“Brains- Not Just Brawn”
Initiative to optimize nutrition in VLBW infants in NICU
Sheldon B. Korones Newborn Center at Regional One Health and
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Background: Improving nutrition and growth of our VLBW babies will help improve postnatal growth and improve their neurodevelopmental outcomes. Studies have shown that this can be achieved by using standardized feeding protocols and optimizing protein and caloric intake in our VLBW infants.

Aim: Our main aim was to decrease the number of babies with postnatal growth restriction at discharge by 25% by December 2014 as measured by change in Z-score (Δ Z) from birth to discharge, with a stretch goal of 50% by December 2015. We also wanted to enhance the protein and caloric intake on our VLBW infants as a nutritional target.

Setting: We are a 69 beds Level III NICU and regional referral center. We admit approximately 1200 babies a year, with about 4000 deliveries. Of those, approximately 200 are VLBW infants.

Mechanism: We identified a deficiency in starting early PN and IL in our VLBW infants. We also realized that we were not reaching our target protein intake of 4gm/kg/day when on full enteral feeds with our VLBW infants.

Drivers of Change: 1. Improve education of our staff to start early PN and lipids and improve adherence to our revised standardized feeding guidelines and thereby improve protein intake to target goals.
2. To standardize our length and head circumference measurements and collect data regarding human milk use on a regular basis.

Methods: In the initial phase of the project we collected baseline data for all our growth parameters, updated our existing feeding guidelines to optimize calories and protein intake in our VLBW infants. We standardized our length and head circumference measurements and collected data regarding human milk use on a regular basis. We also looked at performance measures like time to starting PN and IL, initiation of enteral feeds, days to achieve full feeds and percentage of babies reaching enteral protein intake of 4 gm/k/d when on full enteral feeds. Z-scores at birth and discharge will be calculated and compared to see effects of our interventions.

Measures: Growth parameters and anthropometric measurements for our VLBW infants were collected from Jan 2014 – June 2015 as our ongoing performance measures.

- Z scores at birth & discharge (weight, head circumference and length.)
- Our compliance to following feeding guidelines as indicated by days to achieve goal feeds.
- Our timing in hours to start PN, lipids in our VLBW infants
- Our NICU’s human milk usage with initiation rates and duration of usage in VLBW infants

Data: The results from our QI project reflected an improvement in our Δ Z scores for weight from -1.12 in Jan. 2014 to -0.93 in June 2015. The head circumference Δ Z scores improved from -0.53 to -0.27 during the same time period (Fig1). Our Δ Z scores for length however remained unchanged with increased variability in measurements (Fig1). We followed our nutritional measures on our adherence to feeding guidelines, initiation time of PN and lipids, starting of enteral feeds, days to achieve full feeds, goal protein target and human milk usage. Our practice adherence to feeding guidelines as assessed by days to achieve full feeds had improved from 27.6 days in Jan 2014 to 18.1 days in May 2015 (Fig. 2), our days to regain birthweight also improved from 11.5 days to 8.2 days during this time (Fig. 2). Our time duration to start PN showed improvement from 3.1hrs in Jan 2014 to 2.3hrs by May 2015 (Fig. 3). Our lipids start time had also improved from 25.5hrs to 23.1hrs (Fig. 3). Human milk usage had been historically high in our unit, but during this project we found that our VLBW babies not only had a high initiation rate but also received longer duration of human milk compared to previous year (Fig. 4).

Discussion: As a multidisciplinary team, we have been successful in improving our adherence to feeding guidelines in our VLBW infants. The improvement in Δ Z scores for weight and head circumference may be attributed to our increased adherence to standardized feeding guidelines, thus achieving goal enteral feeds sooner, target protein intake and subsequent improvement in our days to regain birth weight. We had early initiation of PN and lipids and had increased the duration of human milk usage in our VLBW infants along with our early initiation rates. Our future plans are to work on standardizing guidelines with early fortification of human milk feeds in our VLBW infants.
Keywords: VLBW infant nutrition, nutrition outcomes, preterm nutrition, preterm infant growth, preterm feeding, human milk, Z scores.

Team Members and Acknowledgements:

**Nurse team:** Kelley Smith, RN (Nurse Leader); Gayle Spence, RN (Data collection); Ashley Smith, RN, IBCLC and Amy Little, RN, IBCLC (Lactation team); Adrianne Sween, RD (Dietician); Kay Conlee, RN; Elizabeth Endy, RN; Rachel George, RN; Linda Gruber, RN and Christine Maxwell, RN (Nursing team members).

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**Fig. 1:** Graph reflecting quarterly Δ Z scores for weight, length and head circumference at discharge with PDSA cycle points
A: Audit of measurements  
B: Review of feeding guidelines  
C: Review of protein intake

**Fig. 2:** Graphs reflecting our compliance to following feeding guidelines as indicated by days to achieve goal feeds/calories
Fig. 3: Graphs showing our timing in hours to start PN, lipids in our VLBW infants

Fig. 4: Graphs showing our NICU’s human milk usage with initiation rates and duration of usage in VLBW infants