EE68

ASSESSMENT OF THE COST-UTILITY OF PALIVIZUMAB FOR PREVENTING SEVERE RESPIRATORY SYNCYTIAL VIRUS (RSV) INFECTION IN PRETERM INFANTS BORN 29–35 WEEKS GESTATIONAL AGE IN THE PHILIPPINES

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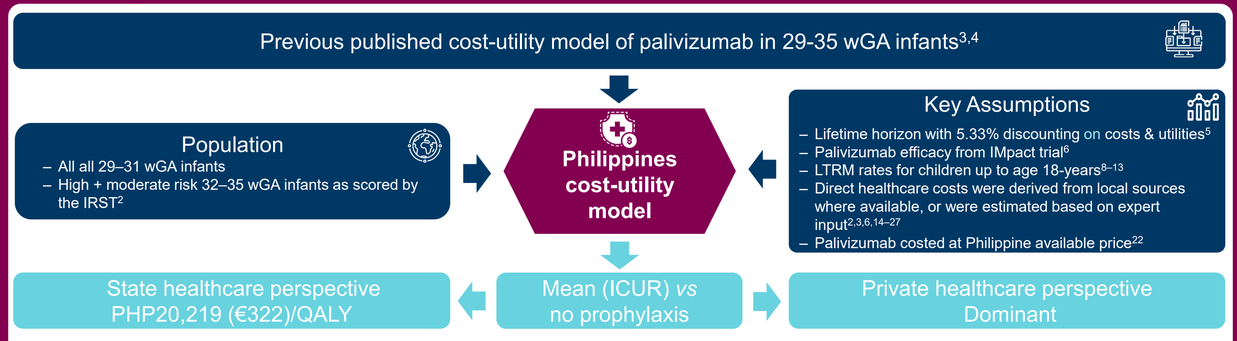
Why did we perform this research?

- Palivizumab has been available for the prevention of severe respiratory syncytial virus (RSV) infection in high-risk infants since 1998, albeit its availability and use in low- and middle-income countries remains relatively limited[1]
- The International Risk Scoring Tool (IRST)[2] was developed to support the identification of infants born at 32–35 weeks' gestational age (wGA) who are at increased risk of RSV-related hospitalisation (RSVH) and comprises 3 risk factors: 1. Birth 3 months before to 2 months after the RSV season start; 2. Smokers in the household and/or smoking while pregnant; and 3. Siblings/daycare
- Use of the IRST has been shown to improve the cost-effectiveness of palivizumab in countries within North America (*e.g.* Canada), South America (*e.g.* Colombia), Europe (*e.g* Italy), and Asia (*e.g.* South Korea)[3]

Objective: To provide the first assessment of the cost-utility of palivizumab for the prevention of severe respiratory syncytial virus (RSV) infection in premature infants born at 29–35 weeks' gestational age (wGA) in the Philippines

Summary



ICUR: incremental cost utility ratio; IRST: International Risk Scoring Tool; LTRM: long-term respiratory morbidity; PHP: Philippine peso; QALY: quality-adjusted life year; wGA: weeks' gestational age

Key takeaway

- Palivizumab was found to be cost-effective (*vs* no prophylaxis) for use in Filipino 29–35 wGA infants
- The IRST should be considered to target prophylaxis locally in 32–35 wGA infants

IRST: International Risk Scoring Tool; wGA: weeks' gestational age

What did we find?

Palivizumab prophylaxis of 29–35 wGA infants was cost-effective *versus* no intervention from the Philippine state healthcare system perspective

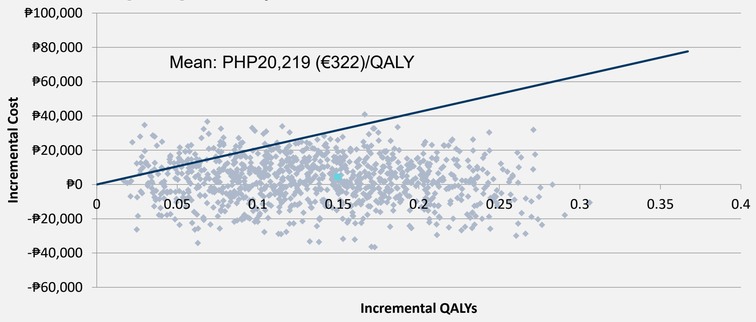
- The mean ICUR was PHP20,219 (€322)/QALY, with a 92.3% probability of being cost-effective at a willingness to pay threshold of 1 times the gross domestic product *per capita* (PHP211,666 [€3,376]) (Table 1 & Figure 1)

Table 1. Palivizumab prophylaxis was a cost-effective strategy *vs* no prophylaxis from the state healthcare system perspective

	No palivizumab	Palivizumab
Total costs, PHP (€)	103,201 (1,644)	107,632 (1,714)
Total QALYs	19.16	19.31
Mean ICUR, PHP (€)	**20,219/QALY (€322)**	

ICUR: incremental cost-utility ratio; QALY: quality-adjusted life year; PHP: Philippine peso

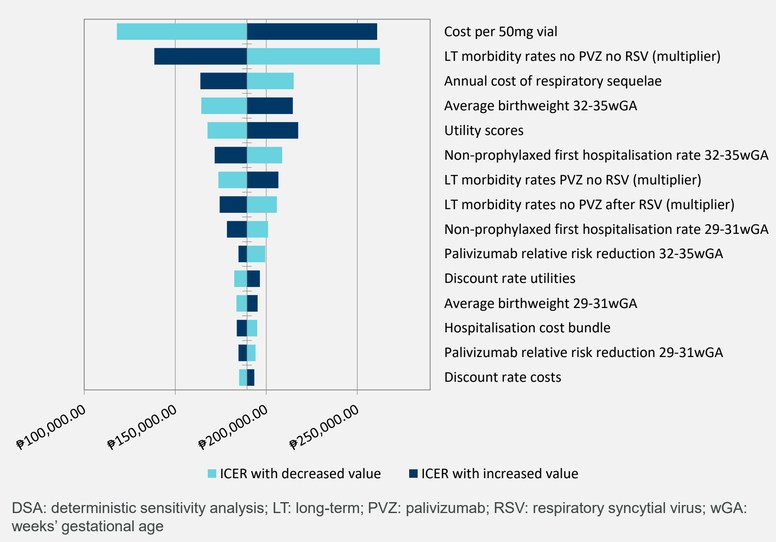
Figure 1. PSA demonstrated that the probability of cost-effectiveness for palivizumab prophylaxis was 92.3% at a willingness-to-pay threshold of PHP211,666 (€3,376, state healthcare perspective)



₱: Philippine peso; PSA: Probabilistic sensitivity analysis; QALY: quality-adjusted life year

- In deterministic sensitivity analyses the model was most sensitive to palivizumab cost and long-term morbidity (LTRM) rate (Figure 2)

Figure 2. DSA found that cost-effectiveness was most sensitive to palivizumab cost and long-term morbidity rate (State healthcare system perspective)



DSA: deterministic sensitivity analysis; LT: long-term; PVZ: palivizumab; RSV: respiratory syncytial virus; wGA: weeks' gestational age

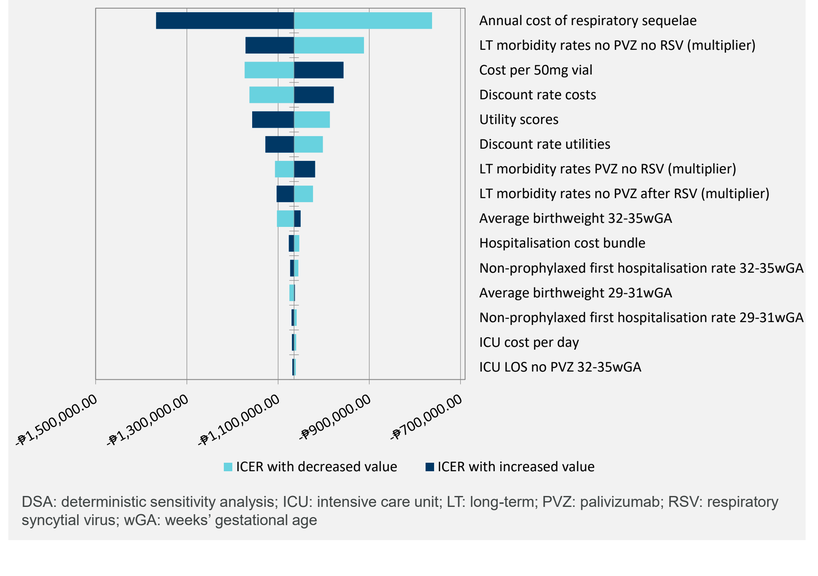
Palivizumab was dominant versus no prophylaxis (less costly and more QALYs gained) from a private healthcare perspective

- The model was most sensitive to the cost and rate of long-term respiratory morbidity and palivizumab cost (Figure 3)

Limitations

- Availability of gestational age specific data on resource utilisation and/or costs.
- Long-term respiratory morbidity data beyond age 6 years and up to date peri- and post-hospitalisation utilities are lacking

Figure 3. DSA found that cost-effectiveness was most sensitive to the cost and duration of long-term respiratory morbidity (private healthcare system perspective)



DSA: deterministic sensitivity analysis; ICU: intensive care unit; LT: long-term; PVZ: palivizumab; RSV: respiratory syncytial virus; wGA: weeks' gestational age

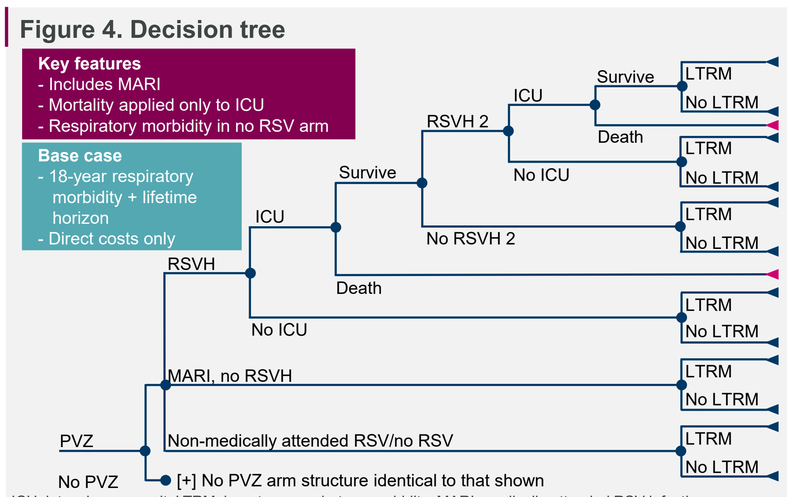
What is the significance of these data?

- **This analysis confirms the cost-utility of palivizumab in preventing RSVH in infants born at 29–35 wGA from both the Philippine state and private healthcare system perspectives**
- **Use of the IRST improves cost-effectiveness in infants born 32–35 wGA**

How did we perform this research?

- A previously published cost-utility model[3,4] was adapted for the Philippine state and private healthcare settings using, where available, country-specific parameters
- Palivizumab prophylaxis was compared to no prophylaxis in 29–35 wGA infants as follows:
  - All 29–31 wGA infants included in the analysis
  - 32–35 wGA infants identified as being at moderate- or high-risk of RSVH by the IRST[2] (score ≥20/56) were included in the analysis
- Infants followed a new decision tree based on a systematic review of previous economic evaluations of palivizumab in 29–35 wGA infants and input from global and national clinical and health economic experts (Figure 4)
  - Infants experienced RSVH, medically attended RSV infection not requiring hospitalisation (MARI), or were uninfected/non-medically attended
  - Infants admitted to the intensive care unit (ICU) could subsequently suffer mortality; survivors could be readmitted to hospital for RSV infection
  - All surviving infants had the potential to experience long-term respiratory morbidity
- In the absence of specific Philippine data, baseline RSVH rates were estimated as 11.60% for 29–31 wGA infants using data from a systematic review and meta-analysis[23] and 6.3% for 32–35 wGA infants judged at high- and moderate-risk using the database (N=13,475) that generated the IRST[2] (Table 2)
- Palivizumab efficacy was derived from the IMpact-RSV study[6] : RSVH relative reduction 63.3% for 29–31 wGA and 82.2% for 32–35 wGA infants
- Prophylaxis costs were calculated using Philippine palivizumab 50 mg vial price,[22] published birthweights[21] and a growth algorithm[24] (Table 3)
  - Mean number of palivizumab doses *per* infant was 3.75, predicated on 5-month RSV season
  - No vial sharing was assumed commensurate with the palivizumab label[25]
- Healthcare resource use (Table 2) and direct healthcare costs (Table 3) were derived from local sources where available, or were validated/estimated based on expert input[2,3,6,14–21]
- Long-term respiratory morbidity (LTRM) was assessed up to age 18 years across a lifetime horizon among RSVH, MARI, or uninfected/non-medically attended infants (Table 4)
  - LTRM rates were drawn from the SPRING[7] study up to 6 years of age and from Sigurs *et al.*[8–10] thereafter
  - The impact of palivizumab on LTRM was modelled based on data from three studies [11–13]
- Costs and utilities were discounted at 5.33% as per the Philippine standard[5]
- Deterministic (±20% on main variables) sensitivity analyses was undertaken
- Results are expressed as an incremental cost *per* quality-adjusted life year (QALY; also called incremental cost-utility ratio [ICUR]) *versus* no prophylaxis, calculated using probabilistic analysis (1,000 iterations)

Figure 4. Decision tree



ICU: intensive care unit; LTRM: long-term respiratory morbidity; MARI: medically-attended RSV infection; PVZ: palivizumab; RSVH: respiratory syncytial virus hospitalisation

Table 2. Model inputs

Parameter	Palivizumab	No palivizumab
RSVH		
- 29–31 wGA rate[3,23]	4.26%	11.60%
- 32–35 wGA rate: IRST moderate + high risk[2,6]	1.12%	6.3%
- ICU rate[14]	12.00%	12.00%
- Hospital ward length of stay, mean days[14]	5.00	5.00
- Utility in hospital[15,16]	0.60	0.60
- Utility post discharge, no sequelae[17]	0.88	0.88
- Utility post discharge, long-term sequelae[18]	0.79	0.79
- Mortality (ICU patients only)[14]	2.00%	2.00%
MARI		
- Rates		
- Outpatient only rate[6,19,20]	2.48%	13.92%
- Outpatient plus ED	0.42%	2.36%
- ED only	0.05%	0.29%
- Utility no sequelae[17]	0.95	0.95
- Utility long-term sequelae[18]	0.79	0.79
No RSVH/MARI		
- Utility no sequelae[17]	0.95	0.95
- Utility long-term sequelae[18]	0.79	0.79
Birth weight (g)[21]		
- 29–31 wGA	1,200	1,200
- 32–35 wGA	1,900	1,900

ED: emergency department; ICU: intensive care unit; MARI: medically attended RSV infection (not requiring hospitalisation);RSV: respiratory syncytial virus; RSVH: RSV hospitalisation; wGA: weeks' gestational age

Table 3. Direct costs

Parameter	Cost, PHP (Euro)
Palivizumab (total cost per infant)[22,26]	
- 29–31 wGA	81,777.61 (1,304.33)
- 32–35 wGA	83,612.37 (1333.59)
Pre-admission healthcare contact (State/Private)[27]	10,000.00/15,000.00 (159.27/238.90)
RSVH *per* stay excluding ICU (State/Private)[27]	75,000.00/150,000.00 (1,194.51/2,389.03)
ICU *per* admittance (State/Private)[27]	150,000.00/500,00.00 (2,389.03/7,963.43)
MARI	
- ED visit (State/Private)[27]	3,000.00/10,000.00 (47.78/159.27)
Respiratory morbidity *per* annum (State/Private)[27]	100,000/320,000 (1,592.69/5,096.60)

ED: Emergency department; ICU: intensive care unit; MARI: medically attended RSV infection (not requiring hospitalisation); PHP: Philippine peso; RSV: respiratory syncytial virus; RSVH: RSV hospitalisation

Table 4. Long-term respiratory morbidity rates[8–13]

Years	Palivizumab		No palivizumab	
	RSVH	No RSVH	RSVH	No RSVH
0–1	18.43%	5.38%	41.43%	12.09%
1–2	18.43%	5.38%	41.43%	12.09%
2–3	11.05%	5.80%	29.27%	15.36%
3–4	6.12%	4.15%	18.55%	12.57%
4–5	4.39%	2.73%	15.00%	9.31%
5–6	3.25%	2.53%	12.39%	9.66%
6–7	2.93%	2.29%	12.39%	9.66%
7–13	2.33%	1.47%	17.39%	10.96%
13–18	1.79%	1.17%	22.39%	14.66%

RSVH: respiratory syncytial virus hospitalisation

Disclosures

- BP and XCE have received research funding and/or compensation as advisors/lecturers from AstraZeneca Merck Sharp Dohme, Pfizer and Sanofi
- BRG, IK, and JF employers have received payment from AstraZeneca for work on various projects
- SDRF has received compensation as an advisor from AstraZeneca
- JET have nothing to disclose.

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- All authors contributed to the development of the publication and maintained control over final content

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