Cost-Effectiveness of Adjuvanted RSVPreF3 Vaccination in Adults Aged 50-59 Years with Cardiopulmonary Diseases in the United States

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Background

- **Adults with cardiopulmonary disease** have an **increased risk of severe respiratory syncytial virus (RSV) disease** compared to adults without these conditions.[1,2]
- A prospective study of **adults with chronic pulmonary disease or heart failure (HF)** estimated that 4-10% are infected with RSV annually.[3]
- Given the increased risk of severe RSV disease in adults with cardiopulmonary disease and the associated **public health burden of RSV**, it is important to understand the value of potential interventions for **RSV prevention** in this population.[4]

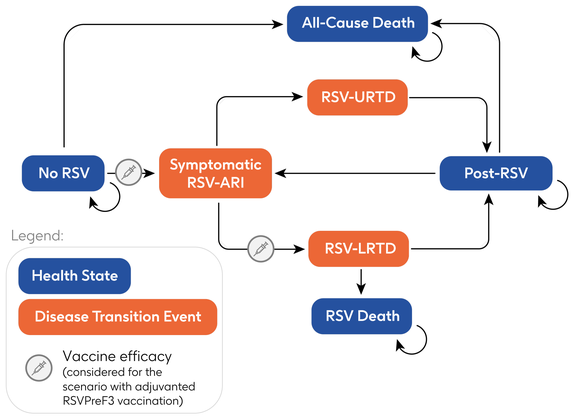
Objective

This study aimed to assess the cost-effectiveness of one-time adjuvanted RSVPreF3 vaccination in US adults aged 50-59 years with select cardiopulmonary diseases.

Methods

Model Overview

- This analysis used a **static multicohort Markov model** with a one-month cycle length.
- **Health and economic outcomes** were modeled over a **3-year time horizon.**
- Quality-adjusted life year (**QALY**) losses and **productivity losses** due to RSV-related death were modeled over the **remaining lifetime.**
- One-time **adjuvanted RSVPreF3 vaccination** was **compared to no vaccination**.
- The model specifically considered populations at an elevated risk of severe RSV disease. However, it is not feasible to combine the results for different populations considered as these may include overlapping patients who are at risk due to the presence of multiple comorbidities.



Populations

Model scenarios were used to assess outcomes with and without one-time adjuvanted RSVPreF3 vaccination for adults aged 50-59 years in the US. The following cardiopulmonary diseases were analyzed individually in the model:

- **Chronic obstructive pulmonary disease (COPD):** n=3,299,241
- **HF:** n=712,959
- **Coronary artery disease (CAD):** n=2,865,359
- **Asthma:** n=3,439,066

Inputs

- Scientific literature and public sources were used to inform model inputs.
- **Vaccine efficacy** and **waning** for adjuvanted RSVPreF3 vaccine were based on **phase 3 clinical trial data** from AReSVi-006 with a median follow up time of 18 months (through 2 full RSV seasons) in adults aged ≥60 years.[5-7]
- Additional phase 3 clinical trial data showed a non-inferior immune response in adults aged 50-59 years with comorbidities associated with increased risk of severe RSV disease compared to adults aged ≥60 years.[6,8]
- Analysis assumed **vaccination in October** at the same coverage rate as for influenza vaccines during the 2022-2023 season (50.1%).[9]

Conclusions

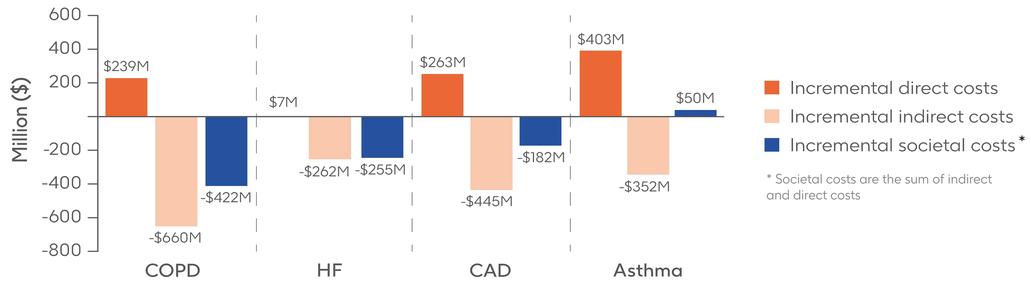
Adjuvanted RSVPreF3 vaccination may **improve health outcomes** and **reduce costs or be cost effective** in adults aged 50-59 years with a range of cardiopulmonary diseases.

Use of adjuvanted RSVPreF3 vaccination for prevention of RSV in these populations is expected to be an efficient use of healthcare resources in the US.

Results

- For adults aged 50-59 years with COPD, HF, and CAD, one-time **adjuvanted RSVPreF3 vaccination reduced societal costs and improved health outcomes** over 3 years, with an ICER <$0 per QALY, being dominant compared to no vaccination.
- For adults aged 50-59 years with asthma, the **ICER** for adjuvanted RSVPreF3 vaccination was **$8,577 per QALY gained** compared to no vaccination.
- Results were generally **robust** to input uncertainty in one-way and probabilistic sensitivity analyses.

Incremental Direct, Indirect, and Societal Costs of Adjuvanted RSVPreF3 Vaccination in Adults Aged 50-59 Years with COPD, HF, CAD, and Asthma



	Direct Costs			+ Indirect Costs			= Total Societal costs		
	No Vaccine	Adjuvanted RSVPreF3	Incremental: RSVPreF3 vs. No Vaccine	No Vaccine	Adjuvanted RSVPreF3	Incremental: RSVPreF3 vs. No Vaccine	No Vaccine	Adjuvanted RSVPreF3	Incremental: RSVPreF3 vs. No Vaccine
COPD	$1,165M	$1,404M	**$239M**	$2,673M	$2,013M	**-$660M**	$3,839M	$3,417M	**-$422M**
HF	$414M	$421M	**$7M**	$1,014M	$752M	**-$262M**	$1,428M	$1,173M	**-$255M**
CAD	$806M	$1,069M	**$263M**	$1,852M	$1,407M	**-$445M**	$2,658M	$2,476M	**-$182M**
Asthma	$652M	$1,055M	**$403M**	$1,554M	$1,202M	**-$352M**	$2,206M	$2,257M	**$50M**

QALY* losses with adjuvanted RSVPreF3 vaccination compared to no vaccination

	No vaccine	Adjuvanted RSVPreF3	Incremental
COPD	34,351	25,491	-8,860
HF	11,630	8,549	-3,081
CAD	24,475	18,245	-6,230
Asthma	23,687	17,799	-5,887

*3% annual discount rate applied to QALYs

Abbreviations

ARI: acute respiratory illness; CAD: coronary artery disease; COPD: chronic obstructive pulmonary disease; HF: heart failure; ICER: incremental cost-effectiveness ratio; LRTD: lower respiratory tract disease; QALY: quality-adjusted life year; RSV: respiratory syncytial virus; US: United States.

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Disclosures

Conflict of interest: DS, EL, SP and DM are employed by and hold shares in GSK. JG and MG are employed by RTI Health Solutions which received funding from GSK for this study. The authors declare no other financial and non-financial relationships and activities.

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Digital poster
Supplemental data
Narrated summary

SCAN ME

Audio File

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Supplementary material

Values and sources applied for demographic model inputs

Input	Value	Source
Population size		
Population aged 50-59 years with COPD	3,299,241	
50-54 years	1,333,235	1, 2
55-59 years	1,966,006	
Population aged 50-59 years with HF	712,959	
50-54 years	357,240	1, 3
55-59 years	355,718	
Population aged 50-59 years with CAD	2,865,359	
50-54 years	1,434,239	1, 3
55-59 years	1,431,121	
Population aged 50-59 years with asthma	3,439,066	
50-54 years	1,379,921	1, 4
55-59 years	2,059,145	
Annual probability of mortality[a]	Probability of dying by single year of age	1 – 6

[a]Based on life tables for the general population aged 50-59 years. Chronic condition-specific mortality was derived by estimating the increased risk of mortality based on data from the CDC WONDER database[6] and prevalence of the chronic condition of interest.

Values and sources applied for epidemiological model inputs

Input	Value	Source
Annual incidence of symptomatic RSV-ARI[a]		
Cardiopulmonary populations	0.0562	7
Percentage of RSV-ARI cases that are RSV-LRTD[b]		
Cardiopulmonary populations	57.1%	8, data on file
Percentage of RSV-LRTD cases that result in death[c]		
COPD	0.686%	7, 9 – 12
HF	1.302%	
CAD	0.534%	
Asthma	0.332%	

[a]Incidence is based on the mean incidence of symptomatic RSV across 4 seasons from Falsey et al. (2005)[7] and is assumed to be the same for first infection and reinfection. RSV-ARI incidence is based on the data from Falsey et al. (2005)[7] for adults with chronic cardiopulmonary conditions (adults aged ≥ 21 years with HF or chronic pulmonary conditions).
[b]The percentage of RSV-ARI cases that are RSV-LRTD was based on results from the RSV OA=ADJ-006 phase 3 clinical trial, using data from participants in the placebo arm who had at least one comorbidity of interest (i.e., COPD, chronic cardiovascular disease, diabetes [type 1 or type 2], chronic kidney disease, or chronic liver disease).
[c]URTD assumed to not lead to death. Mortality is assumed to occur only with LRTD cases. RSV-related mortality rates among LRTD cases were calculated based on the estimated percentage of RSV-LRTD cases that are medically attended[7,10,12,13], the estimated age-specific hospitalization rates per medically-attended RSV-LRTD case[7,10,11,13], and extrapolated estimates of age-specific 30-day mortality following RSV-LRTD hospitalization[9].

Values and sources applied for utility inputs

Input	Value	Source
Baseline utilities[a]		
COPD		
50-54 years	0.7883	
55-59 years	0.7633	
HF		
50-54 years	0.7915	
55-59 years	0.7665	
CAD		14, 15
50-54 years	0.8160	
55-59 years	0.7910	
Asthma		
50-54 years	0.8337	
55-59 years	0.8087	
QALY loss due to RSV-URTD[b]	0.0133	16
QALY loss due to RSV-LRTD[b]	0.0178	16

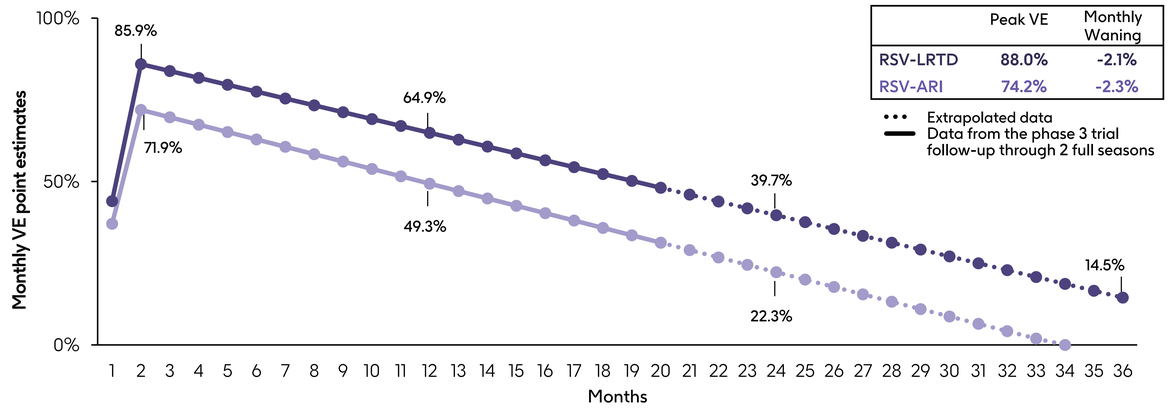
[a]Baseline utilities for increased-risk conditions were estimated by subtracting the disutility of the condition from the general population utility. Disutilities of conditions were obtained from Sullivan et al. (2006)[15], which estimated disutilities using a multivariable regression analysis.
[b]QALY loss inputs are based on a time trade-off study conducted among adults in the US that estimated QALY losses associated with severe RSV-LRTD, RSV-LRTD, and RSV-URTD cases. The model input for QALY loss due to RSV-LRTD is only based on results from the time trade-off study for RSV-LRTD and does not include results for severe RSV-LRTD, which is intended as a conservative assumption.

Values and sources applied for vaccine-specific model inputs

Input	Value	Source
Vaccination month	October	Assumption
Vaccination coverage[a]	50.10%	17
Peak vaccine efficacy against RSV-ARI[b]	74.17%	8, 18
Monthly waning rate for vaccine efficacy against RSV-ARI[b]	2.26%	8, 18
Peak vaccine efficacy against RSV-LRTD[b]	88.02%	8, 18
Monthly waning rate for vaccine efficacy against RSV-LRTD[b]	2.10%	8, 18
Incidence of vaccine-related Grade 3 AEs[c]	3.37%	8, 18

[a]For adjuvanted RSVPreF3 vaccination coverage, the model assumes the same vaccination coverage as for influenza vaccines during the 2022-2023 season for adults aged 50-64 years (CDC, 2023)[17]. In the scenario with adjuvanted RSVPreF3 vaccination, 1,652,920 adults aged 50-59 years with COPD, 357,192 with HF, 1,435,545 with CAD, and 1,722,972 with asthma were vaccinated.
[b]Efficacy and waning are assumed to be the same for adults aged 50-59 years with cardiopulmonary diseases as in the overall population aged ≥ 60 years based on results from the RSV OA=ADJ-018 phase 3 clinical trial.
[c]AE inputs were based on Grade 3 AEs observed in the RSV OA=ADJ-006 and RSV OA=ADJ-018 clinical trials.

Adjuvanted RSVPreF3 vaccine efficacy inputs[19, 20]



Abbreviations

AE: adverse event; ARI: acute respiratory illness; CAD: coronary artery disease; CDC: Centers for Disease Control and Prevention; COPD: chronic obstructive pulmonary disease; HF: heart failure; LRTD: lower respiratory tract disease; QALY: quality-adjusted life year; RSV: respiratory syncytial virus; URTD: upper respiratory tract disease; US: United States; VE: vaccine efficacy.

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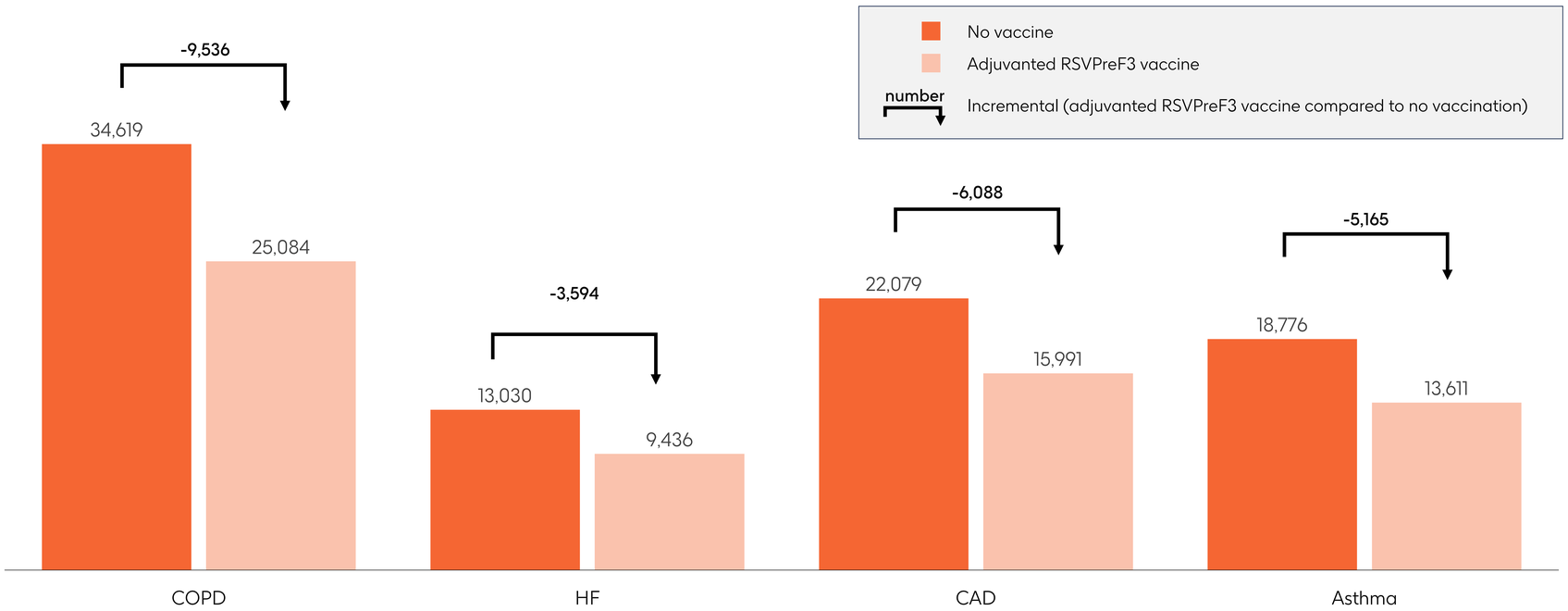
Supplementary material

Discounted LY losses* without and with vaccination and LY losses avoided with adjuvanted RSVPreF3 vaccination



* A discount rate of 3% is applied.

NNV

NNV to avoid 1 case or outcome	COPD	HF	CAD	Asthma
Symptomatic RSV-ARI case	16	16	16	16
RSV-LRTD case	19	20	20	19
RSV-related outpatient visit	26	26	26	26
RSV-related hospitalization	200	116	257	411
RSV-related death	2,838	1,508	3,659	5,852

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Abbreviations

ARI: acute respiratory illness; CAD: coronary artery disease; COPD: chronic obstructive pulmonary disease; HF: heart failure; LRTD: lower respiratory tract disease; LY: life-years; NNV: number needed to vaccinate; RSV: respiratory syncytial virus.

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