STANDARDIZING CARE OF THE

Late Preterm Infant

Summer 2022 Education Update

Objectives

- Identify the increased risk of infant morbidity and mortality associated with late preterm birth
- Recognize the physiologic limitations of the late preterm infant (LPI)
- Explain how immaturity increases the risk of medical complications
- Understand the essential elements of discharge planning for the LPI
- Describe AWHONN's LPI initiatives and recommended discharge criteria for the LPI

Definition & Background

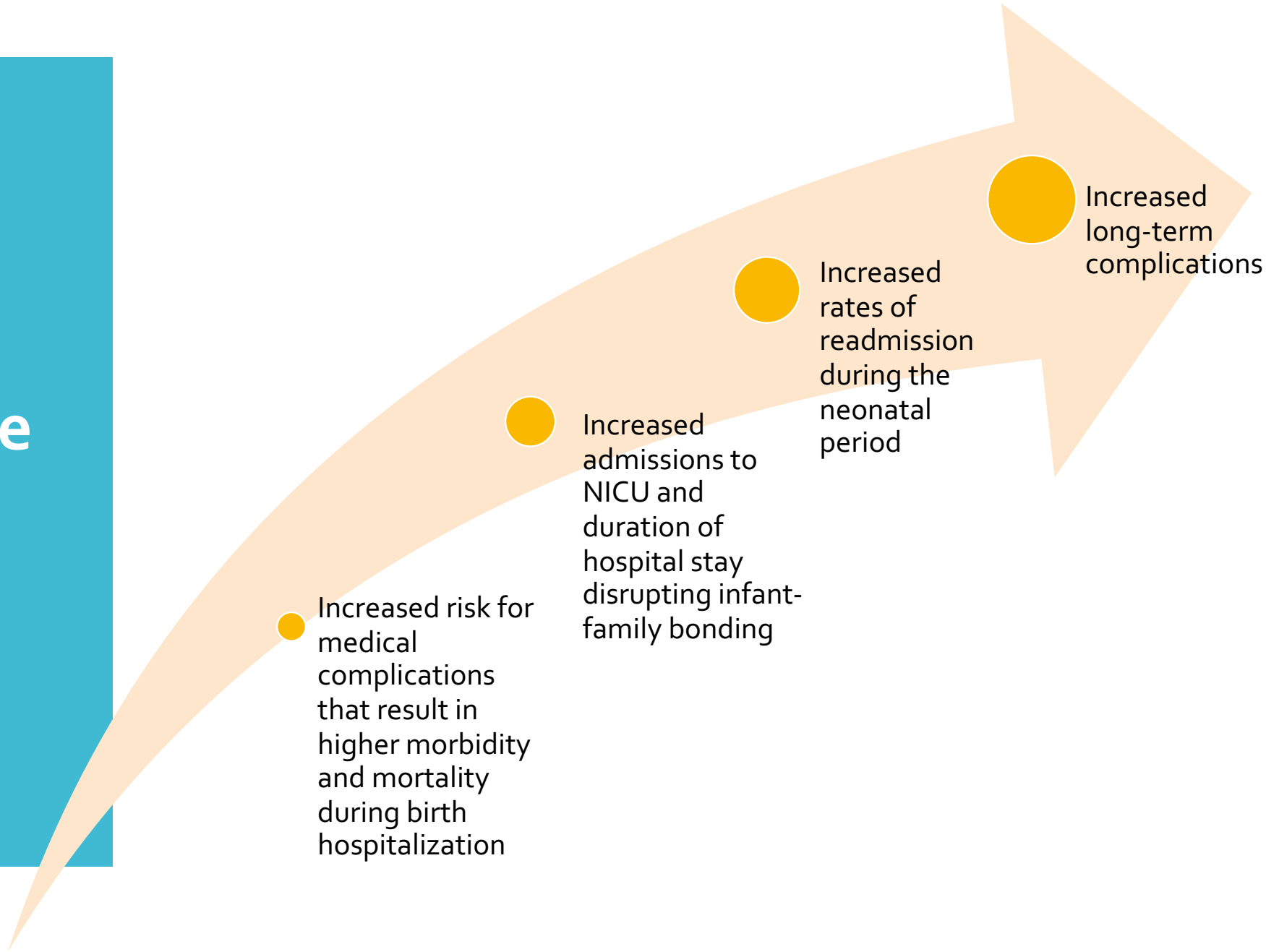
Preterm birth, or birth before completion of 37 weeks gestation, is the leading cause of neonatal mortality.

Nearly 75% of preterm births are to late preterm infants (LPIs), that is, **infants born between 34 weeks and 36.6 weeks gestation.**

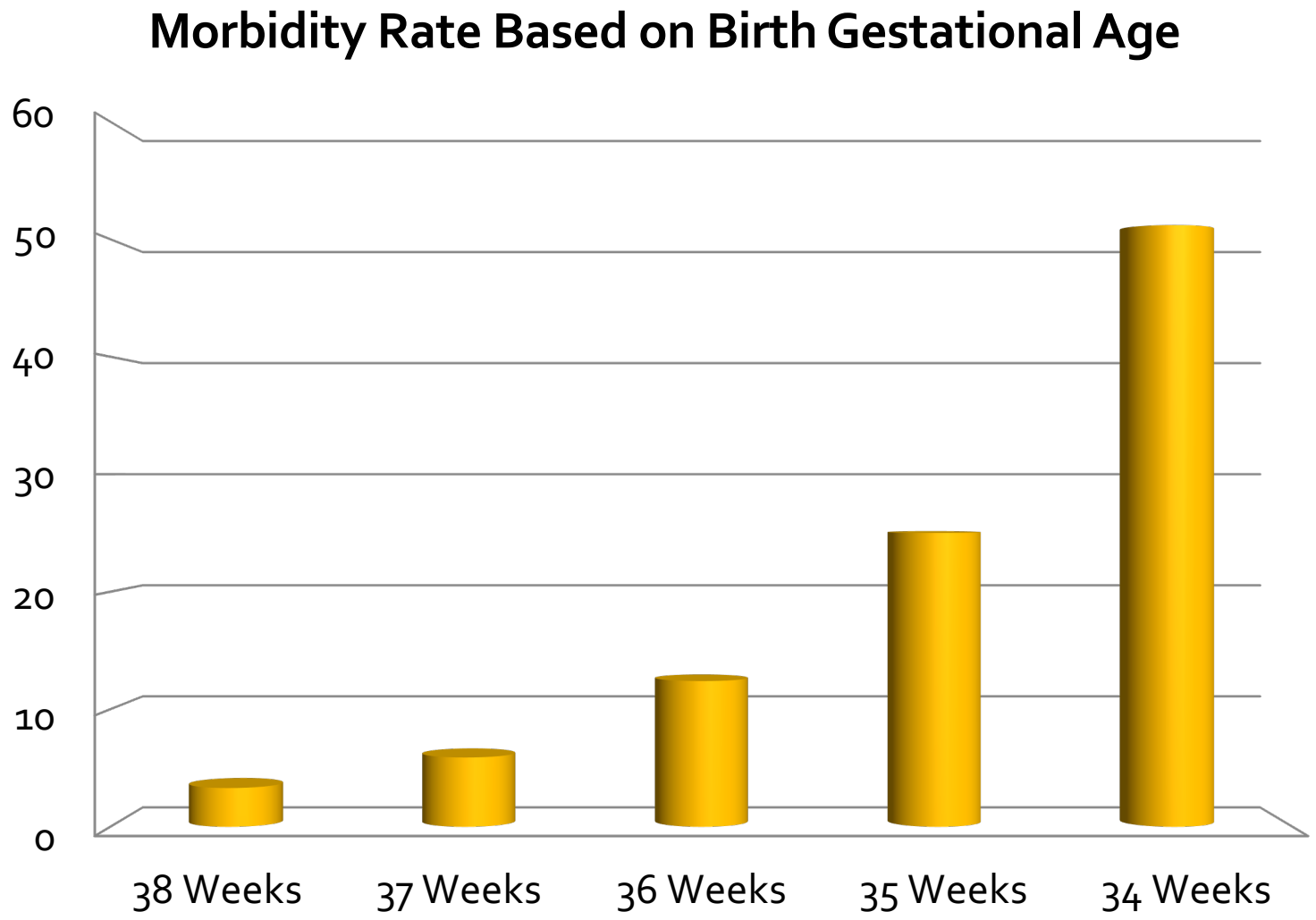
LPIs have higher morbidity and mortality rates because they are physiologically and metabolically immature.

LPIs have a 7-fold increased risk for comorbidities such as breastfeeding difficulty, hypoglycemia, hyperbilirubinemia, hypothermia, respiratory distress, sepsis and neurologic issues, over their full-term counterparts.

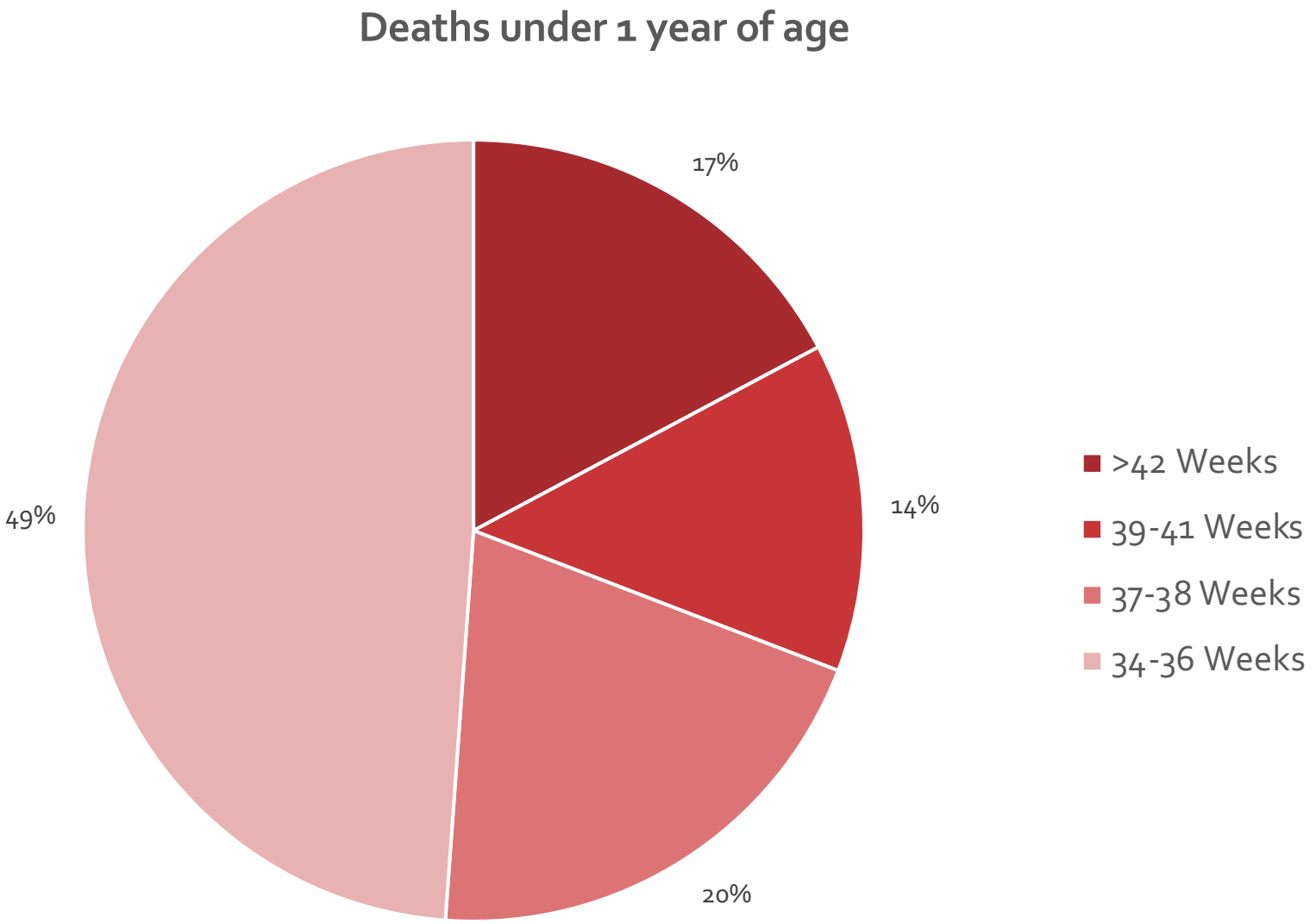
So what's the big deal?



Morbidity


Morbidity Rate Based on Birth Gestational Age
60
50
40
30
20
10
0
38 Weeks
37 Weeks
36 Weeks
35 Weeks
34 Weeks

Mortality


Deaths under 1 year of age
17%
14%
20%
49%
>42 Weeks
39-41 Weeks
37-38 Weeks
34-36 Weeks

Comorbidities increase mortality

Birth defects are responsible for **63%** of late preterm deaths

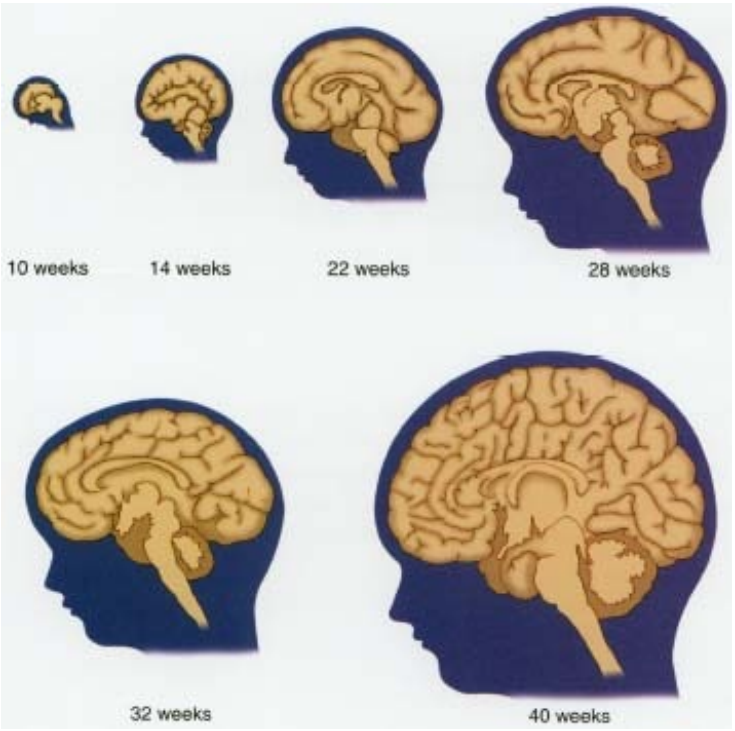
Small for gestational age (SGA) LPIs are **44 times** more likely to die within the first month

LPIs have been called "The Great Pretenders"

What you can see

- At first glance, this infant looks like a newborn. But he is actually an imposter—he's 37 4/7 weeks.

What you can't see



- The brain at 35 weeks weighs only 2/3 of what it weighs at 40 weeks with less myelination, less grey matter surface area, and an immature CNS.

Advice from AHONN…

"The best predictor of the needs of the late preterm infant is a skilled, experience nurse with a high index of suspicion."

Question 1

According to gestational age, what is the definition of a Late Preterm Infant?

1. Less than 37 weeks
2. 35 weeks to 40 weeks
3. 34 weeks to 36.6 weeks
4. 20 weeks to 28 weeks

Question 2

Why do LPIs have higher morbidity and mortality rates than term infants?

1. Because they are larger than term babies
2. Because they are usually delivered after 40 weeks gestation
3. Because they are usually delivered via C-section
4. Because they are physiologically and metabolically immature

Common problems in the LPI

1. Breastfeeding difficulty

- Functional immaturity is the biggest contributor to breastfeeding difficulty as LPIs tire easily, have an immature suck-swallow reflex, and may not adequately empty the breast of milk.

2. Hypoglycemia

- LPIs are at increased risk for hypoglycemia because they have inadequate compensatory mechanisms to deal with the postnatal decrease in blood sugar, plus they are poor feeders, prone to cold stress and underlying respiratory conditions, and are generally immature.

3. Hyperbilirubinemia

- Hyperbilirubinemia is seen more often in LPIs than in their term counterparts, which is exacerbated by the breastfeeding challenges they experience.

4. Hypothermia

- Large surface area compared to body weight and low amounts of brown and white fat contribute to LPI hypothermia risk.

Common problems in the LPI

5. Respiratory distress

- LPIs have a higher risk of developing respiratory problems requiring respiratory support when compared to term neonates, including RDS, TTN, pneumonia, apnea and bradycardia and pulmonary hypertension. Infants born at 34 weeks have a 40-fold increase of developing RDS vs. infants born at 39 weeks.

6. Immune System Immaturity

- Underlying mechanisms for increased rate for sepsis among LPIs include immature innate immunity, poor immunological responses, maternal infection including chorioamnionitis, and invasive procedures.

7. Intraventricular Hemorrhage

- LPIs are at higher risk for IVH when compared to term neonates.

8. Neurodevelopmental delays

- Later in life, late preterm infants have an increased risk for cognitive and speech delays, behavioral problems, and psychological disorders.

Key Assessments & Interventions for LPIs

Assessing Risk Factors & Gestational Age

- Assess factors in the prenatal and/or intrapartum history that increase risk for the following: respiratory distress, thermoregulation issues, hypoglycemia, sepsis, hyperbilirubinemia and feeding challenges.
- Obtain the neonate's length, weight, and head circumference and plot the results, ideally on a validated growth curve.
- Classify the newborn as small for gestational age (SGA), appropriate for gestational age (AGA), or large for gestational age (LGA).

Breastfeeding difficulty

Breastfeeding is best for LPIs!

Breastfeeding Difficulty: Causes

Gastro-Intestinal Immaturity

- Slowed transit
- Less UGT – slower bilirubin metabolism
- Increased enterohepatic circulation
- Poor muscle tone in lower esophageal spincter
- Immature gag reflex
- Low levels of pancreatic lipase and bile acid

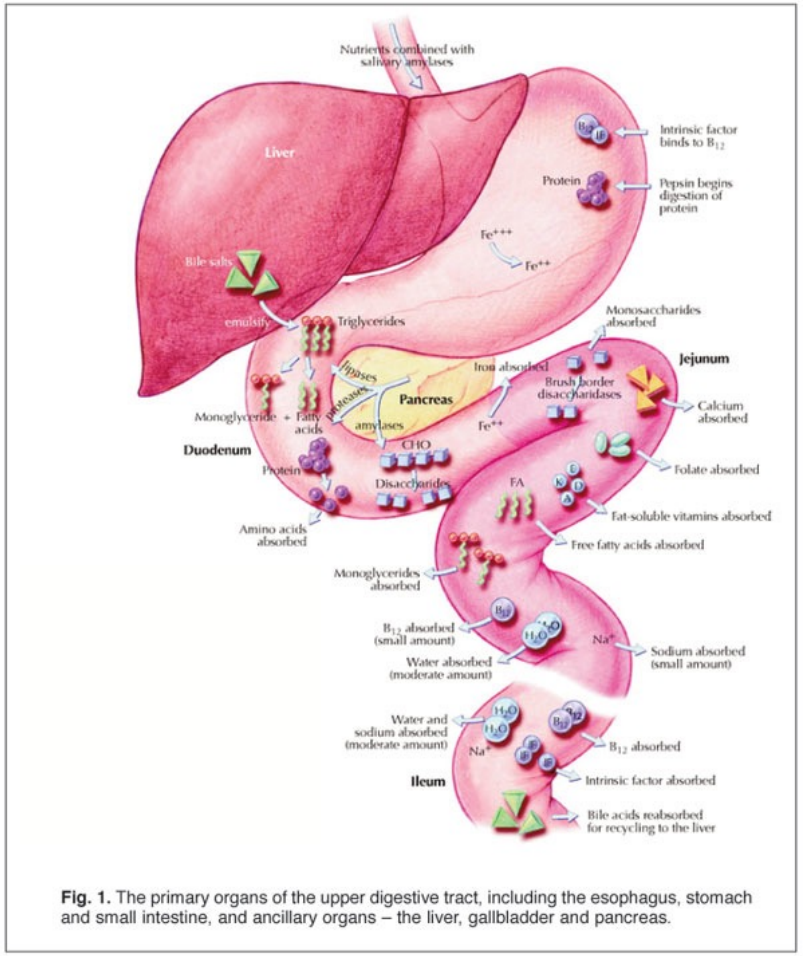


Fig. 1. The primary organs of the upper digestive tract, including the esophagus, stomach and small intestine, and ancillary organs – the liver, gallbladder and pancreas.

Breastfeeding Difficulty: Incidence

- Feeding difficulties affect 34% of late preterm infants
  - Defined as difficulty with latch, poor suck, apnea and/or dusky appearance with feeding
- Hyperbilirubinemia affects 18.8% of late preterm infants
- LPIs are at increased risk for reflux, aspiration, apnea, and bradycardia
- LPIs usually have a prolonged and delayed presentation

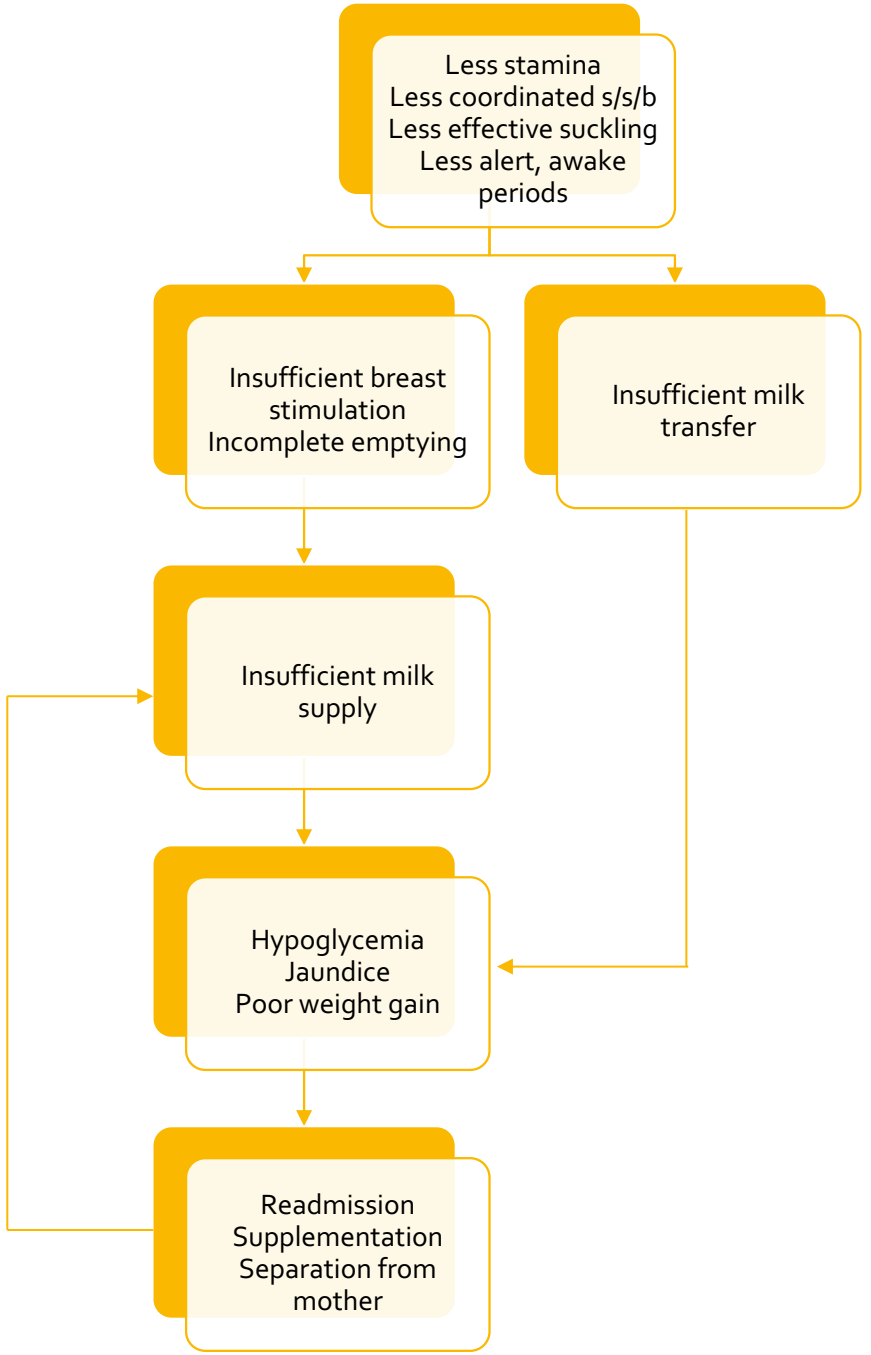
Breastfeeding Difficulty: Suck-Swallow-Breathe

- Suck-Swallow-Breathe
  - Present by 28 weeks but not mature
  - Emerging coordination of S/S/B is present at 32-34 weeks but not for sustaining nutrition
  - Full coordination of S/S/B does not emerge until 36-38 weeks
  - Discoordination of suck, swallow, breathe may persist past 40 weeks in some infants
- Swallowing reflex
  - Developed by 28-30 weeks but easily exhausted
  - Completely functional by 34 weeks

Breastfeeding Difficulty: Considerations of the LPI

- Decreased stamina
- Immature suck-swallow-breathe cycle
- Poor muscle tone
- Fewer alert-awake periods

Breastfeeding cascade for the LPI



Breastfeeding Difficulty”

Nursing Interventions

Risk Factors	Clinical Presentation	Clinical Application

• Late preterm infant
• Cleft palate or other oral-facial anomalies (i.e micrognathia)
• Prenatal drug exposure
• Infants of diabetic mothers
• Infants from difficult deliveries
	• Immature suck burst pattern
	  • 3-5 sucks followed by pause of equal duration (similar to non-nutritive suck burst pattern)
	  • Possible increased respiratory rate (catch-up breathing)
	  • Poor endurance
		• Encourage skin-to-skin contact
		• Ensure and monitor adequate I/O
		• Small, frequent feedings
		• Minimize time spent nursing/bottle feeding
		• Assess suck and swallow
		• Encourage triple feeding: breast-feeding, pumping, and supplementing with breast milk
		• Involve lactation consultant
		• Monitor weight loss

Remember…

- **L** Lots of Skin to Skin
- **P** Position appropriately
- **I** Initiate stimulation controls

- **C** Calories count
- **A** Adequate milk supply
- **R** Reinforce awareness of immaturity
- **E** Educate for discharge!

Key Assessments & Interventions for LPIs

Breastfeeding

- Facilitate early infant feeding as soon as possible after birth.
- Evaluate the coordination of sucking, swallowing, and breathing.
  - Observe for smooth, regular respirations, and hand activity near face with good posture.
  - Signs of stress include increased RR, coughing, and choking.
- Observe and help the mother identify behavioral feeding and satiety cues.
- Evaluate infants sleep wake cycle prior to feedings and monitor for physiologic stability during early feedings.
- Evaluate the mother's position for breastfeeding, latch, and milk transfer once per shift and at least twice per day after birth.
- Encourage the mother to pump at least two to four times daily between breastfeeding sessions to improve milk supply.
- Assess for potential complications associated with poor feedings such as hypoglycemia, hyperbilirubinemia, and increased weight loss.
- Provide supplemental feedings only if medically indicated.
  - Supplement with expressed breast milk, whenever possible.

Question 3

LPIs may experience breastfeeding difficulty for all of these reasons **EXCEPT**:

1. May latch but have a weak suck
2. May tire easily at breast
3. May not give feeding cues
4. May have shorter sleep cycles

Case study 1

Scenario:

Allison gave birth to a baby girl late yesterday evening, GA 35 6/7 weeks. It is now the start of your day shift and the infant has only had one feeding in the last 10 hours. She is sleepy and Allison reports she hasn't been able to wake her up for feedings, and besides, she was so tired she was grateful for the extra sleep.

What is your priority nursing intervention?

1. Check baby's blood sugar
2. Put baby to breast
3. Have Allison pump
4. Call a breastfeeding clinic nurse to do an assessment

Case study 1

Scenario:

You check the infant's blood sugar and it's 25. What should you do next?

1. Recheck baby's blood sugar to make sure your reading was correct
2. Put baby to breast
3. Initiate hypoglycemia protocol
4. Call the provider

Case study 1

Scenario:

The infant's next blood sugar is 55 so you discontinue the hypoglycemia protocol. Allison does not have a feeding plan for her LPI. What do you need to do to initiate this for her? (Select all that apply)

1. Obtain an LPI feeding plan handout for Allison
2. Fill out the LPI feeding plan for Allison and her baby girl
3. Review the LPI feeding plan with Allison
4. While you're writing up the plan, have Allison bottle-feed her baby with formula
5. Initiate a breastfeeding session

Hypoglycemia

Hypoglycemia

- Incidence of hypoglycemia
  - 15.6% LPI vs. 5.3% term infants
  - Nearly 2/3 LPIs will require supplemental IVF to correct
  - 1/3 may resolve with early and frequent feedings
- Glucose
  - Source of energy for organ function
  - Plasma Glucose Goal 40-50mg/dl
- Fetal Glucose
  - 70% of maternal value
  - Stored for later use as glycogen
- Carbohydrate Metabolism
  - Maternal glucose readily crosses the placenta = fetal hyperglycemia
  - Maternal insulin doesn't cross, so the fetal pancreas secretes insulin
  - After birth
    - Removal of maternal glucose supply + increased energy expenditure adjusting to extra uterine life
    - Hyperinsulinemia may occur and persist for 24-72 hours

Hypoglycemia: Pathophysiology

Immediate postnatal drop in blood glucose concentration is physiologic

Failure to increase after 4 hours is pathologic

If glucose consumption exceeds delivery, the brain uses alternate fuels (ketone bodies, lactic acid, free fatty acids, and glycerol)

Prolonged hypoglycemia, without compensation by supply of alternative fuels, may damage neuronal and glial cells of the brain

The hypoglycemic brain may be more vulnerable to the damaging effects of ischemia

Hypoglycemia:
Considerations of the LPI

- Decreased glycogen stores
- Decreased amounts of brown fat
- Immature metabolic pathways to make glucose
- Inadequate intake

Hypoglycemia: Nursing Interventions

Risk Factors	Clinical Presentation	Clinical Application

• Maternal
  • Diabetes
  • Glucose during labor, tocolysis or preclampsia
• Fetal/Neonatal
  • IUGR
  • SGA
  • Sepsis
  • Temp instability
  • Respiratory distress
  • Perinatal asphyxia
	• Hypoglycemia
	  • Jittery, tremors
	  • Exaggerated Moro reflex
	  • Hypothermia
	  • Temperature instability
	  • Poor muscle tone
	  • Lethargy
	  • Poor feeding
	• Complications
	  • Respiratory Distress
	  • Tachypnea
	  • Apnea
	  • Cyanosis
	  • Bradycardia
	  • Seizure activity
	  • DIC
	  • Coma
	  • Death
		• Perform postnatal glucose checks (Policy OB470)
		  • Before feedings for 24 hours
		• Monitor for s/s of hypoglycemia
		  • Lowest serum glucose levels occur 1-2 hours post-birth
		• Facilitate feeding within the first hour after birth
		• Monitor to ensure frequent feedings
		• Provide intervention if required

Key Assessments & Interventions for LPIs

Managing Hypoglycemia

- Perform a screening plasma glucose test by heel or venous sampling using the following recommended protocol:
  - Within the first 2 hours of life:
    - If infant is able to tolerate early feedings, the first glucose sampling should occur 30 minutes after the completion of the first feeding.
  - Before every feeding for the first 24 hours of life
  - If the baby is displaying symptoms of hypoglycemia.
- Provide early, frequent feedings on demand every 2–3 hours.
- If hypoglycemia is suspected or if the infant is symptomatic, regardless of gestational age, immediately assess glucose levels and report and record the results.
- Consider the use of oral dextrose gel to improve blood glucose levels in infants less than 48 hours of age.
- Target glucose screen is ≥ 45 mg/dL (2.5 mmol/L) prior to routine feeds.
- For neonates with continuing hypoglycemia, consider the need for additional diagnostic testing and possible transfer to NICU.

Question 3

True or False: Postnatal glucose checks should be performed on all LPIs.

Question 4

For how long after birth should the nurse perform glucose checks for the LPI?

1. 1 hour
2. 4 hours
3. 12 hours
4. 24 hours

Case study 1

Scenario:

Allison gave birth to a baby girl late yesterday evening, GA 35 6/7 weeks. It is now the start of your day shift and the infant has only had one feeding in the last 10 hours. She is sleepy and Allison reports she hasn't been able to wake her up for feedings, and besides, she was so tired she was grateful for the extra sleep.

You check the infant's blood sugar and it's 25. What is the **best** option for feeding the infant?

1. Put baby to breast
2. Have Allison pump and then bottle feed the expressed milk
3. Supplement with formula from a bottle/nipple
4. Supplement with formula from a cup (cup feeding)

Hyperbilirubinemia

Hyperbilirubinemia: Causes

- Conjugation of bilirubin takes place in the liver and is essential for its excretion into bile and subsequently into the intestine
- Neonatal liver conjugating mechanisms are reduced during 1st day of life
  - Unable to metabolize and excrete only 2/3 to 3/4 of bilirubin circulating throughout the body
- Takes the newborn liver 1-2 weeks to mature enough to handle the build-up of bilirubin in the blood
- Newborn may have diminished bowel motility and delayed meconium passage
- 2% bilirubin excreted in urine, 98% in stools

Hyperbilirubinemia

Pathophysiology

- Too much bilirubin in the blood
  - When red blood cells break down, bilirubin is formed
  - Infants are not easily able to get rid of the bilirubin and it can build up in the blood and in other tissues and fluids of the infant's body
- High levels of bilirubin (hyperbilirubinemia) produces jaundice

Hyperbilirubinemia

Incidence

- 25.3% of LPIs require phototherapy compared to 10.5% term
- LPIs are more susceptible to bilirubin toxicity
- Common reason for longer hospital stays and readmission
- Hyperbilirubinemia is more common and more prolonged in LPIs

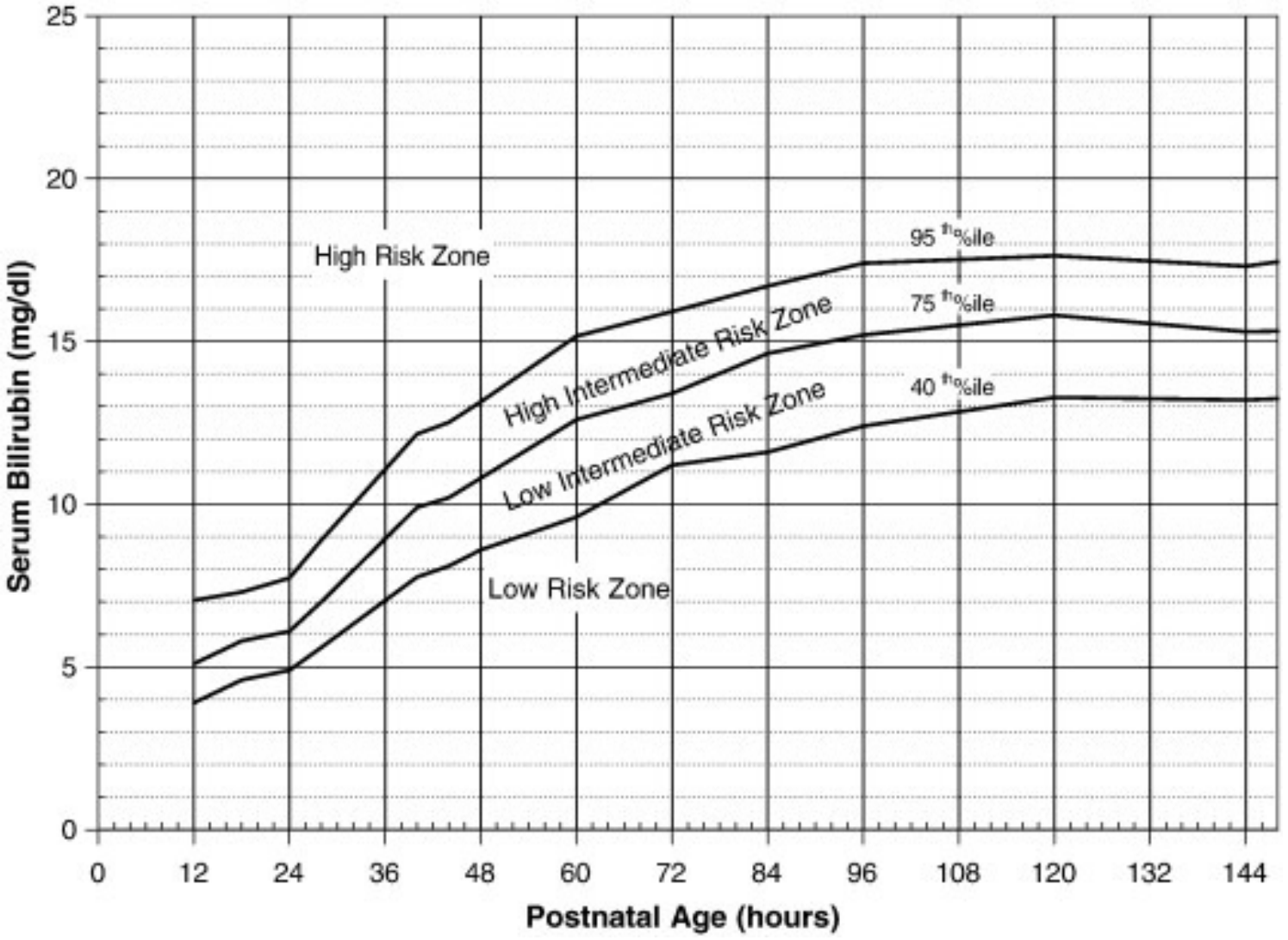
Hyperbilirubinemia: Considerations of the LPI

- Immature liver
- Decreased oral intake
- Delay in bilirubin metabolism
- Delay in bilirubin excretion

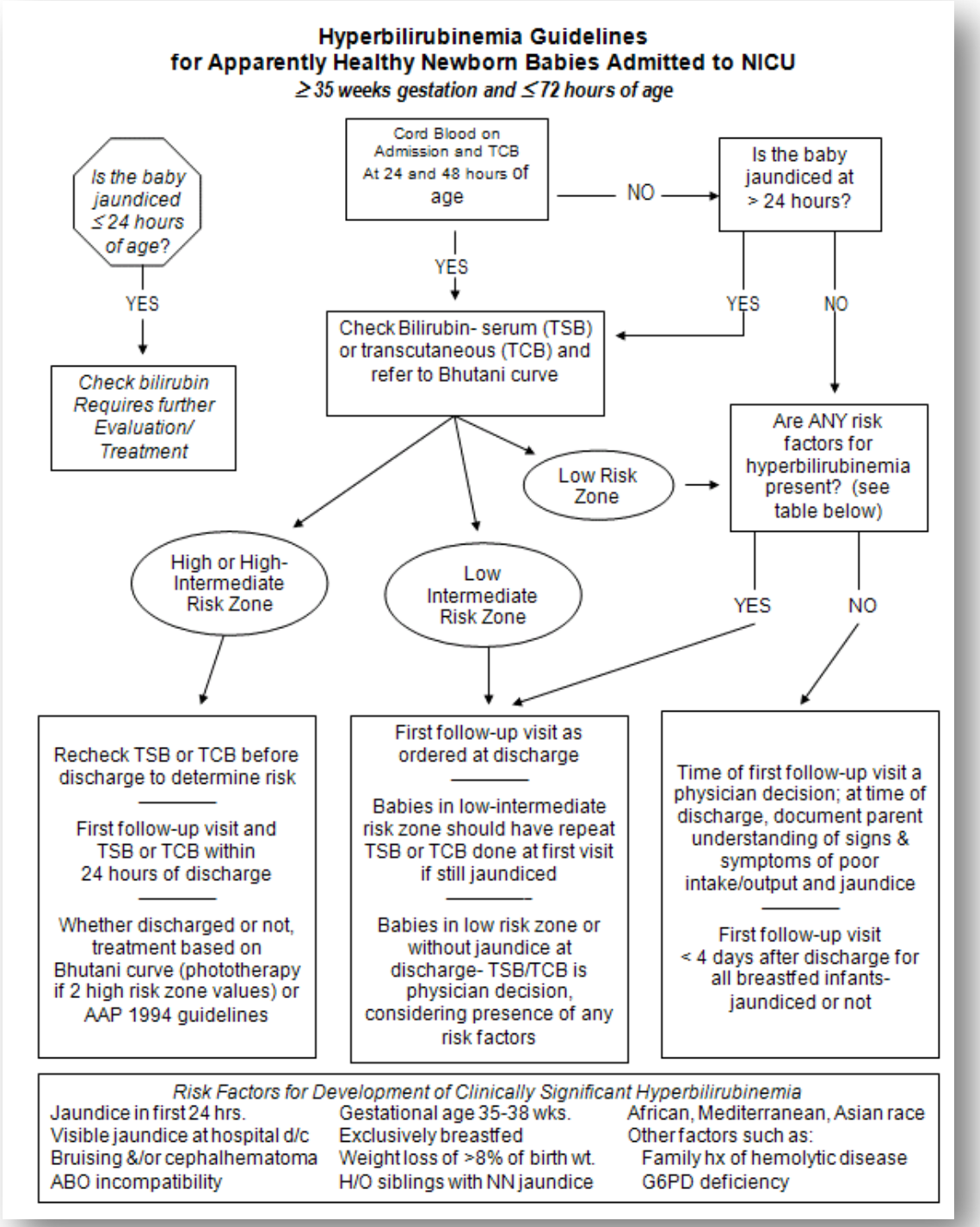
Hyperbilirubinemia: Nursing Interventions

Risk Factors	Clinical Presentation	Clinical Application
• GA 35-38 weeks • Visible jaundice in the first 24 hours of life • Visible jaundice at discharge • Hospital d/c prior to 72 hours of age • ABO incompatibility • Cutaneous bruising or cephalohematoma • Birth weight <2500g • Need for resuscitation at birth • **Ineffective breast-feeding (dehydration)** • >8% weight loss • Hx sibling jaundice • Insulin-requiring diabetic mother	• Yellowing of the skin, tissue, mucosa, sclera → JAUNDICE • Noticible when serum concentration reaches 3X normal amount • Yellow coloring begins in the face and moves down the body as levels get higher • Visible inspection is not enough for diagnosis	• Identify risk factors • Assess adequacy of feeding, voiding, and stooling • Evaluate visible jaundice within the first 24 hours • Obtain TC Bili and plot on curve • High-Intermediate Risk and High-Risk need to be called to provider • Check TC Bili prior to discharge

Hyperbilirubinemia: Normogram



Hyperbilirubinemia: Guidelines for treatment



Key Assessments & Interventions for LPIs

Jaundice & Hyperbilirubinemia

- Assess for the presence of jaundice in the first 24 hours and initiate immediate screening of total serum bilirubin if visible jaundice is present.
- Evaluate bilirubin levels prior to discharge using transcutaneous (TcB) or total serum bilirubin (TsB) levels.
- Plot TcB levels on an hour-specific bilirubin nomogram and identify the infant's risk of developing severe hyperbilirubinemia
- Ensure that phototherapy is initiated when the infant's bilirubin level reaches the threshold for treatment.
- Consider supplementing with expressed breast milk after feedings until breastfeeding is well established in infants with rising bilirubin levels or those with more than 10% weight loss.
- Monitor bilirubin levels for at least 24 hours after phototherapy has been discontinued.
  - Monitoring may be done with outpatient laboratory draws if needed.

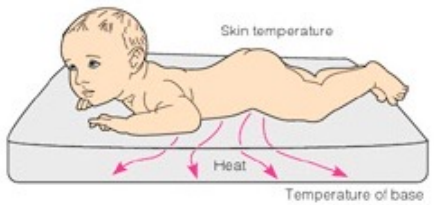
Hypothermia

Hypothermia

Pathophysiology

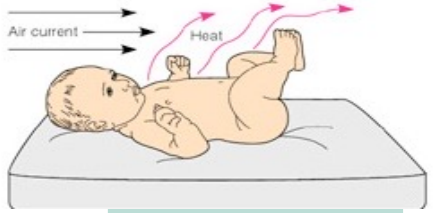
- Non shivering thermogenesis
  - Cold stress stimulates the hypothalamus to release epinephrine at the site of ***brown fat***
  - Major function: heat production
  - Axilla, nape of neck, between scapulae
  - Stores continue to increase 3-5 weeks postnatal life – mostly after 35 weeks
- Requires O_2 and glucose

Hypothermia:
Heat transfer mechanisms



Conduction

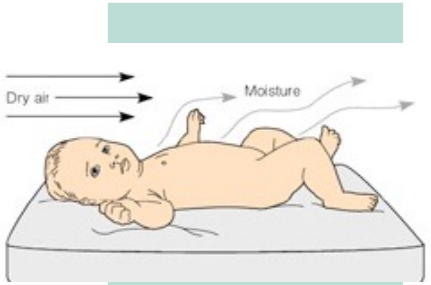
- Heat transfer by direct contact
- Varies with exposed surface area
  - Late preterm infant may not be able to change position
  - Decreased subcutaneous fat for insulation
  - Superficial blood vessels constrict



Convection

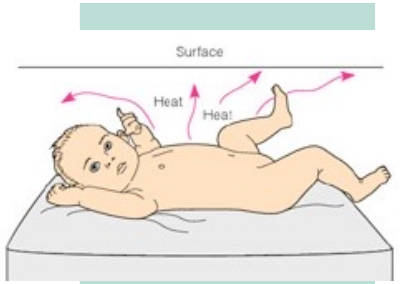
- Air currents remove the baby's boundary layer of warm air, moving heat away from the body
- Causes: ambient temperature, air flow velocity, relative humidity, cool oxygen during resuscitation

Hypothermia:
Heat transfer mechanisms



Evaporation

- Liquid is converted into a vapor
- Water losses through skin and respiratory system
- Major source of heat loss at delivery/bathing
- Dependent upon air speed and relative humidity



Radiation

- Transfer of radiant energy from the body to objects without direct contact
- Radiant warmer
- "Greenhouse effect" can lead to overheating

Hypothermia:
Considerations of the LPI

- Decreased brown fat
- Decreased white fat
- Higher surface area to mass ratio
- Poor reflex control of skin capillaries

Hypothermia:
Prevention

- Skin to skin contact
  - Place infant against parent's skin wearing only diaper; cover with blanket
  - Benefits: VS and O_2 more stable, improved sleeping patterns, close to mother for breastfeeding, increased bonding with both parents
- Warm all items that come into contact infant
- Position infant away from walls or windows to reduce heat loss
- Avoid exposing body of infant
- Increase ambient temperature in room/nursery
- If temperature instability occurs, take actions to stabilize
- If instability persists, consult with next-level care provider

Hypothermia: Nursing Interventions

Risk Factors	Clinical Presentation	Clinical Application

• At birth, wet baby placed in cold/dry environment
• Rapid cooling by convection and evaporation
• Increased activity, vasoconstriction, non-shivering thermogenesis
  • Increased energy use
  • Increased metabolic rate
  • Difficulty maintaining temp
  • Increased need for oxygen
	• Pale, cool to touch
	• Acrocyanosis
	• Respiratory distress
	• Apnea, bradycardia, central cyanosis
	• Irritability progressing to lethargy
	• Progressive or chronic cold stress
	• Potential complications: metabolic acidosis, respiratory distress, hypoglycemia, hyperbilirubinemia, apnea, central nervous depression, profound shock, multiple organ system failure, and death (If left untreated)
		• Monitor Body Temperatures
		  • Axillary temp every 1-4 hours
		  • 97.7-99.5 F (36.5 – 37.5 C)
		  • Skin Temp
		  • 96.8-97.7 F (36-36.5 C)
		• Safe radiant warmer utilization when necessary
		  • Skin servo-controlled
		• Maintain neutral thermal environment
		• Postpone bath

Hypothermia:
Restoring Thermoregulation

- **Remember, the best treatment is prevention!!**
- Initiate nursing measures
  - Add warmth, skin-to-skin or may need radiant warmer
  - Re-Warming Procedure
    - Should **begin immediately but done <u>slowly</u>**
    - Re-warm at a rate of ½ to 1 degree F per hour
    - Rapid re-warming increases the risk of apnea and intraventricular hemorrhage in preterm infant as well as respiratory distress symptoms
    - Assess the infant frequently (every 15-30 min)
- Investigate cause of low temperature

Key Assessments & Interventions for LPIs

Managing Thermoregulation Issues

IMMEDIATE ASSESSMENT AND CARE (FIRST 2 HOURS OF LIFE)

- Thoroughly dry the infant; place a warmed blanket over the back, and a dry cap on the head.
- Provide immediate skin-to-skin contact after both vaginal and cesarean birth whenever possible.
- If unstable, place the infant on a pre-heated radiant warmer.
- Assess the axillary temperature within the first 30 minutes of life.

Key Assessments & Interventions for LPIs

Managing Thermoregulation Issues

TRANSITIONAL & ONGOING CARE (2 HOURS AFTER BIRTH UNTIL DISCHARGE):

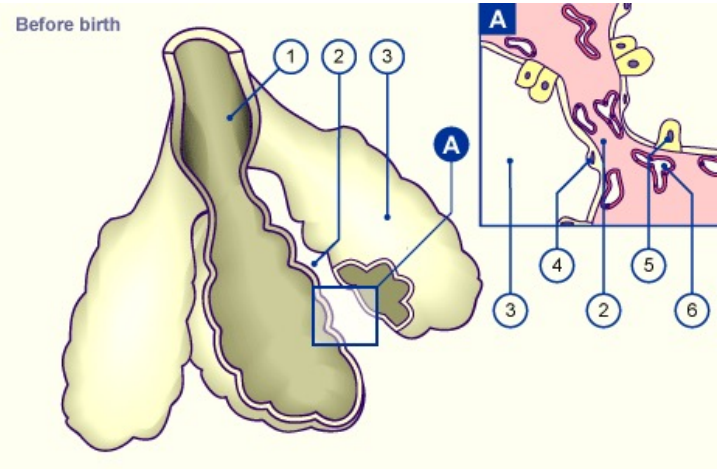
- Assess temperature every 30 minutes until the newborn's condition remains stable for 2 hours. (axillary temp. range: 36.5–37.5°C (97.7–99.5°F).
- Assess for signs of cold stress and take measures to avoid heat loss.
- Continue measures to maintain a neutral thermal environment (NTE).
- Postpone the first bath until respiratory and thermal stability are achieved, at least until 4 hours of age and ideally until 12–24 hours of age.
- Use environmental controls to maintain a NTE during and after bathing.
- Assess for hypoglycemia (may indicate hypothermia).
- For hypothermia:
  - Place infant in skin-to-skin contact or under radiant warmer
  - Take temperature every 30 minutes until it reaches normal limits
  - Review risk factors and other potential signs of illness

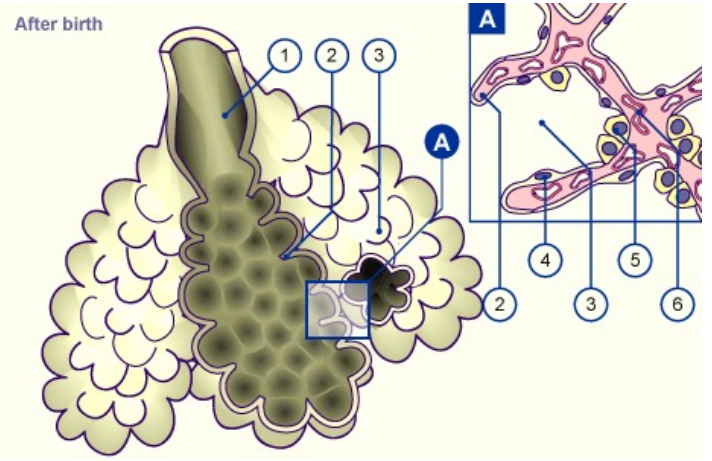
Respiratory Distress

Respiratory Distress

Physiology

- Lungs are filled with fluid in utero
  - 4-6 mL/kg at mid-gestation
  - 30-50 mL/kg near term
- Fluid moves up trachea and is swallowed or moves into amniotic fluid
- Volume of lung fluid mediated by larynx
- First breath must force fluid out





Respiratory Distress: Considerations of the LPI

- Immature lung structure
- Surfactant surge
- Decreased fetal lung fluid clearance
- Immature control of breathing
- Decreased airway muscle tone

Respiratory Distress: Nursing Interventions

Risk Factors	Clinical Presentation	Clinical Application

• Late preterm birth
• Elective C/S without labor
• Male
• Diabetic mother
• Prenatal or perinatal stress (e.g., HTN)
• Placental abnormalities
• PROM
• Traumatic delivery
• Affected by prenatal glucocorticoid treatment and surfactant replacement
	• Onset within minutes to hours of birth
	• Delayed re-absorption of lung fluid (TTN)
	• Tachypnea up to 120 breaths per minute
	• Grunting, flaring and retractions
	  • Incidence of symptoms: 29% vs 4% of term infants
	• Pallor or cyanosis with increasing hypoxemia
	• Decreased breath sounds/fine rales
	• Hypotension, decreased perfusion, tachycardia
		• Monitor RR and work of breathing
		• Maintain skin-to-skin contact if stable
		• If signs of respiratory distress are present, place pulse oximeter, stabilize infant, and consult provider
		• If signs of respiratory distress are persist, consider workup and/or transferring infant to higher level of care
		  • Blood gases
		  • Chest x-ray –
		  • CBC, Blood Culture – r/o sepsis

Key Assessments & Interventions for LPIs

Assessing for Respiratory Distress

IMMEDIATE ASSESSMENT AND CARE (FIRST 2 HOURS OF LIFE)

- Count the respiratory rate (RR) for a full minute (30–60 breaths/minute).
- RR may be irregular during the first 15 minutes (60–80, or up to 100 for a limited time).
- Note the signs of distress. If signs are present, initiate one or more of the following:
  - Request evaluation by MD or APRN
  - Administer supplemental O_2 (preferably monitored, heated, and humidified)
  - Apply pulse oximeter and monitor values (range 90%–95%).
  - Provide supplemental heat source
  - Monitor blood pressure and check blood serum glucose

Key Assessments & Interventions for LPIs

Assessing for Respiratory Distress

TRANSITIONAL AND ONGOING CARE (2 HOURS AFTER BIRTH TO DISCHARGE)

- Monitor RR, respiration type, tone, and activity every 30 minutes until newborn's condition is stable for 2 hours.
- Continue respiratory assessment every 4 hours for the first 24, then once per shift thereafter if stable.
- Encourage rooming-in and skin-to-skin contact whenever possible.

Immune System Immaturity

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Immune system Immaturity

- Incomplete activity of cellular immunity
- Lower neutrophils
- Lower IgG
- Mechanical barriers and mucosal surfaces decreased

Infection risk

- Sepsis
  - 19.7% of LPIs have a sepsis workup
- Meningitis
- NEC

Immune System Immaturity

Risk Factors	Clinical Presentation	Clinical Application

• Maternal GBS positive or unknown with inadequate antenatal antibiotic coverage
• Chorioamnionitis (maternal fever >100.4)
• Maternal cold/flulike symptoms
• Prolonged rupture of membranes (>18 hours)
• Fetal instability during labor and delivery
	• Respiratory Distress
	• Apnea
	• Temperature instability
	• Glucose instability
	• Pale, mottled, or cyanotic color
	• Lethargic
	• Feeding problems
	• Abdominal distention
	• Possibly vomiting
		• Assess and monitor for signs of infection
		• Teach parents and help to recognize early signs of infection
		• Initiation of septic workup and consult with next level care provider (possible transfer to higher level of care)
		  • CBC and Blood culture
		  • Start antibiotics

Key Assessments & Interventions for LPIs

Monitoring for Sepsis

- Anticipate that at least a limited diagnostic evaluation (e.g. CBC and vital signs monitoring) may be ordered in the asymptomatic infant born to mothers whose GBS status is unknown.
- For symptomatic infants, notify the primary care provider, anticipate the need for a sepsis workup, and initiate antibiotic therapy as ordered.

LPI Discharge education

Parent Education: Feeding & Hypoglycemia

- Teach about feeding
  - Feeding Plan = Team effort that includes the mother
    - STS Care
    - Determine the method of feeding
    - Protect mother's milk supply
    - Outpatient breastfeeding consult
  - Quality of feeding
  - Need to wake for feedings
  - Infant cues for feeding readiness
  - Normal output
  - S/S of dehydration
- Teach parents signs and symptoms of hypoglycemia and when to call provider
  - Poor feeding, hypothermia, abnormal cry, irritability, lethargy, tremors, jittery, change in level of consciousness

Parent Education: Breathing & Sleeping

- Review implications of immature brain for apnea risks, feeding and sleeping behaviors, tone, and development, including:
  - Apnea of prematurity and periodic breathing
  - Poor coordination of suck/swallow/breathe and need for pacing if bottle feeding
  - Increased sleep needs and need to wake for feeds
  - Decreased muscle tone and need for positioning support for airway and feeding/swallowing
  - SIDS Prevention (ALL PARENTS NEED THIS!)
- Teach how to recognize signs of respiratory distress and apnea
- Teach when to alert healthcare provider for immediate evaluation of infant, e.g., signs of breathing stress during feedings
- Identify environmental triggers that could affect breathing
  - Secondhand smoke

Parent Education: Temperature

- Review normal range of temperatures
- Show/tell how to obtain axillary temperature
- Describe home environment and clothing suitable for baby (stress importance of adequate clothing)
- Teach and encourage skin to skin
- Review signs and symptoms of thermal instability
- Review when to call provider

Parent Education: Jaundice

- Provide written and verbal information about jaundice, risks of kernicterus, and possible need for phototherapy to treat jaundice
- Stress importance of adequate and frequent feedings to minimize the risk of dehydration and jaundice
- Teach how to recognize signs and symptoms of jaundice
- Review when to call provider

Parent Education: Infection Prevention

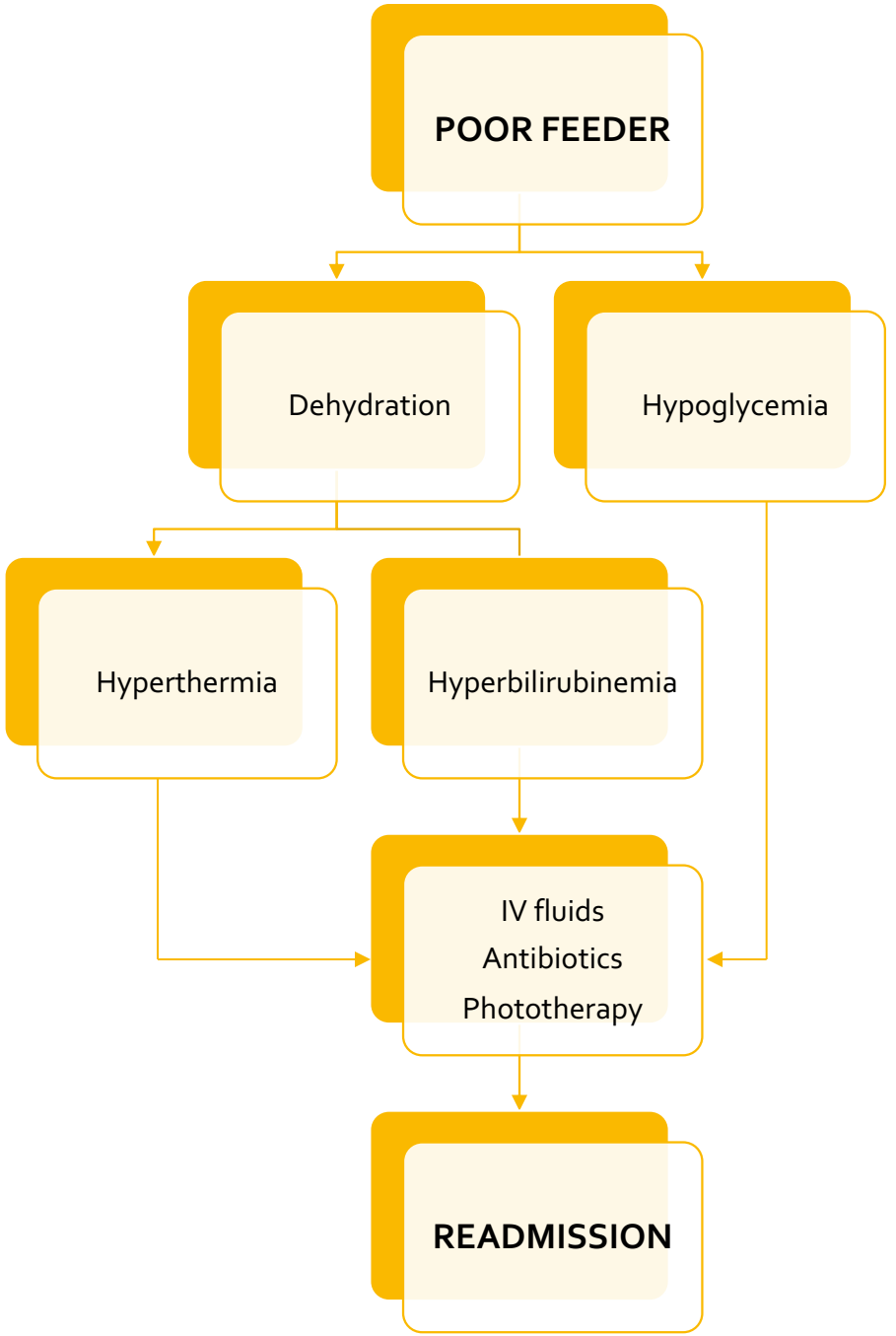
- Encourage good infection control hygiene measures
  - Handwashing
  - Limit visitors
  - Avoid crowds
  - Avoid contact with sick people
- Breastfeed for as long as possible e.g., during the first year or longer
- Review S/S of infection
- Review when to call provider
- Discuss immunization schedule and importance of following this for an LPI

Parent Education: Post-discharge Care

- Every baby is different
- Some presentations are delayed (jaundice, failure to thrive), therefore LPIs need to be follow closely
- Upon discharge, provide parents with written instructions for when to call provider
- Pediatric follow-up 1-2 days after discharge (3-5 days of life)
  - Weight check
  - Assessment for jaundice
  - Review of written feeding record
  - Parameters of adequate intake
  - Assessment of breastfeeding effectiveness
- Future follow-up
  - Information on lactation support and speech therapy if needed
  - Inform of possible need for extended follow-up

Readmission risk factors

LPIs are twice as likely than term infants to be readmitted to the hospital after their initial post-birth stay



Cost of readmission for LPIs

	Re-hospitalization rate	Total 1st year costs (after birth hospitalization)
Term	2.1%	$14,300
Late Preterm	4.2%	$28,500

What can we do?

- Increase awareness of health risks associated with LPI
- Provide lose monitoring for complications and early recognition of respiratory and feeding problems
- Trust our instincts and seek out specialized or higher level care when needed
- Provide additional support with breastfeeding
- Educate parents/family on the uniqueness of LPIs

Fact or Fiction of the LPI?

- Born up to 6 weeks early and misses the benefits of the last weeks of pregnancy _____
- Impersonate term infants by weighing or looking the same as full term infants _____
- Stable in the delivery room _____
- Usually admitted to the newborn nursery _____
- Given basic newborn care and parents given basic newborn care education _____
- More likely to be re-hospitalized _____

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