Effect of Oral Stimulation on Feeding Progression in Preterm Infants

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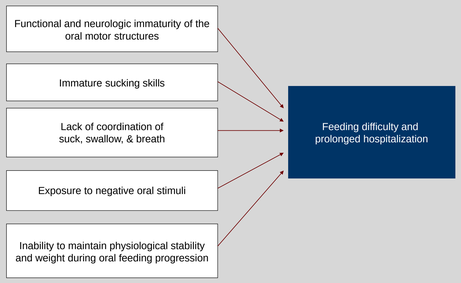
Background

- Preterm birth rate still rising (21% since 1990)
- Double the HP2010 goal of 7.6%
- Over half million preterm infants born per year
- LBW infants hospital stay averages $79,000 per infant
- Nationally - costs >$20 billion annually

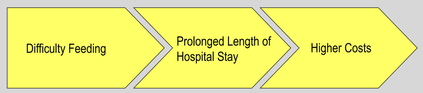
Feeding Difficulties in Preterm Infants



Oral Musculature

- Preterm infants have poor oral-motor control related to:
  - weaker muscle tone around mouth
  - less sensation
  - less tongue strength
- Decreased sucking strength and endurance

Clinical Problem



- Need evidence-based interventions to facilitate successful feeding, thus shortening length of stay, & cutting cost of care

Oral Stimulation

- Oral Stimulation = Stroking and/or pressure to structures in and around the mouth
- More complex, targeted intervention than non-nutritive sucking
- Supplemental oral stimulation → increase functional strength and control of movement for feeding
- The few studies re: oral stimulation are limited to preterm infants who received oral stimulation when they were ≥ 31 weeks PMA
- No studies where oral stimulation was done exclusively prior to the initiation of oral feeding (pre-feeding)

Oral Stimulation

Purpose

- To assess the effect of a prefeeding oral stimulation intervention on feeding progression and length of hospital stay on preterm infants < 30 weeks PMA

Research Questions

1. Will the oral stimulation intervention given prior to a feeding once per day for 7 consecutive days result in a **faster transition from gavage to total oral feedings** when compared to controls who will receive routine NICU care?
2. Will the oral stimulation intervention given prior to a feeding once per day for 7 consecutive days result in a **shorter length of hospital stay** when compared to controls who will receive routine NICU care?

Design

- Double blind, experimental design
- Short term longitudinal study
- Block randomized to experimental or control group
- Pilot study to test intervention methods, safety and efficacy on 29 week PMA infants

Setting

- All subjects from one Level III NICU in a regional medical center in Peoria, IL
- Vermont-Oxford Network – rank top 3% nationally for NICU outcomes
- Developmental care protocols in place
  - Nesting, swaddling
  - Cycled lighting
  - Decibel meters
  - Rural rounding

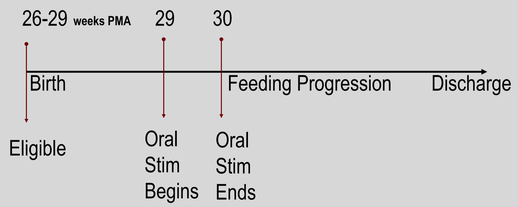
Sample

- Convenience sample n = 19
- Preterm infants born AGA between 26-29 weeks PMA
- Clinically stable
- Exclusion criteria:
  - –Congenital anomalies
  - –NEC
  - –Brain Injury (including IVH > grade1)
  - –Prenatal illicit drug exposure
  - –Assisted ventilation (hi-flow nasal cannula allowed)

	Experimental (n=10) M ± SD	Control (n=9) M ± SD	*P value
PMA+ (weeks)			
At birth	28.1 ±.6	28.0 ± .9	0.842
PCS^			
At birth	4.4 ± .5	4.3 ± .7	0.968
At entry	3.8 ± .9	3.8 ± .7	0.968
Weight (grams)			
At birth	1017.3 ± 127.1	913.3 ± 87.8	0.028
At entry	991.0 ± 124.6	915.5 ± 145.2	0.079
Parent feedings			
During feeding prog.	3.2 ± 2.6	3.0 ± 3.2	0.661
Total to discharge	1.6 ± 1.2	2.2 ± 2.2	0.458

+ PMA = Post Menstrual Age
^ PCS =Postnatal Complications Score
* Mann-Whitney Test

Study Timeline



Procedure

- Intervention began the day the infant turned 29 weeks
- Allowed a minimum of 9 hours and maximum of 36 hours between interventions (24 hours ideal)
- Clinical stability and eligibility rechecked prior to every intervention, and monitored throughout
- Any adverse physiologic or behavioral responses to the intervention were recorded on the study documentation form
- After intervention—followed chart for continued eligibility and measurement of feeding progression and length of stay

Control Condition

- PI/RA stands with hands inside Isolette, not touching infant, for 5 minutes
- Curtain is pulled for blinding

Experimental Condition

- Oral Stimulation using Beckman*
- Once per day for 7 consecutive days
- Done 15-30 minutes prior to a gavage feeding
- Begins at 29 weeks PMA
- Continuous EKG/SaO2 monitoring
- Done by PI and trained RA's
- Curtain pulled for blinding

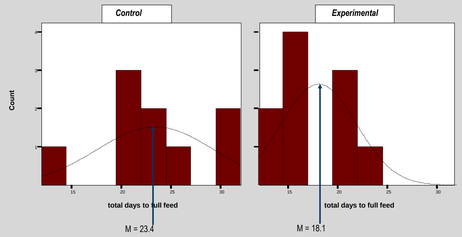
*Beckman Oral Motor Intervention-Premature Infant (BOMI-PI)

Beckman Oral Motor Intervention-Premature Infant (BOMI-PI)

- Provides assisted movement to activate muscle contraction and provides movement against resistance to build strength.
- Focus is to increase functional response to pressure and movement, and control of movement for the lips, cheeks, jaw, and tongue.
- Cheeks, lips, gums, tongue and palate were stimulated per specific protocol with finger stroking for 3 minutes
- Ends with non-nutritive sucking for 2 minutes

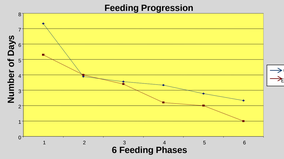
Structure	Purpose	Frequency	Duration
Cheek Stretch	Improve range of motion and strength of cheeks, and improve lip seal.	2x each cheek	30 sec
Lip Stretch	Improve lip range of motion and seal.	1X each lip	30 sec
Upper and Lower Lip Curl	Improve lip strength, range of motion, and seal.	1X each lip	30 sec
Gum Massage	Improve range of motion of tongue, stimulate swallow, and improve suck.	2X	30 sec
Lateral Borders of Tongue	Improve tongue range of motion and strength.	1X each	15 sec
Midblade of Tongue	Improve tongue range of motion and strength, stimulate swallow, and improve suck.	2X	30 sec
Elicit a Suck	Improve suck, and soft palate activation.	N/A	15 sec
Non-Nutritive Sucking	Improve suck, and soft palate activation.	N/A	2 min

Results- Total Days to Full Oral Feedings



- The oral stimulation group transitioned to total oral feedings **5 days sooner** than controls (p = 0.043)
- 29 week PMA infants tolerated BOMI-PI. Of the182 times oral stim done, it was never terminated due to adverse responses of infants. There were only 4 delays for apnea in which infant self-corrected, and oral stim was continued

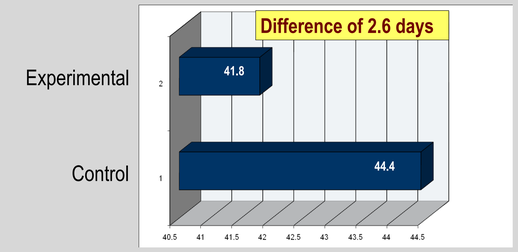
Feeding Progression Within the 6 Phases



Day/Phase 1	1 Nipple per day	When consumes >50% for 48 hours, progress
Phase 2	Nipple BID	When consumes >50% for 48 hours, progress
Phase 3	Nipple TID	When consumes >50% for 48 hours, progress
Phase 4	Nipple QID	When consumes >50% for 48 hours, progress
Phase 5	Nipple 6 per day	When consumes >50% for 48 hours, progress
Phase 6	Nipple 8 per day (all)	When consumes >50% for 48 hours, progress

- Phase 1 was clinically most relevant, as the control group took 2 additional days to complete phase 1
- Control groups also took a mean of 1 day longer to complete phases 4 & 6
- 2 control infants took >5 days to progress out of phase 6, while all experimental infants took the minimum 48 hours

Results- Length of Stay (from 29 weeks PMA)



- The oral stimulation group was discharged **2.6 days sooner** than controls (p = .541)
- A 3-day decrease in LOS would save our nation more than $2 billion annually

Limitations

- Small sample size (pilot)
- Breast milk and formula both used in bottle feedings
- Heterogeneity of Birth Weight
- No Measurement of Behavioral State

Future Research

- Larger study/larger sample size
- Dose-response studies
  - More times per day
  - Longer period of days (to discharge?)
    - Right before each gavage or during gavage?
    - Decrease attrition by delaying start of oral stim by 1 week (30 weeks PMA)- if not *pre*feeding anymore
- Nurse/Parent responses to the BOMI-PI
- Measure Infant Behavioral State