

# Assessment of Nurses' Knowledge and Practices Regarding Implementation of Premature Infant Oral Motor Intervention (PIOMI) in Transition to Oral Feeding: A Scope Review

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## Abstract

**Background:** Transitioning to full oral feeding is a critical developmental milestone for preterm infants and a primary requirement for hospital discharge. The Premature Infant Oral Motor Intervention (PIOMI) is a novel, evidence-based technique designed to strengthen oral muscles and decrease the length of hospital stays. Despite its clinical benefits, the successful implementation of PIOMI depends heavily on the competence and attitudes of neonatal intensive care unit (NICU) nurses. **Objective:** This review aimed to appraise the current state of knowledge and practices among neonatal nurses regarding the implementation of PIOMI. **Method:** A systematic approach was employed to search electronic databases including PubMed, Ovid (Medline), and Elsevier. The search focused on peer-reviewed articles published within the last five years using specific keywords such as "PIOMI," "oral feeding practices," and "neonatal nurses' knowledge." Strict inclusion criteria ensured the selection of empirical studies focused on NICU settings and nurse-led interventions. **Result:** Seventeen studies met the inclusion criteria. The review of literature reveals that while PIOMI significantly improve feeding efficiency and reduce hospital stays, a notable disparity exists between nurses' positive attitudes and their practical competence. Several studies highlighted that structured training programs significantly improve nurses' knowledge levels and the speed at which infants achieve independent feeding. **Conclusion:** The literature underscores the efficacy of PIOMI in optimizing developmental outcomes for preterm infants. However, the gap between nurse enthusiasm and clinical skill necessitates the integration of standardized, competency-based educational programs into NICU protocols. Collaborative efforts to involve parents in feeding interventions and the adoption of standardized assessment scales are crucial for fostering the successful transition to oral feeding and improving the overall quality of neonatal care.

**Keywords:** Premature Infant Oral Motor Intervention (PIOMI), NICU, Neonatal Nursing, Preterm Infants, Oral Feeding Transition, Nurse Education, Evidence-Based Practice.

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## INTRODUCTION

Premature birth rates have been increasing universally for the previous two decades. Annually, around 15 million infants are born prematurely, accounting for more than 1 out of every 10 babies. Moreover, approximately 1 million children die because of complications linked to premature birth. Numerous premature survivors have to live with disabilities such as learning disabilities and visual and hearing issues. Following pneumonia, prematurity is the most common reason for death in children under the age of 5 years and the primary cause of death in the critical first month of life. (Kumari *et al.*, 2023).

The neonatal period, characterized by its fragility and vulnerability, is an essential phase in the lifecycle where the health and well-being of newborn infants are uncertain. This uncertainty is more evident than in the Neonatal Intensive Care Unit (NICU), a specialized clinical setting designed to cater to the complex needs of infants born prematurely or with medical conditions requiring acute care (Lima & Mazza, 2019).

The feeding experiences of premature infants in their first year are not similar to the ones of full-term infants, as they experience problems in eating foods with

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new textures, may be sensitive to them, and refuse to eat. Furthermore, long-term use of endo-tracheal tube or nasogastric tube for feeding can be the chief cause of the later sensory problems in premature infants. (Ghomie *et al.*, 2019). Premature babies tend to have oral-feeding difficulties due to the delay in the development of oral-motor skills and poor suck-swallow-breath coordination. (Ghomie *et al.*, 2019) They usually struggle to develop their suck, swallow, and breath reflexes before 34 weeks postpartum due to the neurological immaturity and other health issues. Because their gastrointestinal tract, respiratory, and central nervous systems are not developed sufficiently to organize sucking, swallowing, and breathing, premature new-borns must be kept in neonatal intensive care units (NICUs) for long to acquire the ability of coordination to suck, swallow, and breath to achieve safe and successful oral feeding. (Amin *et al.*, 2021)

This transition to full oral feeding remains the most crucial step in developmentally oriented care of preterm infants; the point of transition is marked toward hospital discharge and normalization of life for the infant's family (Lubbe, 2017). Compatible with (Author\_id, 2008) It is necessary for preterm infants to consume all their feedings per bottle or breast before being discharged from the NICU. Consequently, poor oral feeding is one of the reasons that associated delay in hospital discharge of healthy preterm infants (Preterm Birth, 2007).

This is the area in which Premature Infant Oral Motor Intervention (PIOMI) can provide a lot of help in the future. This novel technique carries with it the potential to make a significant contribution to the process and, ultimately, to the length of hospital stay and feeding outcomes according to Jaywant *et al.*, (2020). Yet, despite this importance, there is a wide gap in the literature in relation to knowledge and practices of neonatal nurses regarding PIOMI in their setting, more especially in a NICU.

This literature review aims at appraising the neonatal nurses' current state of knowledge and practices in the implementation of PIOMI during the transition of preterm infants from gavage to oral feeding. In the light of this, therefore, much of the study shall focus on the Neonatal Intensive Care Unit (NICU) environment, with most of the special interest lying in the establishment of educational and training needs for nurses in a bid to offer optimum nursing care to preterm infants during this critical phase (Altimier & White, 2019). The prior studies, as reviewed, are what make a current review necessary, and there is variability with regard to knowledge and use of the PIOMI techniques between and among nurses and the availability of scant research in specified geographic areas such as Jeddah, Saudi Arabia.

Few studies have specific focus on the

knowledge and practices of neonatal nurses regarding the transition of preterm infants to oral feeding (Mörelius *et al.*, 2021); however, since few studies are available with this specific focus, this review is targeting a gap in the current literature. From this understanding, the discussion below establishes the influences educational interventions bring about in nursing practice, the effectiveness of PIOMI, and considers broad implications for standards of neonatal care. In synthesizing the studies of only the past five years, this review aims at presenting a fairly wide and comprehensive review that might offer some guidance to future directions in researching, clinical practice, and policy formulation in this area of neonatal care.

## METHODS OF THE REVIEW

In the pursuit of comprehensively addressing the existing research in the full sense, designed so that it captures a broad scope of related research regarding neonatal nurses' knowledge and practices in implementing the Premature Infant Oral Motor Intervention (PIOMI) in transitioning preterm infants to oral feeding. This section elaborates on the key methods employed in this scoping review was adopted targeted at identifying gaps in the literature, encompassing key terms used, inclusion and exclusion criteria, and the devised search strategy. The stringent application of these methods was crucial in ensuring the robustness and rigor of the review process.

## Key Terms

In this regard, several key terms and important concepts have been used as part of the present effort to help circumscribe the scope and focus of the investigation conducted within this literature review. The sub-sections that follow inform on these terms to gain a hold over the subtlety of the research questions and implications, which have been offered through the findings of the present study. Below are the definitions of the critical terms used throughout the review:

## Premature Infant Oral Motor Intervention (PIOMI)

PIOMI is a specific type of intervention defined as a 5-minute oral motor intervention by using a pinkie finger in the and all around the mouth of preterm infants as young as 29 weeks PMA. PIOMI aims to mimic the in-utero oral experience that strengthens and develops feeding mechanisms. The 8 steps provide assisted movement to activate muscle contraction as well as provide movement against resistance to build strength in areas needed for subsequent bottle and breastfeeding. The intervention increases functional response to pressure and improves control of movements for the lips, cheeks, jaw, and tongue (PIOMI | ORAL MOTOR THERAPY | HOME, n.d.). This intervention allows for easier transition from tube to oral feeding. The treatment approach includes a variety of exercises aimed at the muscles used during suckling, swallowing, and feeding, to increase strength, coordination, and functionality necessary for a child to be used appropriately by a child

during oral feeding.

### Preterm Infants

Preterm infants refer to infants that are born before the completion of 37 weeks' gestation. Preterm infants are predisposed to problems with feeding, ventilation, and thermoregulation; all require good care to enhance improvement in development and health of the child.

### Oral Feeding Transition

Transition from tube feeding (gavage feeding) to oral feeding. This is the most important and exciting developmental milestone for the preterm baby readiness for discharge (to feed efficiently and safely by sucking) from the breast or bottle.

### Neonatal Intensive Care Unit (NICU)

A special ward in a hospital designed to provide whole care to infants born with preterm, low birth weight, or critical birth disease. It is armed with the latest state-of-the-art technology, but behind its operations are the human resources—a multi-disciplinary team of experts taking care of the neonate, including but not limited to neonatologists, neonatal nurses, respiratory therapists.

### Neonatal Nurses

A registered nurse who administers special intensive care or medical attention to very sick newborn infants. In the NICU, neonatal nurses provide everyday care to newborns, monitor their health, provide treatment by administering medicines, and support families.

### Knowledge and Practices

The word "knowledge" refers to information and understanding that neonatal nurses possess regarding PIOMI and the principles of oral feeding transition for preterm infants. Practices are used in this knowledge by influencing the clinical intervention, procedures, and care strategies practiced in the NICU to support readiness and oral feeding success of the preterm infants.

### Inclusion and Exclusion Criteria

To ensure relevance and quality, the inclusion criteria are strict in the studies to be included. Inclusion criteria will be as follows:

- Published within the last five years to ensure the recency of the data.
- Focused on the implementation of PIOMI or related oral motor interventions in transition to oral feeding for preterm infants.
- Reporting on neonatal nurses' knowledge, attitudes, or practices regarding oral feeding transitions in NICUs.
- Conducted in NICU settings, with a preference for studies that included direct feedback or data from neonatal nurses.

### Exclusion criteria involved studies that:

- We're not available in English.
- Focused solely on parental perspectives without including neonatal nurses' input.
- Lacked empirical data or were purely theoretical without a clear research methodology.

### Search Strategy

#### Databases Searched

This was comprised of a multi-database search strategy to ensure the literature review is both inclusive and relevant. For the multi-database search strategy, I searched databases such as Ovid (Medline), Elsevier, and PubMed. These comprised the following selected ones for the broad depository of medical and healthcare journals in these platforms, which offered a very wide array of studies that focused on neonatal care, nursing practices, and interventions such as PIOMI. The utilization of reference management software aided in organizing and tracking the retrieved articles throughout the review process.

### Keywords Used

A combination of specific and broad keywords was utilized to maximize the search scope. The key search terms used were "Premature Infant Oral Motor Intervention," "PIOMI," "oral feeding practices in preterm infants," "oral feeding practices in preterm infants," "NICU feeding interventions," and "transition to oral feeding in preterm infants." Further refinement to enhance the search was done by the use of the Boolean operators (AND, OR).

The methodological approach was framed to bring out strong and diverse literature, which may enable an extensive analysis on the current knowledge, practices, and other issues related to PIOMI among neonatal nurses. The aim of the study, therefore, was to synthesize findings that would help future research, educational initiatives, and clinical guidelines to ameliorate the quality of the overall care provided for preterm infants in NICUs.

### Synthesis of Evidence

The evidence from the literature reviewed gives a very convincing story of the critical need for targeted feeding interventions, such as PIOMI, cue-based feeding, and Infant Driven-Feeding (IDF) protocols, to be the mainstay in improving oral feeding outcomes for preterm neonates in Neonatal Intensive Care Units (NICUs). This body of research not only educates on the manner in which these interventions may be successful in increasing feeding efficiency, reducing hospital stay length, weight gain, and encouraging parent involvement, but also advises education and training of NICU nurses for successful practice.

The studies collectively suggest that the Premature Infant Oral Motor Intervention (PIOMI) can

positively influence oral development in transition preterm infants from gavage feeding to full oral feeding bottles or breast, as well as the overall well-being of neonates in a healthcare setting. Three themes emerged from the results recorded from the scoping literature review process:

**Theme 1:** Efficacy of feeding interventions.

**Theme 2:** Importance of nurse education and training.

**Theme 3:** Parental involvement.

**Theme 4:** Oral motor function and feeding efficacy.

**Theme 5:** The gap between attitude & competence in trophic feeding for preterm infants.

**Theme 6:** Neonatal nurses' readiness for advanced oral feeding techniques.

**Theme 7:** The Challenges in enteral feeding practices among neonatal nurses.

### I. Efficacy of Feeding Interventions

Thomas *et al.*, (2021) and Lessen Knoll *et al.*, (2019) shed more light on this critical aspect of cue-based feeding strategies and its potential to revolutionize not just preterm care but also care for other cohorts suffering from PIOMI. In addition, these interventions also lead to faster transitions to full oral feedings, reduction of hospital stays, and encouragement of parent involvement. Salient to realize, these improvements do have consequences on the developmental trajectories of preterm infants and family emotional well-being. The reduction in hospital stays mentioned in these studies, apart from giving emotional benefits to the families, has a perspective of cost-saving from a health care system point of view. The paradigm shifts to the use of structured feeding protocols, such as cue-based feeding or PIOMI, reflects a much larger movement in the field of neonatal care optimization. This especially emphasizes the use of approaches most likely to help in the natural development of preterm feeding skills without detracting from the emotional and financial strain at both the family and institution levels. As per Alinezhad Shebilouysofla *et al.*, (2022) conducted a randomized clinical trial to evaluate the effects of cup, syringe, and finger feeding methods on preterm neonates. The study found no significant difference in the time to reach full oral feeding among the three methods, suggesting that multiple feeding strategies can be effectively employed in the NICU setting. This theme highlights the importance of flexibility and individualized care in addressing the diverse needs of preterm infants during the oral feeding transition and to improve feeding quality, which is necessary for the infants' future development and well-being.

### II. Importance of Nurse Education and Training

McKenna *et al.*, (2022) further make it clear through their studies the position of nurse education and training in the process of transition to evidence-based feeding practice in the NICU. This study exemplifies how an education intervention to teach staff about the IDF Infant-Driven Feeding (IDF) protocol can remarkably change perceptions and practices, in this

case, leading to changing practice to be more individualized and developmentally appropriate for preterm infants during the initiation of oral feedings. It implies a shift from the rigid criteria, such as gestational age or weight-based, to developmental readiness cues as the determinants for feeding progression; this is an example of a more nuanced view of preterm infant feeding. This not only supports the latest research that calls for tailored care strategies, but it underscores the continued improvement of neonatal nursing practice towards a competency-based model. Such advances in nursing education and training provide great relevance in the incorporation of this and other feeding interventions with regard in improving the overall outcomes for preterm infants in the NICU. Girgin *et al.*, (2021) investigated the impact of training on neonatal nurses' knowledge regarding the transition of preterm infants to oral feeding. The study found that a structure 240-minute training program significantly improved nurses' knowledge levels at one week and one-month post-training. Compatible with study conducted by (Beissel *et al.*, 2022), that the nurses' education program had a positive effect on the oral feeding of preterm neonates, leading to an earlier attainment of independent oral feeding. This study was conducted as a quality improvement initiative and implemented an infant-cue based nurse educational feeding bundle. The intervention resulted in a significant reduction in the time taken for preterm neonates to achieve independent oral feeding during the post-intervention period compared to the baseline period. The program included nurse training and coaching and aimed to enhance feeding outcomes for premature neonates in a neonatal intensive care unit.

This underscores the critical role of continuing education and training programs in equipping nurses with the necessary skills and knowledge to support effective oral feeding practices in NICUs. Additionally, the study by Astuti *et al.*, (2023) in Indonesia delved into nurses' experiences and identified key areas such as comprehensive assessment, nursing issues, nutritional management skills, and the need for collaborative support. These insights highlight the complexity of oral feeding readiness and the multifaceted role nurses play in ensuring successful transitions for preterm infants.

### III. Parental Involvement

Majoli *et al.*, (2023) brought out another new dimension in neonatal care through their study on PIOMI administered by parents vs. professionals. They said no significant difference in full oral feedings, but increased parent satisfaction and bonding. This finding is an important development, keeping in view neonatal care for a model that places active participation in the journey of care for their infant in the hands of parents. Conversely, Ciochetto *et al.*, (2023) conducted study about the impact of Kangaroo Care on the advancement of oral abilities and the attainment of exclusive oral feeding in premature infants holds great importance. Kangaroo Care, which involves the direct skin-to-skin

contact between the mother and the infant, has been proven to have a favorable influence on multiple facets of infant health and development. Studies have revealed that Kangaroo Care can result in enhanced cognitive and motor development by the time the infants reach six months of age. Additionally, it has been found to reduce the duration of postpartum hospital stays and offer economic advantages to parents. Furthermore, long duration of Kangaroo Care led to enhanced neurobehavioral performance, feeding capabilities by reaching full enteral feeds faster, and breastfeeding success in premature infants (El-Farrash *et al.*, 2019).

In summary, the evidence substantiates the efficacy of Kangaroo Care in fostering oral feeding skills in preterm infants. This technique not only assists in the progression of oral abilities but also enhances the chances of successful breastfeeding and improves overall health outcomes for preterm infants. The efficacy of parental involvement in clinical interventions, validated in this study, challenges not only conventional roles of parents within the NICU but also sees its ability to validate psychological benefits of such involvement to both the infant and the parents. As neonatal care modernization evolves, practice is being redefined and shifting from place-focused, one-size-fits-all models of care to more comprehensive and inclusive intervention models. The shift in models of intervention is likely one in which there is increased involvement of parents in interventions aimed at supporting critical developmental accomplishments, such as oral feeding.

#### IV. Oral Motor Function and Feeding Efficiency

Works of Guler *et al.*, (2022) and Alidad *et al.*, (2021) bring a piece of growing evidence to justify the value of specific oral motor interventions, like PIOMI, for improving feeding efficiency and oral motor function in the preterm population. Such interventions serve to ease the transition to oral feeding through improvements in the motor skills required while also pointing at even better growth outcomes, thereby underlining broad developmental benefits of early and targeted support. Indeed, it supports a multidimensional impact through oral motor interventions—providing a very strong basis for practices to be used in everyday routine care for the NICU. This would highlight a potentially important area for future research and practice aiming to optimize feeding outcomes and overall development in this population group vulnerable to a wide range of developmental challenges. Oral stimulation practices are usually applied in preterm baby rehabilitation programs. Providing stimulations prior starting of oral feeding can aid in the neural system maturity, improve performance, and coordinate sucking, swallowing, and breathing functions. (Amin *et al.*, 2021). It focuses on the chin, cheeks, lips, tongue, gums, and palate in and around the mouth because of the restricted stretching of the mouth and minimal tolerance of outside stress in preterm infants. (Huang *et al.*, 2024). Furthermore, Zhang *et al.*, (2014) and Le *et al.*, (2021) demonstrate the

effectiveness of non-nutritive sucking (NNS) and oral stimulation (OS) interventions in reducing the time preterm infants require to transition from tube to oral feeding. The combined NNS and OS approach notably shortened the transition time and improved milk transfer rates, suggesting that oral motor interventions can significantly enhance feeding efficiency in preterm infants. The study by Le *et al.*, (2021) further identified that incorporating breast milk in oral stimulation (BM-PIOMI) yielded even shorter initiation of oral feeding (IOF) times and improved NNS scores, though without affecting the length of stay (LOS) in the NICU. Additionally, the study of (Singh *et al.*, 2023) conducted to compare between PIOMI which are the eight steps in five minutes duration and routine oromotor stimulation techniques such as non-nutritive sucking in preterm infants. Accordingly, the result showed that the time to oral feeding readiness, transition time to full oral feeds, and the length of stay at NICU are shorter in group who received PIOMI compared with the other group who received routine oromotor stimulation. In addition, the weight gain and exclusion breastfeeding rate post discharge in PIOMI group are higher compared to the other group. In conclusion of the study, PIOMI is more effective oral stimulation techniques that used to increase earlier transition time to full oral feeding for vulnerable hospitalized preterm infants. These findings underscore the potential of targeted oral motor interventions to expedite the transition to oral feeding, which is crucial for the development and hospital discharge of preterm infants. Chang *et al.*, (2022) introduced the TW-POFRAS scale as a tool to assist in deciding the initial oral feeding of preterm infants. The study emphasizes the utility of standardized assessment tools in clinical decision-making, suggesting that such scales can help in determining when preterm infants are ready to commence oral feeding. This theme resonates with the broader need for evidence-based tools and protocols that can guide nurses and clinicians in the nuanced process of transitioning preterm infants to oral feeding, thereby optimizing outcomes.

#### V. The Gap between Attitude and Competence in Trophic Feeding for Preterm Infants

Neonatal care, especially in preterm and low-birth-weight infants, has been underlined to have a remarkable disparity in relation to trophic feeding by Galal *et al.*, (2023). Whereas most nurses had a positive attitude towards this very vital aspect of neonatal nutrition, somehow, their knowledge and practical skills seemed not to merge with this enthusiasm. With such dissonance between attitude and competence, specialized feeding interventions, such as Premature Infant Oral Motor Intervention (PIOMI), would come close to becoming nearly impossible to implement. The positive attitude would build up the basic readiness to accept and use advanced feeding strategies. Comprehensive knowledge and skills that are lacking are, therefore, very great barriers to the effective translation of this willingness into clinical practice.

Such a disparity in this case would imply great implications to the neonatal care field, more so to the training and professional development of the neonatal nurses. This highlights the high need for specific educational programs that are guided not only toward gaining an increase in knowledge but also toward obtaining practical skills, which are indispensable during the implementation of specialized feeding protocols. Successful implementation of the interventions like PIOMI into practice would be possible only if the nurses are equipped with such profound knowledge related to the techniques and benefit implementation in practice. Efforts to fill these gaps through education and training would dramatically influence the care and outcomes for preterm infants since positive attitudes toward advanced neonatal care need to translate into competent and effective practice.

## VI. Neonatal Nurses' Readiness for Advanced Oral Feeding Techniques

If compared with the critical challenges in the study by Galal *et al.*, (2023), the study of Fathi *et al.*, (2022) is characterized by a rather optimistic trend of neonatal nursing practice regarding sensorimotor stimulation for the promotion of oral feeding process in preterm neonates. This, therefore, provides evidence to ascertain that most nurses have knowledge of sensorimotor stimulation techniques and also demonstrate competence in their application. This thus forms a very sound grounding for other specialized interventions, among them PIOMI.

The ready disposition by the neonatal nurses to take up and implement the interventions at hand is a positive pointer that would mean preparedness in the ease of integration of PIOMI in the already existing frameworks in the neonatal care. In such a case, the competency of the nurse is said to be mounted on the sensorimotor stimulation techniques for self-management of stress and embodied at the nature of competencies involved in the introduction of new practices with an implied level of readiness and flexibility. This preparedness reflected the current status of neonatal nursing education and practice; it implies that the efforts indeed being made to enhance knowledge and skills of nurses in this area are bearing fruits. This level of readiness of the staff, therefore, should be optimally utilized, and professional development and education in neonatal care further strengthened. It is more likely, therefore, that improving an environment to be more enabling towards exploring and adopting interventions from evidence may have implications for quality improvement of care for preterm infants and offer professional growth opportunity for nurses. Successful implementation of PIOMI in the neonatal nursing practice thus calls for leveraging the existing knowledge base, with specific reference to specialized feeding interventions and facilitating the provisions that would help in implementing the same. Ostadi *et al.*, (2021) examined the effects of swallowing exercise and NNS on

oral feeding readiness in preterm infants. The study found that both interventions improved oral feeding readiness, with the combined approach of NNS and swallowing exercises significantly increasing the number of discharged infants without tube feeding. This highlights the potential of innovative and combined intervention strategies to accelerate oral feeding readiness and outcomes for preterm infants.

## VII. The Challenges in Enteral Feeding Practices among Neonatal Nurses

The findings from Gomaa *et al.*, (2022) seem to have reported similar concerns to those of Galal *et al.*, (2023) with the knowledge and practice of nurses in enteral feeding to high-risk neonates. This study further portrays that a significant proportion of nurses had unsatisfactory levels of knowledge and practice on a very important area of neonatal care. The gap in both knowledge and practice not only affects the quality of care rendered to high-risk neonates but may also render difficulties to implement programs such as PIOMI successfully. Prokop *et al.*, (2021) focused on registered nurses' (RNs) experiences in supporting breastfeeding women through an integrative review. The review identified key themes such as workplace issues, personal experiences, and the need for breastfeeding knowledge and education among nurses. This underscores the pivotal role of nurses not only in supporting preterm infants but also in providing comprehensive support and education to mothers, which is essential for promoting breastfeeding and enhancing maternal-infant bonding.

This means that the study brings up the wider issue of education and training in the practice of neonatal nursing. The lack of knowledge and practices in the process of enteral feeding reflects a deficiency of any specific educational program in relation to feeding in high-risk neonates. Appropriately, the adoption and implementation of such interventions as PIOMI would depend on the level that the principles of nutrition for the neonatal and techniques for feeding have been articulated among the nursing cadre. These improvements can also be made to integrate those special approaches into routine practice for the improvement of neonates by special training of nurses in the advanced feeding interventions area with increased knowledge and skills.

### Research Implications

Further research is then needed to fully explore this potential of PIOMI, identify possible best-bet intervention strategies, and assess the value of wide-ranging comprehensive educational programs for neonatal nurses. Further research on PIOMI and parental involvement may identify how to promote parent-infant bonding and associated developmental outcomes. Comparative research on different oral feeding approaches would help identify the best practices for NICU settings.

### Clinical Practice Implications

The results give support to the standardization of the PIOMI in the NICU care protocols, encouraging continuing professional development of the neonatal nurses and apply best evidence-based practice. The NICUs will design strategies for active parental involvement when intervening in feeding, which should be in the line of providing individualized care plans for each infant.

### Policy Implications

Special training and education for neonatal nurses need to be supported by policymakers and health organizations, besides promotion of research in neonatal feeding. There is an urgent need to develop standardized guidelines for PIOMI and oral feeding interventions to improve practices associated with neonatal care. Its integration into the routine will require concerted research, changing clinical practice, and policy formulation. Likely, addressing this factor is likely to improve quality care and outcomes among the preterm infant population, which is an indication of a multidisciplinary approach in neonatal care.

## CONCLUSION

Evidence from these various studies underscores the usefulness of focused interventions, such as PIOMI, cue-based feeding, and Infant-Driven Feeding (IDF) protocols, for improving outcomes related to oral feeding in preterm neonates. These measures, in their turn, contribute not only to a much earlier shift to oral feeding and reduction of hospital stays to a fraction of their former durations but also importantly involve parents in the feeding process to a remarkable degree—a key factor for the emotional well-being of the infant and family. More importantly, there was a big mismatch between nurses' attitudes, which were positive about specialized feeding strategies, and the actual knowledge and competence in using the same practices. In the context of this gap, therefore, becomes imperative focused educational and training programs for neonatal nursing professionals. Such, therefore, is a need to enhance the learning and training of nurses in advanced neonatal feeding techniques, which can only be possible with proper incorporation of interventions such as PIOMI into standard care. Further, the review showed a high level of readiness by neonatal nurses to adapt and apply progressively oral feeding techniques, hence pointing toward a positive direction in the integration of such niche interventions in NICU practices. They also noticed that the knowledge and practice among nurses in enteral feeding posed identified challenges, which do underline continued development and support.

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