“Just a Few Weeks Early”-- Breastfeeding Management for Late-Preterm and Early Term Infants

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Learning Objectives
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 remains 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 of 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.

“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.

"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 wks).
- LPIs are at greater risk of morbidity and mortality —both during the birth hospitalization and after discharge—than are infants born at term.

“Late-Preterm” Infants: 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 brain weighs only about 60% of its weight at term. Compared to term infants, late-preterm infants may be at increased risk for long-term consequences:

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


“Late-Preterm” Infants: Population at Risk

Explanations for the rise in births of LPIs:

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


Timing of Elective Repeat Cesarean Delivery and Neonatal Outcomes

- 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
  - Hospitalization for 5 days or more


Nonmedically Indicated Early-Term Deliveries

- A nonmedically indicated early-term delivery is not appropriate.
- Implementing a policy to decrease the rate of nonmedically 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 wks. Babies born in:

- Weeks 37 and 38 are now considered early term.
- Weeks 39 and 40 are called full term.
- Week 41 are called late term.

Babies born beginning in week 42 are post-term.

Recent Trends in Late-Preterm and Early Term Birth Rates

- Late-preterm birth rates significantly decreased in the US from 6.8% in 2006 to 5.7% in 2014.
- Early term birth rates significantly decreased in the US 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 the compelling health benefits of breastfeeding are vigorously promoted, a disturbing "late-preterm breastfeeding paradox" exists:
  - Early hospital readmission, often due to jaundice and poor feeding, is nearly twice as common among breastfed LPIs compared to breastfed term or non-breastfed LPIs.


The Paradox of Breastfeeding-Related Morbidity Among Late-Preterm Infants

- Being breastfed exclusively at hospital discharge is a major risk factor for rehospitalization in LPIs due to dehydration, severe jaundice, and suspected sepsis.
- Less severe morbidities include: slow infant weight gain, protracted jaundice, formula supplementation, and early discontinuation of breastfeeding.


Breastfeeding Outcomes Among Late-Preterm and Early Term Infants

- LPIs were significantly less likely to begin breastfeeding within 1 hour of birth or be discharged from the hospital exclusively breastfeeding, when compared to 37 week gestational age (GA) infants.
- As GA decreases, so does the chances of breastfeeding success!


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 two most common diagnoses associated with readmission, usually within 1 to 2 weeks of hospital discharge.


Reduced Breastfeeding Rates in Firstborn Late Preterm and Early Term Infants

- Late preterm infants (63.8%) and early term infants (72.6%) were significantly less likely to be breastfeeding at 1 month than infants born at term or post-term infants (76.5%).
- Late preterm and early term infants are populations at risk for shortened breastfeeding duration and require additional breastfeeding support and education.

Reduced Breastfeeding Rates in Firstborn Late Preterm and Early Term Infants

- Lower gestational age adversely impacted time to first breastfeeding:
  - 54% of late preterm infants
  - 40.8% of early term infants
  - 36.4% of term infants were *not breastfed* during the 1st “Golden Hour.”


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

- Sleepier, have fewer alert-awake periods
- Poor muscle tone and less stamina
- Weak intraoral suction pressures
- Difficulty attaching to the breast
- Immature suck-swallow-breathe cycles
- Unable to extract enough milk to maintain mother’s milk supply.


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

- LPIs are *not* healthy, term infants.
- They lack adequate fat and glycogen stores, and likely will need supplemental milk in the first 48 hours of breastfeeding.
- LPIs are sleepy and lack the stamina for frequent, lengthy feedings.


Breastfeeding Challenges in LPIs

- Breastfeeding may appear successful in the hospital, but not be sustained after discharge.
- Parents need information and a feeding plan tailored specifically to LPIs.


Common Perinatal Challenges Potentially Affecting Lactation in Mothers of LPIs

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

Why Mothers Stop Breastfeeding

- The top reasons for discontinuing breastfeeding in the 1st 2 months after the child’s birth were: 1) “Baby had trouble sucking and latching on,” 2) “Breastmilk alone didn’t satisfy my baby,” 3) “I didn’t have enough milk.”
- Concerns about their milk supply and their baby’s dissatisfaction with breast milk alone consistently were cited by mothers as important reasons for weaning, regardless of infant age.


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 and 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) is the key hormone involved in the process of milk ejection (let-down).
- 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.
- Without a functioning milk ejection reflex, milk is not removed from the breast, and ongoing milk production is inhibited.


The Milk Ejection Reflex (MER)

- The MER is triggered by breastfeeding or milk expression, and can be conditioned to occur, e.g. by seeing, hearing, or smelling your baby. It also can be inhibited by adrenalin, pain, stress, etc.
- Let-down may be felt as a pins-and-needles, tingling, or tightening sensation in both breasts.
- While multiple MERs occur during breastfeeding, mothers typically perceive only the 1st MER.
- The amount of milk a baby drinks is related to the number of MERs during the feeding.

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 produced in each breast.
- 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 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.


1. Initiation Stage of Lactation

- This is the transition period from birth to lactogenesis II ("milk coming in"), or the onset of abundant milk production.
- Typically occurs within 72 hours PP, and is critical to continued abundant milk production.
- Ideally, breastfeed and/or begin hand expression within the first hour after birth.
- Practice continuous rooming-in and frequent cue-based breastfeeding.
1. Initiation Stage of Lactation

Examples of Risk Factors

- Late-preterm & early term infants
- Delayed onset of lactation
- Mother–infant separation
- Infant latch issues, including using a nipple shield

Mothers who are partially or completely breast pump-dependent during this stage require the use of an effective/efficient, hospital grade electric breast pump, ideally beginning within the 1st hour after birth.


2. Coming to Volume (CTV) Stage of Lactation

- This is the period b/w the onset of lactogenesis II and the production of 500 to 600 mL (17.5–21 oz.) of milk/day, (typically occurs between 4 to 7 days post birth 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!


Comparison of Milk Output in Mothers of Preterm and Term Infants: The First 6 Weeks After Birth

The average milk volume produced on days 6 and 7 predicted whether a mother of a term breastfeeding infant or non-nursing preterm infant would achieve an adequate milk supply at 6 weeks postpartum.


- In a new study, CTV--achieving pumped mother’s own milk volume (MOM) ≥ 500 mLs/day by day 14-- was, by far, the strongest predictor of MOM feeding at NICU discharge.


2. Coming to Volume (CTV) Stage of Lactation

Examples of Risk Factors

- Preterm, late-preterm and early term infants
- Jaundiced newborns and other sleepy babies
- Infants with latch-on problems, including those using a nipple shield
- Clinically significant tongue-tie
- Maternal breast variations
- Severe maternal breast engorgement or sore nipples

Close follow-up of at-risk mother-baby pairs is essential.

2. Coming to Volume (CTV) Stage of Lactation

Milk must be removed frequently and effectively to ensure the establishment of an abundant supply.

Interventions to protect the mother's milk supply during the critical CTV stage of lactation and to promote an adequate milk supply by the end of the first week postpartum are paramount!


Stages of Lactation

3. 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.

**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.


**Breast Storage Capacity**

- The storage capacity of the breast is the maximum amount of milk that can be stored in the breast and that is available to the infant under normal patterns of breastfeeding.
- There is a wide variation in the breast storage capacity of exclusively breastfeeding women.
- The ideal frequency of milk expression to maintain a mother’s supply may depend on her breast storage capacity. Women with a small breast storage capacity will need to breastfeed or express milk more often than mothers with a larger storage capacity in order to maintain their supply.


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**Preventive Early Breastfeeding Management for At-Risk Infant-Mother Dyads**

- At-risk newborns, such as late-preterm infants, with marginal energy stores cannot effectively meet their nutritional needs or stimulate an adequate milk supply, despite abundant skin-to-skin contact and unrestricted breastfeeding.
- Establishing a robust milk supply is the single most important factor impacting breastfeeding duration and exclusivity!


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

3 key objectives:

1. Ensure that the infant is adequately nourished
2. Protect the mother’s milk supply
3. Transition to exclusive at-breast feeding


**Common Comorbidities Among LPIs During the Newborn Hospital Stay**

Among 121 LPIs born to 92 mothers:

- Mean gestational age = 35.2 weeks
- Mean birth weight 2430 grams
- 60% level I care, 40% level II care, 20% level III
- 71% developed at least one comorbidity during their hospital stay
- Most frequent comorbidities: respiratory distress, hypoglycemia, jaundice (phototherapy)
- More than 1/3 were affected by > 1 comorbidity

Breastfeeding Strategies for LPIs

- If the infant is clinically stable, begin immediate and ongoing skin-to-skin contact and assist with early direct breastfeeding.
  

- The benefits of early skin-to-skin contact and breastfeeding may be even greater for LPIs, who are at increased risk of neonatal morbidities.
  

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, 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.
  

“Hands-On Pumping” to Increase Expressed Milk Volumes

- The manual techniques studied were hand expression of colostrum in the first 3 days (Initiation Stage of lactation) & “hands-on” pumping (HOP)—a combination of pump suction, breast compression, and hand expression during the “Coming to Volume” and “Maintenance Stages” of Lactation.

- Milk production was significantly increased when mothers performed hand expression of colostrum & “hands-on” pumping of transitional and mature milk.

  *http://med.stanford.edu/newborns/professional-education/breastfeeding/maximizing-milk-production.html*  

Helping Mothers LPIs Establish & Maintain an Abundant Milk Supply

- Routine staff and client education about the physiology of lactation

- Early access to hospital-grade electric pumps

- Understanding that having a surplus of milk improves baby’s breastfeeding effectiveness

- Having 2 collection kits can help Moms maintain their pumping frequency

- Weekly contact to monitor the infant’s weight, triage concerns, provide essential support, and adjust the feeding plan
Lactation Technology #2. Bottle-Feeding

- Even when mothers establish an adequate milk supply, few LPIs will be able to obtain full feedings by breastfeeding alone.
- As LPIs mature, they can take more milk by breastfeeding, allowing Mom to decrease the frequency and amount of supplemental milk fed by bottle.
- Supplemental feedings of EBM, formula, or donor human milk also may be fed by spoon or cup, or by using a Supplemental Nursing System (SNS), with or without a nipple shield.


Breastfeeding at Discharge Among LPTs

- Mean hospital stay 9.9 days
- 43% of infants were being fed exclusively human milk at discharge; only 20% exclusive breastfeeding
- Only 4% of mothers expressed breast milk within the first 6-8 hours of delivery
- Most mothers had expressed milk 4-5 times per day
- Most frequently reported barriers to breastfeeding: ineffective suckling, infants’ drowsiness, presence of a medical device, separation from their infant, concerns about milk supply, infant comorbidity


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

1. Breastfeed (may need to limit to only a few mins, so baby is able to take essential supplemental milk).
2. Pump both breasts for 10 – 15 mins. after nursing, using a hospital-grade, double electric breast pump.
3. 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.

Helping Clients Maintain Triple Feeding

- Teach Mom to distinguish “drinking” vs “nibbling.”
- Consider using the SNS device.
- Help Mom decide when to drop a post-feed pumping session, for example during closer nursing intervals or when infant has removed milk from both breasts.
- At night, have Mom pump without breastfeeding while a helper bottle feeds the infant.
- Encourage Mom to attend a WIC, hospital, or community breastfeeding support group.
- Provide weekly contact.

Lactation Technology #3: Nipple Shields

- A nipple shield is a valuable temporary tool for increasing milk transfer by compensating for the LPI's relatively weak suction pressures that cause the infant to “slip off the breast” during pauses and fall asleep after only a few minutes of nursing.
- A study in premature infants found that infants drink significantly more milk when breastfeeding with a nipple shield than without it.


Helping Clients Wean from Using a Nipple Shield

- Explain that the nipple shield is a temporary, bridging tool.
- Maintaining a generous milk supply makes it easier for the baby to learn to latch.
- Encourage plenty of skin-to-skin contact.
- It may be easier to wean from the “contact” nipple shield that allows skin-to-skin contact.
- An infant may be able to nurse w/o the shield during the 1st part of the feeding, before tiring.
Lactation Technology #4. Test-Weighing

- The test-weighing procedure takes the guesswork out of "getting enough," so that extra milk is provided only when needed.
- In-home test-weighing helps parents correlate their own assessment of the quality of the feeding with the infant's actual milk intake.
- Weighing infants before and after breastfeedings allows parents to monitor their baby's progress taking more milk at each breast each week.


Making the Test-Weighing Procedure More Readily Available to Clients

- WIC agencies may have scales accurate to two grams, or may be able to purchase a scale and train selected staff to interpret test-weighing.
- Infant test-weighing may be available at hospital out-patient lactation clinics, breastfeeding support groups, visiting nurses, private lactation consultants, or at pediatric office visits.
- Accurate scales can be rented, but the cost may be prohibitive for WIC enrollees and other low-income Moms.

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.
  - 1 gram weight change = 1 milliliter milk
  - Approximately 30 grams = 1 ounce of milk
- Consider the 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—approx. 1 oz. per hour.

Discontinuing Lactation Technologies

- The cessation of lactation technologies typically occurs b/w 40-42 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.


Discontinuing Lactation Technologies

- As the LPI matures and takes increasingly more milk with breastfeeding, s/he will need fewer supplemental feedings and smaller total daily volumes of EBM.
- Once an infant is taking all feedings from the breast without a nipple shield and is growing appropriately with exclusive breastfeeding, the mother can gradually taper her post-feeding pumping, while closely monitoring the infant's weight gain.


Discontinuing Lactation Technologies

- Typically, mothers discontinue using the in-home rental scale after their LPI is breast-feeding effectively, and they no longer need to pump to maintain adequate milk production.
- Some moms continue to perform daily naked infant weights for a week or two before returning the scale.

Helping Mothers of LPIs Wean from Using Lactation Technologies

- Provide empowering information and abundant ongoing support.
- Offer weekly visits and frequent phone calls.
- Encourage clients to use hospital-based, outpatient follow-up services and support groups, and visiting nurse services.
- Increase physician lactation education and breastfeeding counseling skills.

The Experience of Breastfeeding the Late Preterm Infant: A Qualitative Study

Major themes from structured phone interviews:

- 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")


Breastfeeding the LPI: Experiences of Mothers and Perceptions of PHNs

Three theme emerged among mothers:

- Significant difficulty with breastfeeding
- Failing to recognize the infant’s feeding distress and disorganized behavior
- Parental stress and exhaustion caused by feeding issues: “It was very frustrating;” “a lot of work;” “every feeding is different;” “conflicting advice from HPs;” “it’s work, but it’s worth it.”


ABM Clinical Protocol #10: Breastfeeding the Late Preterm Infant (34\(0/7\) to 36\(6/7\) Weeks of Gestation) and Early Term Infants (37–38 6/7 Weeks of Gestation), Second Revision 2016.

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