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Are Early Enteral Feedings and Standard Feeding Protocols Right for Your NICU?

Speaker:

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Presentation will be available on-demand

http://www.prolacta.com/webinars/feeding-protocols

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EDUCATION
• Dietetic Internship, National Institutes of Health Clinical Center, Bethesda, MD
• B.S. in Nutrition (cum laude), Immaculata College, Malvern, PA

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• Registered Dietitian
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Publications
Feeding Protocols:
Standardizing Practice In the NICU
Olivia Mayer RD, CSP
• This presentation was created by, and reflects the sole opinions held by the presenter based on research and clinical experience.

• I received speaker honoraria from Prolacta Bioscience.
Feeding Protocols

• Why?
• Literature Review
• Clinical Experience
• Practical Applications
Feeding Protocols—
Also Known As

• Feeding Pathway
• Feeding Bundle
• Standardized Feeding Initiation and Advancement
• Standardized Enteral Feeding
Early Enteral Feeding—
Also Known As

• Trophic Feeds
• Minimal Enteral Feeds (MEF)
• Minimal Enteral Nutrition (MEN)
• Gut Stim(ulating) Feeds
• Non-nutritive Feedings
• Small Volume Feeds
• Early Enteral Nutrition
• Defined:
  – Preferred Feed: Human Milk
  – Rationale: stimulate gut hormone maturation, gut hormone release, and induce gut motility
  – Volume: 10-30 mL/kg/day
  – Time Start: < 72 hours of life
    • (IDEAL < 24 hours of life)
  – Time Span: ≤5 days
Why?
Source: Strodtbeck F. The pathophysiology of prolonged periods of no enteral nutrition or nothing by mouth. *Newborn and Infant Nursing Reviews* 3(2); 47-52, 2003.
Depiction of Intact Gut Barrier

Source: Strodtbeck F. The pathophysiology of prolonged periods of no enteral nutrition or nothing by mouth. Newborn and Infant Nursing Reviews 3(2); 47-52, 2003.
Benefits of Early Enteral Feeding

• Fewer line days
• Re-gain birth-weight faster
• Promote GI maturity and tolerance
• Improve bone mass by term age
• Improved mental outcomes at 24 months corrected age
• Decreased length of hospital stay
• Decrease cholestatic jaundice
• Potentially achieve full feeds faster
Contraindications

• Congenital anomalies precluding feeding (omphalocele, gastroschisis)
• Evidence of GI dysfunction associated with hypoxic-ischemic compromise
• Vasopressors
• Indocin (?)
Limitations

• Lactogenesis II (mom’s milk “coming in”)
• Failure to appreciate the differences between the goals of trophic feeds versus nutritive feedings
• Inconsistent definition of “sick” infant
• Complicated feeding protocols/algorithms for feeding intolerance
• Lack of buy-in from caregivers
• Lack of access to banked breastmilk
Impact of Process Optimization and Quality Improvement Measures on Neonatal Feeding Outcomes at an All-Referral Neonatal Intensive Care Unit

Process optimization and the implementation of a standardized feeding strategy **minimize practice variability**, accelerating the attainment of enteral and oral feeding milestones and decreasing LOS without increasing adverse morbidities.

Early Enteral Feeding in Very Low Birth Weight Infants

• 603 VLBW infants
• Median time of feed initiation decreased from 33 to 14 h \((p < 0.0001)\)
• Early EF (defined as within the first 24 h) alone was significantly associated with decreased NEC or death and less PN days \((p < 0.0001)\)

The establishment and implementation of a standardized evidence-based feeding bundle for all VLBW infants in our NICU combined with ongoing monitoring and feedback resulted in a significant reduction in PNGR at time of discharge to home. These benefits were seen in ELBW infants as well, a group considered being at highest risk for PNGR.
On the basis of that, SFPs are simple, cheap, effective, and transmissible; furthermore, they reduce the risk of NEC and it is time that adoption of SFP is no longer optional but imperative in the quest to prevent NEC.

Gephart SM; Hanson CK. Advances in Neonatal Care •2013; Vol. 13, No. 1 • pp. 48-54
Conclusion: Standardized feeding regimens may provide the **single most important global tool** to prevent/minimize NEC in preterm neonates. Randomized controlled trials are needed.
“These trials did not provide any evidence that early trophic feeding affected feed tolerance or growth rates. Meta-analysis did not detect a statistically significant effect on the incidence of necrotising enterocolitis: typical risk ratio 1.07 (95% confidence interval 0.67 to 1.70); risk difference 0.01 (-0.03 to 0.05).”

“The evidence available from randomized controlled trials suggests that delaying the introduction of progressive enteral feeds beyond four days after birth does not affect the risk of developing NEC in very preterm or very low birth weight infants, including growth-restricted infants. Delaying the introduction of progressive enteral feeds results in a few days delay in establishing full enteral feeds but the clinical importance of this effect is unclear. The applicability of these findings to extremely preterm or extremely low birth weight is uncertain. Further randomized controlled trials in this population may be warranted.”

Recommendation: Minimal enteral nutrition be initiated within the first 2 days of life and advanced by 30 mL/kg/d in infants ≥1000 g.
• May not be as dangerous as previously thought
The following studies gave small enteral feeds while infant had UAC line and found a decrease in the incidence of NEC
Use of a Feeding Bundle Appears to Reduce Central Line Utilization in Neonates

• Once an infant tolerates a minimum of 120 ml/kg/day of enteral feeds, the bundle recommends that the central line be removed.
• Central line utilization decreased in all groups (all \( p<0.001 \)):
  – 0.45 to 0.28 in \( \leq 750 \)g infants
  – 0.4 to 0.27 in 751-1000g infants
  – 0.39 to 0.3 in 1001-1500g infants
• The CLABSIs rate was unchanged
• Implementation of a feeding bundle decreased central line utilization

Tauber KA; et. al. JPGN; 2015
Late Enteral Feedings Are Associated with Intestinal Inflammation and Adverse Neonatal Outcomes

- A delay in enteral feedings after the third postnatal day is associated with:
  - 4.5 fold increase in chronic lung disease (95% CI 1.8-11.5, p=0.002)
  - 2.9 fold increase in retinopathy of prematurity (1.1-7.8, p=0.03)
  - 3.4 fold increase in multiple comorbidities (1.2-9.8, p=0.02) compared to infants fed on or before the third day.

- Additionally, a delay in the initiation of feedings is associated with increased fecal IL-8 levels and a decreased IL-10:IL-8 ratio.

“Slow” vs. “Fast” Advance

• Gestational Age <32 weeks at birth
• Birth weight < 1,500 g

—“Slow” 2006/2007 (n = 136)
Enteral feeds were initiated on day 1 with 10–15 ml/kg/day and advanced by 15–20 ml/kg/day

—“Fast” 2010 (n = 88)
Enteral feeds were initiated with 20 ml/kg/day on day 1 and advanced by 25–30 ml/kg/day
The new approach was associated with a significantly shorter period to establish full enteral feeds.

“Slow” vs. “Fast” Advance

• 5 randomised controlled trials => total of 588 infants
• Daily Advance: “Slow” = ^15 to 20 ml/kg “Fast” = ^30 to 35 ml/kg
• Meta-analyses did not detect statistically significant effects on the risk of necrotising enterocolitis (typical risk ratio (RR) 0.97, 95% confidence interval (CI) 0.54 to 1.74) or all-cause mortality (RR 1.41, 95% CI 0.81 to 2.74).

• Infants who had slow advancement took significantly longer to regain birth weight (reported median differences two to six days) and to establish full enteral feeding (two to five days).

Conclusion: “An SSEF protocol significantly reduces the incidence of NEC and combined NEC/death in infants with birth weight <750 g. Despite taking longer to achieve full enteral feeding on this protocol, surviving ELBW infants demonstrated comparable weight gain at discharge without prolonging their hospital stay.”
Common Physiologic

“Excessive” gastric residuals, nor color differences (green, milky, or clear) in gastric residuals were shown to predict feeding tolerance.

Clinical Experience
Improved outcomes with a standardized feeding protocol for very low birth weight infants

Total Subjects
BW ≤ 1500 g
Inborn or transferred DOL 1-3
N=189

Before Feeding Protocol
7/1/06-3/31/07
N=96

Excluded
N=3
Congenital heart disease (2), oropharyngeal atresia

Incomplete data
N=7
Hospital transfer (7)

Died before fed
N=3
RDS, RDS+Infection, Prematurity+IVH

Final Before Group
Received enteral feeds
N=83
BW ≤ 1000 g = 31
BW 1001-1500 g = 52

After Feeding Protocol
4/1/07-12/31/07
N=93

Excluded
N=5
Congenital heart disease, omphalocele, tracheo-esophageal fistula, meconium plugging, aqueductal stenosis

Incomplete data
N=12
Hospital transfer (9), missing flowsheets/orders (3)

Died before fed
N=12
Prematurity (3), Severe IVH (3), RDS, RDS+Severe IVH, RDS+Infection, RDS+Pulmonary hemorrhage, Sepsis/Infection, Pulmonary hypoplasia

Final After Group
Received enteral feeds
N=64
BW ≤ 1000 g = 26
BW 1001-1500 g = 38

Nutrition Outcomes Before and After Implementation of a Standardized Feeding Protocol

$DOL = \text{day of life} \quad TPN = \text{total parenteral nutrition}$

Nutrition Outcomes Before and After Implementation of a Standardized Feeding Protocol

DOL = day of life      TPN = total parenteral nutrition.


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NEC Rates


* p = 0.01
** p = 0.005
Late Onset Sepsis


* p = 0.01
** p = 0.001
Average Daily Enteral Feeding Volumes During the 1st 28 Days of Life Before & After Implementation of a Standardized Feeding Protocol for VLBW Infants

Where to Start?
Steps to Create a Feeding Pathway

1. **Establish Criteria**
   a. All infants < 1250 gm, or < 1000 gm?
   b. APGAR scores?
   c. SGA?
   d. Absent End Diastolic Flow?
   e. Exclusions include: Gastroschisis, Omphalocele, Bowel Obstruction, Imperforate Anus, Malrotation, Volvulus
2. Human Milk Availability
   a. Maternal breast milk
   b. Banked breast milk
      i. Use until mom’s own milk is available
      ii. Use if mom’s own milk is unsafe to feed
3. **Volume**
   a. Initiation
   b. 10-20 mL/kg/day for 3-5 days
   c. Advance
   d. Daily? Every other day?
   e. 10-30 mL/kg/day
4. **Write in breast milk fortification, as part of the feeding protocol**
   a. Volume to start
      i. 40 mL/kg/day? 60 mL/kg/day? 100 mL/kg/day?
   b. Product to start
      i. Human Milk based vs. Bovine based
Steps to Create a Feeding Pathway

5. **Implement as an Automatic Order Set**
   a. On admission
   b. At 24 hours of life
   c. Within 72 hours of life
   d. Other criteria/per provider discretion
6. **Establish stopping criteria and guidelines**
   a. Emesis
   b. Distended Abdomen
   c. Residuals?
   d. Other?
Evaluate the Feeding Pathway

Give it time

What works?

What does not work?
Appendix A Approach to Early Enteral Nutrition for Extremely Preterm Infants (≤ 1,250 g BW)

A. Time of Initiation
   a. Aim to initiate nonnutritive feedings in the first 12 h of life

B. Exceptions to initiation within first 12 h of life:
   a. Persistent oxygen requirement > 60%
   b. Dopamine > 5 μg/kg/min
   c. Need for chest compressions in delivery room; or pH ≤ 7.0 and base deficit ≥ 16 on any blood gas in first hour of life

C. The following are not exceptions to initiation within first 12 h of life:
   a. Mild RDS with anticipated extubation
   b. Normal saline bolus given while pH > 7.0 and base deficit < 16
   c. Indomethacin prophylaxis for IVH
   d. Low dose pressor support (e.g., Dopamine ≤ 5 μg/kg/min)
   e. Sepsis evaluation
   f. High frequency ventilation
   g. Mechanical ventilation with oxygen requirement ≤ 60%
   h. Packed RBC transfusion while Hct ≥ 35
   i. Asymptomatic polycythemia with venous Hct ≤ 70

D. Type of enteral intake for initiation in order of preference:
   a. Mother’s Own Milk ([MOM], colostrum), if available
   b. MOM supplemented with DM, if necessary and with consent
   c. Pasteurized donor human milk (DM), if consent granted
   d. MOM supplemented with preterm formula, if necessary and if DM not approved
   e. Preterm formula if the mother is not planning to express human milk (HM) and has not approved use of DM
Feeding Protocol Summary

• Benefits: Patient, Family, Hospital

• ANY pathway is better than NO pathway

• Each baby needs to be closely monitored, evaluated and *may* need alterations to his/her feeding advancement
About Prolacta Bioscience®

Prolacta develops clinically proven, high-value products derived from human milk that are designed to meet the needs of extremely premature infants in the Neonatal Intensive Care Unit.

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