Late Preterm Infant Care and Parent Education

Cathy White NNP, B-C
Neonatal Outreach Educator
Perinatal Systems

Disclosure

* Please note that this Power Point presentation is an educational tool that is general in nature. It is not intended to be an exhaustive review of the subject matter or the opinion of Palmetto Health. Materials presented in this presentation should not be considered a substitute for actual statutory or regulatory language. Always refer to your legal counsel and the current edition of a referenced statute, code and/or regulation for precise language."
Objectives

- Recall common complications related to the late preterm infant
- Gain knowledge on teaching parents important information related to each of the common complications seen with the late preterm infant

Late Preterm Infant

- Infants born at 34-36 6/7 weeks of gestation
- Higher morbidity and mortality rates than term infants
- Seven fold higher morbidity rate than term infants
- Hospital cost is higher than term infants
- Readmission rate higher after first two weeks after discharge
• Preterm birth

• South Carolina and US, 2014

Preterm is less than 37 weeks of pregnancy.

Source: National Center for Health Statistics, live birth data.

• Late preterm births

• South Carolina and US, 2014

Late preterm is between 34 and 36 weeks gestation.

Source: National Center for Health Statistics, live birth data.
Birth Information

- In an average week in South Carolina
  - 1,108 Babies are born
    - 119 are Preterm
    - 82 are Late Preterm
    - 21 are Very Preterm
- In the United States per year
  - 500,000 infants are born premature
  - 75% are Late Preterm
- Few Evidence Based Approaches of Management
  - Multidisciplinary Guidelines for the Care of Late Preterm Infants
  - National Perinatal Association
  - WHONN
  - March of Dimes

Special Attention at Birth

- Gestational age assessment
  - Accurate assessment
- Level of care
  - Based on infants physiological status
  - Appropriate personnel to provide care
- Admission
  - Based on physiological status and or unit guidelines
    - Normal newborn unit/Couplet Care
    - NICU/SCN
      - 20% are admitted to NICU
      - PHR, all 34 wks are admitted to NICU
      - PHR Guidelines
    - 35-36-37 weeks gestation complete a transition period in SCN
Special Attention at Birth

- Frequency of assessments
  - Every 30 minutes until stable for 2 hours
  - Every 4 hours until 24 hours of age
  - After stable for 24 hours, once a shift until discharge

- PHR Admission Order Set for the Late Preterm (35-35 6/7 wks)
  - Every 30 minutes x4 if stable
  - Every 4 hours x6 if stable
  - Every 8 hours

- Parent Education
  - Communicate risk of late preterm infants
  - Unit specific guidelines explained prior to delivery
  - Encourage and explain benefits of skin-to-skin
    - Promotes physiological stability
    - Facilitates first breastfeeding

What Does The Late Preterm Miss?

- Vital period of maturation
  - Lung Development
  - Brain maturation
  - Liver maturation
- Vital Period of Growth
  - Body mass increases
  - Fat stores increase
Late Preterm Complications

- Respiratory Distress
- Temperature Instability
- Hypoglycemia
- Hyperbilirubinemia
- Feeding Challenges

Thermoregulation

- Hypothermia is a preventable condition that has documented impact on morbidity and mortality, especially in the preterm infant
- Preventing hypothermia during resuscitation and stabilization is critically important
Physiologic Response to Cold Stress Term Infant

- Vasoconstriction
- Purpose: decrease heat loss
- Blood vessels in arms and legs constrict
  - Blood stays in core of body
  - Prevents blood from reaching skin surface where heat loss occurs

Physiologic Response to Cold Stress Term Infant

- Brown Fat Metabolism
- Purpose: heat production
- Brown Fat
  - Appears at 25 weeks gestation
  - Inadequate amount before late 3rd trimester
  - Located around kidneys, adrenal glands, mediastinum, subscapular region, axillae, and nape of neck
Physiologic Response to Cold Stress Term Infant

- Infants have little to no ability to shiver
- They cry and flex their arms and legs to generate some heat in the muscles
- Flexion of arms and legs also reduces the surface area for heat loss

Term Infant

- Pulmonary vasoconstriction → ↑ R to L shunting → Hypoxemia and respiratory distress
- ↑ Metabolic rate → ↑ Oxygen consumption
- Brown fat metabolism → ↓ Peripheral vasoconstriction
- ↓ O2 delivery to tissues → Hypoxia
- ↑ glucose utilization → Depletion of glycogen stores → Hypoglycemia
Late Preterm Infant

- Norepinephrine release
  - ↑ Metabolic rate
  - ↓ O2 consumption
  - ↑ Glucose utilization

- Brown fat metabolism
- Peripheral vasoconstriction
  - Movement and flexion limited
- Oxygen delivery to tissues ↓
  - Hypoxia
  - Depletion of glycogen stores →
  - Hypoglycemia

Clinical Presentation

- Pale, cool to touch
- Acrocyanosis
- Respiratory distress
  - Apnea, bradycardia
- Progressive or chronic cold stress
  - Weak cry, hypotonia, poor feeding
- Irritability progresses to lethargy
Assessment and Interventions of Thermoregulation

- Maintaining NTE (Neutral Thermal Environment)
  - Keeping temperature 97.7-99.5°F (36.5-37.5°C)
  - Dry infant
  - Skin-to-skin
  - Cover infants back with warm blanket
  - Hat on when not skin-to-skin
  - Keep bed away from air vents and drafts
- Prevent heat loss when unable to skin-to-skin
  - Increase room temperature
  - Use RHW or isolette (preheated)
- Delay Bathing
  - Recommended waiting 2-12 hours
    - Could take 4-8 hours to have normal temp

Skin-to-Skin Safety

- Ensure proper maternal and infant positioning and staff availability to supervise mother and infant
- AAP recommendations on infants position
  - Face can be seen
  - Head in sniffing position
  - Nose and mouth not covered
  - Head turned to one side
  - Neck straight not bent
  - Shoulders and chest face mother
  - Legs flexed
  - Back covered with blankets
  - Mother and infant monitored continuously in delivery room and regularly on postpartum unit
  - Mother would like to sleep, infant placed in bassinet or with other support person

http://pediatrics.aappublications.org/content/pediatrics/early/2016/09/01/peds.2016-2819.full.pdf
Parent Education Concerning Thermoregulation

- Parent Education
- Late Preterm Infant at risk for hypothermia because:
  - Decreased Brown fat
  - Less white fat for insulation
  - Larger ratio of surface area to weight
- Teaching points on maintaining thermoregulation
  - Skin-to-Skin
  - Proper clothing
  - Temperature
  - Move away from drafts and windows

Respiratory Distress
Respiratory Distress

- Apnea
- Brain is approximately two thirds size of term infant’s brain
- Central nervous system is immature
  - Immaturity of the central respiratory drive to muscles of respiration

[Infant brain growth image]

http://emedicine.medscape.com/article/1924955-overview#v6

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Respiratory Distress

- Respiratory Distress Syndrome
- Most commonly seen in preterm infants, including the late preterm
- Infants of diabetic mothers have increased risk of RDS
  - Too much insulin in a baby’s system can delay surfactant production
- Immature lung anatomy
  - Surfactant deficient
- Surfactant
  - Produced between 24 and 35 weeks gestation
  - Coating on the inside lining of the alveoli
Respiratory Distress

- Respiratory Distress Syndrome
  - Respiratory distress typically seen at birth or shortly after birth
    - grunting
    - Nasal flaring
    - Retractions
    - apnea
  - CXR
    - Low lung volumes
    - Uniform diffuse granular appearance with air bronchograms

Respiratory Distress

- Transient Tachypnea of the Newborn (TTN)
- Affects term or late preterm infants
- Most common cause of respiratory distress
- Delayed reabsorption of fetal lung fluid
  - Fetal lung fluids clears 35% a few days prior to birth
  - 30% during active labor
  - around 35% postnatally during crying and breathing
  - Alveoli with retained fluid will inhibit gas exchange

http://emedicine.medscape.com/article/6514-overview#as
Respiratory Distress

- Transient Tachypnea of the Newborn
- Onset of respiratory distress usually within 1-2 hours after birth
  - Mild to moderate respiratory distress
  - Oxygen requirements less than 40% typically
- CXR
  - Fluid in fissure
  - Lung overinflation
  - Perihilar markings

Parent Education Concerning Respiratory Distress

- Explain late preterm infant is at risk for respiratory distress due to
  - Immature central nervous system
  - Decreased production of surfactant
- Maintain skin-to-skin contact if stable
  - Decrease infants stress
  - Optimizes respiration and oxygen saturations during transition
  - Helps with hypothermia induced apnea
- Teach signs and symptoms of respiratory distress and when to alert medical staff
  - Infant stops breathing (apnea)
  - Infant breathing to fast (tachypnea)
  - Infant is working hard to breath
    - Area below the ribs, between the ribs, and in the neck sink in when infant takes a breath (retractions)
  - Lips or nails are blue
  - Notify staff immediately
Feeding Challenges

- Late Preterm
  - Immature suck/swallow reflex
    - Needed for safe and efficient oral feeding
  - Fewer awake-alert periods and decreased stamina
    - Leads to inadequate caloric intake, dehydration, and weight loss
  - Poor muscle tone
    - Leading to fatigue, latch difficulty, and sub-optimal feeding
  - Consequences of inadequate intake
    - Hypoglycemia
    - Hyperbilirubinemia
    - Poor weight gain
    - Hospital readmission
Interventions for Successful Feeding of the Late Preterm

- Facilitate skin-to-skin
- Facilitate early feeding
  - Ideally within the first hour of life
- Encourage rooming-in or support couplet care
  - Supports on demand feedings
- Support frequent on demand feedings
  - 10-12 breastfeeding’s per 24 hours
  - 8-10 formula feedings per 24 hours
- Provide lactation consultation
- Evaluate coordination of sucking, swallowing, and breathing

Breastfeeding

- Skin-to-Skin contact until after first breastfeeding
- Lactation consult
  - Evaluate at least twice daily
    - Coordination of suck, swallow, and breathing
    - Mother’s breastfeeding position and comfort
    - Infant’s latch and milk transfer
    - Answer any questions regarding breastfeeding
Monitoring Breastfeeding Success

- Daily weight
  - Weight loss more than 3% per day or 7% by day 3 further evaluation
  - Document voiding and stool patterns
- Supplementation
  - Only if medically indicated
  - Supplement with expressed breastmilk if able

Parent Education Concerning Feeding Difficulties

- Explain late preterm at risk for feeding difficulties due to:
  - Immature suck, swallow and breathing coordination
    - Lead to improper latch for breastfeeding
    - Inadequate intake for bottle feeding
  - May have to awaken infant for feedings due to immature brain and increased sleepiness
  - Take smaller volumes but tire out with increasing volumes
  - Teach to recognize feeding cues:
    - Opening eyes
    - Moving head back and forth
    - Opening mouth, rooting, sucking on hand and fingers
    - Crying (late cue)
  - Encourage skin-to-skin
  - Encourage to ask for assistance as needed for breast and formula feed infants
Parent Education Concerning Feeding Difficulties

- Breastfeeding Infants
  - Stress importance of frequent breastfeeding
    - 10-12 times per 24 hours
  - Colostrum
  - Use phrase "when your milk supply increases"
- Importance of tracking voids and stools
  - 3 voids and 3 stools by day 3
  - 4 voids and 4 stools by day 4
- Supplemental Feedings
  - Only if medically indicated
  - Cup feeding, syringe feeding, gavage feeding
  - Provide breast milk when able
- Importance of lactation support

Hypoglycemia

![Image of a baby]
Hypoglycemia

- Late preterm infant three times greater risk
- Causes
  - Inadequate glucose supply
    - Inadequate glycogen stores
    - Impaired glucose production
      - Glycogenolysis or gluconeogenesis
  - Increased glucose utilization
    - Excessive insulin secretion

Hypoglycemia

- Glycogen Production
  - Glycogen stored in liver, heart, lung and skeletal muscle
  - Glycogen stores slowly increase during first and second trimesters, majority is stored during latter part of third trimester
  - Preterm infants have inadequate amounts of glycogen and available stores may be depleted rapidly after birth
- Glycogenolysis
  - Immediately after birth, plasma glucose is maintained by breakdown of hepatic glycogen
  - Glycogen stores are depleted during the first 8-12 hours of life
- Gluconeogenesis
  - Plasma glucose levels maintained by non-carbohydrate sources such as amino or fatty acids
  - Increased glucose utilization
    - Primarily results from excessive insulin which can suppress hepatic glucose production

https://www.upToDate.com/contents/screening-and-diagnosis-of-neonatal-hypoglycemia?source=see_link
Clinical Presentation of Hypoglycemia

- Irritability, lethargy
- Cyanosis, apnea
- Poor feeding
- Tachycardia
- Hypotonia
- Tremors, jitters, seizures
- Hypothermia

Glucose Screening and Management

Screening and Management of Postnatal Glucose Homeostasis in Late Preterm and Term SGA, IDM/LGA Infants

<table>
<thead>
<tr>
<th>Symptomatic and &lt;40 mg/dL</th>
<th>IV glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth to 4 hours of age</td>
<td>4 to 24 hours of age</td>
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**ASYMPTOMATIC**

- Initial screen <25 mg/dL
  - Feed and check in 1 hour
  - <25 mg/dL
    - IV glucose
  - 25-40 mg/dL
    - Refeed/IV glucose* as needed

- Continue feeds q 2-3 hours
  - Screen glucose prior to each feed
  - Screen <35 mg/dL
  - Feed and check in 1 hour
  - <35 mg/dL
    - IV glucose
  - 35-45 mg/dL
    - Refeed/IV glucose* as needed

Target glucose screen ≥45 mg/dL prior to routine feeds.

* Glucose dose = 200 mg/kg (dextrose 10% at 2 mL/kg) and/or IV infusion at 5-8 mg/kg per min (80-100 mL/kg per d). Achieve plasma glucose level of 40-50 mg/dL.

Symptoms of hypoglycemia include: Irritability, tremors, jitteriness, exaggerated Moro reflex, high-pitched cry, seizures, lethargy, floppiness, cyanosis, apnea, poor feeding.
Parent Education Concerning Hypoglycemia

- Explain late preterm infant is at risk for hypoglycemia due to
  - Decreased glycogen production
  - Immature metabolic pathways to make glucose
- Stress frequent feedings
  - 10-12 Breast feedings per day
  - 8-10 Bottle feedings per day
- Remind they may have to awaken infant
- Glucose screening (heel sticks 30 minutes after every feeding) for the first 24 hours
- Teach signs and symptoms of hypoglycemia and when to alert medical staff
  - Shakiness
  - Bluish tint to skin (cyanosis)
  - Stop breathing (apnea)
  - Floppy muscle tone
  - Lack of movement and energy (lethargy)
  - Low body temperature (hypothermia)
  - Not interested in feeding

Hyperbilirubinemia
Hyperbilirubinemia

- Quick Review
- During antenatal period
  - Fetal hemoglobin levels are higher
  - Increased hemoglobin is needed to carry O2 from maternal/placental blood into fetal tissue
  - Fetal hemoglobin levels tend to decrease as the 40 week mark of pregnancy approaches
- At birth and shortly after
  - Fetal hemoglobin levels drop dramatically
  - A portion of the erythrocytes begin to hemolyze and causes bilirubin to enter circulation
  - The liver conjugates the bilirubin for excretion
  - For normal newborns this is not a problem because
    - Their fetal hemoglobin has decreased
    - Term normal newborns eat and stool well

What's The Big Deal For the Late Preterm?

- Late Preterm
  - Fetal hemoglobin levels are higher, more erythrocytes to hemolyze
  - Immature liver makes it difficult to excrete bili
  - Late preterm infants are known poor feeders which leads to:
    - Dehydration and poor stool output
    - Stooling is body's major method for bilirubin excretion
  - Hyperbilirubinemia
- Concerned for Kernicterus
  - Preterm infant brain is less fully developed
  - Extreme hyperbilirubinemia, bilirubin can infiltrate the basal ganglia, other areas of the brain and spinal cord
Hyperbilirubinemia in the Late Preterm Infant

- Late preterm infants are two times higher risk of developing significant hyperbilirubinemia
- Bilirubin concentrations typically peak
  - Peaks on 5th to 7th day compared to 3rd to 4th day
- 25% will require phototherapy
  - 1 in 4 late preterm infants will require phototherapy

Hyperbilirubinemia Interventions

- Assess for presence of jaundice at birth and with routine assessments
- If visible jaundice before 24 hours of age
  - Obtain transcutaneous bili or serum bili level
  - Measurements should be taken on the forehead or sternum
- Obtain TcB or TSB at 24 hours of age regardless of presence or absence of jaundice
- Depending on your protocol, level is plotted or reported
Phototherapy Initiation and Management

- 35 to 38 weeks gestation with no additional risk factors, phototherapy initiated at the high-intermediate risk zone
- 35 to 38 weeks gestation with additional risk factors phototherapy is initiated at the low-intermediate risk zone
- Management:
  - Provide phototherapy in mother's room if possible
  - Consider supplementing with expressed breast milk after breastfeeding
  - Monitor repeat bili levels per protocol
  - Monitor bili levels for at least 24 hours after phototherapy is discontinued

Parent Education Concerning Hyperbilirubinemia

- Explain late preterm infants are at risk for jaundice
  - Caused when too much of a natural substance called bilirubin is in the blood
  - Livers are immature and may take several days to start working well
  - Can make skin and whites of eye yellow
  - Levels peak at day 5-7 after birth
- Explain they are at risk for kernicterus
  - Type of brain damage that can occur if jaundice is not treated properly
- Concerning behaviors
  - Trouble with nursing or sucking from bottle
  - Very sleepy and hard to wake
  - Cannot be consoled, has increased irritability and high-pitched cry
  - Decrease in the voiding and stooling pattern
- Phototherapy treatment and management
  - Under blue lights
  - Eyes covered
  - Typically can stay in room with mother
  - Will have bili check by transcutaneous or serum bili

Discharge Planning

• Parent education and discharge planning should begin on admission
  • Late preterm infants should not be discharged before 48 hours of age
  • Late preterm infants are two-three times greater at risk for readmission to hospital than term infant
  • 3-fold higher mortality rate than term infants
  • Remind parents of late preterm infants risk factors
    • Hyperbilirubinemia
    • Feeding difficulties
    • Hypothermia
    • Apnea

https://www.uptodate.com/contents/late-preterm-infants#H41

Discharge Criteria

• Temperature stability
  • 97.7 and 99.5°F in open crib
• Respiratory stability
  • Respiratory rate < 60 breaths/min
• Feeding stability
  • Breastfeeding
  • Bottle feeding
  • Weight loss not to exceed 7 percent of birth weight during hospitalization
  • Pass 1 stool spontaneously
• Successful training and parent understanding and recognition of late preterm infant risk factors
  • Jaundice
  • Feeding difficulties
• Completion of routine newborn care
  • CCCHD
  • Hearing screen
  • Vaccinations

https://www.uptodate.com/contents/late-preterm-infants#H41
Parent Discharge Education

- Higher risk from second hand smoke
- Safe Sleep practice
- Follow up visit 24-48 hours after discharge from hospital
- When to call pediatric care provider
  - Temperature below 97°F or above 100.4°F
  - Turning blue-call 911
  - Difficult feeding
  - Jaundice
  - Vomiting
  - Failure to void for 12 hours
  - Lethargy or irritability
  - Changes in the infant’s typical behavior

Thank you!

- Questions?
- You will receive an email following the webinar with an evaluation, please complete the evaluation and your CE certificate will be sent electronically.
- Please contact me for any further questions.
  - 803-434-2913
  - Cathy.White@palmettohealth.org