Original articles

Oral skills and breastfeeding performance of premature newborns hospitalized in a neonatal unit

Flávia Aparecida Felipe de Lima Silva[1] ID

Dário Alves da Silva Costa[1] ID

Amélia Augusta de Lima Friche[1] ID

[1] Universidade Federal de Minas Gerais – UFMG, Programa de Pós-Graduação em Ciências Fonoaudiológicas, Belo Horizonte, Minas Gerais, Brasil.

ABSTRACT

Purpose: to compare oral skills and functional breastfeeding performance at the time of speech-language-hearing assessment and tube removal in premature newborns admitted to a neonatal unit.

Methods: a cross-sectional observational study in premature newborns without serious pathologies, admitted to the neonatal unit of a hospital of the Public Health System, from May to August 2022. Data were collected from the medical records, and premature newborns were assessed regarding the readiness for oral feeding, breastfeeding performance, and oral skill level at the time of assessment and tube removal. The Wilcoxon test was used to compare these measures at both moments, setting the significance level at 5%.

Results: the study sample had 126 premature newborns with a mean weight of 1,937.2 g and a mean gestational age of 33.1 weeks. Both the breastfeeding performance score (from 6.5 to 8.2) and the oral skill level improved between the two moments, with more premature babies in level IV (the most mature), with a statistically significant relationship (p < 0.001).

Conclusion: the breastfeeding performance and oral skill levels improved between the speech-language-hearing assessment and tube removal in hospitalized premature infants, indicating development in skills during this process.

Keywords: Infant, Premature; Speech, Language and Hearing Sciences; Feeding Behavior; Breast Feeding

INTRODUCTION

Premature birth (i.e., one that occurs before completing 37 weeks of gestational age [GA]) can be associated with several neonatal morbidities that may compromise development, including the preterm newborn's (PTNB) oral feeding[1,2].

Adequate coordination between sucking, swallowing, and breathing is generally achieved only around 34 weeks of GA. Therefore, PTNBs may be at a greater risk of complications during feeding, due to inadequate development and immaturity of oral motor skills[2,3]. Around 40% of PTNBs are estimated to have problems transitioning from tube to oral feeding[4].

Successful oral feeding leads to timely removal of the tube, minimizes adverse events such as apnea, bradycardia, and drop in oxygen saturation, and reduces long-term consequences such as food aversion[5].

Many studies address the development of sucking in premature babies. Still, few guide the parameters so that professionals can determine the ideal time to introduce oral feeding and remove the tube[6].

Increased gestational age and consequent maturity are known to enable premature babies to better coordinate sucking, swallowing, and breathing. However, feeding difficulties may persist, hindering the transition to oral feeding, in which case professional assistance to rehabilitate oral functions can help it occur earlier[7]. Studies highlight the benefits of oral stimulation programs in premature babies during their stay in the neonatal unit[8,9].

The literature presents objective instruments to favor and systematize the transition from tube to oral feeding. They can quantify the efficiency and safety of oral feeding in PTNBs and evaluate the mother-baby breastfeeding performance since breastfeeding is the best way to provide ideal food for NBs' healthy growth and development[10].

In 2011, Lau and Smith proposed a new approach to assessing oral feeding skills in PTNBs, considering proficiency (i.e., the percentage rate of milk ingested in the first 5 minutes of sucking by the total prescribed diet volume) and the milk transfer rate (i.e., the volume of milk transferred during the feeding time [mL/min]). Based on these parameters, they proposed four oral skill classification levels, ranging from level I (the most immature) to level IV (the most mature)[11].

To assess breastfeeding, in 2017 Conceição and collaborators[12] translated from English into Portuguese and validated an instrument named LATCH, which helps detect difficulties in this process. It is an objective scale that quantifies the functional breastfeeding performance[12,13].

A gap has been found in the literature regarding the use of these objective instruments in the transition from tube to oral feeding in PTNBs. Even more scarce are studies that compare the scores obtained by these instruments at different moments of the speech-language-hearing (SLH) intervention (initial and final).

Hence, this study aimed to compare oral skills and functional breastfeeding performance at the time of the SLH assessment and of removing the feeding tube in PTNBs staying in a neonatal unit.

METHODS

This quantitative, observational, cross-sectional study was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais, Brazil, under evaluation report no. 5.040.543 and CAAE 51131221.2.0000.5149 and of the Sofia Feldman Hospital, under evaluation report no. 5.077.779 and CAAE 51131221.2.3001.5132. It was conducted at the neonatal unit of a philanthropic hospital, which works only with the Unified Health System (SUS, in Portuguese) in Belo Horizonte, Minas Gerais, Brazil.

The inclusion criteria were PTNBs without serious associated pathologies, who required a gastric feeding tube and were treated by that institution's SLH service. The exclusion criteria were PTNBs in social hospitalization due to maternal abandonment or social vulnerability, with absolute contraindication to breastfeeding, and who died during the research.

Data were collected from May to August 2022. They encompassed information on the PTNBs' and mother's profiles in the medical records and the SLH assessment, which followed the routine criteria for such evaluations in the institution's Technical Procedure Guidelines: clinically stable PTNBs, with ascending weight curve.

The assessment comprised the following stages:

Stage I. Assessment of readiness for oral feeding, using the Preterm Oral Feeding Assessment Scale (POFRAS) before the scheduled feeding time[14]. The NBs were in the supine position for this assessment, trunk elevated, limbs flexed, and head aligned with the trunk. They were assessed according to the protocol criteria, with corrected GA at the time of evaluation, addressing the behavioral organization status, oral posture, oral reflexes, and non-nutritive sucking. Each item was scored, totaling a maximum of 36 points.

PTNBs with scores greater than or equal to 30 were considered suitable for oral feeding[15].

PTNBs not suitable for oral feeding underwent SLH intervention and were reassessed daily, following the institution's protocol, until they were ready according to POFRAS. The time they took to acquire this skill was quantified in days. Qualified PTNBs proceeded to stage II.

Stage II. Assessment of breastfeeding perfor-mance of PTNBs suitable for oral feeding: the PTNB was positioned on their mother's breast and the LATCH was applied to assess breastfeeding. This instrument evaluates the following items: L (Latch) refers to the quality of the child's attachment to the breast; A (Audible swallowing) refers to the possibility of hearing the baby swallowing while breastfeeding; T (Type of nipple) evaluates its type; C (Comfort) refers to the mother's comfort level regarding her breasts and nipples; and H (Hold) refers to whether or not the mother needs help positioning the child. Each item score ranges from 0 to 2, depending on the performance, totaling a maximum of 10 points, which indicates better performance[16].

Stage III. Assessment of the PTNB's oral skill level: This stage was carried out at another feeding time, using finger feeding, with the NB in a supine, semi-elevated posture. The diet prescribed by the medical team was offered with a 20 mL syringe and a no. 4 gastric tube. The milk volume ingested in the first 5 minutes of sucking, the prescribed milk volume, the total amount of milk ingested, and the total oral feeding time were recorded.

The following parameters were calculated based on these measures:

- Proficiency: percentage (%) volume ingested in the first 5 minutes of breastfeeding in relation to the prescribed volume.
- Transfer rate: the amount of milk ingested via oral feeding in relation to the time necessary for feeding (mL/minute).

Thus, the oral skill level was classified according to the criteria proposed by Lau and Smith (2011)[11]:

- LEVEL I, the most immature, with a proficiency < 30% and transfer rate < 1.5 mL/min; it indicates low oral feeding skill and low resistance.
- LEVEL II, with a proficiency of < 30% and transfer rate ≥ 1.5 mL/min; it indicates low oral feeding skill and high resistance.
- LEVEL III, with a proficiency of ≥ 30% and efficiency < 1.5 mL/min; it indicates high oral skill and low resistance.
- LEVEL IV, the most mature, with a proficiency of ≥ 30% and efficiency ≥ 1.5 mL/min; it indicates high oral skill and high resistance.

The transition from tube to oral feeding took place according to the institution's protocol. At the time of tube removal, their breastfeeding was reassessed with the LATCH, and their oral skills were reassessed with finger feeding, considering the oral skill levels. The number of days spent between the first assessment and tube removal was recorded.

Statistical Analysis

For descriptive data analysis, the categorical variables were presented in absolute and relative frequency, and the continuous variables were presented in measures of central tendency and variability. The Wilcoxon test compared both the oral skill levels and the LATCH scores between the time of assessment and tube removal. These two variables were compared in charts between the two moments. The analyses were performed in Stata software, version 16.0; the signifi-cance level was set at 5%, and the confidence interval was set at 95%.

RESULTS

The study sample comprised 126 PTNB staying at the neonatal unit, who met the inclusion criteria.

The data on the PTNBs' profiles are shown in Table 1.

Table 1. Profiles of the preterm newborns included in the study

Variables	Mean	Standard deviation	Minimum	Q_1	Median	Q_3	Maximum
Birthweight	1,937.2	524.1	910	1,552.5	1,860	2,285	3,545
GA at birth	33.1	2.1	26	32	33	35	36
Time of oxygen therapy (days)	5.5	6.3	1	2	3	6	28

Captions: GA – gestational age; Q1 – quartile 1; Q3 quartile 3.

These PTNBs' mothers were mostly high school graduates (47.5%), had two or more children (57.1%), and had delivered the current NB through a cesarean section (63.5%). The mothers' mean age was 27.8 years (SD 6.2), and the majority (85.4%) accompanied the NB full-time during hospitalization in the neonatal unit.

The PTNBs' profiles at the time of the SLH assessment are shown in Table 2.

Table 2. Profiles of the preterm newborns at the speech-language-hearing assessment

Variables	Mean	Standard deviation	Minimum	Q_1	Median	Q_3	Maximum
Weight	1,981.5	445.6	1,255	1,664	1,835	2,290	3,350
GA	34.5	1.6	32	33	34	36	39
Days of life	9.9	9.5	1	4	7	12	61

Captions: GA – gestational age; Q1 – quartile 1; Q3 quartile 3.

The assessment of readiness for oral feeding with POFRAS found that 106 NBs (84.1%) were ready, and 20 NBs (15.9%) were not yet ready for oral feeding. Those who were not ready needed a mean of 2.8 days of SLH intervention to get ready.

The data on the PTNBs' oral skill levels in the first nutritive sucking assessment are presented in Table 3.

Table 3. Oral skill levels of preterm newborns at the assessment

Oral skill level	Assessment N (%)
I	43 (34.4)
II	9 (7.2)
III	17 (13.6)
IV	56 (44.8)

Captions: N = number of preterm newborns; % = proportion of preterm newborns

The mean LATCH score was 6.5 (SD 2.0) in the first breastfeeding assessment and 8.2 (SD 1.1) in tube removal.

Figures 1 and 2 present the behavior of the data, respectively comparing the LATCH score and oral skill levels between the time of SLH assessment and tube removal.
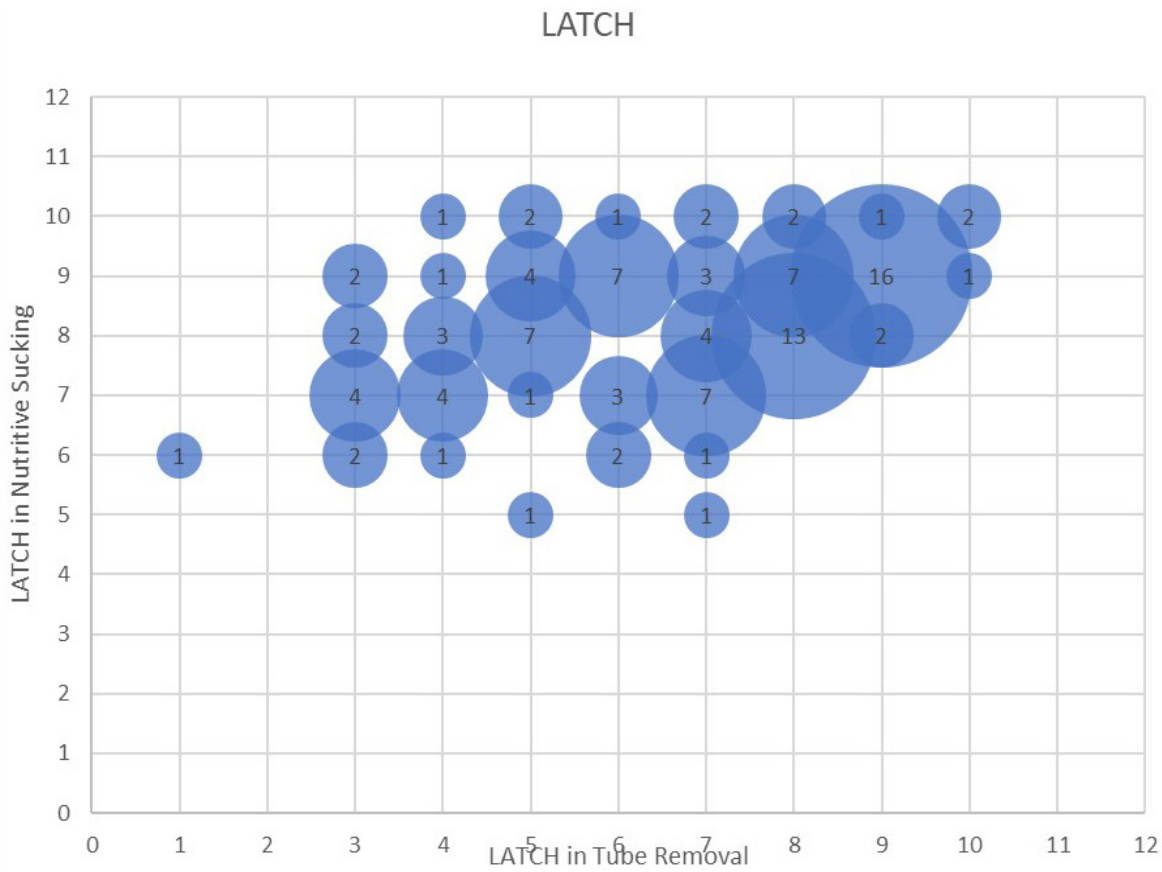
Figure 1. LATCH score comparison data between the assessment and tube removal
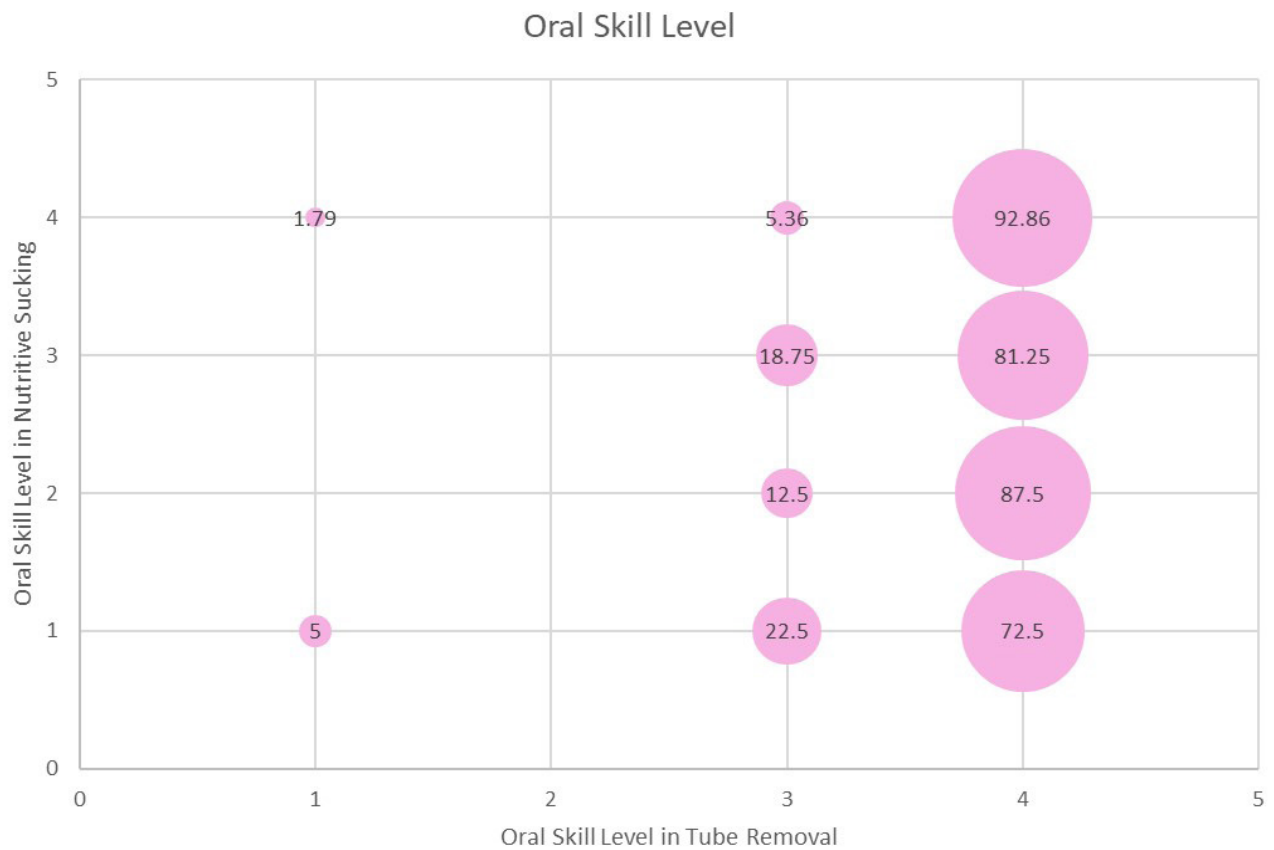

Figura 2. Dados de comparação dos níveis de habilidade oral na avaliação e na retirada de sonda

The comparison of LATCH scores between the SLH assessment and tube removal is shown in Table 4.

The comparison of oral skill levels between the SLH assessment and tube removal is shown in Table 5.

Table 4. Comparison of LATCH scores between the assessment and tube removal

Variables	Mean	Standard deviation	p-value
LATCH score at assessment	6.5	2.0	<0.001*
LATCH score at tube removal	8.2	1.1	

* Wilcoxon test, significant at 5%.

Table 5. Comparison of oral skill levels of premature newborns between the assessment and tube removal

Oral skill level	Assessment N (%)	Tube removal N (%)	p-value
I	43 (34.4)	3 (2.5)	<0.001*
II	9 (7.2)	0	
III	17 (13.6)	16 (13.2)	
IV	56 (44.8)	102 (84.3)	

* Wilcoxon test, significant at 5%.
Captions: N = number of preterm newborns; % = proportion of preterm newborns

The mean transition time from tube to oral feeding was 4.2 days (SD 2.9), and most PTNBs were discharged on exclusive breastfeeding (51.2%).

DISCUSSION

The transition process from tube to oral feeding is gradual and may vary according to each PTNB's clinical characteristics and possible complications during this process[17].

PTNBs require a period of preparation and stimulation so that sucking, swallowing, and breathing coordination can occur properly. Thus, SLH intervention during this period helps in the maturation and development of essential functions for safe oral feeding[18].

This study found an improvement in both oral skills and breastfeeding performance between SLH assessment and tube removal.

The profile of PTNBs included in the study was low birthweight and moderately premature infants. This can be associated with the study's inclusion criteria, which excluded PTNBs with associated serious morbidities. Thus, the main diagnostic hypothesis for all NBs was respiratory distress syndrome (RDS), which led to the use of oxygen by the vast majority. This finding corroborates the literature since RDS is one of the most frequent changes in PTNBs due to their lung immaturity[19].

A study that used objective instruments to assess PTNBs' oral feeding found similar mean GA and weight in SLH assessment to the present study[20]. This can be explained by the stability criteria required to start SLH intervention. The readiness assessment with POFRAS found that most PTNBs could start oral feeding. This information is probably due to the sample profile since the sucking, swallowing, and breathing coordination is generally present around 32 to 34 weeks of GA[21].

PTNBs who were not yet ready needed a mean of 2.8 days of SLH intervention to become suitable for oral feeding. This data corroborates the literature that presents the importance of non-nutritive sucking stimulation to adapt sucking parameters and readiness for oral feeding in PTNBs, which can accelerate the suction maturation process with improved oral performance[22]. However, the mean number of days required to be ready for oral feeding was higher than that of another study that evaluated PTNBs' oral performance and found they took a mean of 1 day to start oral feeding[8].

The ability to feed orally may be associated with the readiness to start oral feeding and the willingness to eat[23]. Oral feeding skills are very important in the success of oral feeding, being considered one of the defining attributes of successful oral feeding[24]. Thus, the classification of these skills into levels can quantify the PTNB's ability to receive food orally[11]. Oral feeding

skills are measured through proficiency, (which is the oral feeding ability in the first 5 minutes) and the transfer rate (expressed in mL/min, indicating the resistance to ingest the prescribed volume). The four levels of oral feeding skills mentioned above are defined based on these two variables[11,25,26].

The present study found an improvement in the PTNBs' oral skills between the assessment and tube removal. There was a statistically significant relationship in the distribution of the sample in the groups at both moments, suggesting an improvement in the PTNBs' oral skills in the transition from tube to oral feeding.

A study aimed to determine whether the transition from tube to oral feeding can be accelerated by the early introduction of oral feeding in PTNBs. It corroborates the findings of the present one, as its results had a significant increase in efficiency and transfer rate within the study groups from the beginning of the intervention until the first successful oral feeding[6].

Another study aimed to correlate cardiorespiratory parameters with GA and the level of oral feeding skills when introducing oral feeding in PTNBs. It identified that the SLH assessment classified many such infants as oral skill level I[27]. In the present study, though not being the majority, many NBs were also at level I at the time of assessment – i.e., requiring improvement in oral skills to allow for efficient oral feeding.

Despite the differences, the data from the present study show a significant improvement in proficiency and milk transfer rate during the transition process from tube to oral feeding, which took a mean of 4.2 days. This time is shorter than that found in a study that analyzed PTNBs' oral feeding performance stimulated by the swallowing training technique, with a mean of 7 days for tube removal[8]. On the other hand, it corroborates other studies that assessed the transition from tube to oral feeding in PTNBs[28,29]. These differences can be justified by the profile of the sample in the studies, the feeding routes, interventions, and even the time when the intervention began.

A study that analyzed PTNBs' oral feeding performance stimulated by the swallowing training technique initially identified half of the sample at level IV of oral skill (i.e., the most mature) – data similar to those found in the present one[8]. It is important to highlight the proportion of PTNBs who were classified as oral skill level IV (the most mature) at tube removal (84.3%), demonstrating their real ability to maintain exclusive oral feeding.

However, besides identifying PTNBs' oral skills, it is important to evaluate how this ability occurs during breastfeeding, given the known importance of this practice for PTNBs. Thus, the present study also compared these newborns' functional breastfeeding performance in the SLH assessment and tube removal, using the LATCH scale as a breastfeeding assessment tool. It is a simple instrument that objectively evaluates and monitors the breastfeeding technique[13]. This study found an improvement in breastfeeding performance between the assessment and tube removal.

Few studies were found in the literature using this tool in PTNBs. A study aimed to verify breast milk intake in full-term NBs and PTNBs and determine whether the LATCH scale could be useful in concluding breastfeeding effectiveness and sufficient milk intake. It concluded that 75.8% of full-term NBs consumed the entire volume of milk expected for each feeding, while only 2.1% of PTNBs did the same. The median LATCH score of full-term NBs was 9, while that of PTNBs was 7 – similar to the score found in the present study at the time of SLH assessment[30]. In that same study, higher LATCH scores were associated with higher median breast milk intake, whereas the minimum and maximum intake for each LATCH score revealed sharp variability[30]. Thus, as the present study found improved LATCH scores, it can be considered that there was an improvement in the volume of milk ingested by PTNBs during the transition from tube to oral feeding, facilitating safe tube removal.

Most PTNBs were exclusively breastfeeding when the tube was removed, highlighting the importance of this practice for PTNBs. The presence of the mother during the newborn's stay in the neonatal unit greatly favors this practice[31]. In the present study, most mothers were full-time accompanying their newborns. A strength of the service where the study was carried out is its good practices in assisting mothers, families, and NBs, encouraging and stimulating mothers to remain in the unit. It has a space/accommodation for mothers to stay full-time while their children are in the neonatal intensive care unit and ensures joint stay in the kangaroo neonatal intermediate care unit and the conventional neonatal intermediate care unit, encouraging autonomy and participation in care. Strategies like these bring benefits to the baby, favoring breastfeeding and early hospital discharge[32].

The comparison of the oral skill level and the LATCH score between the assessment and tube removal found statistically significant relationships. These results

indicate a significant improvement in the NBs' oral skills and breastfeeding performance during the transition from tube to oral feeding. There is a known tendency for parameters to improve with increasing weight and age[7], which can be accelerated with the intervention of an SLH pathologist in this period[9,22,33]. However, this study did not assess SLH intervention, which does not allow us to establish direct relationships with the transition time to oral feeding.

The main limitation of the study is that it did not control the SLH intervention in NBs as part of the service's routine, which may have influenced the improvement in the evaluated parameters. Nevertheless, the service has standardized routine interventions, and the SLH professionals are continuously trained, which may have minimized any differences between interventions. Furthermore, the results cannot be extrapolated to other PTNB groups, such as those with serious pathologies, which were not addressed in the present study. As strengths, the joint evaluation of oral skill parameters and breastfeeding performance in a large sample of PTNBs from a reference hospital in a large city stands out. The results may help characterize oral skills and functional breastfeeding performance in PTNBs.

The use of assessment tools and the establishment of objective parameters can help define the ideal time for tube removal in PTNBs, contributing to safe and efficient feeding and, consequently, faster hospital discharge.

CONCLUSION

This study found a statistically significant improvement in oral skill levels and LATCH scores between SLH assessment and tube removal in PTNBs staying in the neonatal unit.

This result suggests that breastfeeding performance is likely to improve along with oral skill parameters. Thus, objective parameters can help the transition from tube to oral feeding in PTNBs. This allows early tube removal, with benefits that involve the NB's development, improved breastfeeding rates, and improved bonding between mother and baby. Consequently, tube removal favors early hospital discharge, allowing greater turnover of hospital beds, and ensuring this population's access to health services.

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