

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases



Chronic Conditions as Risk Factors for RSV-Associated Hospitalization

Advisory Committee on Immunization Practices Meeting

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February 29, 2024



Information is needed about which chronic conditions increase the risk of hospitalization for RSV infection.

Research Questions



Which chronic medical conditions are associated with higher **rates of RSV-associated hospitalization** among community-dwelling adults aged ≥ 50 years?



What are the **rate ratios** comparing RSV hospitalization rates among community-dwelling adults aged ≥ 50 years **with and without** chronic medical conditions?



How do the rates and rate ratios comparing RSV hospitalization rates among community-dwelling adults aged ≥ 50 years with and without chronic medical conditions **vary by age group**?

Methods

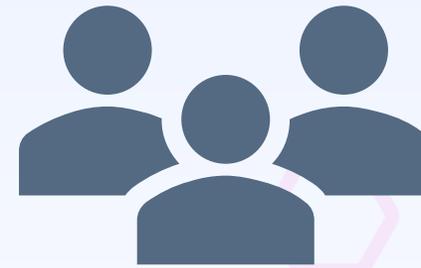


We leveraged multiple data sources to calculate RSV-associated hospitalization rates during the 2017-2018 RSV season by chronic condition and age group.



Numerator

- RSV-Associated Hospitalization Surveillance Network (RSV-NET)

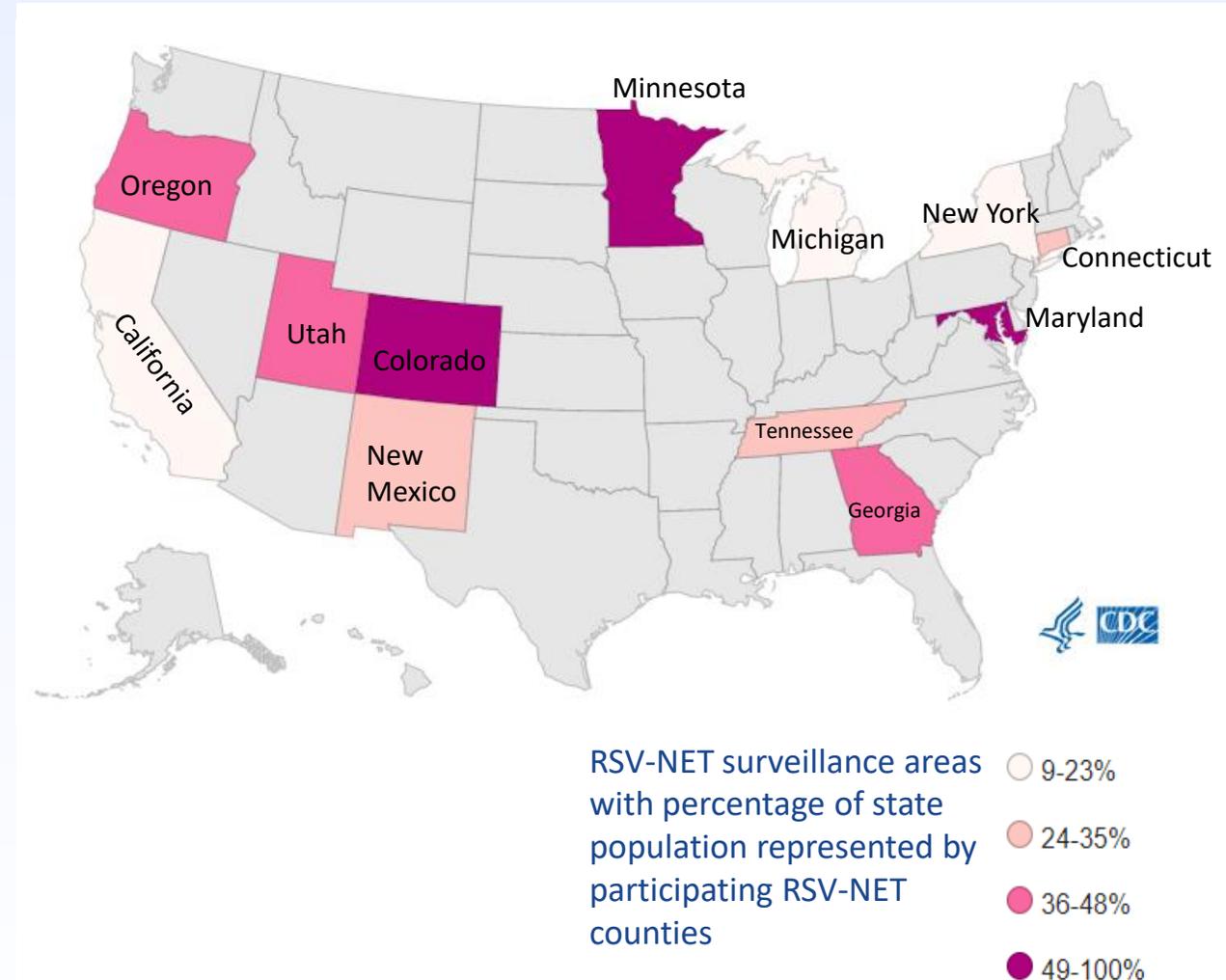


Denominator

- Behavioral Risk Factor Surveillance System (BRFSS)
- Census population counts

RSV-Associated Hospitalization Surveillance Network (RSV-NET)

- RESP-NET: a population-based hospitalization surveillance platform
- Active, population-based surveillance of laboratory-confirmed RSV-associated hospitalizations
 - >300 acute-care hospitals, 58 counties in 12 states
 - ~8.6% of U.S. population
- Tests positive for RSV within 14 days prior to or during hospitalization
 - Clinician-driven testing



Behavioral Risk Factor Surveillance System (BRFSS) Overview

A woman with long dark hair, wearing a brown turtleneck sweater and a black headset with a microphone, is seated at a desk in a call center. She is looking towards the right of the frame. In the background, another person is visible, also wearing a headset and working at a computer. The background is slightly blurred, showing a typical office environment with desks and monitors.

- Annual telephone-based survey in the US, DC, and select territories
- Self-reported history of select chronic conditions
- Representative of the state population
- Eligible participants:
 - Civilian, community-dwelling residents
 - Aged ≥ 18 years

We evaluated 9 chronic medical conditions as potential risk factors for RSV-associated hospitalization.

- Asthma
- Chronic kidney disease (CKD)
- Chronic obstructive pulmonary disease (COPD)
- Coronary artery disease (CAD)
- Current smoking
- Diabetes mellitus
- Obesity (body mass index 30-39 kg/m²)
- Severe obesity (body mass index ≥ 40 kg/m²)
- Stroke



We calculated RSV-associated hospitalization rates using the following methods.



Obtained **counts of RSV-associated hospitalizations** among community-dwelling adults aged ≥ 50 years with and without chronic medical conditions during the 2017-2018 surveillance season (RSV-NET)



Obtained estimated **counts of community-dwelling adults** aged ≥ 50 years with and without chronic medical conditions in 2018 for the 38-county RSV-NET catchment area

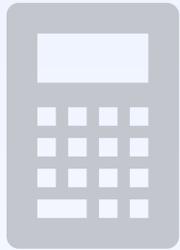


Calculated **RSV-associated hospitalization rates** (per 100,000 population) among adults with and without chronic medical conditions stratified by age group (50-64, 65-74, ≥ 75 years)



Applied **burden multipliers** to the rates to account for frequency of RSV testing among adults hospitalized with respiratory illness and sensitivity of diagnostic tests

We calculated RSV-associated hospitalization rate ratios using the following methods.



Divided the RSV-associated hospitalization rates in adults with vs. without chronic medical conditions (ages 50-64, 65-74, ≥ 75 years)



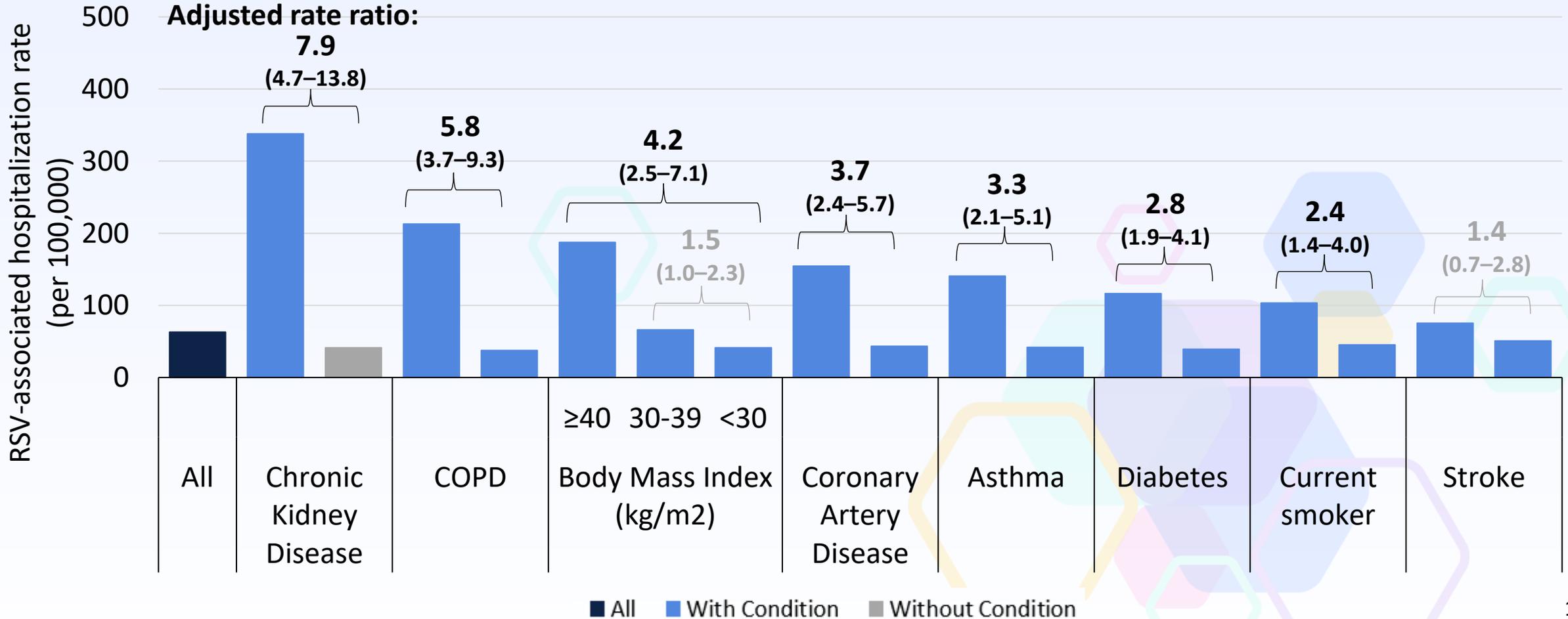
Used Monte Carlo simulation and generalized Poisson models to estimate rate ratios adjusted for sex and race or ethnicity group and 95% Monte Carlo (confidence) intervals

Preliminary Results

The background of the slide is a solid blue color. It is decorated with a pattern of overlapping hexagons. Some hexagons are solid colors in shades of blue and purple, while others are just outlines. The hexagons vary in size and are scattered across the right and bottom portions of the slide, creating a modern, geometric aesthetic.

Adults Aged 50-64 Years

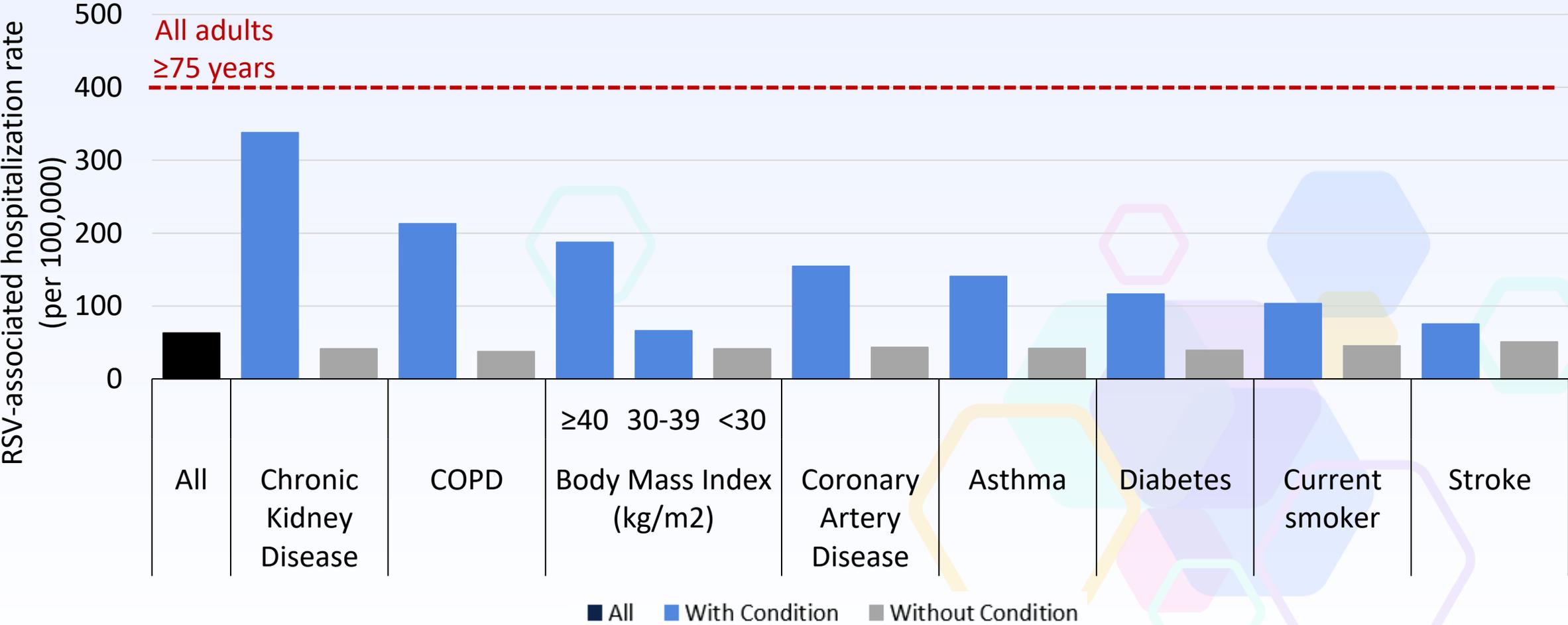
RSV-associated hospitalization rates among community-dwelling adults aged 50-64 years with and without chronic medical conditions, 2017-2018 surveillance season



COPD: Chronic Obstructive Pulmonary Disease. Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group. Adjusted rate ratios are derived from generalized Poisson models using Monte Carlo simulation methods and adjust for sex and race and ethnicity group.

Adults Aged 50-64 Years

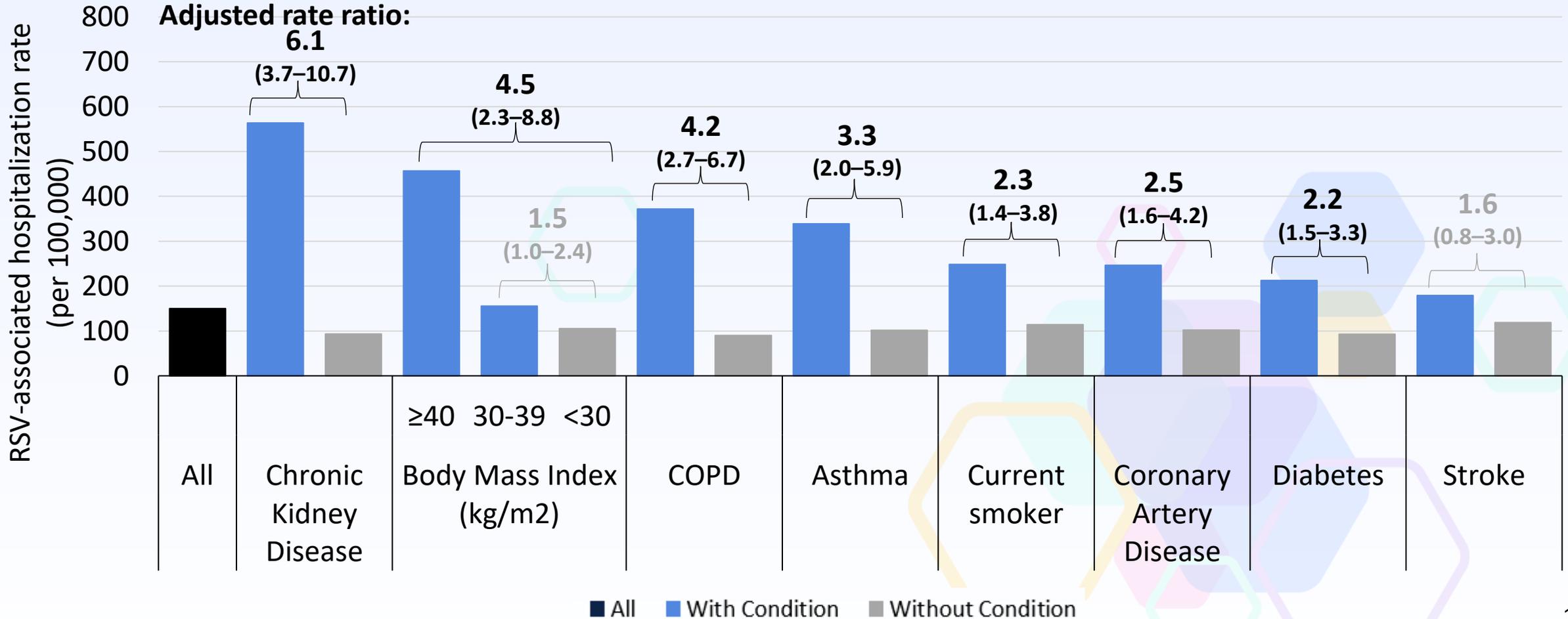
RSV-associated hospitalization rates among community-dwelling adults aged 50-64 years with and without chronic medical conditions, 2017-2018 surveillance season



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Adults Aged 65-74 Years

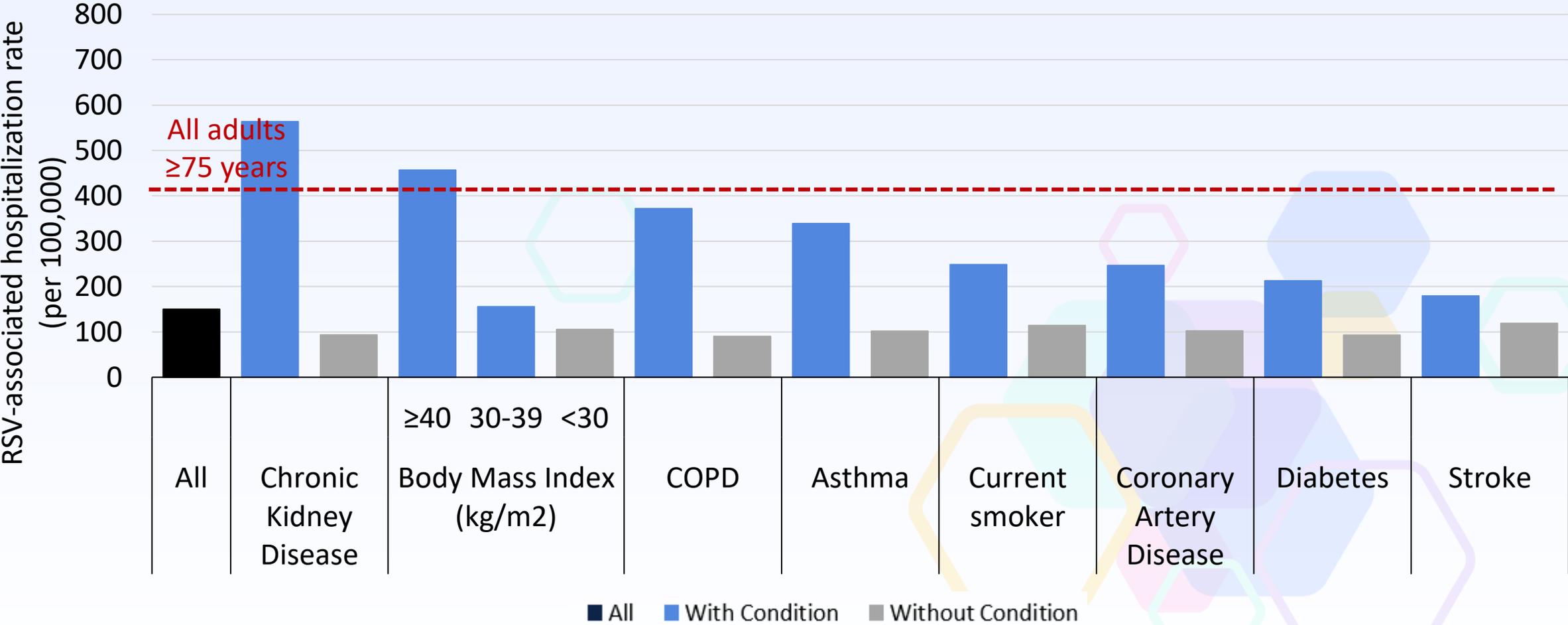
RSV-associated hospitalization rates among community-dwelling adults aged 65-74 years with and without chronic medical conditions, 2017-2018 surveillance season



COPD: Chronic Obstructive Pulmonary Disease. Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group. Adjusted rate ratios are derived from generalized Poisson models using Monte Carlo simulation methods and adjust for sex and race and ethnicity group.

Adults Aged 65-74 Years

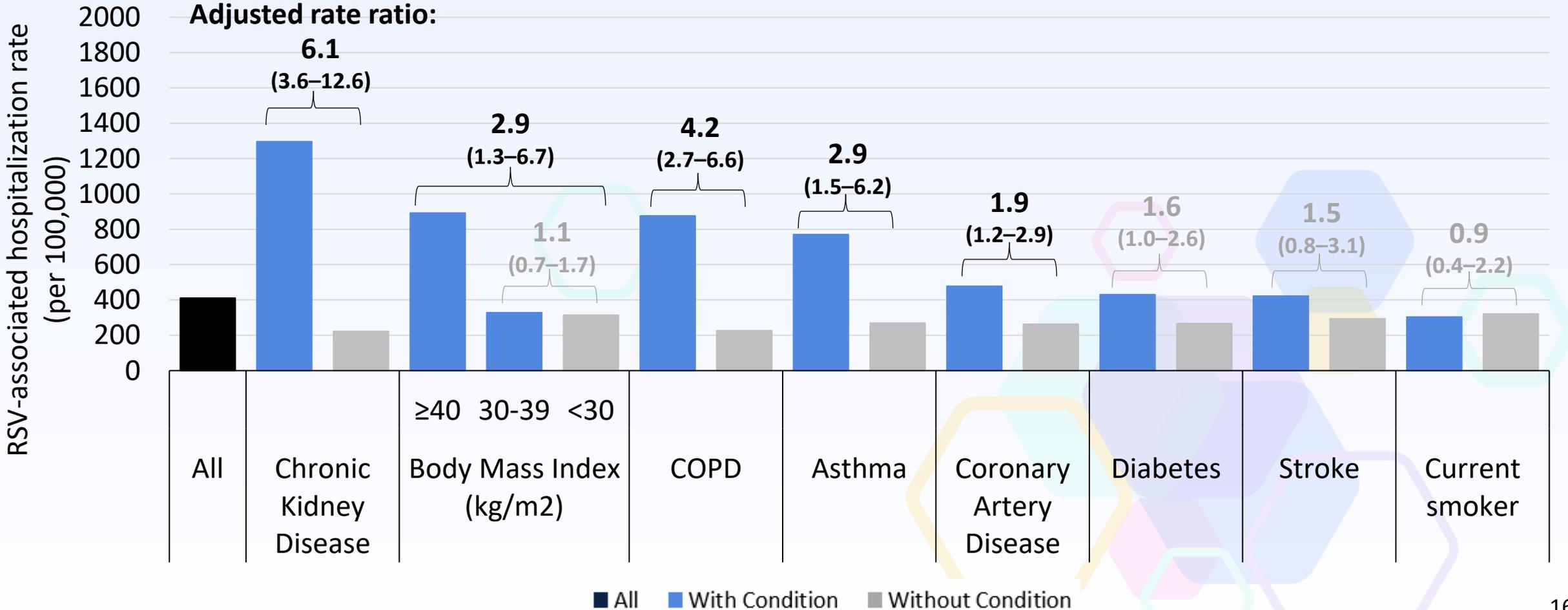
RSV-associated hospitalization rates among community-dwelling adults aged 65-74 years with and without chronic medical conditions, 2017-2018 surveillance season



COPD: Chronic Obstructive Pulmonary Disease. Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group.

Adults Aged ≥ 75 Years

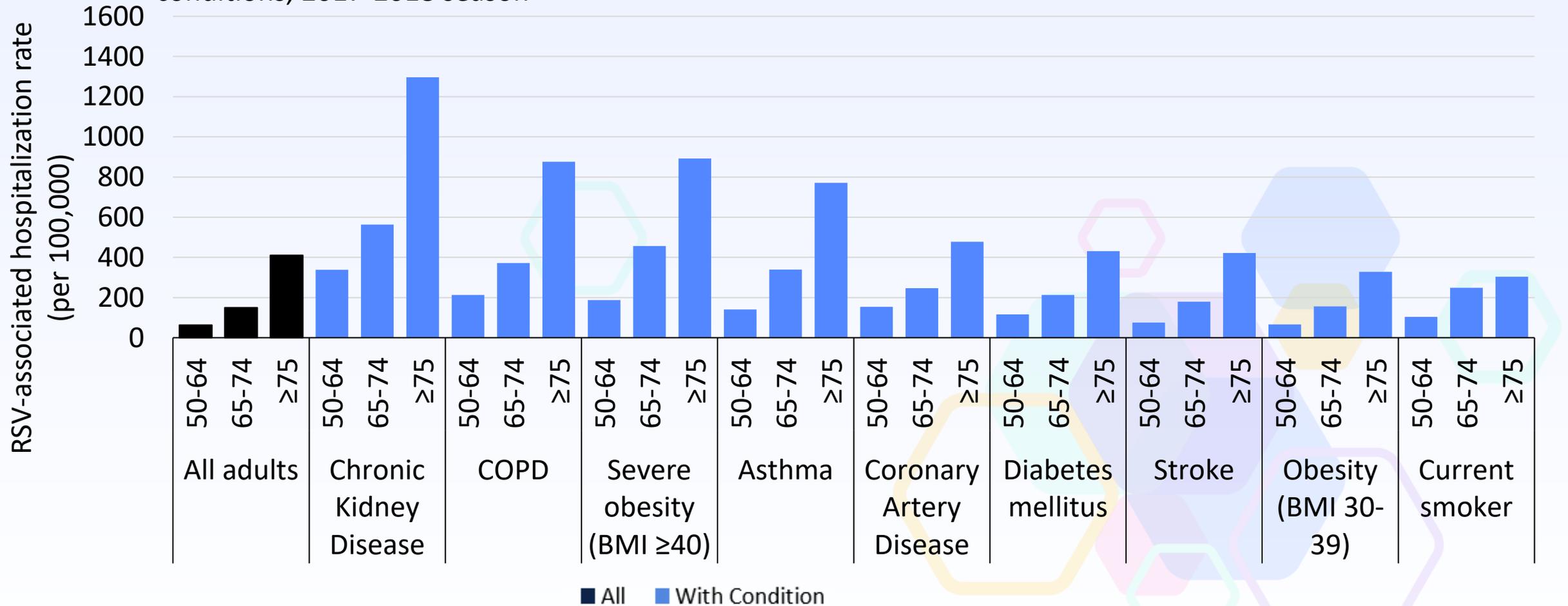
RSV-associated hospitalization rates among community-dwelling adults aged ≥ 75 years with and without chronic medical conditions, 2017-2018 surveillance season



COPD: Chronic Obstructive Pulmonary Disease. Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group. Adjusted rate ratios are derived from generalized Poisson models using Monte Carlo simulation methods and adjust for sex and race and ethnicity group.

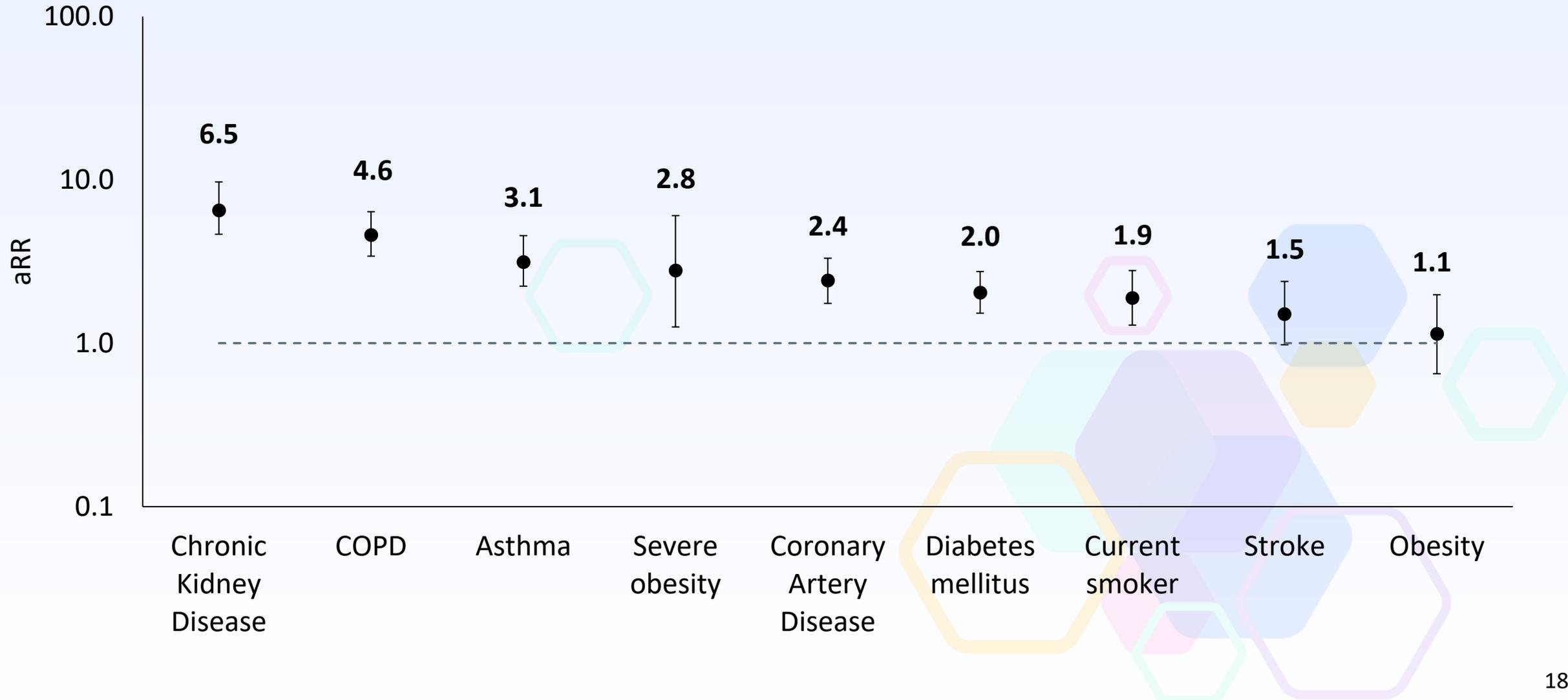
RSV-Associated Hospitalization Rates by Chronic Condition and Age Group

RSV-associated hospitalization rates among community-dwelling adults aged ≥50 years with chronic medical conditions, 2017-2018 season

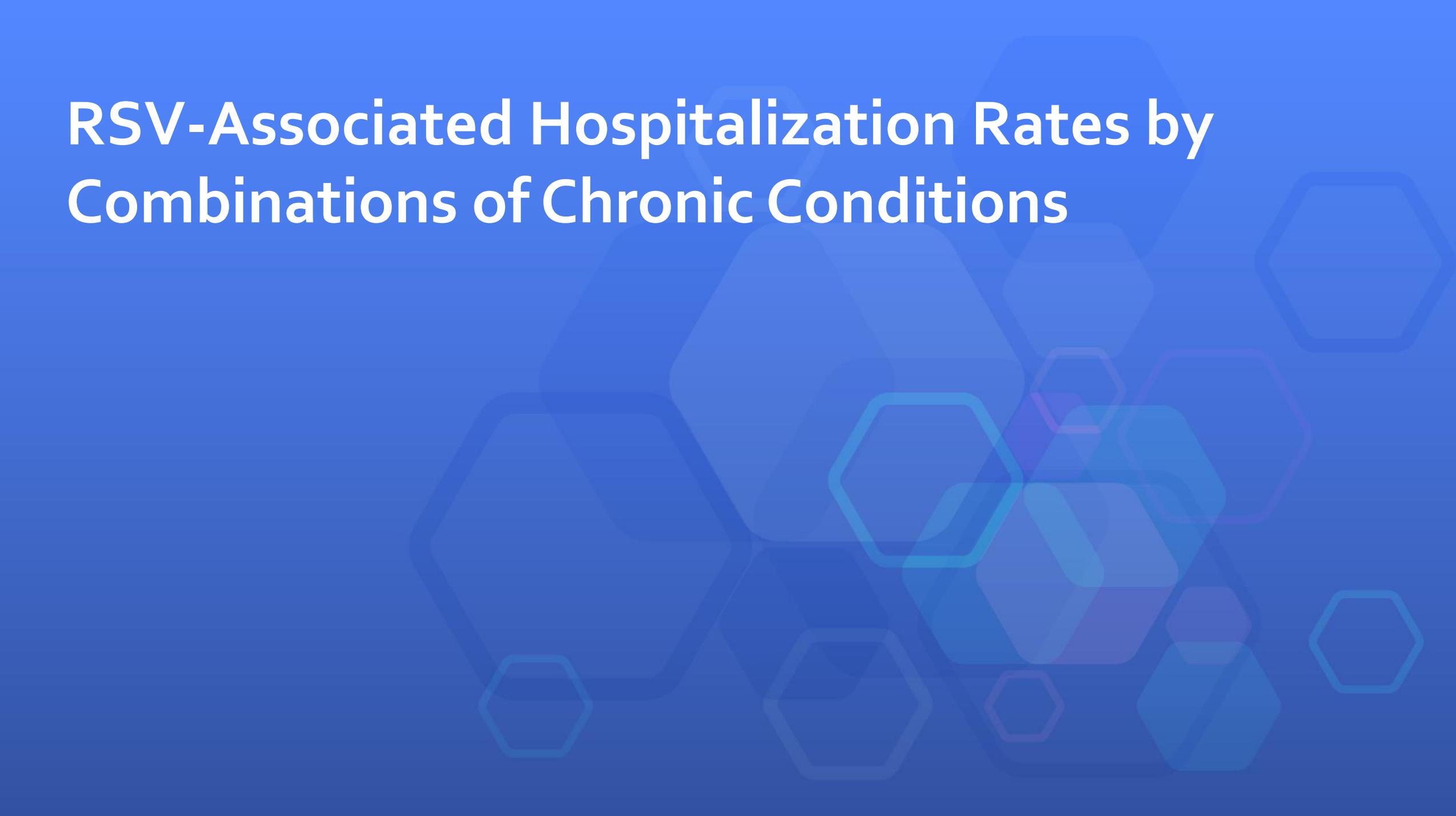


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Adjusted Rate Ratios for RSV-Associated Hospitalization by Chronic Condition among Adults Aged ≥ 50 Years

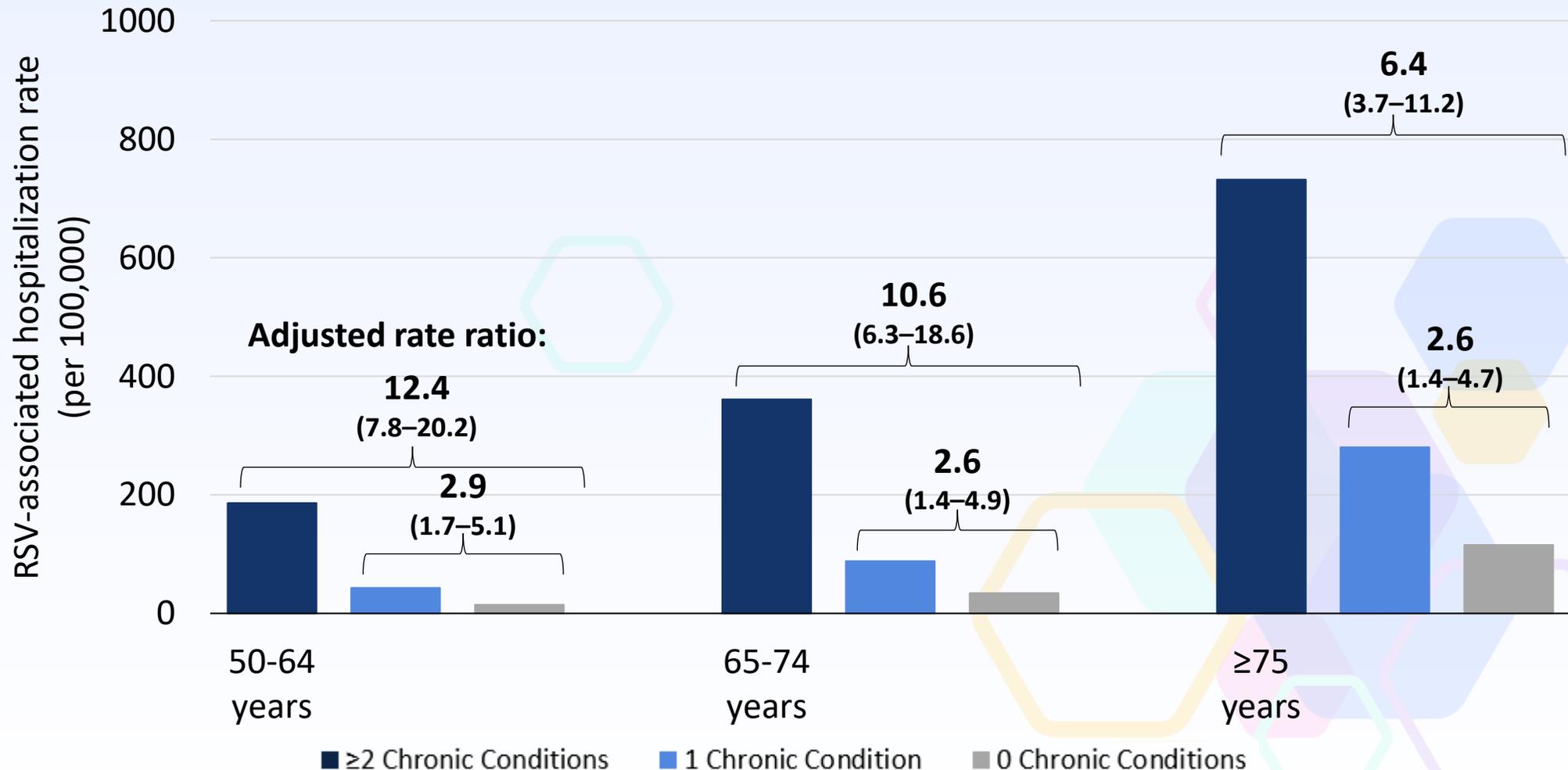


RSV-Associated Hospitalization Rates by Combinations of Chronic Conditions



By Number of Chronic Conditions

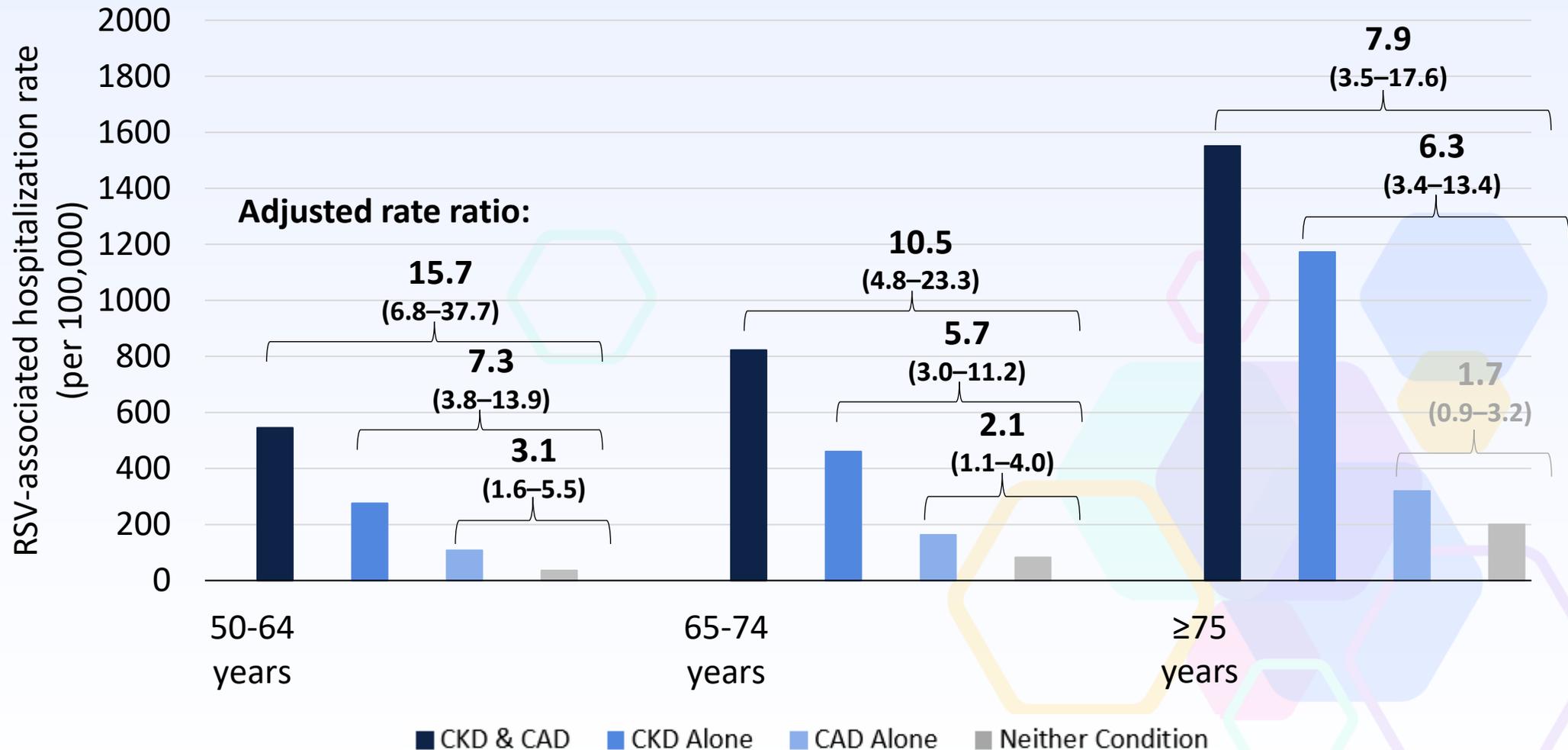
RSV-associated hospitalization rates* among community-dwelling adults aged ≥50 years by number of chronic conditions and age group, 2017-2018 season



* Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group. Adjusted rate ratios are derived from generalized Poisson models using Monte Carlo simulation methods and adjust for sex and race and ethnicity group.

By Chronic Kidney Disease & Coronary Artery Disease

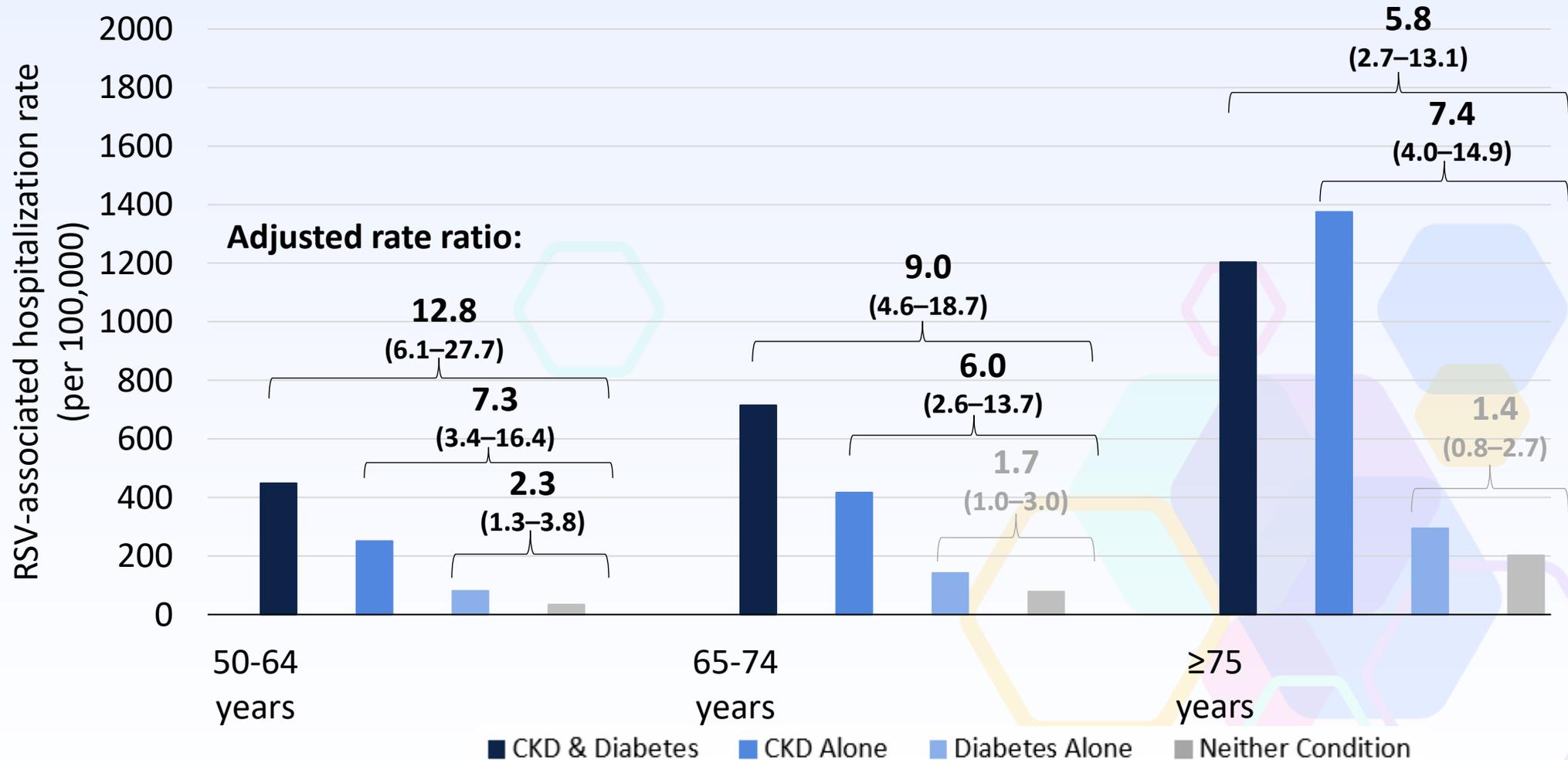
RSV-associated hospitalization rates* among community-dwelling adults aged ≥50 years by chronic kidney disease (CKD), coronary artery disease (CAD), and age group, 2017-2018 season



* Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group. Adjusted rate ratios are derived from generalized Poisson models using Monte Carlo simulation methods and adjust for sex and race and ethnicity group.

By Chronic Kidney Disease & Diabetes

RSV-associated hospitalization rates* among community-dwelling adults aged ≥50 years by chronic kidney disease (CKD), diabetes, and age group, 2017-2018 season



* Data are preliminary and unpublished. Rates of laboratory-confirmed RSV-associated hospitalization account for under-detection of RSV infection among hospitalized adults and sensitivity of diagnostic tests; rates exclude residents of nursing homes and long-term care facilities and are not adjusted for sex or race/ethnicity group. Adjusted rate ratios are derived from generalized Poisson models using Monte Carlo simulation methods and adjust for sex and race and ethnicity group.

Limitations

- Denominator data were created based on self-reported history of chronic conditions from BRFSS
 - ~49.9% response rate in 2018
 - Subject to recall & social desirability biases
- BRFSS might underestimate true prevalence of select chronic medical conditions, which would drive the rates and rate ratios upwards
- Could not assess all chronic medical conditions or potential risk factors of interest
 - Heart failure
 - End-stage renal disease
 - Immunocompromise
- Results do not necessarily generalize to non-community-dwelling adults (e.g., residents of nursing homes, long-term care facilities, shelters, treatment facilities, or correctional institutions)



Select chronic medical conditions were associated with higher rates of RSV-associated hospitalization among community-dwelling adults, which varied by condition and age group.

Acknowledgements



Centers for Disease Control and Prevention

Coronavirus and Other Respiratory Viruses Division

- Gordana Derado, PhD
- Sarah Hamid, PhD
- Fiona P. Havers, MD
- Michael Melgar, MD
- Huong Pham, MPH
- Christopher A. Taylor, PhD

Division for Heart Disease and Stroke Prevention

- Fleetwood V. Loustalot, PhD
- Elizabeth Lundeen, PhD
- Ahlia Sekkarie, PhD

RSV-Associated Hospitalization Surveillance Network (RSV-NET) Site Investigators, Surveillance Officers, and Staff

For more information, contact CDC
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TTY: 1-888-232-6348 www.cdc.gov

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