

Cost-Efectiveness Analysis Between Multichambered Standarized Pediatric Parental Nutrition and Individualized Compounded Parental Nutrition, Analysis From the Mexican Public Health System Perspective

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Background

- More than 2 million babies are born each year in Mexico and 3 out of 4 births take place in the public health sector.¹
- With a preterm birth rate that ranges from 7.1%-7.5% (2016-2020), every year over 150 thousand preterm babies are born in the country.¹
- 52% of these premature babies are considered very preterm (<34 weeks), making them more likely to require parental nutrition (PN) support.²
- In Mexico, as of 2022 the only alternative on the market for PN support is personalized PN bags through in-hospital compounding or surrogate compounding services.
- It is estimated that around 30% of these preterm babies are born outside operational hours of compounding centers and must wait an average of 12 hours to receive their PN support.¹
- Numetzah® is the first standardized ready-to-use three-chambered bag formulation for newborns and pediatric patients with amino acids, lipids and dextrose

Research Question

From the Mexican Public Health System perspective, could Numetzah G13®, a ready-to-use pediatric standardized parental nutrition bag, be a cost-effective alternative to current practices (Compounded PN)?

Methods

A complete cost-effectiveness model comparing a pediatric standardized parental nutrition bag (Numetzah® G13) versus individualized compounded parental nutrition was performed around three groups of neonatal patients with different ranges of birth body weights who require parental nutrition therapy for 7 days:

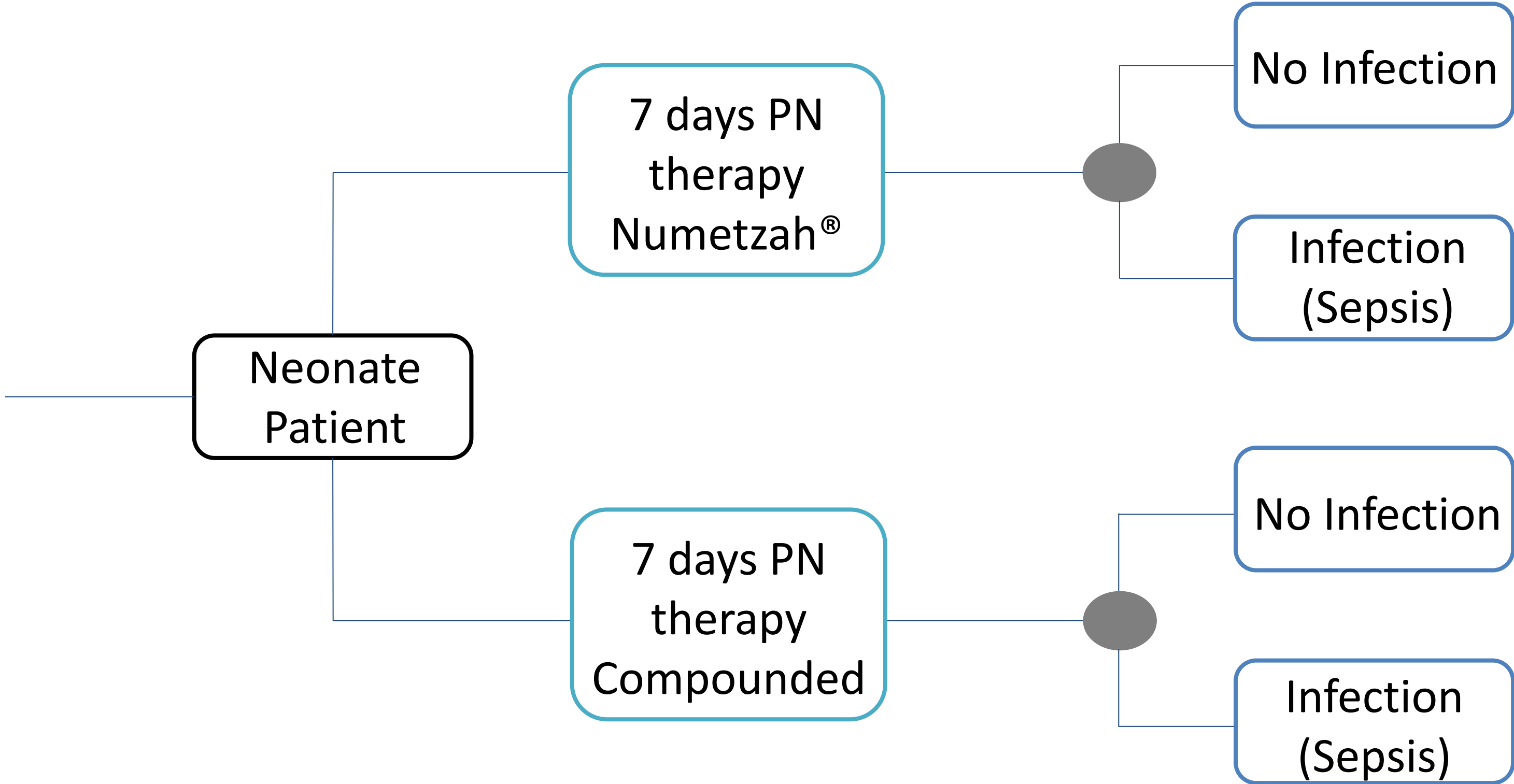
- a. $1 \geq \text{kg}$
- b. $1 \leq 1.5 \text{ kg}$
- c. $1.6 \leq 2 \text{ kg}$

Daily nutritional requirements for each group were set in accordance with NICE guidelines.³

A decision-tree type model was developed on the clinical efficacy rates published by Evering (2017)⁴. Efficacy was measured as a percentage of patients free of infection (sepsis). Costs were determined by incorporating individual components in the elaboration of compounded PN published on national tenders by the Social Security Mexican Institute (IMSS). Only direct costs were included in the model (PN and Infection cost); the cost for Numetzah® G13 was \$69 USD. The cost for treating an episode of sepsis in neonates was estimated from the Diagnostic Related Groups published by IMSS⁵ and updated to May 2022 prices, which came to be \$4,636 USD. Exchange rate: 20.67 mxn/usd.

Univariate sensitivity analysis was performed with parameters that could generate uncertainty in the model (price, efficacy and complication costs). Additionally, a Monte Carlo simulation performed with 1,000 iterations.

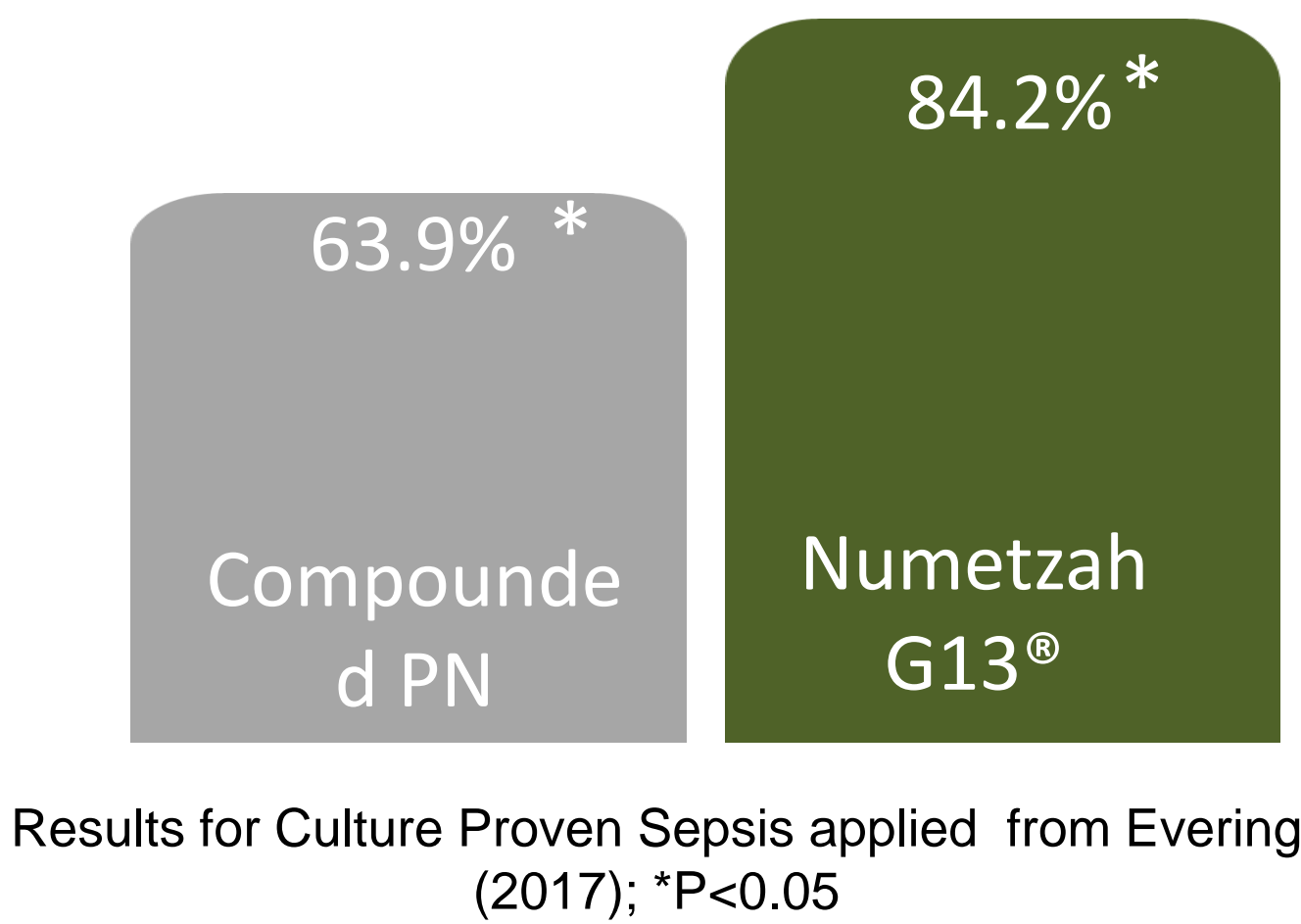
Figure 1: Decision Model Structure



Results

The cost-effectiveness analysis positioned Numetzah® G13 as the dominant alternative over individualized compounded PN bags in all three groups of patients, allowing 20.2% more patients free of infection at a lower cost: \$-2,413 usd ($1 \geq \text{kg}$), \$-2,419 usd ($1.1 \leq 1.5 \text{ kg}$) and \$-2,425 usd ($1.6 \leq 2 \text{ kg}$). The robustness of the model was verified through the sensitivity analyzes proposed.

Graph 1: Effectiveness rates (Infections avoided)



Graph 2: ICER Plane

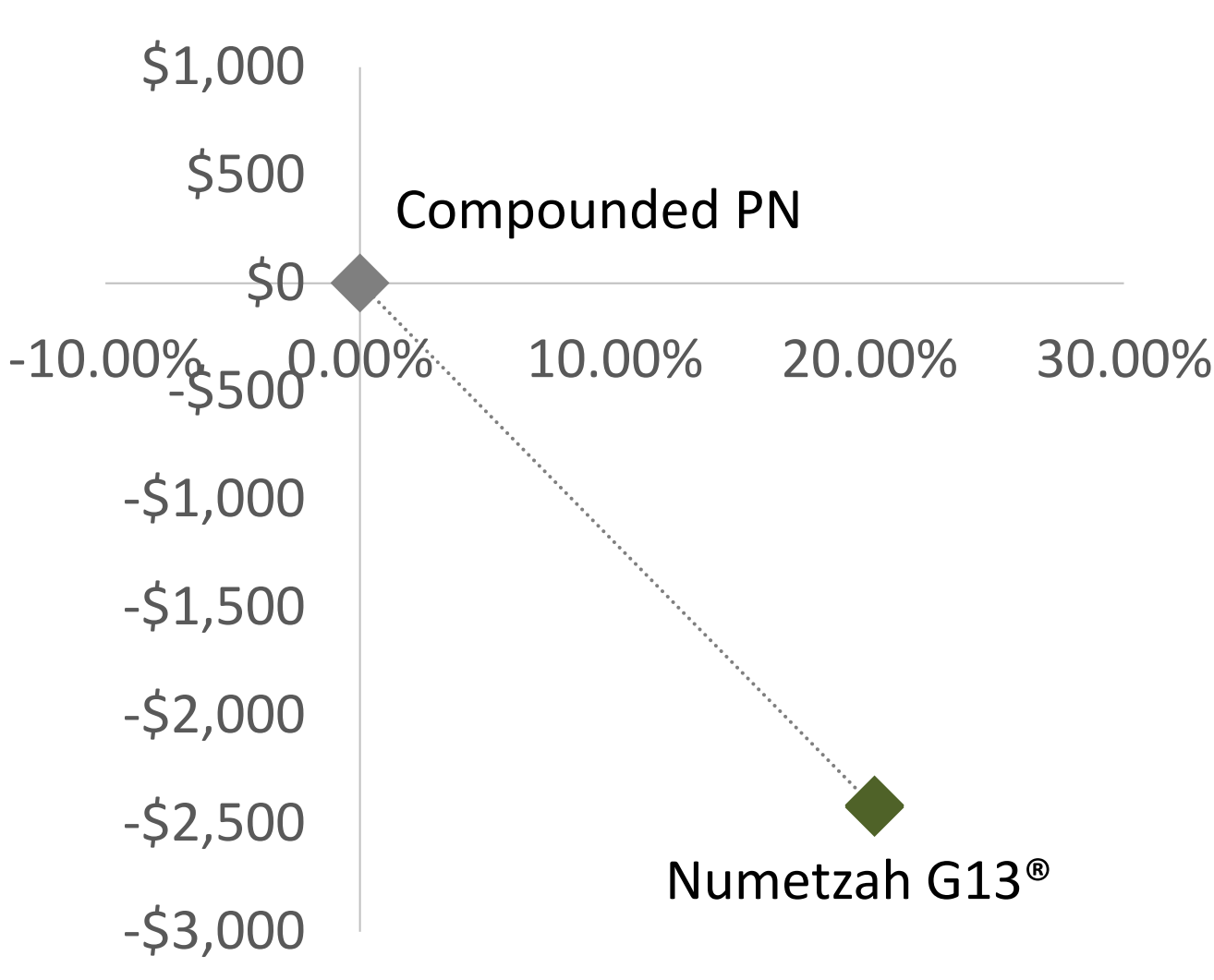
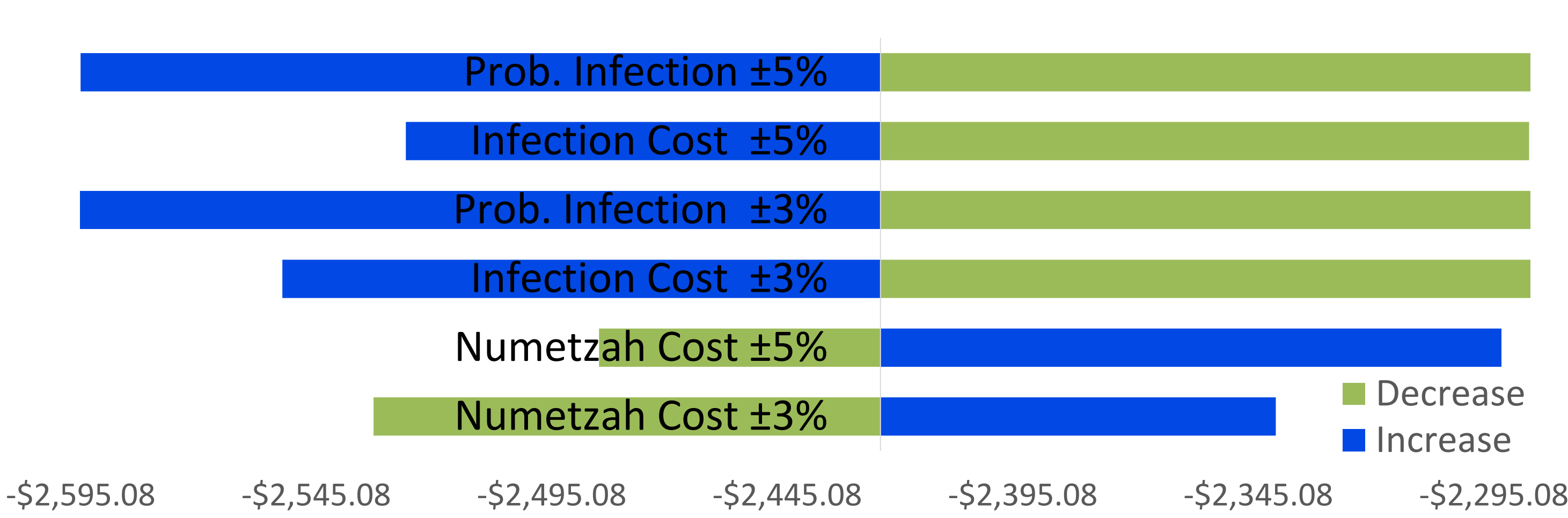


Table 1: ICER

Patients	Alternatives	Cost	Diff. Cost	Diff. Effect.	ICER
1 ≥ Kg	Numetzah®	\$1,219			
	Compounded PN	\$1,708	-\$488	0.202	-\$2,413
1 ≤ 1.5 Kg	Numetzah®	\$1,219			
	Compounded PN	\$1,709	-\$490	0.202	-\$2,419
1.6 ≤ 2 Kg	Numetzah®	\$1,219			
	Compounded PN	\$1,710	-\$491	0.202	-\$2,425

Graph 3: DSA



Conclusion

Although PN therapy costs were lower than compounded bags, Numetzah® showed to be the dominant alternative.

Other publications have also positioned Numetzah® as a cost-effective alternative when compared to Compounded PN, by considering additional variables such as labor costs, compounding errors, equipment and supplies.^{6, 7}

Our findings suggest that implementing ready-to-use pediatric PN bags such as Numetzah® should be considered by Mexican public health institutions as it shows to be a cost-effective alternative, as well as being a great solution for babies born outside operational hours of compounding centers, making PN therapy available under the 8-hour threshold recommended by NICE⁸.

References

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