



Mother's Own Milk (MOM) Initiative

April 2018 Learning Session:
Taking a SPIN around the NICU

Partnering to Improve Health Care Quality
for Mothers and Babies



Welcome!

- **Please enter your Audio PIN on your phone or we will be unable to un-mute you for discussion.**
- If you have a question, please enter it in the Question box or Raise your hand to be un-muted.
- This webinar is being recorded.
- Please provide feedback on our post-webinar survey.

Agenda

1/18/2018

- 👶 Project Announcements
- 👶 Taking a SPIN around the NICU
 - 👶 Dr. Jae Kim, Supporting Premature Infant Nutrition Program
- 👶 Q&A and Discussion

Announcements

- 👤 Don't Forget: Free Personalized On-site Consultations for your unit!
 - 👤 Grand Rounds educational session option
 - 👤 We can review your NICUs data and progress and help you prioritize your efforts.
 - 👤 Contact Ivonne at ihernand@health.usf.edu to schedule!

April 19-20, 2018

Florida Perinatal
Quality Collaborative

ANNUAL CONFERENCE

Holiday Inn Tampa Westshore
Tampa, FL



Session Topics

- State of the FPQC
- Reducing Health Disparities through Shared Decision Making
- Optimizing Physician Engagement
- Partnering with Patients and Families
- Neonatal Abstinence Syndrome
- Customization vs. Standardization of Care
- The Cesarean Epidemic
- Optimizing Enteral Nutrition for Preterm Infants
- Contraceptive Choice Counseling
- The ARRIVE Trial (39 Week Inductions study)
- Healthy Start Coalitions and Hospital QI
- Birth Certificate Accuracy and Perinatal Indicators
- PROVIDE



Neel Shah, MD, MPP
Harvard's Ariadne Labs
**System Complexity and
the Cesarean Epidemic**



Heather Kaplan, MD, MSCE
Ohio Perinatal Quality
Collaborative
**Neonatal Abstinence
Syndrome**



Tara Bristol Rouse, MA
Perinatal Quality Collaborative
of North Carolina
**Partnering with Patients &
Families to Transform QI**



Ann Borders, MD
Illinois Perinatal Quality
Collaborative
**Optimizing Physician
Engagement in QI**



Maya Balakrishnan, MD, CSSBB
Florida Perinatal Quality
Collaborative
**Customization Versus
Standardization of Care**



Karen Harris, MD
ACOG District XII
**Reducing Health
Disparities through Shared
Decision Making**

Project “end’ and Sustainability Phase

👶 *MOM Initiative ends in June*

- 👶 *Feedback Survey for the MOM Initiative will be sent in May*
- 👶 *June webinar will focus on sustaining your MOM NICU’s progress*

👶 *MOM Initiative Sustainability Phase will start in July*

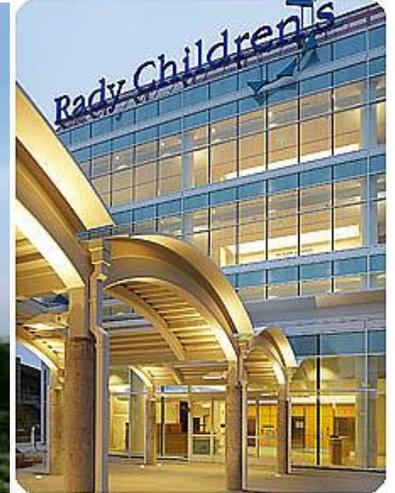
- 👶 *A new data agreement is not required for sustainability*
- 👶 *Further details will be sent soon!*



Taking a SPIN around the NICU

Jae Kim, MD, PhD
Professor of Clinical Pediatrics
Department of Pediatrics
Division of Neonatal-Perinatal Medicine
Division of Pediatric Gastroenterology, Hepatology and Nutrition

Florida Perinatal Quality Collaborative Webinar 2018



UC San Diego Health



Disclosures

Grant/Research	Infacare
Medical Advisory Board	Medela
Consultant	Ferring, Medela
Speakers Bureaus	Mead Johnson Nutrition
Stock Shareholder	PediaSolutions, Nicolette
Owner or Intellectual Property Rights	
Other	

Overview

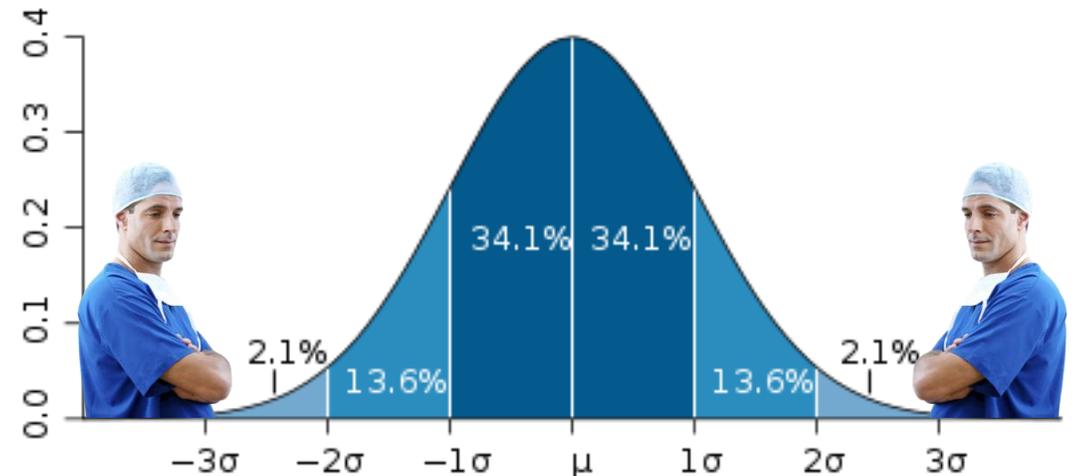
- Standardizing nutrition care
- Human milk science
- SPIN Program
 - Feeding protocols
 - Maternal lactation support
 - Postdischarge nutrition



Standardizing care is better care

- **Why should we standardize?**
 - Any plan is better than no plan
 - Standardized care is better care
 - Obtain interpretable results
 - “in the absence of evidence practice varies widely”
 - Eliminate the outliers (doctor-of-the-day!)
- **Why don't we standardize**
 - Resistance to “cookbook medicine”
 - Fear of obsolescence
 - Loss of control
 - Loss of importance of decision making

- **What should we standardize?**
 - nutrient delivery
 - energy targets
 - nutrient targets
 - growth goals

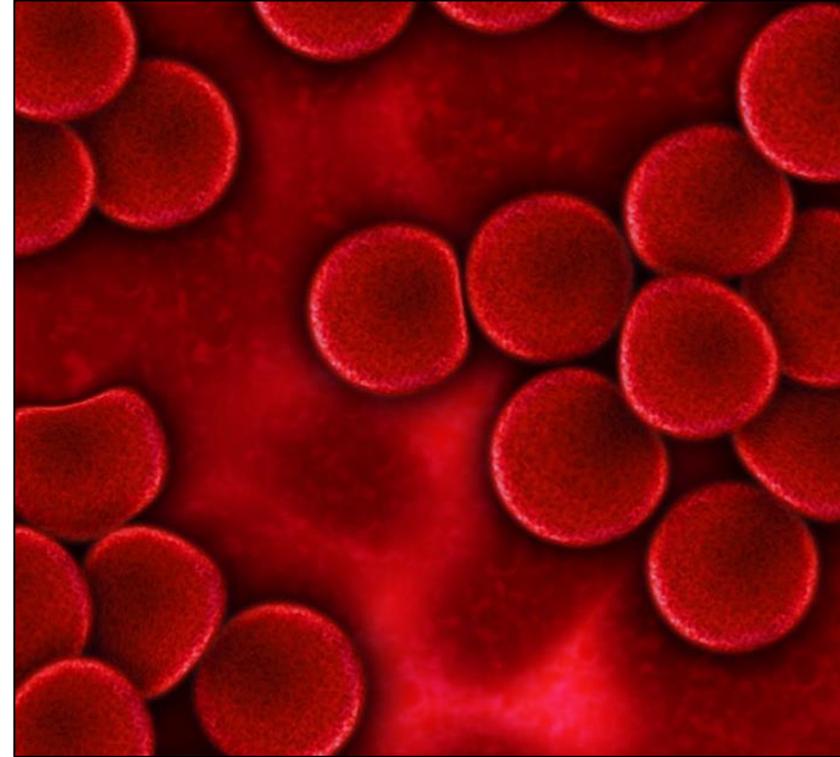


Human milk is a liquid tissue!

Human Milk



Blood



NUTRIENTS
TRANSPORTERS

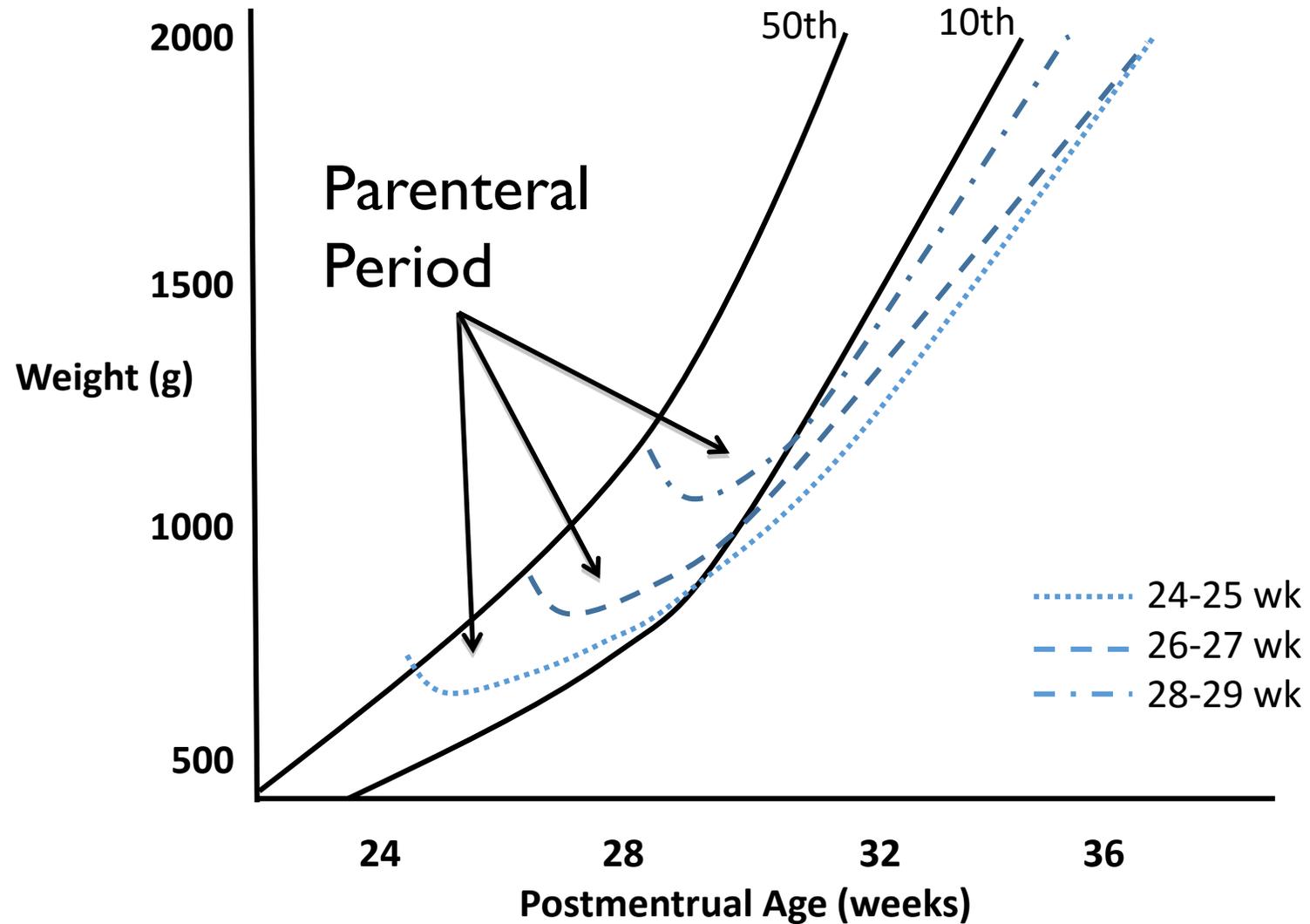
CELLS
CYTOKINES

IMMUNE MODULATORS

ENZYMES

HORMONES
GROWTH FACTORS

The Nutritional Emergency of the Preterm Infant



Adapted from Ehrenkranz et al (1999) Pediatrics 104(2 Pt 1): 280-289.

Progress in Preterm Infant Nutrition

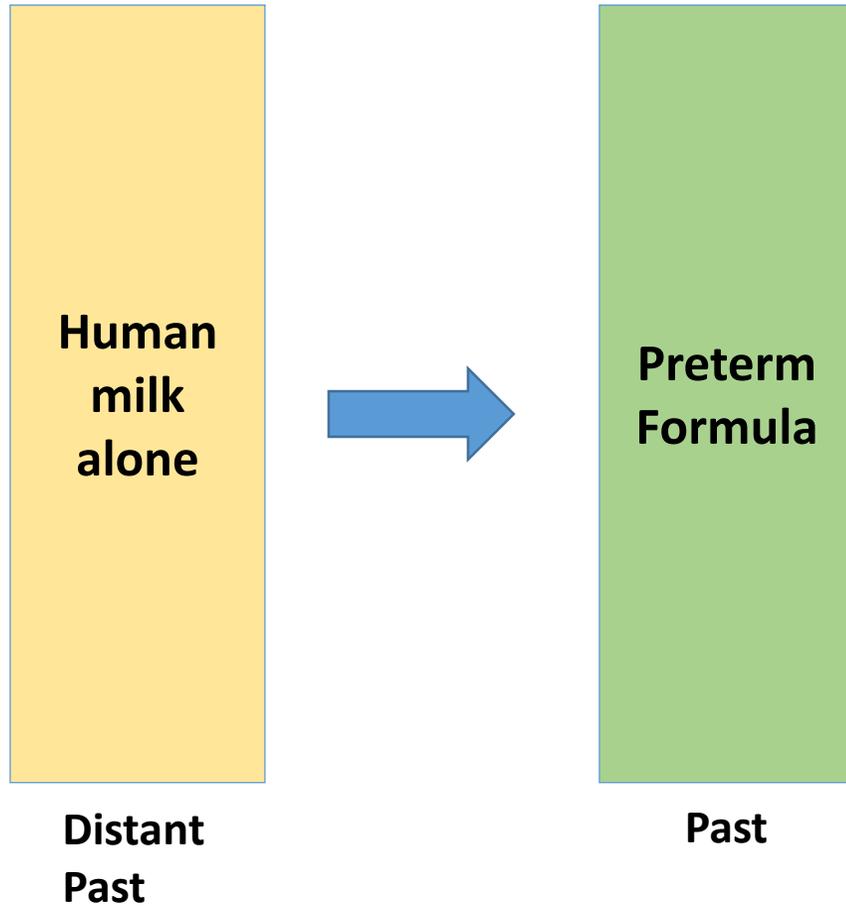


Distant
Past



Poor growth (stunted)
**Poor bones (metabolic
bone disease or rickets)**
**Poor brain development
(due to poor nutrition)**

Progress in Preterm Infant Nutrition



NO!



AP

**SUPPORTING PREMATURE
INFANT NUTRITION (SPIN)**

**BABY FRIENDLY HOSPITAL
INITIATIVE**

PRETERM

TERM



SPIN PROGRAM MISSION STATEMENT

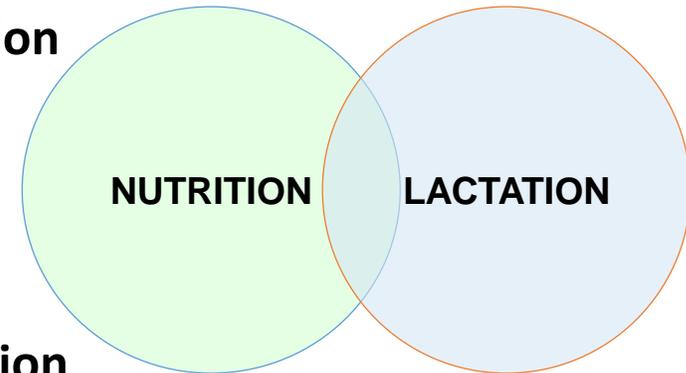
To create a Center of Excellence in neonatal nutrition focused on the provision, analysis, and research of human milk to improve nutritional and long-term health outcomes of premature babies



The SPIN Program Ten Steps



1. Have a NICU nutrition and human milk policy with education of all mother and baby staff
2. Incorporate family centered care principles in the NICU
3. Aim for 100% human milk nutrition
4. Standardize enteral feeding procedures
5. Prevent extra-uterine growth failure
6. Maximize mothers' milk production
7. Optimize milk quality and safety
8. Encourage skin-to-skin care and breastfeeding
9. Standardize oral feeding progression
10. Define a comprehensive nutritional discharge plan



UCSD SPIN Team

MD



Manager



Nurse



OT



Research RN



Lactation



Dietitian



1. Have a NICU nutrition and human milk policy with education of all mother and baby staff

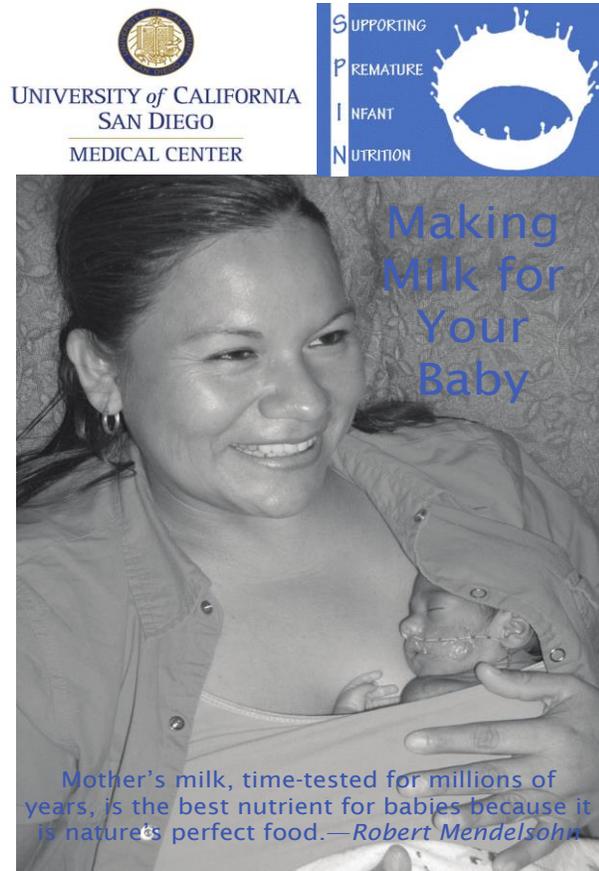
DEVELOPMENT OF SPIN POLICIES



- Milk collection and handling
- Skin-to-Skin care
- Enteral Feeding Advancement
- Consensus on feeding intolerance, stops and starts
- Infant driven feeding
- New growth chart
- Change MD/RN documentation
- Discharge nutrition

2. Incorporate family centered care principles in the NICU

MATERNAL SPIN EDUCATION



- Comprehensive maternal education
- Empower mothers to follow their progress
 - e.g. Pumping log book
- Encourage skin to skin
- Encourage nonnutritive sucking at breast
- Encourage breastfeeding
- Teach parents to advocate for their infant
- Educate them on how to care for their child throughout the hospital stay

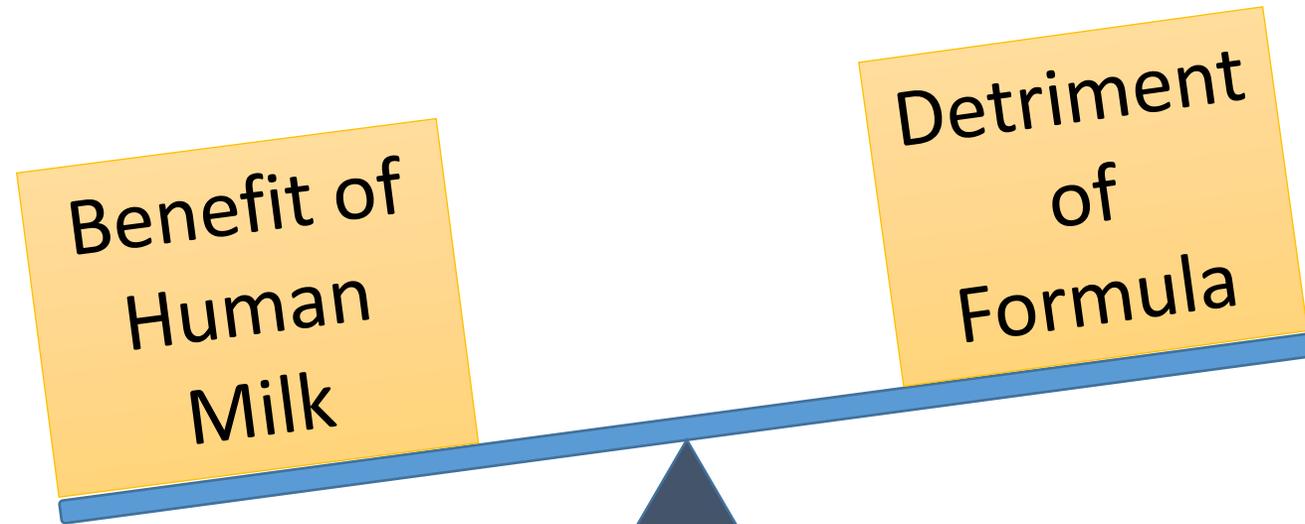
3. Aim for 100% human milk nutrition

Recognize the value of human milk as the basis of preterm nutrition

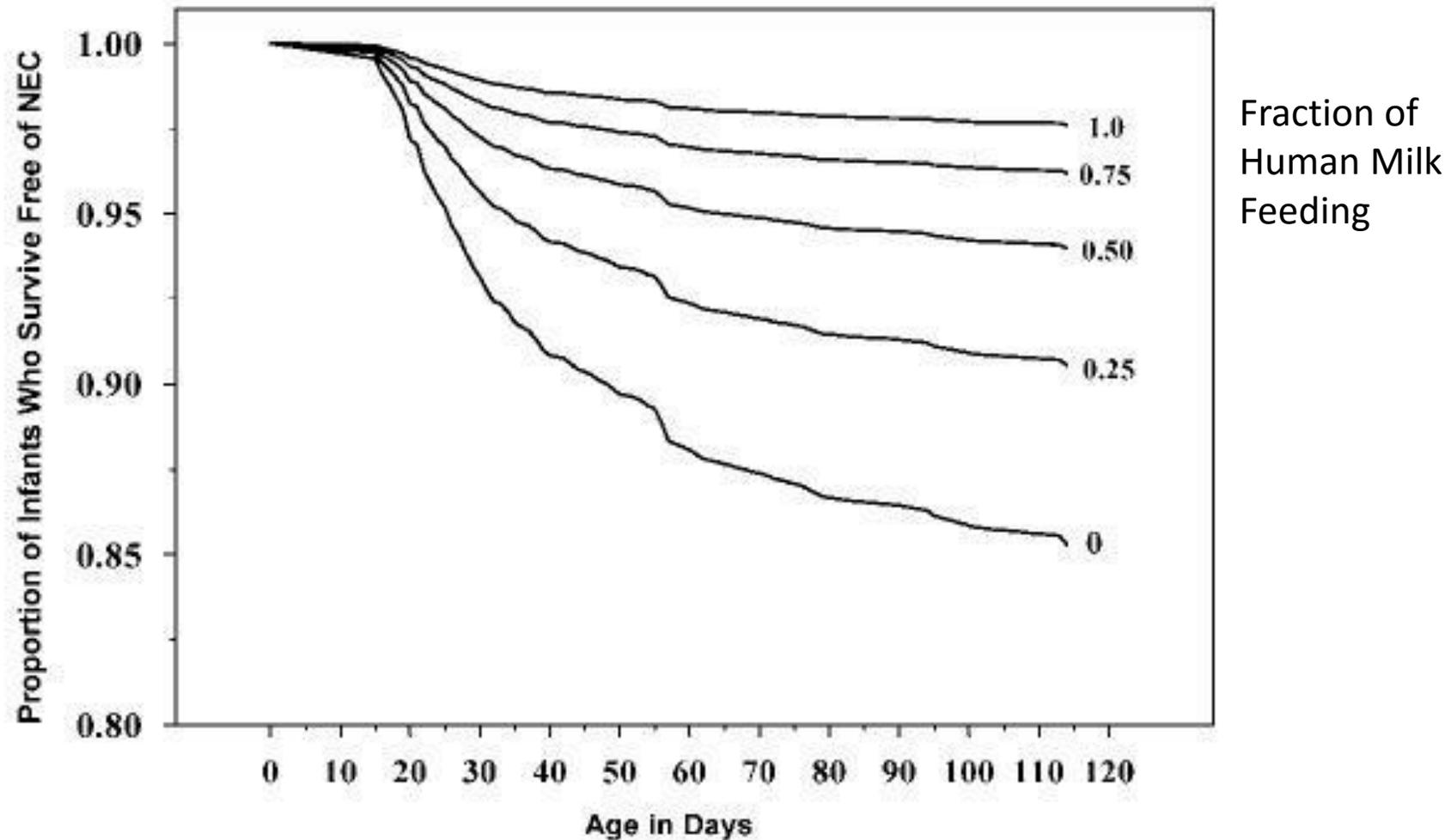
Realize the dose dependent effect of human milk in reducing disease

Understand that even small amounts of intact bovine products can increase an infants risk for NEC

Balance of effects in developing NEC



Fractional Human Milk Feeding Reduces Chances of NEC



The argument against formula for preterm infants

Imagine if 10% of term babies developed NEC

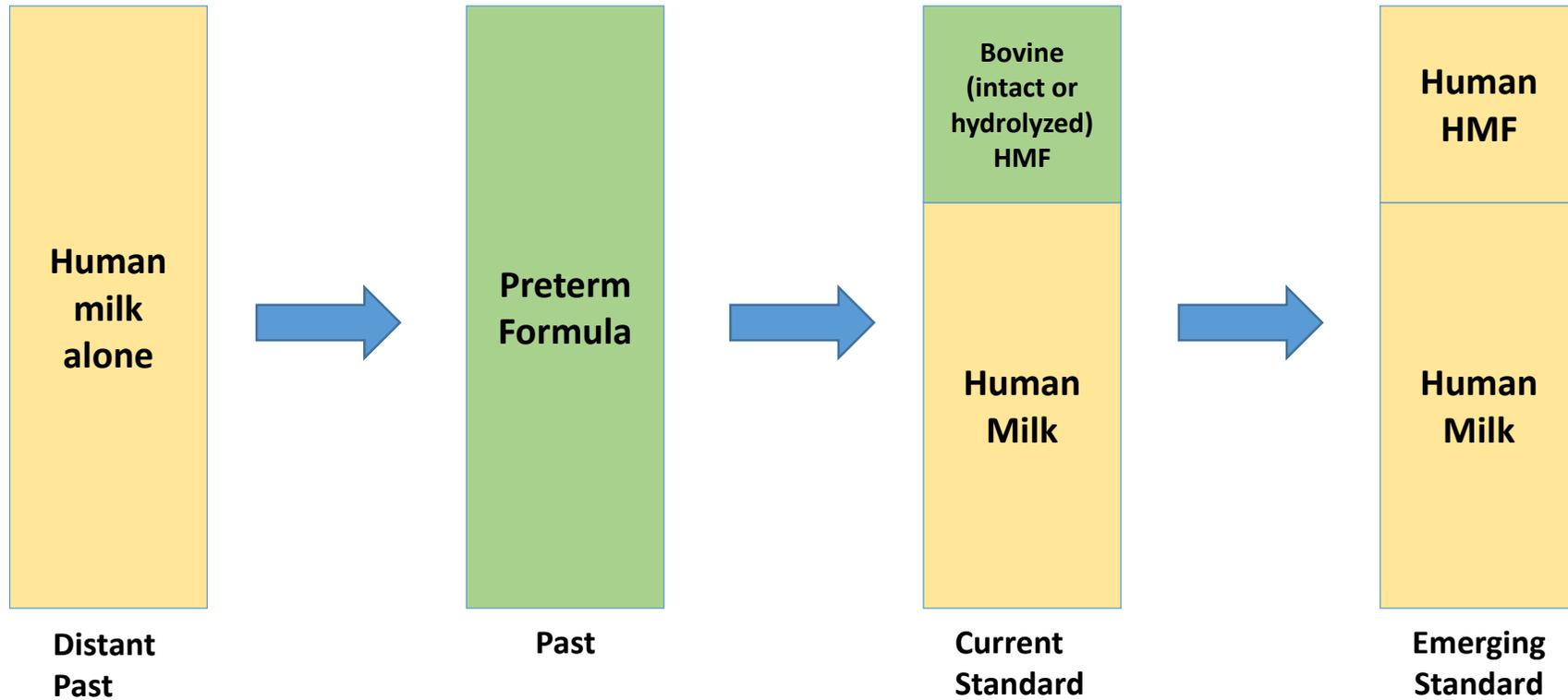
30-50% NEED SURGERY

50% DIE!

**Conservatively, human milk can reduce NEC
(total and surgical) by at least 50%**

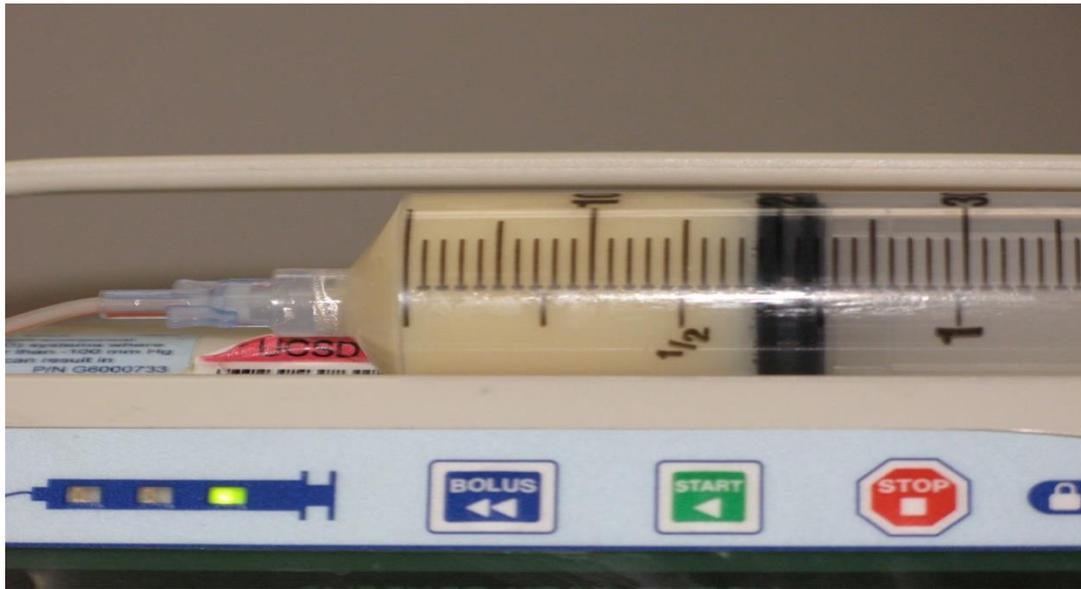
If this were your baby what would you do?

Progress in Preterm Infant Nutrition



INCREASE HUMAN MILK EXPOSURE

- 100% of mothers initiate pumping
- Staff and mothers work together
- Identify barriers
- Maximize maternal milk production
- Goal is 600 mLs per 24 hours by 7-14 days
- Continued vigilance of mother's milk volume throughout stay



HUMAN MILK OR BUST!

Donor human milk

PROS

- Human specific
- Bridges gap when mother's milk supply insufficient to meet infant's requirements
- retains many bioactive factors
- safe alternative to mother's milk
- pooled components from several mothers

CONS

- Lower quality milk compared to fresh mothers' milk
- No cellular components or probiotics
- Less protein due to maturity of milk
- No lipase activity that may alter digestibility, reducing energy absorption
- Reduced bioactive components due to processing
- Reduced salts and vitamins
- Lacks mother-infant specificity

DoMINO Trial

- Canadian Study
- Double blinded RCT, 363 infants (181 donor milk, 182 formula)
- Preferentially fed mother's own milk but supplemented with donor or formula, one or the other for up to 90 days or discharge whichever came first
- Median number of days for donor milk was 65 (IQR, 41-90)
- Long-term anthropomorphic not different between groups
- No difference in 2 year neurodevelopmental outcomes

Table 4. In-Hospital Mortality and Major Morbidities^a

	No./Total No. (%)		Risk Difference, % (95% CI) ^b	P Value
	Donor Milk (n = 181)	Preterm Formula (n = 182)		
Mortality and morbidity index ^c	78/181 (43.1)	73/182 (40.1)	5.0 (-2.7 to 12.7)	.20
Death	17/181 (9.4)	20/182 (11.0)	-1.0 (-9.7 to 7.6)	.82
Late-onset sepsis	44/181 (24.3)	35/182 (19.2)	3.8 (-2.6 to 10.2)	.24
Necrotizing enterocolitis				
All stages	7/181 (3.9)	20/182 (11.0)	-7.1 (-12.5 to -1.8)	.01
Stage ≥II	3/181 (1.7)	12/182 (6.6)	-4.9 (-9.0 to -0.9)	.02
Oxygen support at 36 wk postconception	44/175 (25.1)	37/179 (20.7)	4.2 (-4.9 to 13.4)	.36
Severe retinopathy of prematurity	7/181 (3.9)	8/182 (4.4)	-0.5 (-4.6 to 3.6)	.80
Severe brain injury	38/181 (21.0)	37/182 (20.3)	4.5 (-3.7 to 12.8)	.28

^a The median duration of the initial hospital stay was 77.0 (interquartile range, 50.5-104.0) days among infants randomized to the donor milk group and 67.0 (interquartile range, 50.0-102.5) days among those randomized to the preterm formula group.

^b Differences between feeding groups were analyzed by logistic regression analyses adjusted for recruitment center and birth weight group (<1000 g, 1000-1499 g) for mortality and morbidity index, death, late-onset sepsis, oxygen support, and severe brain injury. Other outcomes (necrotizing

enterocolitis and severe retinopathy of prematurity) were not adjusted because of insufficient sample size.

^c The mortality and major morbidity index is a dichotomous variable that is positive if death or any one of a predetermined list of selected morbidities shown to be inversely related to provision of human milk occurred: confirmed late-onset sepsis, necrotizing enterocolitis (Bell stage ≥II), chronic lung disease (oxygen support at 36 weeks), or retinopathy of prematurity (International stage 4/5, laser or intraocular antivasular injection).

Consent for Donor Human Milk

- Birthweight less than 1500 grams
- Your child has had some type of bowel injury such as necrotizing enterocolitis (NEC) or gastroschisis
- Your physician has requested the use of donor milk for other reasons that he/she feels potentially adds further health benefits for your infant.
- **Provided until 34wks gestation**

OPT IN

I accept the use of donor human milk for my child.

Signature of Guardian _____ Date _____

Signature of Witness _____ Date _____

OPT OUT

I understand that use of cow's milk-based formulas may increase my child's risk of infection, intestinal complications, or allergies, but decline the use of donor human milk for my child.

Signature of Guardian _____ Date _____

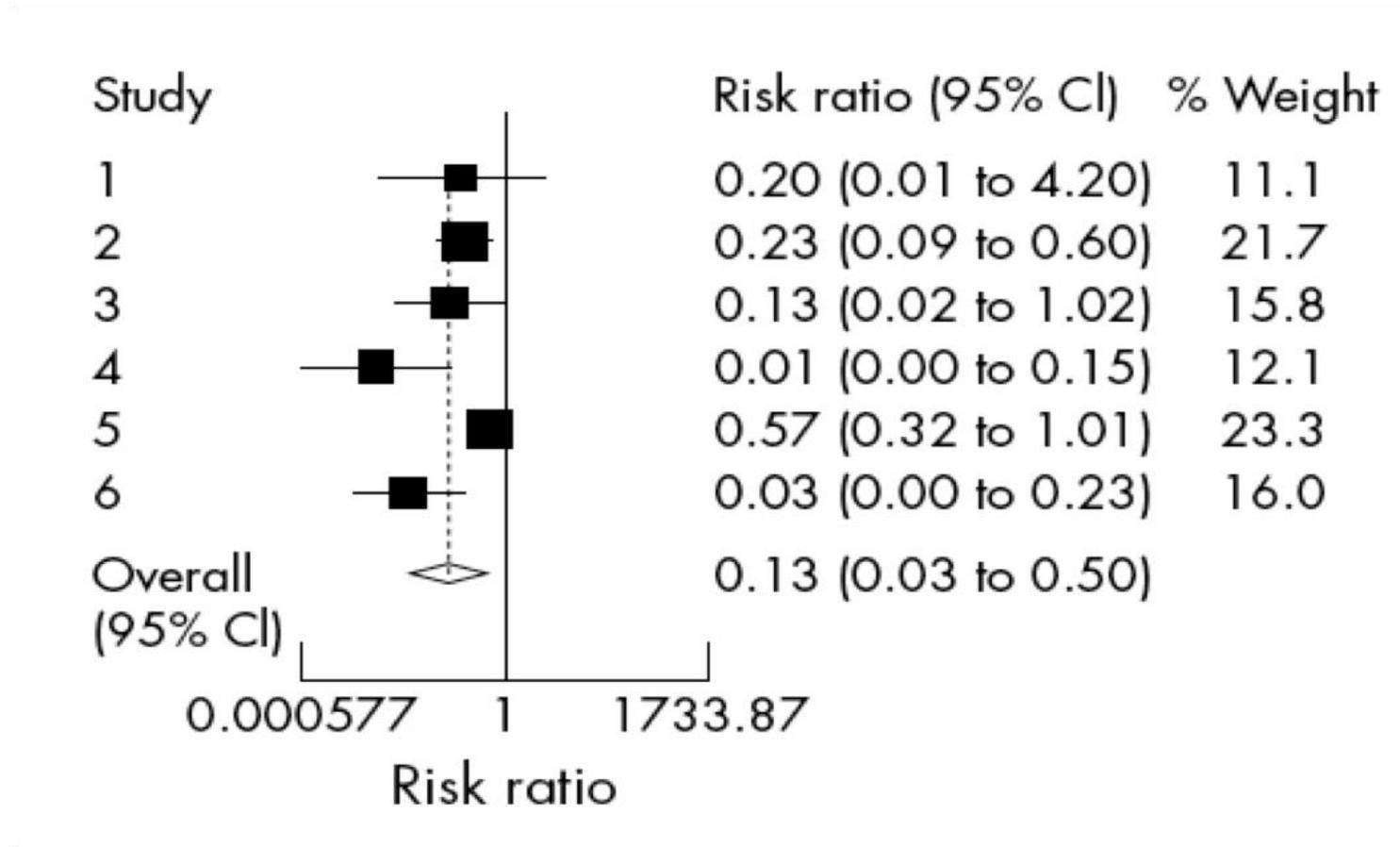
Signature of Witness _____ Date _____

4. Standardize enteral feeding
procedures

Enteral Nutrition

- Start with oral colostrum care
- Early enteral feeding
- Standardize enteral advancement
- Agree on definition of feeding intolerance Minimize stops and starts of feedings
- Earliest fortification of human milk
- Maximize caloric intake
- Early enteric feeding initiation
- Aim for 100% mother's milk nutrition
- If possible use all human diet with human milk based human milk fortifiers

Retrospective evidence for protocol feeding



STANDARDIZE ENTERAL FEEDING ADVANCEMENT

UCSD Medical Center
Individualized Enteral Advancement Tables (iEATs)
for Neonates <750g Birth Wt

Patient Name: [REDACTED] Date: 9/11/08
Medical Record #: [REDACTED]

Weight: 550 grams		Advances by Approximately 8mL/kg/day				
Date & Time Advances are q day	ml/kg/day	Weight Est* (kg)	Volume (mL) of each feeding	Caloric density of milk or formula	Comments - (circle type of feed)	
1 st day of feedings	8	0.550	0.5	20 kcal/oz	MBM or Formula	
2 nd day of feedings	8	0.550	0.5	20 kcal/oz		
3 rd day of feedings	8	0.550	0.5	20 kcal/oz		
4 th day of feedings	16	0.550	1.0	20 kcal/oz		
5 th day of feedings	24	0.550	1.5	20 kcal/oz		
6 th day of feedings	32	0.550	2.0	20 kcal/oz		
7 th day of feedings	40	0.550	3.0	20 kcal/oz		
8 th day of feedings	48	0.550	3.5	20 kcal/oz		
9 th day of feedings	56	0.550	4.0	20 kcal/oz		
10 th day of feedings	64	0.558	4.5	20 kcal/oz		
11 th day of feedings	72	0.566	5.0	20 kcal/oz		
12 th day of feedings	80	0.574	5.5	22 kcal/oz	HMF / PE22	
13 th day of feedings	88	0.582	6.5	22 kcal/oz		
14 th day of feedings	96	0.590	7.0	22 kcal/oz		
15 th day of feedings	104	0.598	8.0	22 kcal/oz		
16 th day of feedings	112	0.606	8.5	22 kcal/oz		
17 th day of feedings	120	0.614	9.0	24 kcal/oz	HMF / PE24	
18 th day of feedings	128	0.622	10.0	24 kcal/oz		
19 th day of feedings	136	0.630	10.5	24 kcal/oz		
20 th day of feedings	144	0.638	11.5	24 kcal/oz		
21 st day of feedings	152	0.646	12.5	25 kcal/oz	Protein for HMF	

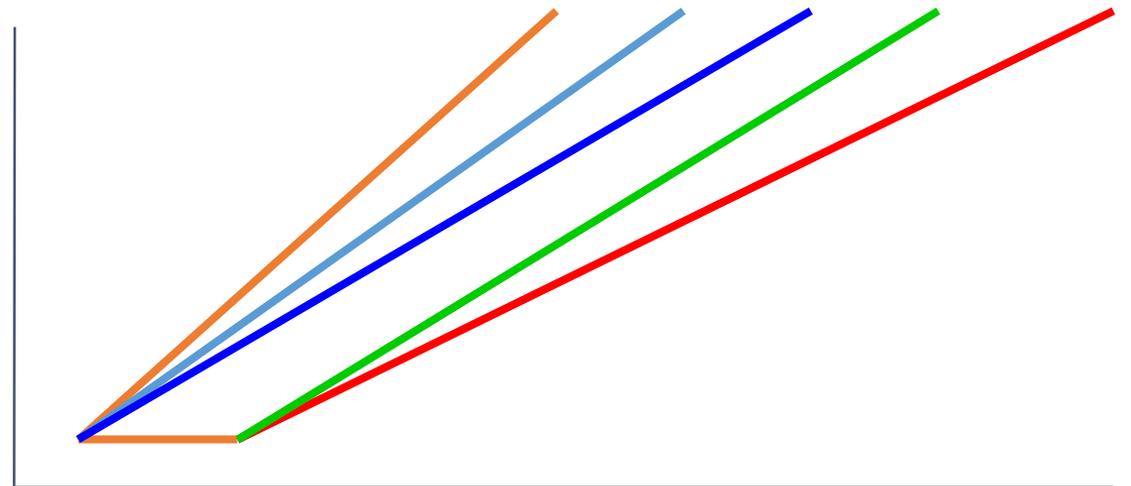
*assumes wt gain rate of 8g/day at 10th day of feeds

Features of a good feeding guideline

- Simple order set to trigger advancement
- Guided by bedside nursing
- Gradual linear advancement
- Steady rate of feeding
- Integrated fortification and vitamin and iron addition
- Goal is for more than 90% of infants to be following guideline

What is the correct rate of feeding?

- Should all preemies be fed the same rate?
 - Literature supports very fast rate of feeding up to 35mL/kg/day
- How much trophic feeding is good?
 - Berseth et al. study suggests that 10 days was better
- When is the earliest day to start feeding?
 - Little data to support day 1 feeding
- When not to feed?
 - More theoretical basis to stop feeds



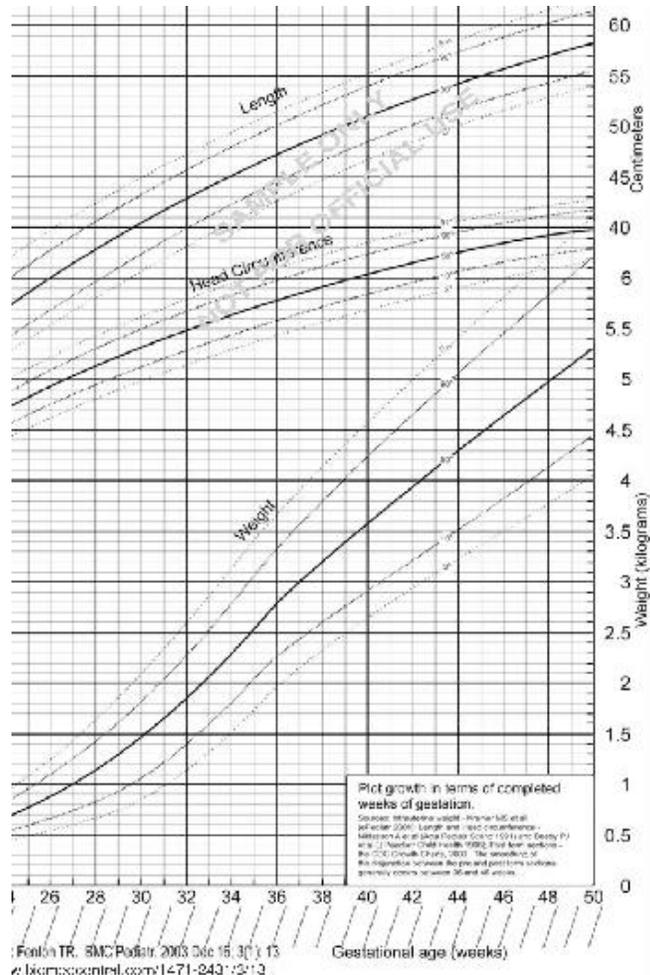
5. Prevent extra-uterine growth failure

PARENTERAL NUTRITION



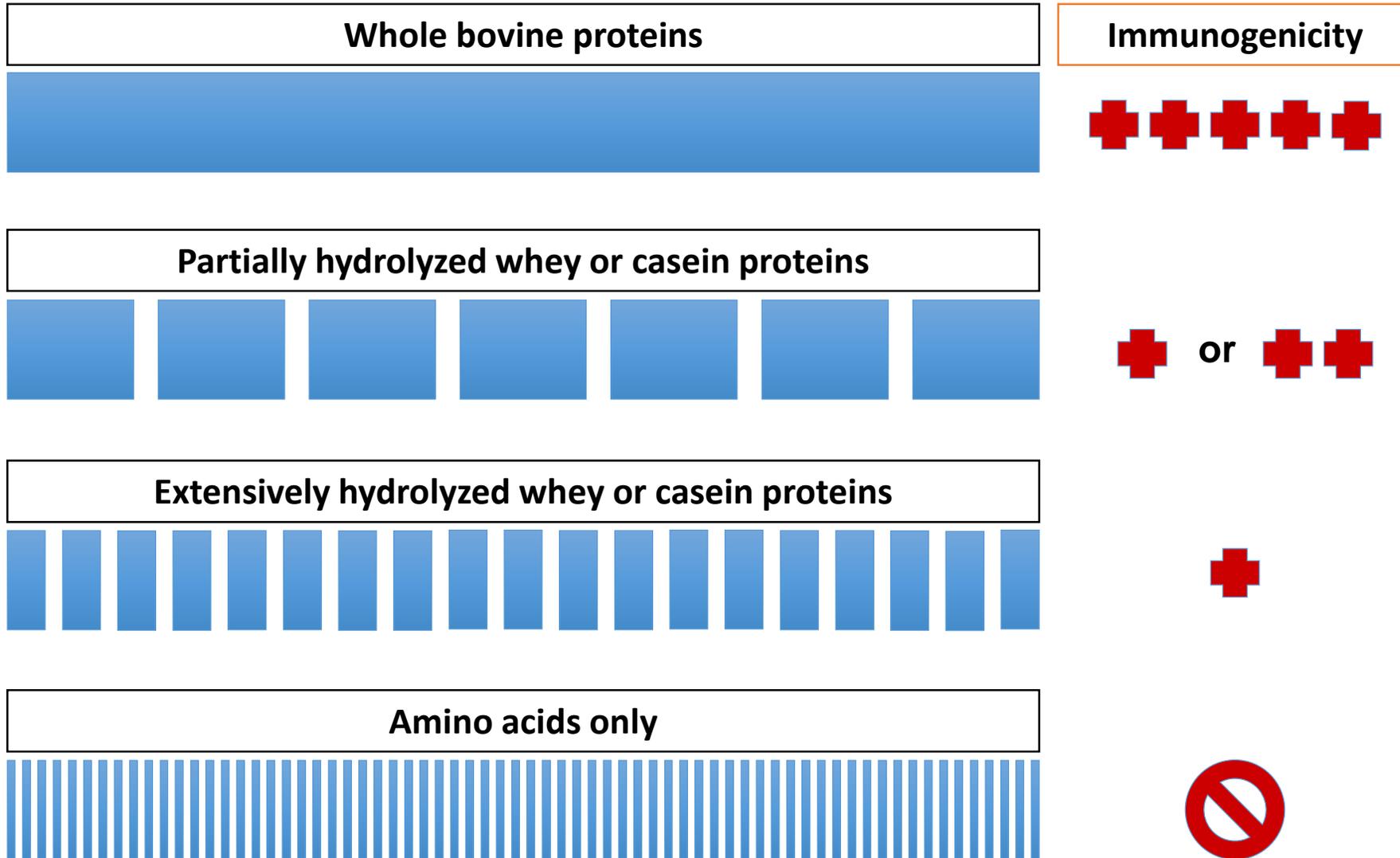
- Starter TPN with 3 g/kg/day quickly advanced to 4g/kg/day
- Start lipids day of life 1 and advance to 3 g/kg/day by 1 g/kg/day
- Increase total fluid goals to 160-180 mL kg/day

STANDARDIZE RESPONSE TO IN-HOSPITAL GROWTH



- Prevent extrauterine growth restriction
- Weekly nutrition rounds
- Work on standard approach to growth issues
- RD rounds with medical team
- Accurate scales and measurement tools
- Weight and measure infants every week and plot on curve
- Fenton growth chart

Less bovine: protein hydrolysis



Newer liquid human milk fortifiers

- new ultra-concentrated liquid fortifiers
- Base protein
 - Partially hydrolyzed whey OR
 - Extensively hydrolyzed casein
- Protein amount: ~20% more protein than older standard fortifier
- Differentiating properties
 - Acidified to mildly low pH
 - Additional lutein, DHA and ARA

Effect of an Extensively Hydrolyzed Protein Liquid Human Milk Fortifier on the Growth of Preterm Infants

	Control Fortifier (CF)	Experimental Fortifier (EF)
Protein Source	Nonfat dry milk, Whey protein concentrate	Extensively hydrolyzed casein (Alimentum protein)
Protein Amount	3.0 g protein/100 Cal (as fed)	3.6 g /100 Cal (as fed)
Other nutrient differences		Lutein and Beta-carotene DHA and ARA

POWDER

LIQUID

Effects of liquid bovine based human milk fortifiers

- Higher weight and linear growth rate were similar to or better than control intact bovine powder
- Strict adherence to protocol further improved overall growth including head circumference with one of the fortifiers
- No differences in measures of feeding tolerance or days to achieve full feeding volumes
- Higher levels of prealbumin, albumin, and blood urea nitrogen
- Similar incidence of sepsis or NEC

At risk infants

- Provide additional nutrients for infants who are at higher risk or who are not growing optimally
- At risk infants include the following:
 - Infants less than 750 g/kg/day
 - IUGR/SGA
 - Donor human milk fed infants
 - High energy expenditure: BPD
 - Intestinal dysfunction (gastroschisis, post NEC, SIP, infants with stomas or discontinuous bowel)

6. Maximize mothers' milk
production

Pump provision

- Hospital grade pump
 - Rental
 - Loaner
 - WIC
- Working mother pump
 - Low income mothers
 - WIC-N-Style
 - Medical assistance pump
 - As a back up for home pump



No mother discharged without an electric pump!

7. Optimize milk quality and safety

OPTIMAL MILK SAFETY, HANDLING AND DELIVERY



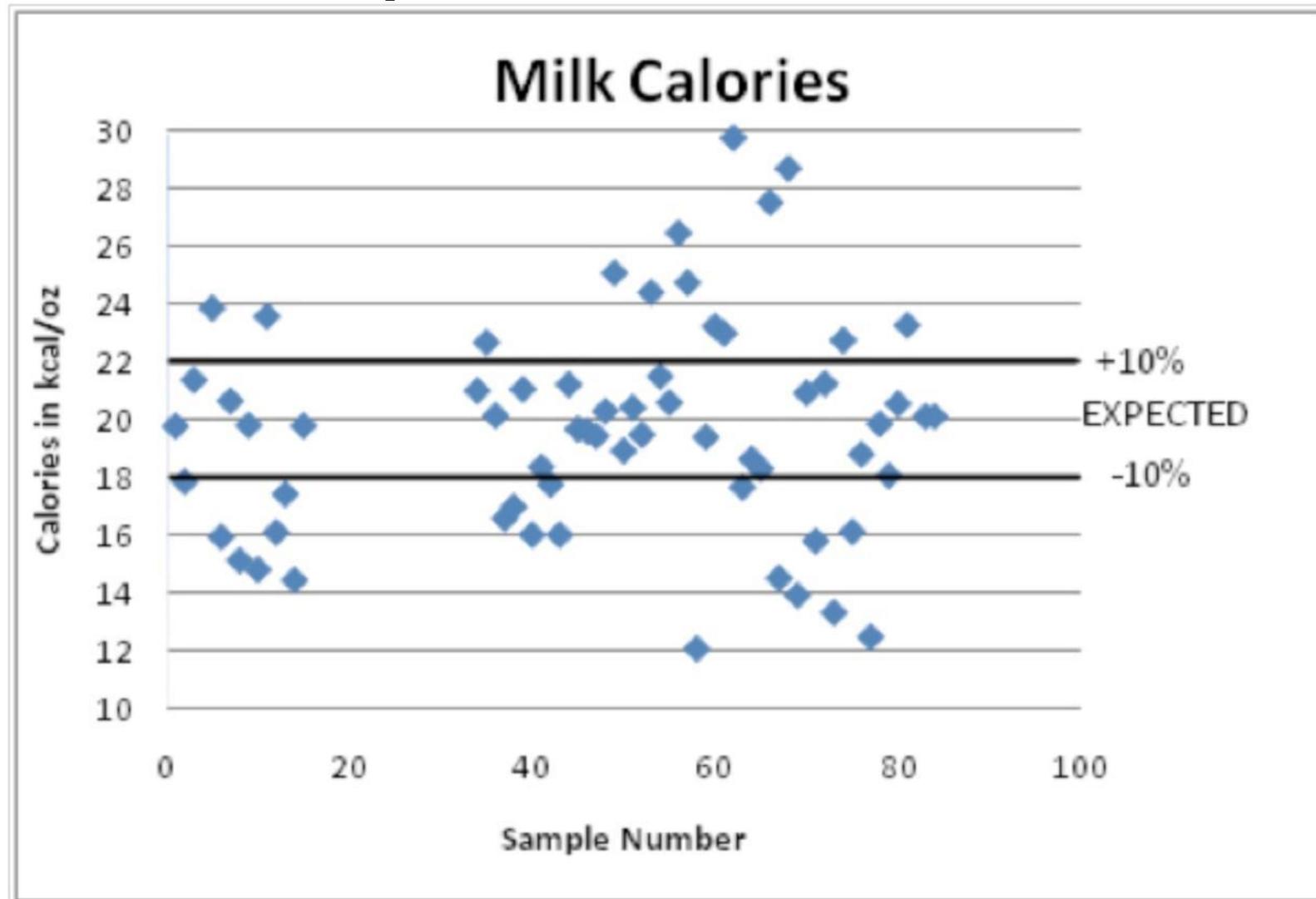
- Standard milk storage guidelines
- All mothers given coolers with blue ice pack
- Hospital freezers-goal is to store all milk
- Milk technician mixes feeding
- Milk scanning system to minimize wrong milk/wrong baby and inventory milk

Improving Milk Processing In NICU: Milk Technician

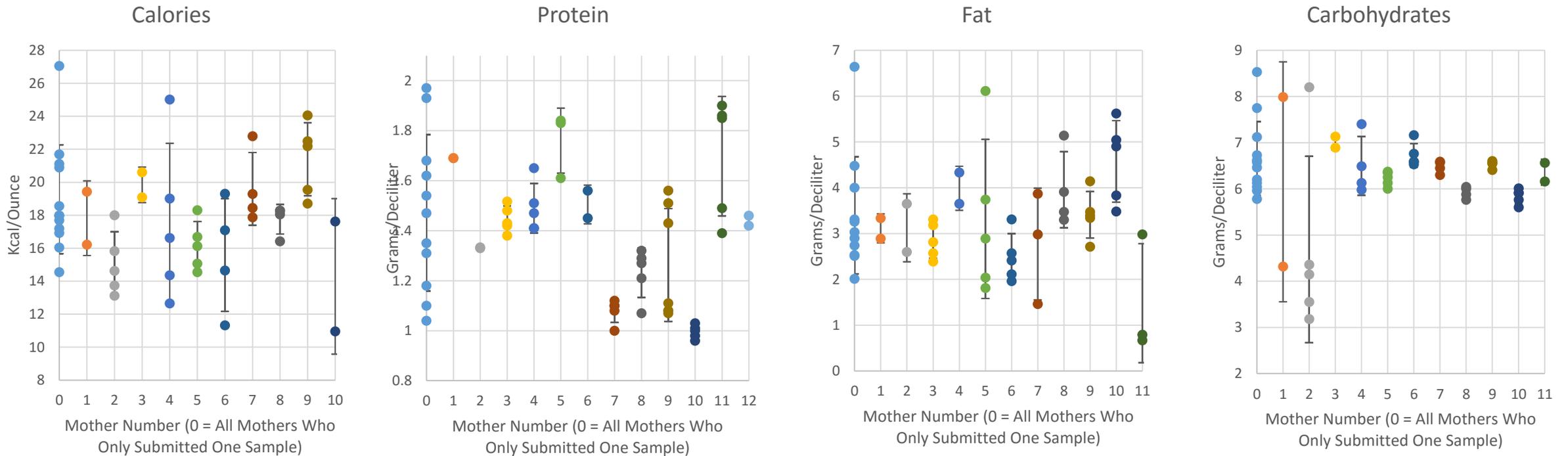
- Milk technician position: dietary tech
 - Collect morning milk order
 - Use standard recipe to mix 24 hour feedings
 - Milk feeding put in syringes, or large bottle once orally feeding
- Dedicated milk preparation area to keep clean away from the NICU
- Benefits of milk tech:
 - Ease RN workload
 - Consistent cleaner preparation
 - Minimize milk transfers
 - Encourage use of fresh milk



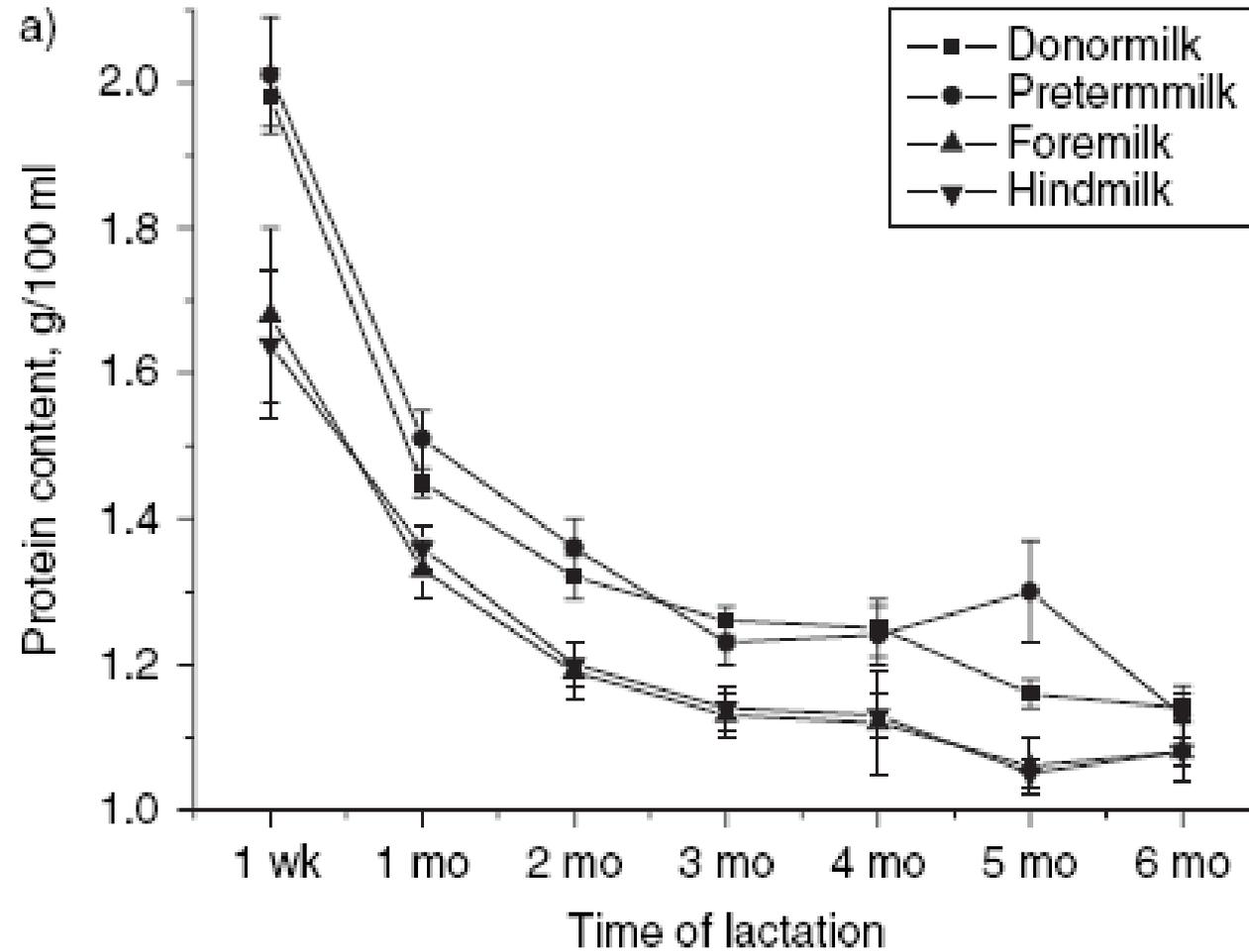
Caloric variability of human milk



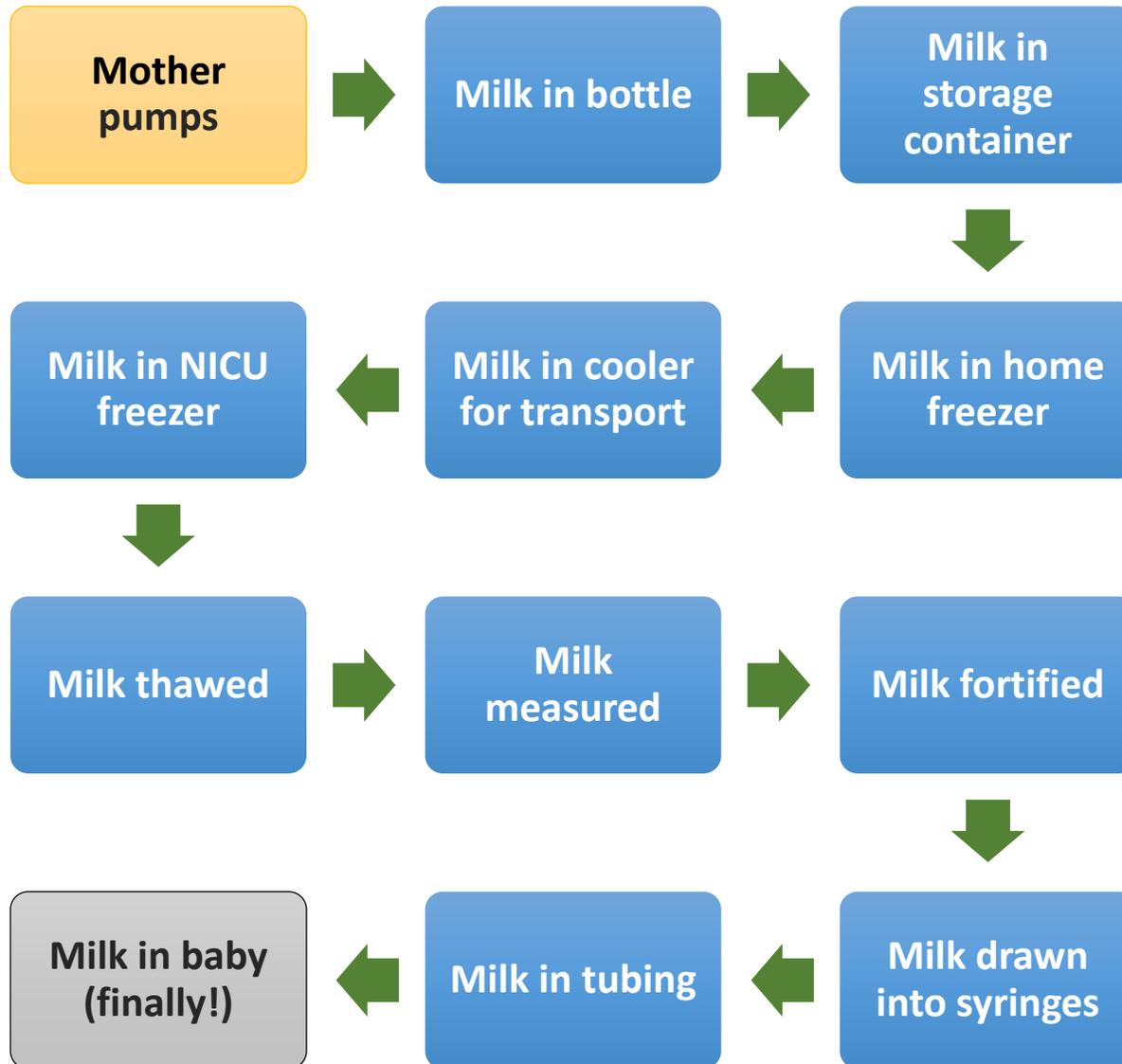
Variability within mothers



Human milk protein declines with time



MILK "TRAFFIC" CHAIN



**MORE MILK
MEANS MORE
RESPONSIBILITY**

8. Encourage skin-to-skin care
and breastfeeding

SKIN-TO-SKIN CARE



- SSC policy written
- Policy clarified few contraindications to SSC
- SSC for ventilated babies and those with central lines if stable
- Parents encouraged to ask for daily SSC

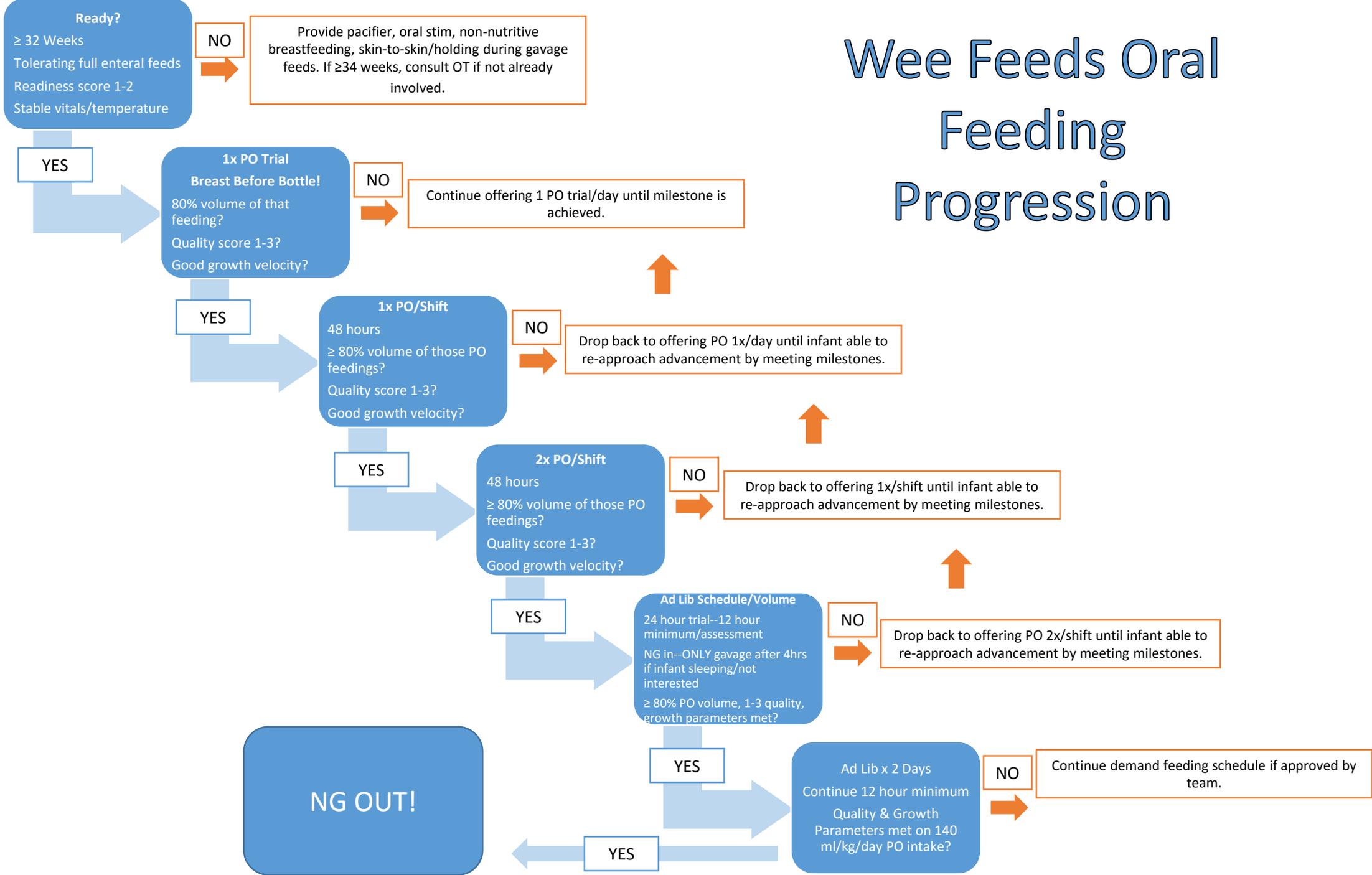
GET BABIES TO THE BREAST

- Define your steps from SSC to ad lib feedings
- Provider writes order to start the process
- Give nursing as much autonomy here
- Nurse moves baby through process based on infant readiness



9. Standardize oral feeding
progression

Wee Feeds Oral Feeding Progression



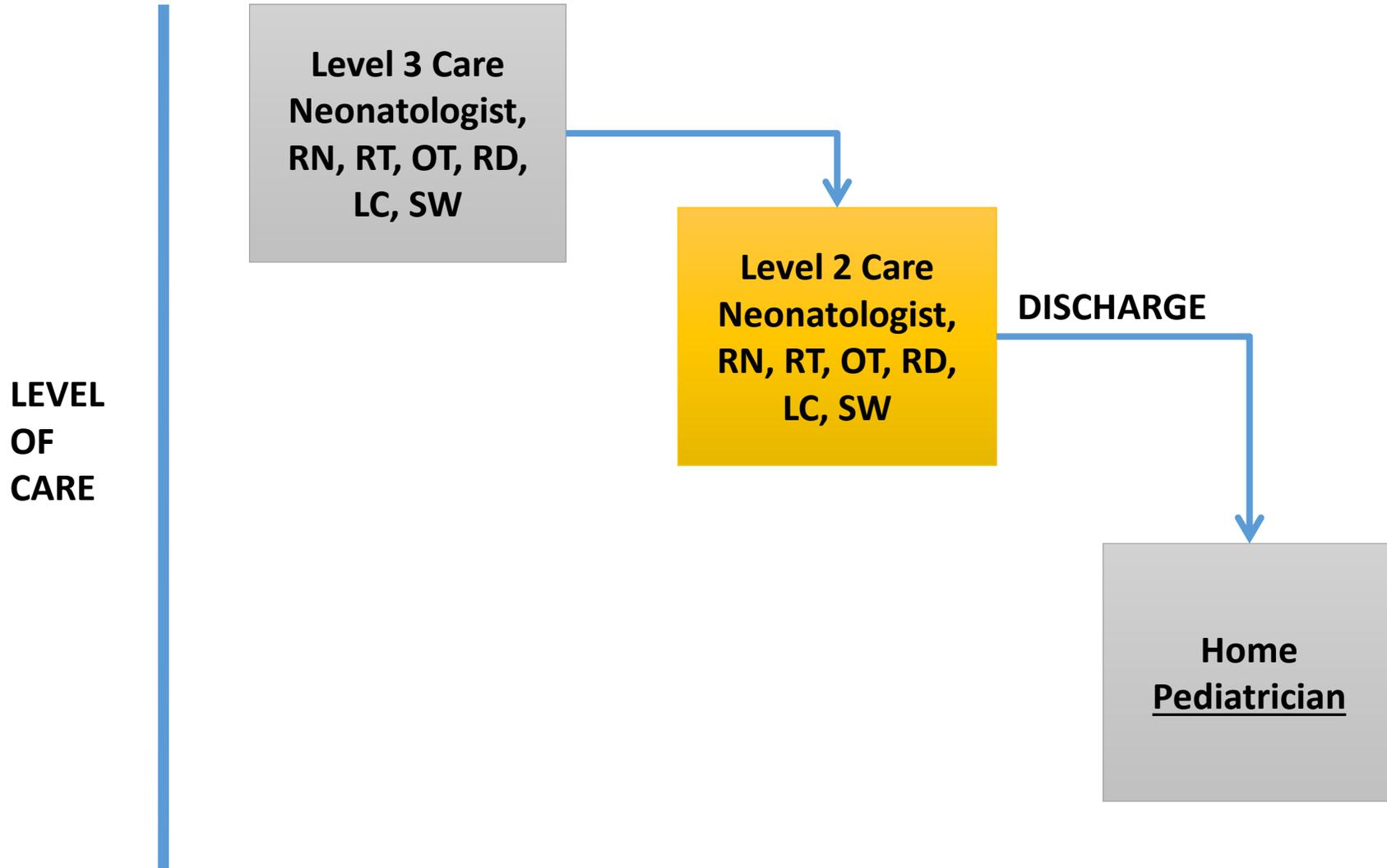
10. Define a comprehensive nutritional discharge plan

POST-DISCHARGE NUTRITION



- Discharge planning
- How to supplement?
- How long to continue?
- Optimal growth; concerns about too-rapid weight gain or faltering growth
- Vitamins and minerals
- Anemia prevention and iron
- Transition to the breast
- PINC clinic

Transitioning from NICU to home



- Major loss of intensity of care
- Loss of consistency of care
- Next major interface with neonatology is 6 month corrected high risk infant followup

Outpatient Gastrointestinal / Nutritional Issues for NICU grads

- Undernutrition/Overnutrition
- Gastroesophageal reflux disease
- Gastroschisis, tracheo-esophageal atresia, SIP
- Food sensitivities/allergies
- Short bowel syndrome secondary to atresia, NEC
- Genetic causes of intestinal dysfunction or feeding failure: CF, Shwachman Diamond, Riley Day Syndrome, unexplained
- Neonatal cholestasis

What do you do for nutritional discharge?

- Do you have an organized discharge?
- Is discharge nutrition plan communicated to PCP?
- Do you send growth chart?
- Do parents (and PCP) understand need for fortification?
- Vit-Fe-supplements easy for parents and safe for baby?
- Do you have a post-discharge clinic for your NICU?



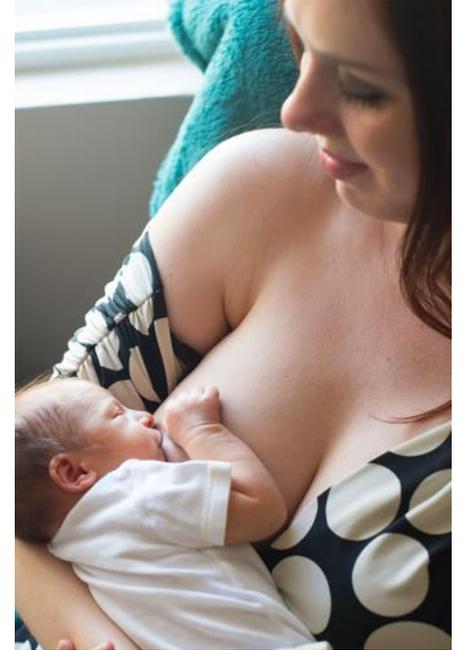
How can we improve discharge planning?

- Better preparation at discharge
- Help mother with breastfeeding plan/milk production at home
- Improve education/communication with PCP
- Send growth chart and nutrition plan to PCP
- Provide clear fortification recommendation
- Work out simple strategies to fortify human milk fed infants at discharge
- Improve follow up in the community



Postdischarge Nutrition Choices

- Human milk
 - Human milk alone
 - Fortified human milk with postdischarge powder
 - Supplemental bottles of postdischarge formula
 - Liquid fortifier
- Formula
 - Standard term formula (20 kcal/oz)
 - Increased calorie term formula (22-24 kcal/oz)
 - Postdischarge formula (22 kcal/oz)



Liquid 30 kcal Discharge Fortification

- Provide 90-120 mL 30 kcal preterm formula daily (20-25% of total feeds)

Benefits

- Low osmolality
- Higher mineral support than most strategies
- Ease of use of RTF liquid
- Can follow BM feeding or be mixed in
- **Supportive of breastfeeding**
- Multiple product choices

Disadvantages

- Lack of availability
- Cost
- Lack of data



“THIRTY IS THE NEW TWENTY”

Feeding aversion

- Is it how we feed them early on?
- Is it the oral trauma during NICU stay?
- Is it reflux?
- Is it the bottle feeding during their convalescence?
- Is it due to issues of vulnerable children?
- Referral (feeding clinic at Radys CHSD)
- Prevention



GERD

- UCSD 749 low birth weight infants less than 2500g
- 67 had GERD diagnosis (just less than 10%) at discharge
- 24 with GERD diagnosis sent home on



Gastroesophageal Reflux Disease Algorithm

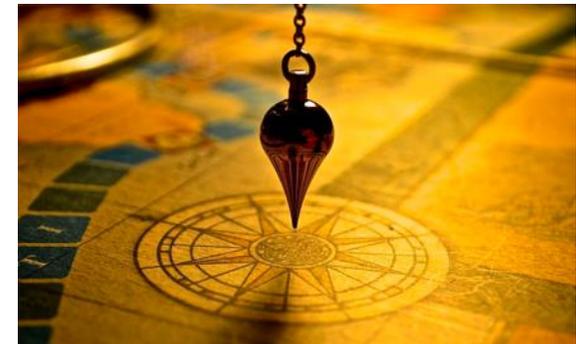
STEPWISE APPROACH

Feeding Regimen
Rate, Frequency, Volume

Positioning
Postfeeding, Sleep Incline,
Upright, Laterality, Prone

Thickening
Starch based

Acid Blockade
H2RA, PPI



UCSD GERD Algorithm

Implementation of standardized postdischarge nutrition

- Medical team makes discharge nutrition and feeding plan (MD, RN, LC, RD)
- Feeding team members attend discharge planning rounds
- Fortification method chosen
- Supplement until 12 weeks postdischarge for GA < 34 weeks
- Supplement until 40 weeks corrected for GA 34 to 36 weeks
- Provider education about preemie nutritional needs
- Recommends vitamins/iron/lab testing/growth targets/wt checks
- Referral to premature infant nutrition clinic if appropriate
- Discharge handouts about breastfeeding progression



Formal Nutrition Discharge Plan

UC San Diego MEDICAL CENTER

"NICU" GRADUATE NUTRITION DISCHARGE PLAN

Patient Identification

Primary Care Provider: _____ Telephone: _____ Fax: _____

Nutritional Concerns: _____

EDC:	GA at birth	Birth WT (gm)	%	Birth LT (cm)	%	Birth HC (cm)	%
DC date:	CorrGA (corrected gest age)	DC WT (gm)	%	DC LT (cm)	%	DC HC (cm)	%

NUTRITIONAL INFO		GOALS AND RECOMMENDATIONS																			
Optimal Growth: • Most premature infants leave the NICU with significant growth and nutritional deficits. Optimal nutrition can prevent long-term problems with poor head/brain growth, slow weight gain, osteopenia, anemia, ultimate short stature, and poor neurodevelopmental outcomes.		<input type="checkbox"/> We recommend the use of the Fenton growth chart until 40 wks CorrGA and then the CDC or WHO growth chart <input type="checkbox"/> Infant should have weekly weight checks at least until 1 month after discharge or 44 weeks CorrGA																			
Protein and Minerals: • Protein needs are increased in growing preemies, up to 3 gm/kg/day • After discharge, preemies can grow quickly, outstripping their mineral and Vit D stores, and develop rickets. Adequate Ca, Phos, Vit D can prevent metabolic bone disease.		Growth parameter (term-9 mos corrGA) [3-6 mos corrGA] Weight gain ~ 6-7 oz/week ~ 4 oz/week Length gain ~ 1 cm/week ~ 0.5 cm/week HC gain ~ 0.5 cm/week ~ 0.2 cm/week																			
Vitamins and Iron: • Iron is needed to replenish stores + prevent iron deficiency • Low iron stores have been associated with neurodevelopmental impairment • Tri-Vi-Sol With Iron has (per mL) 10 mg iron, 400 IU Vit D, 10 gm protein • NeoSure has (per liter) 13.4 mg iron, 521 IU Vit D, 21 gm protein • BF preemies will need additional iron once they reach 6 Kg to receive 2-4 mg/kg/day until 12 mos of age		Supplemental Vitamins and Iron: <input type="checkbox"/> Breastfeed (BF) or full term infants: 400 IU Vit D/day <input type="checkbox"/> BF preemies: 1 mL of Tri-Vi-Sol Poly-Vi-Sol With Iron Drops each day until 12 months of age <input type="checkbox"/> Formula fed preemies: 0.5 mL Tri-Vi-Sol Poly-Vi-Sol With Iron Drops each day until 6 months of age <input type="checkbox"/> Fer-In-Sol drops to take <input type="checkbox"/> 7.5 mg/day <input type="checkbox"/> 15 mg/day This will provide additional iron of _____ mg/kg/day <input type="checkbox"/> Other _____																			
Lab Values: • BUN < 5 mg/dL may reflect inadequate protein intake • Alk Phos > 400 mg/dL may indicate early rickets • Ferritin < 40 ug/L reflects low total body iron • Ferritin > 250 ug/L may reflect iron overload • If these values are not optimal (see chart) we recommend the following options: 1. Repeat value 2. Review nutritional intake of protein, minerals, Vit D 3. Consult UCSD Neonatologist Dr. Jae Kim for questions about nutrition/growth 619-543-3799		<input type="checkbox"/> Recommended lab testing and targets: • Birth wt < 1800 gms or GA < 34 weeks • If at 4-6 weeks post-discharge, alk phos, BUN and growth are normal, no further metabolic testing required • If infant not meeting growth targets may need more volume, calories or protein • Current labs (date ____/____/____) Alk Phos _____ mg/dL BUN _____ mg/dL Hgb/Hct _____/_____/_____																			
		<table border="1"> <thead> <tr> <th>Lab test</th> <th>Time after discharge</th> <th>Normal value</th> </tr> </thead> <tbody> <tr> <td>BUN</td> <td>4-6 weeks</td> <td>> 5 mg/dL</td> </tr> <tr> <td>Alk Phos</td> <td>4-6 weeks</td> <td>< 400 mg/dL</td> </tr> <tr> <td>Phosphate</td> <td>4-6 weeks</td> <td>> 4.5 mg/dL</td> </tr> <tr> <td>Hgb</td> <td>4-6 weeks & 3 mos</td> <td>> 10 g/dL</td> </tr> <tr> <td>Ferritin</td> <td>3 mos</td> <td>50-250 ug/dL</td> </tr> </tbody> </table>		Lab test	Time after discharge	Normal value	BUN	4-6 weeks	> 5 mg/dL	Alk Phos	4-6 weeks	< 400 mg/dL	Phosphate	4-6 weeks	> 4.5 mg/dL	Hgb	4-6 weeks & 3 mos	> 10 g/dL	Ferritin	3 mos	50-250 ug/dL
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WHITE - Medical Record YELLOW - Primary Care Provider PINK - SPN



"NICU" GRADUATE NUTRITION DISCHARGE PLAN

Patient Identification

NUTRITIONAL INFO - BREASTMILK FED INFANT	GOALS AND RECOMMENDATIONS
<input type="checkbox"/> OPTION 1: Fortification of mother's milk not necessary: Birth wt \geq 1800 grams and GA \geq 34 weeks • No extra lab tests necessary.	• If infant lagging in growth encourage increased milk volume or consider addition of Post Discharge Formula (PDF) (NeoSure or EnfCare @ 22 cal/oz) to provide additional calories, fat, and protein
<input type="checkbox"/> OPTION 2: Fortification of mother's milk recommended: Birth wt < 1800 grams or GA < 34 weeks • Fortification of mother's milk or formula has been shown to improve growth in preemies. Inadequate protein, minerals, or calorie intake may affect long-term growth (including brain growth). • Infants should be given this extra nutrition for 12 weeks after discharge, even if growing well. • Infants who wean off breastmilk should transition to Post Discharge Formula (PDF) until 12 weeks after hospital discharge.	• Continue mother's milk supplementation or PDF for 12 weeks after hospital discharge or longer if not growing well • Provide supplement by one of the following methods: <input type="checkbox"/> A minimum of 2 feedings each day of NeoSure 22 cal/oz <input type="checkbox"/> Fortification of at least 2 feedings each day of pumped mother's milk with NeoSure powder to <input type="checkbox"/> 22 cal/oz or <input type="checkbox"/> 24 cal/oz. <input type="checkbox"/> Similo Special Care 30 cal/oz: <input type="checkbox"/> 60 <input type="checkbox"/> 90 <input type="checkbox"/> 120 mL each day (as a 10-15 mL "booster" added to feeding or given after BF)
NUTRITIONAL INFO - FORMULA FED INFANT	GOALS AND RECOMMENDATIONS
<input type="checkbox"/> Formula Fed Infant • Post-discharge Formula (PDF) contains extra calories, protein, vitamins and minerals compared to standard term formula to support growing preemies. Its use has been shown to improve somatic growth, including bone mineralization and head (brain) growth in infants born prematurely. • Premature infants should remain on PDF for 12 weeks even if growing well, (or longer if not growing well). • If infant is growing too well, PDF may be made to 20 kcal/oz • To make NeoSure 20 cal/oz: Mix 9 oz water and 4 unspooned level scoops of NeoSure powder (use scoop provided in NeoSure can). • To make NeoSure 24 cal/oz: Mix 9 oz water and 5 unspooned level scoops of NeoSure powder (use scoop provided in NeoSure can)	<input type="checkbox"/> Term formula: _____ <input type="checkbox"/> Post Discharge Formula (PDF) (NeoSure or EnfCare) <input type="checkbox"/> 22 cal/oz <input type="checkbox"/> 24 cal/oz <input type="checkbox"/> Other: _____
Breastfeeding Plan: <input type="checkbox"/> Allow infant to breastfeed (BF) ad lib <input type="checkbox"/> Infant currently taking: _____ mL/feed <input type="checkbox"/> Mom's milk supply: _____ mL/day <input type="checkbox"/> BF _____ x per day	<input type="checkbox"/> Limit BF sessions to 30 min <input type="checkbox"/> Unrestricted BF if actively sucking (up to 45 minutes) <input type="checkbox"/> Baby to add 1-2 BF daily per week as baby matures. <input type="checkbox"/> Offer baby supplemental bottle after BF
COMMENTS:	
Physician Signature/PID# _____ Date/Time _____ RN Signature _____ Date/Time _____	

SAMPLE DOCUMENT NOT FOR OFFICIAL USE

-Includes hospital growth chart, call back #

Photo courtesy of UCSD SPIN program



UCSD Premature Infant Nutrition Clinic ("PINC" Clinic)

A team approach to help mothers and their premature infants by:

- 🌀 Working with infant's primary care provider to improve growth and nutrition.
- 🌀 Promoting human milk nutrition after NICU discharge.
- 🌀 Optimizing mother's milk supply.
- 🌀 Assisting mothers and infants with the transition to nursing at the breast.
- 🌀 Monitoring nutritional status of the infant.

Eyla Boies, MD is a general pediatrician with expertise in the post-discharge care of premature infants and human milk nutrition

Terry Lawson, RN, IBCLC is an experienced NICU lactation consultant.

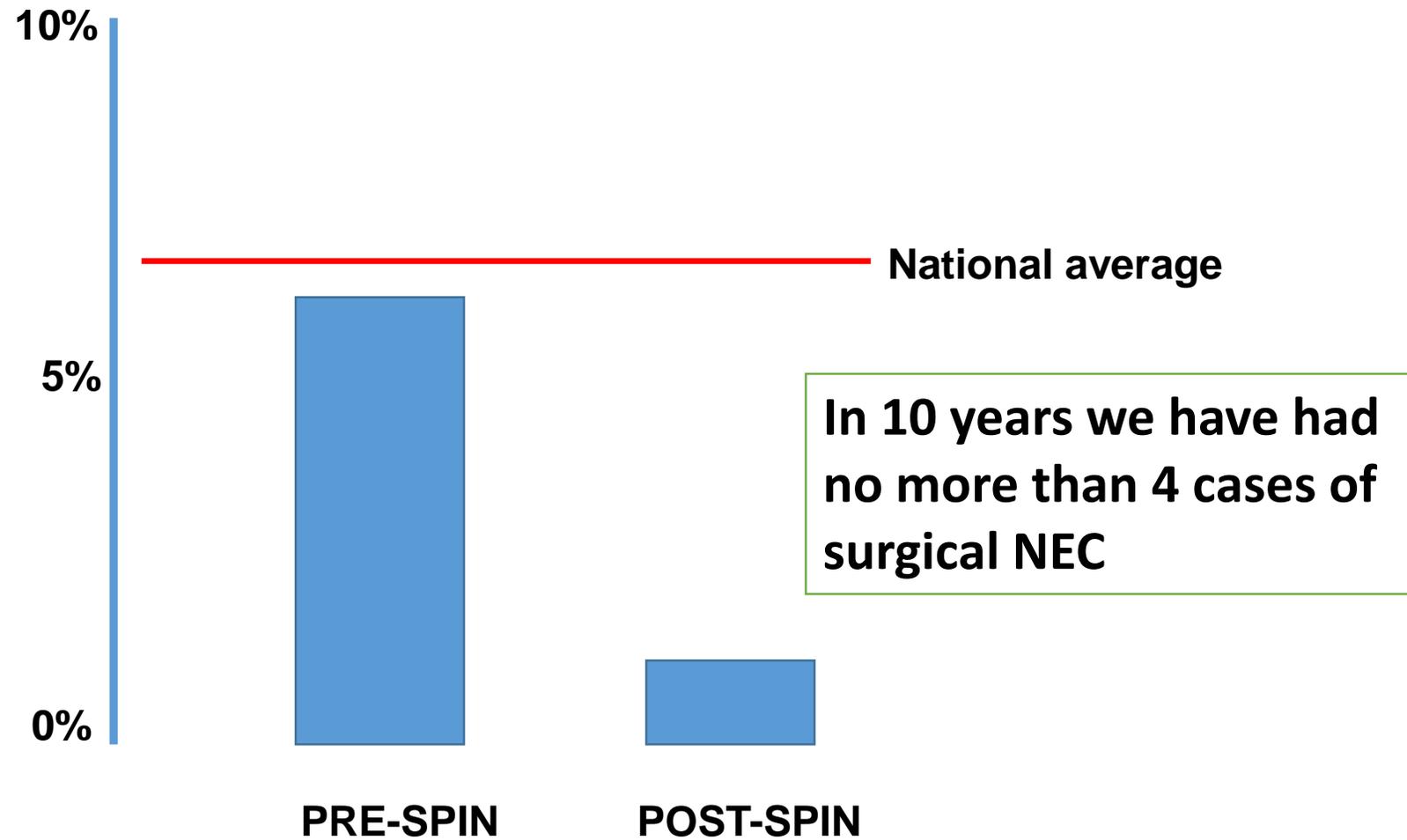
PINC meets Wednesdays, 8:00 - 11:30 am
Cambridge Physicians Office Building 7910 Frost Street,
suite 350

***Call 858 496-4800 to refer a baby to the PINC clinic, or to
make an appointment***

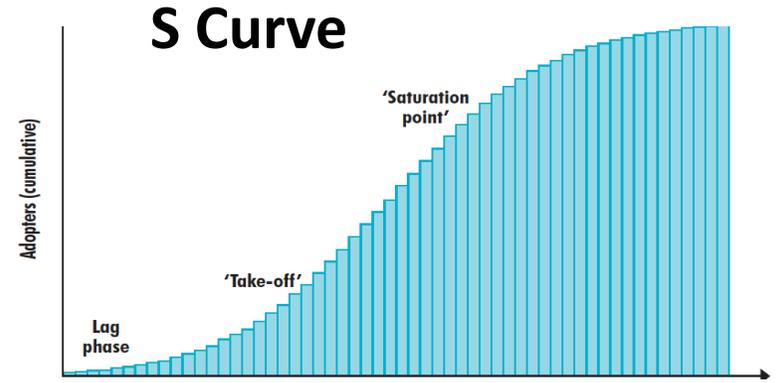
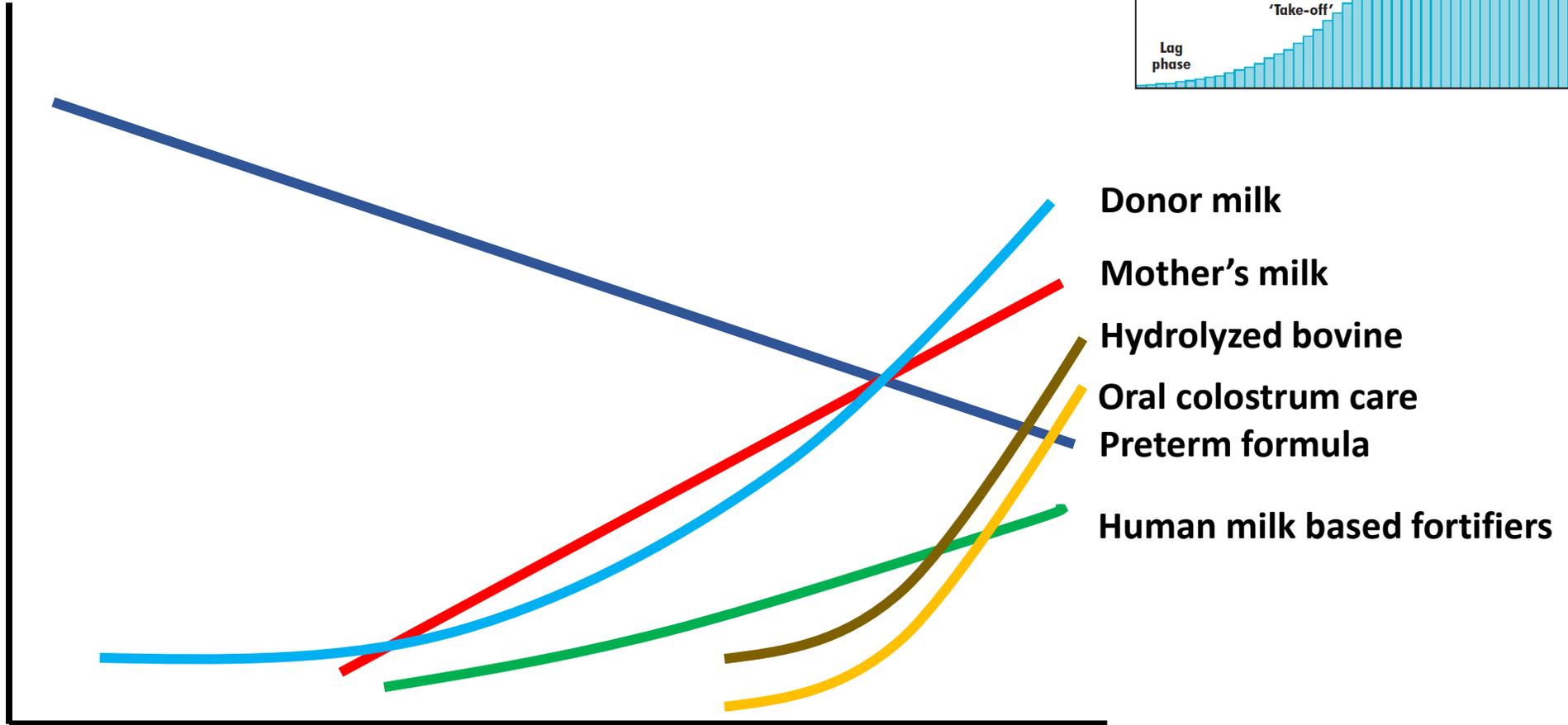


Photo courtesy of UCSD SPIN program

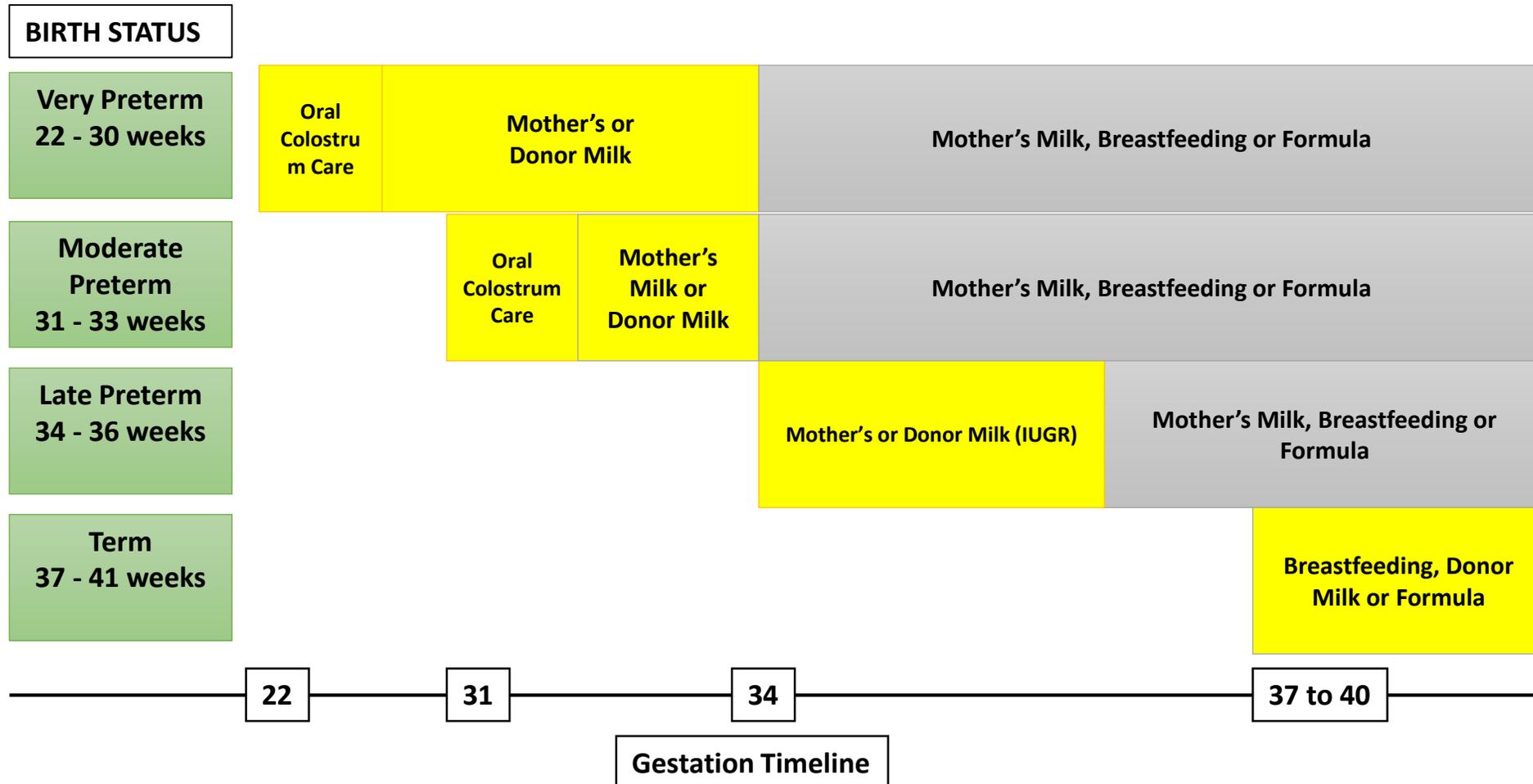
NEC rate at UCSD NICU: 2006 vs 2008/9



Trend in feeding in last decade



Changing Practice of Human Milk





spinprogram.ucsd.edu

Supporting Premature Infant Nutrition (SPIN)

About

NICU Staff Resources +

Parent Resources +

SPIN Mommas

Videos

Give

Contact Us

SPIN: Supporting Premature Infant Nutrition

Premature infants who receive human breast milk have the best outcomes—medically, nutritionally, and developmentally

The Supporting Premature Infant Nutrition (SPIN) program was developed to address the challenges of helping mothers produce sufficient breast milk for their premature infants, and to improve the manner in which neonatal intensive care unit (NICUs) support optimal nutrition and growth in their most vulnerable population of patients.

[Learn more →](#)



Resources for Parents



These resources may be helpful for NICU parents:

- ▶ [Breastfeeding guide](#)
- ▶ [Pump logs](#)
- ▶ [Videos: Tips and one mom's journey](#)
- ▶ [SPIN Mommas mentoring program](#)

[All parent resources →](#)

Resources for NICU Staff



Other hospitals are welcome to use or adapt these resources:

- ▶ [Feeding advancement tables](#)
- ▶ [Lactation support letter](#)
- ▶ [Discharge plans](#)
- ▶ [Maternal education materials](#)

[All staff resources →](#)

CBS News



More than a premature ear... Treatment is... Gupta reports... a Mother's M... old as life itse

[Watch the v](#)

SPIN Achievements

- Nationally recognized best practice standard by JCAHO
- Endorsed by all our women and infant staff
- Marked reduction in NEC with next to no surgical NEC
- Marked reduction in SIP (spontaneous intestinal perforation)
- Top tier human milk use at initiation and discharge
- Stable and not expanding donor human milk use
- High adherence to feeding protocol
- Embedded oral colostrum care, skin to skin practice, nonnutritive sucking at breast
- Routine 30 kcal/oz supplementation strategy for discharge
- Premature Infant Nutrition Community (PINC) Clinic: Post discharge outpatient nutrition and lactation clinic



Summary



Izzy at 6 years old

- Standardizing preterm nutrition after discharge is better care
- Earlier interventions by neonatal specialists may improve outcomes
- Coordination of care with other specialties can reduce the burden on parents
- Clear research opportunities to work together in postdischarge nutrition and management of gastroenterology conditions



FAQ

- We have been working on a quality initiative to increase use and access to mother's own milk for the last two years.
- Q: We are finding significant drops in milk supply after DOL 28 to discharge and have varying practices for infant discharge feeding plans. We are sharing best practices to support maternal milk supply. Families have external factors such as return to work and other responsibilities during the infant's NICU stay that compete with pumping.
- Q: Some of the feedback I have received from the NICUs is the ordering of 3 or more feedings of either formula or fortified human milk. In addition, the use of alimentum formula when milk intolerance is noted and not transitioning back to mother's own milk. The importance of transitioning to the breast during the hospital stay also varies by NICU.
- Q: I also wonder if in your experience longer hospital stays are associated with low use of mother's own milk at discharge?



Partnering to Improve Health Care Quality
for Mothers and Babies

DISCUSSION AND Q&A

If you have a question, please enter it in the Question box or Raise your hand to be un-muted.

We can only unmute you if you have dialed your Audio PIN (shown on the GoToWebinar side bar).



Partnering to Improve Health Care Quality
for Mothers and Babies

Questions?

Technical Assistance:

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