Public Health Impact and Cost-Effectiveness of Adjuvanted RSVPreF3 Vaccination in US Adults Aged ≥60 Years with Cardiopulmonary Disease

Elizabeth La[1], David Singer[1], Coline Dubois de Gennes[2], Jonathan Graham[3], Mei Grace[3], Sara Poston[1], Frederik Verelst[4]

[1]GSK, Philadelphia, PA, US; [2]GSK, London, UK; [3]RTI Health Solutions, Research Triangle Park, NC, US; [4]GSK, Wavre, Belgium

Conclusions

Adjuvanted RSVPreF3 vaccination among adults aged ≥60 years with cardiopulmonary disease was projected to **reduce RSV disease burden, while also reducing societal costs**

Achieving these outcomes in real-world practice would require **efforts to improve RSV vaccination uptake**

Background

- Risk of severe RSV disease is increased among adults with cardiopulmonary disease[1]
- RSV vaccines are available and recommended by the CDC's ACIP among adults aged 60–74 years who are at increased risk for severe RSV disease and all adults aged ≥75 years[2]
- However, RSV vaccination uptake has been relatively low even among adults aged ≥60 years with cardiopulmonary disease[3,4]
- **This study modeled the public health impact and cost-effectiveness of adjuvanted RSVPreF3 vaccination in US adults aged ≥60 years with cardiopulmonary disease**

Study design

Overview: RSV-related health and cost outcomes with and without one-time adjuvanted RSVPreF3 vaccination were estimated using a static multi-cohort Markov model with a 1-month cycle length[5]

Data source: Adjuvanted RSVPreF3 vaccine efficacy was based on phase 3 clinical trial data through 3 RSV seasons,[6] with other inputs obtained from scientific literature, public sources, and clinical trial results (see Supplement)

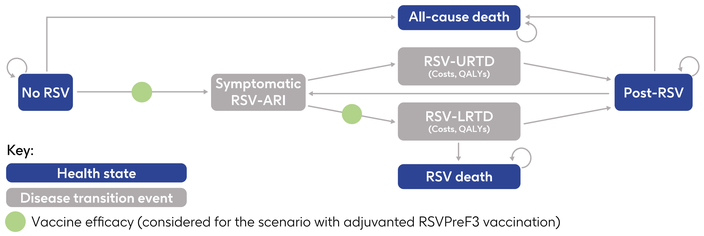
- Vaccination was assumed to occur in October, using the same uptake as for influenza vaccines (aged 60–64 years: 46.2%; aged ≥65 years: 69.7%)[7]

Population: Separate analyses were conducted for adults aged ≥60 years with specific prevalent cardiopulmonary diseases:

- COPD (N=9,728,877)
- Heart failure (N=5,318,193)
- Asthma (N=6,710,866)
- CAD (N=15,154,814)

Analysis: Key incremental outcomes (RSV cases, HCRU, deaths avoided, QALYs lost, and societal costs) and ICERs from the societal perspective were calculated over a 5-year time horizon

Model schematic



Results

Among adults aged ≥60 years with cardiopulmonary disease, **adjuvanted RSVPreF3 vaccination was associated with fewer RSV cases, deaths, and QALYs lost**, as well as **less HCRU**

Across all modeled populations, **adjuvanted RSVPreF3 vaccination** resulted in both **cost savings** and **improved health outcomes** from the societal perspective (i.e., dominant versus no vaccination)

RSV-related outcomes avoided and societal cost savings (adjuvanted RSVPreF3 vaccination compared to no vaccination)

[a]Differences between total RSV-ARI cases and sum of RSV-URTD and RSV-LRTD cases are due to rounding. [b]QALY losses associated with RSV-related deaths were estimated over the remaining lifetime (with a 3% annual discount rate applied). [c]Societal cost savings represent a sum of direct costs and indirect costs (with a 3% annual discount rate applied).

Audio File

Abbreviations

ACIP, Advisory Committee on Immunization Practices; **ARI**, acute respiratory illness; **CAD**, coronary artery disease; **CDC**, Centers for Disease Control and Prevention; **COPD**, chronic obstructive pulmonary disease; **ED**, emergency department; **HCRU**, healthcare resource use; **ICER**, incremental cost-effectiveness ratio; **LRTD**, lower respiratory tract disease; **QALY**, quality-adjusted life year; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

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Acknowledgments

The authors acknowledge Seongbin Shin, GSK, US for publication management. The authors also thank Costello Medical for editorial assistance and publication coordination, on behalf of GSK, and acknowledge Matt Domanico, Costello Medical, US for medical writing and editorial assistance.

Disclosures

Funding: This study was funded by GSK (VEO-000319).

Conflicts of interest: EL, **DS**, **CDG**, **SP**, and **FV** are employed by GSK and hold financial equities in GSK. **JG** and **MG** are employees of RTI Health Solutions, which received funding from GSK to conduct this study.

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Presenting author: Elizabeth La, liz.m.la@gsk.com

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Supplement

Table S1. Annual burden of RSV disease without vaccination, among adults aged ≥60 years with cardiopulmonary disease

Table S1a. COPD (N=9,728,877)

Outcome	Annual RSV disease burden, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	539,006	358,310	180,695	113,333	134,715	110,263	83,110	97,585
RSV-URTD cases	211,651	140,698	70,954	44,502	52,898	43,297	32,635	38,319
RSV-LRTD cases	327,354	217,613	109,742	68,830	81,816	66,966	50,475	59,267
Outpatient visits	281,959	187,436	94,523	59,286	70,471	57,680	43,476	51,048
ED visits	17,610	11,085	6,525	2,239	4,865	3,982	3,001	3,524
Hospitalizations	99,101	59,713	39,388	6,313	29,365	24,035	18,116	21,272
Deaths	10,211	5,484	4,727	580	2,697	2,208	2,174	2,553
QALYs lost	78,466	52,602	25,865	7,914	26,439	18,248	14,128	11,736
Societal costs	$6,785,284,928	$4,719,903,480	$2,065,381,448	$839,184,474	$2,344,349,542	$1,536,369,463	$1,093,894,723	$971,486,725
Direct costs	$1,700,725,957	$1,071,964,931	$628,761,026	$219,522,378	$468,763,398	$383,679,155	$289,195,108	$339,565,918
Indirect costs	$5,084,558,971	$3,647,938,549	$1,436,620,423	$619,662,096	$1,875,586,144	$1,152,690,309	$804,699,615	$631,920,807

Table S1b. Asthma (N=6,710,866)

Outcome	Annual RSV disease burden, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	373,210	269,654	103,556	118,840	82,906	67,907	47,591	55,965
RSV-URTD cases	146,548	105,885	40,664	46,665	32,555	26,665	18,688	21,976
RSV-LRTD cases	226,662	163,769	62,893	72,175	50,352	41,242	28,904	33,989
Outpatient visits	195,230	141,058	54,171	62,166	43,369	35,523	24,895	29,276
ED visits	11,499	7,772	3,726	2,346	2,983	2,443	1,712	2,014
Hospitalizations	24,915	16,077	8,838	3,205	7,076	5,796	4,062	4,776
Deaths	2,537	1,477	1,061	294	650	532	487	573
QALYs lost	27,071	19,360	7,711	5,470	8,134	5,756	4,159	3,551
Societal costs	$2,045,927,962	$1,531,324,658	$514,603,303	$493,116,691	$623,268,714	$414,939,253	$273,915,889	$240,687,414
Direct costs	$491,079,164	$342,085,067	$148,994,097	$125,098,720	$119,283,488	$97,702,859	$68,472,988	$80,521,109
Indirect costs	$1,554,848,797	$1,189,239,591	$365,609,206	$368,017,971	$503,985,226	$317,236,394	$205,442,901	$160,166,305

Table S1c. Heart failure (N=5,318,193)

Outcome	Annual RSV disease burden, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	293,464	182,745	110,719	69,039	62,723	50,983	38,184	72,535
RSV-URTD cases	115,235	71,759	43,476	27,109	24,630	20,019	14,994	28,482
RSV-LRTD cases	178,230	110,987	67,243	41,929	38,094	30,963	23,190	44,053
Outpatient visits	153,514	95,596	57,918	36,115	32,811	26,670	19,974	37,944
ED visits	9,497	5,487	4,010	1,368	2,272	1,847	1,383	2,627
Hospitalizations	59,919	29,545	30,374	11,162	10,141	8,243	6,173	24,200
Deaths	7,168	3,026	4,142	1,143	1,039	844	842	3,300
QALYs lost	47,273	29,097	18,176	12,423	9,879	6,796	5,238	12,938
Societal costs	$4,338,112,791	$2,850,064,219	$1,488,048,571	$1,441,035,888	$856,514,677	$552,513,654	$388,075,839	$1,099,972,733
Direct costs	$1,137,306,491	$656,030,023	$481,276,468	$358,876,482	$163,917,661	$133,235,880	$99,787,398	$381,489,070
Indirect costs	$3,200,806,300	$2,194,034,196	$1,006,772,104	$1,082,159,407	$692,597,016	$419,277,774	$288,288,441	$718,483,663

Table S1d. CAD (N=15,154,814)

Outcome	Annual RSV disease burden, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	837,609	535,472	302,137	202,482	183,761	149,229	111,738	190,399
RSV-URTD cases	328,904	210,264	118,640	79,509	72,157	58,598	43,876	74,764
RSV-LRTD cases	508,705	325,208	183,497	122,974	111,603	90,631	67,862	115,635
Outpatient visits	438,162	280,111	158,051	105,921	96,127	78,063	58,451	99,600
ED visits	26,987	16,055	10,932	4,007	6,649	5,399	4,043	6,889
Hospitalizations	101,408	57,339	44,069	8,770	26,803	21,766	16,298	27,771
Deaths	10,555	5,266	5,288	806	2,462	1,999	1,956	3,333
QALYs lost	83,044	53,748	29,295	11,580	24,907	17,262	13,228	16,067
Societal costs	$6,872,397,072	$4,662,522,373	$2,209,874,699	$1,177,375,359	$2,109,027,895	$1,376,119,119	$962,931,619	$1,246,943,081
Direct costs	$1,820,217,744	$1,104,172,142	$716,045,603	$315,006,048	$435,501,973	$353,664,120	$264,811,103	$451,234,499
Indirect costs	$5,052,179,328	$3,558,350,231	$1,493,829,097	$862,369,310	$1,673,525,922	$1,022,454,999	$698,120,515	$795,708,581

Without RSV vaccination, RSV disease among adults aged ≥60 years with cardiopulmonary disease is associated with a substantial clinical and economic burden each year

Abbreviations

ARI, acute respiratory illness; **CAD**, coronary artery disease; **COPD**, chronic obstructive pulmonary disease; **ED**, emergency department; **LRTD**, lower respiratory tract disease; **QALY**, quality-adjusted life year; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

Presenting author: Elizabeth La, liz.m.la@gsk.com

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Supplement

Table S2. 5-year RSV-related outcomes avoided and societal cost savings (adjuvanted RSVPreF3 vaccination vs. no vaccination)

Table S2a. COPD (N=9,728,877, with n=6,303,881 vaccinated)

Outcome	RSV-related outcomes avoided and societal costs savings over 5 years, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	-642,622	-421,944	-220,678	-100,346	-177,914	-143,684	-105,571	-115,107
RSV-URTD cases	-145,406	-94,957	-50,449	-22,564	-39,994	-32,398	-23,918	-26,531
RSV-LRTD cases	-497,216	-326,987	-170,229	-77,782	-137,920	-111,285	-81,653	-88,576
Outpatient visits	-371,282	-243,953	-127,330	-58,022	-102,878	-83,052	-60,985	-66,345
ED visits	-27,468	-17,347	-10,121	-2,530	-8,200	-6,617	-4,855	-5,266
Hospitalizations	-157,676	-96,578	-61,098	-7,134	-49,502	-39,942	-29,307	-31,791
Deaths	-16,202	-8,870	-7,332	-655	-4,547	-3,669	-3,517	-3,815
QALYs lost	-111,281	-75,166	-36,115	-7,936	-40,214	-27,016	-20,436	-15,679
Societal costs	-$8,147,574,384	-$5,797,603,446	-$2,349,970,937	-$566,910,043	-$3,240,586,583	-$1,990,106,820	-$1,356,998,990	-$992,971,947
Direct costs	-$475,488,788	-$287,888,671	-$187,600,117	$78,190,852	-$206,560,815	-$159,518,707	-$106,900,645	-$80,699,472
Indirect costs	-$7,672,085,596	-$5,509,714,776	-$2,162,370,820	-$645,100,895	-$3,034,025,768	-$1,830,588,113	-$1,250,098,345	-$912,272,475

Table S2b. Asthma (N=6,710,866, with n=4,177,722 vaccinated)

Outcome	RSV-related outcomes avoided and societal costs savings over 5 years, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	-435,727	-306,333	-129,395	-105,905	-110,660	-89,768	-61,713	-67,681
RSV-URTD cases	-98,398	-68,889	-29,509	-23,792	-24,875	-20,222	-13,957	-15,552
RSV-LRTD cases	-337,330	-237,444	-99,886	-82,113	-85,785	-69,545	-47,756	-52,130
Outpatient visits	-251,810	-177,127	-74,684	-61,244	-63,989	-51,894	-35,658	-39,026
ED visits	-17,790	-11,872	-5,918	-2,669	-5,082	-4,120	-2,829	-3,088
Hospitalizations	-39,512	-25,475	-14,037	-3,646	-12,055	-9,773	-6,711	-7,326
Deaths	-4,024	-2,340	-1,684	-335	-1,107	-898	-805	-879
QALYs lost	-37,156	-26,342	-10,814	-5,428	-12,370	-8,544	-6,052	-4,762
Societal costs	-$1,572,928,003	-$1,221,871,769	-$351,056,235	-$175,088,849	-$666,414,924	-$380,367,995	-$233,843,224	-$117,213,011
Direct costs	$658,606,302	$457,952,463	$200,653,839	$194,533,945	$143,681,107	$119,737,411	$86,704,230	$113,949,609
Indirect costs	-$2,231,534,305	-$1,679,824,231	-$551,710,074	-$369,622,794	-$810,096,031	-$500,105,406	-$320,547,454	-$231,162,620

Table S2c. Heart failure (N=5,318,193, with n=3,415,446 vaccinated)

Outcome	RSV-related outcomes avoided and societal costs savings over 5 years, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	-340,116	-208,790	-131,327	-60,433	-82,264	-66,093	-48,212	-83,115
RSV-URTD cases	-77,233	-47,056	-30,177	-13,593	-18,533	-14,930	-10,947	-19,231
RSV-LRTD cases	-262,883	-161,734	-101,149	-46,840	-63,731	-51,163	-37,266	-63,884
Outpatient visits	-196,416	-120,692	-75,724	-34,942	-47,556	-38,194	-27,843	-47,881
ED visits	-14,413	-8,381	-6,033	-1,528	-3,801	-3,051	-2,223	-3,810
Hospitalizations	-88,069	-43,054	-45,015	-12,469	-16,966	-13,620	-9,920	-35,095
Deaths	-10,548	-4,410	-6,138	-1,277	-1,738	-1,395	-1,353	-4,786
QALYs lost	-61,817	-37,461	-24,356	-12,626	-14,886	-9,949	-7,463	-16,893
Societal costs	-$4,805,642,101	-$3,120,292,576	-$1,685,349,525	-$1,345,077,938	-$1,114,297,164	-$660,917,474	-$439,823,618	-$1,245,525,906
Direct costs	-$424,310,689	-$199,471,169	-$224,839,520	-$191,435,324	-$6,057,069	-$1,978,776	$3,422,955	-$228,262,475
Indirect costs	-$4,381,331,412	-$2,920,821,407	-$1,460,510,004	-$1,153,642,614	-$1,108,240,094	-$658,938,699	-$443,246,574	-$1,017,263,431

Table S2d. CAD (N=15,154,814, with n=9,709,143 vaccinated)

Outcome	RSV-related outcomes avoided and societal costs savings over 5 years, overall and by age							
	≥60 years	60–74 years	≥75 years	60–64 years	65–69 years	70–74 years	75–79 years	≥80 years
RSV-ARI cases	-976,136	-612,796	-363,339	-177,995	-241,245	-193,557	-141,390	-221,949
RSV-URTD cases	-221,690	-138,208	-83,482	-40,096	-54,369	-43,742	-32,112	-51,371
RSV-LRTD cases	-754,446	-474,589	-279,857	-137,899	-186,875	-149,815	-109,278	-170,578
Outpatient visits	-563,705	-354,198	-209,506	-102,897	-139,453	-111,848	-81,651	-127,856
ED visits	-41,224	-24,552	-16,672	-4,494	-11,133	-8,925	-6,510	-10,162
Hospitalizations	-157,906	-90,695	-67,211	-9,835	-44,880	-35,980	-26,244	-40,966
Deaths	-16,395	-8,330	-8,065	-903	-4,122	-3,305	-3,149	-4,916
QALYs lost	-114,178	-74,246	-39,932	-11,454	-37,506	-25,286	-18,900	-21,032
Societal costs	-$6,801,605,173	-$4,816,296,394	-$1,985,308,780	-$650,205,146	-$2,617,449,138	-$1,548,642,110	-$1,020,658,023	-$964,650,756
Direct costs	$539,343,197	$331,463,431	$207,879,766	$226,597,257	$53,264,777	$51,601,397	$51,051,582	$156,828,184
Indirect costs	-$7,340,948,370	-$5,147,759,825	-$2,193,188,545	-$876,802,403	-$2,670,713,915	-$1,600,243,507	-$1,071,709,605	-$1,121,478,940

Abbreviations

ARI, acute respiratory illness; **CAD**, coronary artery disease; **COPD**, chronic obstructive pulmonary disease; **ED**, emergency department; **LRTD**, lower respiratory tract disease; **QALY**, quality-adjusted life year; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

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Supplement

Table S3. Detailed public health impact and cost-effectiveness results

Table S3a. COPD

Outcome	Results during 5-year time horizon		
	Adjuvanted RSVPreF3	No vaccine	Incremental (adjuvanted RSVPreF3 vs. no vaccine)
Eligible population	**9,728,877**	**9,728,877**	-
Population vaccinated	**6,303,881**	**0**	**6,303,881**
Health outcomes			
RSV-ARI cases	1,830,601	2,473,223	-642,622
RSV-URTD cases	825,755	971,161	-145,406
RSV-LRTD cases	1,004,846	1,502,062	-497,216
Healthcare resource use			
Hospitalizations[a]	292,592	450,268	-157,676
ED visits[a]	52,885	80,353	-27,468
Outpatient visits	922,485	1,293,768	-371,282
RSV-related deaths[b]	**29,872**	**46,075**	**-16,202**
QALY losses	**208,301**	**319,582**	**-111,281**
RSV-URTD case	10,367	12,249	-1,881
RSV-LRTD case	16,768	25,246	-8,478
RSV-related death	181,068	282,087	-101,018
Adjuvanted RSVPreF3 vaccination AE	97	0	97
RSV-related costs			
Total direct costs	**$6,867,456,556**	**$7,342,945,343**	**-$475,488,788**
RSV-URTD case	$55,702,060	$65,268,004	-$9,565,944
RSV-LRTD case	$4,754,158,338	$7,277,677,339	-$2,523,519,002
Adjuvanted RSVPreF3 vaccination	$2,057,596,158	$0	$2,057,596,158
Total indirect costs	**$15,001,290,170**	**$22,673,375,765**	**-$7,672,085,596**
RSV-URTD case	$220,063,075	$257,483,891	-$37,420,816
RSV-LRTD case	$674,274,438	$996,003,514	-$321,729,076
RSV-related death	$14,008,626,437	$21,419,888,361	-$7,411,261,924
Adjuvanted RSVPreF3 vaccination	$98,326,220	$0	$98,326,220
Total societal costs	**$21,868,746,725**	**$30,016,321,109**	**-$8,147,574,384**
ICER			**Adjuvanted RSVPreF3 dominant[c]**

Table S3b. Asthma

Outcome	Results during 5-year time horizon		
	Adjuvanted RSVPreF3	No vaccine	Incremental (adjuvanted RSVPreF3 vs. no vaccine)
Eligible population	**6,710,866**	**6,710,866**	-
Population vaccinated	**4,177,722**	**0**	**4,177,722**
Health outcomes			
RSV-ARI cases	1,321,591	1,757,318	-435,727
RSV-URTD cases	591,649	690,046	-98,398
RSV-LRTD cases	729,942	1,067,272	-337,330
Healthcare resource use			
Hospitalizations[a]	76,655	116,167	-39,512
ED visits[a]	36,034	53,824	-17,790
Outpatient visits	667,460	919,271	-251,810
RSV-related deaths[b]	**7,738**	**11,762**	**-4,024**
QALY losses	**76,888**	**114,044**	**-37,156**
RSV-URTD case	7,424	8,696	-1,272
RSV-LRTD case	12,176	17,924	-5,748
RSV-related death	57,223	87,424	-30,200
Adjuvanted RSVPreF3 vaccination AE	64	0	64
RSV-related costs			
Total direct costs	**$2,837,179,990**	**$2,178,573,688**	**$658,606,302**
RSV-URTD case	$42,930,497	$49,804,668	-$6,874,171
RSV-LRTD case	$1,427,556,175	$2,128,769,020	-$701,212,845
Adjuvanted RSVPreF3 vaccination	$1,366,693,318	$0	$1,366,693,318
Total indirect costs	**$4,865,513,880**	**$7,097,048,186**	**-$2,231,534,305**
RSV-URTD case	$169,235,884	$196,130,849	-$26,894,965
RSV-LRTD case	$411,910,213	$588,931,873	-$177,021,660
RSV-related death	$4,214,532,151	$6,311,985,463	-$2,097,453,313
Adjuvanted RSVPreF3 vaccination	$69,835,633	$0	$69,835,633
Total societal costs	**$7,702,693,870**	**$9,275,621,874**	**-$1,572,928,003**
ICER			**Adjuvanted RSVPreF3 dominant[c]**

[a]RSV-related hospitalizations and ED visits were assumed to only occur in RSV-LRTD cases. [b]RSV-related deaths were assumed to only occur in hospitalized RSV-LRTD cases. [c]Adjuvanted RSVPreF3 is cost-saving versus no RSV vaccination (i.e., vaccination is associated with lower societal costs and improved health outcomes).

Abbreviations

AE, adverse event; **ARI**, acute respiratory illness; **COPD**, chronic obstructive pulmonary disease; **ED**, emergency department; **ICER**, incremental cost-effectiveness ratio; **LRTD**, lower respiratory tract disease; **QALY**, quality-adjusted life year; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

Presenting author: Elizabeth La, liz.m.la@gsk.com

Public Health Impact and Cost-Effectiveness of Adjuvanted RSVPreF3 Vaccination in US Adults Aged ≥60 Years with Cardiopulmonary Disease

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Table S3. Detailed public health impact and cost-effectiveness results

Table S3c. Heart failure

Outcome	Results during 5-year time horizon		
	Adjuvanted RSVPreF3	No vaccine	Incremental (adjuvanted RSVPreF3 vs. no vaccine)
Eligible population	**5,318,193**	**5,318,193**	-
Population vaccinated	**3,415,446**	**0**	**3,415,446**
Health outcomes			
RSV-ARI cases	972,605	1,312,722	-340,116
RSV-URTD cases	438,233	515,467	-77,233
RSV-LRTD cases	534,372	797,255	-262,883
Healthcare resource use			
Hospitalizations[a]	172,594	260,663	-88,069
ED visits[a]	27,742	42,155	-14,413
Outpatient visits	490,282	686,698	-196,416
RSV-related deaths[b]	**20,274**	**30,823**	**-10,548**
QALY losses	**125,591**	**187,408**	**-61,817**
RSV-URTD case	5,507	6,506	-1,000
RSV-LRTD case	8,925	13,411	-4,486
RSV-related death	111,108	167,491	-56,383
Adjuvanted RSVPreF3 vaccination AE	52	0	52
RSV-related costs			
Total direct costs	**$4,334,903,571**	**$4,759,214,261**	**-$424,310,689**
RSV-URTD case	$30,201,252	$35,362,072	-$5,160,820
RSV-LRTD case	$3,189,345,003	$4,723,852,189	-$1,534,507,185
Adjuvanted RSVPreF3 vaccination	$1,115,357,316	$0	$1,115,357,316
Total indirect costs	**$9,588,744,912**	**$13,970,076,324**	**-$4,381,331,412**
RSV-URTD case	$117,507,218	$137,326,038	-$19,818,820
RSV-LRTD case	$417,856,832	$603,528,027	-$185,671,195
RSV-related death	$9,000,274,207	$13,229,222,260	-$4,228,948,053
Adjuvanted RSVPreF3 vaccination	$53,106,656	$0	$53,106,656
Total societal costs	**$13,923,648,484**	**$18,729,290,584**	**-$4,805,642,101**
ICER			**Adjuvanted RSVPreF3 dominant[c]**

Table S3d. CAD

Outcome	Results during 5-year time horizon		
	Adjuvanted RSVPreF3	No vaccine	Incremental (adjuvanted RSVPreF3 vs. no vaccine)
Eligible population	**15,154,814**	**15,154,814**	-
Population vaccinated	**9,709,143**	**0**	**9,709,143**
Health outcomes			
RSV-ARI cases	2,806,425	3,782,561	-976,136
RSV-URTD cases	1,263,609	1,485,299	-221,690
RSV-LRTD cases	1,542,817	2,297,262	-754,446
Healthcare resource use			
Hospitalizations[a]	294,541	452,447	-157,906
ED visits[a]	79,766	120,990	-41,224
Outpatient visits	1,414,991	1,978,695	-563,705
RSV-related deaths[b]	**30,316**	**46,712**	**-16,395**
QALY losses	**220,783**	**334,960**	**-114,178**
RSV-URTD case	15,873	18,742	-2,869
RSV-LRTD case	25,761	38,631	-12,870
RSV-related death	178,999	277,587	-98,588
Adjuvanted RSVPreF3 vaccination AE	149	0	149
RSV-related costs			
Total direct costs	**$8,278,546,672**	**$7,739,203,475**	**$539,343,197**
RSV-URTD case	$87,388,581	$102,248,334	-$14,859,753
RSV-LRTD case	$5,020,085,476	$7,636,955,141	-$2,616,869,665
Adjuvanted RSVPreF3 vaccination	$3,171,072,615	$0	$3,171,072,615
Total indirect costs	**$14,915,960,780**	**$22,256,909,150**	**-$7,340,948,370**
RSV-URTD case	$341,020,345	$398,315,265	-$57,294,920
RSV-LRTD case	$926,572,385	$1,354,087,860	-$427,515,475
RSV-related death	$13,496,067,943	$20,504,506,025	-$7,008,438,082
Adjuvanted RSVPreF3 vaccination	$152,300,108	$0	$152,300,108
Total societal costs	**$23,194,507,452**	**$29,996,112,625**	**-$6,801,605,173**
ICER			**Adjuvanted RSVPreF3 dominant[c]**

[a]RSV-related hospitalizations and ED visits were assumed to only occur in RSV-LRTD cases. [b]RSV-related deaths were assumed to only occur in hospitalized RSV-LRTD cases. [c]Adjuvanted RSVPreF3 is cost-saving versus no RSV vaccination (i.e., vaccination is associated with lower societal costs and improved health outcomes).

Abbreviations

AE, adverse event; **ARI**, acute respiratory illness; **CAD**, coronary artery disease; **ED**, emergency department; **ICER**, incremental cost-effectiveness ratio; **LRTD**, lower respiratory tract disease; **QALY**, quality-adjusted life year; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

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Table S4. Number needed to vaccinate to avoid 1 RSV-related case or outcome

Outcome	COPD	Asthma	Heart failure	CAD
RSV-ARI case	10	10	10	10
RSV-LRTD case	13	12	13	13
Outpatient visit	17	17	17	17
Hospitalization	40	106	39	61
Death	389	1,038	324	592

Table S5. Condition-specific model inputs

Input	COPD	Asthma	Heart failure	CAD	Sources
Population inputs					
Population size, by age					
60–64 years	2,030,412	2,126,603	1,239,720	3,633,034	1–4
65–69 years	2,418,444	1,485,554	1,127,801	3,303,442	
70–74 years	1,984,469	1,218,980	918,583	2,688,854	
75–79 years	1,502,909	857,235	691,291	2,022,390	
80–84 years	927,071	528,786	687,774	1,845,263	
85–89 years	517,053	294,919	389,469	1,013,686	
≥90 years	348,519	198,790	263,556	648,146	
Total population ≥60 years	9,728,877	6,710,866	5,318,193	15,154,814	
Annual probability of all-cause mortality	Probability of dying by single year of age				5–6
RSV epidemiology and HCRU inputs					
Percentage of RSV-LRTD cases that result in HCRU					
Hospitalization					
60–64 years	9.2%	4.4%	26.6%	7.1%	7–10
65–79 years	35.9%	14.1%	26.6%	24.0%	
≥80 years	35.9%	14.1%	54.9%	24.0%	
ED visit					
60–64 years	3.3%	3.3%	3.3%	3.3%	8–10
≥65 years	5.9%	5.9%	6.0%	6.0%	
Percentage of RSV-LRTD cases that result in death					
60–64 years	0.8%	0.4%	2.7%	0.7%	7–12
65–74 years	3.3%	1.3%	2.7%	2.2%	
75–79 years	4.3%	1.7%	3.6%	2.9%	
≥80 years	4.3%	1.7%	7.5%	2.9%	

Input	COPD	Asthma	Heart failure	CAD	Sources
Cost inputs					
Direct costs per RSV-LRTD case					
60–64 years	$3,119	$1,663	$8,488	$2,491	7–11, 13–17
65–79 years	$5,691	$2,330	$4,264	$3,863	
≥80 years	$5,691	$2,330	$8,621	$3,863	
Productivity loss due to RSV-LRTD case					
60–64 years	$950	$827	$1,403	$897	18–24
65–74 years	$705	$512	$623	$600	
75–79 years	$478	$347	$422	$407	
≥80 years	$478	$347	$591	$407	
Productivity loss due to RSV-LRTD death					
60–64 years	$924,239	$981,988	$885,280	$892,891	5, 6, 19–24
65–69 years	$668,720	$722,248	$637,522	$644,671	
70–74 years	$495,469	$542,715	$467,342	$476,306	
75–79 years	$356,309	$393,874	$327,557	$338,733	
80–84 years	$280,673	$306,594	$251,123	$263,400	
85–89 years	$214,810	$229,181	$188,677	$199,715	
≥90 years	$133,683	$136,109	$121,576	$127,582	
Utility inputs					
Baseline utilities					
60–64 years	0.7633	0.8087	0.7665	0.7910	25–26
65–74 years	0.7503	0.7957	0.7535	0.7780	
≥75 years	0.6883	0.7337	0.6915	0.7160	

Abbreviations

ARI, acute respiratory illness; **CAD**, coronary artery disease; **COPD**, chronic obstructive pulmonary disease; **ED**, emergency department; **HCRU**, healthcare resource use; **LRTD**, lower respiratory tract disease; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

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Table S6. Non-condition-specific model inputs

Input	Value		Sources
RSV epidemiology and HCRU inputs			
Annual incidence of symptomatic RSV-ARI per person-year at risk	0.0562		8
Seasonality adjustment factor for symptomatic RSV-ARI infection			
January	262.3%		27
February	100.6%		
March	45.5%		
April	17.6%		
May	7.9%		
June	3.2%		
July	4.0%		
August	9.9%		
September	14.8%		
October	77.7%		
November	297.3%		
December	359.2%		
Percentage of symptomatic RSV-ARI cases that are RSV-LRTD	60.7%		28
Percentage of RSV cases that result in HCRU and medication use[a]	RSV-LRTD	RSV-URTD	
Outpatient visit	65.2%	32.4%	Assumption, 8–11
X-ray	48.6%	8.8%	
Short-acting bronchodilator	18.8%	6.5%	
Antibiotic use	38.7%	23.7%	
Corticosteroid use	7.7%	3.5%	
Antiviral use	0.0%	1.4%	
Over-the-counter medication use	34.8%	67.6%	
Vaccine-specific inputs			
Vaccination month	October		Assumption
Vaccination uptake			
60–64 years	46.2%		29
≥65 years	69.7%		
Vaccine efficacy against RSV-ARI	Time-varying values ranging from 75.5% in month 2 to 19.6% in month 60		28, 30
Vaccine efficacy against RSV-LRTD	Time-varying values ranging from 86.8% in month 2 to 28.2% in month 60		28, 30
Incidence of vaccine-related Grade 3 AE	2.3%		30

Input	Value		Sources
Cost inputs			
Vaccine purchase cost	$294		16
Vaccine administration cost	$23		15, 31, 32
Unit costs used to derive costs per RSV case	60–64 years	≥65 years	
Hospitalization[b]	$30,774	$15,387	8, 13, 17
ED visit[b]	$884	$442	14, 15, 17
Outpatient visit[b]	$256	$128	15, 17
X-ray[b]	$173	$87	14, 17
Short-acting bronchodilator	$15	$15	16
Antibiotic	$24	$24	16
Corticosteroid	$26	$26	16
Antiviral	$10	$10	Assumption
Over-the-counter medication	$5	$5	Assumption
Direct costs per RSV-URTD case			
60–64 years	$109		8–11, 14–17
≥65 years	$60		
Direct costs per vaccine-related Grade 3 AE			
60–64 years	$752		13, 17, 30, 33
≥65 years	$376		
Productivity loss due to RSV-URTD case			
60–64 years	$413		18–24
65–74 years	$271		
≥75 years	$184		
Productivity loss due to vaccine administration			
60–64 years	$16		19–24, 34, 35
65–74 years	$9		
≥75 years	$7		
Productivity loss due to vaccine-related Grade 3 AE			
60–64 years	$435		19–24, 36
65–74 years	$283		
≥75 years	$192		
Utility inputs			
QALY loss due to RSV case			
QALY loss due to RSV-URTD case	0.0133		30, 37
QALY loss due to RSV-LRTD case	0.0178		30, 37
QALY loss due to vaccine-related Grade 3 AEs	0.0007		36

[a]Percentages are among all symptomatic RSV-ARI cases, including medically-attended and nonmedically-attended RSV-ARI cases. Hospitalizations and ED visits were assumed to only occur among RSV-LRTD cases. All medically-attended symptomatic RSV-ARI cases were assumed to have one outpatient visit each. Over-the counter medication use was assumed among nonmedically-attended symptomatic RSV-ARI cases to manage symptoms. [b]Commercial costs for adults aged 60–64 years were assumed to be two times Medicare costs.[17]

Abbreviations

AE, adverse event; **ARI**, acute respiratory illness; **ED**, emergency department; **HCRU**, healthcare resource use; **LRTD**, lower respiratory tract disease; **QALY**, quality-adjusted life year; **RSV**, respiratory syncytial virus; **URTD**, upper respiratory tract disease; **US**, United States.

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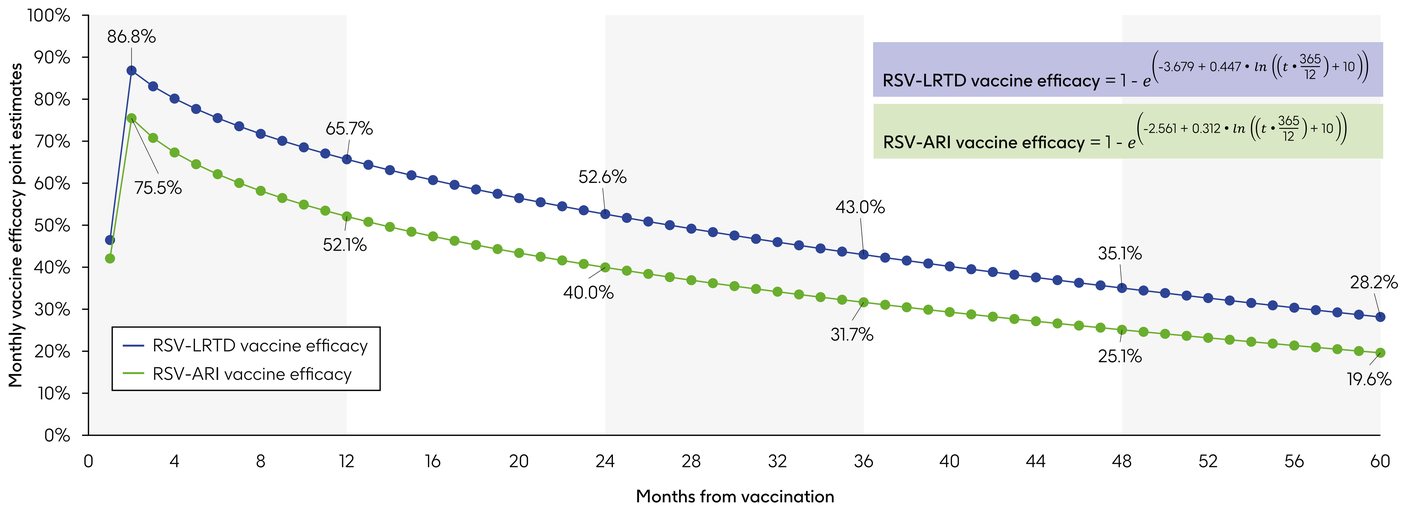
Figure S1. Adjuvanted RSVPreF3 vaccine efficacy inputs



Note: Phase 3 clinical trial data with a median 30.6-month follow-up period were used to estimate adjuvanted RSVPreF3 vaccine efficacy inputs using Cox models for RSV-ARI and RSV-LRTD.[28,30] In the month of vaccination, 50% of peak vaccine efficacy was applied. The figure is shown for the modeled time horizon of 5 years.

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Presenting author: Elizabeth La, liz.m.la@gsk.com