EATING IN “SINC”

A Quality Improvement Project
Calgary Zone NICUs

CALGARY STATUS 2012

- Developing skill and knowledge re oral feeding protocol
  - Reading the feeder
- Open lung
  - Rapidly reducing burden of BPD for fan
- Safety concerns
  - Oral feeding while on CPAP
- Developmental concerns
  - Missing opportunities for feeding skill acquisition
- Long term burden of oral aversion
  - No local data
“AND” IS BETTER THAN “OR”

- **Breathing** ...... optimal lung development

- **AND**

- **Eating** ...... food is pleasant and satisfying

  Optimal lung = endurance and capacity to eat

**Eating and Breathing are co-dependent actions**

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**CAN WE HELP BABIES BORN AT \(<32\) WEEKS TO BREATHE AND EAT?**

1. Physiologic stability
2. Demonstrate cues of readiness to feed
3. Require **time and/or support** for optimal lung development
   - Thousands of new alveoli and neuronal connections being built every day!!
EVIDENCE

- There can be oral sensory deprivation OR overload with learning to eat
  - No opportunity to suck or taste
  - Forced opportunity to suck or taste
  - Overwhelmed by situation
- “Skill” acquisition = building neural pathways
  - Immaturity alone alters the typical path to developing feeding skills

LONG TERM CONSEQUENCES

- Feeding difficulties are associated with language delay in preterm infants
  - J Peds, 2013 (Adams Chapman et al.)
    - 18-22 month Bayley
    - 1477 preterm infants, < 26 weeks
- < 1 % of preterm infants required supplemental tube feeds at time of NICU discharge.
  - Advances in Neonatal Care, 2007 (Kirkby, et al.)
- 10-80% of parents report problems feeding NICU graduates in the first 24 months
  - J Paeds and Child Health, 2002 (Cerro et al.)
  - Archives of Dis (fetal), 2003 (Wood et al.)
Burden of Oral Aversion

- Oral aversion may present:
  - In NICU
  - At end of reflexive sucking
  - At introduction of solids
    - Babies are not free from this morbidity until 1 year of life

- Burden of oral aversion
  - Non-standardized definition
    - Rates of 10-70%
    - Neurodevelopmental delay, BPD
  - ? standardized definition, referral process, or approach to NICU graduate feeding difficulties

Eating Organization Develops in an Orderly Fashion

- Stable non-nutritive sucking may not be identified until 32-34 weeks (or it may be earlier)
  - Poor sucking pressures, frequencies, duration and efficiency
  - Preterm infants show progression of oral-motor development between 30 and 45 weeks
  - Robust NNS is not predictive of ability to manage fluid
- Infant ventilation stops during swallowing
  - Eating may over-ride respiratory chemical control
    - External pacing, skill for the feeder
- Orienting to own mother’s scent and breast milk
  - More stable vital signs, improved brain growth
  - Early nuzzling
- Organization of arousal
  - Lifelong importance of state organization
- Neuronal mapping
  - Clin Perinat, 2011 (Browne and Ross)
“SUFFICIENT” EATERS VS “SKILLED” EATERS

- Poor feeding outcomes increase as gestational age decreases
  - <600 gram neonates followed to 3 years of age
    - 62% had continued eating problems
      - Food as reward, coaxing, food refusal
      - Poor weight gain, vomiting, chronic diarrhea
  - 29% had gastrostomy tubes
  - Sufficient rather than skilled feeders
    - JOGNN, 2007 (Thoyre et al.)
CANADIAN LAMBS

- NNS and CPAP
- Nutritive sucking and CPAP

- Praud and associates
  - Journal of pediatric gastroenterology and nutrition, 2013

PRETERM BABIES CAN BREAST FEED

- Nyqvist
  - 1999 – early human development
  - 2008 – Acata Paediatr
  - 2013 – J Human Lact
SINC: Breathing & Eating

- Safe Individualized Nipple Feeding Competency
  1. < 32 weeks at birth
  2. Required CPAP for optimal lung development.
  3. Demonstrates cues of readiness to feed
  4. Physiologic stability

  Fragile feeders audit

How?

- Baseline audit
- Multi-disciplinary team
- Literature review
- Expert opinion
  - Sherbrooke, Quebec
  - Scandinavia
- Pilot project on the NP team
- Fragile neonates cue for feeding and have opportunity to “taste” at breast or with drops offered during NNS with a pacifier
EARLY AND FREQUENT FEEDING PRACTICE

  - Offered on basis of cardio-respiratory and behavioral responses
  - Sooner to fully orally fed
  - Diminished LOS

QUALITY EATING

Cue Based
- Feeding is relationship based
  - Positive experience
- The baby is learning to feed and skills are emerging
- Learning to eat is a developmental skill focusing on the baby

Volume Based
- Feeding is a competitive sport
  - Intake is most important
- The baby is a “good feeder” or a “poor feeder”
- Feeding the baby is about who can “get the volume in”
**Eating = Pleasure**

- No arbitrary feeding schedules or expectations
- Obligate suck as reflex
- Volitional = choice
- Cue based
  - Cues for Engagement and DIS-engagement
- More breast feeding focus

**Eating in “SINC”**

- **Therapeutic Tasting on CPAP (July 2012)**
  - Pilot at FMC
  - Implemented by NNPs for “Fragile Feeders” (still on CPAP at 32 weeks)
- **Following principles of the Oral Feeding Protocol...**
  - NNS
  - Then small volume feeding progression while on CPAP
  - Maximum feeding times and volumes defined
  - Infant must prove skill and endurance before advancing to larger volume or longer time
THE ALGORITHM

Eating in S.I.N.C.*

“Tank Individualized Nipple-Feeding Competence”

THE ALGORITHM V.15

Infant at 30-32 weeks

1. Infant held with upper chest or abdomen
   above horizontal level

2. Gentle feed
   - Infants with upper chest or abdomen
   below horizontal level
   - Infants with upper chest or abdomen
   above horizontal level

“COMPETENCE”? 

- No decompensation:
  - Increased apnea/bradys
  - Need for increased respiratory support
    - *Deterioration often subtle at first

“Decompensation”

- Infant must prove competence
**No Disengagement:**

- LOW tolerance for stopping the feed –
  - “No” means “NO!”

- Feeding experiences must be positive
  - Building neural connections
    - Goal is to hard-wire food + pleasure vs food + discomfort/fear.
  - Infant does not have to prove disengagement

**Breastfeeding**

- Included at EVERY stage: First oral experience should be at breast
- If cueing, baby can/should go to breast every time the mom is present and the baby is cueing
- Requires conversation/coaching/management of pumping
- “Baby should breastfeed at an APPROPRIATELY pumped breast”
- Careful assessment of infant while at breast (swallowing, flooding, etc)
  - *If mom reports milk transfer, assume baby took max oral volume for that feeding*
  - This means: Subtract the max SINC stage oral volume from the gavage feed
  - Stage F or greater with milk transfer – decrease the gavage top-up by 50% or more
“Caution Events”

- Vaccinations
- Eye exam
- Tub bath
- Procedures
- GERD
- Site transfers (prepare the parents!)

- Consider the baby’s planned/ recent “workload” prior to each feeding opportunity

- Implications for planning SINC stage advancements/ allowance for regression
SINC PROJECT

○ Control population 2012
  - Born < 32 weeks
  - Calgary Oral Feeding Guideline
  - Inconsistent application

○ SINC population 2013
  - Born at < 32 weeks defined as fragile feeders
  - Follow the SINC algorithm
  - Volume and time protected
  - Cues for engagement and disengagement
○ No change in respiratory management guidelines

AUDITING

We review every feed on every baby from first oral feed to discharge home.

1. Compliance with algorithm
   - Need for conversation/education?
2. Gestational age:
   - at introduction of oral feeds
   - at full oral feeds
   - at discharge home
3. Breastfeeding patterns
4. Rates of oral aversion
   - Retrospective comparison with Open Lung cohort

○ Plus:
  - Safety
  - Impact on other feeding/health/development issues
Baseline Feeding Pattern
(2012)

Baby M: 33 - 45 weeks CGA

Volume per feed (mLs)

Baby S. Born at 24 weeks

mL of feed

Canadian Association of Neonatal Nurses – ONE Day of Education
Monday, October 6, 2014
3:05 p.m. – 4:05 p.m.
**SINC Project Results**

- Discharged on gavage
- Discharged on home oxygen
- LOS
- Time of first feeding
- Time of first breast feeding
- Amount of breast feeding at discharge

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**Gestation at First Breastfeed**

![Graph showing gestation at first breastfeed across weeks]

- Completed weeks
- Comparison between 2012 and 2013
GESTATION AT FIRST ORAL FEED

AVERAGE NUMBER OF BREASTFEEDS, LAST 7 DAYS PRIOR TO DISCHARGE HOME
**Gestational Age at Full Feeds**

![Graph showing gestational age at full feeds for two years, 2012 and 2013.](image)

**Infants Discharged Home with Feeds per Gavage**

![Bar chart showing the number of infants discharged home with feeds per gavage from January to June 2012 and July to December 2013.](image)
Median Age to Discharge
Open Lung 2012 vs Open Lung + SINC 2013

No Safety Concerns to Date

- Babies stay on CPAP to allow optimal lung development
- Babies SAFELY “train” with small volumes until consistently capable and then advance slowly
- Breastfeeding is the preferable mode for all oral feeding experiences
- Parents become more engaged with infant feeding, and have reported self-confidence with feeding
- As with all QI projects, close auditing for safety, efficacy and unintended consequences
- Enormous national interest (CNN)
NEXT STEPS

- Follow to 1 year for feeding difficulties
- Physiologic studies underway
  - Stability during all modes of careful eating

Case 5

CHART AUDIT
THE TEAM

- Stacey Dalgleish (Team Lead)
- Noreen Blachly
- Linda Kostecky
- Jammey Kerik, Susan Charron (FMC)
- Jeanne Scotland, Ann Smith (RGH)
- Dallas Baumler (SHC)
- Kirenza Holland, Darlene MacDonald (PLC)
- Deborah Clark (Neo Lead)

- Super User RNs, Nursing Admin (all sites)

- Donna Dressler-Mund (consultant)
- Karen Lasby (NTT consultant)