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Original Article

When do our Extremely Low Birth Weight (ELBW) Infants Lose their Postnatal Weight? -

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ABSTRACT

Introduction: Although it is a very controversial issue, many of our ELBW infants do not achieve their growth potential, with consequences that may be permanent.

Objectives: We wanted to investigate when weight was lost or not gained during the postnatal hospitalization in ELBW babies ≤ 28 w GA at birth in the neonatal Epic Latino network, and what was the magnitude of that loss using weight Z score to quantify it, as a surrogate for the expected gain according to Fenton 2013 growth curves.

Design: We reviewed our database for preterm infants ≤ 28 w GA 2018-2019 with data at birth, 3 days, 14 days and at discharge or death and calculated Postmenstrual Age (PMA) and weight Z-score for each data point using the Fenton 2013 curves. We obtained weight Z score median for each mentioned data point of each of the 13 units in our Epic Latino database that had weight information for comparison between units more than 5 cases, in at least the first three post-natal ages. We compared these medians to see if they showed significant differences and run a linear logistic model.

Results: 132 ELBW infants had weight data in at least birth, days 3 and 14. Statistically significant difference was found between the weight Z score median at birth compared to 3rd day, 14 day and discharge/death. There was also a significant difference between weight Z score in the 8 units selected.

Discussion: The average fall on weight Z score on 3rd day of life was expected, it is a physiological change that occurs after birth, however, the continuous fall on day 14 and discharge/death in some units has no explanation and seems to show an insufficient nutrients input. More studies are needed to confirm and devise a way to improve these results.

INTRODUCTION

Epic Latino is a neonatal database from Latin America based in the Canadian Neonatal Network collection software and an organization dedicated to quality improvement programs in health practices in neonatal units. One of the quality improvement programs is nutrition. There is a large variability of nutritional practices in neonatal units with the expected variability in nutritional results [1-4].

Although it is a very controversial issue, many of our ELBW infants do not achieve their growth potential, with consequences that may be permanent [5]. Often it is believed that the initial weight loss due to fluid redistribution, [6] is the only important one, however, with some frequency, they continue to grow poorly, even until late postmenstrual ages. There are several stages of possible nutrition failure that can lead to poor growth. These stages include the first week of life, which for fear of metabolic risks, often limits the amount of nutrition required to grow properly [1]. A second moment is when you switch from parenteral to oral nutrition [7]. To quickly remove venous lines, parenteral nutrition is suspended very quickly, without adequate oral delivery. Using breast milk without fortifiers for long periods of time can cause malnutrition [8]. As a third stage in which weight gain is inadequate is during oral nutrition with a limit on the amount of volume generally 150-180 mL/K [9] which is sometimes not enough for proper growth. Some studies with higher volumes have shown better weight gain, [10-13] without having been adapted in many centers. Last, fortifies use can *modify growth extensively* [12,14-16].

OBJECTIVES

We wanted to investigate when weight was lost or not gained during the postnatal hospitalization in ELBW babies ≤ 28 w GA at birth in the Neonatal Epic Latino network, and what was the magnitude of that loss using weight Z score to quantify it, as a surrogate for the expected gain according to Fenton's growth curves [17].

DESIGN

We reviewed our database for preterm infants ≤ 28 w GA 2018 and 2019 that had weight data at birth, 3 days, 14 days and at discharge or death and calculated Postmenstrual Age (PMA) for each data point (which are collected in our network). We obtained a weight

Z score calculation for each weight data using the Fenton 2013 curves. We obtained weight Z score medians and Interquartile Range (IQR) from each data point, in these four post-natal days. We also calculated median for each of the 13 units in our Epic Latino database that had weight information and more than 5 cases for individual comparison. We compared these medians to see if they showed significant differences and run a linear regression model controlling for gestational age.

RESULTS

Results can be seen in (figures 1,2). We found 132 ELBW infants that had weight data in at least birth and days 3 and 14. Statistically significant difference was found between the median of weight Z-score at birth compared to 3rd day, 14 day and discharge/death including linear regression results seen in (Table 1) controlled by gestational age. The results of 8 units linear regression with more than 5 cases is shown in (Table 2).

DISCUSSION

The average fall on weight Z score on day 3 of life was expected, it is a physiological change that occurs after birth as discussed in the introduction, however, the continuous fall on day 14 and discharge/death in most units has no explanation and seems to show an insufficient nutrients input. The irregular distribution of the weight Z score drop in the different NICUs draws attention, and they are statistically

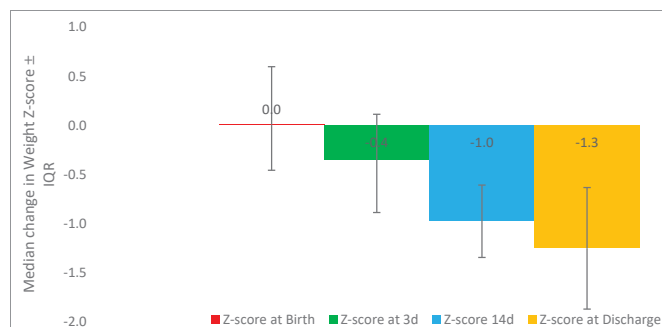


Figure 1: There is statistically significant difference between the four groups controlled by gestational age and unit. IQR: Interquartile Range.

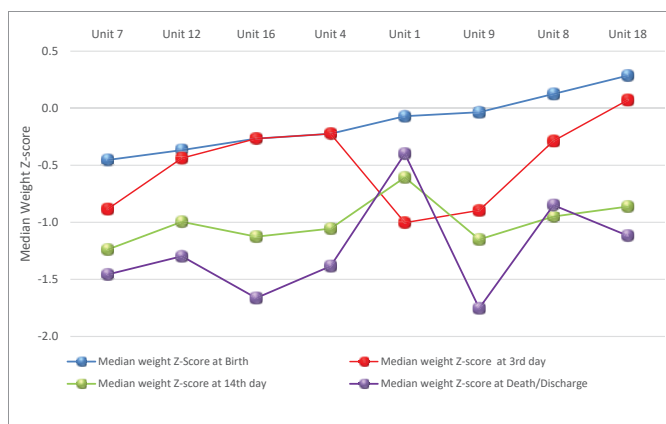


Figure 2: Median weight z-score at birth, 3d, 14d and discharge/death by unit that has more than 5 ELBW (≤ 28 weeks). D: days.

Table 1: Median linear regression controlled by GA of 4 time points using Birth as the reference.

Time point	n	Median	Coef.	Std. Err.	t	p > t	[95% Confident Interval]
Weight Z-score at Birth	132	0.0				Ref	
Weight Z-score at 3d	132	-0.4	-0.4	0.1	-3.5	0.000	-0.6 – -0.2
Weight Z-score at 14d	132	-1.0	-0.9	0.1	-7.7	0.000	-1.1 – -0.7
Weight Z-score at Discharge/Death	129	-1.3	-0.7	0.2	-3.4	0.001	-1.1 – -0.3

D: day, Coef: Coefficient, Std. Err.: Standard Error

Table 2: Unit statistics with linear regression reference Unit 18 (highest mean at birth) control by gestational Age.

Units	n	Median at Birth	Median at Discharge	Coef.	Std. Err.	t	p > t	[95% Confident Interval]
Unit 1	11	-0.1	-0.4	-0.4	0.2	-2.05	0.041	-0.9 – 0.0
Unit 4	30	-0.2	-1.4	-0.5	0.2	-2.94	0.003	-0.8 – -0.2
Unit 7	11	-0.5	-1.5	-0.8	0.2	-3.77	0.000	-1.2 – -0.4
Unit 8	18	0.1	-0.8	-0.5	0.2	-2.52	0.012	-0.8 – -0.1
Unit 9	14	0.0	-1.8	-0.7	0.2	-3.52	0.000	-1.1 – -0.3
Unit 12	8	-0.4	-1.3	-0.6	0.2	-2.39	0.017	-1.0 – -0.1
Unit 16	11	-0.3	-1.7	-0.6	0.2	-2.88	0.004	-1.0 – -0.2
Unit 18	13	0.3	-1.1				Ref	

Coef: Coefficient, Std. Err.: Standard Error

different control by GA using Unit 18 as a reference for having the largest median value at birth and the largest drop at discharge/death. The absence of falling on day 3 in two units and the irregularity of the fall in several of the others probably speaks of difference in fluids handling in the first 3 days since the subsequent fall on day 14 is evident. In one of the units, no fall was observed after day 3, while an evident fall was observed in the other NICUs, probably showing differences in nutritional management. More studies are needed to confirm and devise a way to improve these results.

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