“Just a Few Weeks Early”--Breastfeeding Management for the Late-Preterm Infant
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Disclosure

Neither I, nor any member of my immediate family, have any commercial financial relationships, which relate directly or indirectly, to the content of this presentation.

Learning Objectives
At the end of the presentation, the learner will be able to:
1. Explain how physiologic immaturity in apparently healthy late-preterm infants contributes to newborn complications, including breastfeeding-related morbidities.
2. Describe specific lactation technologies used to protect the mother’s milk supply and ensure that the late-preterm infant is adequately nourished.
3. Discuss practical strategies to help mothers of late-preterm infants successfully transition from using lactation technologies to exclusive breastfeeding.

Definitions of Preterm Births
- **Late preterm** (previously called “near term”), born between 34 and 36 weeks of pregnancy
- **Moderately preterm**, born between 32 and 34 weeks of pregnancy
- **Very preterm**, born at less than 32 weeks of pregnancy
- **Extremely preterm**, born at or before 25 weeks of pregnancy

“Late-Preterm” Infants: A Population at Risk
- Infants born 34\(\frac{0}{7}\) through 36\(\frac{6}{7}\) weeks’ gestation are less physiologically and metabolically mature than term infants and are at higher risk of morbidity and mortality than term infants.
- Late-preterm infants (LPIs) represent more than 70% of all preterm births (<37 weeks). The proportion of all US births that were late preterm rose to 9.1% in 2005, or > 375,000 births annually. Engle, W. Tomaheb, K., Wallman, C. and the Committee on Fetus and Newborn. *Pediatrics* 120:1390-1401, 2007 (Reaffirmed, May 2010).

“Late-Preterm” Infants: A Population at Risk
- The AAP (and NICHD) recommended a change in terminology from “near term” to “late-preterm” to emphasize that these infants are physiologically immature and have special health care needs compared to full term infants (37-41 weeks).
- LPIs are at greater risk of morbidity and mortality—both during the birth hospitalization and after discharge—than are infants born at term.

"Imposter Babies"

- LPIs have been called "imposter" babies because they often masquerade as full-term infants, and many are discharged within 48 hours after birth.
- LPIs often are of "normal" birth weight; have comparable APGAR scores to full term infants; are not admitted to the NICU; may appear as small, cute full term infants.
- Experienced pediatrician in rural Missouri: "These are the babies that turned my hair grey!"

"Late-Preterm" Infants: A Population at Risk

Examples of Increased Neonatal Morbidity and Mortality Among Late-Preterm Infants:

- Temperature instability
- Respiratory distress and apnea
- Hypoglycemia
- Jaundice
- Feeding Problems
- Suspected sepsis
- Longer hospital stays
- Increased neonatal mortality rate (0-27 days)

"Late-Preterm" Infants: A Population at Risk

At 35 weeks gestation, the infant weighs only about 60% of its weight at term. Compared to term infants, late-preterm infants may be at increased risk for the following long-term health consequences:

- Cerebral palsy
- Speech disorders
- Developmental delays
- Learning and behavioral problems

Explanations for the rise in births of LPIs:

- Increased use of reproductive technologies, resulting in more multiple births
- More women giving birth at an older age
- Advances in obstetric practice, resulting in earlier detection of at-risk fetuses
- Increased rates of labor induction and cesarean birth

Timing of Elective Repeat Cesarean Delivery and Neonatal Outcomes

- In a large, multi-center study in the U.S., more than 1/3 of elective repeat cesarean deliveries at term were performed before 39 weeks gestation.
- Compared with deliveries at 39 weeks, births at 37 and 38 weeks were associated with a significantly increased risk of adverse events, including respiratory complications, treated hypoglycemia, newborn sepsis, admission to the neonatal ICU, and hospitalization for 5 days or more.

Nonmedically Indicated Early-Term Deliveries

- Because there are greater reported rates of morbidity and mortality among neonates and infants delivered during the early-term period compared with those delivered at 39 weeks and 40 weeks of gestation, a non-medically indicated early-term delivery is not appropriate.
- Implementation of a policy to decrease the rate of non-medically indicated deliveries before 39 weeks has been found to both decrease the numbers of these deliveries and improve neonatal outcomes.
Definition of Term Pregnancy

ACOG and the Society for Maternal Fetal Medicine have endorsed new, more precise definitions of the 37- to 42-week period to reflect the increased health risks to babies born before 39 weeks.

- Babies born in weeks 37 and 38 are now considered **early term**.
- Babies born in weeks 39 and 40 are called **full term**.
- Babies born in week 41 are called **late term**.
- Babies born beginning in week 42 are called **post-term**.

Recent Trends in Late Preterm and Early Term Birth Rates
- Late-preterm and early term births are of growing public health concern, and US clinicians have been urged to reduce elective deliveries before 39 weeks.
- This study included singleton live births (US and 5 other high-income countries) during 2006-2014.
- Late preterm birth rates significantly decreased in the U.S. from 6.8% in 2006 to 5.7% in 2014.
- Early term births significantly decreased in the U.S. from 31.2% in 2006 to 24.4% in 2014.
- These findings reflect the success of perinatal quality collaboratives to reduce elective deliveries before 39 weeks.

The Paradox of Breastfeeding-Related Morbidity Among Late-Preterm Infants
- Although breastfeeding is vigorously promoted for its compelling health benefits, a disturbing "late-preterm breastfeeding paradox" exists:
- LPIs are at greater risk for breastfeeding-associated re-hospitalization and poor breastfeeding establishment compared to term newborns.
- Rehospitalization, often related to jaundice and poor feeding, is nearly twice as common among breastfed LPIs compared to breastfed term or non-breastfed LPIs. **Current support is ineffective!**

Breastfeeding Outcomes Among Late-Preterm and Early Term Infants
- LPIs were significantly less likely to initiate breastfeeding within 1 hour of birth or to be discharged exclusively breastfeeding, when compared to 37 wk GA infants.
- As GA decreases, so does the chances of breastfeeding success.
- Late-preterm infants represent a sub-population of newborns at high risk for premature cessation of breastfeeding.

Breastfeeding Outcomes Among Late-Preterm and Early Term Infants
- In a study of early readmission of healthy newborns after hospital discharge, both LPIs (34-36 wks) and early term (37-38 wks) newborns were more likely to be readmitted than term babies.
- Feeding problems and jaundice were the 2 most common diagnoses associated with readmission, usually w/in 1 to 2 wks of discharge.

Reduced Breastfeeding Rates in Firstborn Late Preterm and Early Term Infants
- In this large prospective study of first-time mothers and newborns, gestational age was significantly associated with breastfeeding at 1 month PP.
- LPIs (63.8%) and early term infants (72.6%) were significantly less likely to be breastfeeding at 1 mos. than infants born at term or post-term (76.5%).
- Late-preterm and early term infants are populations at risk for shortened breastfeeding duration. Mothers of these vulnerable newborns require additional breastfeeding support and education.

References:
Reduced Breastfeeding Rates in Firstborn Late Preterm and Early Term Infants

- Gestational age impacted time to first breastfeeding: 54% of late preterm and 40.8% of early term infants (compared to 36.4% of term + infants) were not breastfed during the first “Golden Hour,” which may partially explain the lower rates of breastfeeding at 1 month.
- In addition, the mothers of early term newborns who were no longer breastfeeding at 1 month were more likely to report latching problems than mothers of term infants.


Breastfeeding Challenges in Late-Preterm Infants (34, 35, and 36 weeks)

- Late-Preterm Infants typically:
  - Are sleepier, have fewer alert-awake periods
  - Have poor muscle tone and less stamina
  - Have weak intraoral suction pressures
  - Have difficulty attaching to the breast
  - Have immature suck-swallow-breathe cycles
  - Are unable to extract enough milk to maintain the mother’s milk supply.

Breastfeeding may appear successful in the hospital, but not be sustained after discharge.

Pediatr 2003;90:140, 2007

Common Perinatal Challenges Potentially Affecting Lactation in Mothers of LPIs

- Pregnancy-induced hypertension
- Delayed lactogenesis
- Cesarean birth
- Infection
- Multiple births
- Medications
- Diabetes
- Older age

LPIs Cared for in the Maternity Setting Should Not Be Considered Healthy Term Infants

- Most LPIs are kept with their mothers in the maternity area, where lactation care is driven by the Baby-Friendly Hospital Initiative’s (BFHI) guidelines for establishing breastfeeding for term, healthy babies.
- However, LPIs are not healthy, term infants. They lack adequate fat and glycogen stores, making it likely that they will need supplemental milk in the 1st 48 hours of breastfeeding. They are sleepy and lack the stamina for frequent, lengthy feedings. Parents need information and a feeding plan tailored specifically to LPIs.


Endocrine Control of Lactation

Prolactin Neuroendocrine Reflex Arc

- Milk Production - Prolactin is a key lactogenic hormone, secreted from the anterior pituitary gland in response to suckling or pumping.
- Prolactin surges with each feeding, remains elevated throughout lactation, and is critical for the establishment & maintenance of lactation.
- Prolactin levels are higher in early lactation and at night.


Oxytocin Neuroendocrine Reflex Arc

- Milk Ejection Reflex - Oxytocin (secreted from the posterior pituitary gland) is the key hormone involved in the process of milk ejection, or milk let-down. Without a functioning milk ejection reflex, milk is not removed from the breast, and ongoing milk production is inhibited.
- Oxytocin contracts the myoepithelial cells that surround the mammary alveolar glands, moving milk from the alveoli into the collecting ducts, where it is removed by the infant.

Autocrine Control of Lactation
The influence of local factors acting in the breast

- It is not just the level of maternal hormones, but the efficiency of milk removal, that regulates the volume of milk produced in each breast.
- If a woman nurses from one breast only, the other unsuckled breast soon stops producing milk, even though both are exposed to lactogenic hormones.
- Thus, the amount of milk produced in each breast over the long term largely depends on how thoroughly and how often milk is drained by active nursing or pumping.


The Role of Regular Milk Removal in Ongoing Milk Production

- Full breasts will slow down milk production.
- When the breasts are well drained, the rate of milk production increases.
- The longest interval between breastfeeding or milk expressions may be a more important determinant of milk production than the total number of breastfeeds/milk expressions per day.


Stages of Lactation

- **Initiation Stage**—transition to lactogenesis II ("milk coming in") and the onset of copious human milk production
  - Typically occurs w/in 72 hrs PP, and is critical to continued abundant milk production
  - Mothers who are partially or completely breast-pump dependent (including mothers of LPIs) require the use of an effective and efficient, hospital grade electric breast pump, ideally beginning within the first hour postbirth.


- **Coming to Volume**—the period between the onset of lactogenesis II and the production of 500 to 600 mL of milk/day, (typically occurs between 4 to 7 days postbirth among healthy mother/baby pairs who breastfeed exclusively)
  - This is the stage associated with the greatest risk of suboptimal breastfeeding, which often results in early, unplanned weaning


Stages of Lactation

- **Maintenance of Established Lactation**—Mothers who are partially breast pump-dependent (such as mothers of LP and ET infants) must understand that the pump initially provides more effective and efficient milk removal than the infant.
  - These mothers should continue to use a hospital-grade electric breast pump until their infant routinely takes adequate milk volumes from the breast and demonstrates adequate weight gain.


Breastfeeding Management for Late-Preterm and Other At-risk Newborns

Two key objectives:
- Ensure that the infant is adequately nourished
- Protect the mother’s milk supply

Specific Lactation Technologies:
- Breast Pumps
- Use of some bottle-feedings
- Nipple shields
- Infant test-weighing procedure

Breastfeeding Strategies for LPIs

- If the infant is clinically stable, begin immediate and ongoing skin-to-skin contact and assist with early breastfeeding.
- Use breastfeeding positions that provide head support for the infant, such as the football or cross cradle holds.
- Breastfeed when the infant is able to sustain periods of wakefulness. Feed by bottle when baby is too sleepy to breastfeed and when offering supplemental milk.


Lactation Technology #1: Use of a Breast Pump

- Unless the LPI can breastfeed effectively (awake and actively sucking) for at least 15 minutes, each of 8 times daily during the maternity stay, the mother will need to regularly use a hospital-grade electric breast pump to ensure that she establishes an abundant milk supply and obtains expressed milk with which to supplement the infant.
- Additional amounts of donor human milk or formula temporarily may be necessary due to medical concerns related to hypoglycemia, hypothermia, or hyperbilirubinemia.


Lactation Technology #1: Use of a Breast Pump

- Mothers need to understand that regular, effective milk removal is essential to maintaining an adequate milk supply when her LPI does not nurse effectively.
- Establishing/maintaining an abundant milk supply makes it easier for the LPI to obtain milk, despite his immature sucking patterns. Having a surplus of milk allows baby to obtain enough milk by breastfeeding.
- Once her baby is taking all feedings at the breast and is gaining weight appropriately, the mother can cautiously decrease her post-feeding pumping.


Increasing Milk Volumes Produced by Mothers of Premature Infants

- A study among mothers of premature infants in the Stanford NICU found that women's milk production can be significantly increased when mothers perform hand expression of colostrum and "hands-on pumping" of transitional and mature milk.


- To learn hand expression and "hands-on pumping," visit: http://med.stanford.edu/newborns/professional-education/breastfeeding.html

Lactation Technology #4. Bottle-feeding

- Even when mothers have an adequate milk supply, few LPIs will be able to obtain full feedings by breastfeeding alone. Most will temporarily require some bottle supplementation of expressed milk after breastfeeding.
- As LPIs mature, they are able to take more milk from the breast, allowing Mom to decrease the frequency and amount of supplemental milk given by bottle.
- As an alternative, the infant can receive extra milk at the breast with a supplemental nursing system and nipple shield.


“Triple Feeding” for LPIs and Other At-Risk Newborns

- Breastfeed (may need to limit to only a few mins, so baby is able to take essential supplemental milk). Start feeding as soon as the infant shows wakeful signs.
- Pump both breasts for 10 – 15 mins. after nursing, using a hospital-grade, double electric breast pump.
- Supplement the infant with expressed milk, as needed. Use donor milk/formula as required.
- To allow Mom more sleep at night, a designated helper can feed the baby previously expressed milk by bottle, while Mom pumps and returns to sleep.
- As baby breastfeeds more effectively, s/he can receive fewer and smaller bottle feedings of pumped milk.
Lactation Technology #2: **Use of a Nipple Shield**

- **The nipple shield is a valuable temporary tool** for increasing milk transfer by LPIs who have weak suction pressures that cause the infant to slip off the nipple and fall asleep early in the feeding.  

- A study in premature infants found that infants drink significantly more milk when breastfeeding with a nipple shield than without it. The nipple shield facilitates milk transfer during feeding, provided the mother has a normal supply.  

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**Infant Feeding Test-Weighing Procedure**

The difference between the post-feed and the pre-feed weight of the identically clothed infant represents the volume of milk consumed by the baby during the feeding.

- **Post-feed infant weight**
- **Minus**
- **Pre-feed infant weight**
- **Equals**

Volume of milk consumed

1 gram weight change = 1 milliliter milk
Approximately 30 grams = 1 ounce of milk

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**Discontinuing Lactation Technologies**

- The cessation of lactation technologies typically occurs b/w 40 and 42 weeks post-conceptional age.
- As the LPI is able to breastfeed more effectively, s/he may be able to take some daily feedings without the nipple shield, or may need the shield only for the latter part of some feedings.
- Similarly, as the LPI matures and takes increasingly more milk with breastfeeding, s/he will require fewer supplemental feedings and smaller total daily volumes of expressed milk.

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Lactation Technology #3: **Test-Weighing**

- The test-weighing procedure takes the guesswork out of “getting enough,” so that extra milk is provided only when necessary.
- In-home test-weighing helps parents correlate their own assessment of the quality of the feeding with the infant’s actual milk intake. It also allows parents to monitor their baby’s progress in taking more milk at each breast each week.
- Mothers typically can discontinue the use of the rental scale after the infant is breastfeeding effectively and pumping has been gradually tapered.  

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Infant Feeding Test-Weighing Procedure

- Use electronic balance accurate to 2 grams
- Baby must be identically clothed for pre-feed and post-feed weights.
- Do not change diaper during test-weighing procedure.
- Consider interval in hours since the breasts were last drained.

*Between 2 - 3 weeks and 3 months, thriving breastfed infants drink about 700 ml (23 oz.) per day—approximately 1 oz. per hour*

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Discontinuing Lactation Technologies

- Once an infant is taking all feedings from the breast without a nipple shield and is growing appropriately, the mother can gradually taper her post-feeding pumping, while continuing to use the scale to monitor her infant’s milk intake and weight gain.
- Typically, mothers discontinue using the in-home rental scale after their LPI is breastfeeding effectively and efficiently, and they no longer need the pump to maintain adequate milk production.
- Some mothers continue to perform daily infant naked weights for a week or two before finally relinquishing the scale.  
The Experience of Breastfeeding the Late Preterm Infant: A Qualitative Study

Methods: Structured telephone interviews with 44 mothers of late-preterm infants.

Major Themes:
- Breastfeeding was a beautiful bonding experience
- I failed to meet my expectations (“I am sad. I wanted to breastfeed for two years. I feel like a failure.”)
- Medical and physical struggle (“...a hard but good experience. It was a lot to handle at once.”)
- Would do it all again (“Next time I would rather breastfeed than just pump”)


ABM Clinical Protocol # 10: Breastfeeding the Late Preterm Infant (34 0/7) to 36 6/7 Weeks Gestation)

- Principles of Care
- Inpatient: Implementation of Principles of Care
  Initial Steps  Ongoing Care  Discharge Planning
- Outpatient: Implementation of Principles of Care
  Initial Visit  Problem Solving  Follow-Up

References

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