Decrease in the use of parenteral fluids in premature infants from 31 to 34 weeks of gestation at birth

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Abstract

Introduction: Some of the practices in medicine are carried out of habit without proven benefits. This is the case of premature babies from 31 to 34 weeks of gestation who are always given parenteral fluids, even though this practice has been associated with an increase incidence of infection. In 2017, we started a protocol of parenteral fluid restriction. To administer nutrition/fluids, we used oral fluids by suction if this was possible or otherwise by oral/nasogastric tube at volumes of 15-20 mL intake every 3 hours, with 5 mL increments every 12-24 hours until 200 mL/K/day was achieved, always using breast milk when possible.

Material and methods: The present study sought to compare cases before and after this new policy. For this work, we review all premature babies between 31-34 weeks of gestation discharged home in two periods of time, the first from 01/01/2012 to 12/31/2017 and the second from 01/01/2018 to 08/31/2021. The number of cases with and without parenteral fluids (PF), the incidence of infection, the weight at admission and discharge, and the fall in the weight Z score between birth and discharge were compared. Both the anthropometric and outcome variables were compared using the different statistical methods according to each variable.

Results: 725 cases were found with the described characteristics. The groups before and after the intervention did not show significant differences in their general demographic characteristics. A lower use of PF was observed in the second period from 348 cases (79%) to 70 (24%), $p < 0.001$ and fewer days of use (4.1 days/case vs 1.3, $p < 0.0001$) of PF. The weight at discharge and the change in weight Z-score were the same in both

groups. Infections went from three cases to zero but it was not statistically significant. There were no complications due to less use of PF.

Discussion: This study showed that the use of PF is not associated with significant changes in outcomes of interest, which reinforces that its use does not generate any benefit for the patient. Larger number of cases is required to detect differences in low incidence events such as infections.

Key Words: Parenteral fluids in premature infants, late premature infants, infections associated with the use of lines, early oral feeds.

Introduction

Some of the practices in medicine are done out of habit with no proven benefits. This is the case of premature babies from 31 to 34 weeks of gestation who are admitted to the units with degrees of mild to moderate respiratory distress, and they are always given parenteral fluids "just in case", and some are left NPO. The use of excess fluids in the first week of life is not uncommon.¹⁻³ In addition to the pain and discomfort of infusions, it has been associated with increased infections⁴⁻⁷ which makes them undesirable if they are not essential.

Since the end of 2017, in the Neonatal Unit of the Clínica del Country we decided to restrict the use of parenteral fluids in this gestational age group. In cases of adequate suction and without respiratory distress or any other pathology that contraindicates it, we start oral feeds in the first 2 hours of life at a volume between 15-20 mL of milk every 3 hours. In cases with mild and moderate degrees of respiratory distress without any other contraindication, we place an oral or nasogastric tube and we start preterm milk at the same volumes mentioned in the previous paragraph. We do not administer parenteral fluids unless the patient cannot tolerate the oral feeds or it is necessary to administer medications or has another serious pathology requiring fluids. From there, we continue to increase the volume by 5 mL every 12-24 hours until the baby can tolerate 200 mL/Kg,⁸⁻¹⁰ by the third day ideally with fortified breast milk as soon as it is available (we don't have bank human milk).

The present study sought to compare cases before and after this new policy, to see if it had had any beneficial or adverse results.

Material and methods

This is a cohort study of before and after an intervention. We took two periods of time, discharges from January 1, 2012 to December 31, 2017 before the intervention and from January 1, 2018 to August 31, 2021 after. We selected all premature babies from 31 to 34 weeks of gestation who were born in the hospital and that were discharged home. Babies born in another institution of more than one day of life and patients with major congenital malformations were excluded. The number of cases with and without parenteral fluids, the time of fluids or parenteral feeding initiation (days), the incidence of infection defined by positive blood or cerebrospinal fluid cultures, weight on admission and discharge, and the fall in Weight Z-score between birth and discharge were calculated, the latter as a way to assess nutrition. These differences between the two time period groups were compared by gestational age. The variables were presented in absolute or relative proportions, or in medians and interquartile ranges according to the nature of the variable. The Chi-square test by Pearson or Fisher technique was used for comparisons, as appropriate, and Wilcoxon for non-parametric tests for continuous variables. Kruskal-Wallis was used in the continuous groups without normal distribution. A p value less than 0.05 was considered statistical significance.

This study was carried out using the EpicLatino data collection instrument in our unit that has authorization from the ethics committee with the exception of informed consent because it is data from the unidentified clinical record.

Results

725 patients were found with the described characteristics. The groups before and after the intervention did not show significant differences in their general demographic

characteristics, as shown in Table 1. A lower use of parenteral fluids was observed in the second period 348 (79%) vs 70 (24%), $p < 0.001$ and fewer days of use (4.1 days/case vs 1.3, $p < 0.0001$) of parenteral fluid days. Weight and weight Z-score change are shown in Table 2.

This decrease in the use of parenteral fluids was observed in all gestational age groups in the second period as follows: at 31 weeks from 98 to 56%, at 32 weeks from 94 to 36%, at 33 weeks from 79 to 21% and at 34 weeks from 69 to 13%. In none of the gestational age groups were there complications due to not administering parenteral fluids. No cases of hypoglycemia were reported. The infections went from 3 cases before to zero cases later, but this difference was not significant.

Discussion

This study showed that the use of parenteral fluids is not associated with significant changes in outcomes of interest, which reinforces that its use does not generate any benefit for patients.

The practice of using parenteral fluids in patients between 31 and 34 weeks without express indication has no scientific basis. At 31 to 34 weeks of gestation, oral tolerance is adequate to maintain the necessary water and caloric balance, with increments as observed in this work. In particular, there were no hypoglycemic events since caloric nutrition was administered from the first two hours of life, either in the form of parenteral fluids or milk. Systemic infection decreased from 3 cases to 0 but was not significant due to the small number of cases. With regard to nutrition, there was no difference in the drop in Z score between birth and discharge, which suggests that the oral feeds with milk in the indicated increments, is adequate for good growth in this population group. Finally, the discharge weights did not differ between the two groups, suggesting that this methodology does not influence the final weight.

Conclusions

This work confirms that the use of routine parenteral fluids is not necessary and tolerance to oral feeds should be assessed in these premature infant groups between 31 and 34 weeks of gestation from birth. A larger sample size is required to detect differences in low incidence events such as infections.

Table 1. Demographic characteristics of patients before and after policy implementation.

Gestational Age	Before 2018		After 2018		p*
	n	%	n	%	
31	51	12	32	11	0.971
32	79	18	50	17	
33	121	28	84	29	
34	187	43	121	42	
Total	438		287		
Birth Weight					
750-999	4	0.9	1	0.3	0.846
1000-1249	9	2.1	8	2.8	
1250-1499	42	9.6	25	8.7	
1500-2499	355	81.1	232	80.8	
2500-4499	28	6.4	21	7.3	
Total	438		287		
Sex					
Male	228	52.0	149	51.9	0.628

* Fisher's exact test

Table 2. Results

Parenteral Fluids	Before 2018		After 2018		p*
	n	%	n	%	
NO	90	21	217	76	<0.00001
YES	348	79	70	24	
Total	438		287		
Infeccion					
NO	435		287		0.220
YES	3	0.68	0	0.0	
Total	438		287		
Days with parenteral fluids					
Days (medina RIQ)	3 (2-3)		2 (2-2)		0.0095***
Change in Z score between birth and discharge					
p50	-0.6		-0.6		0.9393**
p25	-0.8		-0.9		
p75	-0.3		-0.3		
IQR	0.6		0.6		
Weight at Discharge					
1250-1499	0	0	1	0	0.1542***
1500-2499	364	83	227	79	
2500-4499	74	17	59	21	
Total	438		287		

IQR: Interquartile ranges

* Fisher's exact test

** Since the histogram showed a normal distribution, the t test was used for comparison.

*** Kruskal-Wallis equality-of-populations rank test

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