Vaccine Breakthrough

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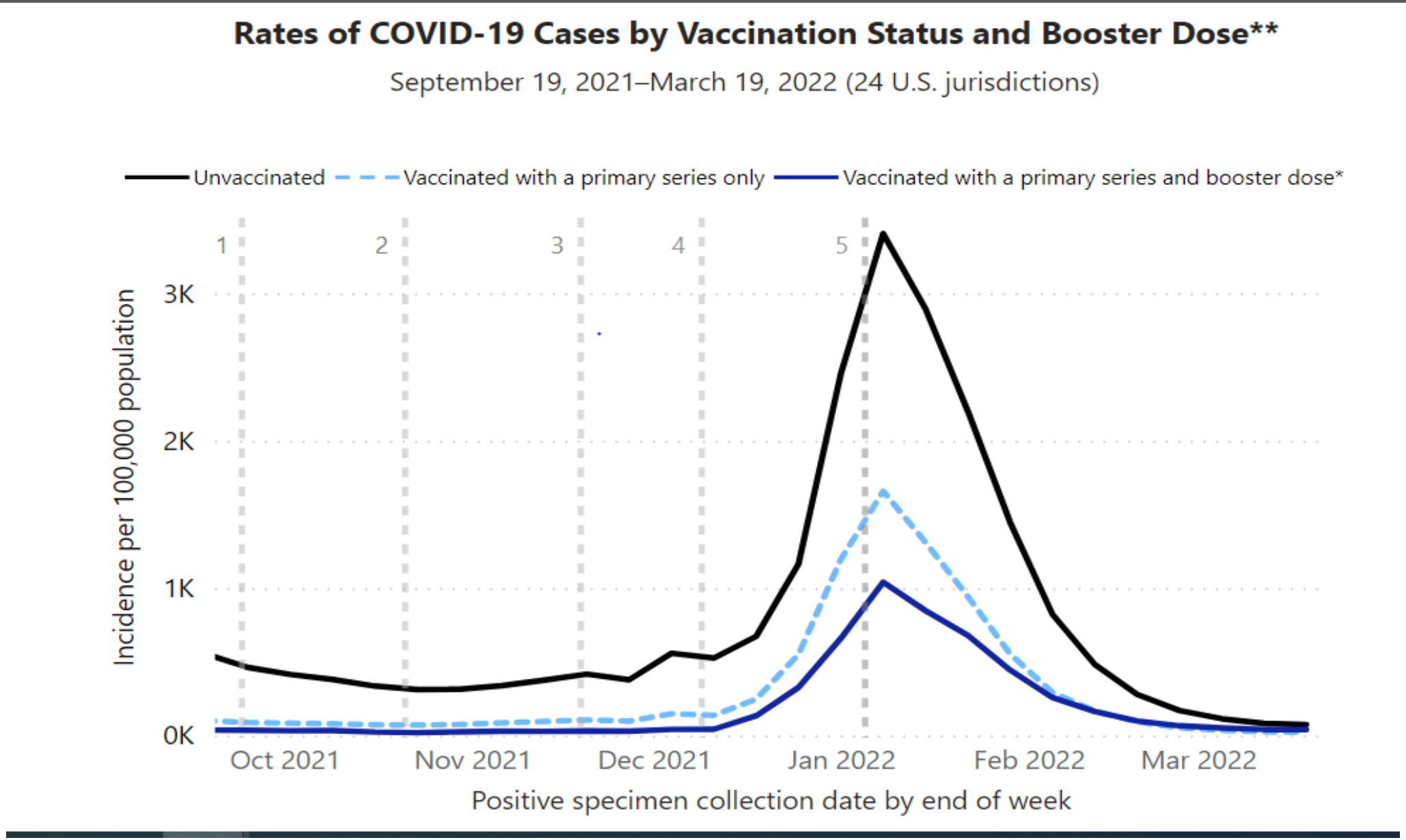
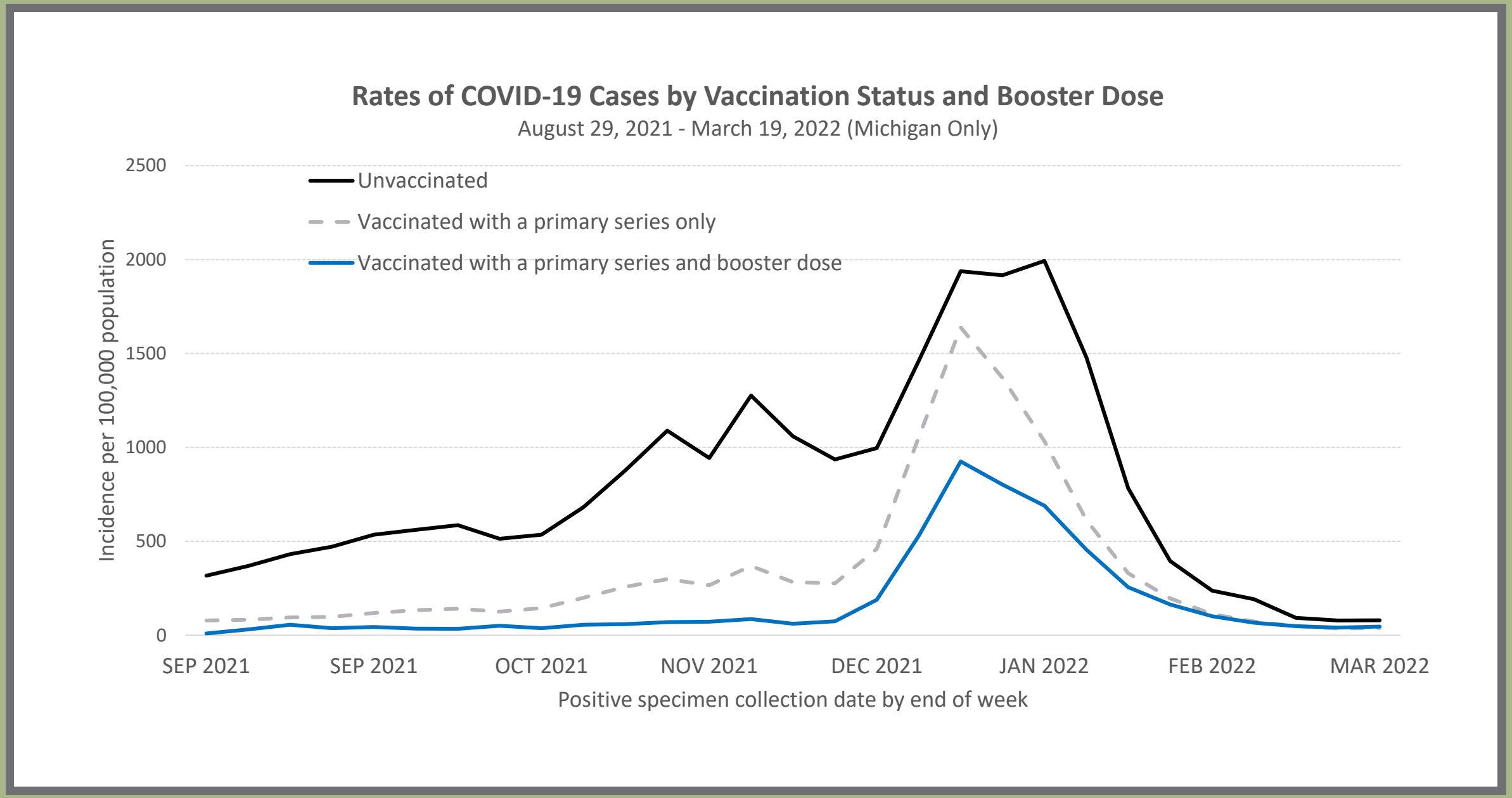
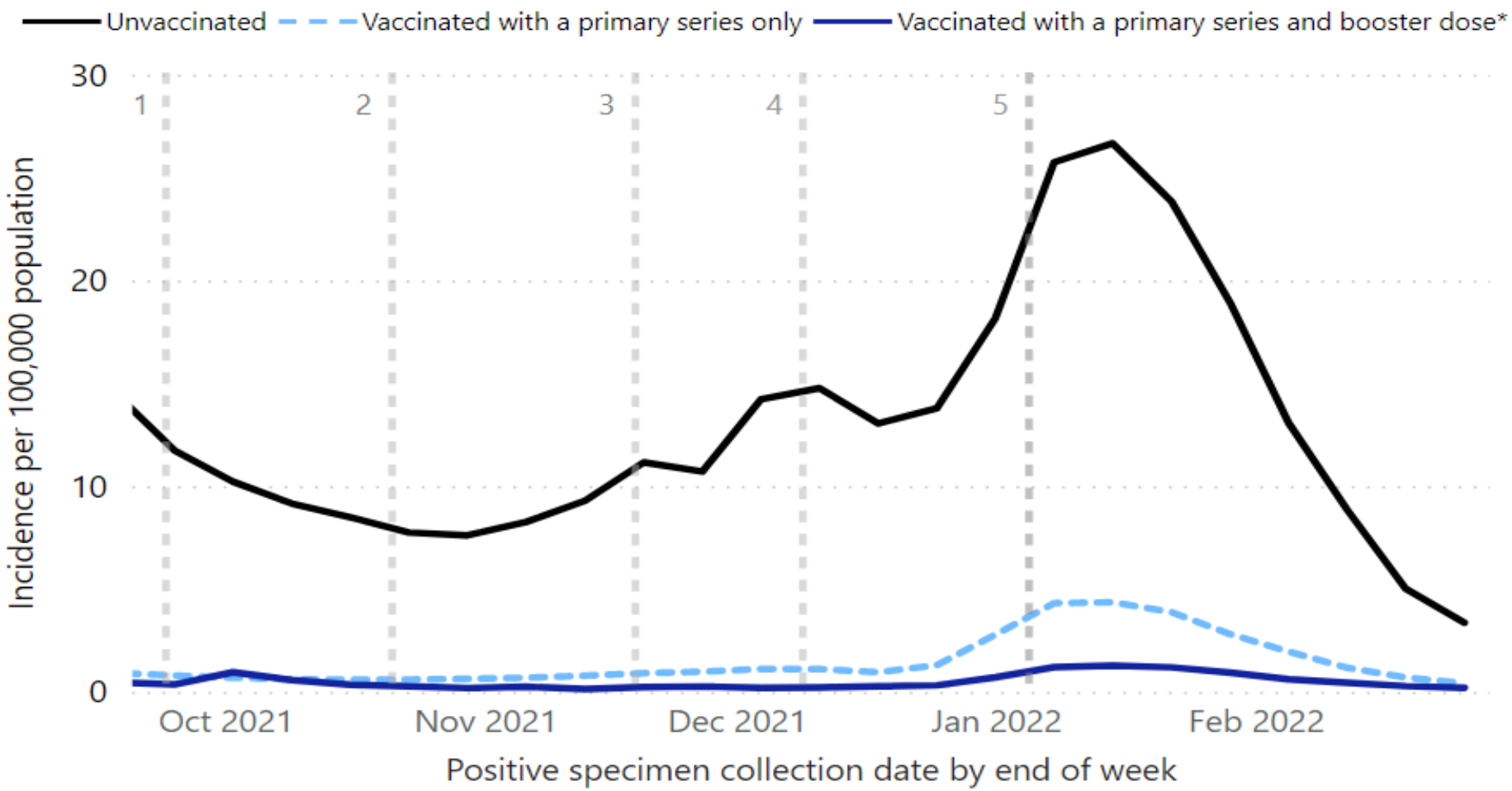
COVID-19 SURVEILLANCE AND INVESTIGATION UNIT

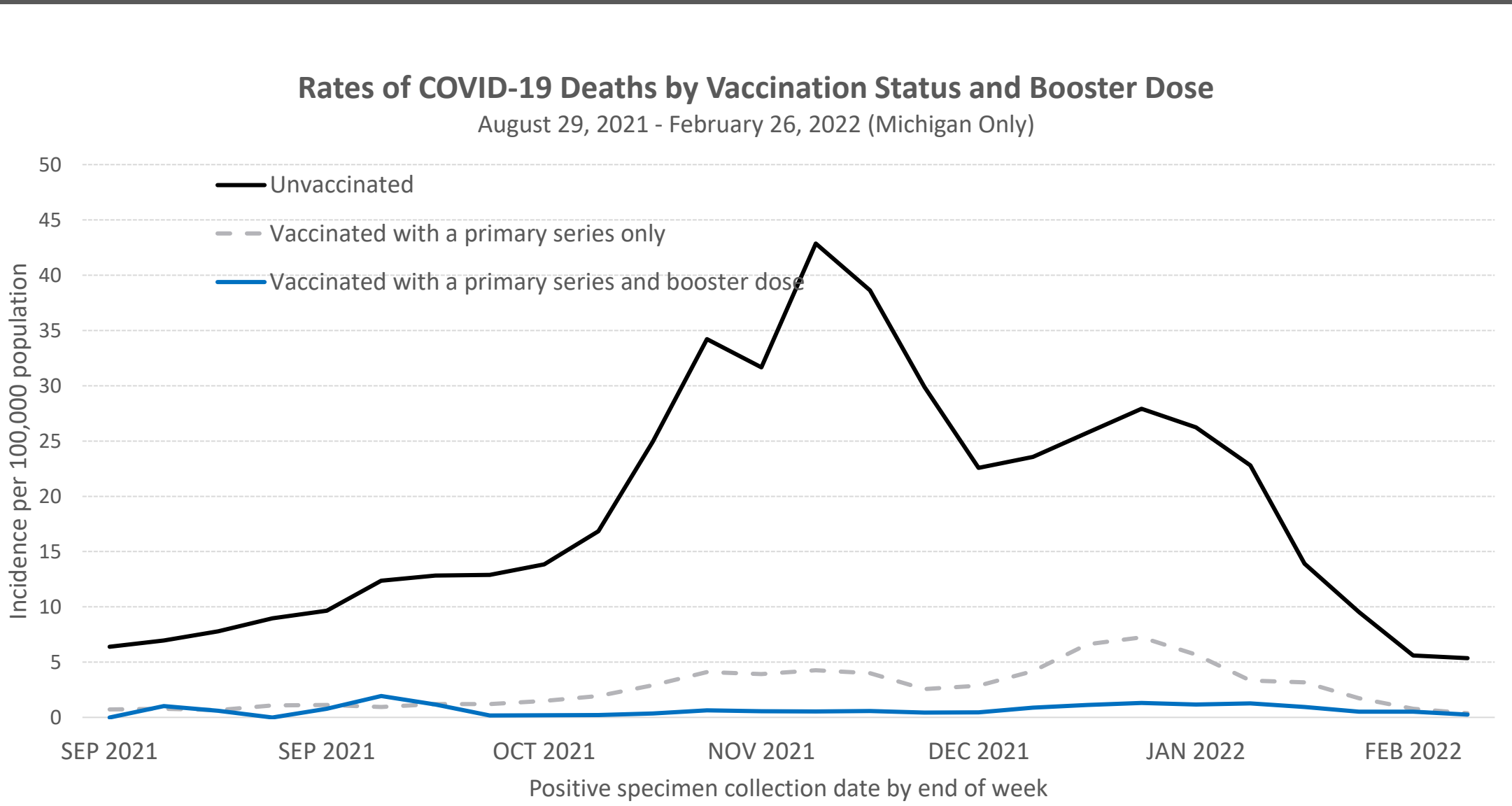

Rates of COVID-19 Cases by Vaccination Status and Booster Dose**
September 19, 2021–March 19, 2022 (24 U.S. jurisdictions)
Unvaccinated
Vaccinated with a primary series only
Vaccinated with a primary series and booster dose*
1
2
3
4
5
Incidence per 100,000 population
3K
2K
1K
0K
Oct 2021
Nov 2021
Dec 2021
Jan 2022
Feb 2022
Mar 2022
Positive specimen collection date by end of week


Rates of COVID-19 Cases by Vaccination Status and Booster Dose
August 29, 2021 - March 19, 2022 (Michigan Only)
Unvaccinated
Vaccinated with a primary series only
Vaccinated with a primary series and booster dose
Incidence per 100,000 population
2500
2000
1500
1000
500
0
SEP 2021
SEP 2021
OCT 2021
NOV 2021
DEC 2021
JAN 2022
FEB 2022
MAR 2022
Positive specimen collection date by end of week

Rates of COVID-19 Deaths by Vaccination Status and Booster Dose**

September 19, 2021–February 26, 2022 (23 U.S. jurisdictions)




Rates of COVID-19 Deaths by Vaccination Status and Booster Dose
August 29, 2021 - February 26, 2022 (Michigan Only)
Unvaccinated
Vaccinated with a primary series only
Vaccinated with a primary series and booster dose
Incidence per 100,000 population
50
45
40
35
30
25
20
15
10
5
0
SEP 2021
SEP 2021
OCT 2021
NOV 2021
DEC 2021
JAN 2022
FEB 2022
Positive specimen collection date by end of week

Nationally,

Unvaccinated people aged 5 years and older had:

2.8X
Risk of Testing Positive for COVID-19

AND

10X
Risk of Dying from COVID-19

in February, and

2.4X
Risk of Testing Positive for COVID-19

in March,* compared to people vaccinated with at least a primary series.

Source: CDC COVID-19 Response, Epidemiology Task Force, Surveillance & Analytics Team, Vaccine Breakthrough Unit

In Michigan,

Unvaccinated people aged 5 years and older had:

2.3X
Risk of Testing Positive for COVID-19

AND

14X
Risk of Dying from COVID-19

in February, and

1.9X
Risk of Testing Positive for COVID-19

in March,* compared to people vaccinated with at least a primary series.

Nationally,

Unvaccinated people aged 12 years and older had:

3.1X
Risk of Testing Positive for COVID-19

AND

20X
Risk of Dying from COVID-19

in February, and

2.0X
Risk of Testing Positive for COVID-19

in March,* compared to people vaccinated with a primary series and a booster dose.**

Source: CDC COVID-19 Response, Epidemiology Task Force, Surveillance & Analytics Team, Vaccine Breakthrough Unit

In Michigan,

Unvaccinated people aged 12 years and older had:

2.8X
Risk of Testing Positive for COVID-19

AND

16X
Risk of Dying from COVID-19

in February, and

1.8X
Risk of Testing Positive for COVID-19

in March,* compared to people vaccinated with a primary series and a booster dose.**

A Case Study in Missingness

- County M found that MDHHS did not report 1,390 breakthrough cases that they identified
- County M had 10,000 cases reported by MDHHS
  - The missing cases would make up nearly 14% of their cases!
- 523 of these cases **did not match** by current matching methods between MDSS and MCIR
- Of the 867 that did match, 555 met basic inclusion criteria
- County M was ahead of the game! 92 were already included in the upcoming breakthrough line list
- After tweaking a few pieces of code, an additional 355 cases were “included” for future updates, for a total of 447 included

A Case Study cont.

- Total included cases, after code update: 10,447/11,390= 91.7%
- Potentially missed breakthrough cases: 8.3%
  - Up to 37,350 cases statewide since January 1, 2021
- Adjusting for cases that did not match between MDSS and MCIR: 10,447/10,867=96.1%
  - Potentially missed 3.9% cases, up to 17,550 cases since January 1, 2021
- The true value of missing cases is likely between 4 and 9%

Current Limitations - MDSS

- Individuals don't always match between MCIR and MDSS
- Errors in referral, onset, and/or diagnosis date can influence initial inclusion of cases
- Volume of data grew rapidly through the Omicron surge and continues to increase steadily
  - Large datasets are challenging to maintain, especially as data quality deteriorates
- Computer limitations
  - Searching through 150+ labs for over 500,000 cases consumes significant computer resources

Current Limitations cont.

- Balancing quality assurance, technology limits, and timely data distribution
- Sensitivity vs specificity challenges
- Human errors in code syntax
- Lack of test information available
  - Home tests, reporting errors, etc.

The Future of COVID-19 Breakthrough Investigation

- Breakthrough investigation was originally intended to investigate high risk or rare events
- We now understand that breakthrough cases are not rare, and are expected to occur among all age, sex, and race and ethnicity groups
- 100% case ascertainment is not possible
- Michigan will continue submitting data to CDC to investigate trends over time
- Increased sample size of CDC reports gives a more accurate representation of the true state of breakthrough illness

Questions?