

Feeding Difficulties of Late and Moderate Preterm Infants: Evidence for Implementing nfant® Feeding Solution

POPULATION: Late and moderate preterm (LMPT) infants
84% of all preterm births
30-40% present with feeding difficulties

PROBLEM: LMPT infants are often perceived as 'normal' and so subtle indications of feeding difficulty go undetected
Practice variability introduced by subjective observation

RECOMMENDATION: Add objective assessment - nfant® Feeding Solution to standard of care

EXPECTED OUTCOME: Reduced practice variability resulting in decreased feeding related length of stay



Every year in the United States, approximately 500,000 babies are born preterm. Increased advances in technology and neonatal care have increased survival rates of premature infants up to 90%.¹

Late and moderate preterm births (LMPT) constitute 84% of all preterm births² and feeding difficulties occur in 30-40%³, evidence LMPT is neither risk-free nor without significant economic and medical costs.⁴ The absolute risk of feeding problems among late preterm infants (LPT; 34^{0/7} – 36^{6/7} weeks gestation) approaches five times that of term infants (34% vs. 7%).⁵

For moderate preterm infants (MPT; 32^{0/7} – 33^{6/7} weeks gestation) the NICHD Neonatal Research Network reported that of 5,123 MPT, 85% remained in the hospital at 36 weeks due to apnea, feeding difficulties, or inadequate weight gain.² Feeding difficulty for these babies leads to poor weight gain and growth, as well as an increased risk for associated morbidities such as sepsis⁶ and dehydration.³

LMPT also have higher documented rehospitalization rates as compared to term infants,⁷ with a reported 16% of those attributable to feeding difficulties.⁸

Immature⁹ and ineffective⁶ suck-swallow coordination are reported as primary reasons for the high incidence of reported feeding issues among LMPT while in the NICU. Variability in feeding practice is cited as a likely reason for the high rate of rehospitalization in this population.²

A major obstacle in the field is the fact that LMPT are often perceived as 'normal newborns' by parents and care providers and so subtle indications of feeding difficulty go undetected and untreated.⁹

Researchers at NFANT Labs hypothesized that because LMPT are perceived as typical newborns, they might not be routinely referred for specialist feeding services. To test this hypothesis, data were extracted from a study underway at a 70 bed, Level IV NICU investigating early sucking as a predictor of neurodevelopmental outcomes (with support from NIH CTSA UL1TR000117; UK CHS Office of Research Grant 1012003440). To be included in the larger study, infants met the following inclusion criteria: preterm infant, no anomalies or diseases known to interfere with feeding, no congenital disorders, chromosomal abnormalities, or major congenital anomalies, no disorder secondary to known perinatal exposure to toxic substances and no history of intraventricular hemorrhage greater than Grade II. Infants could have a diagnosis of respiratory distress syndrome, but could not be ventilated for a prolonged period of time. Of the fifty infants in the study, 16 met the definition of LMPT (Table 1).

FINDINGS

	LMT Group (N=7)	MPT Group (N=9)
Gender M:F	6:1	2:7
Race	White	White
Gestational age (weeks)	35.1 (.483)	32.9 (.38)
Birthweight (grams)	2406.7 (667.3)	1663.3 (247.7)
FRLOS* (days)	15 (4.8)	19 (6.2)
Feeding-related diagnosis	6	9
Referred for services	3	1

Table 1. Means and (standard deviations) of variables of interest.

* Feeding Related Length of Stay

Statistical analyses showed that despite the fact that the LPT were significantly older and had a significantly higher birthweight than MPT, the two groups had statistical equivalent feeding related lengths of hospital stay (FRLOS). This was surprising, since one would assume that the older preterm infants would be discharged from the hospital sooner than the younger preterm infants.

To better understand this finding, we completed a retrospective review of hospital inpatient records.

We found that of the 16 LMPT babies, fifteen had a feeding related diagnosis. Yet, of those, only four were referred for feeding assessment, confirming our hypothesis that LMPT infants are not routinely referred for specialist feeding services.



The four babies referred for services were all diagnosed with difficulty coordinating sucking, swallowing and breathing. Recommendations to support coordination were provided to the medical team, including the bedside nurse and when possible, families. Of the four referred for treatment, two were discharged too soon for follow-up. Of the two receiving follow-up, clinicians documented that the initial treatment recommendations were not followed, per nurse report. These results confirm the findings of those who report that inpatient feeding practice variability may be a significant contributor to the high rate of rehospitalization in this population.²

The Effects of Feeding Practice Variability

One possible reason for significant practice variability lies in the fact that the field of oral feeding in preterm infants has been generally understudied so guidelines and evidence-based support for common feeding practices are limited.¹⁰

As a result, healthcare teams have relied on qualitative methods for routinely evaluating feeding performance. Infant driven feeding has emerged as the clinical gold standard for qualitatively assessing the sucking performance of preterm and sick term infants transitioning to oral feeding. The goal of the trained feeder in infant driven feeding is to visually assess and interpret the infant's behaviors and contingent responses¹¹ and problem solve how best to optimize the feeding experience. Despite documented positive outcomes, there are challenges to the widespread adoption of infant driven feeding practice in NICUs across the country.

The primary challenge is that effective visual assessment of an infant's behaviors and responses requires a trained eye and so is directly impacted by the feeder's educational preparation and practical experience.

Consequently, different feeders (e.g. feeding specialist, nurse, family member) will not always 'SEE' the same things (i.e. fatigue) which leads to variability in feeding practice and in some cases failure to comply with specialists' recommendations; both of which are detrimental to infant health and development, increase hospital length of stay and drive up medical costs.

Taken together, these results, though limited, suggest LMPT infants are not routinely referred for services to address feeding difficulties. If they are referred, other bedside feeders may not 'see' what the specialist sees, and rely on their own experience as feeders. The result is practice variability in the care of a population with limited adaptability, which increases the risk of rehospitalization after discharge.

Adding Objective Evidence- nfant® Feeding Solution

To solve this problem, NFANT Labs developed an innovative tool to study feeding skill development using noninvasive methods that permit continuous observation of neonatal performance during feeding.

Experts in the field have used nfant® Feeding Solution to visualize neonatal performance for interpretation of infant stress versus stability throughout the feeding.

Specialists use their expertise to monitor infant cues related to swallowing, breathing, and physiologic stability and individualize developmentally supportive and protective feeding strategies. Real-time visualization of neonatal performance may confirm or refute interpretation of what is observed:

“Watching the waveform is more objective than monitoring stress cues, especially since stress cues are sometimes very subtle.”

— Kellie L., Neonatal therapist

The ability to visualize performance in real-time also offers an objective appraisal of an infant's response to intervention:

“I see the difference when I use one nipple versus another when using nfant® Feeding Solution during feeds.”

— Deb G., Neonatal nurse

Post feeding review is used to develop care plans that are objective, individualized, can be shared with families and adjusted as feeding skill develops.

nfant® Feeding Solution accommodates and accounts for the needs of individual infants (e.g. nipple brand, liquid type, and position) so is applicable across the vast majority of infants to evaluate neonatal performance.



Clinical experts at NFANT Labs are confident that frequent use of nfant® Feeding Solution allows feeding specialists to train nursing staff on nfant® Feeding Solution use and interpretation of findings and serves as a way to educate families in developmentally supportive feeding practice.

The addition of objective data to assess and treat LMPT with feeding difficulties, collected via nfant® Feeding Solution, may reduce the risk of feeding related rehospitalization and/or feeding-related aversion in the first year of life.

Protocol for Adoption of nfanT® Feeding Solution for Daily Use

INITIAL ASSESSMENT

LMPT infants admitted to the well newborn nursery or neonatal unit, whether fed by breast or bottle, are screened via nfanT® Feeding Solution.

A feeding specialist uses standard visual assessment in combination with real time review of wave forms during feeding.

IMPLEMENT INTERVENTIONS AND MONITOR PROGRESS

For infants identified as ‘at risk’ by the feeding specialist, appropriate interventions are developed and implemented to objectively assess the impact on performance.

Use nfanT® Feeding Solution 3-5 times per week to monitor progress and adjust care plans as needed through to the transition to full independent oral feeding and at discharge.

Data is collected via nfanT and documented in the nfanT® Mobile App. Results are shared with staff and families when describing results and the objective impact of the specialist’s recommendations (e.g. change in nipple flow rate, feeding position, etc.)

Results should be reviewed daily with the health care team and family after each specialist visit and major findings recorded in the unit’s EMR.

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