Respiratory Syncytial Virus
Epidemiology and Disease
Burden in Older Adults

Fiona Havers, MD, MHS, FIDSA
Team Lead, RESP-NET Hospitalization Surveillance Team
Coronaviruses and Other Respiratory Diseases Division
Centers for Disease Control and Prevention

Vaccines and Related Biological Products Advisory Committee (VRBPAC)
February 28, 2023
RSV Epidemiology and Burden
Epidemiology of RSV in older adults

- Frequent cause of severe respiratory illness in older adults
- Lower awareness of RSV in adults among healthcare providers and the public
- Under detection: RSV testing often not performed
- No specific recommended vaccine or treatment in adults
Among adults ≥65 years of age in the United States, RSV is associated with*...

*There is substantial uncertainty in burden of disease, reflected in wide ranges here.

8. CDC RSV-NET data 2016–2020 (unpublished)
RSV and influenza burden, compared

**RSV**

**Adults aged ≥65 years**

- **6,000–10,000**\(^{1–3}\) deaths/year
- **60,000–160,000**\(^{4–8}\) hospitalizations/year
- **0.9–1.4 million**\(^{5}\) medical encounters/year

**Influenza**

**Adults aged ≥65 years**

- **16,000–43,000**\(^{9}\) deaths/year
- **128,000–467,000**\(^{9}\) hospitalizations/year
- **0.8–2.9 million**\(^{9}\) medical encounters/year

---

1. Thompson et al, JAMA (2003): [https://doi.org/10.1001/jama.289.2.179](https://doi.org/10.1001/jama.289.2.179)
8. CDC RSV-NET data 2016–2020 (unpublished)
Population-based RSV-associated hospitalization rates by adult age group, RSV-NET 2016–2020

RSV-NET: unpublished data; https://www.cdc.gov/rsv/research/rsv-net/overview-methods.html. Rates are adjusted for the frequency of RSV testing during recent prior seasons and the sensitivity of RSV diagnostic tests, assuming a 95% sensitivity for PCR testing. Other studies indicate that PCR sensitivity may be lower.
Race and ethnicity of RSV-associated hospitalizations varied by age group: RSV-NET, 2018-19 through 2022-23

Median age of hospitalized patients by race/ethnicity

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
<th>Median age in years [IQR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>69 [56-80]</td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>70 (.5)</td>
<td>59 [48-72]</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>820 (6)</td>
<td>73 [57-83]</td>
</tr>
<tr>
<td>Black</td>
<td>2,671 (20)</td>
<td>60 [47-70]</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1,421 (10)</td>
<td>62 [45-75]</td>
</tr>
<tr>
<td>White</td>
<td>8,536 (63)</td>
<td>72 [61-82]</td>
</tr>
</tbody>
</table>

Substantial burden of medically attended outpatient visits for RSV in older adults

- **11%** of outpatients with acute respiratory illness
- **19%** had a serious outcome\(^1\)
- Rates nearly **2x** higher in patients with chronic cardiopulmonary disease compared with others

---

Seasonal incidence and 95% confidence limits of medically attended RSV by age group in a community cohort of adults ≥60 years old

---

\(^1\) Serious outcome defined as hospitalization, emergency department visit and pneumonia.
COVID-19 pandemic affected RSV in 2020-21 and 2021-22

Early season peak in 2022-23*

* Surveillance for 2015-16 through 2019-20 seasons were conducted from October – April; for 2020-21 and 2021-22 surveillance was conducted continuously from October – September. Data for 2022-23 season through October 1, 2022 – February 11, 2023 only.
Clinical outcomes and co-morbid conditions
RSV is a frequent cause of pneumonia in hospitalized adults


- RSV detected in 3% of adults hospitalized with pneumonia
- RSV was fifth most commonly detected pathogen
### Underlying medical conditions among adults ≥18 years hospitalized for RSV: RSV-NET 2014-2018

<table>
<thead>
<tr>
<th>Major underlying condition categories (n=4,970)</th>
<th>N=4,970</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease</td>
<td>2833</td>
<td>57.0</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>2486</td>
<td>50.0</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1692</td>
<td>34.0</td>
</tr>
<tr>
<td>Renal disease</td>
<td>1378</td>
<td>27.7</td>
</tr>
<tr>
<td>Immunocompromised condition</td>
<td>1126</td>
<td>22.7</td>
</tr>
<tr>
<td>Neurologic disorder</td>
<td>1041</td>
<td>21.0</td>
</tr>
<tr>
<td>Chronic metabolic disease (except diabetes)</td>
<td>934</td>
<td>18.8</td>
</tr>
<tr>
<td>Liver disease</td>
<td>332</td>
<td>6.7</td>
</tr>
<tr>
<td>Blood disorders/ hemoglobinopathy</td>
<td>132</td>
<td>2.7</td>
</tr>
<tr>
<td>Other disease or condition</td>
<td>429</td>
<td>8.7</td>
</tr>
</tbody>
</table>

94% of hospitalized adults have underlying medical conditions:

- **46%**: 1-2 conditions
- **48%**: ≥3 conditions

Source: CDC unpublished data.
RSV hospitalization rates much higher in those with congestive heart failure: RSV-NET 2015-2017

28% hospitalized cases had CHF

Higher rates in adults with CHF:
• Overall: 8x
• 50-64: 14x
• ≥65 years: 3.5x

Adjusted rates (per 10,000 population) of RSV-associated hospitalization by congestive heart failure (CHF) status, RSV-NET, 2015–2017 (N = 2042).

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264890
RSV in immunocompromised adults at high risk for severe disease

- Greatest risk among:
  - Lung transplant recipients
  - Hematopoietic cell transplant (HCT) recipients
  - Other immunocompromised populations including patients receiving chemotherapy for lymphoma and leukemia

- Incidence of symptomatic illness: 12% (2-year period) and 16% (single season) in lung transplant patients

- Severe outcomes in immunocompromised patients
  - Progression to lower respiratory tract infection common
  - Mortality high: 26% among HCT with proven/probable lower respiratory tract infection

---

Outcomes among adults ≥18 years hospitalized for RSV: RSV-NET 2017-18 to 2019-20 seasons (n=8,214)

Severe outcomes frequent among adults hospitalized for RSV of all ages

Source: CDC unpublished data.
Long-term care facility (LTCF) residents vulnerable to outbreaks and serious illness

- Frequent cause of symptomatic illnesses in LTCF residents\(^1\)
- High attack rate in outbreak settings
  - 13.5% over 1 month\(^2\)
- Study of Medicare data estimated RSV-attributable hospitalizations\(^2\)
  - 2,909,106 LTCF residents ≥65 years
  - 6,196 cardiorespiratory hospitalizations

<table>
<thead>
<tr>
<th>Attributable cost</th>
<th>$51,503,105 ($38,899,971 – $64,106,240)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay (LOS)</td>
<td>5.3 days (SE 4.6)</td>
</tr>
<tr>
<td>Attributable LOS</td>
<td>32,008 days (95% CI 24,267 – 39,749)</td>
</tr>
</tbody>
</table>

RSV-associated hospitalization in older adults results in loss in functional status

- Cohort study of 302 adults aged ≥60 years hospitalized with RSV in NYC and Rochester, NY
- Scores of Instrumental Activities of Daily Living (IADL) and Activities of Daily Living (ADL) decreased from pre-hospitalization to admission and remain decreased at discharge
- 14% required higher level of care at discharge
- One third of patients experienced decreased IADL and ADL scores at 6 months post-discharge

RSV is a major cause of severe illness in older adults

- Frequent, often unrecognized, cause of severe respiratory illnesses
- Hospitalization rates increase with increasing age
- High burden of severe disease with variability across seasons
- Adults with co-morbidities, immunocompromised adults, and long-term care facility residents may be particularly at risk for severe illness
- High proportion of those hospitalized with laboratory-confirmed RSV have severe outcomes, including ICU admission and death
- Long-term health consequences
Acknowledgements

- RSV-NET team
- Michael Melgar
- Meredith McMorrow
- RSV-NET Site Principal Investigators and Surveillance Officers
- Emerging Infections Program
- State and local health partners
- Many others....
Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)

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.