

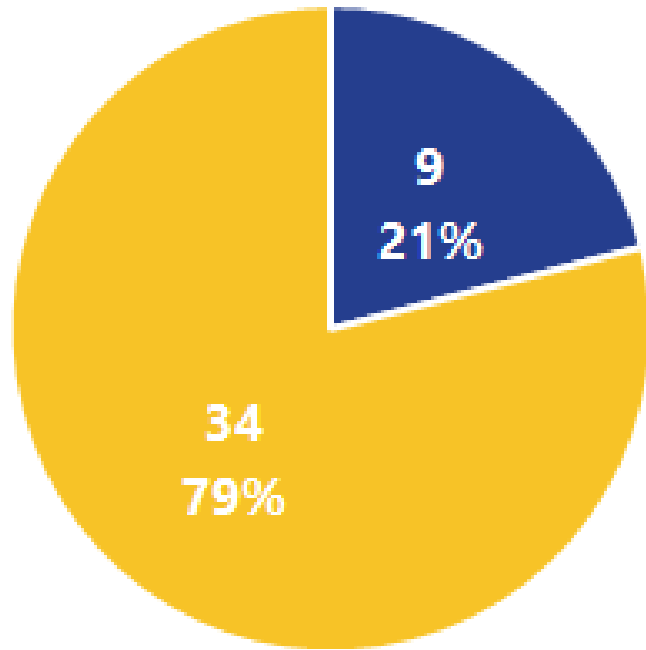
COVID-19 Race



- Asian
- Black or African American
- White
- Other
- Unknown

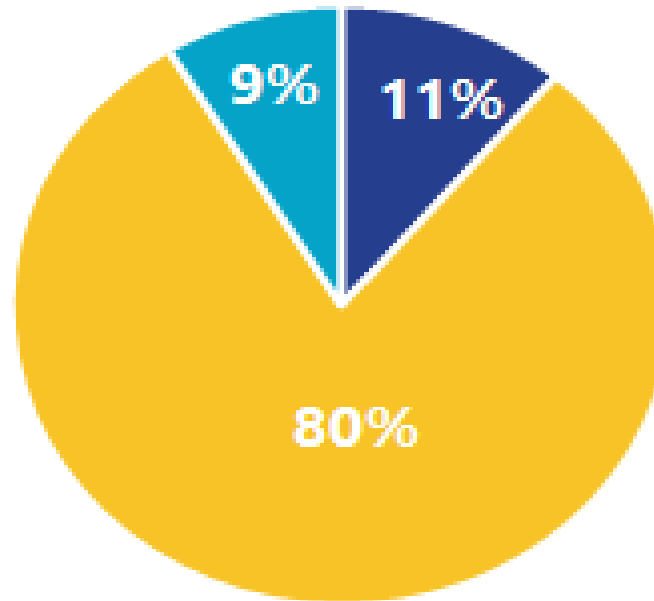
Ethnicity

Coinfection Ethnicity



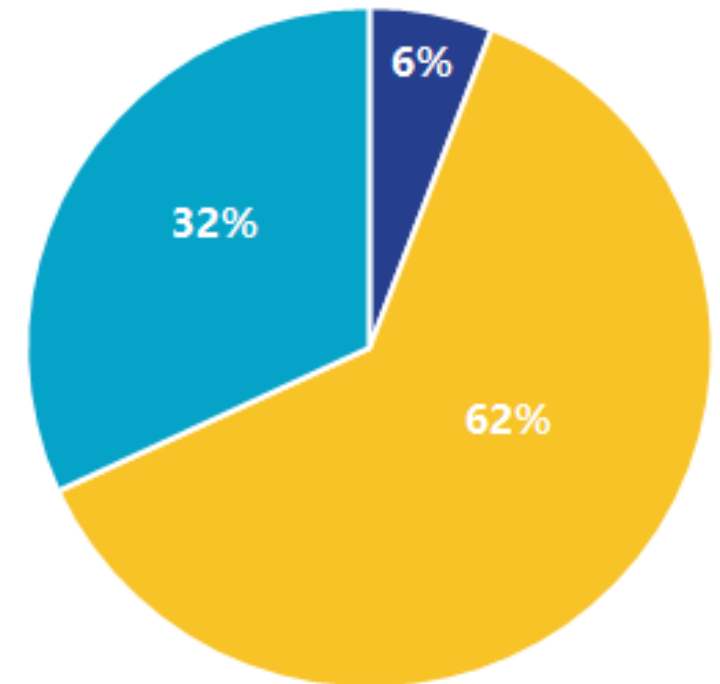
■ Hispanic or Latino ■ Not Hispanic or Latino

TB Ethnicity



■ Hispanic or Latino
■ Not Hispanic or Latino
■ Unknown

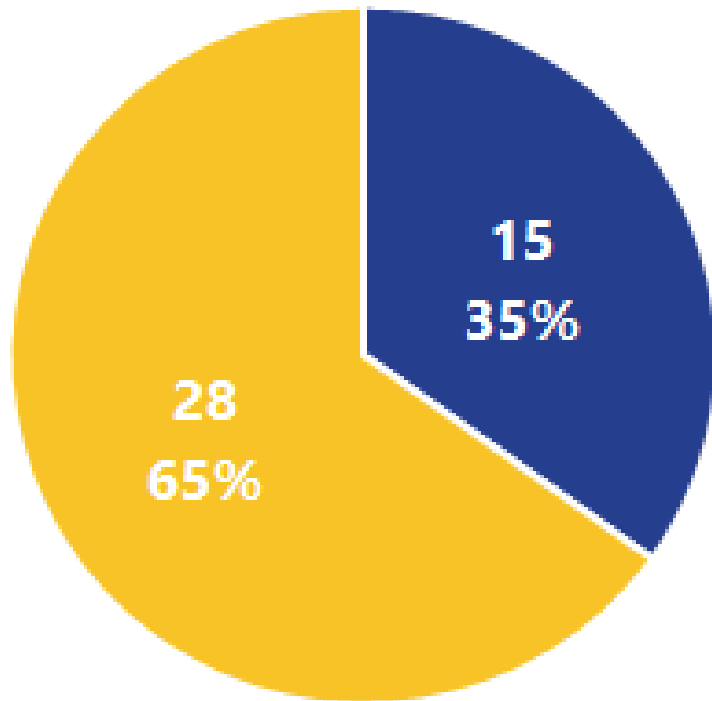
COVID-19 Ethnicity



■ Hispanic or Latino
■ Not Hispanic or Latino
■ Unknown

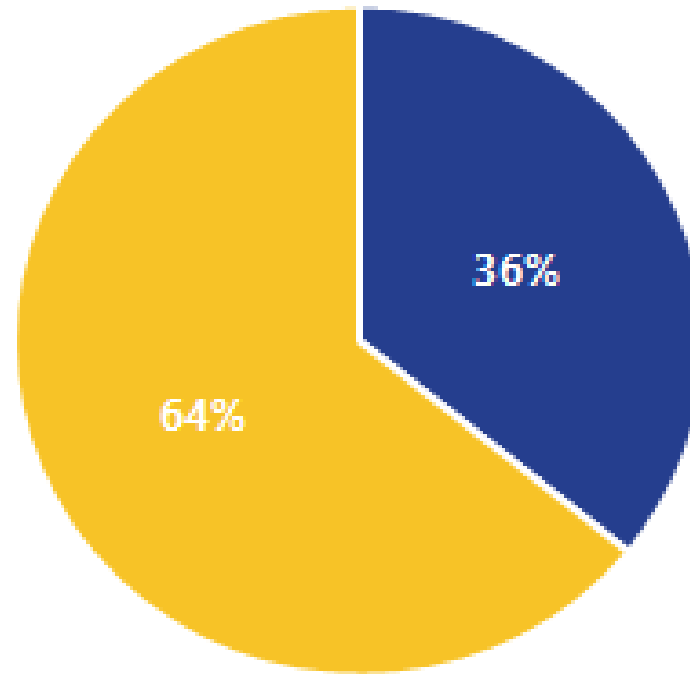
Sex

Coinfection Sex



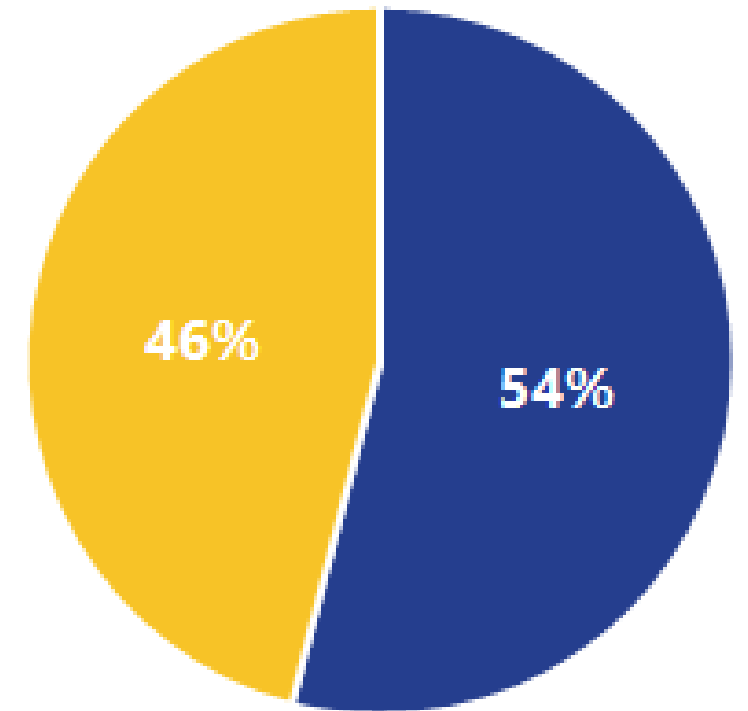
■ Female ■ Male

TB Sex



■ Female ■ Male

COVID-19 Sex



■ Female ■ Male

Age

Age range: 18 to 89 years

Median age: 48 years

Average age: 49 years

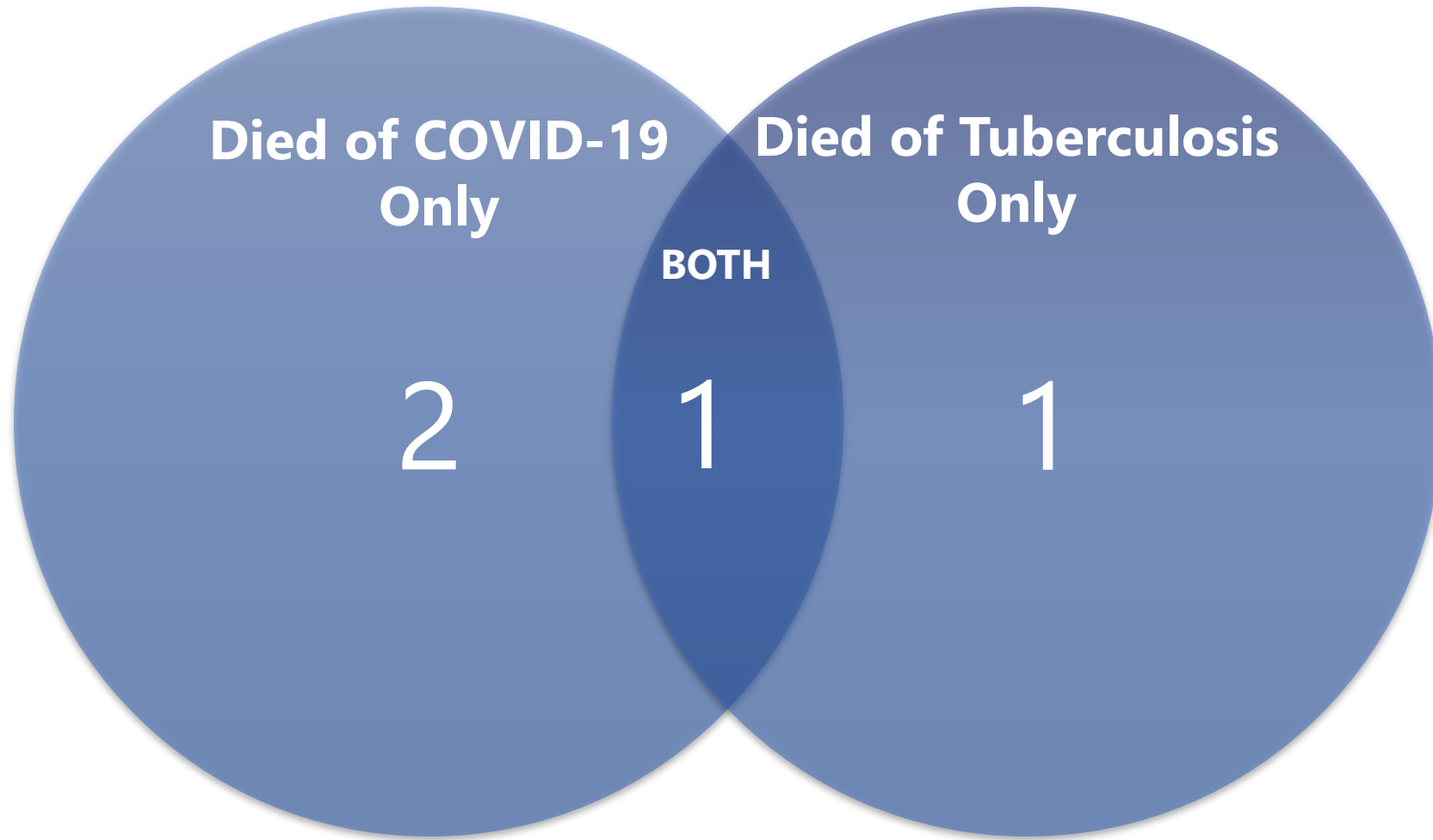
Age Groups (years)	% of Coinfected Cases	% of TB Cases	% of COVID-19 Cases
< 15	0%	5%	11%
15-24	9%	7%	17%
25-44	30%	27%	32%
45-64	42%	37%	27%
65+	19%	24%	13%

Hospitalizations

25 cases of all coinfecting cases (43) were hospitalized for TB
Of those 25, 10 were also hospitalized for COVID-19

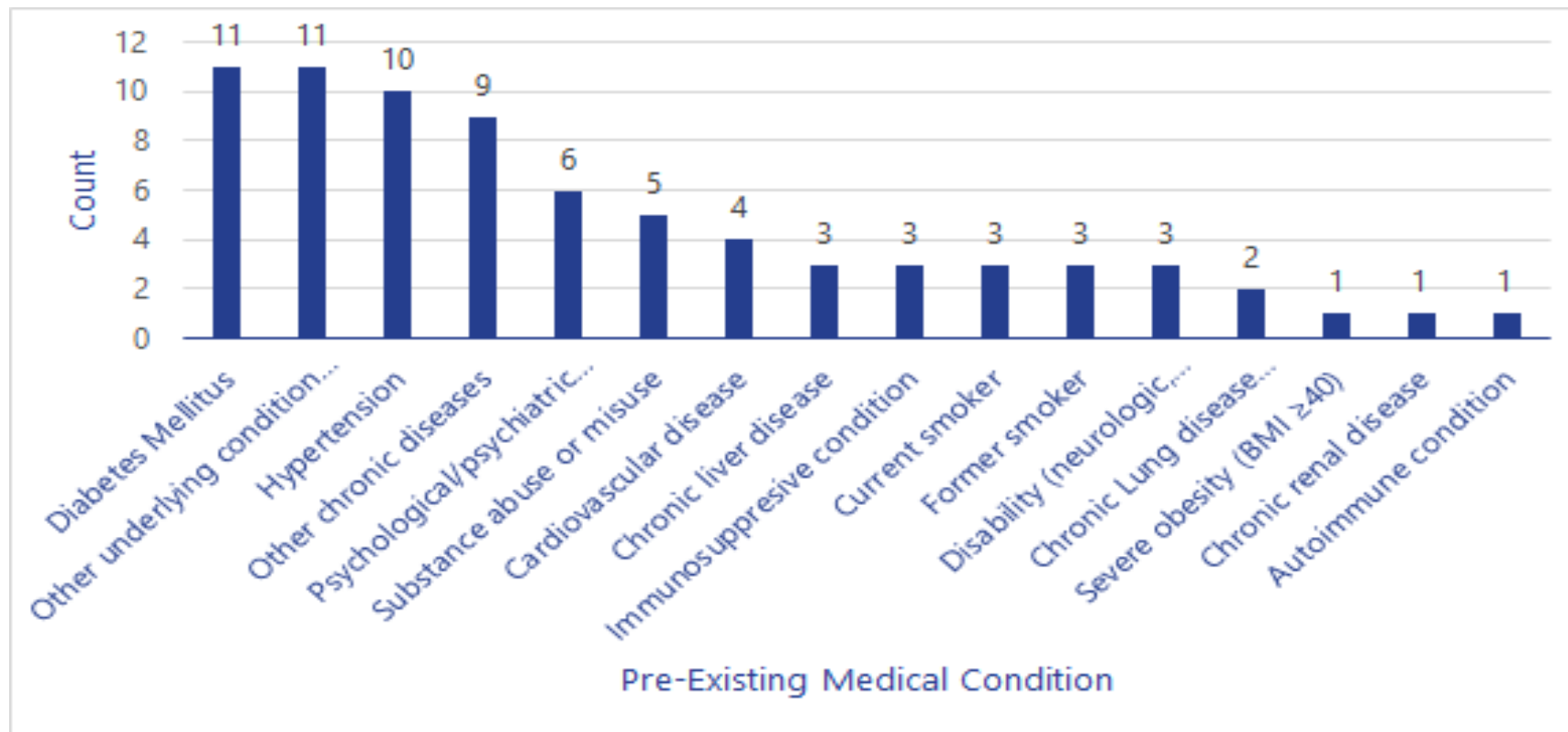
Hospitalization Status	Count
Hospitalized for TB only	13
Hospitalized for COVID-19 only	5
Hospitalized for BOTH	10
Hospitalized for TB; unknown if hospitalized for COVID-19	2

Deaths



Pre-Existing Medical Conditions

- Sixty percent of cases had a pre-existing medical condition
- Average number of pre-existing medical conditions per person: two

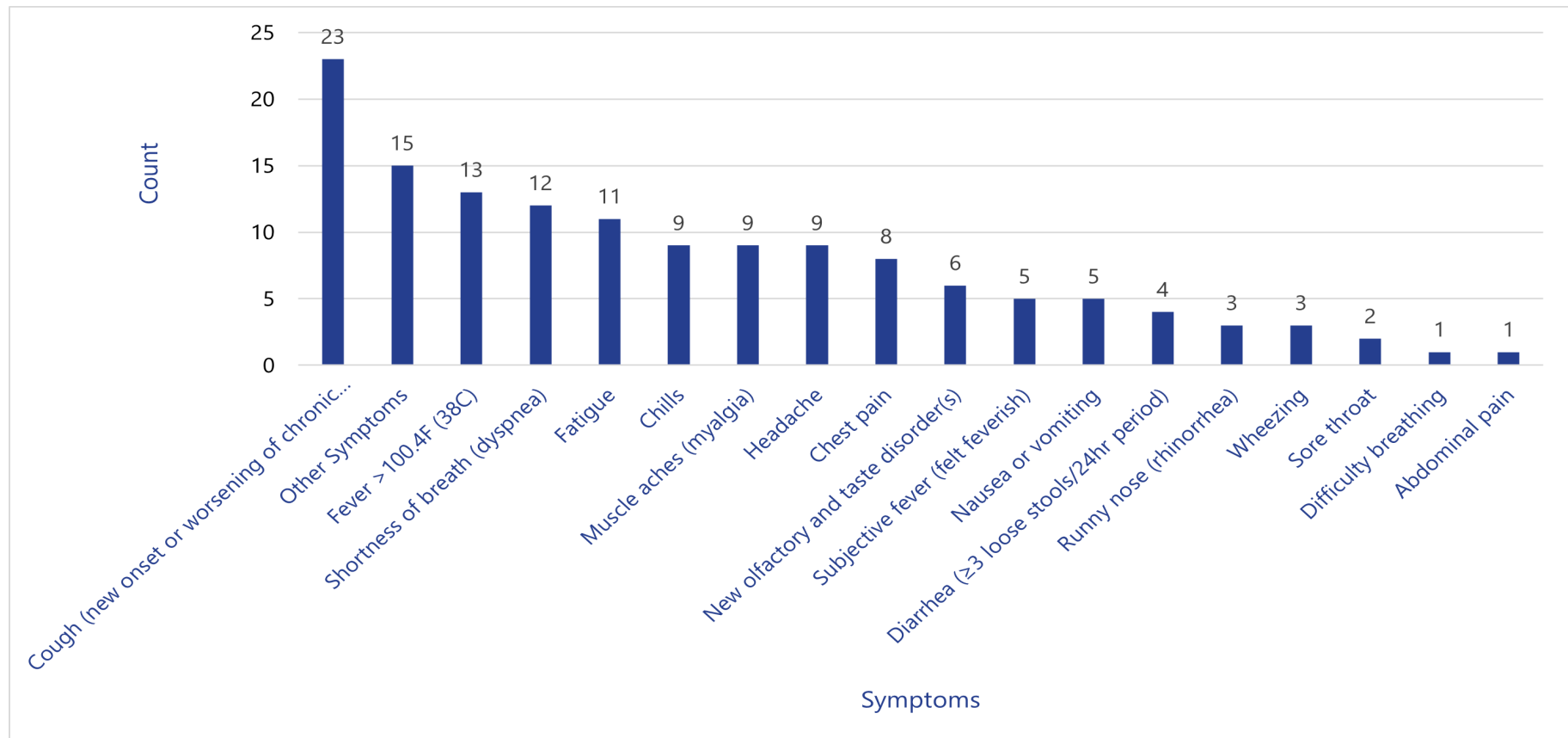


COVID-19 Symptoms

COVID-19 Symptoms?	Count
Symptomatic	35
Asymptomatic	3
Unknown	5

COVID-19 symptoms

- Eighty-one percent of coinfecting cases experienced COVID-19 symptoms
- Average number of COVID-19 symptoms per symptomatic person: three

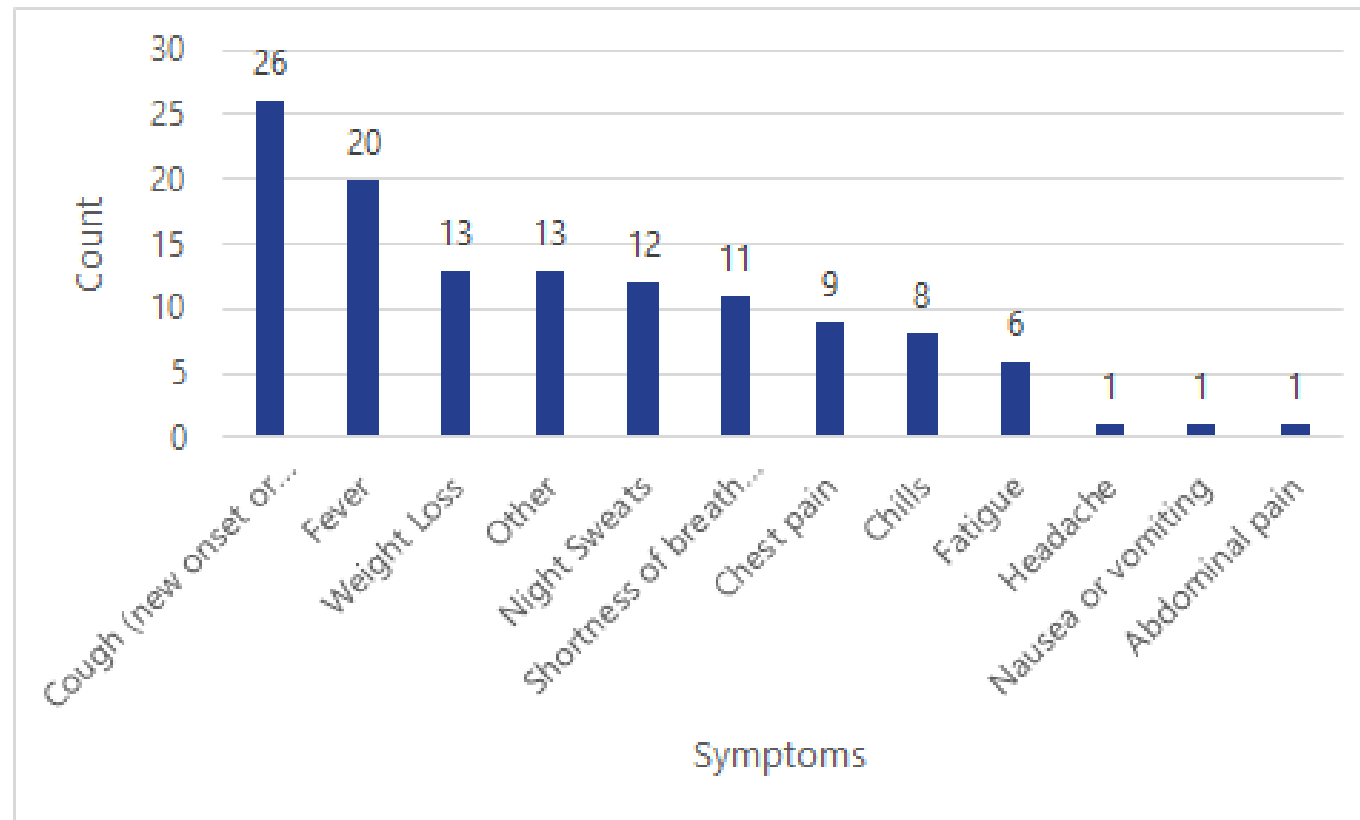


TB Symptoms

TB Symptoms?	Count
Symptomatic	35
Asymptomatic	8


TB Symptoms

- 81 percent of coinfecting cases experienced TB symptoms
- Average number of TB symptoms per symptomatic person: 3



COVID-19 Reinfections

- What is a reinfection?
 - We started counting re-infections after Sept. 1, 2021.
- To count as a reinfection, the date of the second COVID infection had to be Sept. 1, 2021 or later **and** be more than 90 days from the first infection.

Start Date	Status	Condition
09/03/2020	Closed	2019 Novel Coronavirus
09/09/2020	Closed	Tuberculosis
 12/12/2021	Closed	2019 Novel Coronavirus

Reinfections

Of the total cases, five cases diagnosed with COVID were reinfected with COVID at least 90 days after their initial diagnosis, and after Sept. 1, 2021.

COVID-19 Reinfection? Yes/No	Count
Yes	5
No	38
Grand Total	43

Infection 1 – June 2020

Patient A

Hospitalized for TB, later found to be COVID-19+ on 7/1/2020

- TB date of positive culture: 6/27/2020
- COVID-19 date of positive specimen: 6/30/2020

Completed 9 months of TB treatment (DOT Therapy) on 3/26/2021

- Initiation phase: RIPE Therapy completed in 2 months
- Continuation phase: completed in 7 months

Infection 2 – February 2022

Patient A

Reinfected with COVID-19 and Tuberculosis

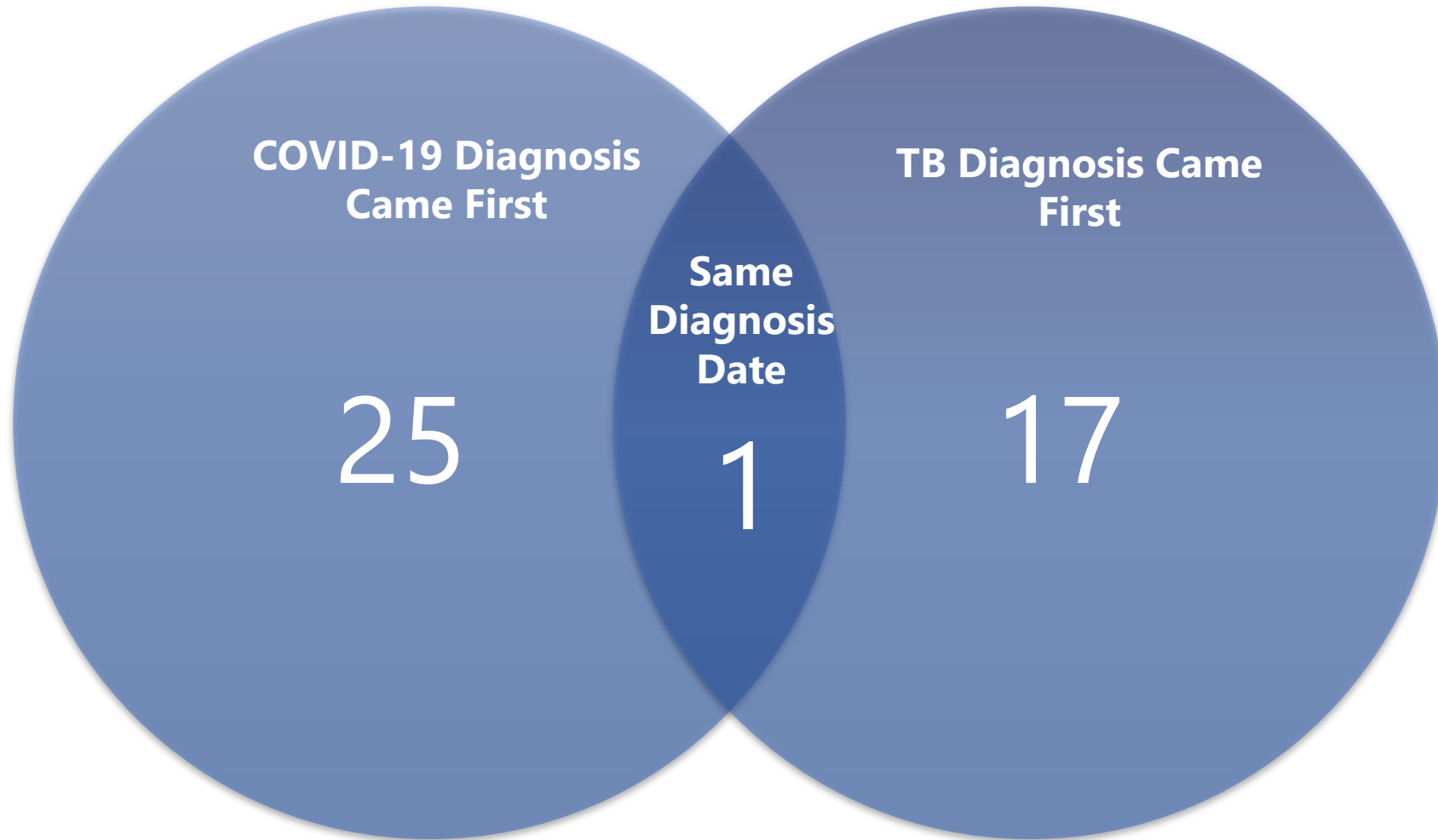
Hospitalized for COVID-19; found to still have TB from lab sample

- TB date of positive specimen: 2/19/2022
- COVID-19 date of positive specimen: 2/11/2022

Potential Relapse Considerations for TB:

- Relapse or Reinfection? - Genotype Pending
- Weakened immune system or other underlying factor(s)
- Potential concern for failure of DOT therapy

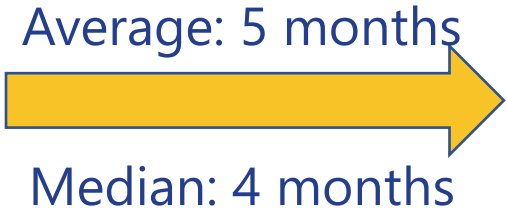
TB Therapy Start Date vs COVID Investigation Start Date



TB Therapy Start Date vs COVID Investigation Start Date

- Sixty percent of cases had a COVID-19 diagnosis come first (25 cases)

COVID-19 Investigation Start Date



TB Therapy Start Date

- Forty percent of cases had a TB diagnosis come first (17 cases)

TB Therapy Start Date



COVID-19 Investigation Start Date

- One case had a TB and COVID-19 diagnosis on the same date

Phases of Tuberculosis

What are the phases of TB?

- **Initiation phase** - first two of TB treatment
- **Continuation phase** - after two months
 - Eight cases (19 percent of all coinfecting cases) were diagnosed with COVID-19 while in the initiation phase of TB (<2 months)
 - Nine cases (21 percent of all coinfecting cases) were diagnosed with COVID-19 outside of the initiation phase (>2 months)

Phases

Of the eight cases diagnosed with COVID-19 during the initiation phase of TB, 50 percent (four cases) were hospitalized with COVID.

- Two cases (25 percent) died from COVID-19 during the initiation phase of TB.

All cases with a COVID-19 diagnosis outside of the initiation phase were not hospitalized with COVID-19 and did not die from COVID-19.

Closing Thoughts

- The coinfection dataset is a small dataset.
 - Coinfections haven't occurred that often, therefore, there is a need for more data at the national level to be able to analyze trends, etc.
- Patients who have one or more pre-existing conditions (this is true for patients who are not coinfecting and just get TB or COVID alone), have a higher susceptibility to a coinfection.
- When comparing coinfection sex to TB and COVID only, we found that COVID occurs more commonly in females, while TB is predominately male, just like our coinfection dataset.

Closing thoughts

- When comparing ethnicity to our coinfection dataset to TB and COVID-only data, we found among all that non-Hispanic or Latino ethnicity was predominately affected.
- When comparing race, we found that TB-only and COVID-only cases were predominately White, which held true for our coinfection data, but there was a high percentage of coinfecting cases who also identified as Asian.
 - Minority populations are disproportionately impacted by TB coinfections

Resources

Song, W.-mei, Zhao, J.-yu, Zhang, Q.-yun, Liu, S.-qi, Zhu, X.-han, An, Q.-qi, Xu, T.-ting, Li, S.-jin, Liu, J.-yue, Tao, N.-ning, Liu, Y., Li, Y.-fan, & Li, H.-chen. (2021, August 8). ***Covid-19 and tuberculosis coinfection: An overview of case reports/case series and meta-analysis.*** Frontiers. Retrieved March 11, 2022, from <https://www.frontiersin.org/articles/10.3389/fmed.2021.657006/full>

Petrone, L., Petruccioli, E., Vanini, V., Cuzzi, G., Gualano, G., Vittozzi, P., Nicastrì, E., Maffongelli, G., Grifoni, A., Sette, A., Ippolito, G., Migliori, G. B., Palmieri, F., & Goletti, D. (2021, December 1). ***Coinfection of tuberculosis and covid-19 limits the ability to in vitro respond to SARS-COV-2.*** International Journal of Infectious Diseases. Retrieved March 11, 2022, from <https://www.sciencedirect.com/science/article/pii/S1201971221001764>

Questions?

CONTACT:

Sarah Bennett and Petia Boykova

SaBennett@isdh.in.gov

PBoykova@isdh.in.gov

