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Research Article

Enteral Nutrition: Challenges of Prematurity in Neonatal Intensive Care Units

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Abstract

The nutrition of very low birth weight (VLBW) infants is aimed at promoting a similar growth to that occurring in the uterus. However, in practice this is difficult to achieve and extrauterine growth restriction is frequent. The current tendency is to avoid this restriction by means of early parenteral and enteral nutrition. Nonetheless, uncertainty about many of the practices related with nutrition has resulted in a great variation in the way it is undertaken. Recommendations based on current publications are presented for postnatal preterm nutrition, depending on birth weight: less 1000 g, between 1000 and 1500 g, and above 1500 g, as well for the development periods: adaptation, stabilisation, and growth.

Keywords: *Prematurity; Breast Feeding; Newborn; Enteral Feeding; Low Weight*

Introduction

In the last decade there have been important changes in the nutrition of the premature baby, especially the extremely low birth weight (EBPN), less than 1,000 g at birth in whom postnatal growth restriction (RCPN) is very frequent and the consequences of Lack of energy, protein and nutrients in the first few weeks affect the potential for further development. Interventions with early nutrition and increased protein intake have documented: reduction of parental nutrition, better cranial growth, better size and better development evaluated at 2 and 5 years. Although postnatal growth is also affected by morbidity, especially bronchopulmonary dysplasia (DBP), enterocolitis, and sepsis, growth can be improved with management protocols and nutritional surveillance. Neurodevelopment is associated with the best nutritional care and the best growth achievements. The risk of postnatal malnutrition is greater at a lower gestational age and avoiding the risk is essential, so the intervention must start from birth [1].

Breastfeeding has multiple nutritional, gastrointestinal, immunological, psychophysical and neurological and maturation benefits. That is why it is recommended to promote the use of human milk from the mother herself as a priority in the feeding of premature children and in any other risky infant. It is important that the team knows the benefits of breastfeeding and the health risks artificial formulas [2].

There are multiple benefits of breastfeeding both for the child and its mother, and for society as a whole. Breastfeeding especially lowers the risk of diarrhea, acute otitis media, lower respiratory infections, and related mortality. It also decreases the risk of necrotizing enterocolitis and sepsis, especially in premature infants [3]. The administration of human milk in premature babies has been related to shorter hospitalization times, fewer re-hospitalizations and better post-high health conditions [4].

Most preterm infants accumulate significant energy, protein, mineral, and other nutrient deficits upon discharge from hospital. Although demand-fed preterm infants consume higher volumes of milk than term infants after hospital discharge, growth deficit persists throughout childhood and beyond [5]. Poor postnatal growth, especially of the head, in preterm infants is associated with an increased risk of neurodevelopmental disorders in childhood, as well as poor cognitive and educational outcomes. Premature infants who have accumulated calcium and phosphate deficits at the time of hospital discharge are at increased risk for poor bone mineralization, metabolic bone disease, and slower skeletal growth compared to term-born infants. It is also a concern that nutritional deficiency and growth retardation, both in utero and in the neonatal period, may have long-term consequences for cardiovascular health [6].

General aspects of enteral feeding breast milk

Breast milk is the first alternative of enteral supply for premature babies. To obtain adequate volumes, milk extraction must be started before 6 hours of life. The extraction must be carried out 8 times a day, until the milk is lowered, and subsequently 6 times a day. The extraction can be manual or by pump, ideally by pump, both breasts simultaneous and with massage. It is important to monitor milk production, since it tends to decrease by the third week; In that case, the use of galactogogue and the increase in the frequency of extraction significantly increases milk production [7]. The milk of the mother of the premature baby contains more protein, sodium and IgA. Despite this higher content, which decreases progressively in the first month, it is necessary to increase the contribution of protein, calcium and phosphorus. The protein and energy content is variable between one mother and another, and this variability is greater than in term mother's milk, so that one child can receive a very good nutritional contribution, but another cannot [8]. There is no relationship between the energy intake and the proteins in breast milk (Table 1). The amount of protein is the biggest limiting factor in growth. Monitoring growth and controlling urea nitrogen (NU) is essential, since if growth decreases and the urea is less than 8, it requires additional protein, even on the fortifier [9]. Donated breast milk has a significantly lower protein content; In addition, when pasteurized, they decrease its bioactive properties and infection protection, but it maintains advantages in the risk of necrotizing enterocolitis (NEC) in relation to the formulas. For good growth, it requires optimal fortification, and eventually mixed feeding with formula [10].

	Enteral
Volumen ml/kg	20-150
Proteín g/kg	0.5-4.5
Energy kcal/kg	15-120
Relation protein-energy, g/100 kcal	3.7

Table 1: *Needs of the enteral feeding in newborn.*

Fortifiers and premature formulas

The essential nutrients to supplement breast or donated milk are protein, calcium, phosphorous, zinc and iron for a good evolution. Commercial fortifiers contain other theoretically necessary nutrients. It is important to individualize the fortifying supplement as described below, eventually adding protein of the lactalbumin type [11].

Standardized fortification assumes an average nutritional composition in the 2-week-old breast milk and adds a fixed dose of fortifier. Given the variability in the composition of breast milk, standard fortification may not be correct. It does not achieve growth contributions similar to those fed by the formula, especially if the protein content is below average.

Individualized fortification is proposed:

- Fortification based on the analysis of breast milk (infrared spectroscopy and periodic analysis).
- Adjustable fortification according to metabolic response: periodically evaluate with nitrogen urea; the target range is 9 to 15 mg/dl. It intervenes with a value lower than 8 mg/dl, increasing the concentration of the fortifier, correlating with the growth rate: children who grow <15 g/kg/day or slow down, probably need more protein; the addition of 0.5-1 g/kg/day of protein is reasonable, the fortifier can be used at 5 or 6% [12].

Premature formulas

Preterm Formulas are more concentrated in protein (60%) and energy (20%), and in all nutrients, than term formulas. They were developed to cover premature requirements between 1,000 and 2,000 grames, however it becomes inadequate for the extremely low birth weight (ELBW, lower than 1000 grames) who needs higher protein requirements. Ideally, the amount of protein per 100 kcal should be greater than 3.5 for extreme low weight bith, possibly more, if you had Intrauterine GROWTH RESTRICTION AND are in recovery growth. In case of limitation of the volume contribution, the use of formula with 101 kcal per 100 ml allows a good contribution with 130 to 150 ml/kg/day. The formulas are prepared so that with 230 to 300 ml daily, depending on the brand, the complete recommendations of vitamins and minerals are covered. The calcium-phosphorus ratio in millimoles is from 1.5: 1 to 2: 1, given the lower oral calcium absorption [13].

Specific enteral feeding recommendations according to patient weight

For the specific recommendations, 3 stages have been considered: adaptation (considers the first week of life), stabilization (between the week of life and the exclusive enteral supply) and growth (patient with enteral supply, growing and maturing) and three groups of premature according to their birth weight: less than 1000 grames, 1000-1500 grames and from 1500 to 2000 grames [14].

Nutrition of the minor of 1.000 grames

Adaptation period

This stage is a nutritional emergency due to its limited reserves and the association with long-term neurodevelopment [15]. It is essential to reduce weight loss, catabolism, and lean mass loss in the first week and provide nutrition that approximates the growth rate and composition of a normal fetus of a similar postconception age very early [16].

Enteral feeding

There is a growing consensus to start enteral feeding on the first day of life in premature infants who are not critically ill. Onset is delayed in children under 1,000 grames with Intrauterine growth restriction and/or altered Doppler no later than 48 hours [17]. One of the difficulties of early onset is the consideration of food or mucous gastric residues. In the first days there will always be residue, even in larger volumes of the contribution delivered. Not measuring waste is a suggested possibility, or establishing waste management protocol [18]. The presence of residues does not anticipate or is associated with the risk of necrotizing enterocolitis [19]. European groups start very slow enteral delivery: every 6 hours, increasing the frequency daily. Bile (moss green) or hematic residues are pathological and should lead to a clinical evaluation. The first alternative is milk from its own mother or donated milk, but if they are not available, the start of enteral feeding should not be delayed, with formula in minimum volumes. Diluting the formula offers no significant benefits [20]. The start with hydrolyzed formula shows better tolerance. The goals of parenteral and enteral nutrition in the first week are to achieve at 7 days: at least 4 g of protein/kg and 120 cal/kg. Observe weight loss the first 3 to 4 days. Obtain born weight recovery at 9 + 3 days. Start the enteral supply on the first to third day and obtain breast milk very early [21].

Stabilization period

After the first week of life, the goal is an early recovery of birth weight and a growth rate similar to intrauterine for gestational age. The nutritional contribution is delivered through parenteral and enteral. If the enteral supply is from 0 to 30 ml/kg, the complete parenteral nutrition must be maintained, adapting the volume to the requirements according to age and concomitant morbidity (ductus, oxygen requirements, renal function). In this period it is easy that the nutritional contribution is insufficient and It can significantly impact the degree of recovery of birth weight [22].

In the newborn weighing less than 800 grams, especially if it has presented deterioration in the period of adaptation, it is recommended to maintain an enteral contribution of 100 to 120 ml/kg/day with a parenteral contribution of 30 to 40% nutritional requirements several days before stopping the parenteral since they tend to have less absorption intestinal due to intrauterine malnutrition. The contribution of Proteins must be kept adequate, since insufficient intake has been documented when suspending parenteral nutrition, while a good enteral contribution is reached with repercussion in the growth rate [23].

Rate of increase in enteral supply

The increase in enteral supply in this group is 15 to 20 ml/kg/day, but many babys do not tolerate these increases, especially the babys with restriction and altered fetal doppler, so reaching the contribution enteral can delay. Children under 750 grames may benefit from an increase of 10 ml/kg/day every 48 h, especially if the local risk of necrotizing enterocolitis is high [24]. In this period, gastric residues can be an obstacle to the advance of the contribution. The recommendation to return them and complete the indicated volume can facilitate reaching the total enteral contribution [25].

Enteral supply

Preferably mother's breast milk. Fortification can be started with 50 ml/kg/day if the food tolerance is good (without further abdominal bloating, little residue). This will allow not producing insufficient protein intake.

Formula for premature babies

They do not cover protein recommendations in this group, unless the contribution is greater than 180 ml/kg/day. Consider supplementing if necessary, especially on babys with restriction.

Donated milk

Consider protein content, and measure it if possible. Select from donor mother of premature or early mature milk (less than one month). Fortify as above. Individualize contribution according to protein, energy content and evolution [26].

Alimentary intolerance

In this period, some babys have not made significant progress in enteral intake due to food tolerance problems. Intolerance is expressed by the presence of persistent residuals and bloating, which prevents progress in the volume of enteral delivery, although it is always considered as a differential diagnosis. It is more frequent in the son of a hypertensive mother [27].

As measures it is recommended:

- Avoid prolonging the enteral fast (beginning at the latest 48 hours of life).
- Use of non-nutritive suction (pacifier use), if it is not with an orotracheal tube.
- Use of continuous enteral feeding.
- Use of breast milk or formula with protein hydrolyzate.
- Feeding in slow boluses every 2 or 3 hours, by orogastric tube, is recommended, but for children under 850 g, or if there are problems with food tolerance or significant respiratory compromise, the use of continuous feeding is more appropriate [28].

Nutritional goals

Increased weight. The intrauterine evolution in this period is 18-19 g/kg/day (prior to 30 weeks). These levels are difficult to achieve during stabilization. Depending on the morbidity situation, reaching 15 g/kg/day is a sufficient objective. Recovery of birth weight is expected in this period: between 8 and 12 days of life. Longer time translates into insufficient nutritional intake. Estimating the amount of protein and total energy received is essential to adjust the contributions. This aspect of neonatal care tends not to be considered and the presence of standardized protocols and a nutritional surveillance system allows to minimize the insufficient contributions and, with this, to reduce the incidence of restriction [29].

Growth stage

From the moment he achieves complete enteral feeding, the birth weight has already been recovered and the task is to have a growth in weight, height, cranial growth and body composition similar to the intrauterine of the same gestational age. In addition, the adaptation period must be recovered, in which there is generally no growth and there is morbidity that affects growth. Until now the postnatal growth of the premature baby is different from the intrauterine one, with greater accumulation of visceral adipose tissue and less longitudinal growth. The advance should be focused on producing adequate cranial and longitudinal growth and avoiding the disproportionate deposit of visceral fat. In this context, the emphasis is given by an adequate quantity and quality of proteins and less in the contribution of energy [30]. The postnatal growth of the premature baby is disproportionate in the different parameters: the head circumference grows relatively well, the weight is slower and the height is the one that experiences more delay. Today emphasis has been placed not only on achieving anthropometric growth, similar to intrauterine, but also on achieving an adequate and proportional body composition. We need to have a tool that allows evaluating body composition, ideally measuring the amount of adipose tissue deposited, currently available internationally with total body densitometry but very expensive for routine clinical application. Her own mother's milk and fortified is the most recommended diet [31]. The use of bank breast milk, in the case of not having breast milk from its own mother, reduces some complications, but the growth is less, so it should be very well fortified, ideally with analyzes of macronutritional composition and proportional fortification. It must be considered that the advantages of feeding with breast milk are related to the volume ingested and the continuity of its contribution: the higher the volume, the greater the benefit [15].

If breast milk is not available, the contribution with formulas for premature babies is adequate in most cases, but it must be remembered that these milks have not been designed for babies with extremely low weight for gestational age and their protein content may be insufficient for current recommendations, especially in preterm infants with restriction that require recovery growth and also in recovery from birth weight derived from severe morbidity and insufficient intake in the first weeks of life. Having a high protein formula is more appropriate, but is not currently available in every country. Increasing the fortifier to a quarter or a half of the usual dose to add to the formula is an alternative, or add 0.3 to 1% protein concentrate [32]. An enteral supply of 180 ml/kg/day has been recommended in this period, but if the premature baby does not have cardiopulmonary problems that require limiting the volume, some premature babies require more, especially if they were born with IUGR. This is frequently observed after 33 to 34 weeks of postconceptional age due to hunger manifestations between feedings [33].

Evolution control

Achieve catch-up growth and avoid extrauterine malnutrition. Assess postnatal growth by measuring growth velocity and plotting measurements prospectively on reference curves or by assigning percentiles. Evaluate with Fenton (percentiles); drop in percentiles means extrauterine malnutrition. The weight of the 3rd day of life (in general it is the lowest weight) can be considered as the reference value to evaluate growth and observe the increases in the percentiles or score. Growth in this stage is dynamic, the growth rate increases with increasing gestational age until term, where it slows down [34].

Measuring only growth rate we do not have the reference with respect to normal growth. In general, weight greater than 20 g/kg/day, size 1- 1.2 cm/week, cranial growth 0.8-1 cm/week. Linear growth reflects lean mass and organ growth, including brain, and together with the head circumference, should be evaluated weekly and plotted on the reference curves. Better growth is associated with better neurodevelopment.

- Hematological controls and reticulocyte count every 10-15 days.
- Control plasma electrolytes (sodium must be kept above 130 mEq/dl), calcaemia, phosphemia, alkaline phosphatases every 10-15 days.
- Increase calcium and phosphorous intake.
- Ensure vitamin D supplement 400 IU daily, eventually increase to 800 depending on evolution and history.
- Review medications and suspend diuretics and corticosteroids if possible [35].

Nutrition from 1,000 TO 1,500 Grames

Enteral delivery begins early, on the 1st or 2nd day, if the child is stable. Delay it, if there is a history of altered Doppler, restriction, or severe suffocation. The increase in children at low risk of necrotizing entercolitis can be 20 to 30 ml/kg/day, and in those at risk, 15 to 20 ml/kg/day [36].

Stabilization period

The newborn between 1,000 and 1,500 can be at 7 days with enteral and parenteral or enteral and glucose solution and electrolytes. Some may be with only enteral supply, since the daily increase can be from 20 to 30 ml/kg/day if they have not had greater morbidity or severe restriction. Enteral delivery is by orogastric or nasogastric tube every 3 h in slow bolus. Recovery of birth weight is expected between 6 and 10 days. The weight increase for the period is from 15 to 24 g/kg/day. Some prematur baby with severe restriction of growth weighing less than 1,200 g may have food intolerance, but it is rare. In these children, increases in intake of 15 to 20 ml/kg/day every 24 to 72 hours may be necessary and follow recommendations for food intolerance. Start of breast milk fortifier with volumes of 50 to 80 ml/kg/day [37].

Growing period

The observation of growth is similar to that described in the group less than 1,000 grames, both anthropometry and laboratory tests have similar recommendations. The risk of osteopenia is low and associated with management or morbidity such as pulmonary bronchodysplasia, short bowel, prolonged parenteral [38].

Nutrition from 1,500 to 2,000 grames

Adaptation period

This group does not require starting parenteral nutrition. Only if it is not reached a minimum enteral supply after 5 days of 40 to 50 ml/kg and some pathology situation is added that prevents enteral feeding, will be supported with parenteral nutrition the minimum necessary until your recovery. There is a practice of leaving premature infants without food upon admission to the neonatal unit, which in this group is even less justified. In most cases, they will not be able to receive complete feeding by mouth, but they will be able to receive it through a nasogastric tube and they will be given orally according to their gestational age. Starting enteral from 20 to 30 ml/kg/day and advancing from 30 to 35 ml/kg/day will allow to quickly obtain an adequate nutritional contribution [39]. In case of very important morbidity or preterm with altered Doppler, the start of the enteral supply should be deferred 48 h [40].

Stabilization period

This period is very short or inapparent in healthy preterm infants, but with a high-risk patient for necrotizing enterocolitis, it requires combining parenteral nutrition and a slow rise in the enteral supply from 15 to 20 ml/kg/day. With about 80 ml of well-tolerated enteral supply, the parenteral supply can be suspended [41].

Growth period

In these patients the use of fortified breast milk can achieve good growth, especially if there is no volume limitation, but there would be no optimal ossification. Fortifying with calcium (60-80 mg/kg/day) and phosphorus (40-60 mg/kg/day) during hospitalization will help better ossification. If the supply volume is restricted, feeding with breast milk should be considered fortifying (42).

What is the best way to provide enteral feeding: continuously or intermittently (by bolus or gavage)?

Enteral feeding through a naso, or orogastric tube is necessary in most sick and/or very premature newborns. The conventional way of feeding via gastric tube is in the form of a bolus, given in 10 to 20 minutes by gravity. However, this method is not always tolerated by critically ill or very low gestational age babies. The first report of continuous nasogastric tube feeding was in 1972 by Valman. There are some theoretical advantages and risks with each of these two modalities. Feeding in the form of intermittent bolus by gavage is considered more physiological since it promotes the cyclical increase in intestinal hormones as normally occurs in the healthy newborn [43].

These gastrointestinal hormones such as gastrin, gastric inhibitory peptide and enteroglucagon are trophic factors that require the presence of intraluminal nutrients for their secretion. Sudden cyclical increases in plasma concentrations of these hormones appear to be of importance for the development and maturation of the postnatal gastrointestinal tract [44]. On the other hand, functional limitations of the gastrointestinal system of a premature baby, such as delayed gastric emptying or intestinal transit, may affect his ability to tolerate feeding given as an intermittent bolus. In a retrospective study published only in abstract form in 1981, Krishnan found that babies fed continuously achieved caloric intake and weight gain faster than those fed intermittently [45].

Premji in 2001 performed meta-analysis, comprising 443 premature infants where the available evidence suggests that continuously fed babies take longer to achieve full enteral nutrition. Although no differences in growth were detected, this can be attributed to the fact that all babies received a consistent supply of nutrients through parenteral feeding [46].

In conclusion, although there is not enough evidence to recommend one modality over the other, considering the advantages of intermittent feeding on intestinal development and maturation and the disadvantages of rapid bolus feeding on the duodenal motor response, and the potential beneficial effect in weight gain in the smallest babies who received continuous feeding, the recommendation of this consensus group is to individualize the modality of> 45 enteral supply to each patient and to try, whenever possible, to give this contribution intermittently but slow (feeding with an infusion pump in a period of 1 to 2 hours every three hours), especially in very immature newborns and/or with difficulties to tolerate feeding [47].

What is the best way to provide enteral feeding when the newborn does not suction: by nasogastric or orogastric tube?

Establishing safe oral feeding in preterm infants may be delayed due to poor sucking and swallowing coordination, neurological immaturity, and respiratory compromise. In such cases, enteral feeding can be delivered through a catheter or tube nasal or buccal to the stomach or upper small intestine. Neonates breathe almost exclusively through the nose. Nasal feeding feeding tubes can cause partial nasal obstruction, increased airway resistance, and increased work of breathing, as detected by lung function studies [48]. Oral tubes, on the other hand, can cause vagal stimulation with bradycardia and apneas. They are also more difficult to maintain in an adequate position and tend to move more easily, increasing the potential risk of aspiration and respiratory compromise. There is insufficient data in the literature to help us determine best practice [49].

Use of feed tubes

The enteral feeding tube is a tube of more or less flexible plastic material that is normally placed nasal, although it can also be placed orally. They are made of different materials, such as polyvinyl, silicone or polyurethane. Polyvinyl are thick and stiff, making them very useful for suctioning [50]. Silicone and polyurethane ones are thinner and more elastic, preferable for long-term drilling, and thus reduce the discomfort and vagal phenomena associated with their placement. No differences were found in terms of weight gain, incidence of apnea or bradycardia when the probe was kept for more than 3 days compared to placement before each feeding, and instead the cost was higher when it was placed each time as more probes were used [51]. Given the high cost of using a different tube for each feeding, the time requirement of the nursing staff and the potential stressful or traumatic effect for the neonate, it is recommended to use more "permanent" tubes. If polyvinyl tubes are used, they should be changed every 48 to 72 hours, to avoid possible bacterial growth and lesions in the oropharynx. Silicone and polyvinyl tubes can be kept for 4 to 6 months, although most units change them every few weeks [52].

What are the recommended intervals to provide intermittent enteral feeding?

The physiological response to feeding in preterm infants has been studied in terms of gastric emptying, intestinal motility, the hormonal response, and the vasodilatory response at the mesenteric level, with enteral bolus delivery every one, two, or three hours. Feeding every hour produces a slight but sustained increase in mesenteric flow, whereas feeding given every three hours produces an increase flow, returning to the basal level around 2 hours [53]. Different volumes do not influence significantly and the response is different with formula than with breast milk. With dairy formula the initial response is greater, but with breast milk it is more sustained. The practice of administering hourly boluses has not been experimentally evaluated. It requires more human resources and the real benefit has not been documented. The residue is frequent in highly fractional feeding since the average gastric emptying time is 35 minutes for breast milk but 70 for dairy formulas, the first phase of emptying being faster than the second [54].

Nutritional recommendation on discharge of premature newborn

Nutrition of the premature baby after discharge is still a controversial issue. The association of a slow somatic growth rate with retarded head growth and subsequent neurodevelopmental disturbance has been a matter of concern. Likewise, more recently, and based on Barker's hypothesis related to fetal scheduling, it has been established that disturbances in fetal nutrition can cause long-term health effects, including cardiovascular disease [55]. Lucas and Singhal have shown that acceleration of growth can have adverse effects in adulthood. Although there are no specific recommendations for nutritional requirements for preterm infants after discharge, there is agreement that the goal of achieving body composition and the growth rate of a normal fetus of the same post-conceptional age extends during the first year of life. Despite a greater awareness of the importance of early nutrition in the short and long-term evolution, a large number of these babies suffer from extrauterine growth retardation [56]. At discharge, many still have a significant nutritional deficit. It seems appropriate then to assume that the needs for growth and nutritional recovery of the post-discharge premature are greater than for the healthy term newborn. The protein intake needs for these babies is estimated to be between 2.5 and 3.5 g/kg/day, higher than that of the term newborn [57]. Other nutrients for which the requirements in this population are known are calcium, phosphorus and vitamin A. The accumulation of calcium and phosphorus occurs mainly during the third trimester of pregnancy. In preterm infants this accretion does not take place, and a significant deficit accumulated during the period when trying to establish enteral feeding is added. This, added to the rapid body growth of these children in the first year of life, makes the calcium and phosphorus requirements higher than in the term newborn. Studies evaluating the use of formulas enriched with minerals or fortified breast milk after discharge show better bone mineralization [58]. Based on these studies, the recommended intake of calcium ranges from 150 to 175 mg/kg and that of phosphorus from 90 to 105 mg/Kg. Few studies have addressed the needs of Vitamin A or retinol in this rapidly growing population of newborns. In a study in which these premature infants received approximately 1000 IU of vitamin A/100 ml, a very low percentage had plasma retinol levels in the range considered deficient. However, when these babies were discharged fed with the term formula, 48% had vitamin A deficiency. Based on these studies, it is extrapolated that the daily need for vitamin A in these babies is at least 1000 IU. Even less is known the needs after discharge in relation to other micronutrients, such as vitamins D and E. However, it is important to note here that none of the post-discharge formulas available meet vitamin D needs (400 IU/day) even if the child receives 200 ml/kg/d [59]. Different methods can be used to facilitate the growth of recovery after hospital discharge (Table 2), the most common is the use of enriched or transition formulas, in which the caloric, protein, vitamin and mineral intake is greater than in the formulas standard. Another alternative is to provide concentrated formulas, that is, with higher caloric density. This distinction is important because the baby who is allowed to feed to satiety will modify the volume ingested to compensate for the energy difference, but not for the quality of nutrients. The reality of these babies at discharge is the mother's inability to achieve an adequate volume of breast milk production, due to the prolonged length of hospital stay and the lack of stimulation of sucking by the baby, so the need requiring substitute happens in most of these patients [60].

	Recomendación koletzko	ESPGHAN (2010)
PROTEIN, GR	3.5-4.5	4-4.5
LIPID, GR	4.8- 6.6	4.8-6.6
LINOLEICO MG	385-1.540	385-1.540
ALFA, LINOLENICO	>55	>55
ARA	35-45	18-42
DHA	55-60	12-30
CARBOHIDRATHOS, GR	11.6-13.2	11.6-13.3
VITAMIN A MCG	400-1100	400-1100
VITAMIN D, mcg	400-1000	800-1000
VITAMINA E	2.2-11	2.2-11
VITAMIN K, mcg	4.8-28	4.4-28
TIAMINA MACG	140-300	140-300
RIBOFLAVIN MCG	200-400	200-400
VITAMIN B6 MCG	50-300	45-300
VITAMIN B12 MCG	0.1-0.8	0.1-0.77
NIACINA MG	1.5-5	0.38-5
ACIDO FOLICO NCG	35-100	35-100
ACIDO PANTOTENICO MG	0.5-2.1	0.33-2.1
BIOTINA MCG	1.7-16.5	1.7-16.5
VITAMINA C MG	20-55	11-46
COTINA MG	8-55	8-55
INOSITOL MG	4.4-53	4.4-53
CALCIO MG	120-200	120-140
FOSFORO MG	60-140	60-90
MAGNESIOMG	8-15	8-15
HIERROMG	2-3	2-3
ZINC MG	1.4-2.5	1.1-2
MANGANESIO MCG	1-15	<27
COBRE MCG	100-230	100-130
YODO MCG	10-55	11-55
SELENIO MCG	5-10	5-10
SODIO MG	69-115	69-115
POTASIO MG	78-195	66-132
CLORO MG	105-177	105-177

Table 2

Conclusions

In conclusion, the basis of adequate enteral nutrition in critically ill patients is to carry out an adequate comprehensive diagnosis, and to assess the comorbidities that lead to prematurity alone. In addition to being aware that management in intensive care units is always dynamic, depending on the patient's state of health.

As well as prioritizing that breast milk is and will be the first feeding option in any patient at any gestational age and weight of the patient. Help us in parenteral nutrition to complement the adequate caloric intake, caloric-protein ratio, which in every premature child is vital for proper growth and development, and at this critical stage of life, nutrition is essential to ensure well-being in the neonatal intensive care. Of course always taking into account the importance of parenteral nutrition since neither exclusive human milk nor standard formulas provide enough calcium and phosphorus to support the anticipated needs for postnatal accretion of very low birth weight premature infants.

Aiming to maintain our nutritional goals: Achieve intrauterine-like growth, prevent postnatal malnutrition, maintain an adequate body and bone mass, promote proper neurological development and avoid associated sequelae.

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