Update on SARS-CoV-2 Variants and the Epidemiology of COVID-19

CDR Heather Scobie, PhD, MPH

Coronavirus and Other Respiratory Viruses Division (Proposed)
Centers for Disease Control and Prevention

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SARS-CoV-2 Variants
SARS-CoV-2 Omicron (B.1.1.529) variant

- Five main sub-lineages: BA.1 through BA.5
- Increased transmissibility and immune evasion, but decreased disease severity
- 30+ mutations in spike gene (S-gene)
  - 15 in receptor binding domain
- Lower vaccine effectiveness
  - Reduced neutralization by sera from vaccinated or convalescent individuals
- Reduction in efficacy of some monoclonal antibody treatments

Key mutations (yellow) in the Omicron spike protein (top view)
Source: New York Times

Trends in Weighted Variant Proportion Estimates & Nowcast
United States, May 22–August 27, 2022

Collection date, week ending

Estimated Number of Reported COVID-19 Cases by Variant
Variant Proportions Scaled by Positive Nucleic Acid Amplification Test (NAAT) Counts

Nowcast Estimates of Variant Proportions by HHS Region
United States, August 21–27, 2022

HHS=Health and Human Services
https://covid.cdc.gov/covid-data-tracker/#variant-proportions
Accessed August 26, 2022
COVID-19 Trends
As of August 30, 2022: 94,268,241 reported cases
In May, trends in reported COVID-19 cases and NAAT positivity (%) become uncoupled, related to decreases in provider testing and increases in at-home testing.

Grey shaded area denotes the most recent 2 weeks where reporting is <95% complete.


Since April, hospitalization rates in older age increased relative to other age groups.
Hospitalization Rate Ratios by Age Group
COVID-NET, June 2021 – May 31, 2022

Adults aged 18-49 years are the reference group for all periods
### Characteristics of hospitalized adults ≥18 years
COVID-NET, June 20, 2021 – May 31, 2022

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>% of Total Hospitalizations</th>
<th>Delta Jun 20, 2021–Dec 18, 2021 (n=5,234)</th>
<th>Omicron BA.1 Dec 19, 2021–Mar 19, 2022 (n=1,804)</th>
<th>Omicron BA.2 Mar 20, 2021–May 31, 2022 (n=1,228)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Median (years)</strong></td>
<td></td>
<td>59.9</td>
<td>63.8</td>
<td>70.5</td>
</tr>
<tr>
<td><strong>Likely COVID-19–related</strong>*</td>
<td></td>
<td>95.5</td>
<td>87.8</td>
<td>85.4</td>
</tr>
<tr>
<td><strong>Risk Factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any underlying medical condition</td>
<td></td>
<td>89.3</td>
<td>91.7</td>
<td>95.1</td>
</tr>
<tr>
<td>Immunosuppressive condition</td>
<td></td>
<td>11.0</td>
<td>16.0</td>
<td>19.2</td>
</tr>
<tr>
<td>Long-term care facility</td>
<td></td>
<td>5.7</td>
<td>9.0</td>
<td>14.2</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of stay (days, median)</td>
<td></td>
<td>4.8</td>
<td>3.9</td>
<td>3.3</td>
</tr>
<tr>
<td>ICU admission</td>
<td></td>
<td>24.3</td>
<td>17.9</td>
<td>13.2</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td></td>
<td>13.5</td>
<td>7.6</td>
<td>5.7</td>
</tr>
<tr>
<td>In-hospital death</td>
<td></td>
<td>12.4</td>
<td>7.5</td>
<td>5.1</td>
</tr>
</tbody>
</table>

### Trends during BA.1 & BA.2
- Median age increased
- Underlying conditions more prevalent
- Clinical outcomes less severe

* COVID-19–related illness as a likely reason for admission is indicated by COVID-19 diagnosis or symptoms consistent with COVID-19 as the chief complaint or reason for admission in the history of present illness. Non-COVID-19 reasons for admission included planned inpatient surgery or procedures, psychiatric admission needing acute medical care, trauma, other, and unknown. Havers et al. MMWR 2022; 71(34):1085–1091. https://www.cdc.gov/mmwr/volumes/71/wr/mm7134a3.htm?s_cid=mm7134a3_w
Age-Adjusted Rates of COVID-19-Associated Hospitalizations Among Persons of All Ages by Race/Ethnicity
COVID-NET, March 7, 2020 – August 13, 2022 (3-Week Moving Average)

Recent hospitalization rates highest among American Indian/Alaskan Native and Black persons.
Daily Trends in Number of COVID-19 Deaths, United States
Provisional Death Certificate Data, National Vital Statistics System

As of August 27, 2022: 1,042,112 deaths

NOTE: Provisional death counts are based on death certificate data received and coded by NCHS as of the date of analysis and do not represent all deaths that occurred in that period. Data for the most recent 5 weeks (shown in the gray shaded area) are typically less than 90% complete, with lower levels of completeness in more recent weeks. Death counts are updated as additional deaths are received and coded.

SOURCE: NCHS, National Vital Statistics System. Estimates are based on provisional data.
Weekly Trends in COVID-19 Mortality Rates by Age Group, United States, March 1, 2020 – August 20, 2022
Provisional Death Certificate Data, National Vital Statistics System

Source: National Center for Health Statistics, National Vital Statistics System. Data accessed on August 25, 2022. Date provided for "Week of Death" references week-end date. The gray box over the most recent two weeks indicates total death data for these weeks are less than 60% complete overall and should be interpreted with caution.

Source: https://data.cdc.gov/NCHS/Provisional-Weekly-Deaths-by-Region-Race-Age/tpcp-uiv5
Weekly Trends in Age-Adjusted COVID-19 Mortality Rates by Race/Ethnicity, United States, March 1, 2020 – August 20, 2022
Provisional Death Certificate Data, National Vital Statistics System

Source: National Center for Health Statistics, National Vital Statistics System. Data accessed on August 25, 2022. Date provided for "Week of Death" references week-end date. The gray box over the most recent two weeks indicates total death data for these weeks are less than 60% complete overall and should be interpreted with caution. https://data.cdc.gov/NCHS/Provisional-Weekly-Deaths-by-Region-Race-Age/tpcp-uiv5 (National Vital Statistics System provisional death certificate data)
Weekly Trends in Age-Adjusted COVID-19 Mortality Rates by Race/Ethnicity, United States, March 1, 2020 – August 20, 2022
Provisional Death Certificate Data, National Vital Statistics System

Recent mortality rates show less evidence of disparities.
Trends in COVID-19 by Vaccination Status
COVID-19 Vaccinations in the United States

As of August 24, 2022

- **223.9M** People vaccinated with a primary series
  - 72% Population ≥5 Years of Age

- **108.5M** People received a first booster dose*
  - 49% Population ≥5 Years of Age

- **23.1M** People received a second booster dose*
  - 34% Population ≥50 Years of Age

**Differences in vaccination coverage by:**
- Age, with lower primary series coverage in children
- Race/ethnicity, with lower booster coverage in most minority groups
- Disability status

*This includes people who received booster doses and people who received additional primary doses. [Source](https://covid.cdc.gov/covid-data-tracker/#vaccinations_vacc-total-admin-rate-total) Accessed August 24, 2022
In July 2022, **unvaccinated** people ages ≥5 years had **2.4X higher** risk of testing positive for COVID-19, compared to those with at least a **primary series**.
In June 2022, unvaccinated adults ages ≥18 years had 4.6X higher COVID-19-associated hospitalization rates compared to those vaccinated with at least one booster dose.
Age-Adjusted Rates of COVID-19-Associated Deaths by Vaccination Status and Receipt of Booster Dose* Among Ages ≥5 years

In June 2022, unvaccinated people ages ≥5 years had 8X higher COVID-19-associated death rates compared to those with at least one booster dose.

This was a decrease from ~20X during January-March 2022.

In June 2022, people ages 50 years and older with ≥2 booster doses had **14 times** lower risk of dying from COVID-19, compared to unvaccinated people and **3 times** lower risk of dying from COVID-19 than people with **one booster dose**.

*Includes either a booster or additional dose.

Risk of Severe COVID-19 Illness

- Unvaccinated people at higher risk of severe illness compared with vaccinated people
- Most (75%) vaccinated people with severe COVID-19 illness have multiple risk factors:
  - Older age (most ≥65 years, but with risk increasing with age)
  - Underlying medical conditions (with risk increasing with number of underlying conditions)
    - Immunosuppression
    - Diabetes mellitus
    - Chronic kidney disease
    - Chronic lung disease
    - Chronic cardiovascular disease
    - Chronic neurologic disease
- Antiviral drugs can help reduce risk of severe illness in people at higher risk, regardless of vaccination status

Summary

- CDC continues to monitor emerging variants, like the sub-lineages of Omicron, including prevalence and impact on disease incidence, severity, and vaccine effectiveness over time.
- Racial and ethnic minority groups have been disproportionately affected by COVID-associated hospitalization and mortality; these inequities have decreased over time but have not been eliminated.
- Trend of increasing severe illness, including hospitalization and death, in people of older age and with underlying health conditions.
- Currently approved vaccines offer protection against severe illness and death from COVID-19 — important to stay up to date with vaccination, including all boosters in eligible populations.
- Therapeutics and multiple prevention measures should be used to protect people at higher risk of severe COVID-19 illness, regardless of vaccination status.
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