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

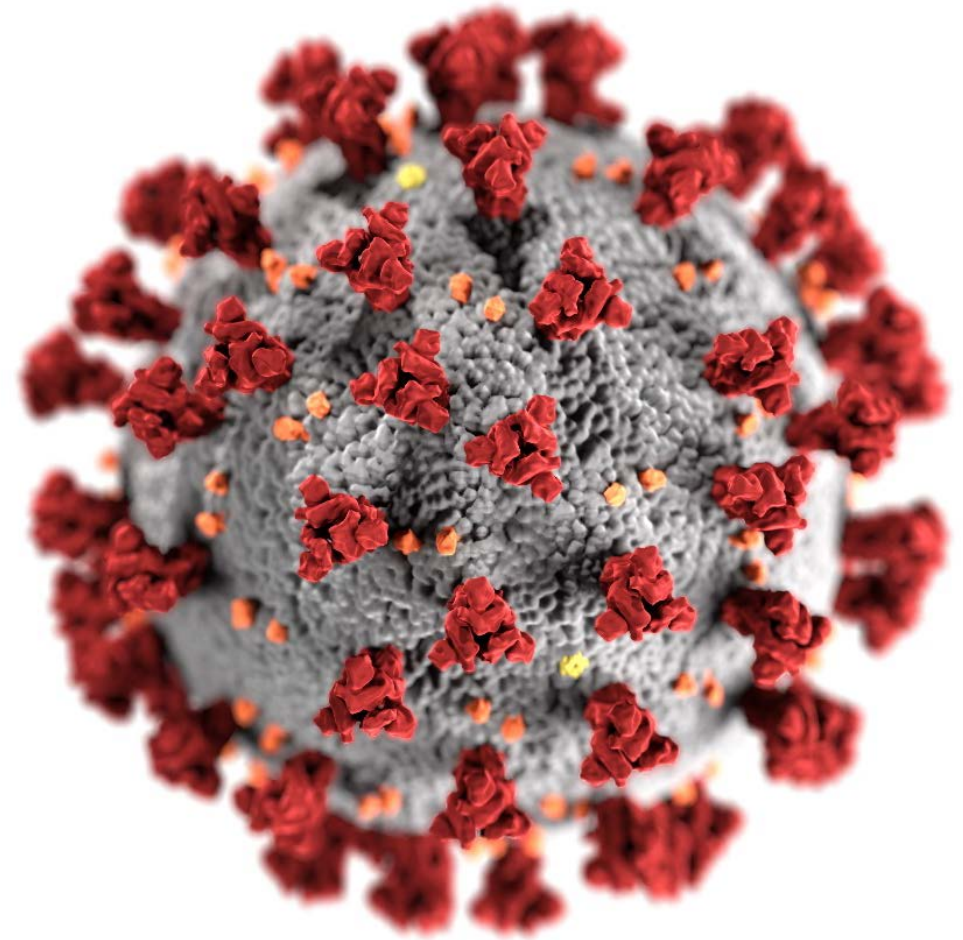Aron J. Hall, DVM, MSPH, Dipl ACVPM

Epidemiology Task Force Co-Lead, COVID-19 Response

Chief, Respiratory Viruses Branch, Division of Viral Diseases
National Center for Immunization and Respiratory Diseases
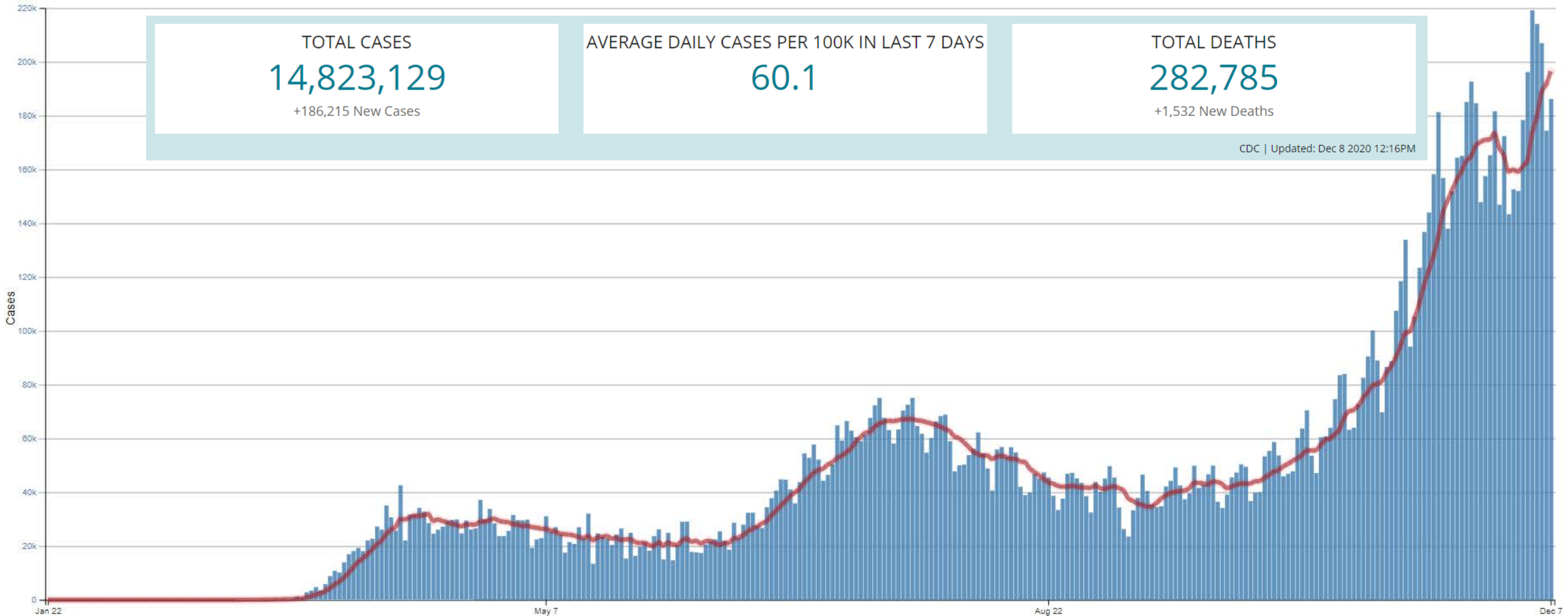Centers for Disease Control and Prevention

VRBPAC Meeting, December 10, 2020

cdc.gov/coronavirus

# Trends in Number of COVID-19 Cases in the United States

January 22 to December 8, 2020

TOTAL CASES	AVERAGE DAILY CASES PER 100K IN LAST 7 DAYS	TOTAL DEATHS
14,823,129	60.1	282,785
+186,215 New Cases		+1,532 New Deaths

CDC | Updated: Dec 8 2020 12:16PM

Cases

220k
200k
180k
160k
140k
120k
100k
80k
60k
40k
20k
0

Jan 22   May 7   Aug 22   Dec 7

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
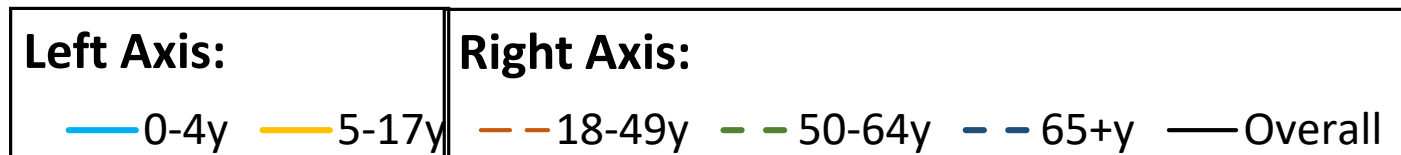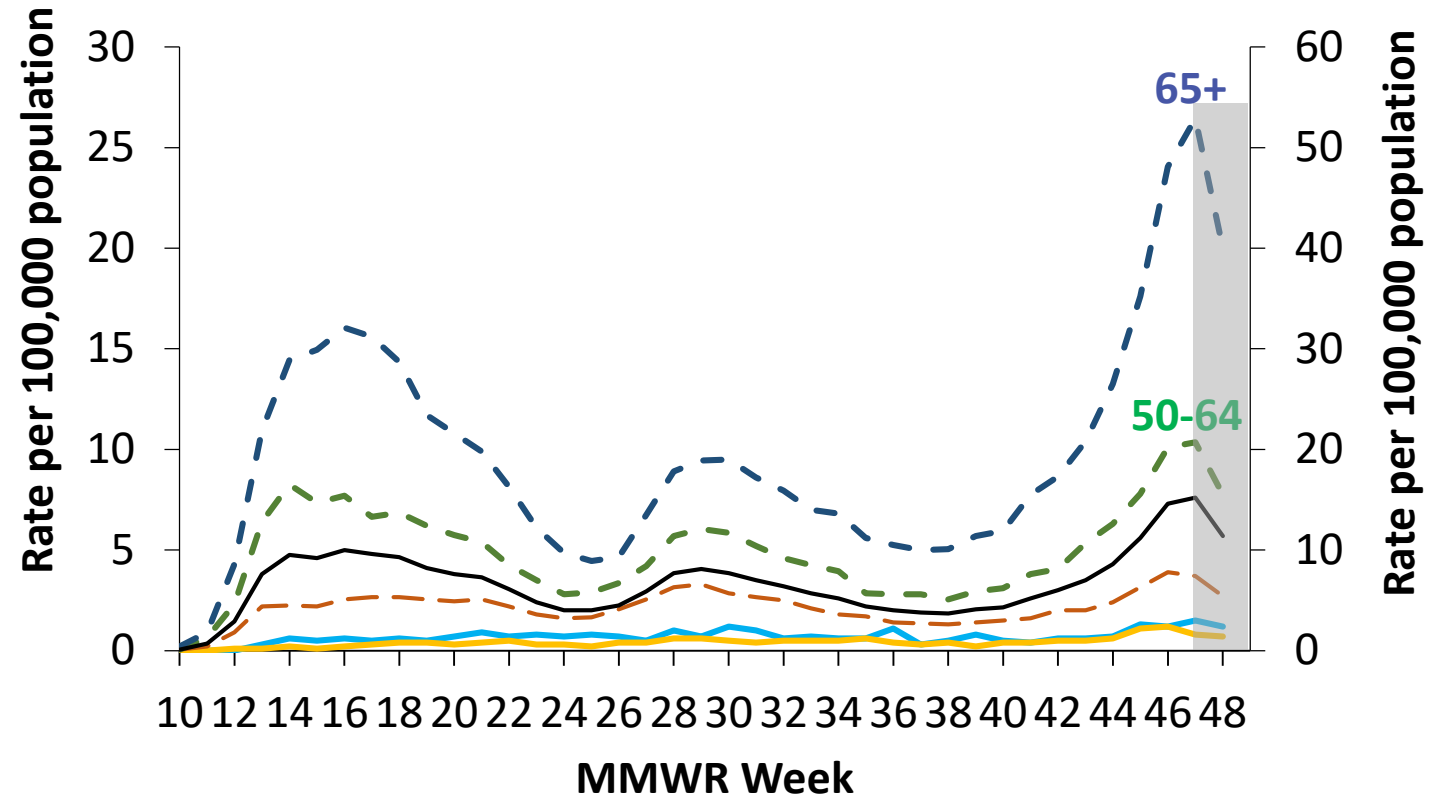 - The % of **deaths** due to pneumonia, influenza or COVID-19 (PIC) increasing since October
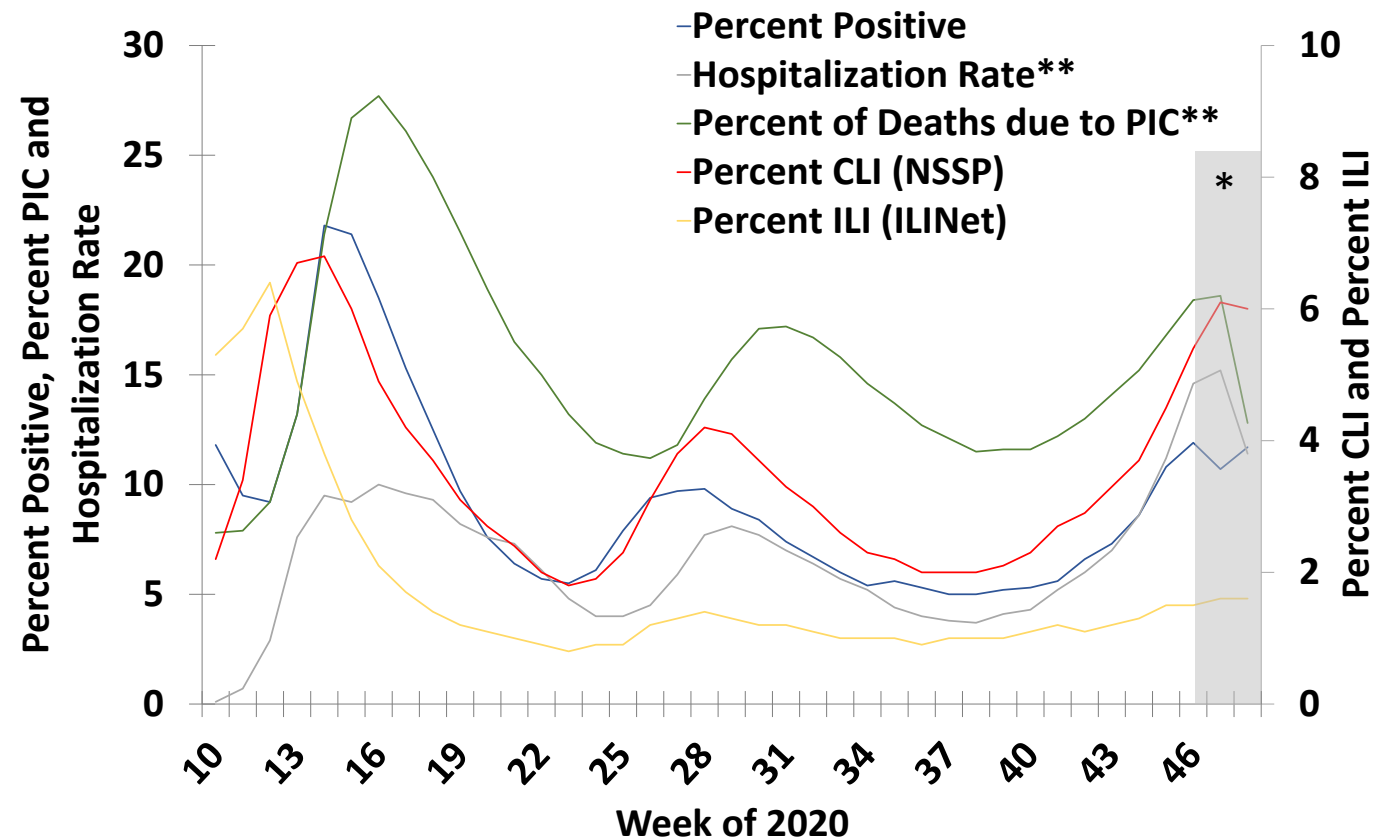
*Data are preliminary and may change as more reports are received.
**The percentage of deaths due to PIC and the hospitalization are expected to increase for the most recent weeks as additional data are received.

https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html

# Weekly COVID-19-Associated Hospitalization Rates by Age — COVID-NET, March 1–November 28, 2020 (n=85,678)

- 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

Left Axis:		Right Axis:			
—— 0-4y	—— 5-17y	- - 18-49y	- - - 50-64y	- - - 65+y	—— Overall

https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html

Cumulative COVID-19-Associated Hospitalization Rates by Age — COVID-NET, March 1–November 28, 2020 (n=85,678)

https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html
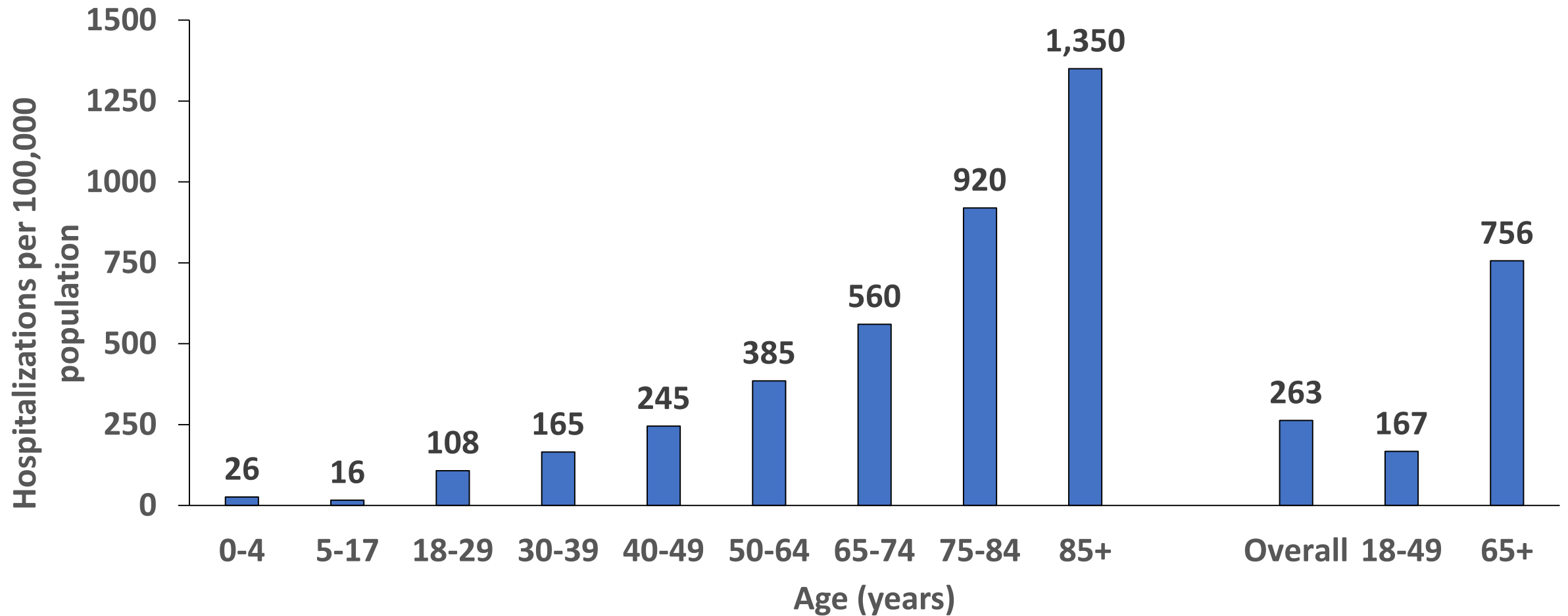
Age-adjusted COVID-19-Associated Hospitalization Rates* by Race/Ethnicity† — COVID-NET, March 1–November 28, 2020
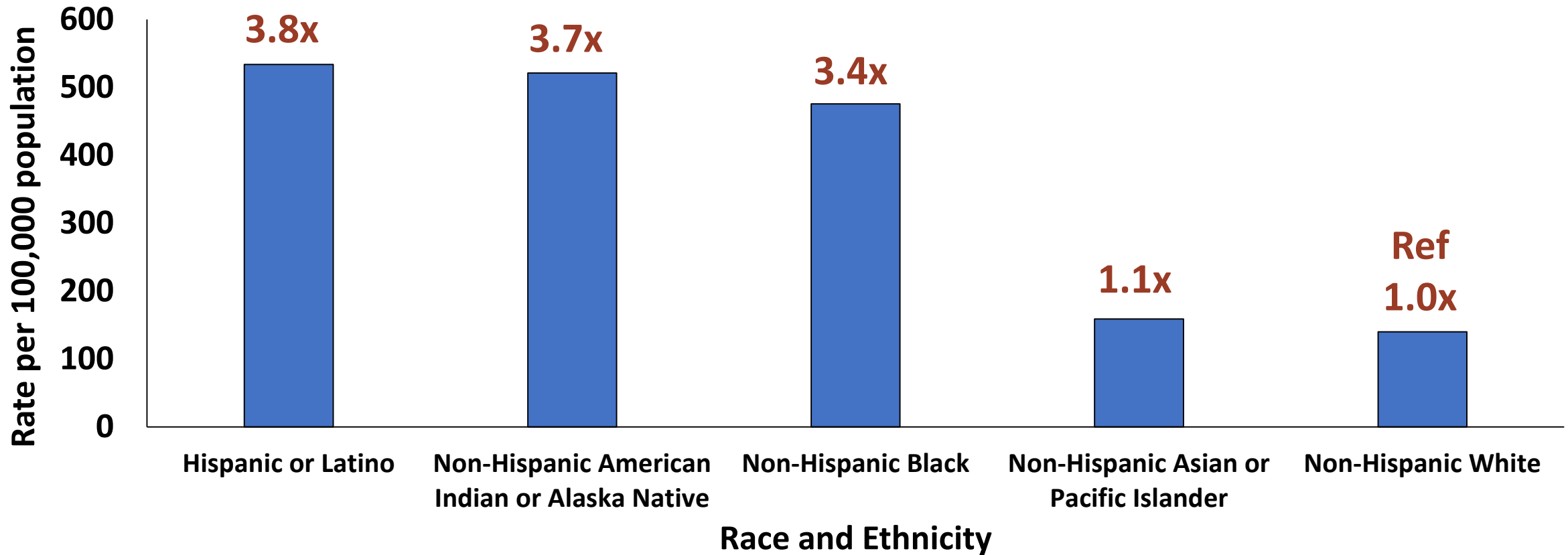
*Calculated using hospitalized COVID-NET cases with known race/ethnicity for the numerator and NCHS bridged-race population estimates for the denominator. Rates are adjusted to account for differences in age distributions within race/ethnicity strata in the COVID-NET catchment area.
†Race and ethnicity missing for 3.5%.

Risk for In-Hospital Death among Adults Hospitalized with COVID-19 Increased with Age
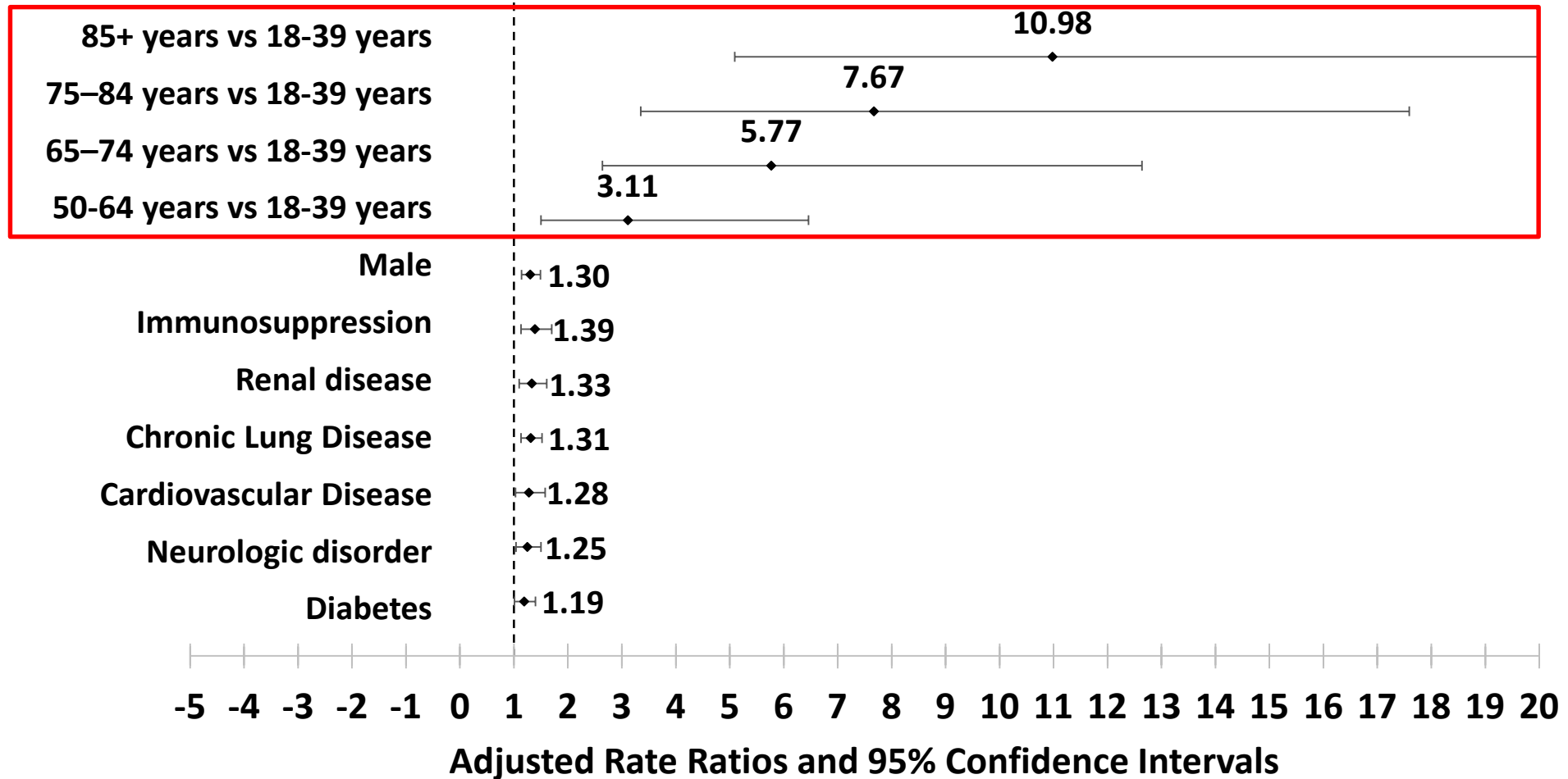
*COVID-NET Surveillance; Final model adjusted for age, sex, race/ethnicity, smoker, hypertension, obesity, diabetes, chronic lung disease, cardiovascular disease, neurologic disease, renal disease, immunosuppression, hematologic disorders, and rheumatologic or autoimmune disease.

Kim 2020 CID: https://doi.org/10.1093/cid/ciaa1012

Risk for COVID-19 Hospitalization Increased for Adults with Underlying Medical Conditions
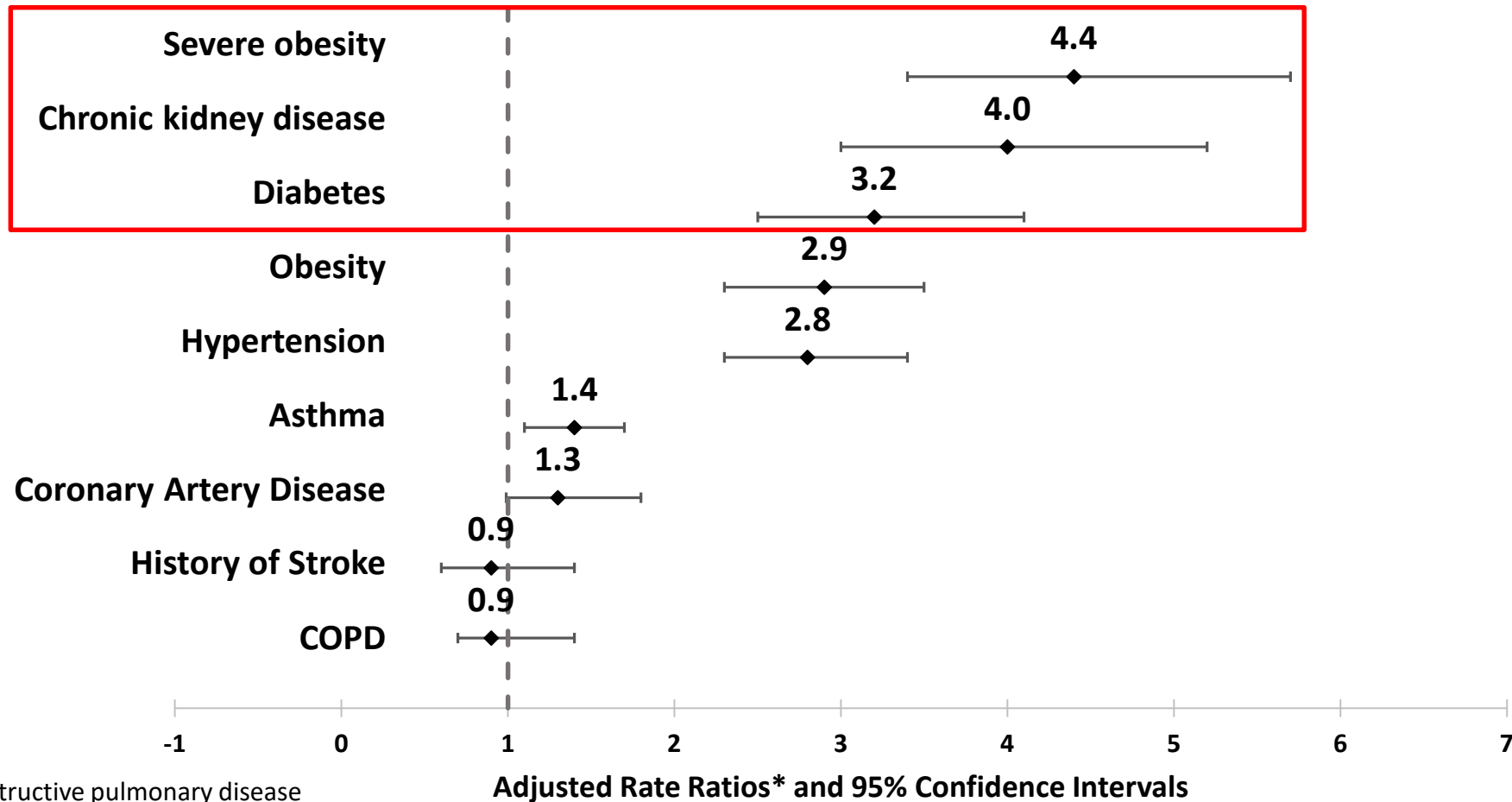
COPD: Chronic obstructive pulmonary disease
Obesity=BMI ≥30kg/m^2 ; Severe obesity = BMI ≥40kg/m^2
*Each underlying medical condition is in a separate model, adjusted for age, sex, race/ethnicity

Ko 2020 CID: https://doi.org/10.1093/cid/ciaa1419

Risk for COVID-19 Hospitalization Greatest for Adults with Multiple Underlying Medical Conditions

	Unadjusted Rate Ratio (95%CI)	Adjusted Rate Ratio* (95%CI)
Number of conditions†		
1	2.8 (2.7, 3.1)	2.5 (2.1, 3.0)
2	5.6 (5.2, 6.1)	4.5 (3.7, 5.5)
3+	7.2 (6.6, 7.9)	5.0 (3.9, 6.3)
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.
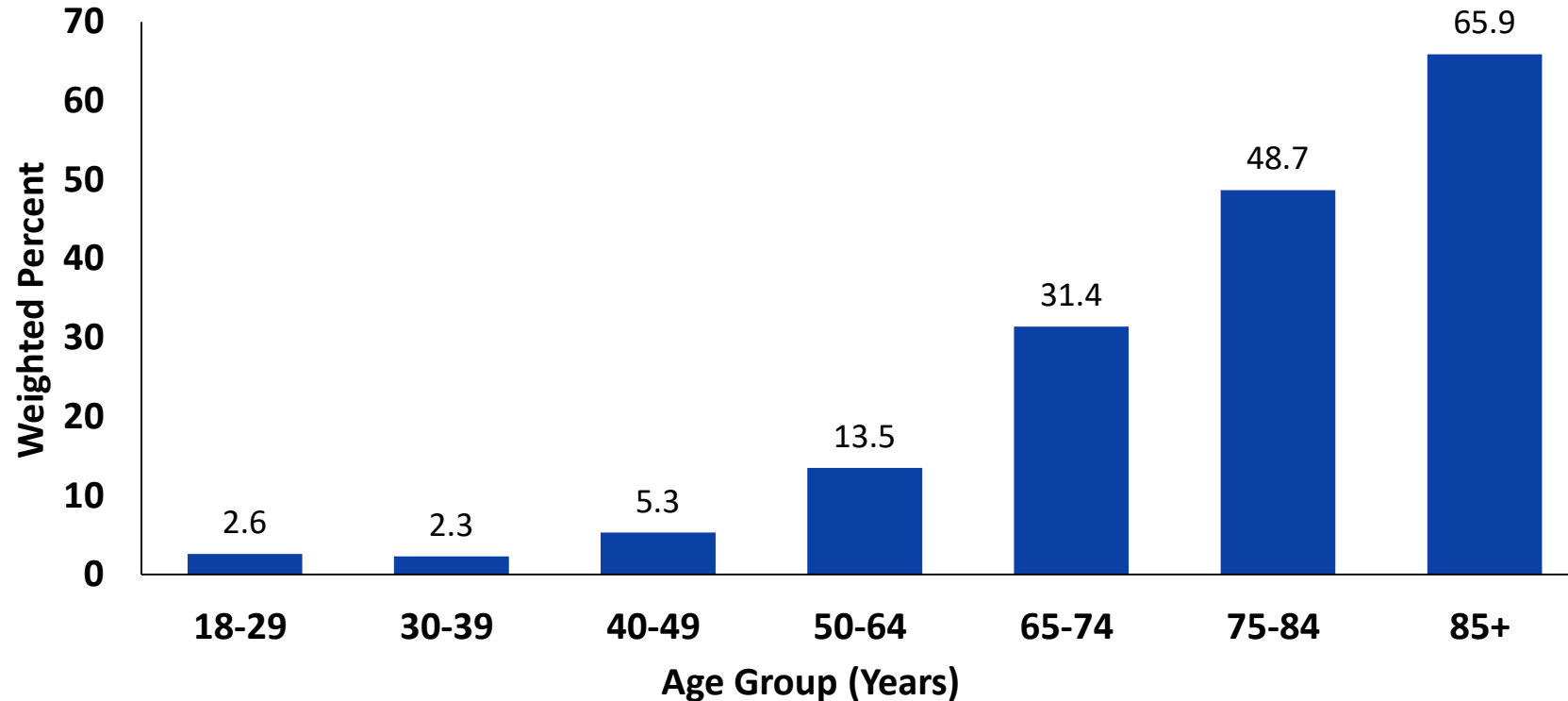
‡Reference group is 18-44 years

§Reference group is female

||Reference group is non-Hispanic white

Ko 2020 CID: https://doi.org/10.1093/cid/ciaa1419

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.

COVID-19-Associated Hospitalizations among Healthcare Personnel, COVID-NET, March–May 2020
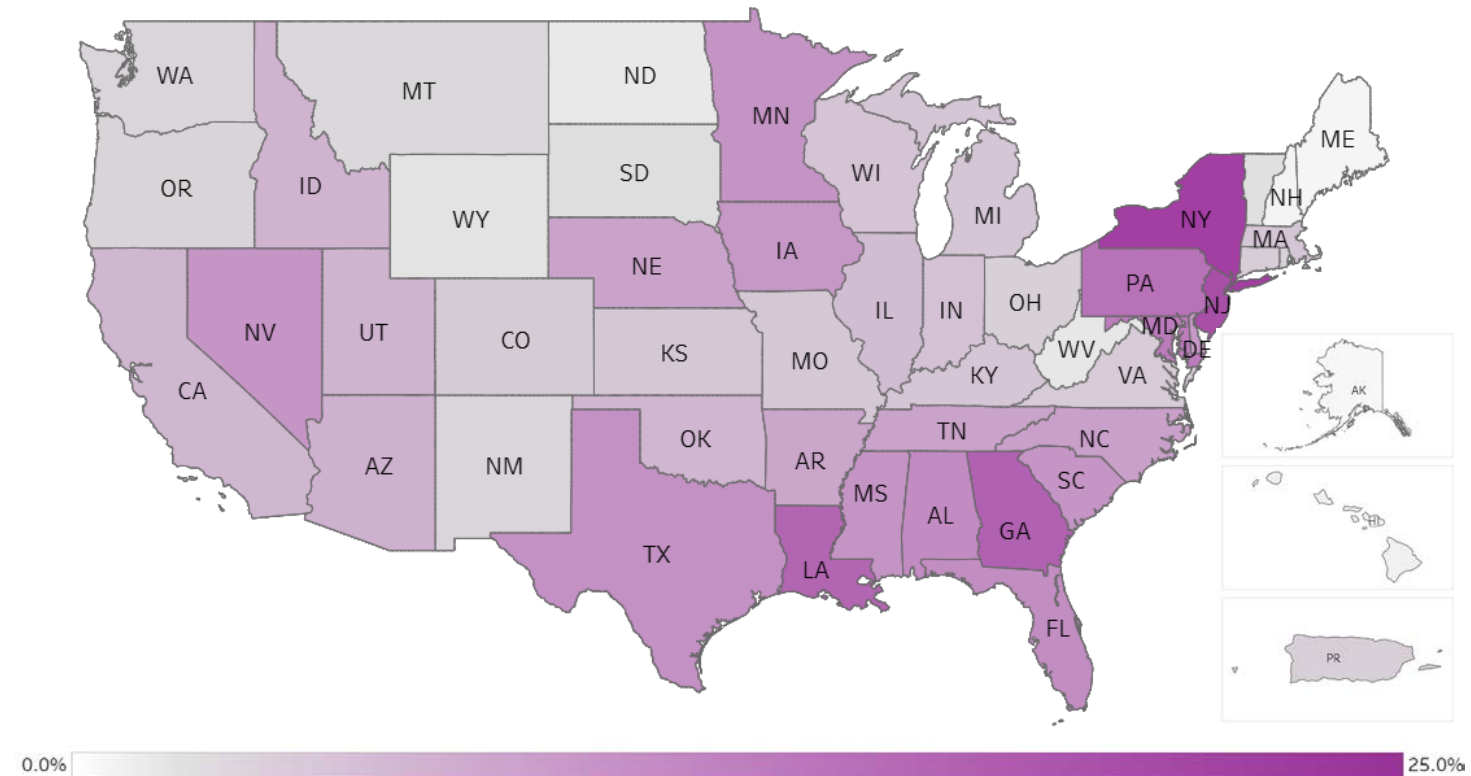
- 6% of adults hospitalized with COVID-19 were healthcare personnel (HCP)
  - 36% were in nursing-related occupations
  - 73% had obesity
  - 28% admitted to ICU
  - 16% required mechanical ventilation
  - 4% died

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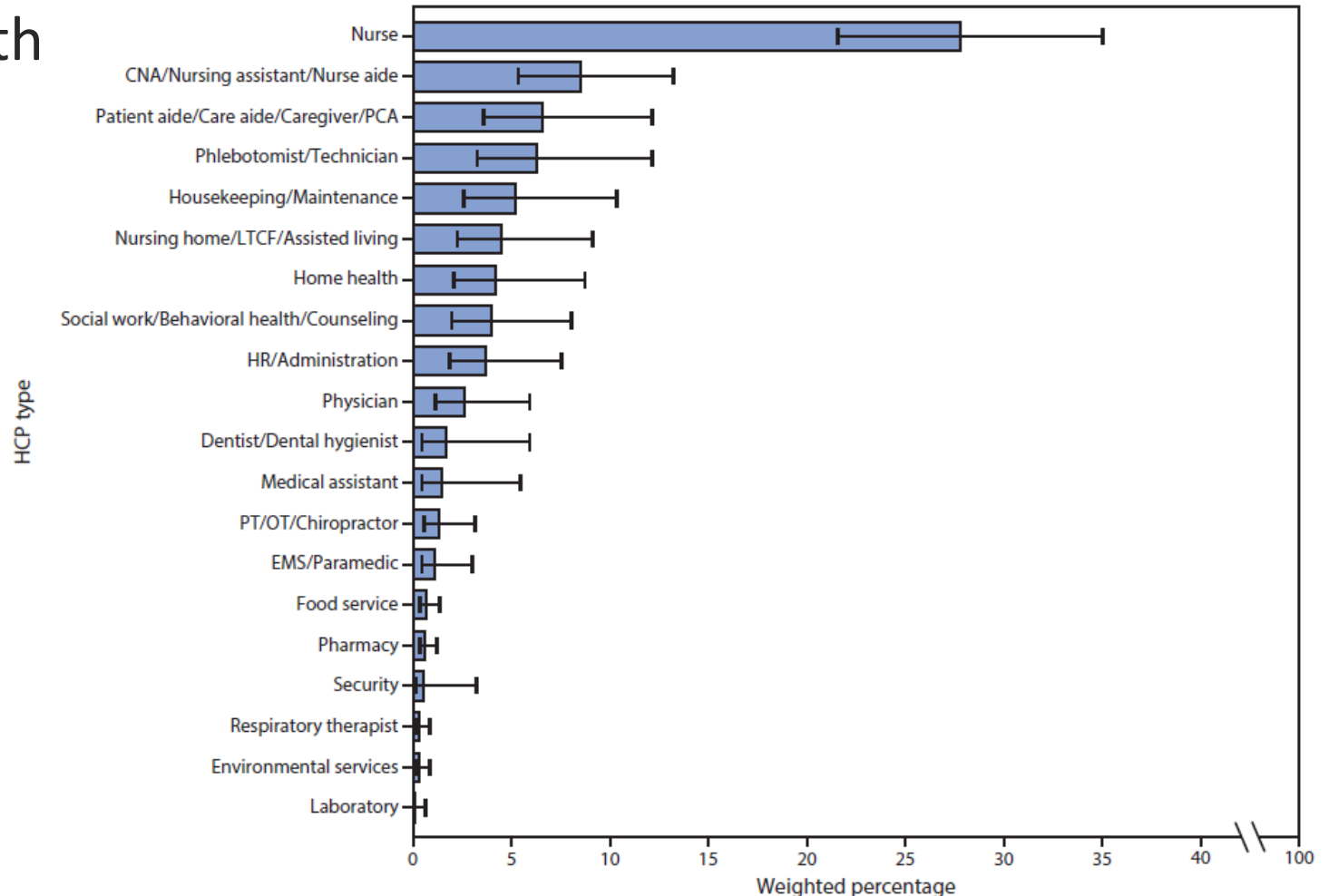
Nationwide Commercial Laboratory Seroprevalence Survey

- 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
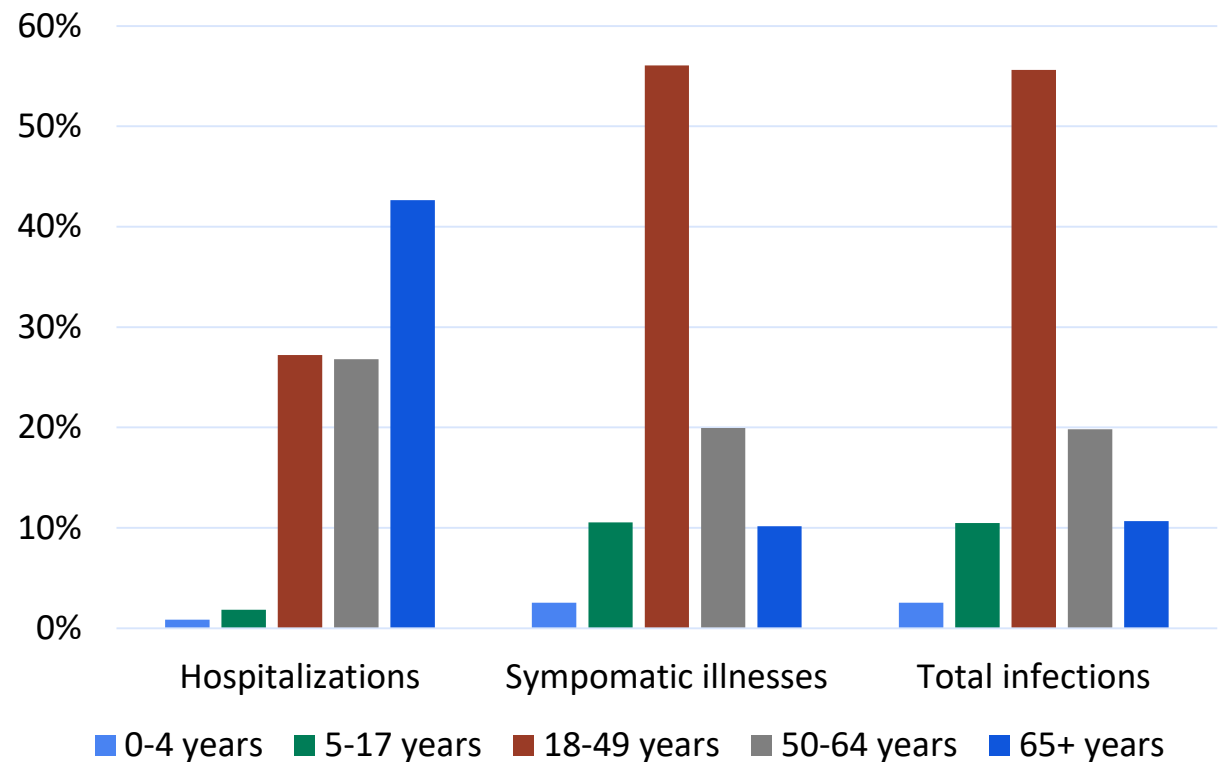

Seroprevalence among Specimens Collected September 7-24, 2020

Bajema 2020 JAMA IM: https://doi.org/10.1001/jamainternmed.2020.7976
https://covid.cdc.gov/covid-data-tracker/#national-lab

Total Estimated Hospitalizations, Illnesses, and Infections with SARS-CoV-2, United States, February–September 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

Age Distribution of Total Estimated Hospitalizations, Illnesses, and Infections with SARS-CoV-2

Legend: 0-4 years, 5-17 years, 18-49 years, 50-64 years, 65+ years

Categories: Hospitalizations, Sympomatic illnesses, Total infections

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)
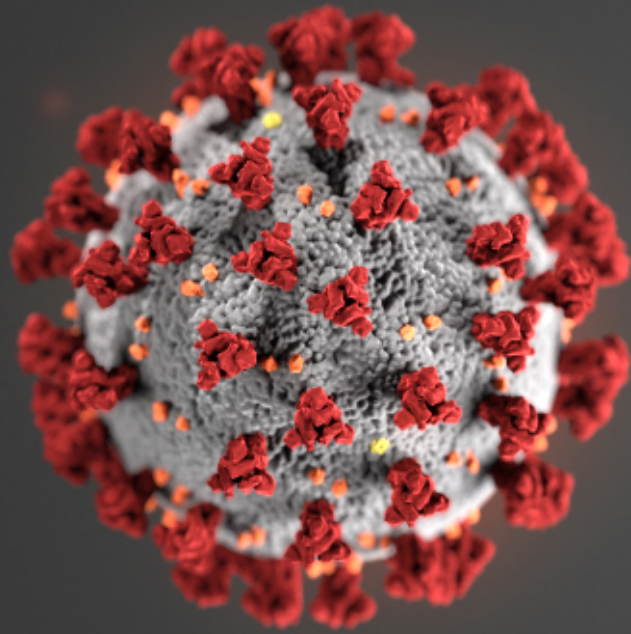
For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348   www.cdc.gov

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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.