The Potential Public Health Impact of New Immunization Strategies for the Prevention of RSV in Children in Panama

Saez-Llorens Xavier, MD[1], Lasalvia Pieralessandro, MD[2], Jaramillo Paula, MD[2], DeAntonio Rodrigo, MD, Dr.PH[3]

[1]Hospital del Niño Dr. José Renán Esquivel, Ciudad de Panamá, Panamá; Sistema Nacional de Investigación at Secretaria Nacional de Ciencia y Tecnologia (SENACYT), Ciudad de Panamá, Panamá, [2]NeuroEconomix, Bogotá, CUN, Colombia, [3]Cevaxin Centro de Vacunación en Investigación The Panama Clinic, Ciudad de Panamá, Panamá

Correspond Author: *DeAntonio R, MD, Dr.PH, rodrigo.deantonio@cevaxin.com *Membership number 26067*

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INTRODUCTION

- Respiratory syncytial virus (RSV) is a leading cause of morbidity and mortality in children, affecting mostly healthy infants during their first year of life[1-4]. In Panama, RSV circulates year-round, with most cases occurring between July and December[5-8], which significantly impacts healthcare systems[9-11] .
- New strategies to reduce the burden of RSV disease have become available, including direct protection of the infants using nirsevimab (long-acting monoclonal antibody) and through maternal immunization with the RSVpreF (bivalent RSV-prefusion-F-protein).
- Prevention includes monoclonal antibodies like palivizumab and nirsevimab, with nirsevimab providing sustained protection for at least 5 months[12-16].
- In Panama, the current standard of care (SoC) recommends palivizumab for infants <35 weeks of gestational age and infants with chronic pulmonary disease (CPD) and any cardiopathy[17].
- Nirsevimab is recommended for neonates and infants during their first RSV season and children up to 24 months who remain vulnerable to severe RSV disease through their second RSV season[18].
- Maternal immunization with the RSVpreF vaccine is approved to be administered during pregnancy from 32 to 36 weeks gestational age, and it has been shown to reduce the burden of RSV-associated lower respiratory tract disease in newborns and infants[19-21].

OBJECTIVE

- To compare the potential public health impact and evaluate the health and cost outcomes of nirsevimab and RSVpreF preventive immunization strategies against RSV in Panama over one calendar year from a payer's perspective, in comparison to the standard of care.

METHODS

- **A static analytical decision-making model** was used to estimate the public health impact (health, cost, and quality-of-life outcomes related to RSV) in infants over one year starting in 2024.
- **Study Population** includes the Panamanian newborn cohort entering their first RSV season, divided into three subgroups:
  - Palivizumab-eligible infants with chronic pulmonary disease (CPD) and any cardiopathy[17].
  - Preterm infants born between 29 and 34 weeks and 6 days of gestational age eligible for immunization with palivizumab in Panama
  - Term infants born at or after 35 weeks of gestational age.
- **Intervention strategy**
  - Standard of Practice: monthly administrations of palivizumab during the RSV season for palivizumab-eligible infants only (with a maximum of five doses), as per Panamanian recommendations,[17] and no prophylaxis for late preterm and term infant populations.
  - Intervention strategy –"nirsevimab": Immunization with nirsevimab for the entire birth cohort and catch-up for infants not exposed to their first RSV season.
  - Intervention strategy –"RSVpreF": Year-round immunization of pregnant individuals 32-36 wGA with the RSVpreF vaccine.
- **Demographic and epidemiology data was obtained** from the National Institute of Statistics and Census of Panama (INEC) for 2022. RSV incidence, emergency room visits, primary care visits, hospitalization rates, RSV-related deaths and medical costs were obtained from local literature and validated with surveillance reports from the Ministry of Health in Panama[20-27].
- **Immunization coverage estimates:** BCG immunization coverage at birth (97%) and DTP3 vaccine coverage (84%) were used for the nirsevimab strategy. DTPa immunization coverage during pregnancy (72.5%) was used for RSVpreF.
- **Outcomes included** the total number of RSV cases, emergency visits, hospitalizations (including ICU), outpatient visits, associated complications, and deaths.
- **Associated costs and utilities** prevented by nirsevimab and RSVpreF were separately estimated and compared with the current standard of care. Then, nirsevimab and RSVpreF were compared indirectly to evaluate the health and economic impact. Quality-adjusted life years (QALYs) loss for all RSV health outcomes reported in the literature were used.
- **The number needed to immunize** was calculated for both strategies.
- **Efficacy estimates** were obtained from the literature separately since there are no head-to-head trials.
  - The duration of protection was established at 30 days for palivizumab, 150 days for nirsevimab, and 180 days for RSVpreF, with varying levels of decay over time
  - Maternal vaccination does not replace palivizumab and is adjusted for gestational age and timing.

Table 1: Efficacy estimates for passive immunization and maternal vaccination.

	Palivizumab-eligible infants with (CPD) and any cardiopathy		Preterm infants born between 29 and 34 weeks		Term infants born at or after 35 weeks of gestational age	
	Inpatient	Outpatient	Inpatient	Outpatient	Inpatient	Outpatient
Palivizumab[28]	51%	51%	-	-	-	-
Nirsevimab (1st dose)[12,13,15,29]	51%	51%	83%	86%	83%	75%
Maternal immunization [19]	NA	NA	Adjusted based on wGA at birth and timing of immunization of pregnant individuals		81.8%* 69.4%**	57.1%* 51.3%**

*Efficacy up to 90 days ** Efficacy up to 180 days

RESULTS

1. Nirsevimab All Year Round + Catch-up

Nirsevimab is projected to reduce RSV-associated events by 46%, preventing 14,694 cases. It also decreases emergency room RSV visits by 35%, primary care RSV visits by 52%, hospitalizations by 58%, and deaths by 38%, resulting in a gain of 634 QALYs. A one-year program could save $10,010,100. The NNI to prevent one RSV case is 7, with higher NNIs for more severe outcomes.

2. Maternal Immunization All Year Round

Maternal immunization is projected to reduce RSV-associated events by 17%, preventing 3,152 cases. It also decreases emergency room RSV visits by 12%, primary care RSV visits by 19%, hospitalizations by 24%, and deaths by 15%, resulting in a gain of 148 QALYs. A one-year program could save $2,268,824. The NNI to prevent one RSV case is 15.

3. Nirsevimab All Year Round + Catch-up Comparison with Maternal Immunization All Year Round

Nirsevimab would prevent more RSV cases overall (14,694 vs. 3,152) than RSVpreF, including emergency visits (4,567 vs. 921), hospitalizations (2,578 vs. 599), ICU (188 vs. 40), and deaths (16 vs. 4) (Fig. 1). The NNI to prevent an RSV case and an RSV death with nirsevimab and RSVpreF would be 7 vs. 15 and 5,908 vs 11,775, respectively (Fig. 2). All of the above would represent significant savings in hospitalizations, ICU admissions, emergency room visits, primary care, complications, and non-medical costs.

Figure 1. Number of RSV cases prevented with different immunization strategies

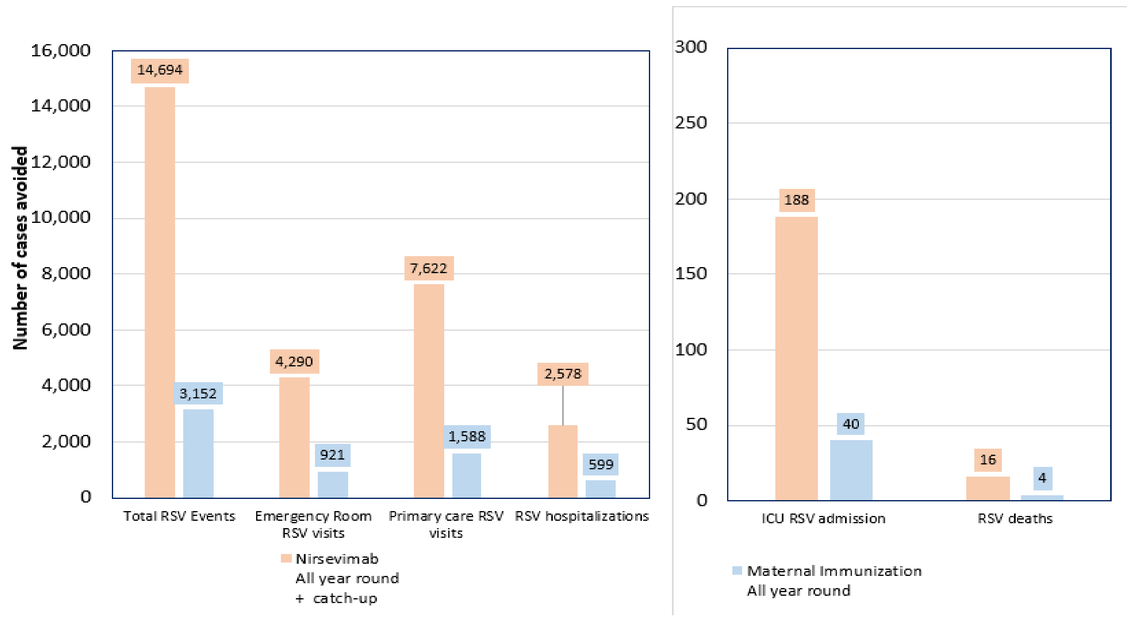
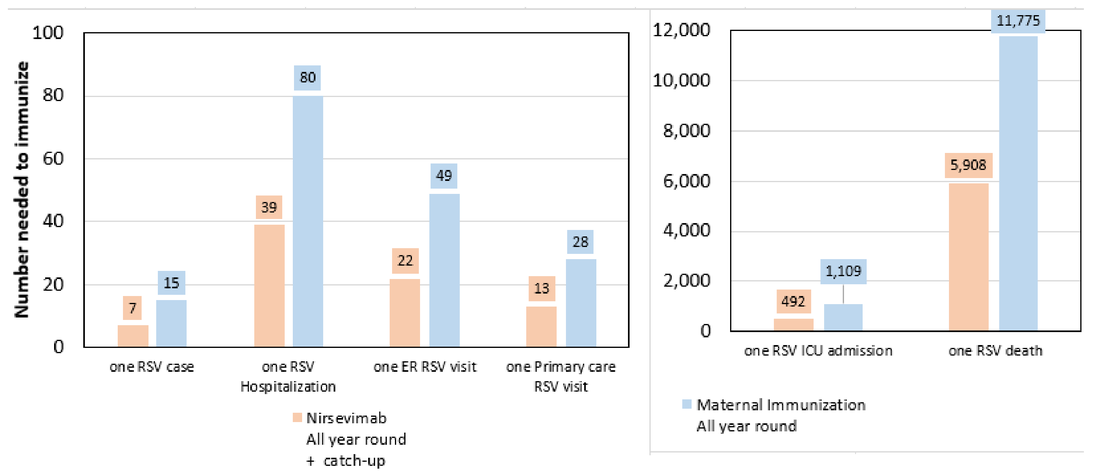
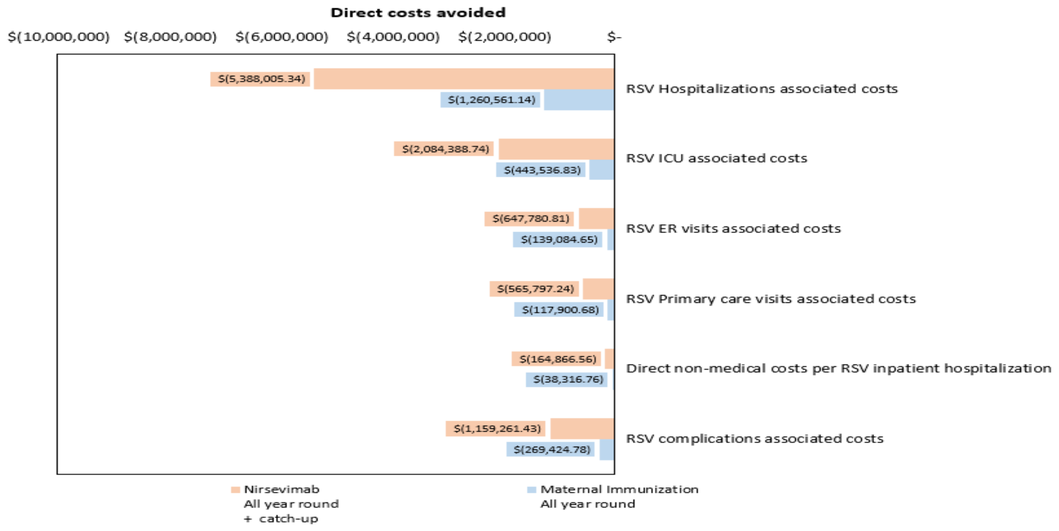


Figure 2. Number needed to immunize with the RSV prevention strategies in Panama



❖ The strategy with nirsevimab would save $7,741,275 in associated costs as compared to RSVpreF (Fig. 3).

Figure 3. RSV-associated costs avoided.



CONCLUSIONS

- **Nirsevimab is estimated to generate a larger public health impact as compared to RSV maternal immunization in Panama. This difference is mostly due to nirsevimab's efficacy, timely immunization, and ability to protect infants regardless of gestational age birth.**
- **These findings should guide public health policy in Panama to achieve the most significant impact on reducing RSV cases in infants.**

REFERENCES

1. Hall, C.B. *New England Journal of Medicine* 344, 1917–28 (2001).; 2. Nyiro, J.U. *Wellcome Open Res* 25, 3-89 (2018).; 3. Krause, C.I. *Nurse Pract* 4, 20–6 (2018).; 4. Glezen, W.P. *Arch Pediatr Adolesc Med* 140, 543 (1986).; 5. Omer, S.B. *Pediatric Infectious Disease Journal* 38, e57–9 (2019).; 6. Rabarison, J.H. *Influenza Other Respir Viruses* 13, 138–47 (2019).; 7. Núñez-Samudio, V. *BMC Infect Dis* 21, 43 (2021).; 8. Iwane, M.K. *Am J Epidemiol* 177, 656–65 (2013).; 9. Nair, H. *The Lancet* 375, 1545–55 (2010).; 10. Shi, T. *The Lancet* 390, 946–58 (2017).; 11. Stein, R.T. *Pediatr Pulmonol* 52, 556–69 (2017).; 12. Griffin, M.P. *N Engl J Med* 383, 415–425 (2020).; 13. Hammitt, L.L. *N Engl J Med* 386, 837–846 (2022); 14. Simões, E.A.F. *Lancet Child Adolesc Health* 7, 180–189 (2023); 15. Drysdale, S.B. *N Engl J Med* 389, 2425–2435 (2023); 16. Muller, W.J. *N Engl J Med* 388, 1533–1534 (2023); 17. Recomendaciones sobre el uso de Palivizumab (Adaptación de guías AAP 2015). Guia Hospital del Niño Dr. José Renán Esquivel. 18. Loe, M.W.C. *J Paediatr Child Health* (Aug 2024); 19. Kampmann, B. *New England Journal of Medicine* 388, 1451–64 (2023).; 20. In: Panorama de la Salud: Latinoamérica y el Caribe 2020. OECD (2020).; 21. INEC. Internet. (2022) https://www.inec.gob.pa/publicaciones/Default3.aspx?ID_PUBLICACION=1218&ID_CATEGORIA=3&ID_SUBCATEGORIA=6.; 22. Azziz-Baumgartner, E. Lancet regional health. Americas, 13, (2022).; 23. HOSPITAL DEL NIÑO DOCTOR JOSÉ RENÁN ESQUIVEL DDN. Internet. 2018 [cited 2024 Sep 9]. p. 1–16 PROTOCOLO DE MANEJO DE LAS CARDIOPATÍAS EN NEONATOLOGÍA. Available from: chrome-.; 24. Johannesen, C.K. J Infect Dis. 226 (2022).; 25; Jara J.H. Journal of Infection 79, 108–14 (2019).;

26. Caja del Seguro Social [Internet]. [cited 2024 Sep 9]. Available from: https://www.css.gob.pa/.; 27. David, W. Economic Analysis of Nirsevimab in Pediatric Populations [Internet]. Michigan; (2023) https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2023-02/slides-02-23/RSV-Pediatric-02-Hutton-508.pdf.; 28. Andabaka, T., *Cochrane Database of Systematic Reviews*. (2013); 29. HARMONIE press release https://www.sanofi.com/assets/dotcom/pressreleases/2023/2023 05 12 08 50 00 2667568 en.pdf 30. Sanofi. BEYFORTUS Prescribing Information. Preprint at https://products.sanofi.us/beyfortus/beyfortus.pdf (2023).

CONFLICTS OF INTEREST

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