

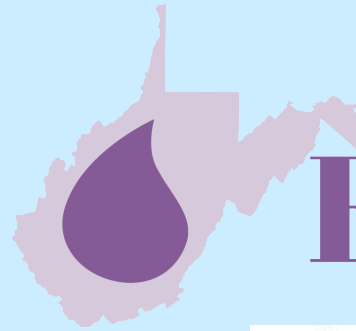
# *Supplementing Breastfed Babies: Evidence for the Why, When and How*

*A webinar for healthcare providers and lactation support professionals*  
June 18, 2026

*Brought to you by a collaboration between CHAMPS National and WV Breastfeeding,  
with funding support from the WV Department of Health- Office of Maternal Child and Family Health*



**CHAMPS**  
NATIONAL



WEST VIRGINIA  
**Breastfeeding**



*A project of the*  **West Virginia  
Perinatal  
PARTNERSHIP**

# Today's Speakers



**Elizabeth A. Copenhaver, MD, FAAP** is an Assistant Professor of Pediatrics at Vandalia Health. She is a Newborn Hospitalist with specialized training in breastfeeding and lactation medicine, including completion of the IABLE "Deep Dive" and Academy of Breastfeeding Medicine Leadership Academy curricula. She focuses her clinical and research work on the practicalities and outcomes of infant feeding during the newborn hospitalization.



**Emily K. Nease, MD, NABBLM-C, FAAP** is an Associate Professor of Pediatrics at the West Virginia University School of Medicine in Morgantown, WV. She is a board-certified Pediatrician and board certified Breastfeeding and Lactation Medicine physician through the North American Board of Breastfeeding and Lactation Medicine (NABBLM).

# DISCLOSURES

*Neither of our 2 speakers today have any relevant financial or nonfinancial relationships in any products or services described in the presentation*

# OBJECTIVES

By the end of this session, participants will be able to:

- Explain maternal and infant lactation risk factors.
- Identify the medical indications for supplementation of breastfed infants
- Develop evidence-based management strategies to provide medically indicated supplementation while continuing to support breastfeeding

# Medical Provider Goals

- **Promote, Protect, and Support** Breastfeeding
- **Shared Decision Making**
- **Setting Realistic Goals** and **Ensure Safety** and health of the dyad
- **Identify and Address Barriers** to breastfeeding
- Meet the family where they are at
- **Providing Education and Support** for breastfeeding dyad

# Breastfeeding and the Use of Human Milk

- American Academy of Pediatrics Policy statement
- **Exclusive breastfeeding for 6 months**
- Continued breastfeeding along with complimentary foods for 2 years and beyond
- As long as mutually desired by mother and child
- **Breastfeeding and human milk are the normative standard** for infant feeding and nutrition

FROM THE AMERICAN ACADEMY OF PEDIATRICS | POLICY STATEMENT | JUNE 27 2022

## Policy Statement: Breastfeeding and the Use of Human Milk **FREE**

Joan Younger Meek, MD, MS, RD, FAAP, FABM, IBCLC ✉; Lawrence Noble, MD, FAAP, FABM, IBCLC;  
Section on Breastfeeding

Address correspondence to Joan Younger Meek, MD, MS, Florida State University College of Medicine, 250 E. Colonial, Suite 200, Orlando, FL 32801 E-mail: [jmeek@fsu.edu](mailto:jmeek@fsu.edu)

*Pediatrics* (2022) 150 (1): e2022057988.

<https://doi.org/10.1542/peds.2022-057988> **Article history** ↻

# World Health Organization (WHO)

- Initiate breastfeeding within the first hour life
- Exclusively breastfed for 6 months of life
- Breastfeed on demand, day and night
- Introduction of complimentary foods beginning at 6 months
- Continued breastfeeding for up to 2 years or beyond

<https://www.who.int/health-topics/breastfeeding>



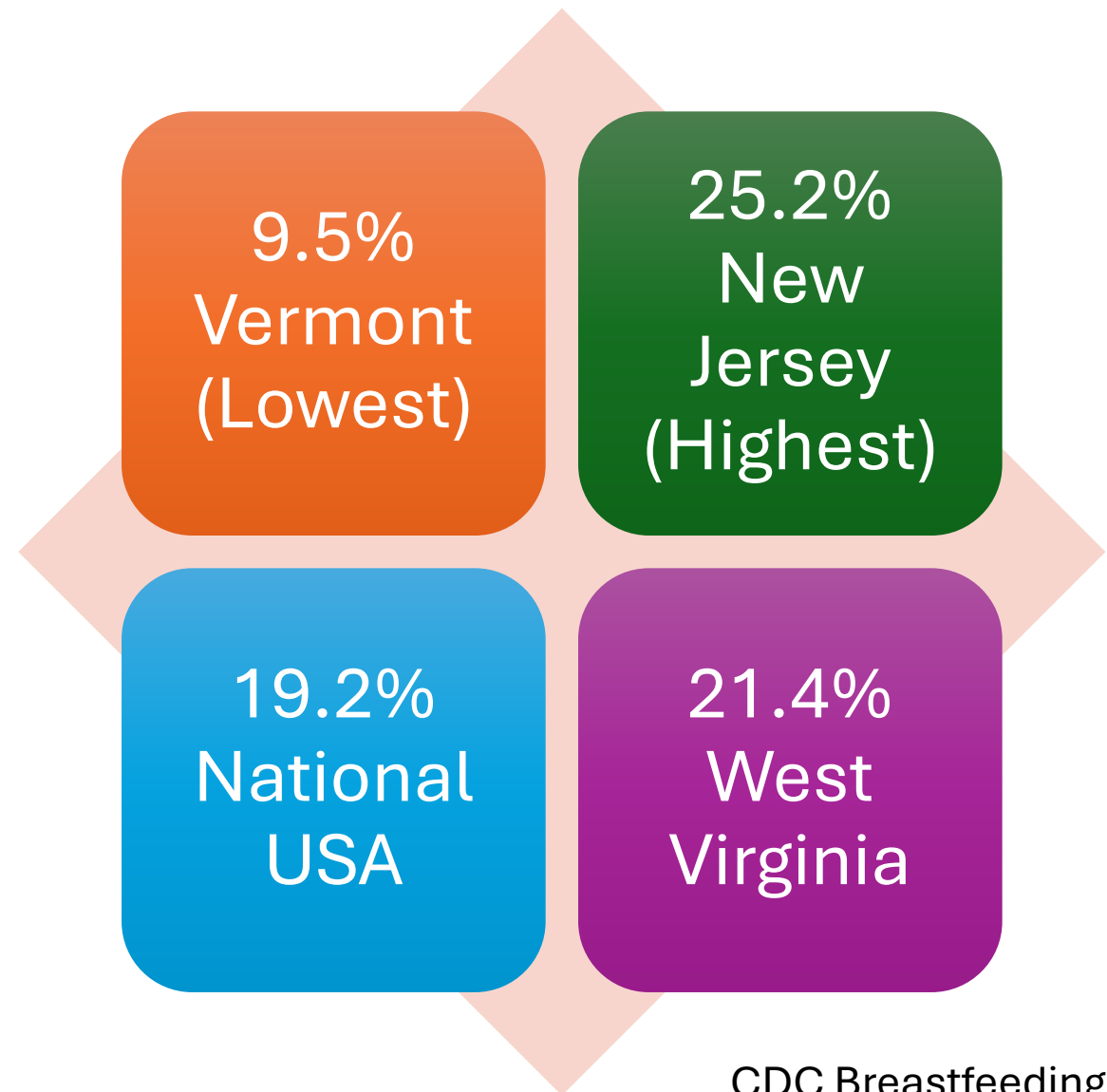
# Breastfeeding Rates

|                      | <b>Ever<br/>Breastfed</b> | <b>Exclusive<br/>Breastfeeding<br/>at 6 Months</b> | <b>Any<br/>Breastfeeding<br/>at<br/>12 months</b> | <b>Formula<br/>Supplementation<br/>at 2 Days</b> |
|----------------------|---------------------------|----------------------------------------------------|---------------------------------------------------|--------------------------------------------------|
| <b>West Virginia</b> | 59.8%                     | 13.8%                                              | 19.2%                                             | 21.4%                                            |
| <b>U.S. National</b> | 83.2%                     | 24.9%                                              | 35.9%                                             | 19.2%                                            |
| <b>HP2030 Target</b> | N/A                       | 42.4%                                              | 54.1%                                             | N/A                                              |

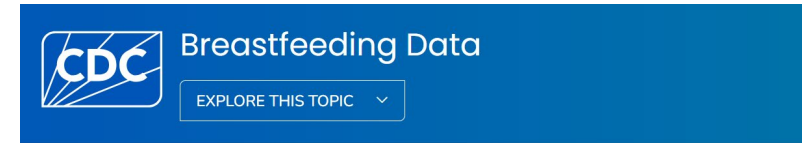
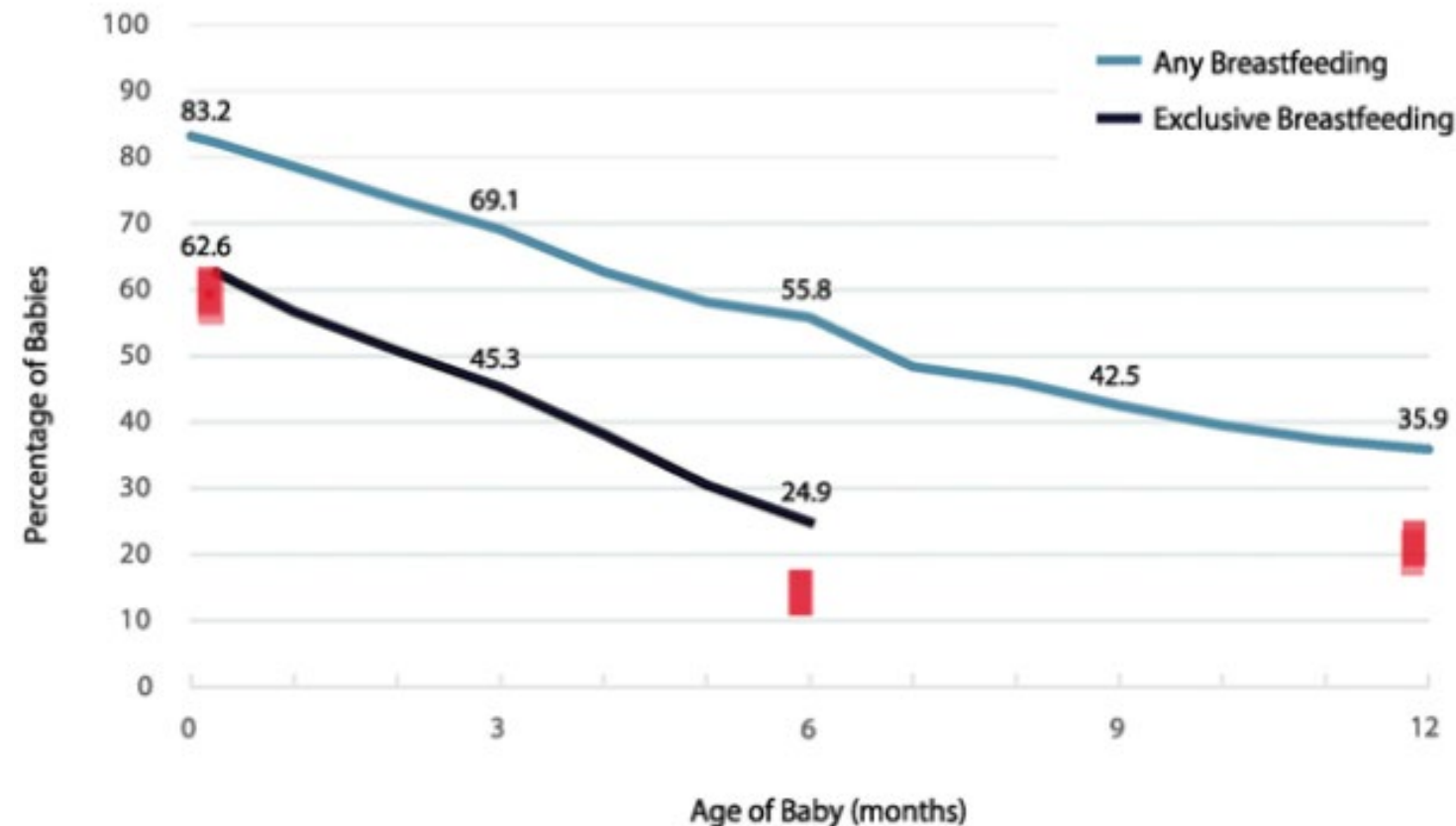


CDC Breastfeeding  
Report Card 2022

# Rate of Receiving Formula Before 2 Days of Age in the USA 2019



# Percentage of Infants Receiving Any and Exclusive Breastmilk During the First 12 months



NIS-Child Breastfeeding Rates

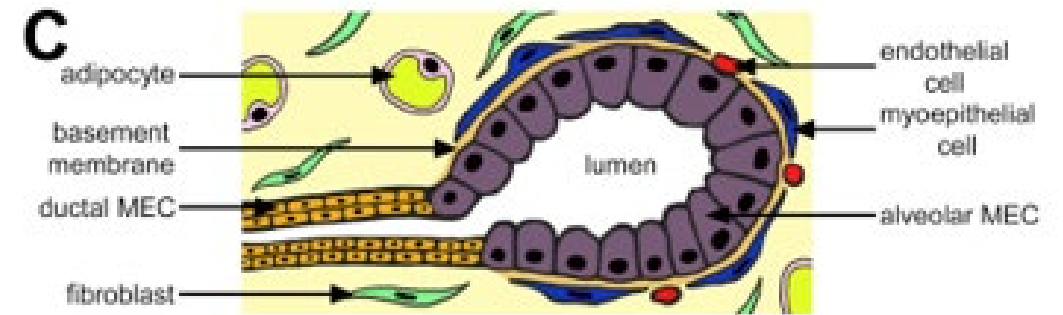
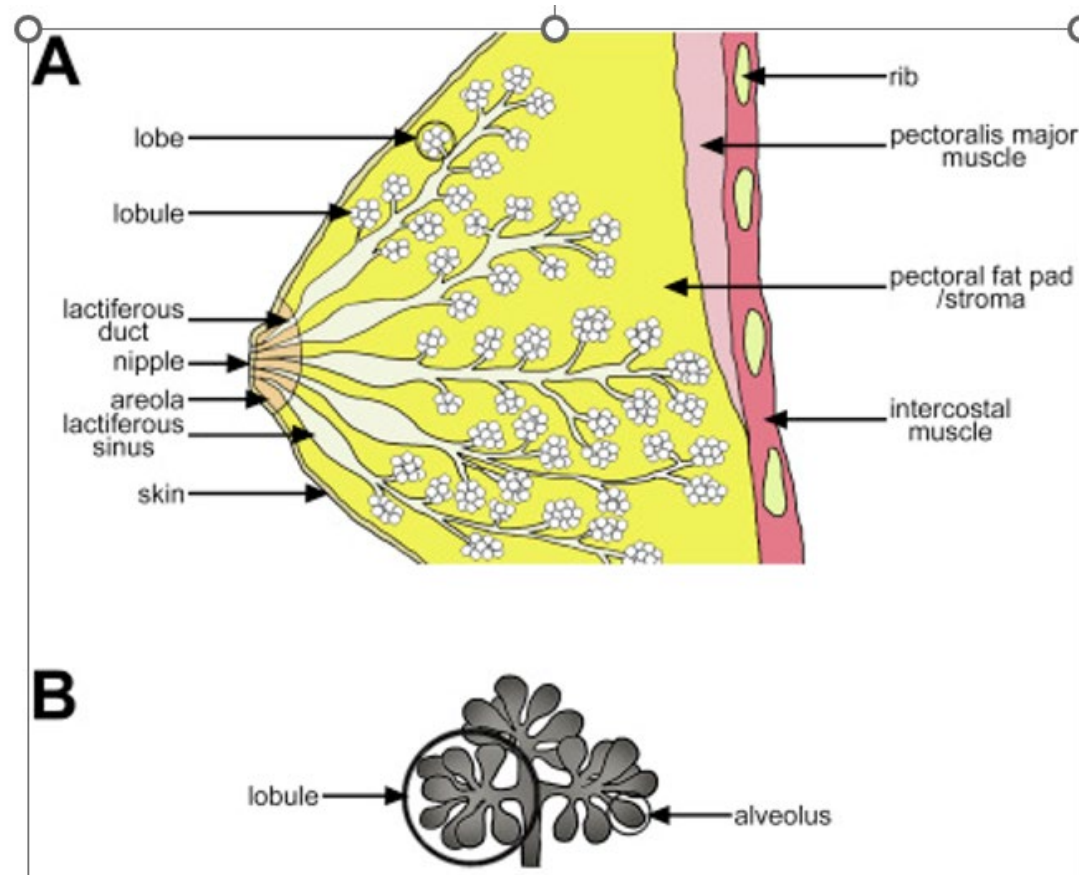
CDC National Immunization Surveys (NIS) 2020 and 2021, among children born in 2019.

# 10 steps..... to more breastfeeding



# Breast Anatomy and Lactation Physiology





Pandya S and Moore RG. Breast Development and Anatomy. Clinical Obstetrics and Gynecology.54(1) 91-95. 2011.

Truchet S and Honvo-Houeto E. Physiology of milk secretion. Best Practice & Research Clinical Endocrinology & Metabolism 31(2017) 367-384.

# Breast Physiology

- Stem cells are present before puberty
- Puberty results in development of terminal buds
- Puberty (trees in the spring)
- Hormones involved in breast development
- Puberty: estrogen, progesterone, growth hormone



Pandya S and Moore RG. Breast Development and Anatomy. Clinical Obstetrics and Gynecology.54(1) 91-95. 2011.

Truchet S and Honvo-Houeto E. Physiology of milk secretion. Best Practice & Research Clinical Endocrinology & Metabolism 31(2017) 367-384.

# Breast Hypoplasia

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Hypoplastic breasts and breast surgery may greatly impact lactation

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Wide variety of presentations

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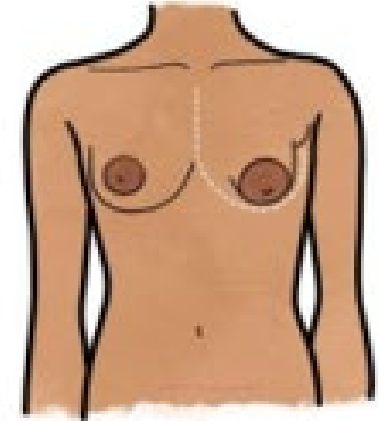
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Not size. This is more about shape

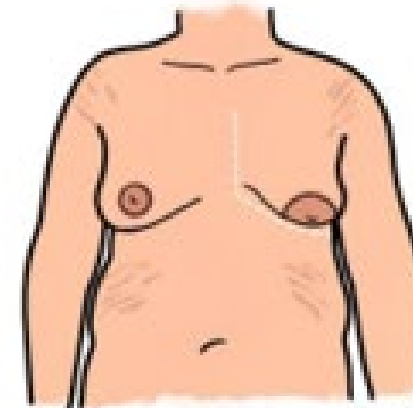
# Breast Hypoplasia



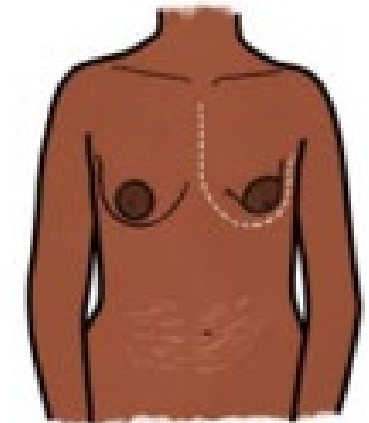
**TYPE 1**  
hypoplasia of the  
lower medial quadrant



**TYPE 2**  
hypoplasia of the  
lower and lateral quadrant  
sufficient skin in the subareolar region



**TYPE 3**  
hypoplasia of the lower  
medial and lateral quadrant  
Skin deficiency in the subareolar region



**TYPE 4**  
severe breast constriction  
minimal breast base

Amir LH, Cullinane M, Ingram J, Li X, Nommsen-Rivers LA (2024)  
Breast hypoplasia markers among women who report insufficient milk  
production: A retrospective online survey. PLoS ONE 19(2): e0299642

# Lactation Physiology: 2 Separate Events

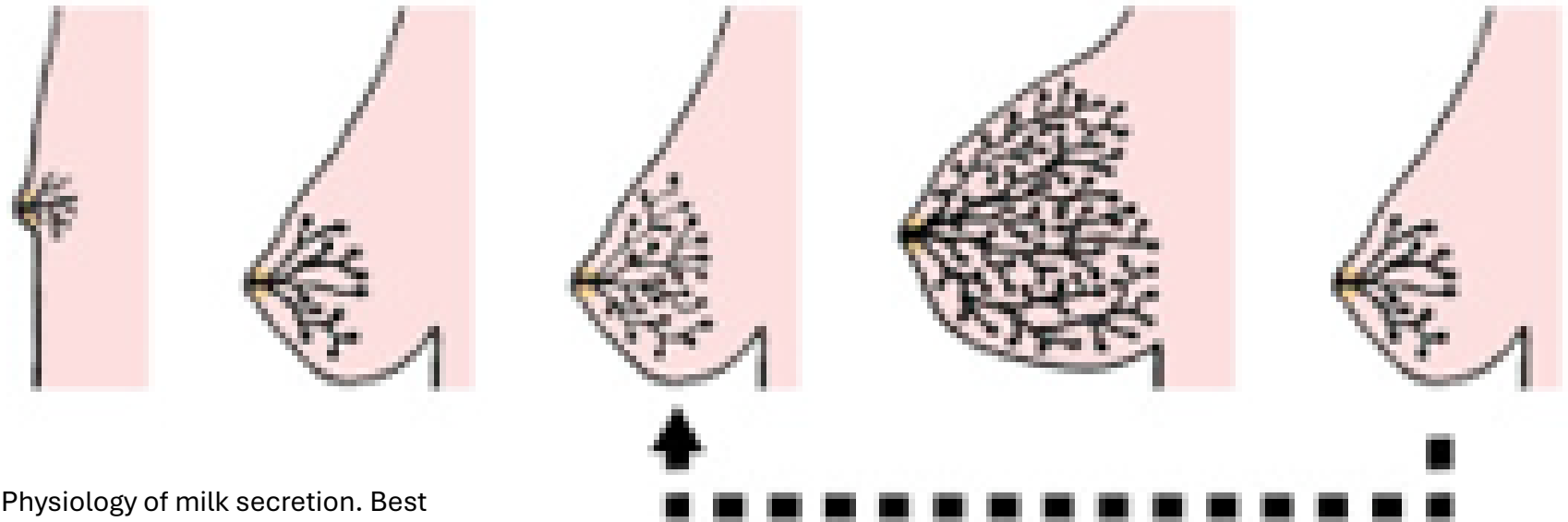
## **Secretory Differentiation**

- Preparation of glandular tissue during pregnancy
- Used to be called Lactogenesis I

## **Secretory Activation**

- Increasing milk volumes
- Used to be called Lactogenesis II

birth ► puberty ► gestation ► lactation ► involution



Truchet S and Honvo-Houeto E. Physiology of milk secretion. Best Practice & Research Clinical Endocrinology & Metabolism 31(2017) 367-384.

Hormonal  
Control of  
Lactation During  
Pregnancy

Estrogen

Progesterone

Prolactin

Insulin

# What Medical Conditions Might Impact Secretory Differentiation?

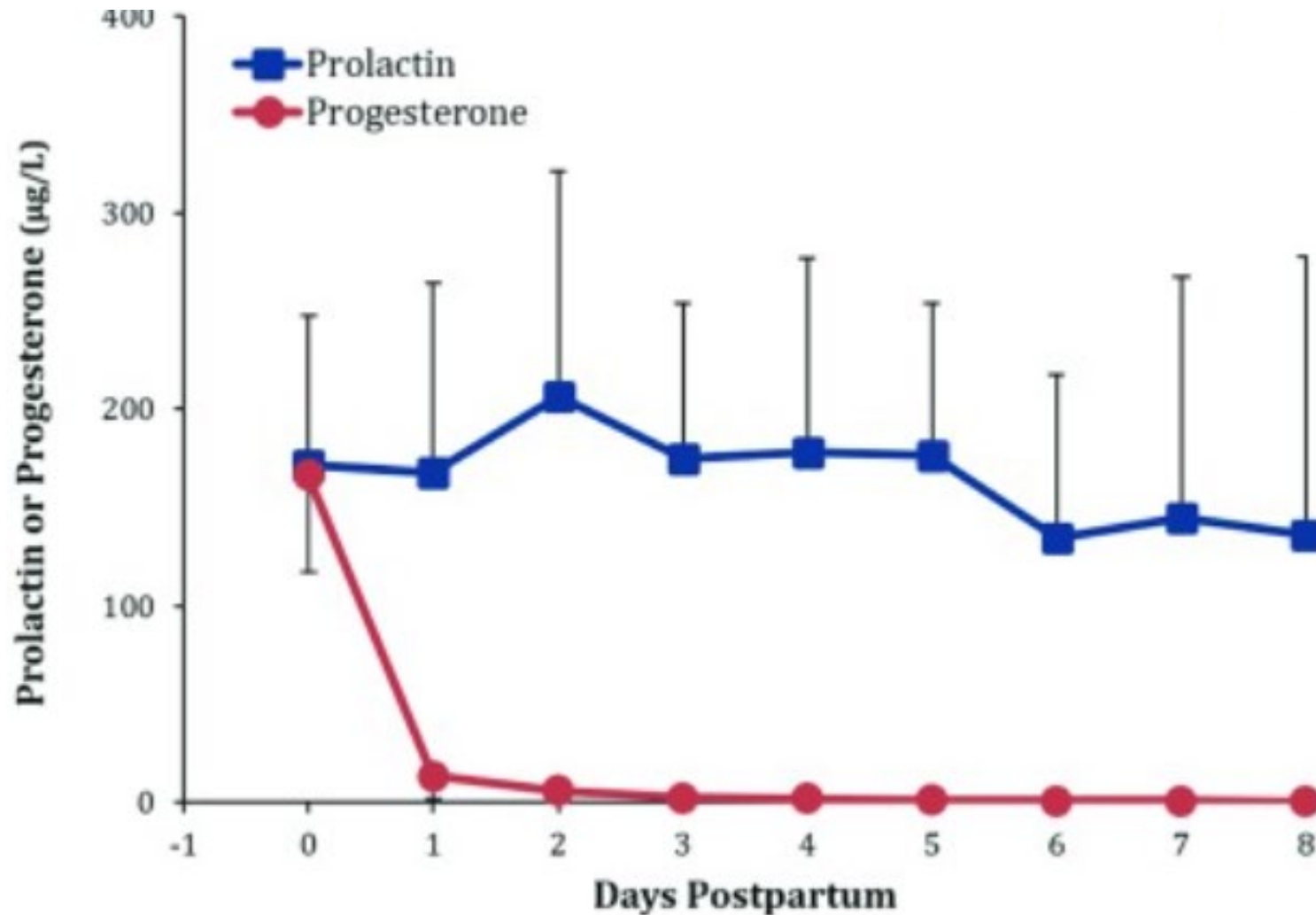
- Insulin Resistance
- Diabetes (Type 2)
- Medications
- Polycystic Ovarian Syndrome (PCOS)
- Pre-eclampsia
- Infertility/Invitro fertilization (IVF)
- Inability to raise prolactin (example pituitary insufficiency)
- Hypoplasia of breast(s) Insufficient Glandular Tissue
- Breast Reduction
- History of Breast Radiation



# Secretory Activation

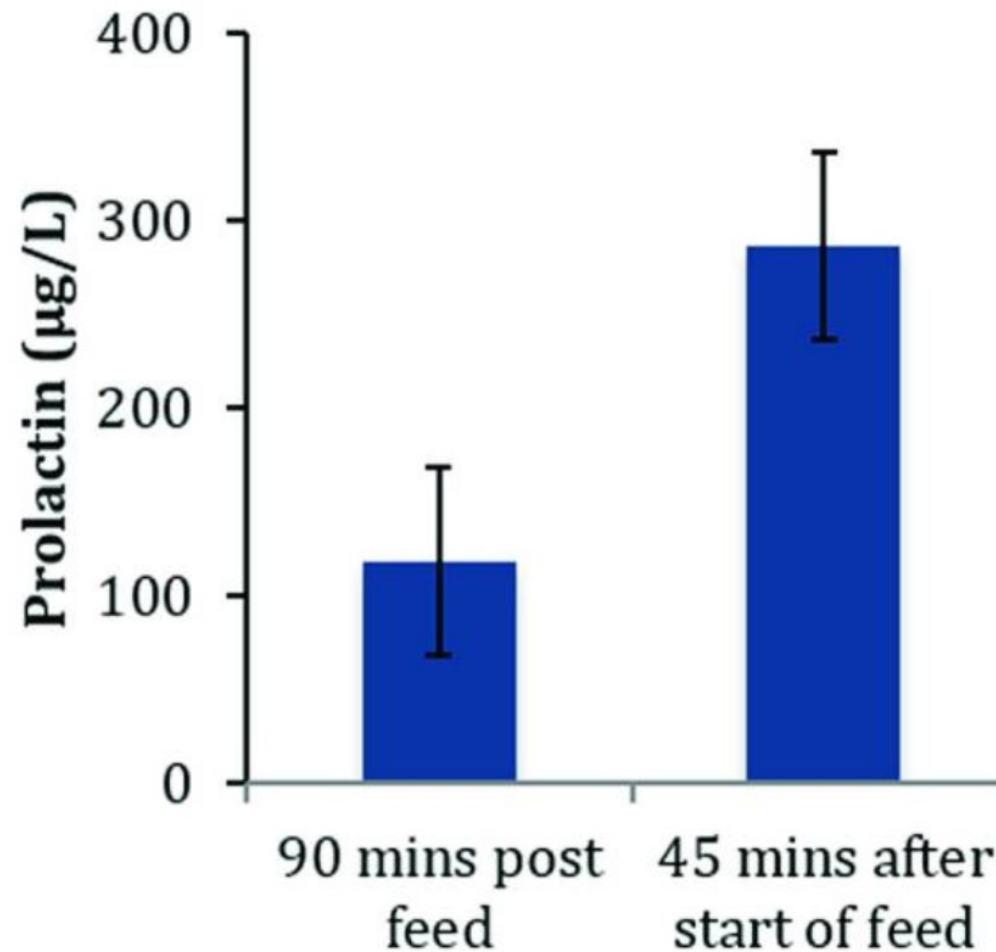
- Drop in Estrogen and Progesterone
- Adequate Cortisol and Insulin
- Tight junctions form
- Milk must be removed regularly (feedback mechanism)
- Prolactin is very high and must remain elevated
  - Continued spikes in prolactin with each pump or latch
  - Nipple stimulation is required to get a prolactin spike

# Progesterone and Prolactin



Boss M, Gardner H and  
Harmann P. **Normal Human  
Lactation: closing the gap.**  
F1000 Research 2018

# Pulsatile Activation of Prolactin



Boss M, Gardner H and  
Harmann P. **Normal Human  
Lactation: closing the gap.**  
F1000 Research 2018

# Timing of Secretory Activation

- Delayed Onset Lactation is after 72 hours of life.
- **Peng et al Meta-analysis: Incidence of delayed Onset of Lactation in the US is 34%**
- The incidence of delayed onset of lactation is high in the US
- Important for providers to:
  - Identify dyads with no risk factors and normal timing of secretory activation
  - Identify dyads with risk factors for delayed secretory activation
  - Identify signs of delayed secretory activation
  - Implement interventions that support and promote lactation

Peng Y, Zhuang K, Huang Y. Incidence and Factors Influencing Delayed Onset of Lactation: A Systematic Review and Meta-analysis. International Breastfeeding Journal 2024  
Li S. et al. Factors Influencing Delayed Onset of Lactogenesis: A Scoping Review. International J. of Gen. Medicine. 2024.

# Reasons for Delayed Secretory Activation

- Insulin resistance/gestational diabetes
- Gestational HTN
- High androgens/PCOS
- Elevated BMI
- Primiparity
- Infrequent/ineffective milk removal
- Preterm delivery
- Older Maternal Age
- Maternal medications
- Maternal illness
- Unscheduled C-section
- Excessive weight gain during pregnancy

Peng Y, Zhuang K, Huang Y. Incidence and Factors Influencing Delayed Onset of Lactation: A Systematic Review and Meta-analysis. International Breastfeeding Journal 2024

Li S. et al. Factors Influencing Delayed Onset of Lactogenesis: A Scoping Review. International J. of Gen. Medicine. 2024.

# Maternal Lactation Risk Factors

- Previous Negative Breastfeeding Experience
- History of Breast Surgery
- Multiple births
- Gestational Diabetes, Type II Diabetes Mellitus (insulin resistance)
- Elevated BMI
- PCOS
- Medical Condition/Illness and breastfeeding postponed
- Older maternal age

ABM Clinical Protocol #5. Peripartum Breastfeeding Management for the Healthy Mother and Infant at Term 2013.

# Maternal Lactation Risk Factors

- History of Infertility
- Inverted nipples
- Previous History of Low milk Supply
- Primiparity
- Maternal Medications
- C-section
- Infrequent/Ineffective milk removal
- Breast hypoplasia

ABM Clinical Protocol #5. Peripartum Breastfeeding Management for the Healthy Mother and Infant at Term 2013.

# Infant Lactation Risk Factors

- Infant is late preterm or premature
- SGA
- Poor latch/no latch
- Sleepy baby
- Congenital anomaly
- Neurologic impairment
- Medical Condition or Illness that postpones breastfeeding
- Early Bottle introduction
- Inadequate suck/swallow/breathing coordination

ABM Clinical Protocol #5. Peripartum Breastfeeding Management for the Healthy Mother and Infant at Term 2013.

# Infant Lactation Risk Factors

- Hyper/Hypotonia
- Cleft lip/palate
- Torticollis
- Ankyloglossia
- Micrognathia
- Hypoglycemia
- Hyperbilirubinemia

ABM Clinical Protocol #5. Peripartum Breastfeeding Management for the Healthy Mother and Infant at Term 2013.

# Definitions

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**Exclusive breastfeeding:** only human milk (at the breast or own mother's expressed breast milk)

---

**Supplementary feedings:** additional fluids provided to a breastfed infant before 6 months of age.

---

**Pre-lacteal feeds:** fluids other than mother's own milk in the first 3 days after birth

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**Complementary feedings:** solid or semisolid foods provided to an infant in addition to breastfeeding

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# Medical Indications for Supplementation: Infant

- Asymptomatic hypoglycemia unresponsive to appropriate breastfeeding. Infants with symptomatic hypoglycemia

BREASTFEEDING MEDICINE  
Volume 16, Number 5, 2021  
© Mary Ann Liebert, Inc.  
DOI: 10.1089/bfm.2021.29178.new

## ABM Clinical Protocol #1: Guidelines for Glucose Monitoring and Treatment of Hypoglycemia in Term and Late Preterm Neonates, Revised 2021

Nancy E. Wight, MD, IBCLC, FABM, FAAP; and the Academy of Breastfeeding Medicine

### Abstract

*A central goal of The Academy of Breastfeeding Medicine is the development of clinical protocols for managing common medical conditions that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards*

ABM Clinical Protocol #3: Supplementary  
Feedings in the Healthy Term Breastfed  
Neonate. 2017.



# Medical Indications for Supplementation: Infant

- Weight loss of >8-10%
  - **Case by case basis.** Not automatic. Indication for evaluation
  - Is there evidence or concern for poor milk transfer or low milk production?
  - **Evaluate the infant, assess breastfeeding, and provide breastfeeding assistance**
  - **Consider Maternal and Infant Lactation Risk factors**
- Delayed Bowel Movements
  - Fewer than 4 stools on day of life 4
  - Continued meconium stools beyond day of life 4

# Infant Growth

Back to birth weight by 14 days

Gain of about 30 gm/day until 3 months of age

Gain of about 20 gm/day from 3-6 months of age

10 gm/day from 6-12 months

# Medical Indications for Supplementation: Infant

- Hyperbilirubinemia
  - Suboptimal intake jaundice
    - Poor breastmilk intake despite appropriate feeding support
    - On-going weight loss
    - Limiting stooling
    - Voiding with urate crystals
  - Severe hyperbilirubinemia

ABM Clinical Protocol #3:  
Supplementary Feedings in the  
Healthy Term Breastfed  
Neonate. 2017.

# Resources

BREASTFEEDING MEDICINE  
Volume 12, Number 5, 2017  
© Mary Ann Liebert, Inc.  
DOI: 10.1089/bfm.2017.29042.vjf

## **ABM Protocol**

### ABM Clinical Protocol #22: Guidelines for Management of Jaundice in the Breastfeeding Infant 35 Weeks or More of Gestation—Revised 2017

Valerie J. Flaherman,<sup>1</sup> M. Jeffrey Maisels,<sup>2</sup> and the Academy of Breastfeeding Medicine

*A central goal of The Academy of Breastfeeding Medicine is the development of clinical protocols free from commercial interest or influence for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.*

FROM THE AMERICAN ACADEMY OF PEDIATRICS | CLINICAL PRACTICE GUIDELINE |  
AUGUST 05 2022

## Clinical Practice Guideline Revision: Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation **FREE**

Alex R. Kemper, MD, MPH, MS, FAAP ; Thomas B. Newman, MD, MPH, FAAP;  
Jonathan L. Slaughter, MD, MPH, FAAP; M. Jeffrey Maisels, MB BCh, DSc, FAAP; Jon F. Watchko, MD, FAAP;  
Stephen M. Downs, MD, MS; Randall W. Grout, MD, MS, FAAP; David G. Bundy, MD, MPH, FAAP;  
Ann R. Stark, MD, FAAP; Debra L. Bogen, MD, FAAP; Alison Volpe Holmes, MD, MPH, FAAP;  
Lori B. Feldman-Winter, MD, MPH, FAAP; Vinod K. Bhutani, MD; Steven R. Brown, MD, FAAP;  
Gabriela M. Maradiaga Panayotti, MD, FAAP; Kymika Okechukwu, MPA; Peter D. Rappo, MD, FAAP;  
Terri L. Russell, DNP, APN, NNP-BC

# Medical Indications for Supplementation: Infant

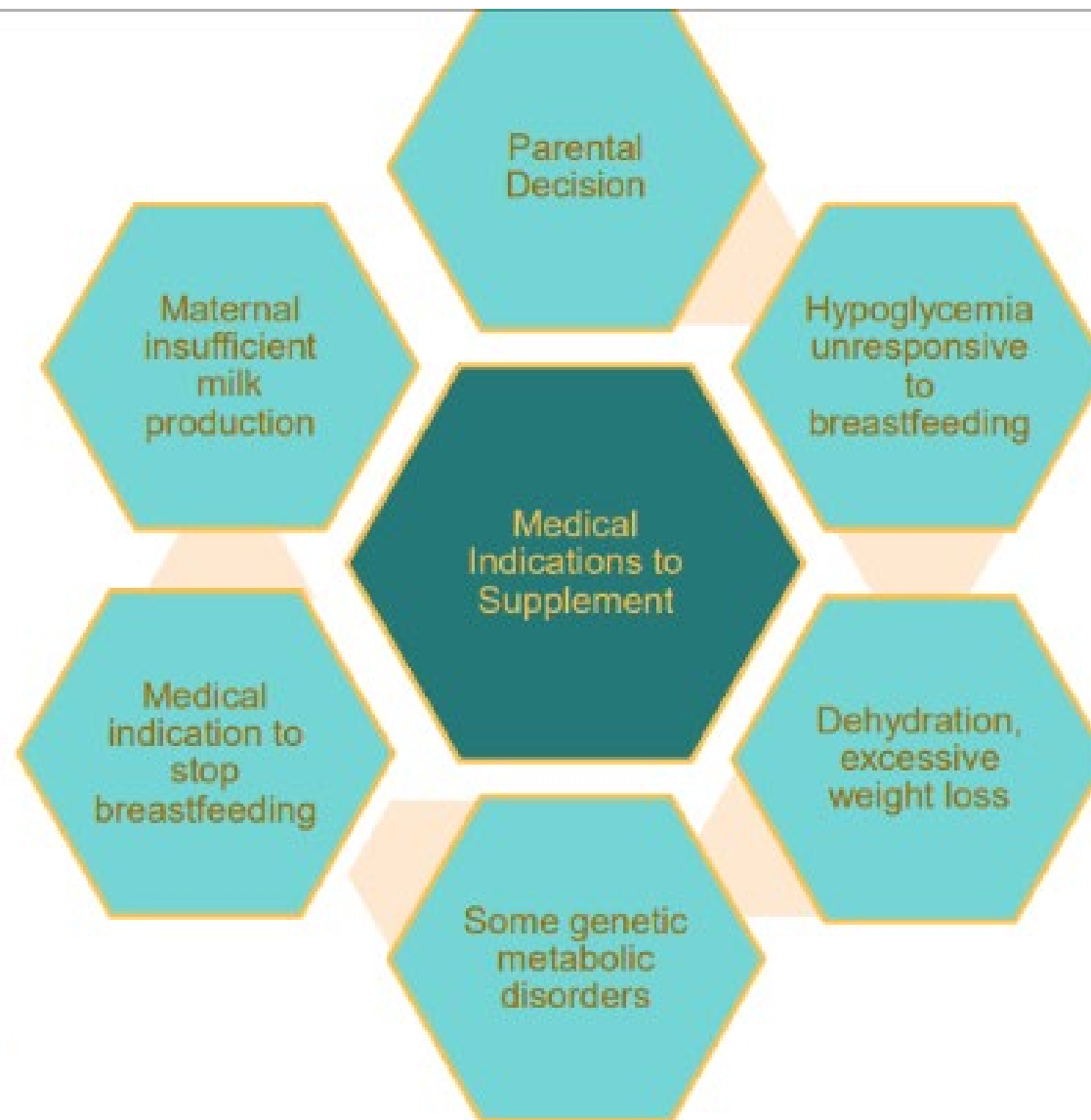
- Baby Not Latching
- Late Preterm/Small for Gestational Age
- Inborn Error of Metabolism
  - Macronutrient supplementation

ABM Clinical Protocol #3:  
Supplementary Feedings  
in the Healthy Term  
Breastfed Neonate. 2017.

# Medical Indications for Supplementation: Maternal

- Delayed secretory activation
- Primary glandular insufficiency
  - Abnormal breast shape, poor breast growth during pregnancy, failure of secretory activation
  - Maternal breastfeeding history of low milk supply
- Breast pathology or prior Breast Surgery
  - Breast reduction surgery
  - History of breast radiation
- Known maternal insufficient supply

ABM Clinical Protocol #3:  
Supplementary Feedings  
in the Healthy Term  
Breastfed Neonate. 2017.



6

## SUPPLEMENTING

Hospitals **support mothers** to breastfeed by...

Giving only breast milk  
unless there are medical  
reasons

Prioritizing donor  
human milk when a  
supplement is needed

Helping mothers  
who want to formula  
feed to do so safely

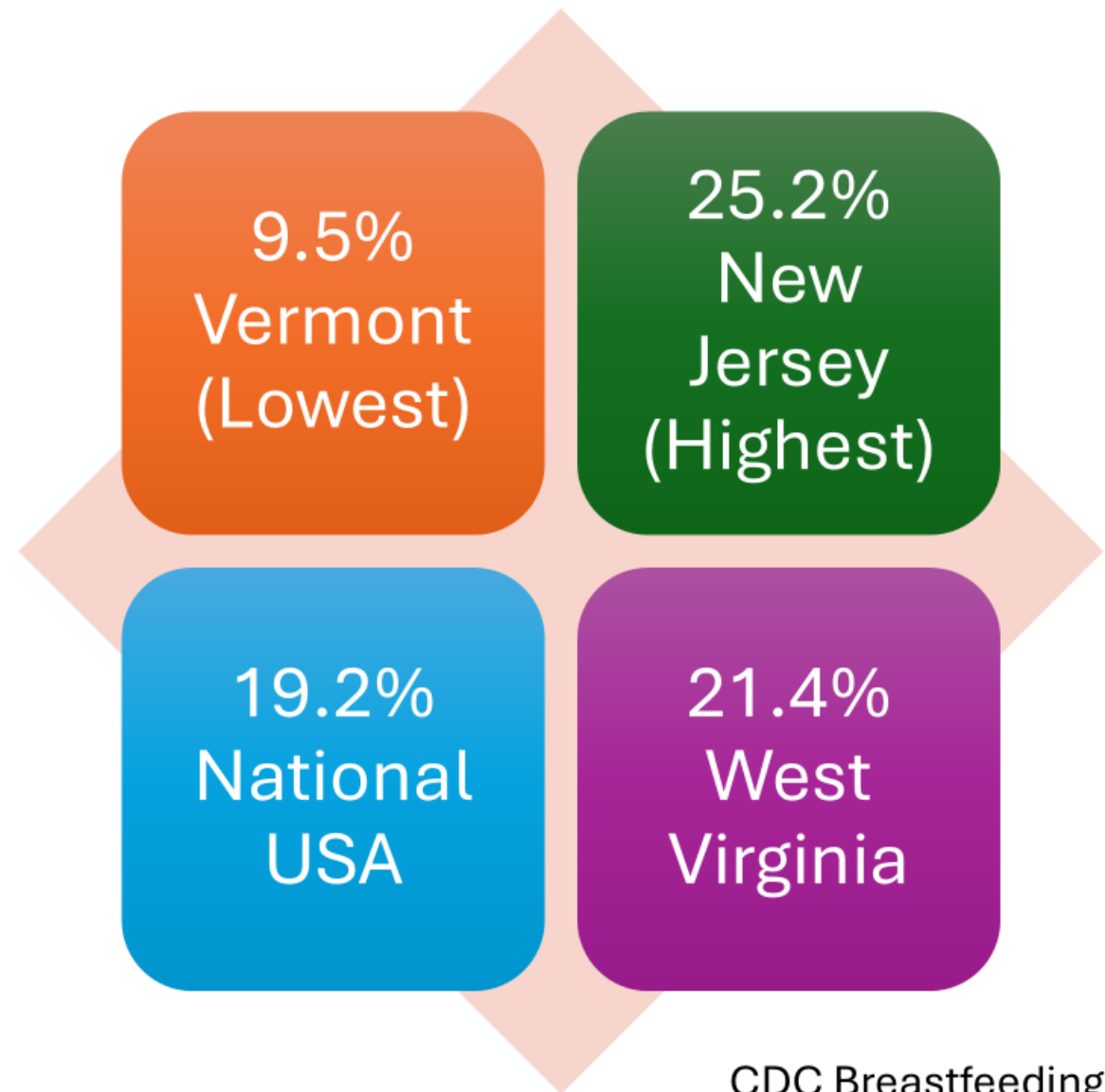


# Resources

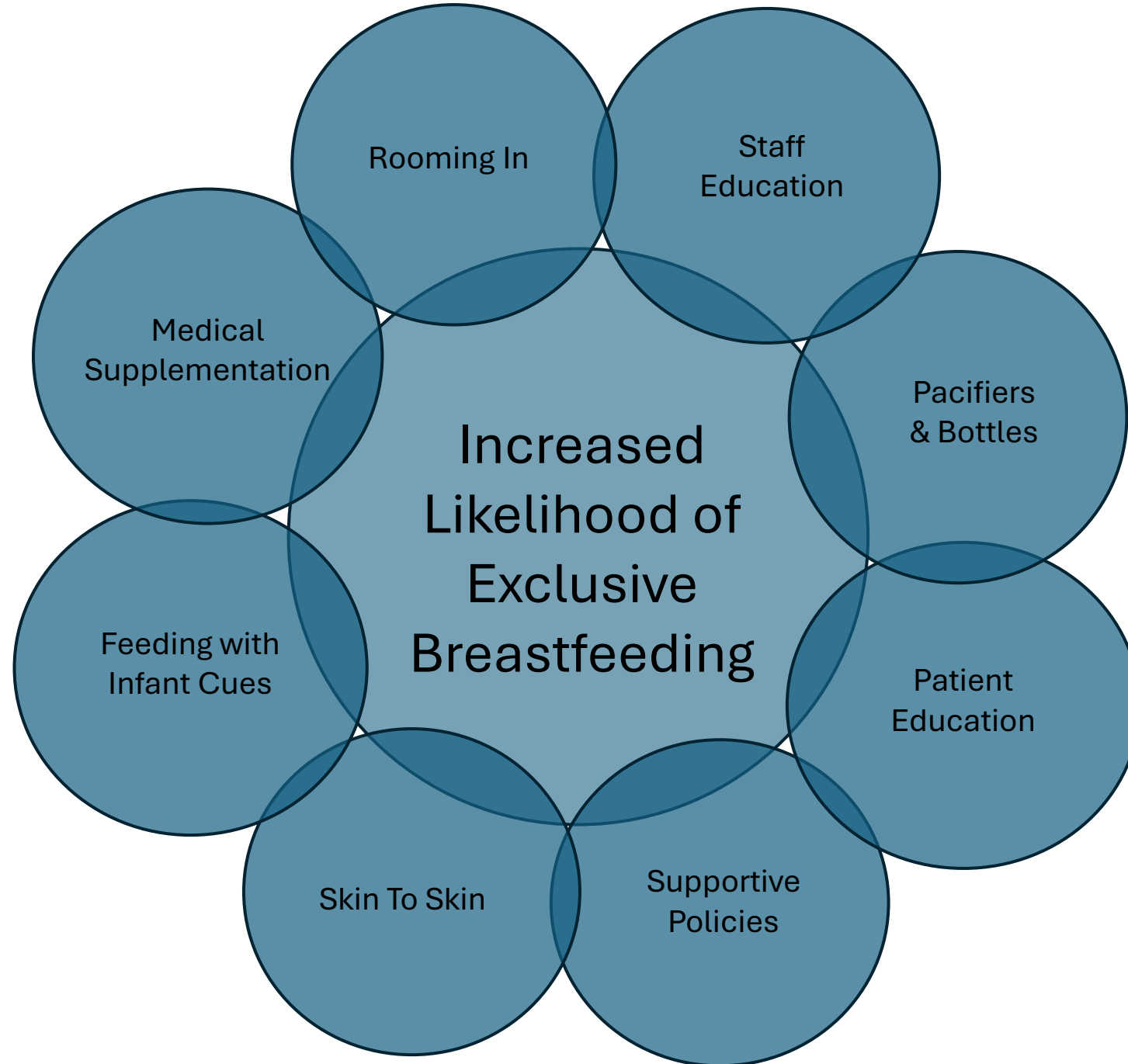
- Meek, JY, Noble, L; AAP Section on Breastfeeding. Policy Statement: Breastfeeding and the Use of Human Milk. Pediatrics. 2022;150(1):e2022057988
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- CDC Breastfeeding Report Card 2022. <https://www.cdc.gov/breastfeeding-data/media/pdfs/2024/06/2022-Breastfeeding-Report-Card-508.pdf>. Accessed 5/14/2026.
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- Jesinger, RA. Breast Anatomy for the Interventionalist. Techniques in vascular and interventional radiology. 17 (1) 2014
- Pandya S and Moore RG. Breast Development and Anatomy. Clinical Obstetrics and Gynecology.54(1) 91-95. 2011.
- Truchet S and Honvo-Houeto E. Physiology of milk secretion. Best Practice & Research Clinical Endocrinology & Metabolism 31(2017) 367-384.
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## Rate of Receiving Formula Before 2 Days of Age in the USA 2019



CDC Breastfeeding Report  
Card 2022



Exclusivity during newborn nursery is a strong predictor of the dyad's breastfeeding longevity and duration.



# Medical Indications for Supplements

## Maternal

- ★ Breast pathology (e.g., surgery)
- ★ Insufficient glandular tissue (IGT)
- ★ Intolerable pain
  - Medications/ Supplements
  - Delayed secretory activation

## Infant

- Hypoglycemia unresponsive to effective, frequent breastfeeding
- Hyperbilirubinemia unresponsive to interventions
- Inborn Errors of Metabolism
- Inadequate milk transfer



# Maternal Medicine Resources

| Practitioner Resources | Patient Handouts | Live Chat |
|------------------------|------------------|-----------|
|                        |                  |           |



# Maternal Medicine Resources

| Practitioner Resources                                                                                                                                                  | Patient Handouts                                                                    | Live Chat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                     |                                                                                     |                                                                                     |     |      |     |        |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----|------|-----|--------|--|--|
| <br> |   | <br>Call 1-800-352-2519<br>Monday to Friday 8AM to 3PM CST<br><table><tr><td></td><td></td><td></td></tr><tr><td>0-6</td><td>6-12</td><td>12+</td></tr><tr><td colspan="3">Months</td></tr></table> |  |  |  | 0-6 | 6-12 | 12+ | Months |  |  |
|                                                                                      |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |                                                                                     |                                                                                     |     |      |     |        |  |  |
| 0-6                                                                                                                                                                     | 6-12                                                                                | 12+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     |                                                                                     |                                                                                     |     |      |     |        |  |  |
| Months                                                                                                                                                                  |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |                                                                                     |                                                                                     |     |      |     |        |  |  |



# Infant: Hypoglycemia

## Maternal Conditions

- Diabetes
- PreEclampsia or Pregnancy Induced Hypertension
- Hx Macrosomic Infant
- Substance Abuse
- Beta-agonist tocolytics
- Hypoglycemic agents

## Infant Conditions

- Birthweight (IUGR, SGA, LGA, discordant twin)
- Prematurity
- Cold stress
- Polycythemia
- Erythroblastosis Fetalis
- Beckwith-Weidmann Syndrome
- Suspected Infection
- Microphallus or midline defect
- Respiratory Distress
- Signs of Hypoglycemia



# Infant: Hypoglycemia

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- **Diabetes**
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- Signs of Hypoglycemia

# Infant: Hypoglycemia



PES



| GLUCOSE OPERATIONAL THRESHOLDS |                                                                                                                                                                      |            |             |                           |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|---------------------------|
|                                | 0-4 Hours                                                                                                                                                            | 4-24 Hours | 24-48 Hours | >48 Hours                 |
| AAP, 2011/2015 <sup>2</sup>    | Expired: Under review by authorship team                                                                                                                             |            |             |                           |
| PES, 2015 <sup>5,7</sup>       | < 50mg/dL<br>(2.8 mmol/L)                                                                                                                                            |            |             | < 60mg/dL<br>(3.3 mmol/L) |
| BAPM, 2017 <sup>79</sup>       | < 18 mg/dL (1.0 mmol/L) at any time<br>< 45 mg/dL (2.5 mmol/L) with abnormal clinical signs<br>< 36 mg/dL (2.0 mmol/L) X 2 with risk factor(s) but no clinical signs |            |             |                           |
| CPS, 2019 <sup>47</sup>        | Unwell or abnormal clinical signs at any time<br>< 47 mg/dL (< 2.6 mmol/L) with risk factor(s)                                                                       |            |             |                           |
| SN, 2020 <sup>78</sup>         | < 27 mg/dL (1.5 mmol/L)<br>< 47 mg/dL (2.6 mmol/L) with abnormal clinical signs<br>< 27-45 mg/dL (1.5-2.5 mmol/L) X 2                                                |            |             |                           |
| Notes                          | * any symptomatic infant with glucose <40mg/dL (2.22mmol/L) will require IV glucose                                                                                  |            |             |                           |

**FIG. 1.** Comparison of AAP, PES, BAPM, SN, CPS. AAP, American Academy of Pediatrics, Committee on the Fetus and Newborn; PES, Pediatric Endocrine Society; BAPM, British Association of Perinatal Medicine; SN, Svenska Neonatalföreningen; CPS, Canadian Paediatric Society. Adopted from figure by Dr. Alberto Heart. Color images are available online.



# Infant: Hypoglycemia

Perform newborn blood sugar screening for at-risk infants only

Screening all infants increases the risk of unnecessary supplementation

## Prevention:

- Prenatal:
  - Antepartum Expression  $\geq$  36 wk
  - Maternal Glucose Control
- Postnatal
  - The Golden Hour
  - Frequent Skin to Skin

## Intervention:

1. Breastmilk
  - Direct Breastfeeding Attempt
  - Hand Expression/Pump
  - Donor Breastmilk
2. Medication
  - Glucose Gel

# Infant: Hyperbilirubinemia

- “Suboptimal Intake Hyperbilirubinemia”

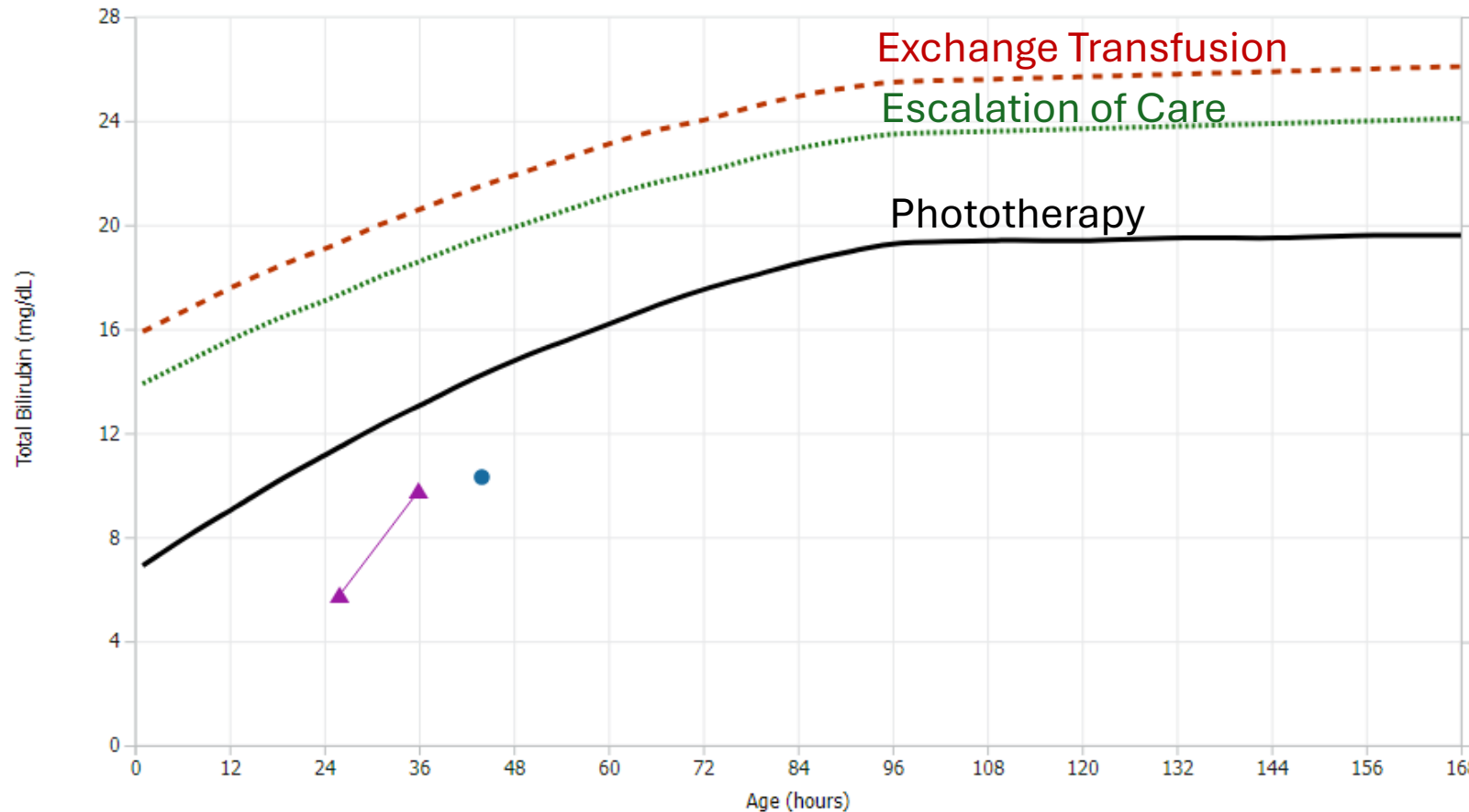
## At Risk Infants:

- Exclusively Breastfed Infants
- <8 feeds in 24 hours
- Prematurity



“Breastfed infants who are adequately hydrated should **not routinely** receive supplementation with commercially available infant formula.”

# Infant: Hyperbilirubinemia



- 36.3 week gestation
- Exclusive Breastfeed

▲ TcBili  
● TsBili

# Infant: Inadequate Milk Transfer Maternal: Delayed Secretary Activation



**F.L.O.W.**

**F** = Feeding Frequency

**L** = Latch

**O** = Output

**W** = Weight



# Infant: Inadequate Milk Transfer Maternal: Delayed Secretary Activation

## Prior Metrics

- Late Preterm Infant – 8%
- Term Infant – 10%



- Delivery type
- Feeding Type
- Weight Change by Hour

[app.newbornweight.org](http://app.newbornweight.org)

EPIC integration

# Example Case

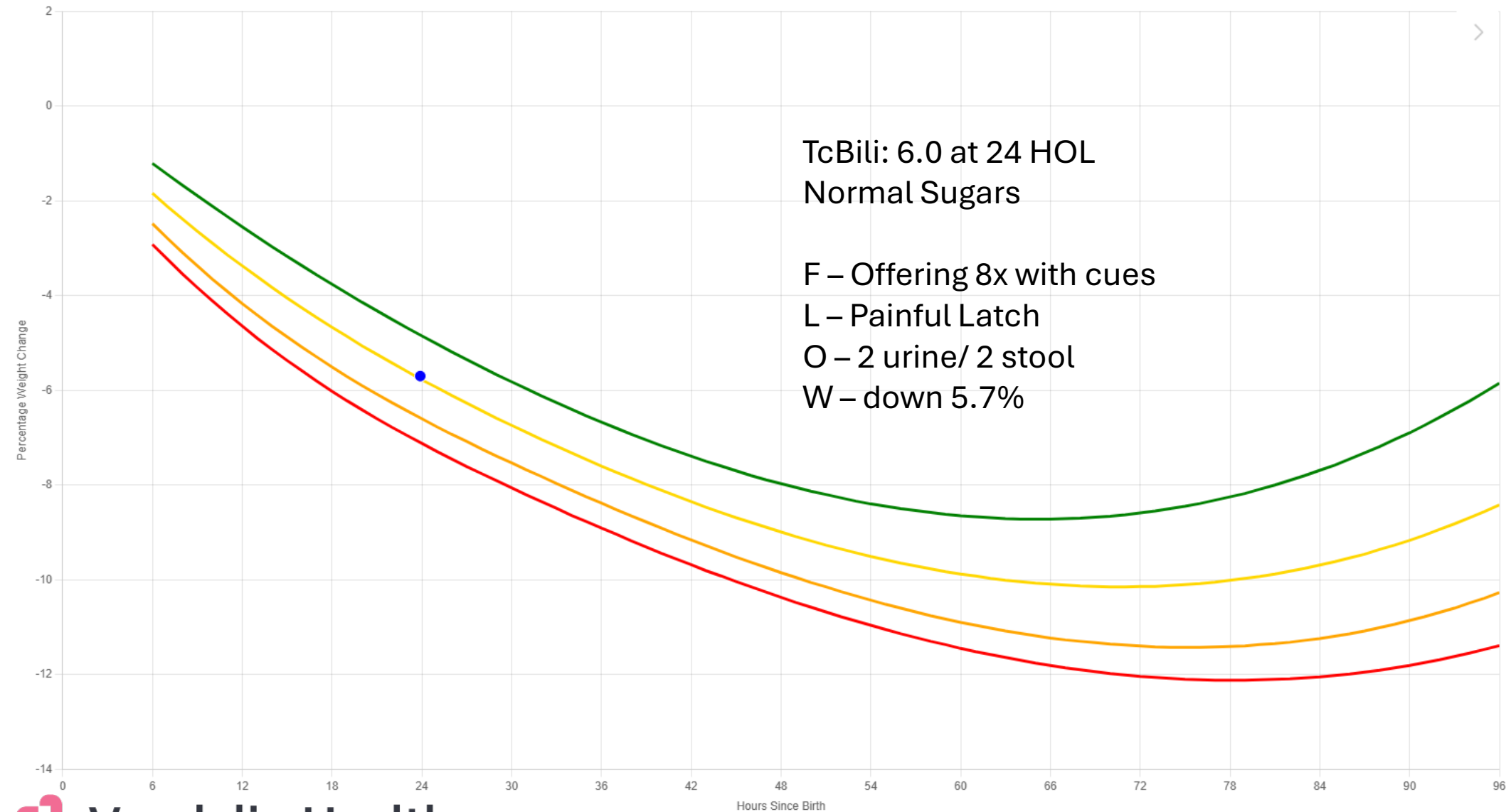
- 35yo G1P1 with pregnancy only complicated by macrosomia and advanced maternal age. Delivery complicated by chorioamnionitis and non-reassuring fetal heart tones.
- Birth Weight: 4400g
- Delivery: C-Section
- Exclusively Breastfed

# Inpatient Case

- **35yo G1P1** with pregnancy only complicated by macrosomia and advanced maternal age. Delivery complicated by **chorioamnionitis** and non-reassuring fetal heart tones.

- Birth Weight: **4400g**
- Delivery: **C-Section**
- Exclusively Breastfed





TcBili: 6.0 at 24 HOL  
Normal Sugars

F – Offering 8x with cues  
L – Painful Latch  
O – 2 urine/ 2 stool  
W – down 5.7%

Unit of Measurement g

### Birth Details

Weight 4400 g

Date 01/15/2021

Time 18:04 24hr

Delivery ☐ Vaginal ☒ Cesarean

### Feeding Method ⓘ

☒ Exclusive breast milk (first 3-4 days)

☐ Exclusive formula (first 2-3 days)

☐ Breast milk + supplementary feeds, ⓘ  
or plotting weights beyond the first 2-4 days

### Measurements

Add Another Measurement ×

Weight 0000 g

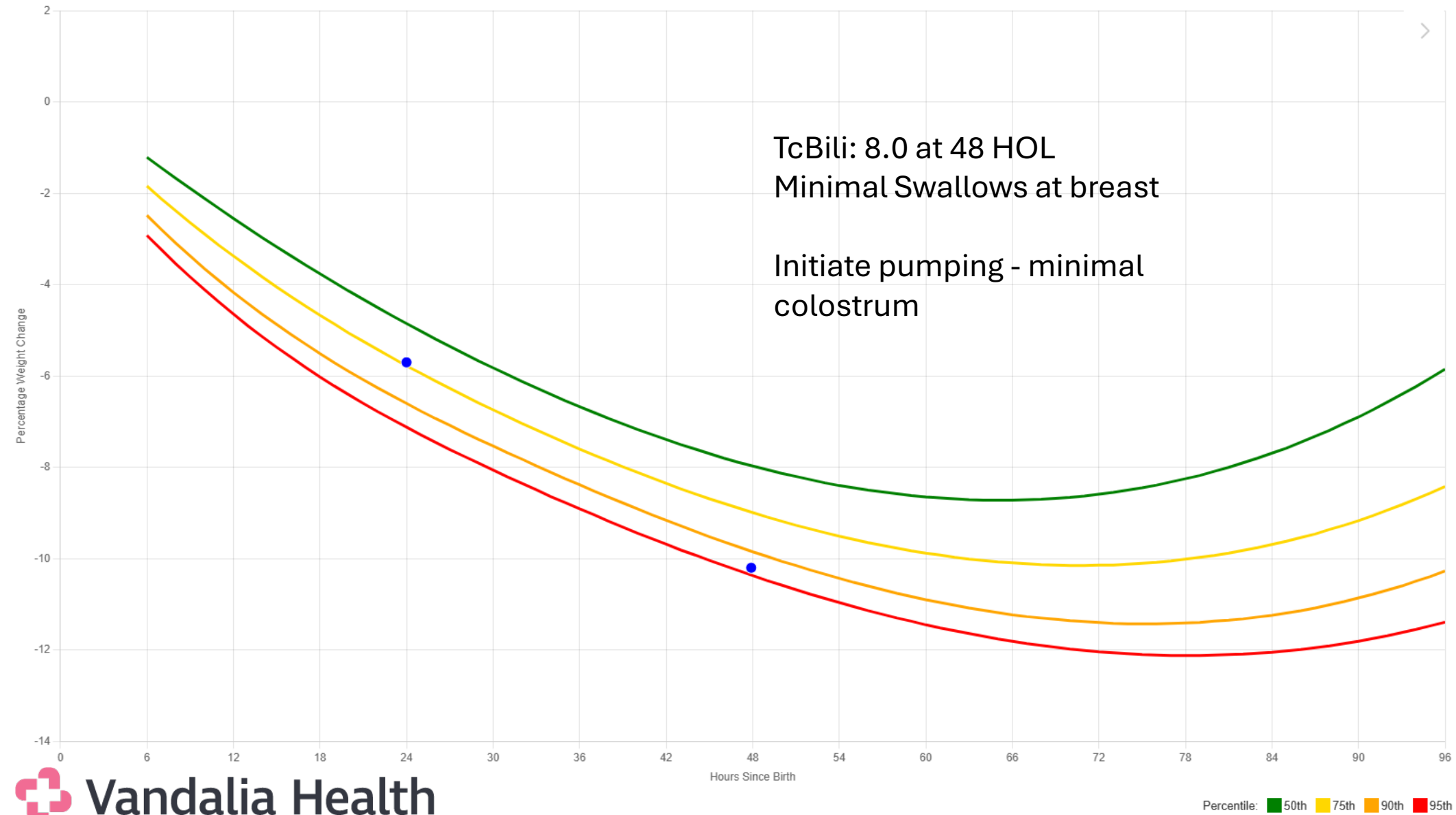
Date mm/dd/yyyy

Time 00:00 24hr

Done Adding Add to Chart

| Hour | Weight | Change |   |
|------|--------|--------|---|
| 23.9 | 4150g  | -5.7%  | > |

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**Unit of Measurement** g

**Birth Details**

Weight

4400

g

Date

01/15/2021

Time

18:04

24hr

Delivery

☐ Vaginal

☒ Cesarean

**Feeding Method**

☒ Exclusive breast milk (first 3-4 days)

☐ Exclusive formula (first 2-3 days)

☐ Breast milk + supplementary feeds, or plotting weights beyond the first 2-4 days

**Measurements**

Add Another Measurement

Weight

0000

g

Date

mm/dd/yyyy

Time

00:00

24hr

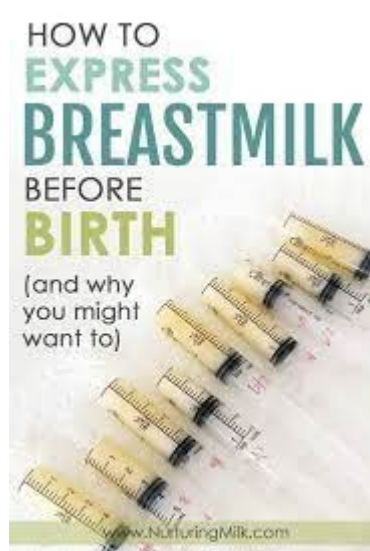
Done Adding

Add to Chart

| Hour | Weight | Change |   |
|------|--------|--------|---|
| 24   | 4150g  | -5.7%  | > |
| 47.9 | 3950g  | -10.2% | > |

©2026 Penn State Health

# What to supplement?



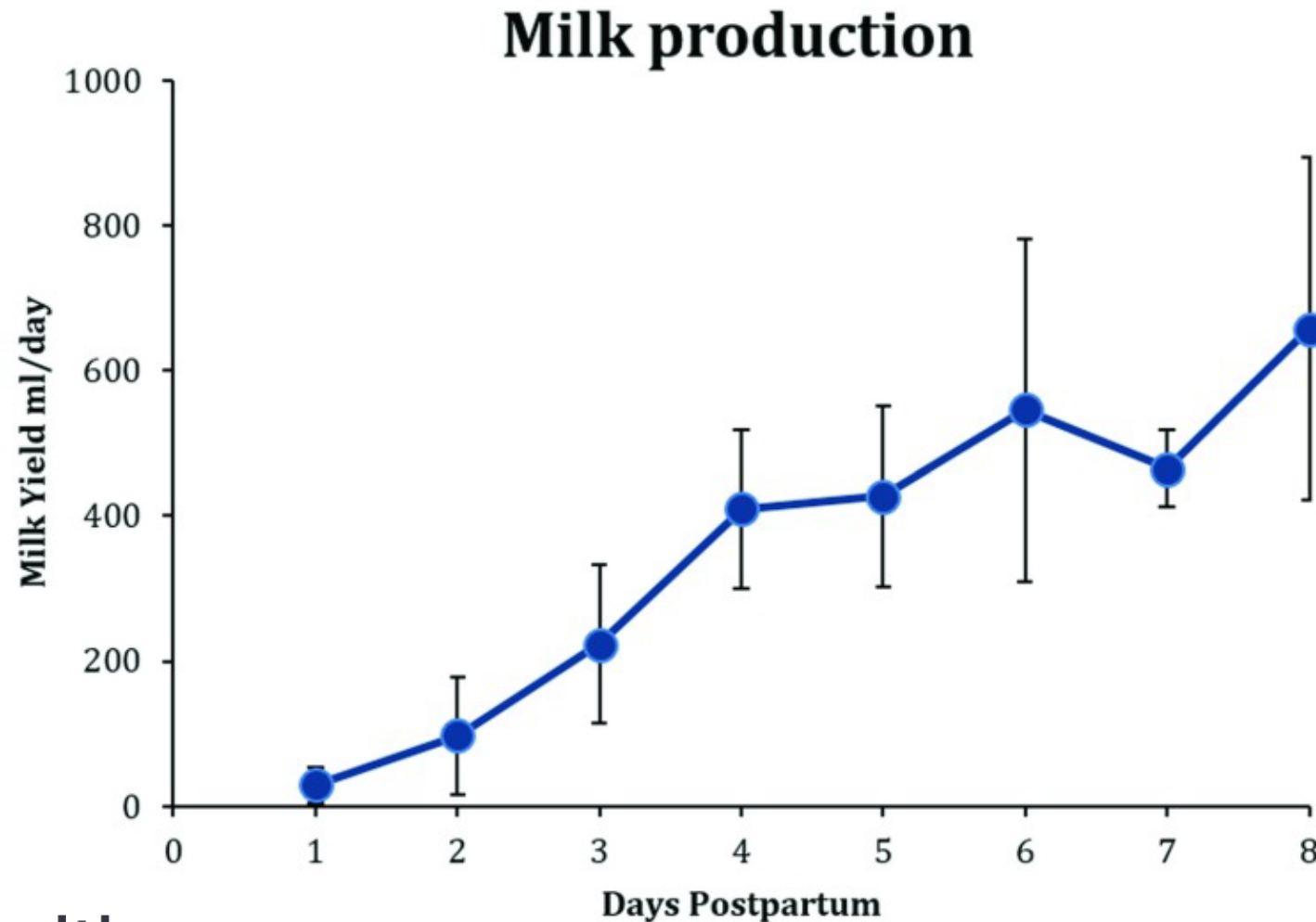
**Priority #1: Mom's Own Milk**



**Priority #2: Donor Milk**

**Priority #3:  
Infant Formula**

# How Much to Supplement



# How Much to Supplement

| Age (hours) | Intake (mL/Feed) |       | Characteristic of Day  | Output |       | Stool Appearance |
|-------------|------------------|-------|------------------------|--------|-------|------------------|
|             | ABM              | AAP   |                        | Void   | Stool |                  |
| 0-24        | 2-10             | 0-5   | “Anything Goes”        | ≥ 1    | ≥ 1   | Meconium         |
| 24-48       | 5-15             | 5-10  | “Feeding Frenzy”       | 2-3    | 1-2   | Meconium         |
| 48-72       | 15-30            | 10-20 | “Starting to get milk” | 4-6    | ≥ 3   | Transition       |
| 72-96       | 30-60            | 20-30 | “Dealing with volume”  | 4-6    | ≥ 4   | Transition       |
| >96         |                  | >30   | “Growing”              | 6-8    | ≥ 4   | Yellow           |

# How Much to Supplement

Size of a newborn's stomach



**Day 1**

size of a cherry

5 - 7 ml

1 - 1.4 tablespoons



**Day 3**

size of a walnut

22 - 27 ml

0.75 - 1oz



**Day Week**

size of an apricot

45 - 60 ml

1.5 - 2 oz



**One Month**

size of a large egg

80 - 150 ml

2.5 - 5 oz



**Vandalia Health**

CAMC Women and  
Children's Hospital

# How to Supplementation



Finger Feeding



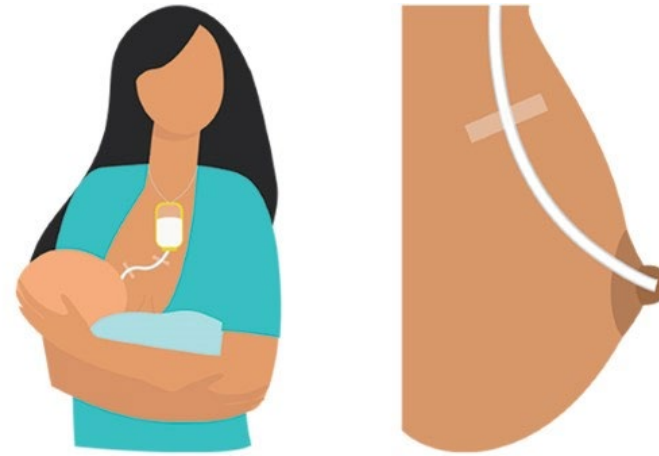
Cup Feeding



Syringe Feeding



Paced Bottle Feeding



Supplementary Nursing System  
(SNS)



# Methods of Supplementation

## Risk of artificial nipples:

- Affects milk production (less sucking at the breast)
- Interferes with attachment
- Babies might prefer the nipple since the milk flows more freely
- Can result in sore nipples (suck differently on breast than on bottle)

## Alternative Supplementation:

- Cost and Availability
- Ease of use and cleaning
- Volume in 20-30 minutes
- Short Term or “Temporary Tool”
- Long term method
- Stress to infant
- If method enhances breastfeeding skills
- **Maternal preference**
- **Healthcare Staff Education**

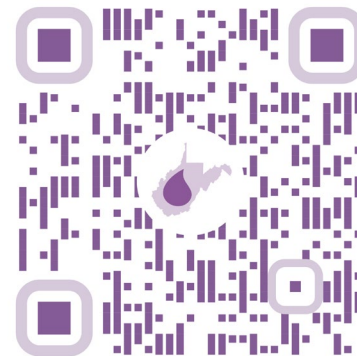
# Spoon Feeding

## Pro:

- Supplies readily available
- 5mL volume
- Inexpensive
- Infant reflex

## Con:

- Small Volume
- Instability for direct hand expression
- Single Use
- Do NOT pour milk into baby's mouth



# Cup Feeding

## Pro:

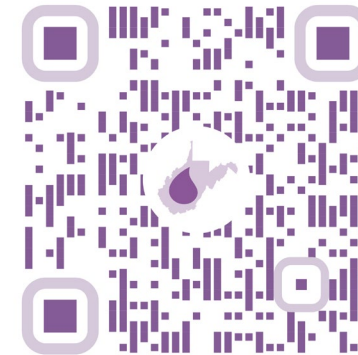
- Supplies Readily Available
- Hand Express Directly into Cup
- Larger Volume
- Infant reflex
- Inexpensive

## Con:

- Caregiver patience
- Do NOT pour milk into baby's mouth



Photos by Every Mother, Inc. and Regina Maria Roig-Romero



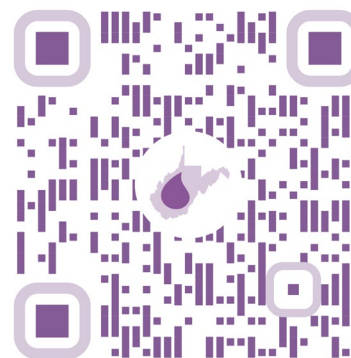
# Syringe technique

## Pro:

- Supplies Readily Available
- Use Smaller Syringe

## Con:

- Not infant reflex
- Temptation to quickly feed



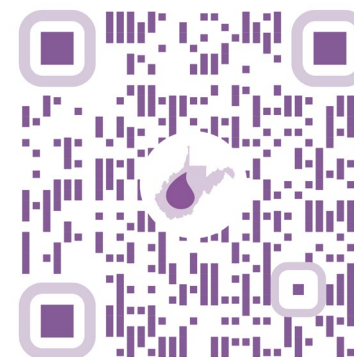
# Dropper technique

## Pro:

- Supplies Readily Available
- Washable

## Con:

- Quickly feed with pressure on bulb
- More expensive



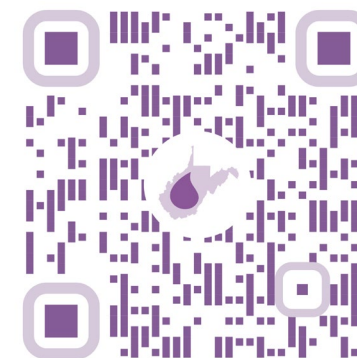
# Finger Feeding

## Pro:

- Adaptable as infant grows
- Reusable Supplies
- Adjustable flow rate with gravity
- Transition directly to Breast

## Con:

- Small volumes
- Tape/Tubing irritates infant



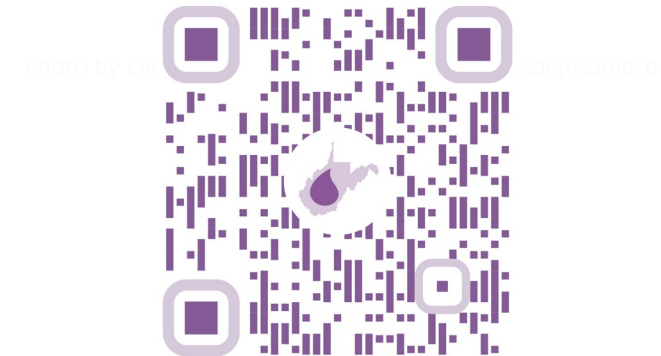
# Tubing Devices

## Pro:

- Adaptable as infant grows
- Reusable Supplies
- Adjustable flow rate with gravity

## Con:

- Cumbersome Supplies
- Not discreet
- Alert infant



# Paced Bottle Feeding

## Pro:

- Adaptable for larger volumes
- Reusable Supplies

## Con:

- Easy to overfeed
- Feeding Mechanics Different
- Flow Preference rather than Nipple dependence

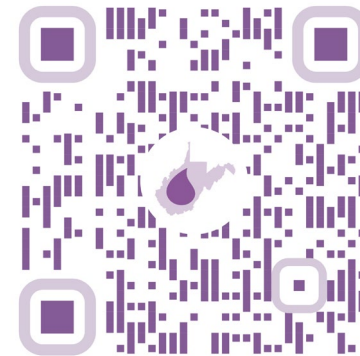


Photo by India Perinatal Partnership

# How to preserve/improve mother's supply

- Frequent skin to skin



# How to preserve/improve mother's supply

- Attempts with cues
- “q3 hours” vs. 8-12 times per



# How to preserve/improve mother's supply

- Breast Compression with Feed
- Hand Expression or Pump with each supplementation



# How to preserve/improve mother's supply



# What Can We Do to Lesson Early Non-Medically Indicated Supplementation

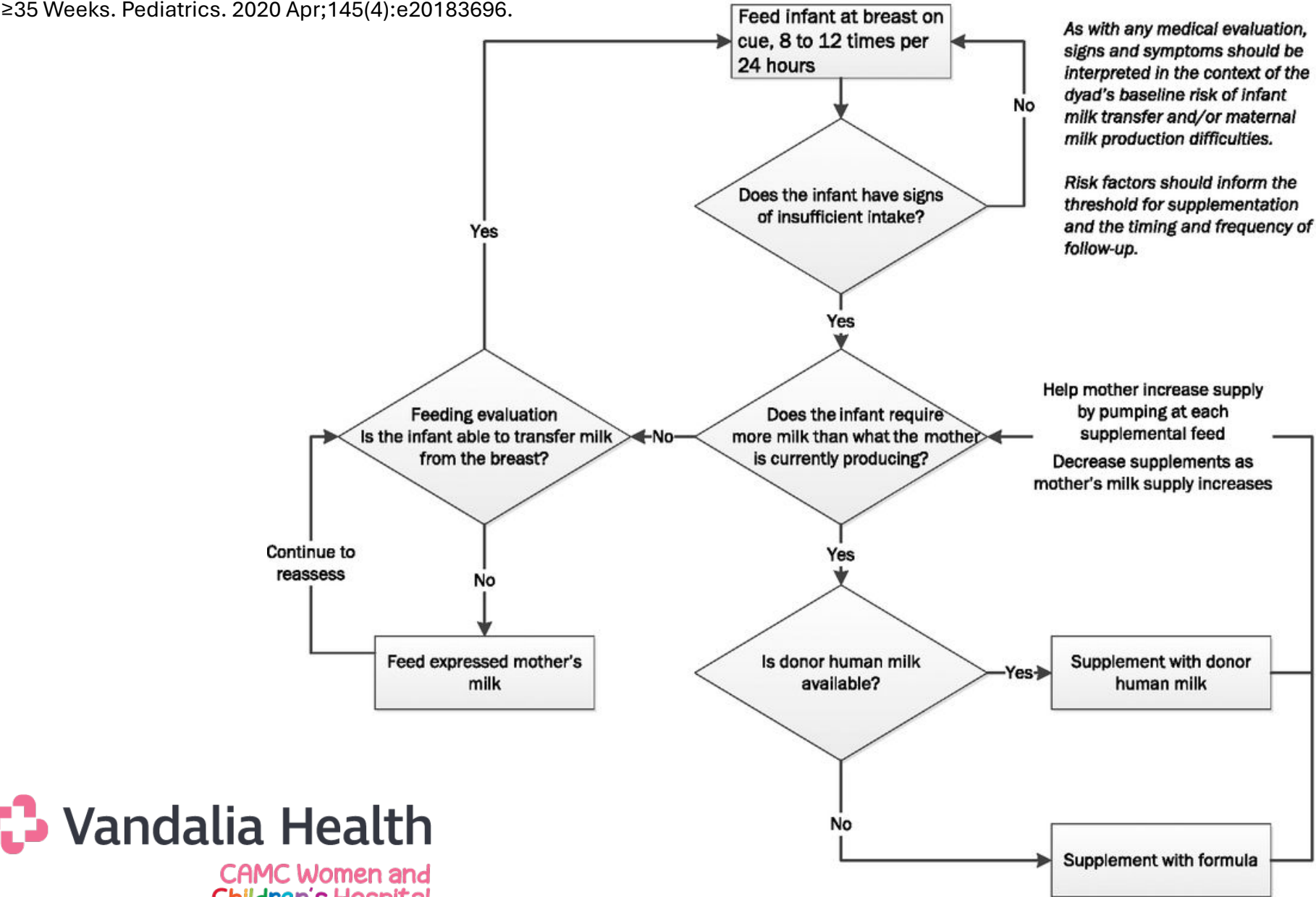
**Introduction**  
*We are interviewing mothers on our floor about how they are feeding their baby. Can I ask you a few questions about this? There are no right or wrong answers. Please let me know if you have any questions or want help with any of the things we talk about!*

| Question                                                                                                                                                                                                                     | Answer and Notes                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. When you came to the hospital, how were you planning to feed your baby?<br>(If only formula, end interview)                                                                                                               | <input type="checkbox"/> Only breastmilk<br><input type="checkbox"/> Breast milk and formula<br><input type="checkbox"/> Only formula<br><input type="checkbox"/> Other: _____ |
| 2. Did you or anyone else feed your baby formula?<br>(If no, end interview)                                                                                                                                                  | <input type="checkbox"/> Yes<br><input type="checkbox"/> No<br><input type="checkbox"/> Don't know                                                                             |
| 3. (If yes) Can you explain what happened the first time your baby got formula?<br>Prompts:<br>- What was the reason your baby had formula?<br>- When did your baby get the formula?<br>- What did your nurse or doctor say? | Mother's feedback:                                                                                                                                                             |
| 4. (If mother intended to breastfeed) Did a nurse teach you to hand express your milk to give to your baby before you gave him/her formula?                                                                                  | <input type="checkbox"/> Yes<br><input type="checkbox"/> No<br><input type="checkbox"/> Don't know                                                                             |
| 5. If applicable (If donor milk was available) Was donor milk offered before formula?                                                                                                                                        | <input type="checkbox"/> Yes<br><input type="checkbox"/> No<br><input type="checkbox"/> Don't know                                                                             |

**After the interview, check off the reason given for supplementation. Confirm in medical record, if needed.**

☐ Jaundice (☐ confirmed per protocol in medical record)  
☐ Low blood sugar (☐ confirmed per protocol in medical record)  
☐ Weight loss (☐ confirmed per protocol in medical record)  
☐ Staff recommends for non-medical reason (describe): \_\_\_\_\_  
☐ Perceived low milk supply  
☐ Maternal exhaustion  
☐ Fussy baby  
☐ Maternal choice (describe): \_\_\_\_\_  
☐ Other (describe): \_\_\_\_\_

Feldman-Winter L, Kellams A, Peter-Wohl S, Taylor JS, Lee KG, Terrell MJ, Noble L, Maynor AR, Meek JY, Stuebe AM. Evidence-Based Updates on the First Week of Exclusive Breastfeeding Among Infants ≥35 Weeks. Pediatrics. 2020 Apr;145(4):e20183696.



Infant signs of insufficient milk intake and potential medical indications for supplementation

Persistent asymptomatic hypoglycemia despite skin-to-skin care and support for breastfeeding

Symptomatic hypoglycemia

Weight loss >10% with delayed lactogenesis II (>72 hours)

>75% weight loss by using NEWT curves

Decreased stooling (<4 stools after day 3) with delayed lactogenesis II

Clinical or biochemical signs of inadequate intake (such as decreased skin turgor, dry mucous membranes, high serum sodium levels, and no stool color change to yellow by day 5)

Hyperbilirubinemia approaching exchange transfusion levels, risk factors for neurotoxicity, or rising bilirubin levels despite lactation management

Infant risk factors for low milk transfer

Anomaly or other reason preventing direct breastfeeding and expressed milk insufficient for infant feeds

Anomalies suggestive of persistent hypoglycemia (eg, Beckwith-Wiedemann syndrome)

Maternal risk factors for low milk production

Glandular insufficiency with low milk production

Medical conditions associated with delay or lack of lactogenesis II (may occur with cesarean delivery, primiparity, obesity (BMI > 27), pregnancies conceived via infertility treatments, lack of perceived increased breast size during pregnancy, history of polycystic ovarian syndrome, or other hormonal condition affecting lactogenesis)

Breast pathology or previous breast surgery resulting in insufficient milk production

# Inappropriate Reasons for Supplementation in the Context of a Healthy Newborn and Mother, Responses, and Risks

*Source: Appendix A1 from the Academy of Breastfeeding Medicine Protocol  
#3 “Supplementary Feedings in the Healthy Term Breastfed Neonate”*

| Concerns/inappropriate reasons                                                                        | Responses                                                                                                                                                                                                                  | Risks of Supplementation                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| There is “no milk”<br>belief that colostrum is insufficient until<br>the milk “comes in” <sup>5</sup> | Mother and family should be educated about the benefits of colostrum including dispelling myths about the yellow color. Small amounts of colostrum are normal, physiologic, and appropriate for the term, healthy newborn. | Can alter infant bowel flora and microbiome. <sup>86,87</sup><br>Potentially sensitizes the infant to foreign proteins. <sup>88,89</sup><br>Increases the risk of diarrhea and other infections, especially where hygiene is poor. <sup>3</sup><br>Potentially disrupts the “supply-demand” cycle, leading to inadequate milk supply and long-term supplementation |
| Supplementation is needed to prevent weight loss and dehydration in the postnatal periods             | A certain amount of weight loss is normal in the first week of life and is due to diuresis of extracellular fluid and passage of meconium.                                                                                 | Supplementation in the first few days may interfere with the normal frequency of breastfeeding.<br>Supplementation with water or glucose water, increases the risk of jaundice, <sup>90</sup> excessive weight loss, <sup>91</sup> and longer hospital stays. <sup>92</sup>                                                                                        |
| Infant could become hypoglycemic                                                                      | Healthy, full-term infants do not develop symptomatic hypoglycemia as a result of suboptimal breastfeeding. <sup>15</sup>                                                                                                  | Same risks as for weight loss/dehydration.                                                                                                                                                                                                                                                                                                                         |

|                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Breastfeeding is related to jaundice in the postnatal period</p>                                       | <p>The more frequent the breastfeeding, the lower the bilirubin level.</p> <p>Same risks as for weight loss/dehydration.</p> <p>Bilirubin is a potent antioxidant<sup>95</sup> and jaundice is normal in the newborn.</p> <p>Colostrum acts as a natural laxative helping to eliminate meconium that contains bilirubin.</p>                                                                                  | <p>Same risks as for weight loss/dehydration</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>Lack of time for counseling mother about exclusive breastfeeding when mothers request a supplement</p> | <p>Train all staff in how to assist mothers with breastfeeding.</p> <p>Mothers may benefit from education about artificial feeds and/or how supplements may adversely affect subsequent breastfeeding.</p> <p>Time spent by healthcare professionals listening to and talking with mothers is at least as important as other more active interventions (which may be viewed more as “real work” to them).</p> | <p>If the supplement is infant formula, which is slow to empty from the stomach and often fed in larger amounts, the infant will breastfeed less frequently.</p> <p>Depending on the method of supplementation, or the number of Supplements, an infant may have difficulty returning to the breast.</p> <p>Feeds given before secretory activation and copious breast milk production (as opposed to supplementation) may be associated with delayed initiation of breastfeeding and negatively associated with exclusivity and duration of breastfeeding</p> |

|                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                           |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Medications may be contraindicated with breastfeeding                          | <p>Accurate references are available to providers (e.g., Medications and Mothers' Milk ,<sup>99</sup> LactMed on Toxnet website <sup>15</sup>)</p> <p>Risk of decreasing breastfeeding duration or exclusivity.<sup>9,10</sup></p> <p>For most medical conditions, medication safety for breastfeeding mothers and babies is available</p>                                                                                                                                                                                                                                                                                                                                                                                                                       | Risk of decreasing breastfeeding duration or exclusivity                                                                                                                                  |
| Mother is too malnourished or sick to breastfeed or eats an inappropriate diet | <p>Even malnourished mothers can breastfeed. Breast milk quality and quantity is only affected in extreme circumstances.</p> <p>Supplements are better given to the mother (with continued breastfeeding) than the infant.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Risk of decreasing breastfeeding duration or exclusivity.                                                                                                                                 |
| Supplementation will quiet a fussy or unsettled infants                        | <p>Infants can be unsettled for many reasons. They may wish to cluster feed or simply need additional skin-to-skin time or holding.</p> <p>Filling (and often overfilling) the stomach with a supplement may make the infant sleep longer, missing important opportunities to breastfeed, and demonstrating to the mother a short-term solution which may generate long-term health risks.</p> <p>Teaching other soothing techniques to new mothers such as breastfeeding, swaddling (but not if prone or side lying), swaying, singing, encouraging father or other relatives to assist. Caution should be taken to not ignore early feeding cues.</p> <p>Ensure comfortable, effective latch to maximize signal to mother's body and intake for the infant</p> | <p>Risk of decreasing breastfeeding duration or exclusivity.</p> <p>Maternal engorgement due to decreased frequency of breastfeeding in the immediate postpartum period.<sup>54</sup></p> |

|                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Concern about the cause of frequent feeding and cluster feeding and other changes in infant behavior | <p><b>Periods when infants demand to breastfeed more are sometimes interpreted by mothers as insufficient milk. This may happen in later weeks but also in the second or third night (48–72 hours) post birth.</b></p> <p>Anticipatory guidance for normal infant development and behavior is helpful.</p>                                                                                         | Risk of decreasing breastfeeding duration or exclusivity                                                                                                   |
| Mothers need to rest or sleep                                                                        | <p><b>Postpartum mothers are restless when separated from their infants and actually get less rest.</b></p> <p><b>Mothers lose the opportunity to learn their infants' normal behavior and early feeding cues.</b></p> <p><b>Infants are at highest risk for receiving a supplement between 7 p.m. and 9 a.m.</b></p>                                                                              | Risk of decreasing breastfeeding duration or exclusivity                                                                                                   |
| Sore nipples will improve if mother takes a break from breastfeeding 5                               | <p>Sore nipples are not a function of length of time breastfeeding. Position, latch, and sometimes individual anatomic variation (e.g., ankyloglossia) are more important.</p> <p>There is no evidence that limiting time at the breast will prevent sore nipples.</p> <p>The nipple should not be rubbed or compressed during breastfeeding even if the feedings are frequent or “clustered.”</p> | <p>Problem with latch not addressed.</p> <p>Risk of decreasing breastfeeding duration or cessation of breastfeeding.</p> <p>Risk of breast engorgement</p> |



# Outpatient Case

- 33-year-old G1P1. Infant born at 39 weeks. C-section due to failure to progress. PPROM
- + GDM (diet controlled). No hypertension. No pre-eclampsia.
- Good latch and direct breastfeeding in the newborn nursery.
- Hand expression and pumping during early newborn course due to intermittent hypoglycemia

# Outpatient Case

- Secretory activation on day of life 4
- Additional Breastfeeding Medicine history:
  - + breast changes during pregnancy. Colostrum present before delivery
  - No breast surgery. Normal breast development during puberty.
  - No thyroid disease.
  - Breasts feel full prior to feeding the infant
- Triple feeding (latching, pumping and formula supplementing) during nursery course due to transient hypoglycemia, delayed secretory activation and weight loss.
- Triple feeding at the time of hospital discharge



# Outpatient Case

- How do we manage this feeding plan in the outpatient world?
  - Lactation and breastfeeding support provided
  - Maternal milk supply continued to increase



# Outpatient Case

## Formula Supplement

- Bottles of formula after breastfeeding gradually weaned to ensure adequate weight gain velocity.
- Direct BF only for overnight and early morning feeds
- Formula supplementation after evening feeds (3, 6, and 9 pm)
- Total formula supplement about 6-9 oz per day

## Pumping

- Mother latched infant each feed (offering both sides)
- Pumping was discontinued once infant proven efficient and effective at milk transfer

## SUPPLEMENTATION FRAMEWORK FOR HEALTHCARE PROVIDERS



### Signs of under-feeding

- Poor growth
- Listlessness
- Poor output (urine and stool)



### Signs of over supplementing

- Milk production, once robust, now decreases
- Growth is too rapid
- Caregivers are encouraging infant to drink past signs of satiety
- Infant fussiness due to other factors (dirty diaper, cold, tired, etc.) is soothed by supplementing.
- Hospital or other caregivers supplement when infant is separated
- Infant sleeps through breastfeeding or chestfeeding

### HOW TO MANAGE AN UNDER-FED INFANT

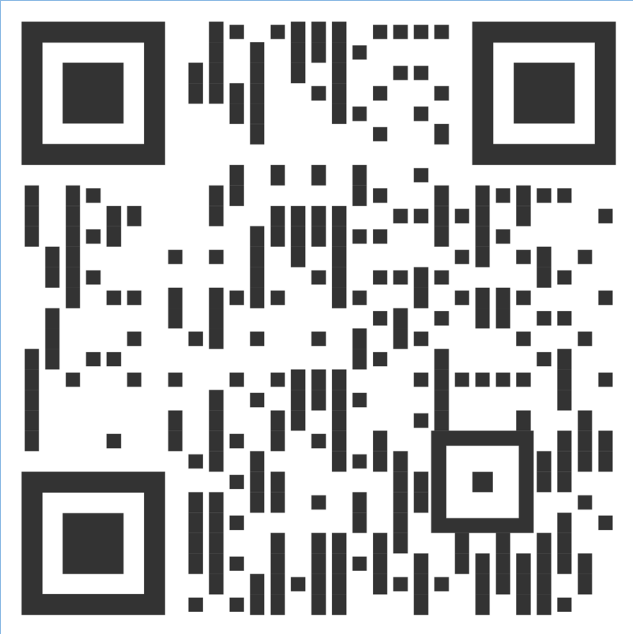
- Identify early
- Assess breastfeeding and other feeding practices (when, how often, latch assessment, other methods)
- Identify supplementation target
- Begin supplementation with expressed milk, donor milk or formula
- Support ongoing breastfeeding, chestfeeding or lactation
- Support latch effectiveness
- Support parental milk production (frequent feeds or expression)

### HOW TO MANAGE AN OVER-SUPPLEMENTED INFANT

- Reduce amount of supplementation rapidly if baby showing signs of overfeeding
- Reduce amount of supplementation slowly if milk production is affected
- Monitor infant growth & satiety closely any time supplementation regimen is changed
- Support return to exclusive breastfeeding, chestfeeding or lactation
- Support latch effectiveness
- Support milk production (frequent feeds or expression)

***THANK YOU to our presenters and  
thank you for your participation!***

# EVALUATION



Please SCAN the QR Code or go to:  
**<https://www.surveymonkey.com/r/X7GYKWQ>**

## **Need a CE Certificate?**

- If you provided your credentials and/or the type of CE you need (CME, Nursing CE, Lactation or general) when you registered, you will receive a certificate by email in the next 1-2 weeks.
- Questions about CE Certificates?

Please Email:

[mandymquick@wvbreastfeeding](mailto:mandymquick@wvbreastfeeding)

- All other questions email
  - [mmcmillion@osteo.wvsom.edu](mailto:mmcmillion@osteo.wvsom.edu)



# WEST VIRGINIA Breastfeeding



Molly McMillion [mmcmillion@osteo.wvsom.edu](mailto:mmcmillion@osteo.wvsom.edu)

for healthier moms and babies



[wvbreastfeeding.org](http://wvbreastfeeding.org)  
[@wvbreastfeeds](https://twitter.com/wvbreastfeeds)

