

Hospital Utilization for Elderly Patients Diagnosed With Respiratory Syncytial Virus vs Influenza in the United States

Kathy W. Belk¹, Laura A. Clark¹, Peter J. Mallow², Evelyn J. Rizzo¹, Rosa Banuelos¹, Canter Martin¹

¹Healthcare Consultancy Group New York, NY; ²Xavier University Cincinnati, OH

Background



- Respiratory syncytial virus (RSV) was first recognized as a serious health risk for older adults in the 1970s following outbreaks in nursing home facilities¹
- Today, it accounts for over 10,000 annual deaths of people over 65 years of age in the United States¹
- This type of respiratory tract infection has the second highest mortality rate worldwide²
- Influenza and RSV disproportionately impact people over 65, and mortality rates have increased along with the advancing age of the population³
- The disease burden of RSV is similar to influenza in the elderly, with 93% of RSV deaths occurring among persons 65 years and older⁴

Study Objective



- To examine hospital utilization for encounters of elderly patients diagnosed with RSV compared with influenza

Methods



Study Design

- A retrospective matched cohort study was conducted on a cross section of hospital discharges with any ICD-10-CM diagnosis of RSV (n=13,841) or influenza (n=92,770) using the 2016-2018 Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS)⁵
- Cohorts were matched (n=13,840) on discharge year, quarter, and gender, with additional propensity score matching for age, race, Charlson Comorbidity Index (CCI), hospital location, and teaching status

Statistical Analyses

- Logistic regression and chi-square tests were used to evaluate in-hospital mortality, hypoxemia, respiratory failure, and mechanical ventilation
- General linear models with negative binomial and gamma distributions were used for length of stay (LOS) and charges
- Covariates for all models included patient demographics, comorbidities, and hospital characteristics

Results



Prematch Cohort Demographics

- Patients who were hospitalized with RSV were more likely to be female (60.6% vs 44.1%, $P<.001$) and had higher CCI scores (3.0 vs 2.6, $P<.001$)
- Congestive heart failure (41.1% vs 31.3%) and chronic pulmonary disease (56.2% vs 44.7%) were more prevalent ($P<.001$) in RSV patients, as were concomitant diagnoses of bronchitis (29.0% vs 9.7%), bronchiolitis (13.1% vs 0.2%), and pneumonia (22.2% vs 17.8%)

Postmatch Cohort Demographics

- Differences in comorbidities persisted after cohort matching (Table 1)

Table 1: Postmatch Comorbidities

	RSV, n (%)	Influenza, n (%)
Congestive heart failure	5695 (41.1)	4554 (32.9)
Chronic pulmonary disease	7773 (56.2)	6600 (47.7)
Diabetes	2096 (15.1)	2543 (18.4)
Renal disease	4381 (31.7)	3964 (28.6)
Malignancy	1327 (9.6)	994 (7.2)
Bronchitis	4019 (29.0)	1358 (9.8)
Bronchiolitis	1820 (13.2)	33 (0.2)
Pneumonia	3069 (22.2)	2434 (17.6)

Prematch Cohort Outcomes

- RSV patients had higher rates of in-hospital mortality (5.1% vs 4.3%, $P<.001$), hypoxemia (8.5% vs 8.0%, $P<.05$), respiratory failure (50.3% vs 37.4%, $P<.001$), and mechanical ventilation (9.8% vs 6.0%, $P<.001$) than influenza patients
- RSV patients had longer average LOS (6.6 vs 5.6, $P<.001$) and higher median charges (\$27,757 vs \$22,164, $P<.001$)

Postmatch Cohort Outcomes

- In-hospital mortality, hypoxemia, mechanical ventilation, and respiratory failure were more common in the RSV cohort in the postmatch population (Figure 1)
- As shown in Table 2, RSV patients in the matched cohort also had longer LOS and higher charges
- Matched cohort regression analyses revealed RSV to be significantly associated with in-hospital mortality (Odds Ratio (OR)=1.28, 95% Confidence Interval (CI)=1.14-1.45), hypoxemia (OR=1.14, 95% CI)=1.04-1.26), respiratory failure (OR=1.44, 95% CI=1.36-1.52), and mechanical ventilation (OR=1.45, 95% CI=1.31-1.59)

Figure 1: Postmatch Clinical Outcomes

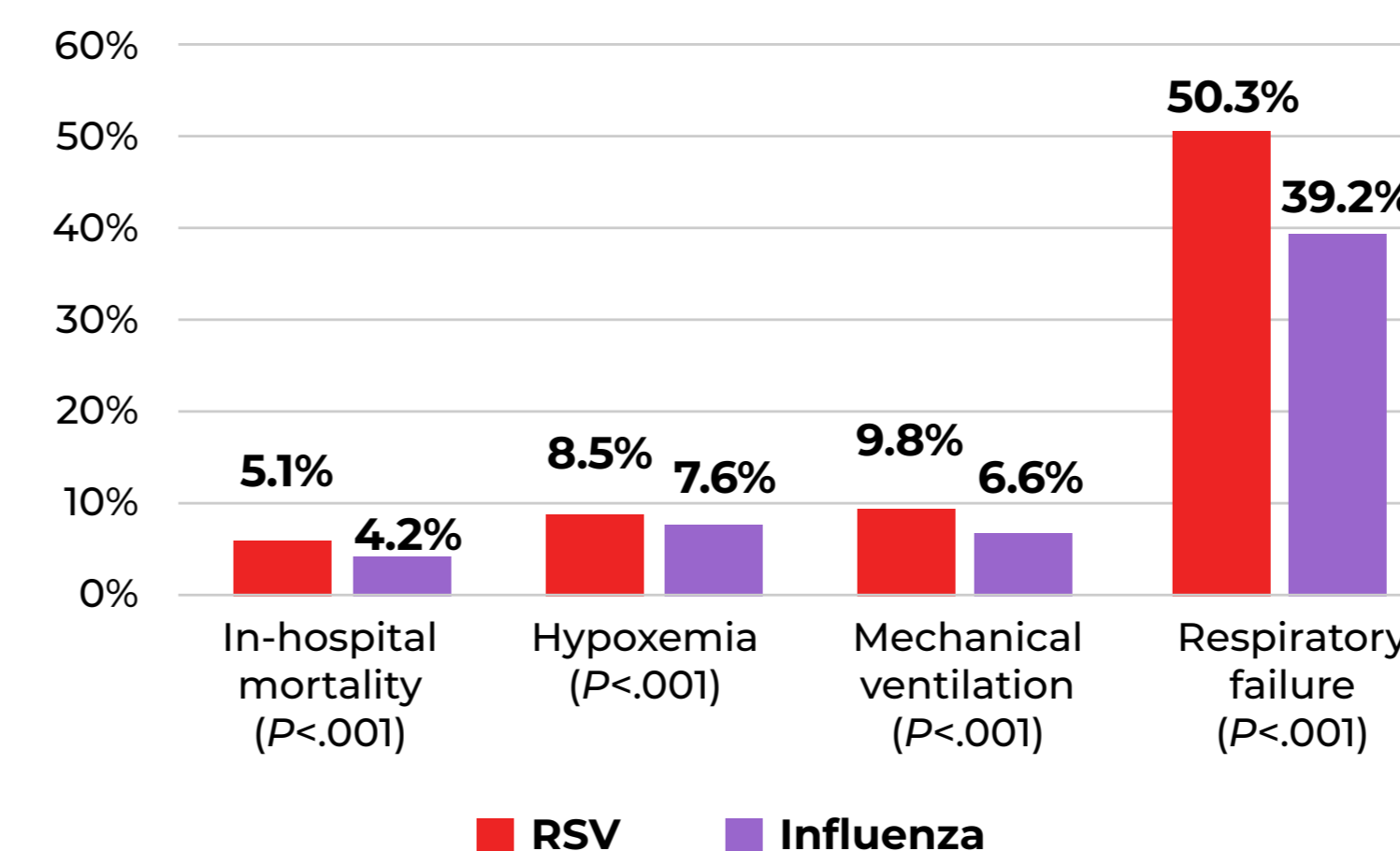


Table 2: Length of Stay and Inpatient Charges

	RSV	Influenza	P value
LOS, median (IQR), days	5.0 (5.0)	4.0 (4.0)	<.0001
Charges, median (IQR), \$	38,955 (46,643)	31,237 (40,260)	<.0001

- RSV was associated with approximately 10% increase in LOS (Incidence rate ratio (IRR)=1.10, $P<.001$) and hospital charges (IRR=1.11, $P<.001$)

Limitations



- Limitations of large-scale administrative data include inconsistent coding and billing practices that produce incomplete records
- The data used were collected at the discharge-level instead of the patient-level
- Settings of care captured in this analysis include inpatient hospitalizations, which do not account for all settings of care required for patient management

Conclusions



- RSV was a significant driver of hospital utilization relative to influenza, indicating a significant unmet need for new prevention methods (eg, vaccines) and treatment
- Further research using more detailed inpatient admissions and routine outpatient medical records is needed to assess the impact of the timeliness of testing and treatment regimens both prior to and during the hospitalization on resource utilization

Acknowledgments

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