

Health professional's perception about the use of human colostrum, as preventive measure for necrotizing enterocolitis in preterm newborns

Percepción del equipo de salud sobre los beneficios del calostro como factor protector de enterocolitis necrotizante en recién nacidos prematuros

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What do we know about the subject matter of this study?

El calostro materno es beneficioso para la salud del recién nacido, por su aporte inmunológico. No obstante, en recién nacidos prematuros, dada su inmadurez general, la lactancia materna se restringe en las primeras horas de vida.

What does this study contribute to what is already known?

Entrega la opinión y experiencia de profesionales de salud de hospitales de alta complejidad neonatal, acerca del suministro precoz, dosificado y protocolizado de calostro a prematuros aún extremos, como medida profiláctica general y preventiva de Enterocolitis necrotizante.

Abstract

In Chile, necrotizing enterocolitis (NEC) mainly affects preterm infants, with an incidence of 0.3 to 2.4 per 1,000 live births, and 8 to 12% in preterm infants weighing less than 1,500 grams. **Objective:** To describe health professionals' perceptions on the use of human colostrum as a preventive measure against necrotizing enterocolitis in preterm newborns. **Subjects and Method:** Qualitative study, using 18 semi-structured individual interviews of health professionals in three public hospitals of the Valparaíso Region. The interview included 3 topics: Knowledge, Perception of early colostrum supply and Opinion about the extent of the measure, and 6 subtopics, 2 for each topic respectively: Self-perception of knowledge level and Sources of information; Experience: positive aspects/adverse

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events and Opinion of colostrum as a protective factor for enterocolitis; Facilitating or hindering aspects and Opinion about the measure as national policy. Data were processed through qualitative content analysis. **Results:** Two of the three high-complexity neonatal units of the Valparaíso Region have a protocol for administering colostrum in premature infants. Participants have a positive opinion about the preventive results of this measure. Even in the third hospital where there is no protocol, they have a favorable perception of its potential benefit and its low cost of implementation. However, we observed that this procedure requires more evidence and an application protocol. Other limitations would be the lack of staffing and training and the need for equipment and supplies. **Conclusions:** Professionals who have applied a colostrum administration protocol in preterm infants in the Valparaíso Region report good health outcomes and promote team motivation towards this practice. However, it is relevant to the dissemination and discussion of national and international protocols, as well as the development of local research. Given the ongoing experiences in Chile and the international debate, we considered appropriate to address and discuss the topic within the national health community.

Introduction

In Chile, the necrotizing enterocolitis (NEC) incidence is 0.3 to 2.4 per 1,000 live births, which mainly affects premature infants, 8 to 12% of whom born under 1,500 grams¹. National guidelines for the management of premature infants¹ include a zero-feeding regime. Failure to comply with this measure could lead to several disorders in the newborn, including NEC^{2,3}, as the newborn's immature digestive system is not well developed yet³. Regarding the low-birth-weight infant with risk factors, enteral feeding should be delayed for at least 48 hours, and in those with no risk factors, they can be fed from day one¹. This measure is in line with national and international evidence and guidelines for feeding preterm infants, which indicate that they may be fed enterally from the first or second day, depending on the clinical evolution of the patient⁴⁻⁸.

In the last decade, several authors have raised the benefits of early enteral feeding in preterm infants in order to trophic stimulate, support the immune system, and prevent gastrointestinal diseases^{6,9}, as well as gain time to achieve full enteral feeding and promote breastfeeding^{10,11}. Various reviews and research have investigated the risk and prophylactic benefit of early maternal colostrum feeding from the first hours of life, even in extremely premature infants⁹⁻¹⁴. In these cases, they were fed with colostrum in very low doses, between 0.1 and 0.5 ml every 2 to 4 hours. As for its results, its administration has been reported to be safe in extreme preterm and ill newborns^{11,14-17}, however, its benefits are divergent.

Clinical trials and literature reviews have established a positive association between the human colostrum intake and lower incidence of morbidity and mortality^{7,17,18}, specifically NEC^{12,13,19-24}. There is disagreement about the volume and speed of intake^{25,26}.

However, other studies have shown that the relationship has not been determined, or has been insufficient^{10,11,14,16,17,26-33}. A multicenter clinical trial is currently underway including 622 patients, with a protocol published in 2015³³.

Some studies have analyzed the positive impact of standardized nutrition protocols on the morbidity and mortality of premature infants^{17,22,24}. A comprehensive analysis of enteral trophic feeding protocols in premature infants would require a specific study, however, some examples show positions that favor its use.

The World Health Organization, in its global action report on premature births³⁴, promotes early enteral feeding, even in extremely premature newborns, as does the Spanish Association of Pediatrics^{35,36}. However, clinical practices in that country vary in their feeding regimen for premature infants³⁷, and the benefit of starting enteral feeding in the early hours is not clear³⁸. Besides, the Ibero-American Society of Neonatology recommends starting enteral trophic feeding with breast milk as soon as possible after birth, although it recommends caution given the lack of evidence about the benefits³⁹. In the Dominican Republic, a clinical practice guideline for the care of premature infants⁴⁰ favors the trophic enteral feeding of preterm infants, as does a clinical guideline from the local health district of Sydney, Australia⁴¹.

In Chile, hospitals in some regions, including the Metropolitan, Valparaíso, and Los Lagos, are administering minimal enteral feeding with maternal colostrum, for the preventive purpose mentioned above⁴²⁻⁴⁵. However, this practice is not widespread, there is no national protocol for early colostrum administration in the first hours of life of premature newborns, and no studies evaluating national experiences.

In the Valparaíso Region, there are three hospitals with neonatal intensive care units, two of them administer trophic feeding with maternal colostrum

to preterm newborns. In one of them, we had access to the protocol which indicates the colostrum administration to the preterm infants from the first six hours in a dose of 0.5 ml every three hours, eight times daily, via a gastric tube or sublingual, even in stabilized extremely preterm infants that are not at risk of enterocolitis. In a third hospital, the above does not apply, given the different clinical management criteria in the same region.

Considering the influence of the clinical experience and vision of health professionals in the discussion, proposal, and execution of health measures, there is interest in knowing their opinion regarding these practices. This is a preliminary step to establish a start to learn about the health team's predisposition to the issue, the discussion about the risks and benefits of extending this practice present in some of their high complexity hospitals, and the motivation to study the issue. Therefore, the objective of the study is to know the opinion of the health team on the use of colostrum as a protective factor of NEC.

Patients and Method

Approach

A qualitative approach was used, with a phenomenological perspective^{46,47}, given that the objective is to know the perception⁴⁸ of the health personnel, from their vision and experience, which influences their opinion and contributes to maintain the practices or generate changes. This approach is useful when the researcher needs to understand the perspective of people on the phenomena that surround them, the meaning they give to them^{49,50}, and the behavior from the participant's reference⁴⁶.

Participants

The population consisted of obstetrician and gynecologists, pediatricians, midwives, and advanced-technical-degree nurses from neonatal and obstetrics-gynecology units, from each of the three high-complexity public services of the Valparaiso Region. The sample consisted of 18 professionals, which covered the variety of the three disciplinary areas and three facilities mentioned above (see Table 1)⁵¹, also achieving saturation of the most relevant topics. The participants expressed their willingness to collaborate in a personal capacity, as well as informants with more than two-year experience caring for premature infants and their mothers. To obtain the sample of participants, different qualitative techniques were used such as chain-referral or snowball sampling, and for convenience^{49,51}. Exclusion criteria were having worked in the area for less than two years or being a substitute.

Data collection method

Semi-structured individual interviews with key informants were used. They were recorded, guided by an interview pattern (see Table 2), and flexible regarding content and thematic sequence of the conversation^{47,49,51}.

Analysis

For analyzing data, thematic content analysis⁵²⁻⁵⁶ was used through an inductive coding process^{49,52}. That is the identification of thematic axes (categories) and sub-themes (subcategories) that emerge from the transcribed text, which code each interview, in a preliminary analysis. In a second analysis, integrated coding was carried out grouping the categories and subcategories, looking for patterns and relationships between them, considering the objectives and dimensions established for the study, as well as the emerging themes not raised in the initial design of the work.

Exhaustive research

At the beginning of the study, the research team underwent an identification process of researchers' biases, training, and homologation for the application of the interviews previously piloted. All interviews were recorded and transcribed verbatim. Once the first interviews were conducted, their results were discussed, in order to adapt the instrument and improve its application. The coding process of the entire text of each interview was carried out along with a reflection process on interpretative biases and results by a thesis team member, the principal investigator, and the study's methodological advisor. The overall outcome and scope were discussed. Given the sample, the transferability of results should be studied in other regional contexts^{46,49,56}.

Ethical aspects

The study was approved by the Ethics Committee of the Aconcagua Health Service (March 2018). All participants gave their informed consent to the interview, which was anonymous. The authors do not declare conflicts of interest.

Results

The following results include knowledge and perception about the early colostrum intake in premature newborns and opinion about the conditions of implementation and the extent of this measure nationally.

Health team perception of early maternal colostrum administration as a protective factor for NEC

Most of the respondents (sixteen) have a positive perception of this prophylactic measure. The main re-

ason why the administration of colostrum in the first hours of life of premature infants seems to be positive is due to the trophic stimulation and its supply of immunoglobulins. This perception applies to all preterm infants, especially extremely preterm infants, regardless of their condition. The measure would decrease the length of hospital stay and therefore the risk of healthcare-related infections. They point out that several investigations, such as the positive results in their patients, support the practice.

“But specifically for NEC, colostrum plays a key role. I mean, because of the anti-infective factors it has, proteins and living cells as well, and factors that stimulate the growth of normal intestinal flora. A natural probiotic, absolutely, has oligosaccharide factors that stimulate the proliferation of bifid flora, lactobacilli, protective flora. Hence the interest of colostrum as an anti-infective protector rather than for nutritional purposes” (E6P31).

Two interviewees did not give a definite positive response. In their opinion, there is insufficient evidence, even though they recognize the general protective

benefits and components of colostrum. Therefore, they would not apply it as a prophylaxis to prevent NEC, but as enteral stimulation, since it requires minimal volumes of breast milk.

“Based on a small study, I wouldn’t implement it. If the resources were available, I would run a larger study with more statistical power. And to demonstrate some kind of benefit... you have to weigh the risks against the benefits it can bring, but with so little, it’s difficult (E10P5)”.

Based on the experience, all participants from the two hospitals applying the measure do not believe that it has contraindications or causes any harm in the preterm infant if it is properly dosed and administered. It is used as an immunological treatment and is administered as a dosed medication.

Risk perception of colostrum droplet management practice

From experience, all participants from the two hospitals applying the measure do not believe that it has

Table 1. Sample description

Profession and competence area	Hospital 1	Hospital 2	Hospital 3	Total
Médico ¹ :				
Pediatrician	1	1	1	3
Obstetrician and Gynecologist	1	1		2
Midwife ² :				
Neonatology	1	2	1	4
Obstetrics and Gynecology	1	1	1	3
Advanced-technical-degree nurses ² :				
Neonatology	1	1	1	3
Obstetrics and Gynecology	1	1	1	3
Total	6	7	5	18
				(13 women and 5 men; age range: young adults and adults)

¹Doctors from Neonatology and Obstetrics and Gynecology Services, and the field of Nutrition. ²Midwives and advanced-technical-degree nurses of Obstetrics and Gynecology Service (Birthing Unit, Obstetrics and Gynecology Emergency Services, Obstetrics and Gynecology Hospitalization Service, Newborn Nursery and Breastmilk bank); and Neonatology Service (Immediate Care of the Newborn, Hospitalization (Basic, Intermediate and ICU).

Table 2. Interview guideline

Topics	Subtopics
Knowledge	Self-perception of the level of knowledge Information sources
Perception of early colostrum supply	Experience: positive aspects and adverse events Opinion about colostrum as a protective factor against enterocolitis and other pathologies, attitude towards its prophylactic use
Opinion on the extent of the measure	Facilitating or hindering aspects Opinion about the measure as national policy

contraindications or causes any harm in the preterm infant if it is properly dosed and administered. It is used as an immunological treatment and is administered as a dosed medication.

"The use of colostrum, what I've seen, and what's done here, is administration of 2 sublingual drops that wouldn't have big contraindications actually. Extremely premature (newborns) in critical situations connected to mechanical ventilation, hemodynamic stability that one wouldn't think of feeding them enterally. But the administration of two drops of colostrum every three hours for eight times sublingual doesn't affect. And it would have a protective role from the immunological point of view and from the point of view of diminishing the risk of necrotizing enterocolitis" (E2P2).

The participants considered the aseptic technique relevant. In the two hospitals where it is applied, the interviewees reported that it is performed as a universal indication for preterm infants since there is a protocol for it. The colostrum extraction is done as early as possible. The only cases in which this practice is postponed are in HIV positive mothers, due to the risk of transmission.

Understanding and internalizing colostrum droplet management

Regarding the knowledge about the subject, three different professionals expressed vast knowledge about it.

"A lot of knowledge, first because of the undergraduate training and the training we've had to do here, since we've had breastfeeding training, with the Chile Crece (Chile Grows) team" (E1P5).

Thirteen other participants reported medium or insufficient knowledge and stated that more evidence is needed on the subject.

"I think that little, I think that we all have little knowledge about it, we just need to do studies, big protocols. I don't think there's anyone who can say on a firm footing 'no, I've got a lot of knowledge about it'. Because first of all, NEC is a multifactorial disease... ..So, to think that colostrum alone necessarily has an influence is a very positive thought and that's fine. But because it's so multifactorial and today we don't know what to aim for more strongly, if colostrum has anything to do with reducing the incidence of NEC, I think there's a lot of studies missing, a lot of evidence" (E2P5).

The main source of information was training courses at their healthcare center or in other locations.

Another source has been existing protocols in Hospital 1 and 2, and scientific publications. In addition, most participants reported more knowledge about breastfeeding in general, than specifically about colostrum and its prophylactic effect.

Factors facilitating or hindering colostrum administration in newborns

Regarding the resources to implement the measure, several interviewees reported that the financial means would be available for buying inputs. At the same time, competent human resources are available. A majority (fifteen) believe that they are already trained and willing to carry out this practice, especially in the neonatal units. Also, the facilities have a breastfeeding room and basic supplies that could be used.

"I believe that the infrastructure exists, that the human resource exists. We have to see what we need from the point of view of inputs, but in general terms, I think so. Here we have a breastfeeding room where the mother extracts milk, where the milk is stored, which they can use of course for safe colostrum extraction, the conditions are, more or less uncomfortable, but they are" (E2P12).

However, there are also difficulties such as that not all the hospitals in the country have the same facilities and resources, and not always the staff has a positive willingness within the team. Some of the difficulties mentioned are access to the mother for early colostrum extraction, as she may be in an intermediate treatment unit or intensive care unit, or the lack of adherence of some professionals to the indication of zero-feeding regimen in preterm infants. Finally, there is a lack of information about colostrum and its benefits, particularly in facilities that do not yet implement this practice.

Implementation of early colostrum management practice in premature infants as a national policy

Most of the interviewees, mainly those working in the two hospitals applying the measure, stated that colostrum droplet prophylaxis should be established as a national policy. This is due to the benefits observed in preterm infants, and the possibility of low-cost implementation. Some professionals say that this practice is already carried out in some cities in the country. If it has not been done in other cities, it is thought that this may be due to a lack of information.

"It has a cost in terms of resources that is very low. The health effect that necrotizing enterocolitis has on the patient, comparing the effect-cost, is very wide the advantage" (E7P9).

However, some participants, specifically those from the hospital without the measure, believe that it should not be applied nationally. Although their general perception is positive, they believe that research should first be developed and results evaluated in sentinel sites, in order to verify the benefits in newborns undergoing this preventive treatment. At the same time, human resources should be sensitized and trained for successful implementation. A national clinical guide and protocols for early implementation should be available.

"I don't know if at the country level yet. I think it's good that some centers are adopting it. And maybe gather cases and see how they're doing, the preliminary results. And if you see good results, copy the good examples and have them adopted at the country level. But of course, sometimes these sentinel centers that are the ones that have adopted this practice, it would be good to report these results and show if it works" (E10P7).

Discussion

In this study, the interviewed health professionals had a positive perception of early colostrum administration in preterm infants due to its immunological and trophic stimulation properties, and because it is considered a low-risk method. This positive attitude is consistent with the results of research conducted in several countries⁹⁻²⁴ and recommendations from some neonatal services in Chile⁴²⁻⁴⁵.

Considering the favorable scenario described in high complexity hospitals in other regions of the country, the question arises as to whether this measure should be generalized. Some of the possible answers can be identified in this study. The main obstacles refer to scientific-clinical, institutional, and organizational aspects.

Regarding the first aspect, several participants stated that the scientific evidence is still not enough, which reflects the international scientific debate. According to this, some studies favor the practice of enteral trophic feeding with colostrum from the mother during the first hours of life, while others discuss its usefulness or level of evidence for the prevention of neonatal morbidity and mortality, specifically of NEC^{10,11,14,16,17,26-33}. Another reason reported by some participants is the lack of knowledge about the experiences developed in Chile. It should be noted that, when searching for background for the study's design, no publications were found with the results of the experiences in progress in the country.

The second limitation, of institutional nature, is the lack of national ministerial policy, with its respective clinical guidelines and protocol specifically aimed

at early enteral administration of maternal colostrum in the first hours as a prophylactic measure. There are also concerns about the possible risks associated with the application of this measure, and the limitations of professional adherence to the indication of the zero-feeding regime in extremely preterm infants.

At the organizational level, the central problem raised by study participants is the lack of personnel. In a context of work overload, the application of new techniques, change of habits, and new forms of work organization, could face certain passivity or resistance among health professionals; therefore, it would be essential to raise awareness and inform the professional team, and also coordinate between maternity and neonatal services. Another difficulty is that not all facilities with neonatal intensive care units have the same resources, and even though the measure would not have a high cost, it would have to have some implementation resources. Objectifying the cost-benefit ratio of implementing this practice by studying it could contribute to the debate on a possible national policy.

As a synthesis of the background information reviewed and the results of this study, it is raised the relevance and timeliness of addressing and discussing the issue in the near future. The results suggest that there is fertile ground for the expansion of this practice at the regional level, and eventually nationally if it is adopted as national policy in the future. However, it is necessary to record and disseminate existing experiences, and to discuss the issue at events in the scientific community, as well as developing both retrospective outcome and process studies of these experiences, and prospective studies about the safety and impact of the measure.

The central limitation of this work is the sample restricted to a single region (Valparaíso). In a future study, with wider coverage, it would also be important to involve the management staff of the establishments, which are not included in this work.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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