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Effect of Premature Infant Oral Motor Intervention on Feeding Progression and Length of Hospital Stay: A Randomized Controlled Trial in a Tertiary Hospital in Burkina Faso

Chantal Zoungrana Ouattara[1,2*], Aissa Dembélé[1], Rolande Kaboré[1,2], Oumarou Sawadogo[1], Angèle Zongo[1], Roselyne Ouattara[1], Flore Ouédraogo[1,2], Angèle Kalmogho[1,2], Caroline Yonaba[1,2], Fla Kouéta[1,2]

[1]Service de pédiatrie, CHU Yalgado Ouédraogo, Ouagadougou, Burkina Faso
[2]Département de Pédiatrie, Université Joseph Ki-Zerbo, Ouagadougou, Burkina Faso
Email: *chantalzoungrana@gmail.com

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Abstract

Objective: To evaluate the effect of Premature Infant Oral Motor Intervention (PIOMI) on oral feeding progression and length of hospital stay in preterm infants hospitalized in a tertiary hospital in Burkina Faso, a low-resource setting where neonatal care relies largely on simplified developmental care practices. **Methods:** A randomized, open-label, two-parallel-group trial was conducted in the neonatal unit of the Yalgado Ouédraogo University Hospital (CHU-YO), Ouagadougou, from November 7, 2024 to January 6, 2025. Preterm infants with a gestational age of 29 - 34 weeks were randomized into two matched groups according to gestational age and birth weight: the PIOMI group (n = 30) and a control group receiving standard care (n = 30). Standard care consisted of routine developmental and supportive neonatal practices including kangaroo mother care, sensory protection, swaddling, and analgesic oral sucrose during procedures. The primary outcome was length of hospital stay. Secondary outcomes included time to achieve feeding independence, progression through feeding stages, and weight gain. **Results:** The initial characteristics of the sixty premature infants included were comparable between the groups: Gestational age (31.1 ± 1.2 GA vs 31.0 ± 1.1 GA; p = 0.78), and birth weight (1248 ± 180 g vs 1239 ± 175 g; p = 0.84). The length of hospital stay was significantly shorter in the PIOMI group: 15.6 ± 4.8 days vs 20.1 ± 5.2 days (p = 0.003), representing an average reduction of 4.5 days. The time to

achieve feeding independence was shorter in the PIOMI group: 11.2 ± 2.1 days vs 13.0 ± 2.4 days (p = 0.01). The average daily weight gain was higher in the PIOMI group: 18.2 ± 4.3 g/kg/day vs 15.1 ± 3.9 g/kg/day (p = 0.02). **Conclusion:** PIOMI improves feeding progression and significantly reduces the length of hospital stay for preterm infants. This simple and inexpensive intervention could be integrated into developmental care in neonatal units in resource-constrained countries.

Keywords

Preterm Infant, PIOMI, Oral Feeding, Length of Hospital Stay, Developmental Care

1. Introduction

Prematurity remains the leading cause of neonatal mortality worldwide and represents a major challenge for health systems, particularly in low- and middle-income countries. Each year, an estimated 13.4 million babies are born prematurely, many of whom require specialized neonatal care to survive and develop normally [1].

Among the challenges faced by preterm infants, the acquisition of safe and effective oral feeding is one of the most important milestones for clinical stabilization and hospital discharge. Because of neuromuscular immaturity and incomplete coordination of the suck-swallow-breathing reflexes, preterm infants often experience difficulties transitioning from tube feeding to full oral feeding [2]-[4]. These feeding difficulties can delay nutritional autonomy, prolong hospitalization, and increase healthcare costs.

Developmental care refers to a set of individualized interventions designed to support the neurobehavioral maturation of preterm infants and minimize stress related to the neonatal intensive care environment [3]. These practices include strategies such as kangaroo mother care, sensory protection, and non-pharmacological pain management. Among developmental care approaches, oromotor stimulation has been proposed as a strategy to enhance the maturation of oral feeding skills in preterm infants.

The Premature Infant Oral Motor Intervention (PIOMI) is a standardized five-minute stimulation protocol involving peri-oral and intra-oral stimulation followed by non-nutritive sucking [5]-[7]. Previous randomized studies have suggested that PIOMI may accelerate the transition to oral feeding and reduce the length of hospital stay in preterm infants [8]-[12].

Furthermore, recent reviews of the available data confirm the potential benefits of oral and motor interventions in preterm infants, particularly in improving oral feeding performance and shortening the transition period between tube feeding and full oral feeding, although there remains significant heterogeneity in protocols and results [13]-[15].

In Burkina Faso, neonatal units operate in a resource-constrained context where optimizing feeding progression and reducing hospital stay are essential to improve neonatal outcomes. Although developmental care practices have recently been introduced in the neonatal unit of Yalgado Ouédraogo University Hospital (CHU-YO), evidence regarding the effectiveness of PIOMI in this setting remains limited.

The aim of this study was therefore to evaluate the effect of PIOMI on feeding progression and length of hospital stay in preterm infants hospitalized in a tertiary hospital in Burkina Faso.

2. Methods

2.1. Study Design and Setting

This study was a single-center, open-label, pilot randomized controlled trial with two parallel groups**,** conducted in the neonatal unit of Yalgado Ouédraogo University Hospital (CHU-YO)**,** a tertiary referral hospital located in Ouagadougou, Burkina Faso, from November 7, 2024 to January 6, 2025.

The trial was designed as a pilot study to assess the feasibility and potential clinical benefit of Premature Infant Oral Motor Intervention (PIOMI) in our clinical context. Because the main objective was exploratory, no formal sample size calculation was performed. A target sample of 60 preterm infants (30 per group) was considered feasible during the study period and sufficient to provide preliminary estimates of intervention effects for future larger trials.

2.2. Study Population

Preterm newborns hospitalized in the neonatal unit with a gestational age between 29 and 34 completed weeks were eligible for inclusion**.**

Inclusion criteria

Infants were included if they met the following criteria:

- gestational age between 29 and 34 weeks,
- clinical stability allowing oral stimulation,
- absence of major congenital malformations,
- written informed parental consent.

Exclusion criteria

Infants presenting any of the following conditions were excluded:

- severe neurological distress,
- major digestive or respiratory malformations,
- transfer to another healthcare facility before enrolment,
- death before randomization.

2.3. Randomization and Allocation Concealment

Eligible infants were randomly assigned in a 1:1 ratio to either the PIOMI intervention group or the control group receiving standard care. The random allocation sequence was generated using a computer-generated randomization list prepared by

an investigator not involved in recruitment or outcome assessment. Allocation concealment was ensured using sequentially numbered, opaque, sealed envelopes. After confirming eligibility and obtaining parental consent, the attending neonatal clinician enrolled the participant and opened the next envelope in sequence to determine the allocated group. Baseline characteristics, particularly gestational age and birth weight, were compared after randomization to assess group balance. No reassignment or post-randomization matching of participants was performed.

2.4. Intervention

Infants allocated to the intervention group received the Premature Infant Oral Motor Intervention (PIOMI) according to the standardized protocol described by Lessen.

The intervention consisted of a five-minute oromotor stimulation session, administered once daily for seven consecutive days. The stimulation included:

- perioral stimulation of the cheeks and lips,
- intraoral stimulation of the gums and tongue,
- palatal stimulation,
- non-nutritive sucking.

The procedure was discontinued if signs of physiological instability or stress were observed.

2.5. Intervention Fidelity

PIOMI sessions were administered by trained neonatal nurses or physicians who had received theoretical and practical training on the standardized protocol prior to study initiation.

A structured checklist was used to document intervention delivery, including:

- the provider administering the session,
- session completion,
- infant tolerance,
- missed or interrupted sessions.

Adherence to the protocol was defined as completion of the planned seven sessions, unless clinical instability prevented continuation.

2.6. Standard Care and Co-Interventions

Both groups received routine neonatal care practiced in the unit. Standard care included:

- kangaroo mother care (skin-to-skin contact),
- sensory protection, including reduction of noise and light exposure,
- swaddling,
- oral sucrose for analgesia during painful procedures.

Other co-interventions were provided according to unit protocols and clinical indications, including respiratory support, antibiotic therapy for suspected neonatal infection, thermal regulation, and advancement of enteral feeding.

2.7. Outcome Measures

Primary outcome

The primary outcome was length of hospital stay, defined as the number of days between admission and hospital discharge from the neonatal unit.

Secondary outcomes

Secondary outcomes included:

- time to feeding independence,
- progression through feeding stages,
- daily weight gain,
- weight at feeding independence,
- weight at discharge.

Feeding independence was defined as full oral feeding for at least 48 consecutive hours without gavage supplementation and without clinical signs of feeding intolerance.

2.8. Feeding Progression Stages

Feeding progression was assessed using six predefined stages based on the proportion of prescribed feeds taken orally within a 24-hour period:

- **Stage 1:** oral feeding initiated, ≤25% of prescribed feeding volume taken orally,
- **Stage 2:** >25% to 50% of prescribed feeding volume taken orally,
- **Stage 3:** >50% to 75% of prescribed feeding volume taken orally,
- **Stage 4:** >75% of feeding volume taken orally but not yet full oral feeding,
- **Stage 5:** full oral feeding for less than 48 hours,
- **Stage 6:** full oral feeding autonomy maintained for ≥48 hours.

Feeding stage was assessed daily, using nursing records and feeding charts.

2.9. Discharge Criteria

Discharge decisions followed routine unit criteria applied to all patients, including:

- clinical stability without acute cardiorespiratory compromise,
- tolerance of full oral feeding,
- satisfactory weight progression,
- no ongoing need for intravenous therapy or intensive monitoring.

Because the trial was open-label, discharge decisions were not blinded to treatment allocation.

2.10. Statistical Analysis

Statistical analyses were performed using **STATA version 15.1**.

Continuous variables were expressed as mean ± standard deviation **or** median (interquartile range)**,** as appropriate.

The normality of distributions was assessed using the Shapiro-Wilk test.

- Normally distributed variables were compared using the Student's t-test.
- Non-normally distributed variables were compared using the Mann-Whitney U test.

- Categorical variables were compared using the Chi-square test or Fisher's exact test.

Effect sizes with 95% confidence intervals (95% CI) were reported in addition to p-values for the main outcomes. The statistical significance threshold was set at $p < 0.05$.

2.11. Ethical Considerations

The study protocol was approved by the National Health Research Ethics Committee (N° 2024-11-256) and by the administration of CHU-YO. Written informed consent was obtained from the parents or legal guardians of all participating infants.

3. Results

3.1. Participant Flow

During the study period, 69 preterm infants were assessed for eligibility. Nine infants were excluded before randomization: five deaths occurring before enrolment, and four transfers to another healthcare facility prior to randomization. A total of 60 infants were randomized, with 30 allocated to the PIOMI group and 30 to the control group. All randomized infants received the allocated intervention and were included in the final analysis (Figure 1).

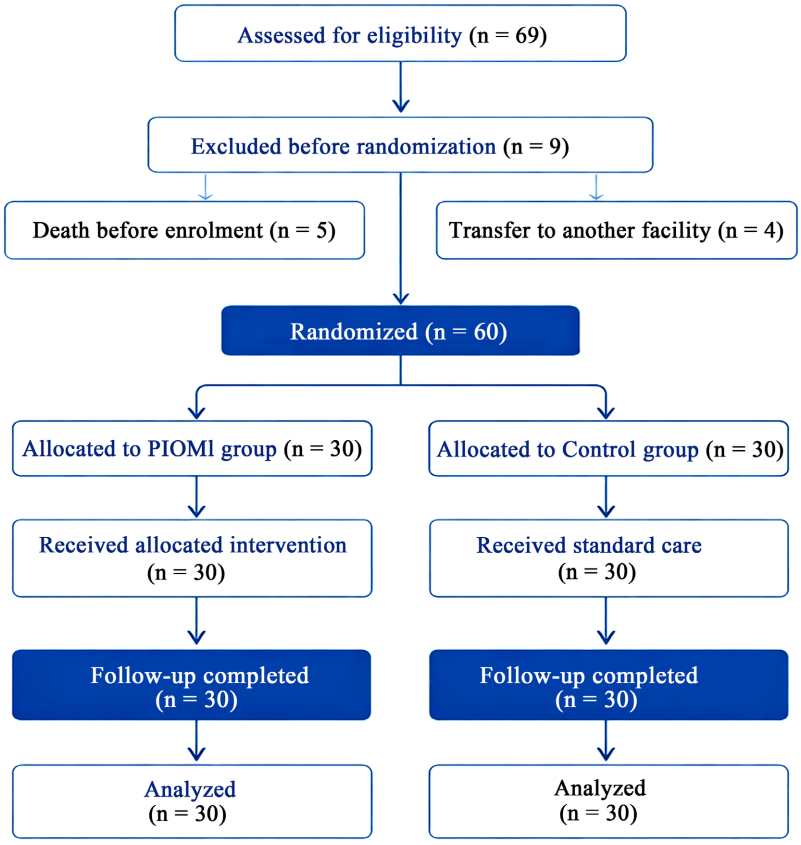

Figure 1. CONSORT flow diagram of participant recruitment, allocation, follow-up, and analysis.

3.2. Baseline Characteristics

The baseline characteristics of the infants were comparable between the two groups (Table 1).

The mean gestational age was 31.12 ± 1.05 weeks in the PIOMI group and 31.08 ± 1.02 weeks in the control group (mean difference 0.04 weeks, 95% CI −0.47 to 0.55, p = 0.86).

Mean birth weight was 1258 ± 168 g in the PIOMI group and 1263 ± 172 g in the control group (mean difference −5 g, 95% CI −92 to 82, p = 0.91).

Table 1. Initial characteristics of newborns.

Characteristics	PIOMI (n = 30)	Control group (n = 30)	p
Gestational age (week)	31.12 ± 1.05	31.08 ± 1.02	0.86
Birth weight (g)	1258 ± 168	1263 ± 172	0.91
Head circumference (cm)	26.9 ± 1.3	26.7 ± 1.4	0.57
Height (cm)	40.8 ± 2.4	40.6 ± 2.3	0.74

Very preterm infants (30 - 33 weeks gestation) accounted for 71.6% of the sample.

Upon admission to the unit, 58% of patients presented respiratory distress, with no difference between groups (p = 0.77). Hyaline membrane disease was the most common associated condition (22%).

3.3. Clinical Outcomes

Clinical outcomes comparing the PIOMI and control groups are presented in Table 2. PIOMI was associated with shorter time to feeding independence, greater daily weight gain, and reduced length of hospital stay.

Table 2. Clinical outcomes of preterm infants in the PIOMI and control groups.

Outcome	PIOMI Group (n = 30) Mean ± SD	Control Group (n = 30) Mean ± SD	Mean Difference (PIOMI − Control)	95% CI	p-value
Time to feeding independence (days)	11.38 ± 1.82	13.02 ± 2.11	−1.64	−2.63 to −0.65	0.004
Daily weight gain (g/kg/day)	17.9 ± 3.8	15.2 ± 3.6	+2.7	0.81 to 4.59	0.010
Weight at feeding independence (g)	1392 ± 124	1326 ± 131	+66	0.9 to 131.1	0.048
Length of hospital stay (days)	15.7 ± 4.6	20.3 ± 5.1	−4.6	−7.11 to −2.09	0.001
Corrected gestational age at discharge (weeks)	34.3 ± 1.2	34.8 ± 1.4	−0.5	−1.18 to 0.18	0.12
Weight at discharge (g)	1654 ± 210	1623 ± 225	+31	−81 to 143	0.58

Values are expressed as mean ± standard deviation. Mean differences are presented with 95% confidence intervals. Comparisons between groups were performed using Student's t-test or Mann-Whitney U test according to data distribution

4. Discussion

This pilot randomized controlled trial evaluated the effect of Premature Infant Oral Motor Intervention (PIOMI) on feeding progression, weight gain, and length of hospital stay among preterm infants hospitalized in a tertiary neonatal unit in Burkina Faso. The findings suggest that PIOMI was associated with earlier feeding independence, greater daily weight gain, and shorter hospital stay compared with standard care alone.

4.1. Effect of PIOMI on Feeding Progression

One of the main findings of this study was the significant reduction in time to feeding independence in the PIOMI group. Infants receiving PIOMI achieved full oral feeding approximately 1.6 days earlier than those in the control group. Although the magnitude of this difference may appear modest, it is clinically meaningful in neonatal care, where the transition from tube feeding to oral feeding represents a critical milestone for hospital discharge.

This finding is consistent with previous studies demonstrating that oromotor stimulation interventions improve the coordination of sucking, swallowing, and breathing in preterm infants, thereby facilitating the transition to oral feeding. In a randomized clinical trial, Ghomi *et al*. reported that PIOMI significantly accelerated oral feeding acquisition in preterm infants, reducing the duration of tube feeding and improving feeding performance [11]. Similarly, Lessen and Yavanoglu-Atay demonstrated that PIOMI improved feeding progression and reduced hospitalization duration in premature infants [9] [10].

The physiological rationale for PIOMI lies in the stimulation of oral sensory and motor pathways involved in feeding coordination. Premature infants often exhibit immature neuromuscular control of the oral structures, resulting in inefficient sucking patterns and delayed feeding competence. Structured oromotor stimulation may enhance neural maturation and improve oral feeding skills through repetitive sensory input and motor training.

4.2. Effect on Weight Gain

Another important result of this study was the higher daily weight gain observed in the PIOMI group**.** Infants receiving PIOMI gained on average 2.7 g/kg/day more than those in the control group. This difference likely reflects improved feeding efficiency and earlier attainment of nutritional autonomy.

Improved weight gain has also been reported in previous studies evaluating oral stimulation programs in preterm infants. Enhanced oral feeding competence may reduce energy expenditure associated with ineffective feeding attempts while increasing the effective intake of milk, thereby promoting growth [4] [6].

Although the absolute difference observed in this study is relatively small, even modest improvements in weight gain may contribute to improved clinical outcomes in preterm infants, particularly in settings where nutritional support resources are limited.

4.3. Reduction in Length of Hospital Stay

One of the most clinically relevant findings of this study was the significant reduction in length of hospital stay among infants receiving PIOMI. The intervention was associated with a mean reduction of approximately 4.6 days, which represents a substantial improvement in neonatal care efficiency.

This reduction is consistent with previous randomized studies evaluating oromotor stimulation interventions [10]-[15]. Earlier attainment of feeding independence is one of the main determinants of discharge readiness in preterm infants, and interventions that accelerate feeding maturation can therefore shorten hospitalization.

From a health system perspective, reducing the duration of neonatal hospitalization is particularly important in resource-limited settings, where neonatal units often face high patient loads and limited bed capacity. Even a modest reduction in length of stay can improve bed turnover, reduce healthcare costs, and allow more infants to receive specialized neonatal care.

4.4. Implications for Neonatal Care in Low-Resource Settings

The potential benefits of PIOMI may be particularly relevant in low- and middle-income countries, where access to advanced neonatal technologies may be limited. PIOMI is a simple, low-cost intervention that requires minimal equipment and can be integrated into routine neonatal care after appropriate staff training.

In Burkina Faso and similar settings, optimizing feeding progression is crucial for improving neonatal outcomes and reducing hospital overcrowding. The implementation of structured developmental care interventions such as PIOMI may therefore represent a practical strategy to enhance neonatal care quality without substantial additional resource requirements.

4.5. Strengths and Limitations

This pilot randomized controlled trial provides preliminary evidence on the feasibility and potential benefits of PIOMI in a resource-limited neonatal setting. However, the relatively small sample size, the open-label design, and the single-center setting may limit the statistical power and generalizability of the findings.

5. Conclusion

In this pilot randomized controlled trial, PIOMI was associated with improved feeding progression, greater daily weight gain, and shorter hospital stay in preterm infants. These findings support the feasibility and potential clinical value of PIOMI in a resource-limited neonatal unit. However, larger adequately powered randomized trials are required to confirm these results and to further evaluate the clinical impact of PIOMI in diverse neonatal care settings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] World Health Organization (2023) Born Too Soon: Decade of Action on Preterm Birth. World Health Organization.

[2] Ratet, I., Touzet, M., Demouy, J. and Da Costa, L. (2017) Les troubles de l'oralité alimentaire en médecine et réanimation néonatales. *Soins Pédiatrie/Puériculture*, **38**, 25-28. https://doi.org/10.1016/j.spp.2017.09.005

[3] Sizun, J., Guillois, B., Casper, C., Thiriez, G. and Kuhn, P. (2022) Soins de développement en période néonatale: De la recherche à la pratique. 2e Edition, Lavoisier.

[4] Lau, C. (2020) To Individualize the Management Care of High-Risk Infants with Oral Feeding Challenges: What Do We Know? What Can We Do? *Frontiers in Pediatrics*, **8**, Article ID: 296. https://doi.org/10.3389/fped.2020.00296

[5] Abadie, V. (2004) L'approche diagnostique face à un trouble de l'oralité du jeune enfant. *Archives de Pédiatrie*, **11**, 603-605. https://doi.org/10.1016/j.arcped.2004.03.040

[6] Fucile, S., Phillips, S., Bishop, K., Jackson, M., Yuzdepski, T. and Dow, K. (2019) Identification of a Pivotal Period in the Oral Feeding Progression of Preterm Infants. *American Journal of Perinatology*, **36**, 530-536. https://doi.org/10.1055/s-0038-1669947

[7] Als, H. (1982) Toward a Synactive Theory of Development: Promise for the Assessment and Support of Infant Individuality. *Infant Mental Health Journal*, **3**, 229-243. https://doi.org/10.1002/1097-0355(198224)3:4<229::aid-imhj2280030405>3.0.co;2-h

[8] Fucile, S., Gisel, E. and Lau, C. (2002) Oral Stimulation Accelerates the Transition from Tube to Oral Feeding in Preterm Infants. *The Journal of Pediatrics*, **141**, 230-236. https://doi.org/10.1067/mpd.2002.125731

[9] Yavanoglu Atay, F., Berber Ciftci, H., Sahin, O., Guran, O., Colak, D. and Gok, N.R. (2023) Evaluation of the Effect of Oral Motor Stimulation Exercises on Feeding Skills in Premature Infants. *SiSli Etfal Hastanesi Tip Bulteni/The Medical Bulletin of Sisli Hospital*, **57**, 189-194. https://doi.org/10.14744/semb.2022.96562

[10] Lessen, B.S. (2011) Effect of the Premature Infant Oral Motor Intervention on Feeding Progression and Length of Stay in Preterm Infants. *Advances in Neonatal Care*, **11**, 129-139. https://doi.org/10.1097/anc.0b013e3182115a2a

[11] Ghomi, H., Yadegari, F., Soleimani, F., Knoll, B.L., Noroozi, M. and Mazouri, A. (2019) The Effects of Premature Infant Oral Motor Intervention (PIOMI) on Oral Feeding of Preterm Infants: A Randomized Clinical Trial. *International Journal of Pediatric Otorhinolaryngology*, **120**, 202-209. https://doi.org/10.1016/j.ijporl.2019.02.005

[12] Li, Y., Hu, Y., Li, Y., Li, X., Huang, X., Shi, Z., *et al*. (2024) The Effect of Oral Motor Intervention with Different Initiation Times to Improve Feeding Outcomes in Preterm Infants: Protocol for a Single-Blind, Randomized Controlled Trial. *Trials*, **25**, Article No. 306. https://doi.org/10.1186/s13063-024-08131-8

[13] Tsai, Y., Hsieh, P., Chen, T. and Lin, Y. (2024) Effects of Complete Oral Motor Intervention and Nonnutritive Sucking Alone on the Feeding Performance of Premature Infants: A Systematic Review and Meta-Analysis. *Children*, **11**, Article 4. https://doi.org/10.3390/children11010004

[14] Ibrahim, C., Chavez, P., Smith, D., Craig, J. and Pineda, R. (2024) Oral Motor Interventions Used to Support the Development of Oral Feeding Skills in Preterm Infants: An Integrative Review. *Early Human Development*, **198**, Article 106125.

https://doi.org/10.1016/j.earlhumdev.2024.106125

[15] Jyoti, M., Kodi, S.M. and Deol, R. (2023) Effect of Premature Infant Oral Motor Intervention on Oral Feeding and Weight Gain: A Systematic Review and Meta-Analysis. *Iranian Journal of Nursing and Midwifery Research*, **28**, 225-234. https://doi.org/10.4103/ijnmr.ijnmr_341_21