Cost-Utility Model of Maternal RSV Vaccination from the Perspective of the Brazilian Public Health System

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BACKGROUND

Human respiratory syncytial virus (RSV) is a major cause of lower respiratory tract infections (LRTI), particularly bronchiolitis and pneumonia, and is the leading cause of death in infants under one year of age worldwide [1-4] . In Brazil, RSV circulates year-round, disproportionately affecting young infants. Between January 2020 and April 2024, 59,408 RSV-associated hospitalizations were reported, with 87% occurring in children under one year. Hospitalizations increased sharply during this period, raising public health concern. Currently, palivizumab is available only for a small, high-risk population, providing individual rather than population-level protection. In 2022 alone, more than 2.6 million newborns in Brazil were exposed to RSV without a broad preventive strategy. Therefore, maternal immunization with the RSV A and B vaccine (recombinant, Abrysvo) represents a promising strategy to provide broad, population-level protection against RSV-related LRTI and severe LRTI in young infants.

OBJECTIVES

To estimate the cost-utility of maternal RSV vaccination compared to no vaccination in preventing severe RSV outcomes in infants in the Brazilian public healthcare system (SUS) perspective.

METHODS

A decision-tree model was constructed with a one-year time horizon to reflect the acute nature of RSV disease (**Figure 1**). Vaccine effectiveness was derived from the MATISSE trial[5], and probabilities of hospitalization (ward and ICU) were obtained from national health data (DATASUS)[6,7]. Health-state utilities were sourced from the literature, applying disutility during episodes of illness and recover[8]. Direct medical costs were estimated through micro costing study conducted in a public hospital in Brazil, including ward and ICU admissions[9]. The price of RSV A and B vaccine (recombinant) used in the model was BRL 225.00 per dose. Results were expressed as incremental cost-effectiveness ratio (ICER) per quality-adjusted life year (QALY) considering the BRL 40,000/QALY gained threshold adopted by Brazilian government. Deterministic and probabilistic sensitivity analyses (DSA/PSA) were also conducted.

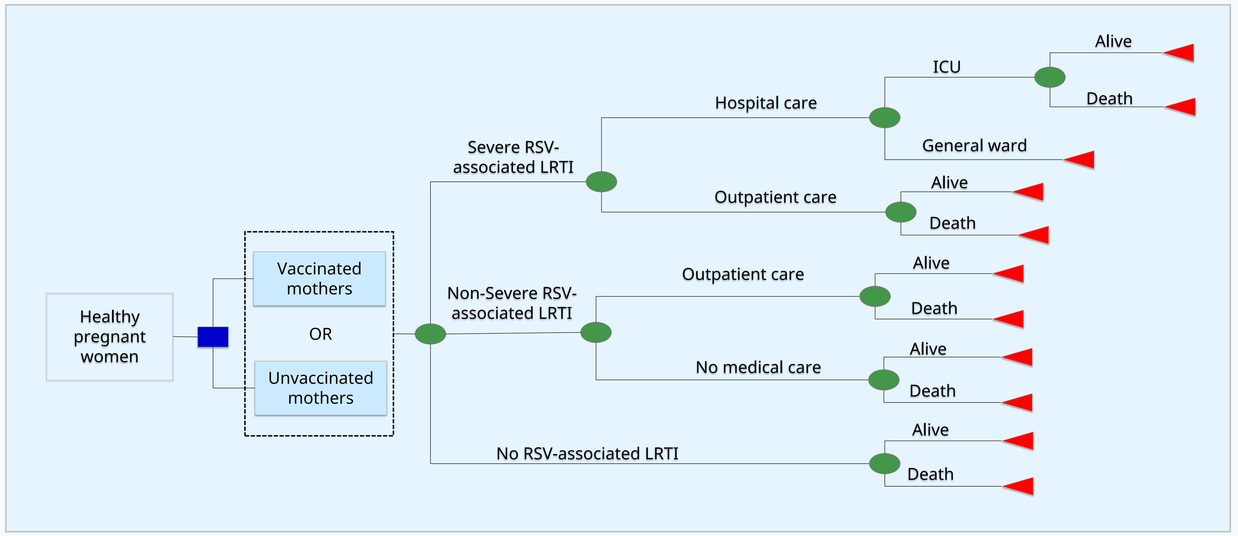

Figure 1 – Markov model structure for pneumococcal vaccination strategies. RSV: Human respiratory syncytial virus; LRTI: lower respiratory tract infections; ICU: Intensive Care Unit

RESULTS

In the base case, maternal RSV vaccination resulted in an incremental cost of BRL 65.28 per pregnant woman and generated QALY gains, yielding an ICER of BRL 7,981.04/QALY, i.e. cost-effective compared to no vaccination at the threshold employed (**Table 2**). In both the DSA e PSA, maternal RSV vaccination remained cost-effective as in the base case scenario (**Figure 2** and **Figure 3**).

Table 2 – Results of the base-case cost–utility analysis comparing the RSV A and B vaccine (recombinant) versus no vaccination for the prevention of severe RSV-associated lower respiratory tract disease (LRTD) in children through maternal immunization

Strategy	Cost (BRL)	QALYs	ICER (BRL/QALY)
RSV A and B vaccine (recombinant)	BRL 287.13	0.984	**BRL 7,981.04**
No vaccination	BRL 221.85	0.975	–
Incremental	**BRL 65.28**	**0.008**	–

ICER: incremental cost-effectiveness ratio; QALY: quality-adjusted life year

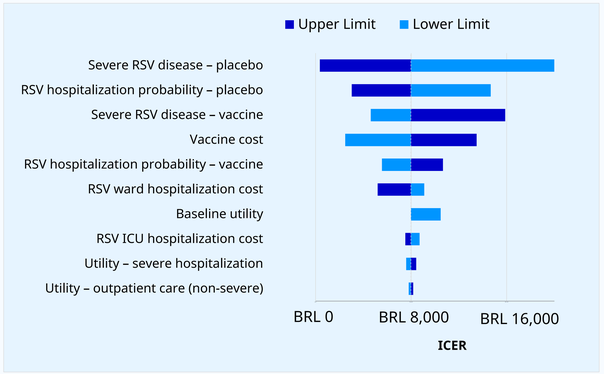

Figure 2 – Results of deterministic sensitivity analysis (Tornado diagram)

DISCUSSION

The cost-effectiveness analysis indicates that maternal RSV vaccination provides good economic value by reducing severe RSV-related outcomes in infants, particularly hospitalizations and ICU admissions, which are major drivers of healthcare costs. The favorable ICER observed in the base-case analysis remained consistent across deterministic and probabilistic sensitivity analyses, suggesting robustness to parameter uncertainty. The use of national epidemiological data and locally derived cost inputs strengthens the relevance of the findings for the Brazilian public health system. Moreover, the one-year time horizon appropriately reflects the acute nature of RSV infection in early infancy and captures the short-term clinical and economic consequences most relevant for decision-making.

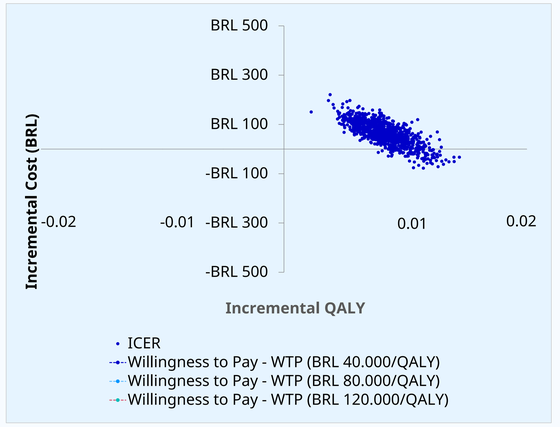

Figure 3 – Results of the probabilistic sensitivity analysis (cost-utility plane)

CONCLUSIONS

Maternal RSV vaccination is highly cost-effective in Brazil under an acute-phase, one-year horizon model. These findings supported its inclusion into the Brazil' NIP in February 2025 as an effective strategy to reduce RSV-related morbidity and healthcare burden in infants.

DISCLOSURES

Authors are current employees from Pfizer Brazil.

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