

Risk of Hospital Readmission Among Adults Aged 50 Years and Older Hospitalized with Respiratory Syncytial Virus (RSV) or Influenza

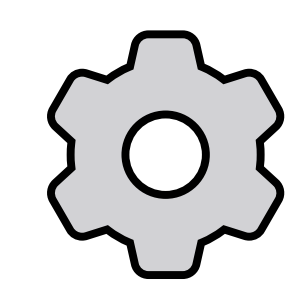
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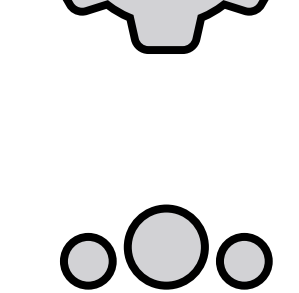
Background

- RSV is a common cause of acute respiratory illness (ARI)¹
- Evidence suggests that severe RSV disease is associated with adverse health outcomes beyond the acute illness in increased-risk adults, such as increased risk of exacerbation of underlying chronic conditions^{1,2,3}
- The objective of this analysis was to estimate the risk of hospital readmission among adults aged ≥50 years hospitalized with RSV or influenza

Study design



Design: Retrospective cohort study using data from Optum's de-identified Clinformatics® Data Mart database (October 2015–June 2023)



Population: Adults aged ≥50 years with ≥12 months of continuous enrollment before the start of an RSV-ARI or influenza-ARI episode that involved hospitalization^a

- RSV cohort: Patients with ≥1 RSV-ARI episode involving hospitalization
- Influenza cohort: Patients with ≥1 influenza-ARI episode involving hospitalization

Study design schematic:

Index date: The first^b ARI diagnosis within a 28-day episode that included hospitalization and an RSV or influenza diagnosis, respectively

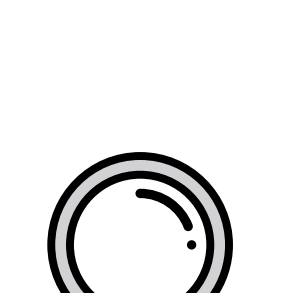
Baseline period: 12 months of continuous enrollment preceding the index date during which baseline characteristics were measured

Follow-up period: Hospital readmission was measured during the follow-up period starting from the discharge date of the first hospitalization during the index episode until the earliest date of end of continuous enrollment, death, or end of data availability^c

October 2015 October 2016 June 2023

Selection window: Index dates could occur from 1 October 2016–2 June 2023

Data availability: The study included data from 1 October 2015–30 June 2023



Analysis:

- Hospital readmission risk was estimated in each cohort using a cumulative incidence function with death included as a competing risk
- Comparisons in hospital readmission risk were made between cohorts using multivariable-adjusted Cox modeling, reporting adjusted hazard ratios (aHR)^d

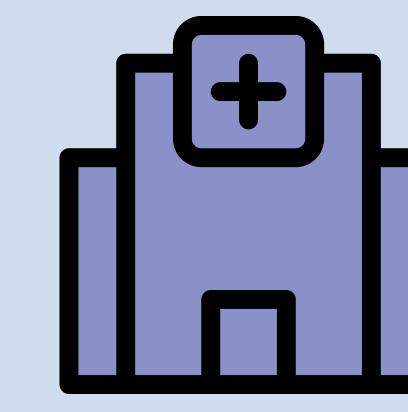
^aBased on an RSV or influenza episode that involved hospitalization (identified using ICD-10-CM codes, for RSV and Influenza cohorts, see supplement for more details, or a positive RSV lab test [e.g., PCR]). Only one episode per patient was included in the study. If one ARI episode included both RSV and influenza diagnosis codes, the episode was classified as an RSV-ARI episode.

^bFor patients with multiple RSV-ARI or influenza-ARI episodes, the first date of a randomly selected episode was used as the index date. Only one ARI episode per patient was included in the analysis.

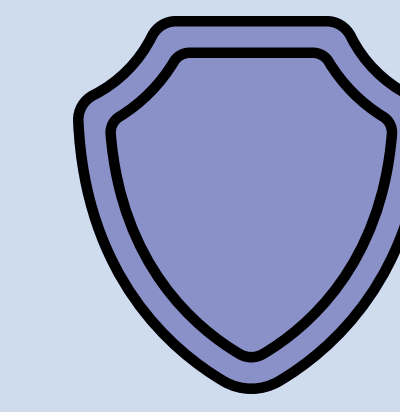
^cAmong those discharged alive from initial hospitalization.

^dThe adjusted models controlled for demographics, temporal trends, risk factors for serious infection, preventive treatments (i.e., influenza vaccination), baseline costs, and baseline healthcare resource utilization.

Conclusions



Adults aged ≥50 years who experience RSV- or influenza-related hospitalizations are at substantial risk of 30-day and 3-month hospital readmission



These findings further demonstrate the importance of preventing severe RSV disease and influenza in increased-risk populations

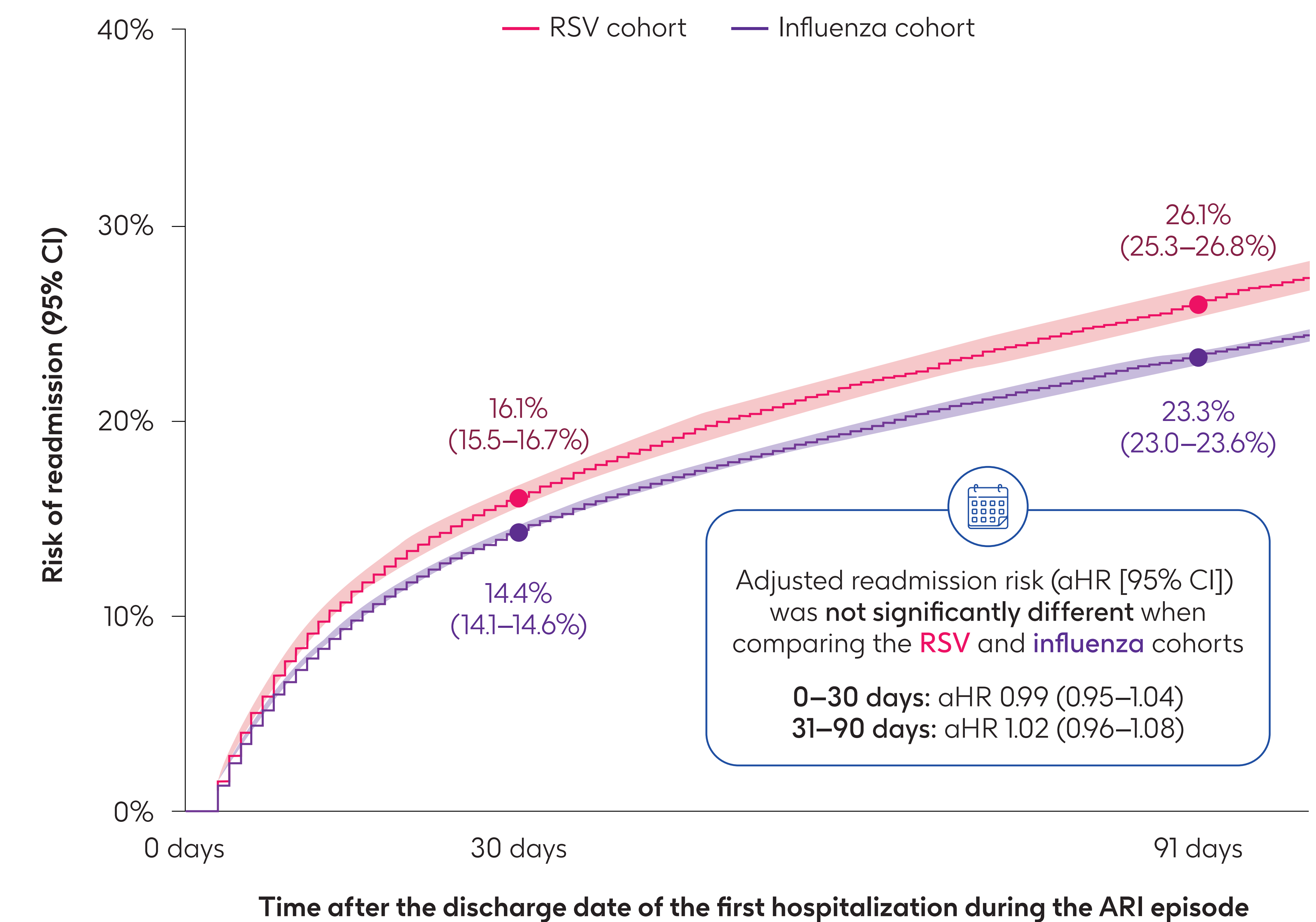
Results

Baseline demographic and clinical characteristics^a

	RSV cohort (N=14,257)	Influenza cohort (N=74,930)
Baseline demographics		
Age, mean ± SD (years)	76.4 ± 9.8	75.4 ± 9.9
Sex, female, n (%)	8,654 (60.7)	42,051 (56.1)
Risk factors for severe disease during the baseline period		
Charlson Comorbidity Index, ⁴ mean ± SD	3.3 ± 2.5	2.9 ± 2.4
Chronic cardiovascular diseases, n (%)	9,228 (64.7)	42,560 (56.8)
Heart failure	5,485 (38.5)	23,053 (30.8)
Coronary artery disease	5,766 (40.4)	27,291 (36.4)
Cardiac arrhythmias	6,034 (42.3)	25,507 (34.0)
Chronic respiratory diseases, n (%)	8,112 (56.9)	36,095 (48.2)
COPD	6,471 (45.4)	28,568 (38.1)
Asthma	2,691 (18.9)	11,274 (15.1)
Chronic kidney disease, n (%)	5,438 (38.1)	25,045 (33.4)
Chronic liver disease, n (%)	1,385 (9.7)	6,504 (8.7)
Diabetes, n (%)	6,154 (43.2)	33,101 (44.2)
Immunosuppressive conditions, n (%)	514 (3.6)	1,562 (2.1)
Healthcare resource utilization during the baseline period		
Number of inpatient admissions, mean ± SD	0.9±1.5	0.7±1.3
Preventive measures during the baseline period		
Influenza vaccination, n (%)	5,169 (36.3)	24,274 (32.4)

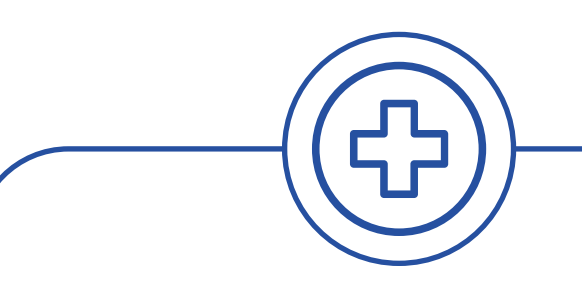
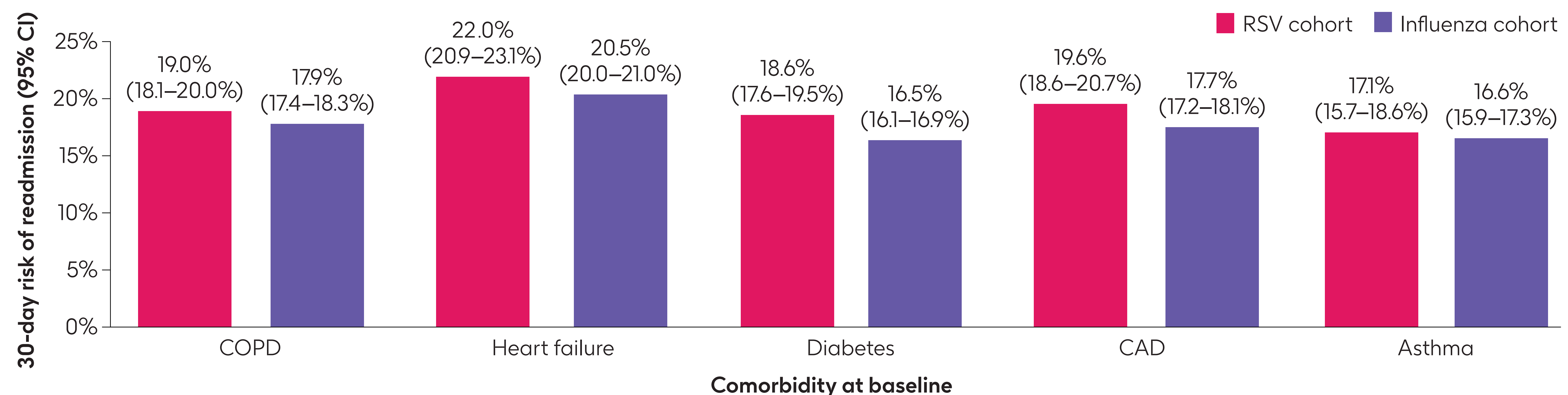
^aReadmission analyses were conducted among patients who were discharged alive from the first hospitalization during the ARI episode.

Risk of readmission at 30 days and 3 months after the discharge date of the first hospitalization during the ARI episode^b



^bReadmission was evaluated among patients in the RSV and influenza cohorts who had inpatient as the highest level of care in the selected ARI episode. A total of 3,040 patients in the RSV and influenza cohorts died during their initial hospitalization and were excluded from the readmission analyses.

30-day hospital readmission risk by baseline comorbidity



In adjusted analyses by comorbidity, readmission risk was **not significantly different** when comparing the **RSV** and **influenza** cohorts

Abbreviations

aHR, adjusted hazard ratio; ARI, acute respiratory illness; CAD, coronary artery disease; CI, confidence interval; COPD, chronic obstructive pulmonary disease; HR, hazard ratio; ICD-10-CM, International Classification of Diseases, 10th Revision, Clinical Modification; n, number; PCR, polymerase chain reaction; RSV, respiratory syncytial virus; SD, standard deviation.

References

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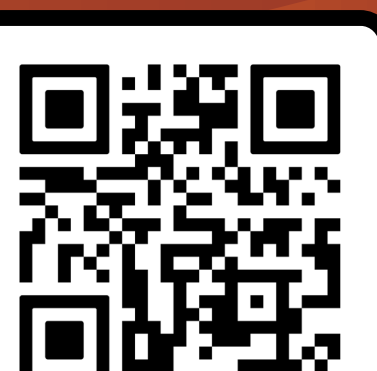
Disclosures

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Conflicts of interest: DS, EL, and SG are employed by GSK and hold financial equities in GSK. YW, AW, and KAB are employees of Analysis Group, which received funding from GSK to conduct this study.



Audio File



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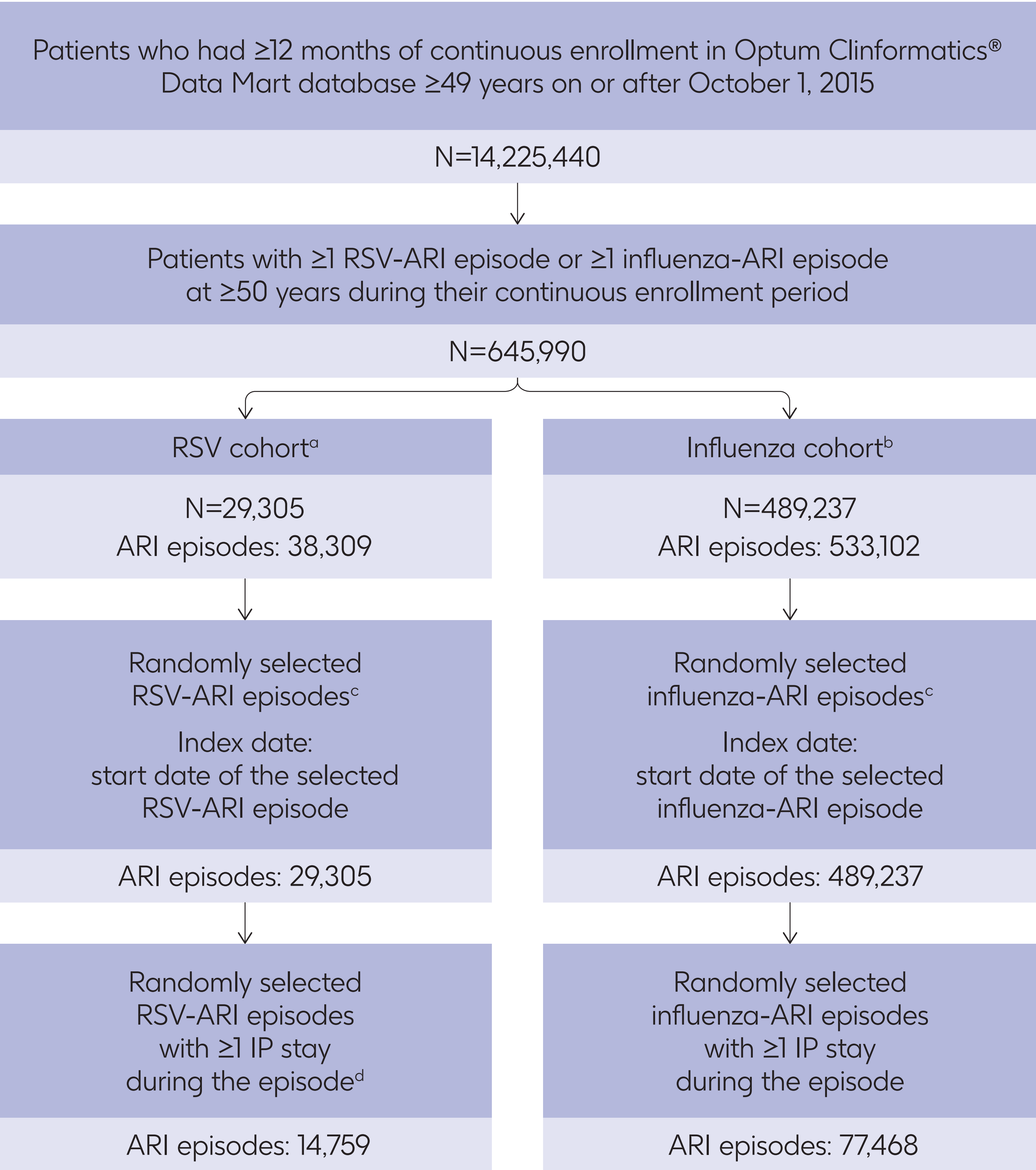
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Risk of Hospital Readmission Among Adults Aged 50 Years and Older Hospitalized with Respiratory Syncytial Virus (RSV) or Influenza

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Supplement

Figure S1. Sample selection schematic



^aPatients were selected into the RSV cohort if they had ≥1 RSV-ARI episode at age 50 years or older, with ≥12 months of continuous enrollment before the RSV-ARI episode. RSV-ARI episodes were defined as ARI episodes with ≥1 RSV diagnosis during the episode or ≥1 positive RSV lab result within the ±17 days' window around the episode. Antibody-based RSV lab tests were not used to identify positive RSV due to their inaccuracy in detecting active RSV infection status.¹ If one ARI episode included both RSV and influenza diagnosis codes, the episode was classified as an RSV-ARI episode.

^bPatients were selected into the influenza cohort if they (a) were not eligible for the RSV-ARI cohort and (b) had ≥1 influenza-ARI episode at age 50 years or older, with ≥12 months of continuous enrollment before the influenza-ARI episode.

^cAmong patients with multiple eligible RSV-ARI (or influenza-ARI) episodes, one RSV-ARI (or influenza-ARI) episode was randomly selected for each patient, with its start date defined as the index date. Only one ARI episode per patient was included in the analysis.

^dAmong the patients in the RSV-ARI cohort with ≥1 IP stay during the episode, 913 patients had at least 1 diagnosis of influenza during their selected ARI episodes, which accounted for 6.2% of the total number of ARI episodes in the RSV-ARI cohort with hospitalization.

Table S1. ICD-10-CM Codes for RSV and Influenza

ICD-10-CM codes	
RSV	B97.4, J12.1, J20.5, J21.0
Influenza	J09–J11

Table S2. Age groups by cohort at index^e

	RSV cohort (N=14,257)	Influenza cohort (N=74,930)
Age (years), n (%)		
50–59	927 (6.5)	6,047 (8.1)
60–64	942 (6.6)	5,561 (7.4)
65–74	3,890 (27.3)	21,335 (28.5)
75+	8,498 (59.6)	41,987 (56.0)

^eReadmission analyses were conducted among patients who were discharged alive from the first hospitalization during the ARI episode.

Table S3. Adjusted risk of hospital readmission (RSV cohort vs. influenza cohort)

Days post-discharge	Adjusted HR (95% CI)
0–30	0.994 (0.949–1.041)
31–90	1.017 (0.958–1.080)
91–365	1.059 (1.013–1.108)
>365	1.040 (0.989–1.094)

Table S4. Risk of hospital readmission at 30 days and 3 months post-discharge by age

Cohort		30 days	91 days
Age 50–59 years			
RSV cohort (N=927)	Number at risk	729	580
	Event probability (95% CI)	0.162 (0.139–0.187)	0.282 (0.253–0.312)
Influenza cohort (N=6,047)	Number at risk	4,980	4,184
	Event probability (95% CI)	0.119 (0.111–0.127)	0.214 (0.204–0.225)
Age 60–64 years			
RSV cohort (N=942)	Number at risk	710	574
	Event probability (95% CI)	0.181 (0.157–0.207)	0.293 (0.264–0.323)
Influenza cohort (N=5,561)	Number at risk	4,381	3,682
	Event probability (95% CI)	0.147 (0.138–0.157)	0.238 (0.226–0.249)
Age 65–74 years			
RSV cohort (N=3,890)	Number at risk	3,005	2,442
	Event probability (95% CI)	0.160 (0.149–0.172)	0.270 (0.256–0.284)
Influenza cohort (N=21,335)	Number at risk	16,774	14,158
	Event probability (95% CI)	0.145 (0.140–0.150)	0.233 (0.227–0.238)
Age 75+ years			
RSV cohort (N=8,498)	Number at risk	6,253	5,098
	Event probability (95% CI)	0.159 (0.151–0.167)	0.250 (0.241–0.260)
Influenza cohort (N=41,987)	Number at risk	31,585	26,178
	Event probability (95% CI)	0.146 (0.143–0.150)	0.236 (0.232–0.240)

Table S5. Adjusted risk of hospital readmission by age (RSV cohort vs. influenza cohort)

Days post-discharge	Adjusted HR (95% CI)
Age 50–59 years	
0–30	1.124 (0.937–1.350)
31–90	1.123 (0.905–1.393)
91–365	1.160 (0.974–1.382)
>365	0.958 (0.756–1.214)
Age 60–64 years	
0–30	1.062 (0.896–1.259)
31–90	1.170 (0.938–1.458)
91–365	1.227 (1.035–1.456)
>365	1.188 (0.949–1.487)
Age 65–74 years	
0–30	0.964 (0.833–1.053)
31–90	1.140 (1.022–1.272)
91–365	1.098 (1.007–1.198)
>365	1.062 (0.961–1.173)
Age 75+ years	
0–30	0.990 (0.932–1.052)
31–90	0.940 (0.868–1.019)
91–365	1.024 (0.966–1.085)
>365	1.018 (0.957–1.084)

Table S6. Adjusted risk of hospital readmission by comorbidity (RSV cohort vs. influenza cohort)

Days post-discharge	Adjusted HR (95% CI)
COPD	
0–30	1.011 (0.949–1.078)
31–90	0.985 (0.906–1.071)
91–365	1.041 (0.976–1.110)
>365	1.013 (0.937–1.096)
Heart failure	
0–30	1.054 (0.988–1.125)
31–90	1.021 (0.938–1.111)
91–365	1.048 (0.978–1.124)
>365	1.083 (0.990–1.185)
Diabetes	
0–30	1.000 (0.937–1.068)
31–90	1.035 (0.952–1.125)
91–365	1.083 (1.015–1.156)
>365	1.002 (0.926–1.084)
CAD	
0–30	1.028 (0.962–1.098)
31–90	0.987 (0.906–1.076)
91–365	1.060 (0.991–1.134)
>365	1.040 (0.958–1.129)
Asthma	
0–30	0.971 (0.875–1.078)
31–90	1.044 (0.917–1.190)
91–365	1.025 (0.925–1.136)
>365	0.966 (0.857–1.089)

Abbreviations
ARI, acute respiratory illness; CAD, coronary artery disease; CI, confidence interval; COPD, chronic obstructive pulmonary disease; HR, hazard ratio; ICD-10-CM, International Classification of Diseases, 10th Revision, Clinical Modification; IP, inpatient; n, number; RSV, respiratory syncytial virus.

References
(1) Onwuchekwa et al. J Infect Dis. 2023;228:173–84.