



Skills of premature newborns to oral feeding initiation

Habilidades de recém-nascidos prematuros para início da alimentação oral

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Objective: to identify the scientific evidence about the abilities of premature neonates in Neonatal Intensive Care Unit, to oral feeding initiation. **Methods:** integrative review, held in the databases Scopus, Cinahl, Medline, Lilacs, Science Direct and Web of Science, not controlled and with no timeframe, using the key words: *Recém-Nascido Prematuro/Premature, Infant; Comportamento Alimentar/Feeding Behavior and Aleitamento Materno/Breast Feeding*, crossing them with the AND operator. Inclusion criteria: full available in Portuguese, English and Spanish, without year limitation; and exclusion: articles that did not answer the research question, repeated and from other scientific sources. **Results:** the scientific productions revealed that the sensory-motor-oral stimulation, non-nutritious sucking and evaluation of hemodynamic parameters favor the transition from probe-oral to breastfeeding. **Conclusion:** we identified evidence that prove that the use of the stimulation and skills development facilitate, in less time, the beginning of oral feeding.

Descriptors: Infant, Premature; Feeding Behavior; Breast Feeding; Neonatal Nursing.

Objetivo: identificar as evidências científicas acerca das habilidades de recém-nascidos prematuros, em Unidade de Terapia Intensiva Neonatal, para início da alimentação oral. **Métodos:** revisão integrativa, realizada nas bases de dados Scopus, Cinahl, Medline, Lilacs, Science Direct e Web of Science, de forma não controlada e sem recorte temporal, utilizando os descritores: *Recém-Nascido Prematuro/Premature, Infant; Comportamento Alimentar/Feeding Behavior e Aleitamento Materno/Breast Feeding*, cruzando-os com o operador AND. Critérios de inclusão: disponíveis na íntegra, em português, inglês e espanhol, sem limitação de ano; e os de exclusão: artigos que não responderam à questão de pesquisa, repetidos e provenientes de outras fontes científicas. **Resultados:** as produções científicas revelaram que a estimulação sensório-motora-oral, sucção não nutritiva e avaliação de parâmetros hemodinâmicos favorecem a transição sonda-oral para o aleitamento materno. **Conclusão:** foram identificadas evidências que comprovam que o uso da estimulação e o desenvolvimento das habilidades facilitam, em menor tempo, o início da alimentação oral.

Descritores: Recém-Nascido Prematuro; Comportamento Alimentar; Aleitamento Materno; Enfermagem Neonatal.

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Introduction

Prematurity, growing over the years, is a reason of concern for health professionals, in order to provide greater confrontation of the problems, contribute to perinatal and neonatal mortality reduction and encourage increased survival of premature neonates. Among the many problems at this stage, are the food issues⁽¹⁾.

Newborn premature babies are born before 36 weeks and six days, with a birth weight less than 2,500 Kg. However, birth weight alone does not rate prematurity but the association between gestational age and weight. This format classifies in three ways: small for gestational age, appropriate for gestational age and big for gestational age⁽²⁾.

The lower the gestational age of premature newborns, the greater the physiological immaturity, which in addition to neurological immaturity, muscle hypotonia, poor reflexes, difficulty in self-regulation and oral and respiratory disorders decrease oral and motor skills and hampers feeding. Breast milk is the ideal food to meet the nutritional needs of premature babies, especially when produced by the mother, because protection factors make up this milk, and it is also a way of reducing children morbidity and mortality and impacts on health promotion of the mother-son binomial⁽³⁻⁵⁾.

Breastfeeding is a key practice of nutrition, protection, bond and affection, being the more natural and safer way to feed a newborn baby. Research show that feeding the premature baby with milk taken from the mother provides benefits for immunity, digestion and nutrients absorption. The recommendation of breastfeeding has been defended on the basis of its immunological properties, gastrointestinal maturation, in the mother-child bond and it improves neuro-comportamental performance⁽⁶⁻⁷⁾.

However, premature newborn babies have difficulties to overcome due to the instability of their basic vital functions and the immaturity of sucking, swallowing and breathing reflexes. As a result, feeding

is performed by a gastric probe (gavage) until they are able to start oral feeding^(3,8).

The multidisciplinary team has to monitor and evaluate the transition process by continuously observing sucking, swallowing and breathing coordination of the premature newborn, until they obtain adequate nutritional intake that allows growth, physiological stability and progress in the feeding function. It is one of the great challenges that the premature baby must overcome after they obtained physiological stability^(3,9).

The most important point in the process of transitioning from probe to breastfeeding is the encouragement to begin breastfeeding, in order to meet the nutritional needs of the premature baby and to insert the mother in the context of care during their hospital stay. The World Health Organization indicates breastfeeding as the best feeding practice, and the American Academy of Pediatrics defines the ability of full oral feeding as one of the criteria for hospital discharge⁽⁹⁾.

The premature newborn is able to feed on the maternal breast with the help of the professionals, who must be prepared to integrate the hospital clinical management of lactation through standardized protocols. However, the literature points out a lack on protocols standardization on these thematic protocols^(6,8-9).

The concept of skill, according to the Dictionary of Portuguese Language⁽¹⁰⁾, is the ability to do something, that is, it relates to the aptitude to fulfill specific task with a certain level of dexterity. In this way, the premature needs early stimulation of skills to achieve oral feeding. However, we observe that, in practice, premature babies begin oral feeding in an unsystematic manner, with no evaluation standard of the right time. Research is diversified as to the use and content of evaluation protocols for oral feeding initiation^(3,7-9).

Based on the above, the following question arose: What is the evidence in the area of health about the skills of premature newborns, in the Neonatal Intensive Care Unit, for the initiation of oral feeding? To

answer the question, the review aimed to identify the scientific evidence about the abilities of premature newborns, in the Neonatal Intensive Care Unit, for oral feeding initiation.

Methods

We adopted an integrative review of the literature, which provides the synthesis of knowledge and relates the results in a critical way, in order to produce new knowledge that contribute significantly to science and clinical practice⁽¹¹⁾.

The implementation of the integrative review was held by means of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The elaboration of the guiding question was based on the PICO strategy that consists of the identification of the P= participant, I= intervention, C= control and the O= outcome, which contemplated the population (premature newborn), the interest of the study (knowing the evidence in health on skills), the context (Neonatal Care Unit) and the outcome (oral feeding of premature newborns).

The search was carried out in 2016, in the following databases: SCOPUS, The Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medical Literature Analysis and Retrieval System Online (MEDLINE), Latin American and Caribbean Literature in Health Science (LILACS), Science Direct and Web of Science. The search in different databases had the goal of expanding the search field of the research and minimizing errors of result interpretation. A single researcher accessed each base in order to select the largest number of articles to answer the question of the research.

The descriptors used in the research identified in the Descriptors in Medical Subject headings (MESH) were: 1#Premature, Infant; 2# Feeding Behavior and 3#Breastfeeding, through crossing 1#2#3 and Boolean operator and (1#AND2#AND3#). We used this search strategy in the databases in an uncontrolled way. We chose the uncontrolled search due to the limita-

tion of publications in controlled search and therefore greater scope in that option.

The inclusion criteria established were: articles fully available, in English, Portuguese, Spanish and without publication year limitation. It had no period, due to the limited publications available on this subject and its specificity. In addition, the exclusion criteria were: articles that did not answer the question of the research, repeated and publications from other scientific sources such as: dissertations, theses, book, pilot study, editorials, notes to the editor and reviews.

We found 5,098 articles in the Identification Step by means of researches databases, and excluded 5,059 because they did not meet the objective of the research. Then, we recovered 39 articles for evaluation, which composed the Eligibility Step. In the Inclusion Step, we pre-selected 39, eight composed the review, since 31 were excluded, of which 21 did not answer the question of research, three were repeated and seven because they were not fully available. We did not use reference manager. In the course of the research, the researcher identified repeated articles immediately withdrew them.

In order to assess the level of evidence of the publications included in this review, we chose the classification⁽¹²⁾ presented below: Level I- systematic review of randomized clinical trials; Level II- systematic review of quasi-experimental studies, at least a randomized controlled clinical trial; Level III- well-delineated cohort study or case-control or observational study, without a control group; Level IV- systematic review of descriptive studies or case study; Level V- systematic review of expert opinion or consensus.

Figure 1 shows the flowchart, in an orderly way, used in the selection of publications.

Finally, figures 2 and 3 were built, based on the PRISMA model, to systematize the search results with the following characteristics: identification, author/year of publication, journal/database, search site, methodological design, results and conclusions of the articles analyzed.

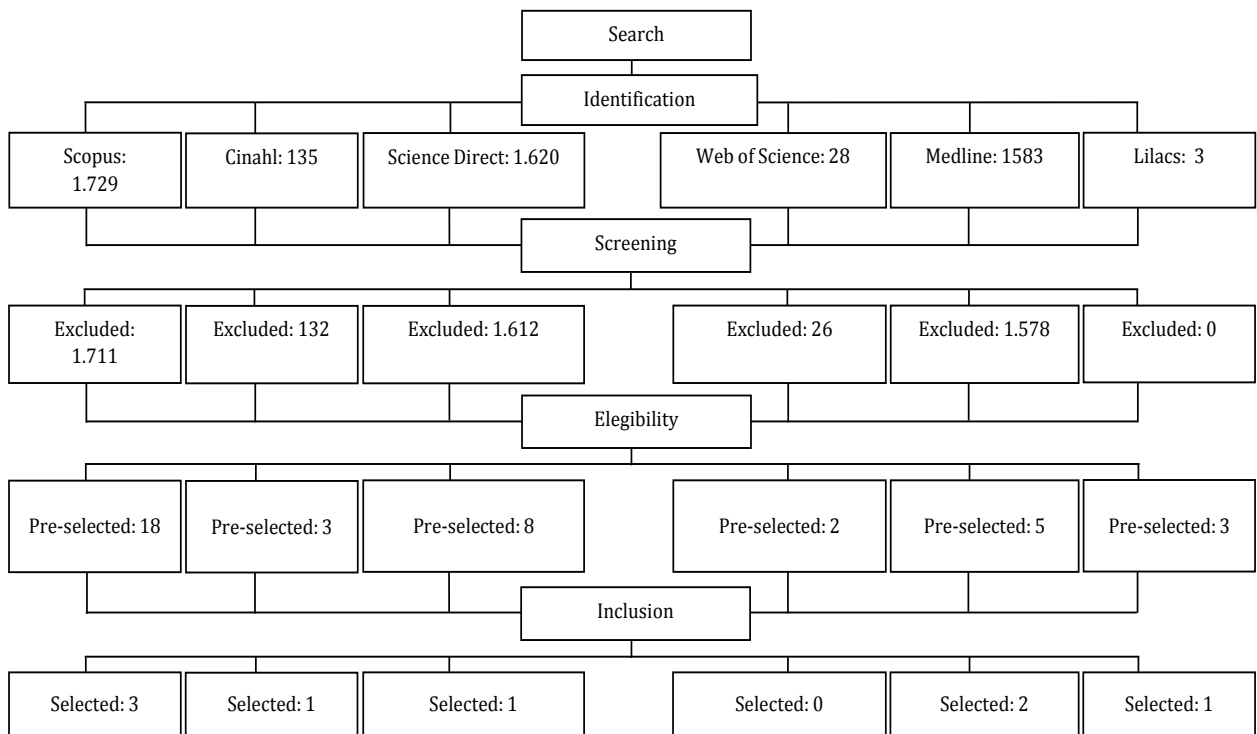


Figure 1 – Flowchart used for the selection of publications, based on PRISMA

Results

As for the period of publication, we found that the time of the articles included in the research was varied from 2004 to 2016; however, the most of the publications was carried out after 2009. About the level of evidence, we identified that four out of eight publications were classified at level II; two, level V; one, level IV; and one, level III.

With regard to the professionals involved in the premature babies' assistance, we found in the selected productions: two involved speech therapist; one included a nurse; three covered speech therapist and nurse; and one not identified. As for the language of the publications, two were in the Portuguese and six in English, contemplating most of the publications.

As regards gestational age, the results diverge: one (between 26 and 33 weeks); one (32 and 36 weeks);

one (30 and 34 weeks); two (less than 36 weeks); two (less than 37 weeks); and one article did not describe that information.

Figure 2 gathers the characteristics of the final sample, in which articles encoding was performed randomly, without using objective criteria. We specified the main information of the articles used in the review for better identification.

Figure 3 shows that the stimulation made in premature newborns is fundamental in the process of reaching oral feeding, since when receiving the stimulus, they acquire appropriate behaviors, such as the coordination of sucking function, breathing and swallowing, which will facilitate their aptitude for oral feeding.

ID	Authors/Year	Journals/Bases	Search sites	Design
A	Jackson BN, et al./2016	Acta Paediatric/SCOPUS	Six neonatal intensive care units	Retrospective review of medical records
B	Ziadi M, et al./2016	Newborn Infant Nurs Rev/ SCIENCE DIRECT	Database search	Systematic review
C	Yildiz A, Arikan D/2011	J Clin Nurs/CINAHL	Neonatal intensive care clinic and premature unit	Randomized clinical essay
D	Bauer MA, et al/2009	Rev Bras Saúde Mater Infant/ SCOPUS	Neonatal intensive care unit	Controlled clinic essay
E	Aquino RR, Osorio MM/2009	J Hum Lact/SCOPUS	Kangaroo mother Care Unit	Descriptive study
F	Rocha MS, Delgado SE/2007	Rev Soc Bras Fonoaudiol/LILACS	Neonatology Center	Observational study, exploratory
G	Thoyre SM, et al./2005	Neonatal Netw/MEDLINE	Chronic Disease Research Center	Systematic review
H	Pickler RH/2004	Neonatal Intensive Care/ MEDLINE	National Institute of Nursing Research	Not identified in the research

Figure 2 – Final sample characteristics

ID	Results and conclusions of the articles analyzed
A	The time to begin oral feeding decreased with increasing gestational age and weight. For those born at 32 weeks: six days; at 33 weeks: two days. They achieved oral feeding at 36 weeks, on average.
B	Non-nutritious sucking decreased the time required to achieve direct breastfeeding (pacifier group = 7.7 days x control group = 11.7 days) and the length of hospitalization (average pacifier = 15.4 days x control group = 21.7 days). Non-nutritious sucking, with pacifier, helped to achieve higher scores on the success of breastfeeding.
C	The babies who used the pacifier achieved full oral feeding in less time and achieved greater success developing sucking.
D	Sensory-motor-oral stimulation, followed by non-nutritious sucking, before each breastfeeding, motivated 83.3% of the group to complete the transition from probe to oral feeding in up to seven days, with weight gain.
E	Feeding transition was initiated when the baby was clinically stable and able to coordinate the process of sucking, swallowing and breathing. The transition time was from 5 to 10 days, the average daily weight gain was 15 to 18 g/d. 10.0% of the babies began the transition at less than 34 weeks of corrected gestational age.
F	Estomatognathic system stimulation was performed with peri and intraoral handling and use of pacifier, with premature infants in state of alert, in order to tailor the oral sensitivity changed, organize the coordination of the functions of swallowing and breath and encourage the baby to get the mother breast correctly. The consequence was weight gain, because the stimulated premature newborn sucks all the prescribed volume more easily, activates the search reflex behavior, sucking and swallowing, which favors feeding.
G	Premature babies who is interested in breastfeeding will search the nipple, arrange the tongue and guide the posture of their body. The skills of newborns are: keep flexed body posture and get the opportunity of sucking.
H	Non-nutritious sucking is an indicator they are ready for oral feeding. The relevant factors in the decisions of nurses: behavioral factor (Non-nutritious sucking ability); physiological factor (choking when with prob insertion); and physical factor (post gestational age).

Figure 3 – Results and conclusions of the articles analyzed

Discussion

This article presented as a limitation the scarce amount of scientific productions about the skills of premature newborns to start oral feeding, since protocols for this purpose are not, yet, standardized in Neonatal Intensive Care Units, showing inconsistency in establishing criteria and time needed to achieve oral feeding. In addition, it was difficult to find current productions on the subject, due to its specificity.

Given the analysis of the publications content, we perceived that the skills developed by techniques and based on targeting, which leads to the acquisition of specific behaviors and provide premature newborns the ability to oral feeding in a shorter time.

The main techniques used by professionals to develop skills, were the use of non-nutritious sucking, stimulation with gloved finger, through extra and intraoral massages, and the use of bottle and glass, with the purpose of empower premature newborns for sucking, swallowing and breathing. In addition to evaluating the hemodynamic parameters, before and during the transition process, such as oxygen saturation, alert status, muscle tone, posture, maintenance of the sucking rate and signs of stress.

The expression of skill facilitates better adaptation to changes, which happens safely. The factors that confirm that skill are the alert state, oral motor organization, sucking, swallowing and breathing coordination, as well as the maintenance of physiological stability. These skills help professionals determine the ideal time for early start oral feeding, and facilitate the identification of oral dysfunctions and physiological maturity⁽¹³⁾.

The practice of sensory-motor-oral stimulation is addressed as a potential evaluator on the transition time from probe to oral feeding, which consists of extra and intraoral massages performed with the gloved hand, followed by the non-nutritious sucking, with the gloved little finger. The results obtained pointed to a complete transition, in the average of 1.6 days, in patients subjected to stimulation. Most of the children

stimulated (83.3%) achieved the complete transition from probe to oral route at the end of seven days⁽¹⁴⁾.

Sensory-motor-oral stimulation has been analyzed in the literature as a positive measure for the development of premature newborns, in order to improve the coordination of sucking, swallowing and breathing, to accelerate the food transition from probe to oral feeding, reduce hospitalization time and encourage early weight gain and breastfeeding⁽¹⁵⁾.

Another intervention used in the of neonatal intensive care units is the use of bottle nipples, made to facilitate the beginning of the transition. However, this practice interferes with the breastfeeding process. The use of the bottle as a support method can cause confusion between the silicone nipple with the nipple of the mother and premature newborns may prefer the bottle because they do not need to remove the breast milk. In addition, bottle-fed babies showed signs of physiological stress and decreased oxygen saturation compared to those breastfed⁽¹⁶⁾.

On the other hand, feeding the baby with a cup stimulates the reflexes they will need for breastfeeding through the oral and olfactory sensorial receptors, increasing the production of saliva and digestive enzymes. The cup is effective as a feeding methodology since it spends little energy, stimulates the development and coordination of the reflexes of sucking and swallowing, stimulates the secretion of saliva, which makes the digestion more efficient, constituting an easy method to offer diet⁽¹⁷⁾.

Neurological immaturity also interferes with the success of breastfeeding. When the newborn is clinically stable and able to coordinate sucking, swallowing and breathing, they becomes able to initiate the transition. The trans lactation was the technique of intervention we found in a research that verified a transition period between 5 and 10 days, with an average daily weight gain of 15 to 18g, and from 45 to 55g, during the full oral feeding period. Moreover, less than 34 weeks of corrected gestational age was the time when 10.0% of those babies began to change. It is noteworthy that the evaluation of the sucking

ability determines the technique for the beginning of the transition, method of translactation and lactation, without the use of cups and bottles. High percentage of the babies (63.4%) made the transition by relactation since their mothers did not express two-thirds of the prescribed pre- volume diet⁽¹⁸⁾.

To corroborate, another research points out that the technique of direct transition from the probe to the breast (translactation) brings benefits to lactogenesis, since a frequent milking maintains milk production adequate to the caloric and nutritional needs of the premature newborn. So, when the baby is in the phase of the technique called "full breast" sucking, they will receive the adequate volume of milk to their weight and gradually will pass to the phase of free demand breastfeeding, without receiving oral complement (cup and/or bottle), which favors the practice of exclusive breastfeeding⁽⁶⁾.

Gestational age and weight are factors observed in the health care behavior for the aptitude of oral feeding, because they are indicators of physiological maturity, however, isolated, they do not guarantee the efficiency to start the transition. The time for the beginning of the transition decreases with the increase of gestational age and weight. The baby born at 32 weeks obtained an average time of six days and, for those born at 33 weeks, the success was achieved in two days⁽¹⁹⁾.

Another aspect discussed in the literature is the long separation of the binomial mother-child immediately after birth, which added to the stress of the mother, due to the period of hospitalization, impacts negatively on the feeding transition and the establishment of breastfeeding, as well as the risk of early weaning⁽²⁰⁾.

The interventions carried out in this adaptation process are criteria that substantiate and consolidate decision-making. A research that observed the behavior of different groups of babies, identified that premature newborns who used the pacifier realized the transition from probe to oral feeding less time and had greater success in sucking, compared to the ones sub-

mitted to Lullaby⁽²¹⁾.

It was found that non-nutritious sucking decreases the time needed to achieve direct breastfeeding (average in the pacifier group = 7.7 days against 11.7 days in the control group) and the time of hospitalization, which reduced (average in the pacifier group = 15.4 days, against 21.7 days in the control group). Stimulation was performed once a day for at least 10 days⁽²²⁾. The greatest benefits of this technique lies in the ability to soothe an agitated baby and also, leave them in a state of alert for feeding⁽²³⁾.

The shorter time to achieve of the non-nutritional sucking technique in "gloved finger" or "empty breast" is associated with a higher corrected gestational age and longer exposure time to extrauterine experiences, which facilitates the success of sucking and favors the ability of sucking, swallowing and breathing coordination. Weaning from the probe directly into the breast has qualitative advantages, because when sucking, the baby establishes adequate stimulation of the orofacial muscles. With this, muscle tone increases and promotes the correct postures during rest, and the functions of the stomatognathic system, as it is expected in the normal development⁽⁶⁾.

The involvement of a multiprofessional team during the interventions carried out in premature newborns in the process of evaluation of feeding transition is essential, especially speech therapists and nurses^(13-14,19-22,24).

These professionals are important to adapt the stomatognathic system to the stimulation of oral feeding in a safe and effective way, and thus to promote breastfeeding. The multiprofessional team must act in order to give confidence and tranquility for mothers in a peaceful work environment, and they need to be aware of the importance of the affection and respect that mothers and children need at this time. Listening is fundamental in this process of creating a mother-child bond, crucial to the development of physical and mental health^(20,24).

A research confirms that the success of the premature newborn to nutritional sucking is primarily

the responsibility of nurses because they are the only professionals who take care of the patients 24 hours a day. It also suggests that caregivers can help them meet the goals of self regulation⁽²³⁾.

In this sense, the multiprofessional team follow and accurately evaluates the existence of motor and oral capacity that will indicate the appropriate time to go from the probe to the breast.

Conclusion

We identified evidence proving that stimulation (sensory-motor-oral, non-nutritional sucking, use of the cup, relactation), as well as observing oral and motor dysfunctions and adverse events, are facilitators of behaviors that helped premature newborns to acquire, in a shorter time, the specific and essential skills to initiate oral feeding. Some evidence also points more directly to the priority skills in this process: maintaining the alert state and physiological stability; good response to sensory-motor-oral stimulation; efficient coordination of sucking; swallowing and breathing functions.

Collaborations

Cavalcante SEA, Oliveira SIM, Silva RKC contributed writing the article, in the analysis and interpretation of data. Sousa CPC and Lima JVH collaborated with the relevant critical review of intellectual content. Souza NL contributed to the design, article writing, analysis and interpretation of data and final approval of the version for publishing.

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