Budget Impact of RSVpreF Maternal Vaccine and Nirsevimab Monoclonal Antibody to Protect Infants in UAE against Respiratory Syncytial Virus

EE 439

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INTRODUCTION

- Respiratory syncytial virus (RSV) yields a substantial public health burden among infants in Dubai and worldwide, with young infants and infants with chronic medical conditions at an increased risk for severe disease manifesting as lower respiratory tract illness (LRTI)[1-3]
- Both RSVpreF maternal vaccine and nirsevimab monoclonal antibody are authorized for use in the United Arab Emirates to protect infants against RSV[4,5]
- Dubai Health Authority guidelines recommend nirsevimab for newborns born from September through February, unless they are already protected via RSVpreF[6]
- Expanding RSVpreF use among pregnant women (with nirsevimab still available for unprotected infants) may provide a more affordable strategy to protect infants against RSV

OBJECTIVE

- **We evaluated the clinical and economic impact of RSVpreF and nirsevimab immunization strategies to protect privately insured infants in Dubai against RSV**

METHODS

Model Overview:

- A deterministic cohort-type budget impact model was employed to quantify the clinical and economic outcomes associated with RSV among infants aged <1 year and the projected impact of interventions:
  - Clinical outcomes: RSV-LRTI episodes by setting of care (hospital [H], emergency department [ED], outpatient clinic [OC]) and deaths following hospitalization
  - Economic outcomes (reported in 2025 US$): medical care costs and intervention costs
- Budget impact was calculated as the difference in total costs between immunization strategies and was reported overall and as a per-member per-year (PMPY) cost

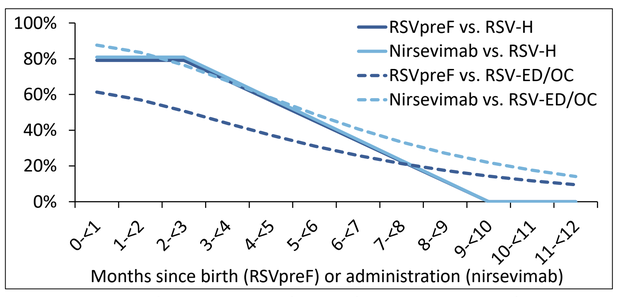
Estimation of Model Inputs:

- Model population included non-Emirati infants born to expatriates living in Dubai with private health insurance[7,8]: 30,708 live infants born to 29,828 pregnant women each year
  - Infants were allocated into term status groups based on Saudi Arabian data[8]: full term (FT, ≥37 weeks gestational age [wGA]): 91.9%; late preterm (LP, 32-36 wGA): 6.8%; early preterm (EP, 28-31 wGA): 0.8%; extreme preterm (ExP, ≤27 wGA): 0.4%
- Epidemiological inputs, intervention effectiveness inputs, and cost inputs are provided in Table 1, Figure 1, and Table 2, respectively

Table 1. Epidemiological inputs

	Month of Age												
	<1	1-<2	2-<3	3-<4	4-<5	5-<6	6-<7	7-<8	8-<9	9-<10	10-<11	11-<12	Refs
Rates of RSV-LRTI (per 1,000)													
Hospital													1,9,10
Full term	19	33	24	17	15	12	11	9	8	9	7	7	
Late preterm	33	58	42	42	37	29	18	15	14	16	12	12	
Early and extreme preterm	9	16	11	40	35	28	74	61	56	64	46	46	
Emergency department													10-12
Full term	14	45	51	75	82	51	46	32	31	31	23	31	
Late preterm	24	78	88	184	203	125	78	54	53	53	39	53	
Early and extreme preterm	6	21	24	177	196	120	314	215	213	213	155	213	
General practitioner's office													10-12
Full term	60	131	164	165	188	205	89	70	94	77	81	87	
Late preterm	104	229	285	408	464	507	152	119	160	131	139	149	
Early and extreme preterm	28	62	77	392	447	488	609	477	639	523	556	594	
Case-fatality rates (per 100)*													1,13
Full term	0.03	0.03	0.03	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	
Preterm	0.22	0.22	0.22	0.18	0.18	0.18	0.36	0.36	0.36	0.36	0.36	0.36	

Figure 1. Intervention effectiveness*[15-18]



ED: emergency department; H: hospital; OC: outpatient clinic
*RSVpreF effectiveness was assumed to be 0% for infants born <2 weeks after administration; onset of nirsevimab effectiveness was assumed to be delayed until one week after administration[19]

Table 2. Economic inputs

A. Medical care costs

	Month of Age			
	<2	2-<6	6-<12	Refs
Medical care costs				20,21
Hospital	$3,128	$2,750	$2,880	
Emergency department	$396	$416	$420	
Outpatient clinic	$204	$220	$228	

B. Intervention costs

	Intervention		
	RSVpreF	Nirsevimab	Refs
Intervention costs			
Acquisition costs	$253.37	$1,122.94	22
Administration costs	$20	$20	Assumption

Analyses:

- Analyses evaluated the budget impact of various RSVpreF and nirsevimab immunization strategies to protect five annual cohorts of privately insured infants in Dubai against RSV-LRTI:
  - No Intervention (comparator for all strategies)
  - Nirsevimab alone
  - RSVpreF with complementary nirsevimab (for infants not yet protected via RSVpreF)
- RSVpreF uptake was assumed to be 10% for pregnant women year-round, administered between 32-36 wGA[6]
- Nirsevimab uptake was assumed to be 90%, targeting infants born September-February only; for the complementary strategy, infants protected via RSVpreF were ineligible for nirsevimab
- Scenario analyses considered the impact of increased RSVpreF uptake; deterministic sensitivity analyses (DSA) considered the impact of changes to key model parameters (±20% from base case inputs)

RESULTS

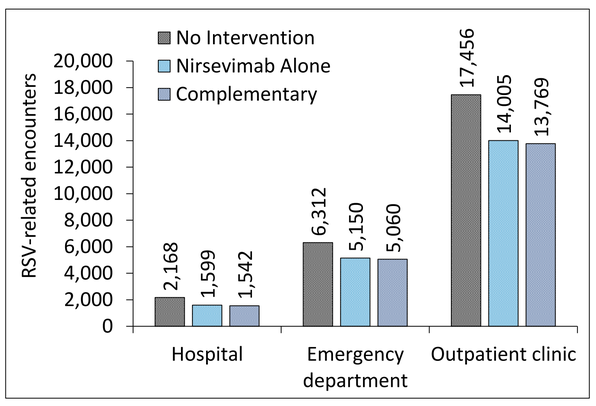
- With no intervention to protect 5 annual cohorts of Dubai infants (N=153,540), there were 25,937 RSV episodes, including 2,168 hospitalizations, and $12.8 million in associated costs (Table 3)
  - Nirsevimab alone would protect 71,672 infants, preventing 26% and 23% of hospitalizations and medical care costs respectively; with $70 million in intervention costs, total costs would increase by $67 million compared to no intervention
  - The complementary strategy would protect 78,827 infants, preventing 29% and 25% of hospitalizations and medical care costs respectively; with $67 million in intervention costs, total costs would increase by $64 million compared to no intervention

Table 3. Base case results of immunization strategies to protect infants in Dubai (N=30,708) against RSV

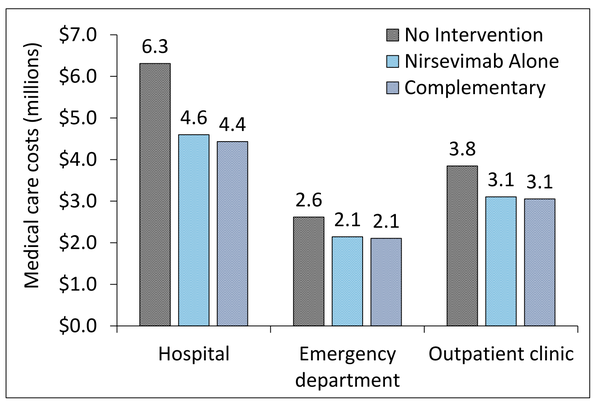
	No Intervention	Nirsevimab Alone	Complementary
Use of interventions			
No. RSVpreF doses administered	---	---	14,479
No. infants protected by RSVpreF	---	---	13,819
No. infants receiving nirsevimab	---	71,672	65,008
RSV-related outcomes			
No. of cases			
Hospitalizations	2,168	1,599	1,542
Emergency department encounters	6,312	5,150	5,060
Outpatient clinic encounters	17,456	14,005	13,769
No. of RSV-related deaths	1.4	1.1	1.1
Economic outcomes (millions)			
Direct medical costs	$12.8	$9.8	$9.6
Intervention costs			
Maternal vaccination	$0.0	$0.0	$3.4
Nirsevimab	$0.0	$70.0	$63.5
Total costs (medical + intervention)	$12.8	$79.9	$76.5
Budget impact			
Per-member per-month cost	$0.06	$0.38	$0.36
Per-member per-year cost	$0.72	$4.52	$4.33

Figure 2. Clinical and economic outcomes by setting of care

A. Clinical outcomes



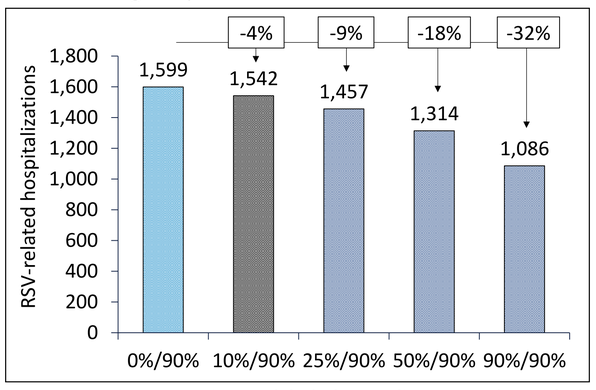
B. Economic outcomes



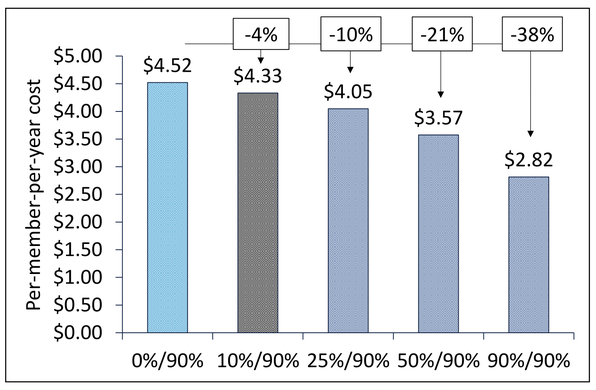
- Incrementally increasing RSVpreF uptake within the complementary strategy would reduce clinical outcomes while decreasing total costs (Figure 3)
- In DSA, intervention effectiveness had the greatest impact on results for both comparators, but PMPY costs remained comparable to base case (Figure 4)

Figure 3. Results of intervention strategies considering alternative RSVpreF uptake

A. Resulting hospitalizations



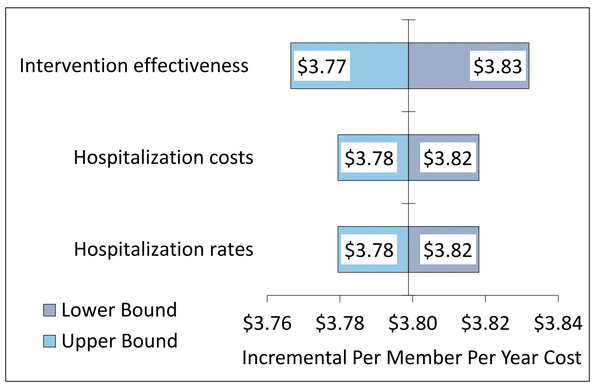
B. Resulting per-member per-year costs



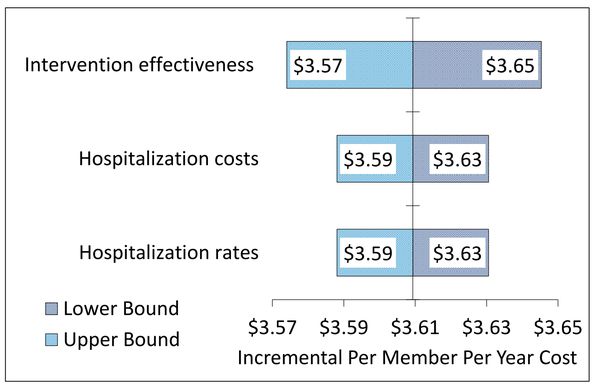
*Immunization strategies are labeled according to uptake, with the first percentage representing RSVpreF uptake and the second percentage reflecting nirsevimab uptake

Figure 4. Results of deterministic sensitivity analyses

A. Nirsevimab Alone versus No Intervention



B. Complementary strategy versus No Intervention



LIMITATIONS

- Efficacy trial endpoints employed by Hodgson et al.[16] for RSV-ED/OC effectiveness may not perfectly align with model outcomes
- Recent evidence[23,24] suggests that assuming 0% RSVpreF effectiveness among infants born within two weeks of administration may cause a conservative bias against RSVpreF
- UAE-specific data were not available for all inputs; data from comparable country settings were thus applied (i.e., data associated with high-income countries, US, and Saudi Arabia)
- Modelling did not consider other benefits of interventions, including potential protection from RSVpreF for pregnant women, indirect effects of both interventions on other populations (e.g., elderly persons), prevention of non-medically attended RSV, and prevention of RSV-related sequelae

CONCLUSIONS

- **Expanding the current RSV prevention strategy to vaccinate pregnant women with RSVpreF, while administering nirsevimab only to unprotected infants, would provide greater coverage, prevent more clinical outcomes and reduce costs compared to the nirsevimab alone strategy**
- **Increasing RSVpreF uptake within the complementary approach would further reduce the budget impact by up to 40% compared with the nirsevimab alone strategy**

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