

Decrease in the use of parenteral fluids in premature infants from 30 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 30 to 34 weeks of gestation who are always given parenteral fluids, even though this practice has been associated with an increase incidence of infection. At the end of 2017, we started a protocol of rationalization in the use of parenteral fluid. To administer nutrition/fluids, we used oral fluids by suction if this was possible or otherwise by oral/nasogastric tube at volumes of 70-80 mL/Kg/day divided 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 results before and after this new policy. For this work, we review all premature babies between 30-34 weeks of gestation in two time periods, the first from 01/01/2010 to 12/31/2017 and the second from 01/01/2018 to 08/15/2022. The number of cases with and without parenteral fluids (PF), the incidence of infection, the weight at admission and discharge, and the change 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: were found 920 cases with the described characteristics. The groups before and after the intervention did not show significant differences in their general demographic characteristics. We observed a decrease use of PF in the second period, from 425 cases (82.0%) before to 297 (26.2%) after implementation, $p < 0.0001$ and fewer days of use (4.1 days/average before vs 1.3 after, $p < 0.0001$) of PF. The weight at discharge and the change in weight Z-score were the same in both groups. Infections went from nine cases

before to two cases after 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 infections⁴⁻⁸ 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 70-80 mL/Kg/day of milk divided 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 above. 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,⁹⁻¹¹ 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, 2010 to December 31, 2017 before the intervention and from January 1, 2018 to August 15, 2022 after. We selected all premature babies from 30 to 34 weeks of gestation who were born at our hospital. Babies born in another institution were excluded. The number of cases with and without parenteral fluids, the incidence of infection defined by positive blood or cerebrospinal fluid cultures, the 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. Demographic characteristics were collected including suspected chorioamnionitis, destination and congenital anomalies. 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 statistically significant.

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 uses data from the unidentified clinical records.

Results

Nine hundred and twenty 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 seen in the period after the intervention as seen in Table 2. We found 105 patients (73.8%) before vs 93 (18.0%) after, $p < 0.0001$ and fewer days on parenteral fluids (4.5 average days before vs 1.3 after, $p < 0.0001$) of parenteral fluid days. Weight at discharge and weight Z-score change are shown in Table 2.

The use of parenteral fluids was decreased in all gestational ages, as follows: at 30 weeks from 93 to 68%, at 31 weeks from 95 to 54%, at 32 weeks from 89 to 31%, at 33 weeks from 82 to 22% and at 34 weeks from 72 to 12%. There were no complications due to withholding parenteral fluids. No cases of persistent hypoglycemia requiring parenteral fluids was reported. The infections went from nine cases before to two cases after, but this difference was not significant.

Discussion

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

The practice of using parenteral fluids in patients between 30 and 34 weeks without express indication has no scientific basis. At 30 to 34 weeks of gestation, oral tolerance is adequate to maintain the necessary water and caloric balance in most cases, 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 9 cases to 2 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 weights at discharge 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 30 and 34 weeks of gestation from birth, before deciding to use parenteral fluids. A larger sample size is required to detect differences in low incidence events such as infections.

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

Gestational Age	Before 2018		After 2018		p*
	n	%	n	%	
30	45	9	28	7	0.860
31	60	12	46	11	
32	85	16	62	15	
33	129	25	102	25	
34	199	38	164	41	
Total	518		402		
Birth Weight					
500-749	1	0.2	0	0.0	0.891
750-999	10	1.9	7	0.8	
1000-1249	25	4.8	20	2.2	
1250-1499	70	13.5	46	5.0	
1500-2499	383	73.9	302	32.8	
2500-4499	29	5.6	27	2.9	
Total	518		402		
Sex					
Male	274	52.9	209	52.0	0.629
Suspected Chorio [¥]	11	1.2%	13	1.4%	0.534
Destination					
Death	10	2.0	10	2.6	0.123
Home	487	94	382	95	
Congenital anomalies	29	5.6	25	6.2	0.436

* Fisher's exact test

¥ Suspected Chorioamnionitis

Table 2. Results

Parenteral Fluids	Before 2018		After 2018		p*
	n	%	n	%	
NO	93	18.0	105	73.8	<0.00001
YES	425	82.0	297	26.2	
Total	518		402		
Infection**					
NO	509		400		0.129
YES	9	2.1	2	0.5	
Total	518		402		
Days with parenteral fluids					
Median (IQR)	3 (4)		0 (1)		0.0001***
Change in Z score between birth and discharge					
p50	-0.56		-0.55		0.910***
p25	-0.82		-0.83		
p75	-0.25		-0.23		
IQR	1.1		1.1		
Weight at Discharge					
500-749	1	0.2	0	0.0	0.5338***
750-999	3	0.6	2	0.5	
1000-1249	3	0.6	1	0.2	
1250-1499	2	0.4	6	1.5	
1500-2499	418	80.7	310	77.3	
2500-4499	90	17.4	82	20.4	
≥4500	1	0.2	0	0.0	
Unknown	0	0.0\$	1	0.0	
Total	418		402		

IQR: Interquartile ranges

* Fisher's exact test

** Infection is defined as positive blood or spinal fluid culture

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

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