# Economic impact of patterned, frequency-modulated oral stimulation in preterm infants

MT16

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## Background

- Premature birth can disrupt the development of essential functions like non-nutritive sucking (NNS), which are necessary to develop full oral feeding (FOF).[1]
- Oral stimulation can be manually provided by nurses/caregivers. However, its efficacy in published research might be inconsistent[2] due to variance in the training frequency, session duration, and pacifier type/positioning.[1]
- Patterned and frequency-modulated oral stimulation (PFOS) can promote NNS development by mimicking the 'burst-pause' temporal dynamics of the later nutritive suck of preterm newborns.[3]
- This study assessed the economic impact of providing PFOS to preterm infants in the US from a payer perspective.

## Methods

- A budget-impact model from a payer perspective was developed, consisting of a decision tree and a semi-Markov model, comparing PFOS (NTrainer™ system 2.0) to the standard of care. (**Figure 1**)
- A structured literature review was conducted to retrieve model inputs.
- The care pathway from childbirth to hospital discharge and follow-up was modelled for 5 years in a cohort of preterm 25-30 Gestational age at birth (GAB) newborns. (**Table 1&2**)
- The outcome measures of the analysis were NICU days, number of infections in-hospital, number of preterms discharged with naso-/oro-gastric tubes, number of infections at home, number of re-hospitalizations and total costs (in 2024 USD).
- The cost of the PFOS device was not considered in the model.
- Probabilistic and one-way sensitivity analyses were performed to address uncertainty.

**Table 1 Key clinical and hospital stay inputs**

| Input | SoC | PFOS |
|---|---|---|
| NNS training success (FOF achievement) | 94.06%[4†] | 93.58%[4†] |
| Discharge from NICU to home in non-FOF patients | 33.33%[4†] | 42.86%[4†] |
| Discharge from NICU to home in FOF patients | 100%[4] | 100%[4] |
| Infection rate in NICU | 11.60%[5*] | |
| Time to NNS training | 28.3 days[4†] | 26.4 days[4†] |
| Time to FOF | 27.0 days[4] | 22.9 days[4] |
| Time to discharge after FOF achievement | 10.5 days[4] | |

SoC: Standard of Care; PFOS: Patterned and frequency-modulated oral stimulation; NNS: Non-nutritive sucking; FOF: Full oral feed; LOS: Length of Stay. †Calculated from Song et al.[4]; * Over average stay of 63.2 days

**Table 2 Key cost inputs**

| Input | Cost† |
|---|---|
| NICU level I, per day | $1,268[6] |
| NICU level III, per day | $3,004[6] |
| Infection | $1,539[7‡] |
| Readmission | $12,008[8§] |
| Naso-/oro-gastric tube (NGT) | $3,892[9¶] |

PFOS: Patterned and frequency-modulated oral stimulation; NICU: Neonatal intensive care unit; †Costs are presented and inflated to 2024 USD; ‡Calculated from Guan et al. ; §Calculated from Speer et al. ; ¶Calculated from White et al.

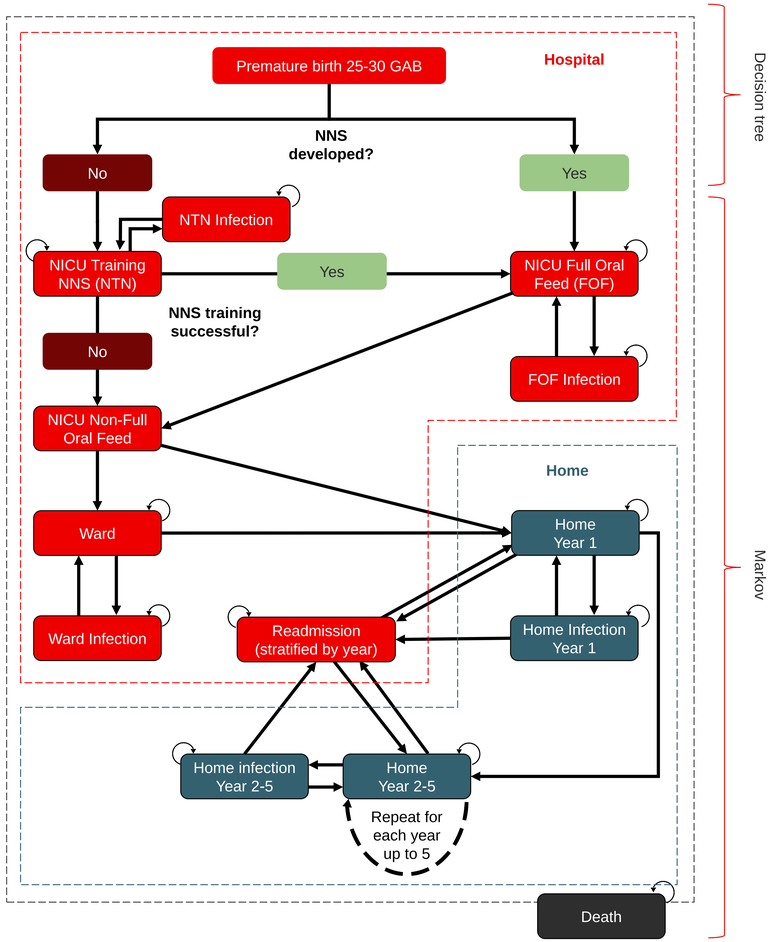


**Figure 1 Decision tree and Markov model**
Death can either occur in hospital (red states) or at home (blue states). NNS: Non-nutritive sucking; FOF: Full oral feed; NICU: Neonatal intensive care unit; NTN: NICU Training Non-Nutritive Sucking

## References

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## Conclusion

From a payer perspective, PFOS is expected to reduce care costs for preterm infants GAB 25-30 in the US due to reduced time to full oral feed and length of NICU stay.

## Results

- For 100 preterm infants born at a GAB of 25-30 weeks, the model resulted in average reduction of 577 NICU days. (**Table 3**)
- The model resulted in average cost savings of $2,349,309 (95% CrI $4,890,321 ; -397,577), when comparing the standard of care to PFOS (total costs: $24,063,24 vs. $21,713,932, respectively). (**Figure 2**)
- The PFOS system would be cost-neutral at $19,578 per patient.
- PFOS was cost-saving in 95.6% of the 1,500 Monte Carlo simulations.
- The main drivers were time to achieve full oral feed, and the percentage of newborns with successful NNS training.

**Table 3 Clinical and length of stay results**

| Category | SoC | PFOS | Difference (%) |
|---|---|---|---|
| NICU (days) | 5,429 | 4,852 | -577 (-11%) |
| Infections due to NGT in-hospital | 7.75 | 6.65 | -1.10 (-14%) |
| Patients discharged with NGT | 5.94 | 6.42 | 0.48 (8%) |
| Infections at home | 42.99 | 42.11 | -0.88 (-2%) |
| Number of rehospitalizations | 122.98 | 121.01 | -1.97 (-2%) |

SoC: Standard of Care; PFOS: Patterned and frequency-modulated oral stimulation; NNS: Non-nutritive sucking; FOF: Full oral feed; LOS: Length of Stay. * Including discharged with NGT, infections at home and readmission.

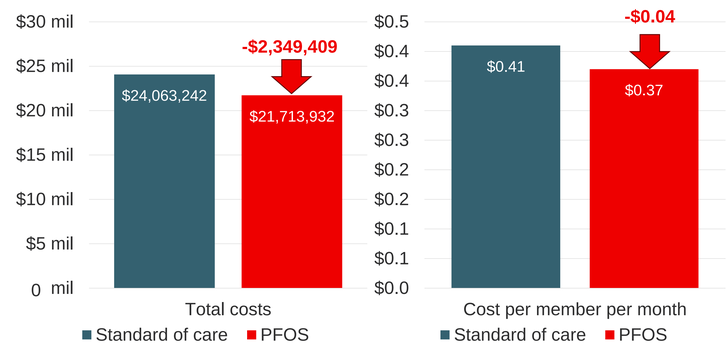


**Figure 2 Cost results**
PFOS: Patterned and frequency-modulated oral stimulation

## Disclaimer

CFB and TM are employees, and RS is the owner of Coreva Scientific, which received consulting fees for this work.
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