Vaccines and Related Biological Products Advisory Committee December 10, 2020 Meeting Presentation - Epidemiology of COVID-19 in the United States

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Epidemiology of COVID-19 in the United States

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VRBPAC Meeting, December 10, 2020
Trends in Number of COVID-19 Cases in the United States
January 22 to December 8, 2020

TOTAL CASES
14,823,129
+186,215 New Cases

AVERAGE DAILY CASES PER 100K IN LAST 7 DAYS
60.1

TOTAL DEATHS
282,785
+1,532 New Deaths

https://www.cdc.gov/covid-data-tracker/
Surveillance indicators of COVID-19 activity increasing since September

- **The % positivity** and **ambulatory visits for CLI** (COVID-19-like illness) are leading indicators
- **Weekly hospitalization** rate is at its highest point since the beginning of the pandemic
- **The % of deaths** due to pneumonia, influenza or COVID-19 (PIC) increasing since October

*Data are preliminary and may change as more reports are received.

**The percentage of deaths due to PIC and the hospitalization are expected to increase for the most recent weeks as additional data are received.*

COVID-NET provides active, population-based surveillance for COVID-19 hospitalizations in 14 states, representing 10% of US population.

Current peak driven by sharp rise in hospitalizations among older adults (≥65 years), although rates are increasing in all age groups.
Cumulative COVID-19-Associated Hospitalization Rates by Age — COVID-NET, March 1–November 28, 2020 (n=85,678)

Age-adjusted COVID-19-Associated Hospitalization Rates* by Race/Ethnicity† — COVID-NET, March 1–November 28, 2020

Race and Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Rate per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic or Latino</td>
<td>3.8x</td>
</tr>
<tr>
<td>Non-Hispanic American Indian or Alaska Native</td>
<td>3.7x</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>3.4x</td>
</tr>
<tr>
<td>Non-Hispanic Asian or Pacific Islander</td>
<td>1.1x</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>Ref 1.0x</td>
</tr>
</tbody>
</table>

*Calculated using hospitalized COVID-NET cases with known race/ethnicity for the numerator and NCHS bridged-race population estimates for the denominator. Rates are adjusted to account for differences in age distributions within race/ethnicity strata in the COVID-NET catchment area.

†Race and ethnicity missing for 3.5%.

Risk for In-Hospital Death among Adults Hospitalized with COVID-19
Increased with Age

*COVID-NET Surveillance; Final model adjusted for age, sex, race/ethnicity, smoker, hypertension, obesity, diabetes, chronic lung disease, cardiovascular disease, neurologic disease, renal disease, immunosuppression, hematologic disorders, and rheumatologic or autoimmune disease.

Kim 2020 CID: https://doi.org/10.1093/cid/ciaa1012
Risk for COVID-19 Hospitalization Increased for Adults with Underlying Medical Conditions

- Severe obesity: Adjusted Rate Ratio* = 4.4
- Chronic kidney disease: Adjusted Rate Ratio* = 4.0
- Diabetes: Adjusted Rate Ratio* = 3.2
- Obesity: Adjusted Rate Ratio* = 2.9
- Hypertension: Adjusted Rate Ratio* = 2.8
- Asthma: Adjusted Rate Ratio* = 1.4
- Coronary Artery Disease: Adjusted Rate Ratio* = 1.3
- History of Stroke: Adjusted Rate Ratio* = 0.9
- COPD: Adjusted Rate Ratio* = 0.9

COPD: Chronic obstructive pulmonary disease
Obesity = BMI ≥30 kg/m²; Severe obesity = BMI ≥40 kg/m²
*Each underlying medical condition is in a separate model, adjusted for age, sex, race/ethnicity

Ko 2020 CID: https://doi.org/10.1093/cid/ciaa1419
Risk for COVID-19 Hospitalization Greatest for Adults with Multiple Underlying Medical Conditions

<table>
<thead>
<tr>
<th>Number of conditions†</th>
<th>Unadjusted Rate Ratio (95%CI)</th>
<th>Adjusted Rate Ratio* (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.8 (2.7, 3.1)</td>
<td>2.5 (2.1, 3.0)</td>
</tr>
<tr>
<td>2</td>
<td>5.6 (5.2, 6.1)</td>
<td>4.5 (3.7, 5.5)</td>
</tr>
<tr>
<td>3+</td>
<td>7.2 (6.6, 7.9)</td>
<td>5.0 (3.9, 6.3)</td>
</tr>
</tbody>
</table>

| Age 45-64 years‡ | ----- | 1.8 (1.5, 2.2) |
| Age 65+ years‡  | ----- | 2.6 (2.1, 3.1) |
| Male§            | ----- | 1.2 (1.1, 1.4) |
| Non-Hispanic Black|| | 3.9 (3.3, 4.7) |
| Other race/ethnicity|| | 3.3 (2.8, 3.9) |

CI: Confidence Interval; COVID-NET: Coronavirus Disease 2019-Associated Hospitalization Surveillance Network
*Model for number of conditions (variable) is adjusted for age, sex, and race/ethnicity
†Reference group is no underlying medical condition; Number of conditions is a sum of underlying medical conditions excluding hypertension; the most recent year of available BRFSS data for hypertension was 2017.
‡Reference group is 18-44 years
§Reference group is female
||Reference group is non-Hispanic white

Ko 2020 CID: [https://doi.org/10.1093/cid/ciaa1419](https://doi.org/10.1093/cid/ciaa1419)
Most Patients Older than 75 Years Hospitalized with COVID-19 were Admitted from a Long-Term Care Facility (LTCF)*

Proportion of COVID-associated hospitalized patients admitted from a LTCF*

*LTCF= Nursing home/skilled nursing facility, rehabilitation facility, assisted living/residential care, LTACH, group home/retirement, psychiatric facility, or other long-term care facility

Data Source: COVID-19 associated hospitalizations reported to Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization Surveillance Network (COVID-NET) surveillance system. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states. Data restricted to hospitalizations during March-May 2020 and weighted to reflect probability of selection for chart review.

- 6% of adults hospitalized with COVID-19 were healthcare personnel (HCP)
  - 36% were in nursing-related occupations
  - 73% had obesity
  - 28% admitted to ICU
  - 16% required mechanical ventilation
  - 4% died

Kambhampati 2020 MMWR: https://doi.org/10.15585/mmwr.mm6943e3
Nationwide Commercial Laboratory Seroprevalence Survey

- Biweekly testing of ~50,000 residual specimens from commercial labs for SARS-CoV-2 antibodies
- From July 27 – September 24, estimated seroprevalence ranged from 0.4 – 23%
- In 42 of 49 sites with sufficient specimens, <10% had evidence of previous SARS-CoV-2 infection
- Seroprevalence generally highest among children and younger adults (aged 0–17 or 18–49 years) and lowest in older adults aged 65+ years

Seroprevalence among Specimens Collected September 7-24, 2020

Multiplier model used to estimate total number SARS-CoV-2 infections that accounts for under-detection and under-reporting

- Estimated number of cases relative to those nationally reported
  - 2.5x hospitalized cases
  - 7.1x non-hospitalized cases

Estimated 2.4 million hospitalizations, 44.8 million illnesses, and 52.9 million total infections

Reese 2020 CID: https://doi.org/10.1093/cid/ciaa1780
Summary

- As of December 8, over 14.8 million cases of COVID-19 and over 280,000 COVID-19-associated deaths reported in the United States
- Based on seroprevalence surveys and models, total estimated number of infections 2x-7x greater than reported cases, but in most states <10% of population has evidence of previous infection
- Factors associated with increased risk for severe COVID-19 disease include older age, racial and ethnic minority group membership, and specific underlying medical conditions
- Ongoing surveillance and epidemiologic studies will inform further development and implementation of candidate vaccines
- Continued need for non-pharmaceutical interventions (mask use, physical distancing, hand hygiene, environmental disinfection)
Acknowledgments:
- CDC COVID-19 Response
- Respiratory Viruses Branch, Division of Viral Diseases

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.