I have no disclosures and do not intend to discuss an unapproved or investigative use of commercial products.

Jane Morton, MD

The synergy of nursing in Galapagos heaven

Objectives

• Objectives: Participants will understand:
  • The practical implications of incorporating research on maximizing milk production into current breastfeeding bedside care
  • Given the goal of enabling exclusive breastfeeding, the rational for prioritizing A,B,C for the low risk dyad and reprioritizing these goals to C,B,A for at-risk dyads.
  • How this reprioritization might provide a more realistic, safe, unpressured plan for the at-risk infant
“Risks of NOT breastfeeding”
AAP’s Section on Breastfeeding: Meek JY.
BF Office, Pediatrics. 2017

<table>
<thead>
<tr>
<th>INFANT</th>
<th>MOTHER</th>
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<tr>
<td>↑ SIDs, “crib death”</td>
<td>↑ breast and ovarian cancer</td>
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<td>↑ obesity</td>
<td>↑ type 2 diabetes</td>
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<td>↑ asthma</td>
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<td>↑ certain childhood cancers</td>
<td>↑ postpartum depression</td>
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<td>↑ postneonatal death</td>
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An opportunity to influence resilience

- Adverse Childhood Experiences (ACEs) (childhood abuse and neglect) impact breastfeeding

- Breastfeeding can be a healing influence, creating resilience and strength instead of scars

Picasso and Breastfeeding

OUTLINE

The Challenge:
- Prevent early complications

<table>
<thead>
<tr>
<th>The Science:</th>
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<tr>
<td>- A,B,C</td>
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<td>- Low vs. high risk</td>
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<th>A Proposed Solution</th>
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<td>- Integrate science into practice in first hour care</td>
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<td>- Empower parents</td>
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The Challenge:
Prevent (vs. wait for)
early breastfeeding complications

Keep it simple!
says Picasso and Steve Jobs

The Challenge:
Prevent Early Complication

- A Attachment
  - Difficulty with latch or milk transfer

- B Breastmilk production
  - Mothers who won’t make enough milk

- C Calories
  - Babies who won’t receive enough milk
The Challenge: Prevent Early Cessation

- Complications related to A, B and C
  - Major causes for stopping earlier than planned, with drop off (~20%) in any breastfeeding before 1 month
  - Result in serious health and financial burdens (hyperbilirubinemia, dehydration, hypernatremia)
  - Key reasons for delayed discharge and readmission (within 2 wks) GLOBALLY
- What we do (or do not do) in the first 3 days (1st hour) directly relates to these complications

The Challenge: Prevent early cessation

Increased risk of early cessation if < 39 wks
- Breastfeeding rates: (40 wk) > (37-39 wk) > (< 30 wk) ≥ (34-36wk)
- Morbidity doubles for each gestational wk earlier than 38
- The population of early babies (< 39 wks) is unlikely to decrease due to
  - demographic factors (obesity, advanced maternal age*)
  - obstetrical practices (32.2% cesarean rate, inductions, multiples)

*About 15% of US mothers are ≥ 35 yrs; 2.6% are ≥ 40

2016 Preterm Birth Rate 9.8% with racial/ethnic disparities
March of Dimes

Stanford University
Births in US Baby-Friendly hospitals;
2.9% in 2007 → 20.01% in 2017
- Written breastfeeding policy
- Train all staff
- Inform all women about benefits and management
- Show moms how to breastfeed and maintain supply if separated

**Initiation in first hr.**
- Exclusive breastmilk feeds unless medically-indicated

**24 hour rooming in**
- Demand breastfeeding
- No pacifiers or bottles
- Providing information on bf support

Ward LP. Improving exclusive breastfeeding in an urban academic hospital. Pediatrics 2017 (37% to 59%)

What more could we do?

The WHO-UNICEF Breastfeeding Advocacy Initiative.
Improving the Early Initiation of Breastfeeding:
Maaike A. July, 2017

Putting infants to the breast in the first hour can save lives. Delaying breastfeeding initiation by 2–23 hours after birth increases the risk of newborns’ dying in the first 28 days of life by 40%.

One of the reasons for the low rate of early initiation of breastfeeding is the inadequate support from health workers around the time of birth.

QUESTION: Might normalizing the use of hand techniques with breastfeeding from the first hour reduce complications associated with early cessation and offer a “leg up” to all high risk dyads?
**The low-risk dyad**

- What can we expect if:
  - The mother is healthy, motivated, educated
  - The baby is healthy and delivered at term
  - The hospital has staff trained in lactation support

**Misconceptions about ABC**

I used to think…

- *(Attachment)* The learning process starts at birth when the baby first looks for the breast
  - **WRONG!**
- *(Breastmilk production)* Hormones control production
  - **WRONG!**
- *(Calories)* Colostrum is nutritious.
  - **WRONG!**
A: attachment

4 Key Points

1. FIRST HOUR

The longer the interval between birth and first feed, the greater the risk for dysfunctional attachment

Carberry AE. Breastfeeding Medicine 2013; Dewey KG. Pediatrics 2003

First hour breastfeeding is the practice most predictive of exclusive breastfeeding in the hospital after vaginal or c-section delivery.

Perine et al, Pediatrics 2012 Jul;130(1):54-60
Kacica, MA. Breastfeeding Medicine 2012 7(6) 409

The olfactory continuity

Prenatal priming for first feed, the last step of the birth process

- Rooting, swallowing, sucking prenatally
- Amniotic fluid pheromones, unique to each mother (genetics/diet)
  - Stimulate nutritive behavior
  - Chemically similar in colostrum and Montgomery gland secretions


Video of breast crawl
The Breast Crawl

- Reaching out to our newborns to hold, handle and help is an ancient, instinctual and natural impulse.
- A documented resurgence in the dx. of flat nipples, tongue-tie, recommendations for nipple shields and frenectomy, not based on valid evidence-based studies. Bin-Nun A, 2018
- No RCT demonstrates any beneficial outcome comparing independent breast crawl to gentle cue-based assistance.

Not always automatic...
Comparison of breast crawl between vaginal and cesarean deliveries

- Term, unmedicated NSVD (n=292), and cesarean deliveries (n=107), given 60 min. to simply attach (not feed) with no assistance
- Roughly 75% complete (88.01% vaginal; 11.21% cesarean)
- Conclusion: Encouraging BC in all dyads, especially in cesarean births, may unduly delay the

What would the same study show about LPT infants?

A: attachment: Key Points

3. Improves with uninterrupted contact (assistance)
4. Improvement is PRODUCTION dependent
B: breastmilk production: Key Points
1. Production is strongest determinant of duration and exclusivity of breastfeeding
   – Production within first 4 days predictive of future potential
   – Attachment improvement is production dependent
2. Hormones set the stage, yet the *early*, *frequent* and *effective* removal of colostrum determines future production potential, making production time sensitive.

C: CALORIES for TERM INFANTS

• Colostrum, 80% of calories of mature milk or formula with an average intake of 15 ± 11 g in first 24 hrs.

• The AGA TERM newborn’s fuel (glucose and ketones) comes mainly from endogenous sources (reserves), not from colostrum: *
  – Breakdown of starch (glycogenolysis)
  – Synthesis from amino acids (gluconeogenesis)
  – Breakdown of fatty acids (ketogenesis)
**Born Hungry? Protection vs. Nutrition**
- Cord cut = last “supper”, so what’s the hurry?
- More protective than nutritious. Unlike donor milk, a mother’s own colostrum provides “tailor-made”, unique active and passive immunity for the mother’s own infant.
  - Passive: ex. immunoglobulins
  - Active: ex. bioactive components that potentiate the infant’s own immune function within the GI lymphoid tissues
- Most vulnerable:
  - Separated
  - Preterm
  - Cesarean

**Colostrum ingested during first day of life**
Santoro W Jr, J Pediatrics 2010
- 90 exclusively breastfed term infants
- Daily mass of colostrum ingested during the first 24 postnatal hrs was $15 \pm 11$ g, with trend toward lower intake in cesarean births
- Ingested volumes showed no tendency to increase
- Volume of milk ingestion in first 24 hrs not related to successful breastfeeding at 6 wks.

**Cesarean vs. Vaginal Nomograms, Weight loss differentials by 6 hours**
- Needs small, reserves adequate for term, AGA infant
- Average weight loss is 6-7%
- Weight loss by 6 hrs. predictive of subsequent >10% loss.
Early Weight Loss Trajectory

- By 6 hrs, wt. loss differentials for infants at risk for excessive wt. loss (EWL of ≥10%) are evident.
- Wt. loss ≥5% in first day predicts eventual EWL (≥10%)
- Discharge wt. loss correlates with maternal concerns for underproduction at 2 wks, exclusive bffeeding at 1 mos, and cessation <6 mos.
- Conclusion: Developing interventions targeted toward newborns at risk for EWL might improve rates of exclusive breastfeeding.

Flaherman VJ, J Hum Lact 2017
Flaherman VJ, Arc Dis Child Fetal Neonatal Ed. 2013

CALORIES

Liberal hand expressed spoon feeding
Berti G 2015
- 1760 "natural births" with 1st hr. feeds
- Low threshold for hand-expressed spoon feeds
- Weight loss 5.95%
- Nadir at 44 hr.
- Zero % with 10% weight loss (3.9% lost-9%)

Flaherman VJ 2015
- 83,433 vaginal "routine care"
- Rarely used hand expressed spoon feeds
- Weight loss 7.1%
- Nadir at 48-72 hr.
- 10% with 10% weight loss

Mean weight loss for term births, with or without spoon-fed colostrum
Berti G 2015 vs. Flaherman V, 2015
Liberal hand expressed spoon feeding

- Would this intervention help all infants…
  - reduce wt. loss
  - shorten the time to secretory activation
  - increases future production potential
  - improve rates of exclusive breastfeeding

Summary Points for Low Risk Dyads
…as simple as

- **A** Attachment:
  - **First hour**
  - Effective, “deep latch” may not happen right away
  - Improves with uninterrupted contact and ↑ production

- **B** Breastmilk production stimulation
  - **First hour**, time sensitive, cornerstone of bfeeding rates

- **C** Calories (adequate intake)
  - **First hour** protection
  - Weight by 6 hour predictive
  - Liberal use of hand expressed feeds modifies weight loss
  - Needs are small, reserves adequate; prioritize **A** and **B**

Potential risks of “missing” the 1st hour
Every first hour counts

- **A** (dysfunctional suckling)
- **B** (insufficient production)
- **C** (suboptimal intake/protection)
The Challenge:
- Prevent early complications

The Science:
- A, B, C
- Low vs. high risk

A proposed solution
- Integrate science into practice in first hour care
- Empower parents

OUTLINE

Infants at risk for insufficient caloric intake (C)
- Infants with compromised reserves
  - Preterm infants (LPT and VLBW)
  - Postmature infants
- Infants with increased demands
  - Infants of diabetic mothers, SGA infants
  - High bilirubin producers

Who Is At-Risk?
Mothers at risk for insufficient production (B)
- Maternal-infant separation (cesarean births)
- Breast surgery/anomalies
- Attachment issues (latch and milk transfer)

Infants at risk for insufficient caloric intake (C)
- Infants with compromised reserves
  - Preterm infants (LPT and VLBW)
  - Postmature infants
- Infants with increased demands
  - Infants of diabetic mothers, SGA infants
  - High bilirubin producers

LPT and Breastfeeding Rates
- Drop off by 1 month in primiparous mothers: *
  - Term: 23.5%
  - Early term (37-<39wk): 27.4%
  - LPT (34-36+wk): 36.2%

- LPT infant breastfeeding rates not impacted by Baby-friendly practices (1st hr. skin-to-skin, rooming-in, no pacifiers) **
- LPT and Early term births less likely to feed in first hour

* Hackman NM, Breastfeeding Medicine 2016
** Goyal NK. Birth 2014, Eidelman A. 2016, Breastfeeding Medicine, editorial 10(3) 2016
The LPT infant (34-<37 weeks)

34-36 wks

26-28 wks

30-32 wks

40-42 wks.

LPT infant, the “at-risk” poster child

- LPT babies are immature in multiple ways. They cannot be expected to behave like term babies.
- Immature thermoregulation → hypothermia
- Immature glucose generating pathways → hypoglycemia
- Immature processing of bilirubin → hyperbilirubinemia
- Immature breastfeeding skills

"THE GREAT PRETENDERS"

Bilirubin encephalopathy

LPT Immature breastfeeding skills

- Passive, sleepy, “content to starve”
- Ineffective milk removal
  - Short sucking bursts
  - Long, frequent pauses
  - Unending feeds
- Anorexia, easy to confuse with satiety
**Underfeeding, the culprit**

- Medical complications (excessive wt. loss, hyperbilirubinemia, hypernatremia) always relate to **underfeeding** colostrum, never over feeding.
- Adverse long-term neurodevelopmental outcomes

**Underfeeding**

“suboptimal intake jaundice”
Flaherman VJ, Maisels MJ. ABM Protocol #22, 2017

- With the exception of infants with pathologic conditions…the single most important clinical risk factor for hyperbilirubinemia in newborns is decreasing gestational age. For each week of gestation below 40 weeks, the odds of developing a TSB ‡428 lmol/L (25 mg/dL) increase by a factor of 1.7 (95% CI 1.4–2.5)

“suboptimal intake jaundice”
Flaherman VJ, Maisels MJ. ABM Protocol #22, 2017

- In normal adults, even 24 hrs of fasting with good hydration, results in a small increase in bilirubin (1-2 mg/dL) due to an increase in enterohepatic circulation.
- Similarly, suboptimal enteral intake of colostrum, (relative starvation) strongly correlates with increased bilirubin and weight loss.
- “First and best supplement to prevent hyperbilirubinemia is hand expressed spoon/cup-fed colostrum …In this way, breastfeeding is best supported.”
High bilirubin producers

Bhutani VK. J Perinatology 2015

- Assessed ETCOc, (corrected end-tidal carbon monoxide, high with production) with hr-specific TB.
- Impaired elimination was predominant contributing factor in infants with TB <95th percentile, many of whom are low-bilirubin producers.
- Better bilirubin elimination may account for the lack of severe hyperbilirubinemia in some high bilirubin producers (i.e. High milk intake can reduce bilirubin even in high bilirubin producers)

VLBW infants

Avoidance of “underfeeding”

Multiple benefits assoc. with early and aggressive nutritional practices (earlier introduction of human milk, ↑ exclusivity, ↑ mother’s own vs. donor milk, and ↑ skin-to-skin time)

Borregas, SP. Acta Pediatr 2017
Lee J Pediatrics 2015
Seigel JK Breastfeeding Medicine 2013
Montjaux-Regis Acta Pediatr 2011
Briere CE. J Ob Gyn Neonatal Nurs. 2014

Skin-to-skin

VLBW infants

- Shortens hospital stay (Romano-Keeler J, J Perinat. 2017)
- ↑ milk production (exclusivity)
- ↑ growth velocity
- ↓ extra-uterine growth restriction in 1st wk
- ↑ pre and post discharge breastfeeding rates
- ↓ necrotizing enterocolitis, ↓ sepsis
- ↑ transition bottle to breastfeeding

Oropharengeal colostrum to ELBW infants
Cesarean Births

• 1st hr feeds, only 3.5% cesarean vs. 71.5% vaginal
  – Less intake when colostrum most available (1st hrs.)
  – Less production stimulation → delayed lactogenesis
  – Greater weight loss evident by 6 hrs. with ≥10% weight loss in 25% cesarean vs. 10% vaginal births


• Formula by discharge 2X higher (25% vs. 11%)
• Lower breastfeeding rates at 7 days, 3 mo, and 6 mo.
  Prior E, 2012, Zanardo V, 2010
• Less milk transfer over first 6 days Evans KC, 2003

Less breastmilk intake over the first 6 days in caesarean (CS) vs. vaginal (NVD) births

By day 6, only 20% of cesarean infants had regained birth weight compared with 40% of the vaginal births.


Maternal intrapartum fluid balance?

Chantry CJ. Pediatrics, 2011

• Is greater weight loss in cesarean births due to the diuresis of fluid from fetal volume expansion related to intrapartum fluid administration?
• Mothers of these infants were more likely to have been induced, have prolonged (>14 hr.) labor, and higher pain ratings, ↑ meds.
• Could these intrapartum factors affect impaired early colostrum transfer, and result in “true” weight loss due to suboptimal intake.
Breastfeeding in the O.R.
First hour breastfeeding for all, including cesarean births
- N=565 cesarean births, military hospital in India
- Higher rates of exclusive breastfeeding than with usual hospital care at:
  - discharge (89.13% vs. 75.94%, p=0.004)
  - 2 weeks (85.51% vs. 53.38%, p<0.001)
  - 6 weeks (74.64% vs. 38.35%, p<0.001).
- This single intervention significantly improves rates of exclusive breastfeeding.

Jesmin E, 2015

Over the shoulder hold for cesarean mothers during delivery

Good visibility, no abdominal pressure, easier for mother/partner to express and assist
Why reprioritize goals for at-risk infants?

1. **Attachment**
   - passive baby → ineffective milk transfer

2. **Breastmilk production**
   - insufficient colostrum removal → delayed lactogenesis, reduced production

3. **Calories**
   - may have (LPT) high energy needs, suboptimal glucose generating pathways → **excessive weight loss**
   - insufficient colostrum intake → increased deconjugation and reabsorption of bilirubin → **excessive jaundice**

C, B, A instead of A, B, C

CBA for at-risk dyads..

Can we safeguard C and B and avoid over-focus on A?

**C, Calories**
- Early, liberal hand expressed, spoon feedings
- ? Prenatal expression/collection

**B, Breastmilk production**
- 1st hr, then frequent removal

**A, Attachment**
- Skin to skin, gentle cue-based attachment assistance
- Improves with time, contact and robust production
- Less pressure on milk transfer

Unrestricted breastfeeding and liberal spoon fed, hand-expressed colostrum to satiety:

1) stimulates production
2) increases intake
3) keeps baby exclusively breastfed
4) less pressure on optimal attachment

Most effective with:
- early initiation
- high frequency (≥ 7x/d)
- effective techniques
**Why Spoons may be best?**

Plastic spoons: no risk, no cost, reusable, readily available, convenient for both collection and delivery of small volumes of colostrum. Not viewed as a "medical intervention", requires minimal to no training of parents or staff, is safe, effective…and studied.

**Spoon/cup fed LPT infants**

- Infants cup/spoon fed vs. bottle fed:
  - Most studies involve preterm
  - No difference weight gain
  - No difference gestational age at discharge
  - More likely exclusively breastfeeding by discharge
  - More likely receiving some breastmilk at 3 and 6 months
  - Inconclusive evidence for term infants

Cochrane Review, Aug, 2016 (Flint A)

**WHO and AAP recommend for all mothers**

(pump-dependent or breastfeeding, preterm or term )

AAP’s Model Hospital Breastfeeding Policy for Newborns, 2009

Many scenarios
Complications become less remedial with time. What we may not hear about...

- Exhaustive and demoralizing remedial regimens
- Enormous sense of grief a mother deals with when breastfeeding fails
- Bad press

The Experience of Breastfeeding the LPT Infant A Qualitative Study. Kair LR. 2015 Breastfeeding Med

Good Press: Success spurs success!

Picasso and Breastfeeding

**OUTLINE**

- The Challenge:
  - Prevent early complications
- The Science:
  - A, B, C
  - Low vs. high risk
- A proposed solution
  - Integrate science into practice in first hour care
  - Empower parents
What More Is Needed?

- Given that morbidity stems from *insufficient production* and *suboptimal intake*

- Given that no amount of skin-to-skin and unrestricted breastfeeding reduces these two problems when infants fail to access sufficient colostrum or stimulate an adequate supply

What More Is Needed?

- Given these time-sensitive problems may worsen by the hour

- Given that many healthy, term infants are unable to automatically latch in first hour (~90% cesarean births, 25% all term births)

- Given the appropriate encouragement for exclusive breastfeeding

Can we PREVENT problems with simple solutions?

Think outside of the box!

Lacoste, France
Can we change the perception...

from: "I'm going to TRY!"

• Breastfeeding is complicated
• Wait for problems to be fixed
• Gadgets, machines necessary
• Depend on hospital routine and professionals
to: "I can do this!"

• The basic ABCs of breastfeeding are simple
• "I understand what needs to happen in any scenario right after my delivery….I have what it takes right from those first awesome minutes."

Can we keep it simple and prepare ALL parents?
First Hour Breastfeeding with A Mother's Touch

Stanford Nursery website, 2017

drjanemorton@gmail.com
Proposed Practice Changes to Reduce Risks

- Make every first hour count in every scenario
- Low threshold for hand-expressed spoon feeds
- Prioritize CBA vs. ABC for at-risk dyad.
- Normalize mother/partner helping hands in 1st hour
- Change the message: “You have all you need!”

QUESTION: Might normalizing the use of hand techniques with breastfeeding from the first hour reduce complications associated with early cessation and offer a “leg up” to all high risk dyads? A question needing an answer.

A B C

Maybe only what really matters the most, matters at all.