

Clinical and Economic Benefits of Bivalent Respiratory Syncytial Virus Prefusion F (RSVpreF) Vaccine for Prevention of RSV Infections Among Older Adults: A Cost-Effectiveness Analysis for Singapore



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Purpose

- Respiratory syncytial virus (RSV) is a common respiratory virus which can cause severe illness in the elderly and those with underlying conditions.¹
- This study estimated the clinical and economic impact of a year-round bivalent RSVpreF vaccination program² for the prevention of lower respiratory tract infections (LRTI) caused by RSV among older adults in Singapore.

Materials and Methods

Overview

- A Markov model was used to project clinical and economic outcomes of RSV in older adults with single-dose RSVpreF vaccination compared to no vaccination, among Singapore residents aged 60-74 years at an increased risk of severe RSV disease and all residents 75-99 years of age.^{3,4}
- Clinical outcomes consisted of medically-attended RSV stratified by care setting (i.e., hospital [H], emergency department [ED], physician's office [PO]), RSV-related deaths (for hospital-admitted patients), life years (LYs), and quality-adjusted life years (QALYs).
- Economic outcomes included intervention costs (RSVpreF vaccine and administration) and direct medical care costs for older adults.

Model Parameters

- Incidence of RSV-H was based on a published analysis of Singapore's national inpatient database;⁵ incidence rates were allocated by risk, based on a recent study of adults in the United States (US).⁶ To account for alternative clinical definitions for RSV associated hospitalizations, the rates were adjusted by two times.
- Case-fatality rate [CFR] of 8.6 deaths per 100 hospitalizations [65-74 years old]) for RSV-associated in-hospital mortality was based on a global systematic literature review on RSV burden in older adults from developed countries,⁷ and distributed across age and risk groups based on published literature.⁸
- Vaccine effectiveness was derived from RENOIR clinical trial data⁹ and duration of protection beyond trial was extrapolated assuming linear waning and truncated at 42 months.
- Vaccine uptake was derived from Singapore's Ministry of Health data for influenza vaccination (18.7% [18-64 years old] and 40.6% [65+ years old]).¹⁰
- All costs were reported in 2024 Singapore dollars (S\$). Direct medical care costs for RSV-H were S\$5,116.88 (18-64 years old) and S\$6,881.70 (65+ years old),¹¹ S\$154.00 for RSV-ED,¹² and S\$91.66 for RSV-PO.¹¹
- Cost for older adult RSVpreF vaccination was S\$273.28 per dose, and the administration cost (S\$3.05) was assumed to correspond to the 10-minute wage of a nursing aide/assistant.¹³
- Utility values for persons aged 18-99 years were based on Singapore-specific EQ-5D index scores,¹⁴ and distributed across risk groups based on published literature.¹⁵

Analyses

- An annual discount rate of 3% was applied for both future costs and outcomes. Analyses were conducted from both the healthcare system and societal perspectives with a lifetime time horizon.
- Scenario analyses tested the results robustness to changes in key model inputs, including RSV-H rates (not adjusted and adjusted by 3x)⁵ and vaccine uptake (20% and 60%).

References

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Results

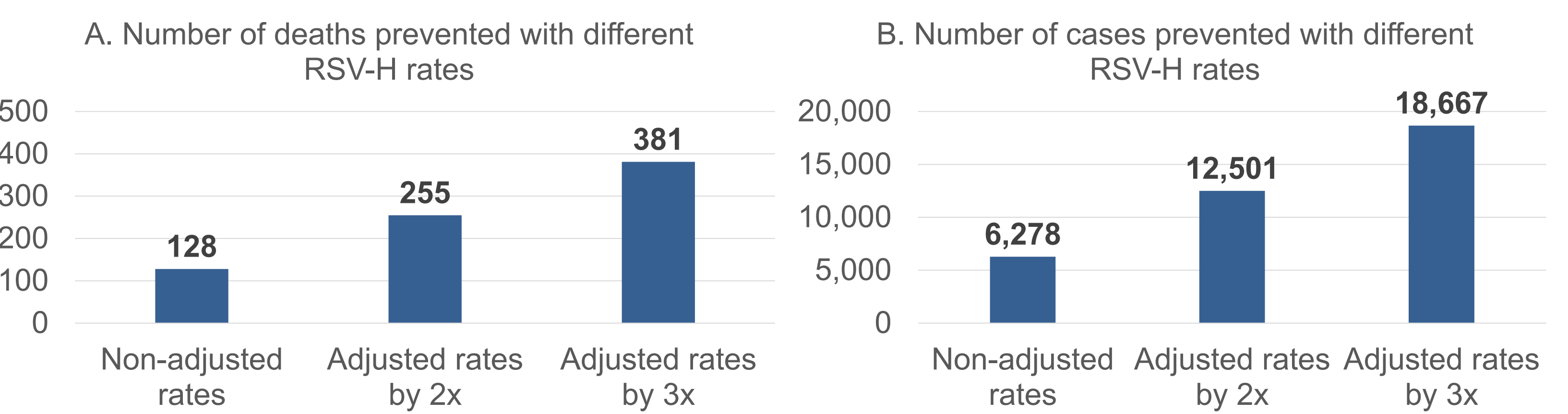
- In the base case analysis, from a healthcare system perspective, older adult vaccination with RSVpreF would be a cost-effective strategy, with an incremental cost-effectiveness ratio (ICER) of S\$47,679 per QALY gained, 0.42 times the assumed willingness-to-pay (WTP) threshold of 1 x gross domestic product per capita (GDPpc) in Singapore (S\$113,778 per QALY gained) (**Table 1**).
- From a societal perspective, the resulting ICER would decrease to S\$25,964 per QALY gained (i.e., 0.23 x GDPpc).

Table 1. Base case results: Older adult vaccine vs. No intervention

	Older adult vaccine	No intervention	Difference
Clinical outcomes, No. of cases			
RSV-H	52,304	54,595	-2,291
RSV-ED visits	31,767	33,193	-1,426
RSV-PO visits	331,170	339,953	-8,784
RSV-related deaths	6,837	7,092	-255
Life years, discounted	10,080,740	10,078,582	2,158
QALYs, discounted	6,534,798	6,533,381	1,417
Economic outcomes, S\$ millions			
Medical care	283.64	299.27	-15.63
Older adult vaccination	82.27	0	82.27
Vaccine administration	0.92	0	0.92
Indirect costs	504.85	535.62	-30.77
Total direct costs	366.82	299.27	67.55
ICER, Cost per QALY gained (S\$)			
Healthcare perspective			47,679
Societal perspective			25,964

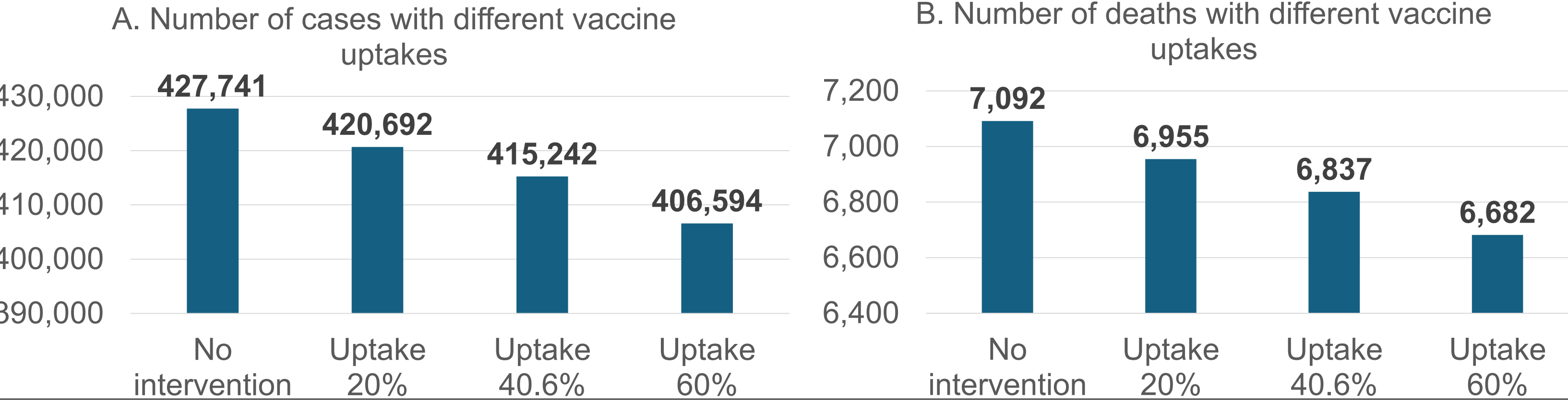
- Prevented RSV medically-attended cases and RSV-related deaths for base case and RSV-H rates scenario analyses are presented in **Figure 1**. The number of RSV cases and RSV-related deaths prevented increased with higher RSV-H rates, with the ICER ranging from S\$106,156 – S\$28,191 per QALY gained for non-adjusted to 3x adjusted rates, respectively.

Figure 1. Total number of RSV deaths (A) and medically-attended cases (B) prevented (RSVpreF vs. No intervention) with different RSV-H rates



- RSV medically-attended cases and RSV-related deaths for base case and vaccine uptake scenario analyses are presented in **Figure 2**. RSV cases and RSV-related deaths decreased with higher vaccine uptake.

Figure 2. Total number of RSV deaths (A) and medically-attended cases (B) with different vaccine uptakes



Conclusion

- Year-round RSVpreF vaccination would be a highly cost-effective program and would substantially reduce the clinical and economic burden of RSV among older adults in Singapore.
- Results of this economic evaluation has substantial health policy relevance and can be significant in future dialogue concerning the inclusion of the RSVpreF vaccine into the national vaccination program for older adults in Singapore.

Disclosure

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