Evidence-based discharge nutrition to optimize preterm infant outcomes

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Yale SCHOOL OF MEDICINE

Disclosures:

Role	Sponsors
Consulting	Baxter

Objectives

- Determine the evidence available to direct discharge nutrition for preterm infants.
- Identify the health benefits of discharge nutrition options and how to develop a comprehensive, family-centered plan.

Consideration 1: Can discharge nutrition be both efficacious and simple?

Preterm infant nutrition at hospital discharge:

Consideration 1: Can it be both efficacious and simple?

Disclosure: I am a part of the problem

Preemie FEED (Facilitating Enteral Education at Discharge) Form

Goals and Recommendations for Infants Born < 32 weeks Gestation
At Discharge, infant is taking _____ ml every _____ hours
At Discharge, mother's 24-hour pumping volume is ☐ Adequate (≥ 500 ml) ☐ Low (<500 ml) ☐ Mother is no longer pumping

Adapted from University of California SanDiego

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At Discharge, infant is taking _____ ml every _____ hours
At Discharge, mother's 24-hour pumping volume is ☐ Adequate (≥ 500 ml) ☐ Low (<500 ml) ☐ Mother is no longer pumping
Feeding Plan (check applicable plan for this infant): (Other listed plans are options to consider) ☐ Mother's milk with human milk fortifier (HMF) to make 24 kcal/oz. (HMF is available through WIC for first 3 months) ☐ Breastfeeding ___ times per day (up to 30 minutes/session) and mother's milk with HMF to make 24 kcal/oz. ☐ Mother's milk with postdischarge formula (PDF) powder to make 27 kcal/oz. and 2 PDF 27 bottles per day ☐ Breastfeeding ___ times per day (up to 30 minutes/session) and mother's milk with PDF powder to make 27 kcal/oz. and 2 PDF 27 bottles per day ☐ Breastfeeding ___ times per day (up to 30 minutes/session) and mother's milk with PDF powder to make 24 kcal/oz. and 2 PDF 24 bottles per day ☐ PDF 27 kcal/oz. ☐ PDF 24 kcal/oz. ☐ Other:_____

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General Mixing Instructions: Mother's Milk with HMF to 24 kcal/oz=1 packet of fortifier per 25 ml of milk Mother's Milk with PDF to make 27 kcal/oz= 2 teaspoons powder per 100 ml milk Mother's Milk with PDF to make 24 kcal/oz= 1 teaspoon powder per 90 ml milk PDF 27 kcal/oz bottle= 5 scoops powder per 240 ml water PDF 24 kcal/oz bottle= 3 scoops powder per 160 ml water Other:_____

Why do we make things so complicated?

Table 3. Nutrition Regimen at Discharge by BW.

		Feeding Regimen, n (%)						
		BM						
BW (kg)	n (%)	BM Without Formula	BM + Formula	Any BM	Term Formula	Preterm Formula	Hydrolyzed Formula	Elemental Formula
<1.0	73 (32.1)	16 (21.9)	11 (15)	27 (37)	2 (2.7)	44 (60.3)	6 (8.2)	5 (6.8)
1.0–1.499	94 (41.4)	28 (29.7)	25 (26.6)	53 (56.4)	1 (1.1)	60 (63.8)	4 (4.3)	1 (1.1)
1.5–2.449	46 (20.3)	12 (26)	17 (40)	29 (63)	2 (4.3)	28 (60.9)	2 (4.3)	2 (4.3)
≥2.5	14 (6.2)	6 (42.8)	4 (28.9)	10 (71.4)	3 (21.4)	3 (21.4)	2 (14.3)	0 (0)
Total	227	62 (27.3)	57 (25)	119 (52.4)	9 (3.9)	134 (59)	14 (6.2)	8 (3.5)

The BM category consists of infants receiving only BM with or without fortification but no feeds of formula alone. The BM + formula category are infants within the formula categories who are also receiving any amount of BM. The sum of the "BM without formula" and formula columns encompasses the entire population.
BM, breast milk; BW, birth weight.

Table 4. Caloric Density of Nutrition Regimens and GT Use at Discharge.

		Caloric Density in kcal/kg (n, %)						
BW (kg)	n (%)	19	20	22	24	27	30	Feeds Via GT
<1.0	73 (32.1)	0 (0)	1 (13.7)	14 (19.2)	35 (48)	17 (23.2)	6 (8.2)	25 (34.2)
1.0–1.499	94 (41.4)	0 (0)	1 (1.1)	6 (6.4)	65 (69)	21 (22.3)	1 (1.1)	4 (4.2)
1.5–2.449	46 (20.3)	1 (2.2)	0 (0)	7 (15.2)	30 (65.2)	8 (17.4)	0 (0)	13 (28.2)
≥2.5	14 (6.2)	4 (28.6)	0 (0)	4 (28.6)	6 (42.8)	0 (0)	0 (0)	9 (64.2)
Total	227	5 (22)	2 (0.8)	31 (13.7)	136 (57.2)	46 (20.5)	7 (3.1)	51 (22.4)

Caloric density of feeds at the time of discharge and proportion of patients receiving any volume of GT feeds.
BW, birth weight; GT, gastrostomy tube.

Zhang et al 2020

Consideration 2: What is the parent's feeding goal?

84% of US families initiate breastfeeding


Utamaro


Gauguin


Picasso

Family's Goal for Her Pregnancy Before Interrupted by Preterm Birth: Can We Help Achieve?

Consideration 3: Post-Discharge Nutrition Needs to Optimize

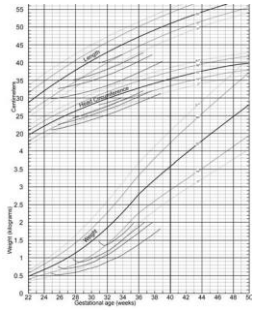
Growth


Health


Neurodevelopment

Very Low Birth Weight Preterm Infant Growth Failure

4 cohorts from NICHD NRN 1994-95
Mean birth weight at
-1450 g
-950 g
-750 g
-550 g
From Ehrenkranz et al *Pediatr* 1999



Fenton et al *BMC* 2003

VLBW Infant Growth

Top Quartile of Growth
18-21 g/kg/day weight gain in hospital

→ Better neurodevelopmental outcome
18-22 months

Postnatal Growth Lag

→ Neurologic and sensory handicaps
Poor school performance
Lower cognitive scores at 8 years
Lower educational at 8 years
Psychosocial delays at 8 years

Ehrenkranz RA et al *Pediatr* 2006; Lucas A et al *BMJ* 1998; Hack M et al *NEJM* 1991; Belfort M et al 2013

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Preterm infant in-hospital growth trajectories associated with neurodevelopmental outcome

Growth or body composition parameter at or prior to term age/ hospital discharge	Positively associated outcomes
Weight gain	
Change in z score or SDS from birth to 36 weeks	Predicted PDI but not MDI at 18 months Predicted MDI but not PDI at 2 years
Change in z score or SDS from birth to discharge	Predicted normal standardized neurologic evaluation at 5 years Predicted mental processing composite score at 5 years
Weight gain from birth to hospital discharge	Predicted speed of processing at 4 years
Linear slope of weight gain from 1 week to term age	Predicted BSID at 18 months
Weight growth velocity	Predicted BSID, lower incidence of cerebral palsy, normal neurologic examination and less neurodevelopment impairment at 18-22 months
Length at a specific time point	
Length at hospital discharge	Predicted speech measured by BSIDII at 2 years
Length gain	
A smaller difference from expected length z score from birth to hospital discharge	Predicted optimal neurodevelopmental outcome at 2 years
Length gain from birth to hospital discharge	Predicted speed of processing at 4 years Did not predict systolic blood pressure at 4 years
Linear slope of length gain from 1 week to term age	Predicted PDI but not MDI at 18 months
Head circumference gain	
Change in z score or SDS from birth to discharge	Predicted composite motor and cognitive scores but not language scores at 18-26 months Predicted neuromotor and psychomotor assessment at 2 years Predicted normal standardized neurologic evaluation at 5 years Predicted less risk of impaired mobility at 5 years
Head circumference gain from birth to discharge	Did not predict faster speed of processing at 4 years
Linear slope of head circumference gain from 1 week to term age	Predicted PDI but not MDI at 18 months
Body Mass Index (BMI) gain	
Linear slope of BMI from 1 week to term age	Predicted BSIDII at 18 months
Fat-free mass gain	
Fat-free mass gain from birth to hospital discharge	Predicted faster speed of processing at 4 years

Shah 2006; Zozaya 2018; Ranz 2009; Pfister 2018; Belfort 2011; Ehrenkranz 2005; Ramel 2012; Simon 2014; Scaal 2017; Raghuram 2017

Is Human Milk Intake Associated with Preterm Infant Neurodevelopment?

Limits of Preterm Infant Human Milk Studies

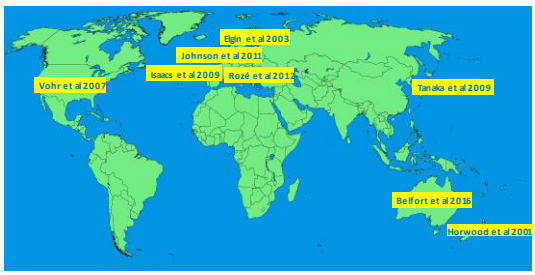
Table 5 Studies of human milk (HM) feeding and developmental outcome in very low birth weight (VLBW) infants: meeting criteria for methodological quality

Reference	Pinelli et al. [29]	Furman et al. [30]	Tanaka et al. [31]	Horwood et al. [32]	Smith et al. [33]	Johnson et al. [34]	Vohr et al. [35]
As primary outcome of original study*	-	+	-	-	-	-	-
VLBW only	+	+	+	+	+	+‡	+‡
A priori power calculation	-	-	-	-	-	-	-
Baseline adjustment for SGA	-	-	-	+	-	-	-
Postnatal complication	-	+	-	+	-	+	+
Maternal intelligence	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Social class or Socioeconomic status	+	-	-	+/-	+/-	+	+/-
Child rearing environment	+/-	+/-	-	+/-	+	-	+/-
Observers blinded to feeding protocol	+	+	-	-	-	+	-
Effect size after adjustment	+	+	NA	+‡	+‡	+‡	+‡
Human milk definition	+	+	+	+	+	+	+
Human milk duration	+	+	+	+	+	+	+
Human milk fortification	+	+	-	-	-	-	-
Human milk feeding data source	+	-	-	+	+	-	+
Formula type	+	+	-	-	-	-	+

SGA = Small for gestational age, NA = not available.
+Met methodological criterion.
-Did not meet methodological criterion; or not stated or not specified in the publication.
+/-Use surrogates such as income for socioeconomic status, maternal education for maternal intelligence, marital status or one or two parent family for child rearing environment.

Koo WW et al 2014

Studies with outcomes measured at > 2 years of age



Mother's Milk and Preterm Infant Neurodevelopment

Study	Population	Human Milk Dose	Age at evaluation	Outcome
Vohr et al 2007 (n=773)	ELBW	Breast milk for hospitalization	30 months	For every 10 ml/kg/day increase in breast milk, MDI increased by 0.59, PDI by 0.56, and total behavior percentile score by 0.99 by BSID-II
Tanaka et al 2008 (n=18)	VLBW	More than 80% breast milk feeds in first month	5 years	Breastfed group had significantly higher sequential processing on KABC, Day-Night Test, KRISP, Motor Planning Test scores
Rozé et al 2012 (n=1462)	Born 22-32 weeks PMA EPIPAGE Cohort	Breastfeeding at time of discharge	5 years	Breastfeeding at discharge associated with a 35% lower risk for suboptimal neurodevelopment by KABC
Belfort et al 2016 (n= 180)	Born < 30 weeks/ <1250 g	First 28 days with >50% breast milk	7 years	Predominant breast milk feeding in first 28 days significantly associated with better IQ by WASI, mathematics by WRAT, working memory, and motor function tests by MABC
Horwood et al 2001 (n= 280)	VLBW	Duration of breast milk feeding	**7-8 years**	Increasing duration of breast milk feeding significantly associated with increased verbal & performance IQ by WISC-R; **<u>Breastfed for > 8 mos adjusted mean verbal IQ 6 points higher than those with no breast milk</u>**
Elgin et al 2003 (n= 130)	LBW	>30% breast milk in neonatal ward	11 years	Lack of breast milk associated with a significant mean reduction in IQ by WISC-R but this was no longer significant when adjected for parental education
Johnson et al 2011 (n=307)	Born <26 weeks PMA	Received breast milk in NICU	11 years	Breast milk in NICU significantly associated with higher reading scores
Isaacs et al 2010 (n=50)	Born ≤ 30 weeks PMA	% maternal milk for hospitalization	Adolescence	Milk dose significantly associated with Verbal IQ (specifically in boys), performance IQ and full scale IQ in boys only by WISC-III and WAIS-III

MDI: Mental Development Index; PDI: Psychomotor Development Index; BSID-II: Bayley Scales of Infant Development Second Edition; WISC-R: Revised Wechsler Intelligence Scale for Children; KRISP: Kansas Reflection-Impulsivity Scale for Preschoolers; KABC: Kaufman Assessment Battery for Children; WISC-III: Wechsler Intelligence Scale for Children Third Edition WAIS-III: Wechsler Adult Intelligence Scale Third Edition; WASI: Wechsler Abbreviated Scale of Intelligence; WRAT: Wide Range Achievement Test; MABC: Movement Assessment Battery for Children

Optimal Preterm Infant Balance for Neurodevelopment?

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Significant risk adjustments for infants in the United States

Ever Breastfeeding
11% ↓ Leukemia
12% ↓Asthma 5-18 years
33% ↓ Otitis media
29% ↓ Crohn's disease
22% ↓ Ulcerative colitis
22% ↓ Childhood & adult obesity
33% ↓ Type 2 diabetes mellitus
64% ↓ Gastrointestinal infections
72% ↓ Lower respiratory infections
19% ↓ Infant mortality (U.S.)
51% ↓ Neonatal mortality
21% ↓ Postneonatal mortality
(to 38% ↓if >3 months)

>6 months exclusive breastfeeding
compared to <4 months exclusive
19% ↓Lower respiratory tract infection
30% ↓Severe or persistent diarrhea


AFantifigure

AHRQ 2007 & AAP 2022

Significant Risk Adjustment for Mother

Any or Ever
22% ↓ Breast cancer
30% ↓ Ovarian cancer
11% ↓ Endometrial cancer
9% ↓ Thyroid Cancer

Longer vs Shorter
32% ↓ Type 2 diabetes mellitus
78% ↓ GDM and Type 2 diabetes

Hypertension
<6 months, 8% ↓
6-12 months, 11% ↓
>12 months, 13% ↓


Cezanne

AAP 2022

Upper respiratory infection symptom days in 39 infants born <2 kg

Table 4 Days of Upper Respiratory Infections

Time period	Human milk mean ± SD (range), median	Formula mean ± SD (range), median	*p*
Discharge–1 mo	0.6 ± 1.7 (0–7), 0	3.5 ± 5 (0–20), 2	< 0.025
Discharge–3 mo	6.6 ± 7 (0–23), 5	14.6 ± 15 (0–46), 9	0.06
Discharge–7 mo	17.6 ± 15 (0–53)	38 ± 26 (9–96)	< 0.025
Discharge–12 mo	42.7 ± 28 (15–96)	54.8 ± 36 (9–121)	ns

Blaymore-Bier et al 2002

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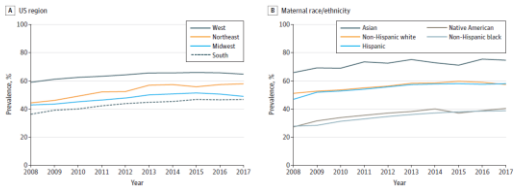
Consideration 4: What is the likelihood of sustaining maternal milk supply?

Year	Ever breastfed	At 6 months	At 12 months	Exclusively at 3 months	Exclusively at 6 months
2008	72	44	18	24	12
2020	83	53	34	40	19

Georgia state flower Cherokee Rose

CDC Breastfeeding Report 2020 & 2008

VLBW Infants Receiving Human Milk at Hospital Discharge



Parker M et al 2019

Consideration 5: Options for feeding type

Enriched Formula Studies

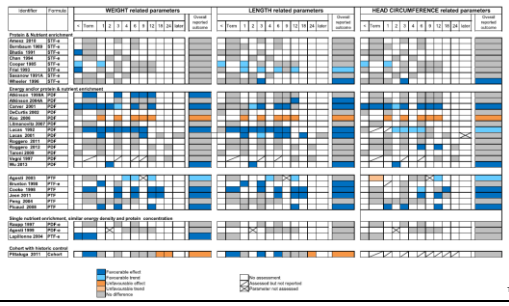
- Post-discharge formula (enriched formula, transitional formula) versus standard term formula
- Preterm formula versus standard term formula

TABLE 1. *Macronutrient composition of standard, postdischarge and preterm formula*

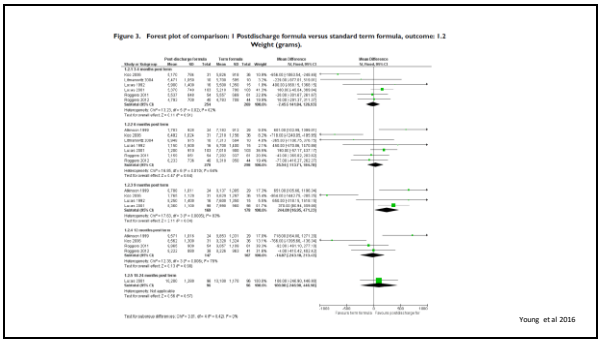
	Standard formula	Postdischarge formula	Preterm formula
Protein (g/100 mL)	1.4 – 1.5	1.8 – 1.9	2.2 – 2.3
Energy (kcal/100 mL)	67	72 – 74	80 – 90
Calcium (mg/100 mL)	35 – 54	70 – 80	100 – 108
Protein (g/100 kcal)	↕2.2	↕2.5	↕2.8

Aggett P et al 2006

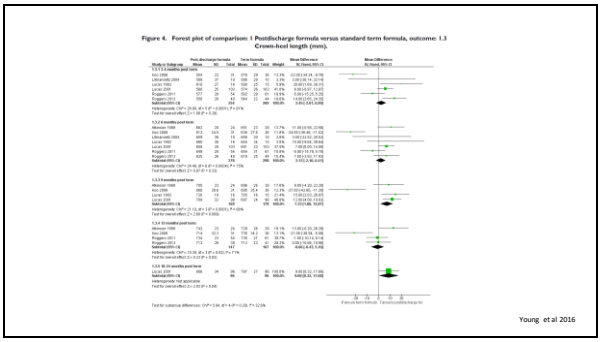
Enriched formula not consistently associated with improved growth parameters



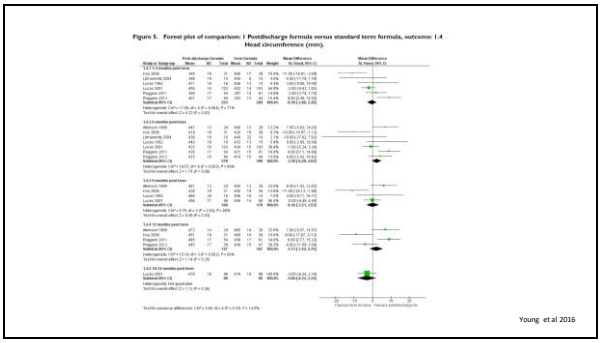
Teller et al 2016



Young et al 2016

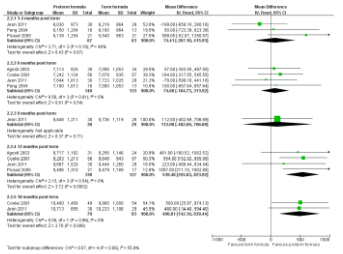


Young et al 2016



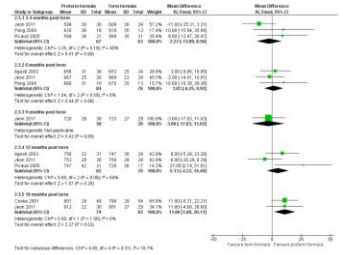
Young et al 2016

Figure 6. Forest plot of comparison: 2 Preterm formula versus standard term formula, outcome: 2.2 Weight (grams).



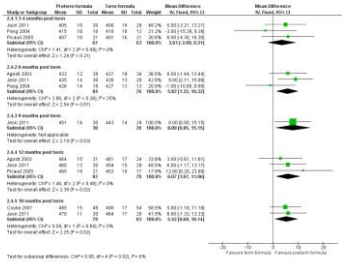
Young et al 2016

Figure 7. Forest plot of comparison: 2 Preterm formula versus standard term formula, outcome: 2.3 Crown-heel length (mm).



Young et al 2016

Figure 8. Forest plot of comparison: 2 Preterm formula versus standard term formula, outcome: 2.4 Head circumference (mm).



Young et al 2016

Enriched post-discharge formula not associated with better preterm infant neurodevelopment

Outcomes	Anticipated absolute effects* (95% CI)	Number of participants (studies)	Quality of the evidence (GRADE)
Postdischarge formula compared with standard term formula after hospital discharge			
Development - Bayley Scales of Infant Development II: Mental Development Index	MD 0.9 higher (3.24 lower to 5.04 higher)	184 (1 RCT)	⊕⊕⊕⊕ High
Preterm formula compared with standard term formula after hospital discharge			
Development - Bayley Scales of Infant Development II: Mental Development Index	MD 1.44 lower (6.22 lower to 3.35 higher)	143 (2 RCTs)	⊕⊕⊕⊕ High

Young et al 2016

What about mother's milk?

Nutrient-Enrichment vs. No Enrichment of Mother's Milk Post-Hospital Discharge

Study	Population	Intervention	Outcomes reaching statistically significance
O'Connor et al 2008	39 ≥80% mother's milk and 750-1800 g at birth infants	Protein 0.8g/kg Calories 10-15/kg Fortified with HMF 50% of feeds for 12 weeks	**Intervention infants at 4-6 months:** • **Greater visual development** **Intervention infants at 12 months:** • **Heavier by 1.2 kg** • **Longer** • **Greater bone mineral content** **Infants born <1250 g at 12 months:** • **Greater head circumference** Intervention infants at 18 months: • No difference in Bayley II scale
Zachariassen et al 2011	320 infants born 24-32 weeks PMA receiving breastmilk at discharge	Protein 1.37 g/day Calories 17/day For 4 months	At 12 months: • No difference in growth
De Cunha et al 2016	53 exclusively breastfed VLBW infants	Protein 0.5g/day Calories 20/day For 4-6 months	At 12 months: • No difference in Bayley II scale • No difference in developmental delay

Nutrient concentrations from Arslanoglu et al 2019

ESPGHAN 2006 "Feeding Preterm Infants After Hospital Discharge"

- Monitor closely
- Measure weight, length, head circumference to identify infants with poor growth
- AGA infants should be breast-fed when possible
- When formula-fed, feed regular infant formula
- If SGA at discharge, supplement with human milk fortifier or enriched formula
  - Until at least 40 weeks'
  - Potentially until 52 weeks'

Focus on growth: To maintain growth velocity 25-35 g/day (term age to 3 months)

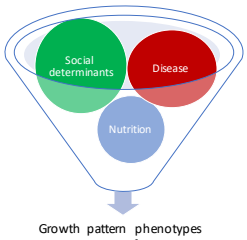
- To maintain growth at a specific z-score or percentile
- To achieve growth at a specific z-score (catch-up growth)

By 40-52 weeks postmenstrual age

- Preterm infants without significant brain, lung, cardiac disease develop the ability to "feed" to grow (at least calories).
  - Titrates volume to obtain calories required to gain weight

Likely plays a role in the mixed results from post-discharge nutrition RCTs

Still do not know how to have just the right amount of "baby fat"



POGO Study
Patterns of Growth and Outcomes
PIs: Sarah Taylor and Cami Martin

Body composition patterns
Neurodevelopment at 2 years corrected age

Growth pattern phenotypes
Very preterm infant

- From birth to term age
- From birth to 1-year corrected age


Utamaro


Gauguin


Picasso

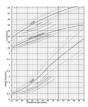
Mother's Goal for Her Pregnancy Before Interrupted by Preterm Birth: Can We Help Her Achieve?

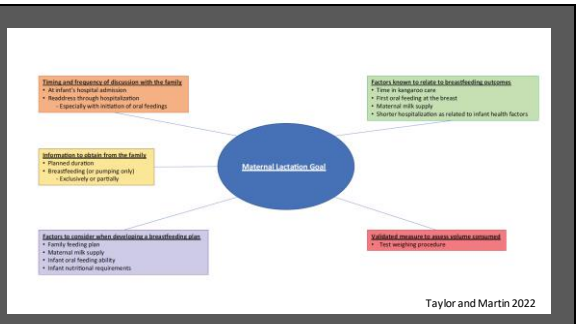

FAMILY'S FEEDING GOAL

Gauguin


Establish and sustain maternal milk supply


Maturation of infant oral abiilty


Infant's specific nutritional needs especially for brain growth



Taylor and Martin 2022

Table 3
Barriers to sustaining breastfeeding for the high-risk infant

Barriers/Reasons	Assessment	Tools
Not receiving enough milk by direct breastfeeding[57]	a. Assess latch b. Evidence of swallowing c. Optimize any breastfeeding that is occurring by teaching breast massage and breast compressions[58]	Electronic Scales—prefeeding and postfeeding test weights[59–62]
Infant not latching/fussy[78]	a. Assess latch[57] b. Teach strategies to latch before infant is crying c. May start with a bottle feed and then finish at the breast	Nipple Shields can be an essential tool but there must be a plan for monitoring and weaning[72]
Poor growth[79]	a. Assess for proportional growth on multiple data points b. Obtain detailed feeding history	Growth charts Fortification plans[76]
Low milk production[80]	a. Quantity at each pumping session b. Frequency of pumping c. Frequency of breastfeeding	Breast pumps[80] Pumping/feeding log
Maternal exhaustion[81]	a. Obtain detailed feeding history b. Assess support at home	Avoid triple feeding (breastfeed, pump, bottle feed at each feeding time) Social support
Maternal anxiety[78]	a. Explore reasons for anxiety b. Assess for depression c. Assess for posttraumatic stress disorder from NICU admission[82]	Assess depression[83] Psychosocial support[69]
Conflicting information[80]	a. Assess the concern b. Assess from where is the information is coming?	Family involvement Pediatrician Lactation specialist Peer support[80]

57- Noble et al 2018; 59- Gianni et al 2018; 69-Bartick et al 2021; 70- Schecter et al 2020; 71-Rankin et al 2016; 72- Savenije et al 2006; 73-Maastrup et al 2019, 76- Arslanoglu et al 2019; 77- Meier et al 2007; 78-Pinchevski-Kadir et al 2017; 79 Koletzko and Li 2021; 80- Dosani et al 2016; 81- Elder et al 2022; 82- Yawn et al 2009; 83- Dennis et al 2002

Gupta & Taylor 2023

Table 1
Tools to support high risk oral feeding after hospital discharge

Tools	Use	Considerations
Breast pumps	Breast pumps are critical in NICU to maintain milk supply while infant is unable to nurse. Even after discharge, most mothers need to pump for several feeds as infants transition to direct breastfeeding	A hospital-grade double electric pump is considered the ideal way to express milk for lactating mothers who are separated from their infants and require full replacement of breastfeeding by pumping[69] Home breast pump should be arranged before discharge. Some mothers experience PTSD[70] after NICU discharge and may not want to hear the noise of a pump. Changing to manual or silicone pump with proper teaching may reduce anxiety
Digital scales	Test weighs are performed by weighing the infant before and after a feed to determine how much breast milk infant consumed during a breastfeed[71,72]	Not all digital scales are accurate.[73] It can create undue anxiety if infant does not gain enough weight and parents may not learn infant's cues and signs of satiety. A clinical trial of test weighing at home did not show improved breastfeeding[74]
Nipple shields	A nipple shield is a thin piece of silicone that is placed on mother's areola and nipple. It is a short-term tool when baby is having trouble latching or due to maternal reasons such as nipple pain, flat nipples, and engorgement	Ongoing lactation support is essential to support use and weaning off nipple shield. Improper use of nipple shield could decrease breastfeeding duration[75]
Slow flow or specialty nipples	Infant's ability to self-regulate flow may be compromised so custom flow restrictions may be warranted to meet each infant's unique feeding needs[76]	High-risk infants using variable flow nipples should be followed up by feeding specialists such as speech pathologists[77]

Gupta & Taylor 2023

Consider nutritional needs beyond maternal milk

Outcomes	Nutrition
Bone mineralization at 12 months CA	• 50% of feeds with HMF for 12 weeks post-discharge (O'Connor D et al 2008; Almone A et al 2009) • Otherwise, no evidence of required calcium/phosphorus post-hospital discharge • Maintain normal serum value of phosphorus (>5.6 mg/dL) and 25(OH)D (>30 ng/mL)
Growth	Difficult because post-NICU studies have compared feed type rather than specific nutrients. • Feed to grow 25-35 g/day and then to maintain percentile line (do not lose trajectory) and maintain or improve proportion • In-hospital growth relates to neurodevelopment
Neurodevelopment	Balance of milk nutrients/bioactives and growth trajectory
Iron stores	3-5 mg/kg/day ferrous sulphate until iron-containing foods
Vitamin D stores (and potentially other vitamins)	At least 400 IU/day (and up to 1000 IU/day) Other vitamins need greater study

Preterm infant follow-up of growth and nutrition

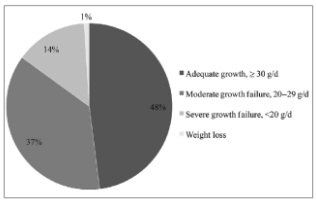
Clinic support
Developed Nutrition NICU Graduate Clinic

Table 1. Patient Demographics.

Characteristic	n (mean or range)
Number of patients	227
Mean gestational age (range)	30.12 wk (23–40)
Male, n (%)	103 (45.4)
Racial group, n (%)	
African American	120 (52.9)
Caucasian	89 (39.2)
Hispanic	12 (5.3)
Mean BW (range)	1.31 kg (0.45–3.75)
BW classification, n (%)	
LBW < 2.5 kg	215 (94.7)
Very LBW < 1.5 kg	167 (73.6)
Extremely LBW < 1 kg	75 (33)
Mean discharge gestational age	40.75 wk (33.4–65.1)

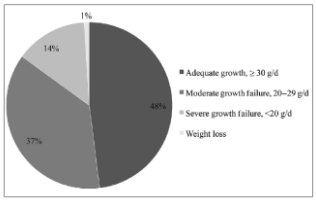
Zhang et al 2020

Growth trajectory from hospital discharge to first clinic visit



Zhang et al 2020

Growth trajectory from hospital discharge to first clinic visit



<u>Interventions at first visit</u>
In 92% of infants

61% required nutrition regimen change
- Increase calories in 26%
- Decrease calories in 26%

18.5% of families were mixing improperly

Zhang et al 2020

Clinical Application of Preterm Infant Discharge Nutrition Evidence

- Know family's feeding goal
- Protect maternal milk intake
- Monitor growth
- Target positive growth trajectory "Feed to Grow"
- Consider the infant's other needs based on disease, growth pattern, and previous nutrition
- Simplify when able (for parents and pediatricians)

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Nutrition Outcomes Research In Sustaining Mother and Infant Health

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