Healthcare Resource Utilization Following Human Metapneumovirus (hMPV) or Respiratory Syncytial Virus (RSV) Diagnosis in Adults: A Retrospective, Self-Controlled, Claims-Based Study in the United States

Daniel Molnar, MS,[1]* Renee L. Gennarelli, MS,[2] Lisa Glasser, MD,[3]
Chengbin Wang, MD, PhD,[4] Corey Fang, PharmD,[3]
Casey A. Dobie, PharmD,[2] Temitope Bello, MS,[2] Angela Branche, MD[5]

[1]Infectious Disease, AstraZeneca Farmacéutica Spain S.A., Barcelona, Spain; [2]Global Consulting Services, Cencora Inc., Conshohocken, PA, USA; [3]Infectious Disease, BioPharmaceuticals Medical, AstraZeneca, Wilmington, DE, USA; [4]Infectious Disease, BioPharmaceuticals Medical, AstraZeneca, Gaithersburg, MD, USA; [5]Division of Infectious Diseases, Department of Medicine, University of Rochester, Rochester, NY, USA.
*Presenting author.

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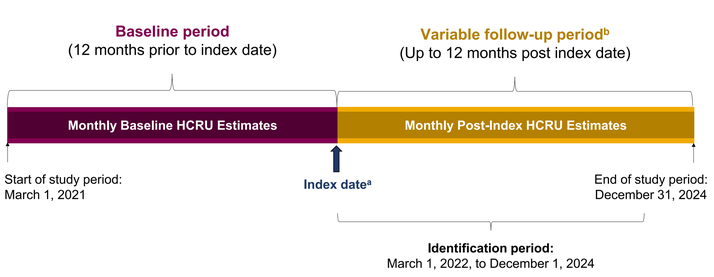
Why did we perform this research?

- RSV and hMPV are viral pathogens that can cause severe lower respiratory tract infections, particularly in older adults and those with risk factors such as immune compromise or underlying chronic conditions, contributing to a substantial public health burden[1–3]
- The burden of RSV is well established in the literature;[4,5] however, RSV epidemiology was disrupted by the COVID-19 pandemic, leaving limited understanding of post-pandemic burden. In contrast, testing for hMPV is less frequent and its associated burden is not as thoroughly understood.
- Three RSV vaccines are currently approved in the United States (US), but no hMPV vaccines are available, though candidates are in development.
- **Objective:** To quantify the acute and long-term healthcare resource utilization (HCRU) following hMPV and RSV infections in adults with and without at least 1 predefined chronic medical condition (CMC) known to increase the risk for severe RSV illness.

How did we perform this research?

- A retrospective, observational, claims-based cohort study was conducted among US adults with hMPV or RSV as identified in the Komodo Research Dataset from March 2021 to December 2024.
- Patients with ICD-10-CM codes for hMPV or RSV in any position on a medical claim (March 1, 2022 to December 1, 2024) were included, with the date of the first claim with ICD-10-CM-coded hMPV or RSV serving as the index date.
  - Included patients also had to have continuous enrollment in medical and pharmacy benefits in the 12-month baseline period through the variable follow-up period. Patients with evidence of pregnancy during the study period were excluded.
- Multivariable generalized estimating equations were used to estimate mean monthly all-cause HCRU before and after hMPV or RSV infection (**see supplementary material**).
  - Patients contributed month-level observations for each of the 12 months of the baseline period and up to 12 months of the follow-up period.
- Subgroup analyses were performed in patients with (CMC+) and without (CMC−) evidence of at least 1 pre-existing CMC known to increase the risk of severe RSV illness.
  - CMCs were aligned with the US Centers for Disease Control and Prevention (CDC) and included chronic cardiovascular disease, chronic lung or respiratory disease, end-stage renal disease (ESRD) or dependence on dialysis, complicated diabetes mellitus, neurologic or neuromuscular conditions causing impaired airway clearance or respiratory muscle weakness, chronic liver disease, chronic hematologic conditions, and severe (morbid) obesity.



[a]Earliest claim for ICD-10-CM-coded hMPV or RSV during the identification period.
[b]The follow-up period was defined from the patient's index date to the earlier of (1) discontinuous enrollment, (2) 12 months (365 days) post index date, (3) death, or (4) data cutoff. To ensure sufficient observation, the follow-up period was required to be a minimum of 30 days unless the patient died within the first 30 days.

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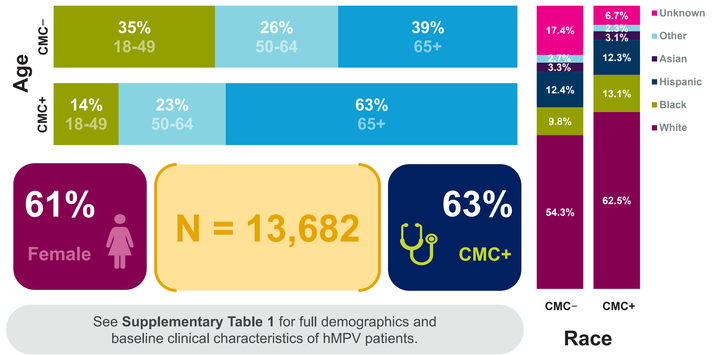
What did we find?

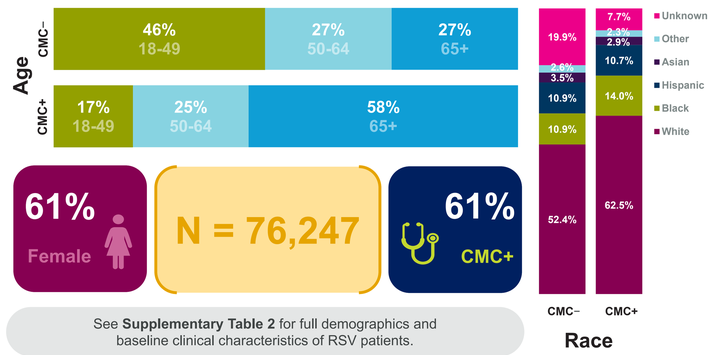
Figure 1. Baseline characteristics for patients with a) hMPV or b) RSV

a) hMPV Patients



See **Supplementary Table 1** for full demographics and baseline clinical characteristics of hMPV patients.

b) RSV Patients



See **Supplementary Table 2** for full demographics and baseline clinical characteristics of RSV patients.

Figure 2. Chronic lung or respiratory disease, chronic cardiovascular disease, and complicated diabetes mellitus were the most common CMCs among patients with hMPV or RSV, particularly among patients aged ≥65 years.

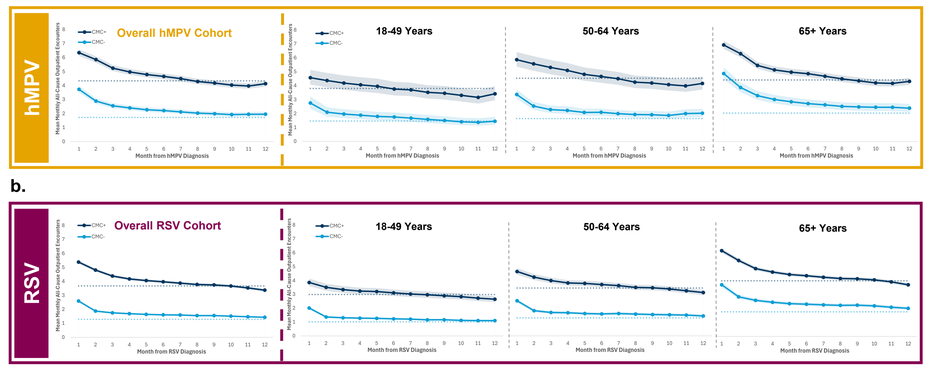
	CMC+ Patients with hMPV				CMC+ Patients with RSV			
Overall hMPV Cohort	65+	50-64	18-49	Chronic Medical Conditions	18-49	50-64	65+	Overall RSV Cohort
59.2%	57.8%	63.1%	59.0%	Chronic lung or respiratory disease	59.9%	60.5%	55.3%	57.4%
56.0%	68.3%	42.1%	23.5%	Chronic cardiovascular disease	16.2%	39.1%	66.3%	51.0%
31.7%	33.9%	32.6%	20.6%	Complicated diabetes mellitus	15.5%	28.1%	32.9%	28.7%
20.5%	14.4%	28.2%	35.6%	Severe obesity	34.6%	26.0%	13.5%	20.2%
6.1%	4.4%	8.6%	9.7%	Chronic liver disease	7.3%	8.8%	4.2%	5.9%
5.4%	4.7%	7.0%	6.0%	ESRD or maintenance dialysis	4.4%	5.8%	4.7%	4.9%
0.9%	0.8%	0.9%	1.1%	Neuromuscular disease	0.6%	0.4%	0.9%	0.7%
0.6%	0.2%	0.7%	2.1%	Chronic hematologic conditions	1.9%	0.5%	0.3%	0.6%

Note: The "Overall" population reflects all patients with hMPV or RSV diagnosis (cohort-dependent), including patients with and without CMCs.

Limitations

- Administrative claims data are collected primarily for billing of health care services and are not specifically intended for research purposes, which may affect the accuracy and completeness of healthcare outcomes.
- Given the lack of routine testing for hMPV, and to a lesser extent RSV, it is likely that the patients included in this study represent those with more severe disease, as they are more likely to have been tested and diagnosed.
- Disease-related measures were defined as the incremental difference in the outcome of interest from baseline to follow-up. Relying on incremental measures may introduce confounding, as observed differences may be influenced by other unrelated factors or comorbid conditions that are not fully captured in the claims data.
- HCRU estimates may lack precision due to small sample sizes and should be interpreted with caution.
- Causal inferences cannot be drawn from this study.

Figure 3. Both CMC− and CMC+ patients had an increase in estimated mean monthly all-cause outpatient encounters during at least the first 6 months following a) hMPV or b) RSV infection, although utilization levels were consistently higher among CMC+ patients.



Notes: Dotted baselines represent mean number of outpatient encounters per month in the year prior to hMPV or RSV diagnosis. Mean monthly baseline visits and 95% CIs were estimated assuming relatively constant utilization across the 12 pre-index months, and estimates utilized all baseline month data regardless of relative time from index. Mean baseline utilization may be slightly overestimated if patients experienced increased utilization in the month prior to hMPV or RSV diagnosis. Caution should be taken when descriptively comparing baseline and post-index utilization estimates due to varying degrees of precision.

Outpatient encounters were individual interactions with the healthcare system in an outpatient setting and included office visits, laboratory and other testing, imaging, procedures, therapy, injected or infused drug administration, and home-based medical services.

Figure 4. Estimated total disease-related outpatient encounters over the first 6 months following hMPV or RSV infection.

How do these real-world data inform clinical practice?

- These findings highlight the short-term and long-term burden that severe respiratory infections have on patients with and without CMCs known to increase the risk of severe RSV illness.
- Elevated post-acute all-cause healthcare utilization suggests that hMPV or RSV infection may be associated with longer-term changes in healthcare needs and patterns of care.
- Estimates of hMPV- or RSV-related outpatient utilization and time to return to baseline all-cause utilization levels following infection increased with age.
- Clinicians should consider implementing more robust preventive strategies, such as vaccination where available, early detection protocols, and comprehensive follow-up care to mitigate prolonged disease burden.

Key takeaway

Patients with and without CMCs that are known to increase the risk of severe hMPV or RSV illness face increased outpatient healthcare burden for several months beyond the acute phase of infection.

Abbreviations

CAR, chimeric antigen receptor; CCI, Charlson comorbidity index; CDC, Centers for Disease Control and Prevention; CI, confidence interval; CMC, chronic medical condition; ESRD, end-stage renal disease; HCRU, healthcare resource utilization; hMPV, human metapneumovirus; IC, immunocompromising conditions; ICD-10-CM, International Classification of Diseases, 10th revision, Clinical Modification; PID, primary immunodeficiency; RSV, respiratory syncytial virus; US, United States.

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Disclosures

This study was sponsored by AstraZeneca. CF, LG, CW, and DM are employees of AstraZeneca. CAD, RLG, and TB are employees of Cencora, which was contracted by AstraZeneca to carry out this study. AB is an employee of the University of Rochester.

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