Cost-Effectiveness of Respiratory Syncytial Virus Prophylaxis in Preterm Infants 29-35 Weeks' Gestation

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Objective

Respiratory syncytial virus (RSV) hospitalization rates have increased since the American Academy of Pediatrics updated its guidance in 2014 to recommend against the use of palivizumab for preterm infants born at or after 29 0/7 weeks gestational age (GA) without additional risk factors.[1,2] A new treatment candidate, nirsevimab, is being developed to target this population.[3] We aimed to: 1) update the existing cost-effectiveness model with inclusion of outpatient costs, 2) re-examine the cost-effectiveness of palivizumab compared with no prophylaxis in this population, and 3) use the updated model to estimate the cost-effective price for nirsevimab.

Methods

Model structure: semi-Markov (decision tree + Markov hybrid)

Perspective: US healthcare sector and societal

Cohort: infants born preterm (29 0/7 to 34 6/7 weeks GA) without additional risk factors and ≤1 year of age entering their first full RSV season

Effectiveness measure: Quality adjusted life-years (QALY)

Outcome: incremental cost-effectiveness ratio (ICER) and incremental net monetary benefit (iNMB)

Time horizon (cycle length): 5 years (1 year)

WTP threshold: $150,000/QALY

All costs adjusted to **2021 USD**; Future costs/outcomes discounted at **3%**

Sensitivity analyses: one-way and probability sensitivity analysis

Threshold analysis to determine the cost-effective price for nirsevimab

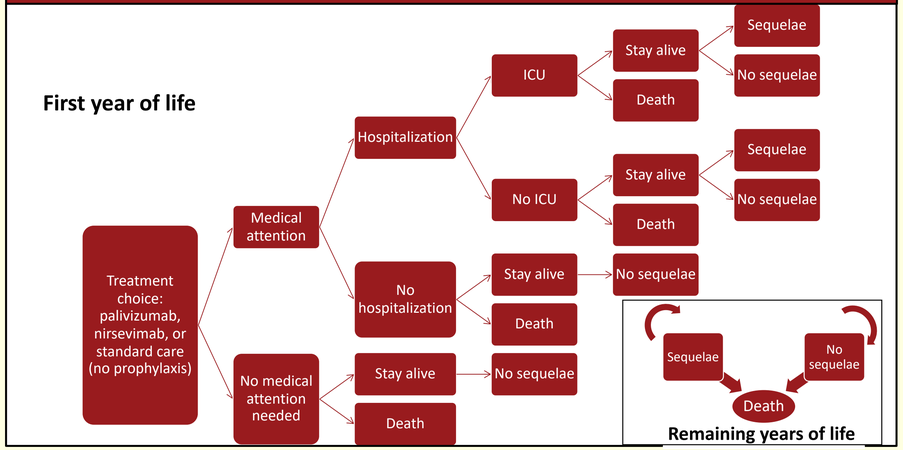
References

1. American Academy of Pediatrics Committee on Infectious Diseases; American Academy of Pediatrics Bronchiolitis Guidelines Committee. Updated guidance for palivizumab prophylaxis among infants and young children at increased risk of hospitalization for respiratory syncytial virus infection. Pediatrics. 2014;134(2):e620-e638.
2. Krilov LR, Fergie J, Goldstein M, Brannman L. Impact of the 2014 American Academy of Pediatrics Immunoprophylaxis Policy on the Rate, Severity, and Cost of Respiratory Syncytial Virus Hospitalizations among Preterm Infants. Am J Perinatol. 2020;37(2):174-183.
3. Griffin MP, Yuan Y, Takas T, et al. Single-Dose Nirsevimab for Prevention of RSV in Preterm Infants [published correction appears in N Engl J Med. 2020 Aug 13;383(7):698]. N Engl J Med. 2020;383(5):415-425.

Table 1. Selected parameters

Probabilities	
Nirsevimab	
Require medical attention	0.026
Medical attention to hospitalization	0.120
OP visit to hospitalization	0.227
Palivizumab	
Require medical attention	0.036
Medical attention to hospitalization	0.187
OP visit to hospitalization	0.385
No prophylaxis	
Require medical attention	0.095
Medical attention to hospitalization	0.163
OP visit to hospitalization	0.325
Any treatment	
Hospitalization to ICU	0.503
Mortality rate in ICU	0.050
Develop sequelae after hospitalization	0.053
Costs	
Palivizumab (5 doses + administration)	$10,575
OP visit	$1,403
Hospitalization	$8,913
ICU stay	$60,100
Sequelae	$2,042
Transportation	$10
Productivity loss b/c OP visit	$108
Productivity loss b/c IP visit	$325
Productivity loss b/c sequelae care	$498
Utilities	
No hospitalization	0.95
Hospitalization	0.88
ICU stay	0.73
Sequelae	0.83
Death	0

Figure 1. Model Depiction



Base case results (Table 2)

Healthcare	Costs, $	Difference in costs	Effectiveness, QALY	Differences in effectiveness	ICER ($/QALY)	INMB
Standard care	$1,748		4.3186			
Palivizumab	$11,320	$9,572	4.3205	0.0019	$5,060,593	- $9,288

Societal	Costs, $	Difference in costs	Effectiveness, QALY	Differences in effectiveness	ICER ($/QALY)	INMB
Standard care	$1,771		4.3186			
Palivizumab	$11,379	$9,603	4.3205	0.0019	$5,077,162	- $9,319

Palivizumab was not cost-effective from either the healthcare sector or the societal perspective (Tables 2). Sensitivity analyses (Figures 1 & 2) showed that this result was robust to uncertainties. Additional threshold analyses revealed that nirsevimab needed to be priced at approximately $11,250 and $1,930 to be cost-effective, compared to palivizumab and standard care, respectively.

Figure 2. Cost-effectiveness plane

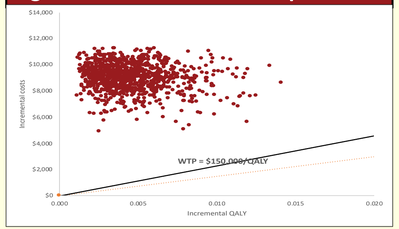
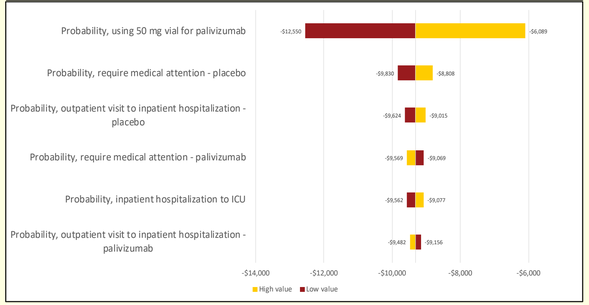


Figure 3. Top 6 contributors to parameter uncertainties



Conclusions & Limitations

- Palivizumab is not cost-effective compared to standard care from both the healthcare sector and the societal perspective for preterm infants 29 0/7– 34 6/7 weeks GA that are otherwise healthy
- The inclusion of outpatient costs in the cost-effectiveness model supports the 2014 AAP guidance update
- Nirsevimab can fill the treatment gap and be a cost-effective choice for RSV prophylaxis, if priced appropriately.

Limitations:

- Short time horizon may not fully capture the impact of RSV prophylaxis
- Many probabilities were calculated, not directly from literature
- Patients assumed to take 5 doses of palivizumab
- The Federal Supply Schedule (FSS) prices were used as a payment benchmark and may not reflect the actual treatment cost

Contact

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