Enteral nutrition in the preterm infant

Israel Macedo
Neonatologist
Maternity Dr Alfredo da Costa

Braga, 12 May 2012
In the last decades, due to several perinatal improvements:
- Better prenatal care;
- Multidisciplinary training and work;
- Antenatal steroids;
- Surfactant;
- Better ventilation (both invasive & non-invasive);
- Parenteral nutrition;
- ...
• Provide adequate enteral nutrition;
• **Uncertainty** about:
  – What is adequate growth in this population?
  – What can they digest at several GA / DOL*?
  – What is better for a better outcome?
  – Scarcity outcome data.

* **GA**: Gestational Age
* **DOL**: Day of life.
Enteral nutrition in the preterm
Gold standard for nutrition?...

• Intrauterine growth rate?
• Fetal body composition?
• Umbilical cord blood nutrient supply?
• Term breastfeed newborns (healthy omnivorous mothers)?

(Ziegler EE. 1976; Putet G 1993; Lemons JA. 2001; Koletzko B. 1992)
Enteral nutrition in the preterm

Limitations...

- Preterm infant $\neq$ fetus (fisiology & metabolism);
- Recommendations based on limited estimates from several sources;
- Assume “healthy” and “normal” subjects;
- Most of ELBW are sick…
Enteral nutrition in the preterm

Reasonable limits of nutritional supply...

**RDA**: Recommended Daily Allowance

**RNI**: Recommended Nutrient Intake

**UL**: Upper tolerable nutrient intake Level

(Tsang RC. 2005)
When to initiate enteral feeding;
Progression from minimal enteral feeding (MEF) to nutritive feedings;
Bolus versus continuous feeding;
Choice of enteral formulation;
Enteral nutrition in the preterm

When to initiate enteral Feeding?
Enteral nutrition in the preterm

Initiation of enteral feeding

• With improved survival, increased the incidence of “Necrotizing Enterocolitis”;  
• In the last 3 decades, the fear of NEC had a great impact on enteral nutrition of VLBW infants;  
• Consequence: a tendency to a delayed initiation and very limited increments of enteral feeding for prolonged periods of time;
Enteral nutrition in the preterm

Evidence on initiation of enteral feeding

• Early fed infants: higher rise in gastrointestinal hormone levels in response to enteral feeding (enteroglucagon, gastrin, GIP, motilin, insulin, pancreatic polypeptid, neurotensin);

  • Lucas A. Arch Dis Child 1980
  • Lucas A. Biol Neonate 1982
  • Ansley-Green A. Acta Paediatr Scand 1982
  • Lucas A. Acta Paediatr Scand 1983
Enteral nutrition in the preterm

Evidence on initiation of enteral feeding

- Early fed infants have advanced maturation of the motor responses of the gut;
- This maturation appears to be enhanced when full strength, rather than dilute formula or sterile water, are used;
- Motor function maturation occurs at similar rates in preterm infants on MEF as on full enteral nutrition;
  - Koenig WJ. Pediatrics 1995
Enteral nutrition in the preterm

Evidence on initiation of enteral feeding

• A systematic review of the results of published trials concluded that early introduction of feedings shortens the time to full feeds, hospital stay and does not lead to an increase in NEC incidence;

• A RCT involving 100 LBW infants confirmed these findings and found, in addition, a significant reduction of serious infections in early-fed infants;

• Tysen E. Cochrane Database Syst. Rev 2000
• McClure RJ. Arch Dis Child Fetal Neonatal Ed 2000
• Even in IUGR preterm infants, there is NO INCREASE in NEC incidence with early MEF (multicenter RCT);

• ADEPT Study, Pediatrics, 2012
Enteral nutrition in the preterm

Conclusion on initiation of EF:

DELAYED INTRODUCTION OF FEEDINGS

• Has NO Beneficial effects (no reduction in NEC incidence); instead

• Has substantial NEGATIVE effects (more time on PN, increase in nosocomial infections and LOS);

DO NOT DELAY initiation of enteral feedings!
Enteral nutrition in the preterm

Advancement of Enteral Feedings
Enteral nutrition in the preterm

Minimal enteral feeding (MEF)

- No uniform definition for MEF:
- Generally refers to small amounts of enteral feedings (5 to 24 ml/kg/day);
- Also called as “PRIMING”, “TROPHIC” or “NON-NUTRITIVE” feeding;
• Maintaining a low rate of increments in EF was another strategy aimed to prevent NEC;
• This was based on a retrospective analysis of 19 cases of NEC, that found an association between NEC and rapid advancements of EF;
• This was never confirmed, even in 3 meta-analysis;

Tyson JE. Meta-analysis 2005
Kennedy. Meta-analysis 2000
The recommendation that EF should not exceed 20 ml/kg/day has found wide acceptance for many years, although its validity has never been confirmed;
Enteral nutrition in the preterm

Conclusion on advancement of EF:

• It is an acceptable practice to limit feeding increments in VLBW infants to 20 ml/kg/d;
Enteral nutrition in the preterm

Bolus or Continuous tube feeding?