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Cost-Effectiveness Analysis of RSVpreF Maternal Vaccine for RSV Prevention in Infants Under Situation of the National Vaccination Program in Taiwan: A Study on Economic and Clinical Advantages

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OBJECTIVE

Respiratory syncytial virus (RSV) is the leading cause of acute lower respiratory tract infections in infants. A retrospective study showed that most infected are <=2 yrs (85%). Among those cases, 16.5% required intensive care. This study also indicated that RSV infections occur year-round in Taiwan[1].

We aim to assess the clinical benefits and cost-effectiveness of a new RSV vaccine for year-round maternal immunization under the situation of national vaccination program.

METHODS

A global Markov model[2,3] was adapted to evaluate the cost-effectiveness of maternal vaccination versus no intervention in preventing RSV infection in infants from birth to age 1, from a healthcare system perspective.

The "MATISSE" clinical trial data informed the vaccine's effectiveness, public data was used to determine model parameters, and a 50% vaccine uptake was presumed, mirroring Taiwan's influenza vaccination rates. Costs and utilities were discounted at 3% annually. Sensitivity and scenario analyses were conducted to test uncertainties arising from the input values.

Sensitivity analysis explored different scenarios (time horizon, discount rate and efficacy wanning effect). A fixed exchange rate was used (1 US dollar= 31.25 TWD)

RESULTS

With a 50% vaccination uptake, the program can avoid 883 hospitalizations, 204 emergency department care, and 2126 outpatient visits, also prevent 2 deaths due to RSV infections. The analysis revealed that the additional cost of vaccine- TWD 414.82M, could increase life years by 51 and quality-adjusted life years(QALY) by 99 compared to no vaccination.(table 1)

This results in an Incremental Cost-Effectiveness Ratio (ICER) of 2,265,981 per QALY gained, falling within 3x Taiwan's GDP per capita. OWSA demonstrated ICERs ranging from TWD 1,096,297 to 3,825,609. The scenarios resulted in a reduction of hospitalizations from 353 to 1412 cases, with the uptake rate increasing from 20% to 80% respectively.

In the one-way sensitivity analysis, the results of the vaccination program vs. no intervention are shown in Fig1. As expected, the effectiveness of maternal vaccine and cost of the vaccine, as well as the incidence of RSV hospitalization, are the most sensitive factors.

The medical utilization between vaccination and no intervention revealed that the cumulative utilization of no intervention is higher than that of vaccination in hospitalization, emergency department visits, and outpatient care (Fig 2).

Table 1 Base Case Analyses

	Maternal RSVpreF	no Vaccination	Difference
Population			
No. pregnant women	136,449	136,449	---
No. infants born	141,017	141,017	---
No. live births	140,794	140,794	---
Use of interventions			
No. receiving maternal vaccine	69,570	---	69,570
% infants adequately protected	99.2%	---	---
Clinical outcomes			
No. of cases			
RSV hospitalization	2,322	3,204	-883
RSV ED encounter	1,421	1,625	-204
RSV outpatient clinic encounter	6,927	9,053	-2,126
No. of RSV-related deaths	5	7	-2
Life years (discounted)	4,093,287	4,093,236	51
QALYs (discounted)	3,689,776	3,689,703	73
QALYs Lost due to AEs (discounted)	---	---	---
Caregiver QALYs Lost (discounted)	52	68	-16
Economic outcomes (millions)			
Direct costs			
Medical care	608.84	822.76	-213.92
Intervention			
Maternal vaccination	414.82	---	414.82
Total	414.82	---	414.82
AEs	---	---	---
Medical + intervention + AEs	1,023.66	822.76	200.90
Indirect costs (non-medical)	105.17	138.96	-33.79
Total costs (direct + indirect)	1,128.83	961.72	167.11
Cost-effectiveness for Strategy 1 vs Strategy 2			
Healthcare system perspective			
Cost per LY			3,974,267
Cost per QALY			2,265,981

Fig 1. One way sensitivity analysis

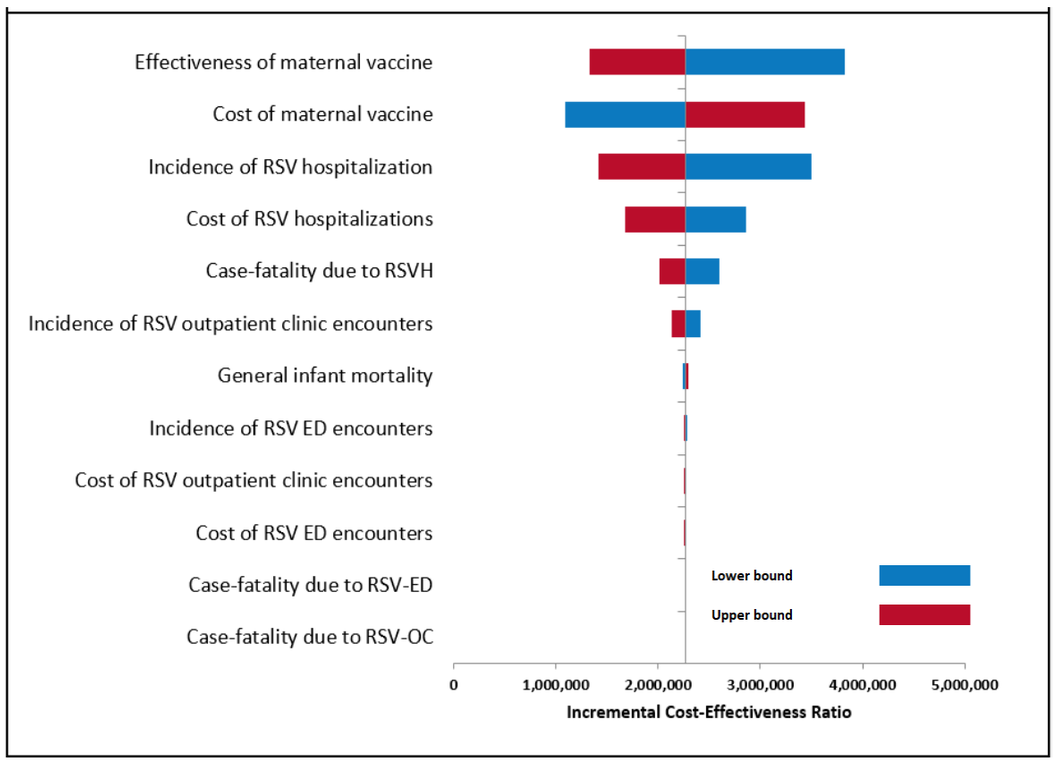
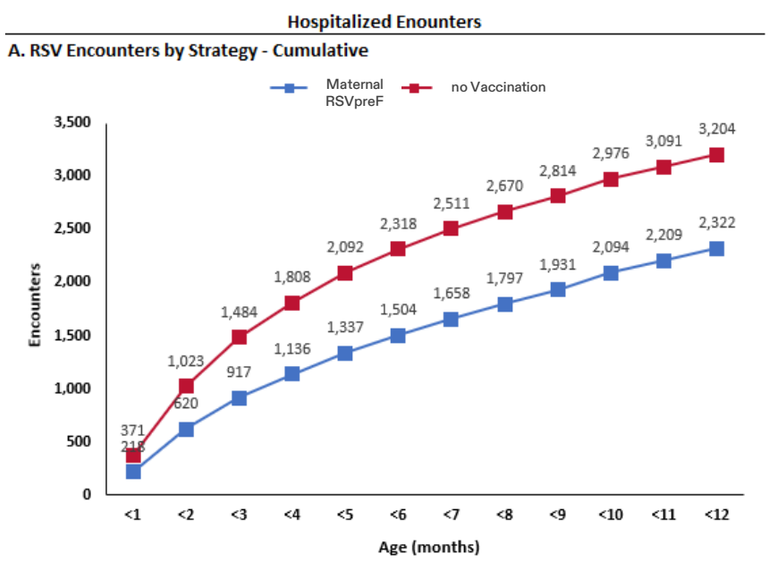
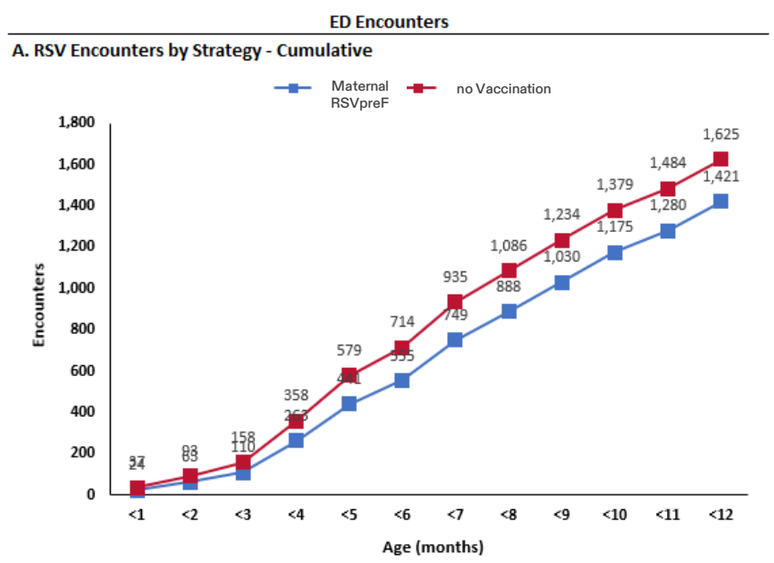
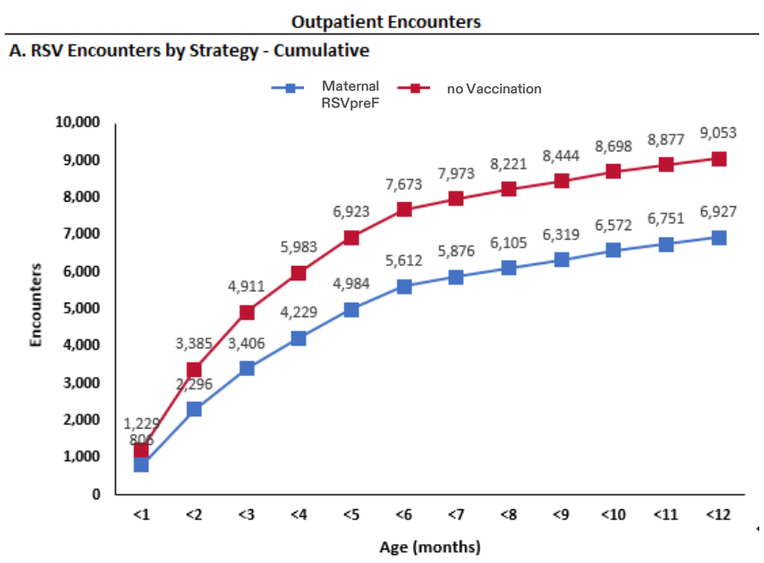


Fig 2 Cumulative Medical Utilization by Strategy (RSV Vx vs no Vaccination)







CONCLUSION

The study finds the year-round RSVpreF maternal vaccination to be cost-effective and clinical beneficial for infant RSV infections under Taiwan's national vaccination program.

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