

**PEDIATRIC NEWBORN
MEDICINE CLINICAL
PRACTICE GUIDELINES**

Care of the Late Preterm
Newborn





Clinical Practice Guideline: Care of the Late Preterm Newborn

Points of emphasis/Primary changes in practice:

1. Approximately 8% of all births in the United States occur between 34 and 36 6/7 weeks of gestation.
2. Compared to their term counterparts, late preterm newborns are at increased risk for respiratory compromise, feeding difficulties, jaundice, hypoglycemia, hypothermia, and the need for sepsis evaluation. As a result, these infants have twice the risk for readmission after birth hospitalization discharge in the first month of life.
3. There is little consensus on the ideal model of care for late preterm newborns. The goal of this CPG is to review the existing literature on care recommendations and formulate guidelines for care at BWH that are based on evidence when it is available, and consensus when experience and clinical judgment must suffice.

Questions? Please contact: Division Chief, Well Newborn Pediatrics



Clinical Guideline Name	Care of the Late Preterm Newborn
Effective Date	7/1/16
Revised Date	
Contact Person	Division Chief, Well Newborn Pediatrics
Approved By	Newborn Clinical Practice Council <u>3/10/16</u> CWN Policy Procedure and Guideline Committee <u>4/13/16</u> BWH Standards Policy and Procedure Committee <u>4/20/16</u> Nurse Executive Board <u>4/25/16</u>

This is a clinical practice guideline. While the guideline is useful in approaching the care of the late preterm newborn, clinical judgment and / or new evidence may favor an alternative plan of care, the rationale for which should be documented in the medical record.

I. Purpose

The purpose of this CPG is to provide guidance for a standardized approach to the care of the late preterm newborn during the birth hospitalization along with discharge recommendations for care and follow up by the medical home.

II. All CPGs will rely on [the NICU Nursing Standards of Care](#).

III. Background/Summary Information

Rationale

Approximately 8% of all births in the United States occur between 34 and 36 6/7 weeks of gestation. The past decade has seen a surge in research that has begun to articulate the risks associated with even this mild degree of prematurity. Compared to their term counterparts, late preterm newborns are at increased risk for respiratory compromise, feeding difficulties, jaundice, hypoglycemia, hypothermia, and the need for sepsis evaluation.[1, 2] These infants have twice the risk for readmission after birth hospitalization discharge in the first month of life.[3] They continue to be at higher risk for both mortality and morbidity during their first year of life compared to full term newborns with issues such as poor growth, iron deficiency, and feeding problems of particular note. [4-7] An increasing body of literature is also identifying this population of children to have mildly elevated risks for adverse neurodevelopmental outcomes throughout childhood.[8] Finally, there is good evidence that the experience of parenting a late preterm infant may be uniquely stressful; studies show increased rates of maternal anxiety and lack of confidence among mothers of late preterm newborns compared to mothers of term newborns.[9] Given the large number of late preterm infants, even small increases in risk translate into significant public health impacts.

**Rationale (con't)**

There is little consensus on the ideal model of care for late preterm newborns. Surveys of birth hospitalizations reveal tremendous variability in where and how these infants are cared for, ranging from routine admission to the NICU to rooming in with their mothers on the postpartum ward. The goal of this CPG is to review the existing literature on care recommendations and formulate guidelines for care at BWH that are based on *evidence* when it is available, and *consensus* when experience and clinical judgment must suffice.

Scope

This CPG focuses on the care of the healthy late preterm newborn. The care of infants with significant respiratory disease, malformations, or other pathologic conditions is beyond the scope of this CPG. Although late preterm gestation is defined as 34 to 36 6/7 completed weeks of gestation, we have excluded infants from 34 to 34 6/7 weeks gestation from this CPG. 34 week infants are not regularly transferred to the mother-baby unit due to their more complex medical problems compared to other late preterms. Therefore, the current CPG would not encompass all relevant aspects of care for this group of infants.

Team Approach to Care

Optimal care of the late preterm newborn and his/her family requires a balance between close monitoring of the less mature infant and encouragement of contact between baby and family. Best care is provided when hospital staff share common philosophy and language as the family moves from the Center for Labor and Birth, the NICU, and the mother-baby unit.

• NICU RN Consultation for Plan of Care Education

The CLB RN should request consultation from NICU Nursing for all late preterm newborns under 36 weeks gestation before the baby's birth if possible to review the Plan of Care. Specific topics that will be covered during this consultation visit include:

- understanding and responding to parents' questions and concerns about their baby being born early
- neurodevelopmentally sensitive care
- monitoring for hypoglycemia
- thermoregulation and the importance of skin to skin care
- increased attention to feeding and nutrition
- monitoring for jaundice
- NICU observational stay for 35 week gestation newborns
- Hospital length of stay based on infant's physiologic and developmental readiness rather than fixed according to mother's postpartum length of stay

• Late Preterm Passport

The late preterm passport is a work list divided by hours of life for certain care tasks that need to be accomplished during the infant's hospital stay. It is not part of the permanent record but a work list to be passed to each area with the infant for staff communication. See attachment.

WNH I.6 Care of the Late Preterm Infant and Infants less than 2500 gms

<https://hospitalpolicies.ellucid.com/documents/view/3289>



ASPECTS OF CARE

I. RESPIRATORY MATURITY/CAR SEAT CHALLENGE

Late preterms are at risk for decreased muscle tone with airway compromise in a more upright position as well as immaturity of respiratory control leading to desaturation in an infant car seat. All late preterm infants should be given a car seat challenge prior to discharge. Parent information regarding specifications based on baby’s weight should be provided to families soon after admission so that they can provide the appropriate seat (or bed) for their child.

WNH C.1 infant car seat-car bed challenge

<https://hospitalpolicies.ellucid.com/documents/view/3247>

II. NUTRITIONAL GUIDELINES

Late preterm infants have unique nutritional needs that are higher than term born infants and lower than preterm infants born at <32 weeks post-menstrual age. Nutritional requirements are designed to accommodate exponential brain volume growth that occurs between 34-40 weeks gestation and ongoing bone mineralization; 80% of which occurs during the 3rd trimester. [6, 10]

a. Categorization SGA, AGA, LGA

Use of the Olsen growth charts is recommended for all infants born <37 weeks gestation. Olsen growth charts are available for use in EPIC. However, the WHO growth chart will default for all newborns at BWH. For infants born at <37 weeks, the provider will need to change over to the Olsen growth chart in EPIC. The Olsen growth charts are gender-specific intrauterine growth curves for weight-, length-, and head circumference-for-age based on a diverse United States population.[11] All infants should be plotted on the growth chart to determine their status as small (<10th percentile), appropriate (10th to 90th percentile), or large (>90th percentile for gestational age. Small-for-gestational age infants may be at higher nutritional risk than infants born appropriate-for-gestational age.

SGA per Olsen Growth Curves

GA at birth	Birth wt (Male)	Birth wt (Female)
35 weeks	≤ 2000 g	≤ 1900 g
36 weeks	≤ 2175 g	≤ 2000 g
37 weeks	≤ 2400 g	≤ 2250 g

LGA per Olsen Growth Curves

GA at birth	Birth wt (Male)	Birth wt (Female)
35 weeks	≥3100g	≥3000g
36 weeks	≥3400g	≥3300g
37 weeks	≥3750g	≥3700g



b. Glucose homeostasis

Late preterm infants are at risk for hypoglycemia. Please refer to:
Neonatal Glucose Assessment and Clinical Management Clinical Practice Guideline

http://www.bwhpikenotes.org/Departments_Centers/NewbornMedicine_NICU/1110_DPNM_Hypoglycemia_FINAL_w.dates_1110.pdf

WNH B.2 Infant Heel stick Blood Sampling

<https://hospitalpolicies.ellucid.com/documents/view/3242>

c. Macronutrients/Micronutrients

The values indicated in the table below are theoretical values per GA group and are intended for general guideline and informational purposes. Intake should be adequate for age appropriate growth trends.

Nutritional needs by GA (weeks)

Variables (per kg/d)	GA, weeks		
	34-36	37-38	39-41
Energy: kcal	127	115	110
Protein, g	3.1	2.5	2
Calcium, mg	120-140	70-120	70-120
Phosphorus, mg	60-90	35-75	35-75

Adapted from: Lapillone A, et al. Nutritional Recommendations for the Late-Preterm Infant and the Preterm Infant after Hospital Discharge. J Peds. 2013;3:S90-100.

Feeding selection for Late Preterm Infants

Breast milk is the preferred feeding for all infants. Neonates born between 35-37 weeks may need additional supplementation to meet their unique nutritional needs. Supplemental feeding regimens are designed to prioritize as much maternal milk, and feeding at breast as possible, without sacrificing essential energy and nutrients required for optimal growth and development. Late preterm infants are also at risk for feeding difficulties. All late preterm infants, especially those born less than 2000 grams, should be closely monitored for growth adequacy, with a low threshold for supplemental feedings of preterm or post-discharge infant formula if suboptimal growth is noted.



During the first 48 hours of life, plain human milk feedings are encouraged as intake volumes increase. Donor milk is appropriate during this time. If supplemental feeds are required after 48 hours of life, donor milk may be phased out early (prior to 5 days of life) to ensure adequacy of growth on the discharge regimen. If infant formula is to be used, either as a supplement to breast milk or as a standalone feed, the feeding selections as outlined in the table below are suggested.

WNH B.9 Infant Feeding

<https://hospitalpolicies.ellucid.com/documents/view/9605/>

[WNH F.4 Infant Formula Use and Storage.](#)

[WNH A.1 Alternate Feeding Methods for Infants](#)

[WNH H.4 Use and Storage of Pasteurized Donor Human Milk \(PDHM\)](#)

[WNH H.6 Human Milk Administration](#)

Suggested feeding selection guidelines

(Intended for orally fed late preterm infants after 48 hours of life)

Feeding Type	<1800g	1800-2000g	2000-2500g	>2500g
Exclusive Breastmilk	50% feeds Enriched MM @ 25 kcal/oz	≥2-3 feeds/day of Enriched MM @ 25 kcal/oz	Breast feed ad lib with close feeding/lactation follow up	
Combination Breastmilk and Formula	≥50% feeds preterm infant formula @ 24 kcal/oz	PDF until due date	PDF until due date	Standard formula
Exclusive Formula	Preterm infant formula @ 24 kcal/oz			

***Breastmilk** (MM) includes breastfeeding, expressed mother’s milk, and pasteurized human donor milk

***Preterm infant formula:** Ready-to-feed is 20, 24 or 30 kcal/oz **REQUIRES EDUCATION TO CWN STAFF RE: OBTAINING THESE PRODUCTS**

Enfamil Premature Infant Formula, Similac Special Care Infant Formula

***PDF (Post-Discharge Formula):** Ready-to-feed is 22 kcal/oz Enfamil EnfaCare, Similac Expert Care NeoSure

***Standard formula:** Ready-to-feed is 20 kcal/oz Enfamil Newborn, Similac Advance

***Enriched Mother’s Milk:** To make 25 kcal/oz: Mix expressed mother’s milk and Enfamil Premature 30 kcal/oz or Similac Special Care 30 kcal/oz 1:1 (example 1 oz MM : 1 oz SC30)

NOTE: Nutrition consult should be requested for all infants with BW<1800gm. See Section II d. for further clarification.

NOTE: If the infant is discharged on any feeding product other than standard term formula and on WIC; ensure *Request for Special Formula and Food* form is filled out and given to families. They are then to pass along to Pediatrician at first appointment. Form can be found here:

www.mass.gov/eohhs/docs/dph/wic/special-formula.pdf



Micronutrient supplementation for Late Preterm Infants

All infants require 400 units Vitamin D/day. This is difficult to meet with human milk alone. Full term infants are born with ~4-6 months of iron stores to last until iron-rich and/or iron fortified foods are added. However, preterm and late preterm infants are not born with the same reserves. Infants of diabetic mothers and SGA babies have low iron stores as well. Thus, vitamin D and iron supplementation should be considered in all late preterm infants. (AAP CON 7th edition 2014)

	Vitamin D3	Iron
Exclusively human milk-fed	400 units/day	2 mg/kg/day
Partially human milk-fed	400 units/day	1-2 mg/kg/day
Exclusively formula fed	200 units/day	-

d. When to consult nutritionist:

Feeding type	<1800g	1800-2000g	2000-2500g	>2500g
Exclusive breastfeeding	<p style="color: red; text-align: center;">Consult Nutrition within first 48-72 hours of life</p>	<p style="color: blue; text-align: center;">Consider Nutrition consult within first 48-72 hours of life</p>	<p>MD discretion</p>	
Bottle/breastfeeding breast milk				
Bottle/breastfeeding breast milk and formula		<p style="color: green; text-align: center;">MD discretion</p>		
Exclusive formula feeding				

e. Nutritional discharge teaching and education

Refer to DPNM Intranet site for the following: Select discharge recipes, WHO guidelines: How to Prepare Formula for Bottle-Feeding at Home, how to obtain specialized preterm infant formula products at discharge. (Recipes/instructions, how to obtain preterm infant formulas, WIC info) [DPNM>Nutrition](#)
 Continuing the discharge nutrition regimen until term corrected age, to accommodate for increased needs during this time, is suggested. Beyond term corrected age, the pediatrician should follow growth closely and adjust based on growth/anthropometric parameters.



III. **BREASTFEEDING SUPPORT**

In addition to the known hypotonia and immaturity of late preterm infants, there is tremendous variation in maternal breast and infant oro-facial anatomy. All of this contributes to the challenge for successful breastfeeding in this population of newborns during the birth hospitalization. It is helpful to inform and reassure families that as their baby matures, breastfeeding will become easier and that it is often possible to exclusively breastfeed by the expected due date if not sooner with extra support from their pediatrician and/or a lactation consultant after discharge.

Goal is to use evidence based strategies to:

- Protect infant hydration and growth
- Establish and preserve maternal milk supply until complete feeding at breast can be achieved
- Facilitate baby to breastfeed

a. **Recommendations for support of optimal lactation**

- If mother and infant are medically stable after delivery, place infant skin to skin (STS) immediately following birth.
- Allow free access to breast so that the first attempt to breastfeed occurs within the first hour after birth. Encourage mother to put baby to breast at least every 3 hours (8-12x/24 hrs) and more often if baby shows feeding cues. Encourage extended periods of STS for 30 mins prior to each breastfeeding. Observe feedings as often as feasible to help optimize latch and positioning.
- Document LATCH score at least once every shift.
- Teach mother to hand express and pump. . Begin hand expression and/or pumping within 6 hrs after delivery if breast feeding is ineffective and within 3 hours if mother and baby are separated (e.g. baby in NICU).

[WNH B.3 Breast Pump Use and Skilled Hand Expression](#)

- Allow rooming-in 24hrs/day if infant is physiologically stable.
- A lactation evaluation is recommended within the first 24hrs of life and then daily through the birth hospitalization to fine tune the breastfeeding dyad's needs.
- Along with the infant's immaturity, consider maternal risk factors for low or delayed milk supply:
 - Cesarean section
 - Significant breast edema/engorgement, ineffective or infrequent milk removal
 - Magnesium sulfate
 - Diabetes
 - Obesity
 - PIH, PTL and PPH
 - Hypothyroidism
 - Breast surgery
 - Breast hypoplasia
 - PCOS

b. **Evidence of successful breastfeeding**

- Established maternal milk supply
- Signs of milk transfer (audible swallowing, pre/post weights)
- Signs of adequate infant hydration:
 - <3% per day weight loss
 - <8% total weight loss



- Voiding/Stooling Minimums
 - DOL 1 –1 void/1 stool
 - DOL-2-- 2/2 (no more than 12 hrs. between voids)
 - DOL-3—3/3 (no more than 8 hrs. between voids, green stools)
 - DOL -4—6-8 voids and at least 3-4 yellow stools/day

c. Recommendations for supplemental nutrition

Late preterm infants may breastfeed effectively on DOL 1 and then gradually become tired and receive less breast milk transfer during feedings by DOL 2-3. Therefore, the following infants will need assessment for possible supplementation with breastfeeding:

- Birth weight <2500 gms
- Poor reserve evidenced by temperature instability or hypoglycemia
- Poor feeding as evidenced by LATCH score <7 or <10 minutes of effective breastfeeding for 2 consecutive feedings
- Use of nipple shield during colostrum phase
- Weight loss >3% per day, or >8%
- Marginal or inadequate output

Guidelines for the quantity of supplemental feedings

- 0-24 hrs- 5-10 ml/feeding
- 24-48 hrs- 10-20 ml/feeding
- 48-72 hrs- 20-30 ml/feeding
- 72 hours and beyond - 30 ml or more/feeding

(For type of supplemental feedings, please refer to ‘Suggested feeding selection guidelines’ in Nutritional Guidelines section)

d. Method of supplementation

This will be dependent on the infant’s abilities and parents’ choice and may include one of more of the following:

- Direct breastfeeding
- Nipple shield if baby is unable to latch or sustain latch
- SNS (5 Fr feeding tube)with direct breastfeeding or use with cup/finger-feeding
- Externally paced bottle feeding (described in detail below in Section IV)

WNH A.1 Alternative Feeding Methods for Breastfeeding Infants

e. Provide each family with an individualized feeding plan to include the following:

- Use awake times for feeding first and delay other care until after feeding (e.g. diaper changing)
- Feed as often as infant cues with a minimum of every 3 hrs (8-12 feedings/24 hrs)
- If infant is able, try to feed for a minimum of 10-20 minutes of effective feeding
- If infant tires easily and requires supplementation, , limit direct breastfeeding attempts to 10-15 minutes and consider limiting number of breastfeed attempts per day. Try to limit overall (breastfeeding and supplements) feeding times to 30-40 minutes. This will help to conserve the baby’s energy for growth.



IV. FEEDING DIFFICULTIES

Overview and general bottle feeding approach (SOFFI model) for infants who receive any bottle feeds

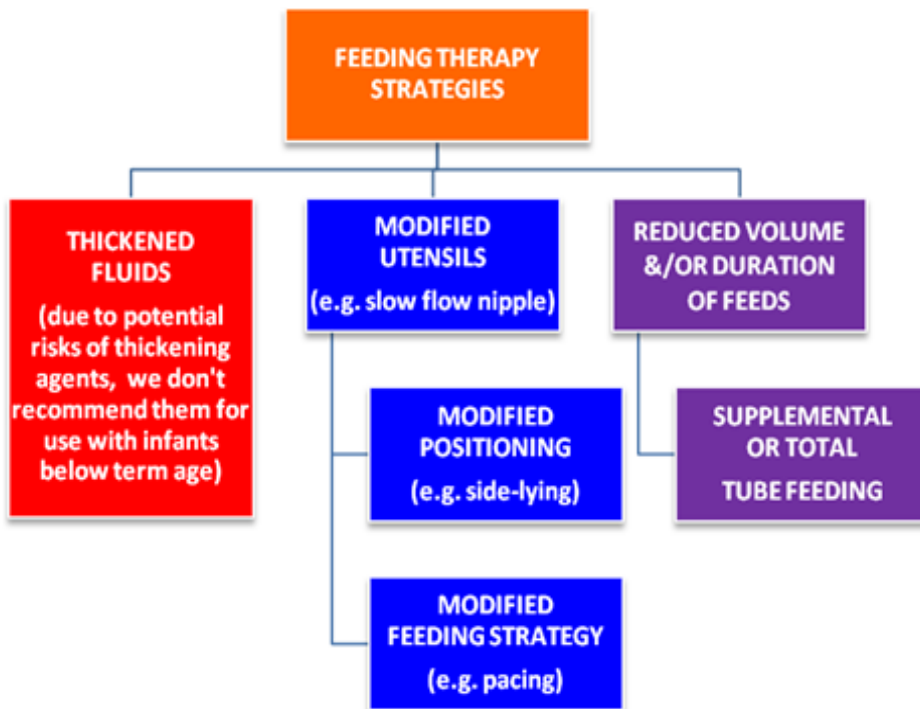
In general, staff should consider starting first bottle feed with standard newborn bottle (level 1, such as Enfamil GREEN ring disposable nipple or a Level 1 nipple brought from home) and hold the infant in a standard feeding position (i.e. traditional cradle hold). Similac brand clear rimmed nipples (which are approximately level 2 or 3) are not recommended for newborns because of their faster flow. The concerns with using a faster nipples are potential airway compromise (increased work of breathing, aspiration, apnea), reduced patient enjoyment of feeding (stress, reduced engagement with feeder, and potential development of aversion to feeds), and possible flow confusion if moving between breastfeeds and bottle feeds.

If needed (i.e. if the infant shows any stress cues or lack of engagement), implement the following compensations in the following order until a suitable option is found:

- Slower flowing bottle nipple
- Horizontal milk flow
- External pacing

Using this approach in the birthing hospital has been shown to result in improved infant feeding in the weeks following birth, as well as improved infant feeding and parent stress at 3 months of age[12, 13].

Recommended therapeutic feeding interventions as outlined below may include special feeding equipment, positioning, and/or feeding strategies (e.g. externally paced feeds); smaller more frequent feeds, or gavage tube feeding (supplemental or total).





a. Therapeutic feeding EQUIPMENT

Slower flowing bottle nipples may be used to assist the infant to regulate milk flow and assist with suck-swallow-breath coordination.

In addition, given that milk flow from the breast is generally not as fast as many fast flow bottle nipples, the use of slower flowing bottle nipples when bottle feeding may assist with transition to breastfeeding.

Currently, the Dr Brown’s brand ‘Preemie’ and ‘Ultra Preemie’ are the slowest nipples that are widely available in the US market. They are slower than the slowest disposable bottle nipple available in the hospital (Enfamil green ring disposable nipple). In addition, they are more reliable (i.e. there is more consistency between nipples) compared to disposable nipples (which often vary widely in flow – even if marked as being ‘slow’).

Flow rate	Description	Hospital product	Home product
Ultra slow flow	Therapeutic	Dr Brown’s Ultra Preemie	Dr Brown’s Ultra Preemie
Very slow flow	Therapeutic	Dr Brown’s Preemie	Dr Brown’s Preemie
Level 1	Newborn, 0-3 months	Enfamil green ring	Any brand of level 1/ newborn nipple
Level 2	3-6 months		Any brand of level 2 nipple
Level 3	6+ months	Enfamil blue ring	Any brand of level 3 nipple

b. Therapeutic feeding POSITIONING

Given that fluids flow more slowly when a bottle is held horizontally vs vertically, the use of horizontal milk flow may be used to assist the infant to regulate milk flow and assist with suck-swallow-breath coordination.

In addition, given that many infants are held in a horizontal position when breastfeeding, the use of this position when bottle feeding may assist with transition to breastfeeding.

It is easiest to achieve horizontal milk flow if the infant is positioned in a supported upright position or in a side-lying position for PO feeds. Avoid feeding infants in a reclined/ supine position.

Parent training will be required when using therapeutic positioning. Developmental therapists and RNs may be involved in performing parent training.[15-17]

c. Therapeutic feeding STRATEGIES

External pacing may be performed on a schedule (e.g. every 3 sucks) or on demand (i.e. cue based).

External pacing is a strategy that may be used if an infant is having difficulty self-coordinating sucking, swallowing, and breathing.

External pacing involves either/ both:

- tipping the bottle can reduce the amount of milk in the nipple and slow milk flow
- removing the nipple from the infant’s mouth to impose a break in sucking to allow the infant to catch their breath.

Parent training will be required when using therapeutic strategies, such as external pacing.

Developmental therapists and RNs may be involved in performing parent training.[15, 18]



d. DOCUMENTATION of therapeutic feeding strategies

If a staff member assesses that a certain bottle nipple, position, and/or strategy is useful for an infant, this should be documented in the infant's electronic medical record. Other staff members should continue use of the recommended bottle nipple, position, and/or strategy unless they assess that this is no longer useful. If so, the reason for this change should be documented in the infant's electronic medical record.[14] – *just changed line spacing here to fit with rest of document*

e. REFERRAL for feeding therapy:

Late preterm infants should be observed closely when feeding whether by bottle or at breast. Evaluation for formal assessment of feeding skills by a developmental therapist should be undertaken for:

- Concerns regarding airway protection/ aspiration during feeding (e.g. Any cyanosis, increased work of breathing, increased congestion, or coughing/ choking with feeds)
- Concerns regarding sucking dysfunction (e.g. persistent drooling of milk, poorly coordinated or weak suck, or inability to take in minimum fluid goals lasting more than 2 days or beyond 3 days of age).
- Infants with cleft lip/ palate

V. THERMOREGULATION

WNH T.1 Infant Thermoregulation <https://hospitalpolicies.ellucid.com/documents/view/3316>

CPG Infant Sleep and Therapeutic Positioning

http://www.bwhpikenotes.org/policies/departments/NICU/documents/DPNM_Infant_Sleep_and_Therapeutic_Positioning_CPG.pdf

a. Quiet warm environment

When a late preterm infant is provided with an environment that is quiet (except for the voices of loved ones and caregivers), dimly lit, and there is limited exposure to cooling, the infant may have decreased unnecessary energy expenditure during the transition to life outside the womb.

b. Room temperature

Encourage mother to maintain room temp between 72-75°F

c. Skin to Skin Care

WNH S.1 Skin to Skin Care <https://hospitalpolicies.ellucid.com/documents/view/3309>

Research has shown that skin to skin warming is at least, if not more, effective as warming with an incubator and more effective than adding blankets, as blankets quickly cool to room temperature. STS for at least 1 hour allows for the infant to complete a normal sleep cycle and benefits thermoregulation.

In recent years, some cases of severe unexpected postnatal collapse (SUPC) have been associated with newborns being positioned prone on their (most often primiparous) mothers for breastfeeding or skin to skin time. Proper instruction in breastfeeding and skin to skin positioning, vigilance around maternal somnolence, and close surveillance of the skin to skin or breastfeeding dyad is of critical importance.



Late preterm infants should remain STS for at least one hour after birth if baby is physiologically stable. STS should be used for warming if temp is less than 36.5° C (97.7°F) but greater than 35.6 C (96.1°F). STS should continue or, **if birth weight is less than 2000 gms, staff should consider placing infant in incubator on ISC probe for first 24 hours when (s)he is not skin to skin.** To ensure that baby will not be stressed by over warming or cooling, gentle warming is recommended with temperatures taken every 1-4 hours depending on thermal condition. If the temperature is less than 36.5° C (97.7°F) or greater than 37.2°C (99°F) then increase/decrease radiant temperature one degree at a time or add /remove warm blankets during STS.

d. **Review signs of hypothermia and hyperthermia**

Signs of hypothermia should be reviewed with families/caregivers and include: pale, mottled, skin cool to touch, acrocyanosis, irritability, lethargy, poor feeding, respiratory distress, apnea, bradycardia, central cyanosis. Progressive or chronic cold stress can lead to hypoglycemia, hyperbilirubinemia, acidosis, respiratory distress.

Signs of hyperthermia should also be reviewed with families/caregivers and include: flushing/reddened skin, sweating, warm to touch, tachypnea, tachycardia, apnea, hypotonia, weak cry, irritability, lethargy, poor feeding. Progressive or chronic hyperthermia can lead to dehydration, hypotension, and apnea and is a risk for SIDS.

e. **Discuss appropriate dressing**

Appropriate dressing should be discussed with parents. Initial weaning from STS or incubator may include shirt, hat and 2 blankets but infants should be challenged without a hat for 24 hours before discharge to home per safe sleep CPG and to ensure adequate temp regulation before discharge.

f. **Bathing and thermoregulation**

Immersion bathing may be more effective in maintaining thermoregulation.[19]

Bathing should be deferred for the first 24 hours and performed at that time only if baby is stable.

VI. NEURODEVELOPMENTAL SUPPORT

Immature development of the late preterm infant is known to contribute to increased risk of mortality, short term medical complications, and neurodevelopmental consequences.[20-22] At 34 weeks gestation brain weight is at about 60-65% of term age brain weight.[20, 21] There is a critical period of development over the last 6 weeks of gestation with a 50% increase in cortical volume between 34-40 weeks gestation,[21, 23] and 25% of cerebellar development occurring during this time period.[23] Late preterm infants are at further neurodevelopmental risk secondary to unstable hemodynamic/ cerebral perfusion regulation and reduced sensitivity of arterial baroreflex to regulate blood pressure,[20] and are at 2-5 times increased risk for developing hyperbilirubinemia and subsequent neurotoxicity.[20, 23] The immature development of integrated autonomic brainstem developmental also puts the late preterm infant at greater risk for developing SIDS.[20]



For the purpose of this CPG and care of the late preterm infant in the well newborn nursery, below are areas identified as the prevalent neurodevelopmental concerns during the neonatal period.

a. Low tone/ Hypotonicity:

- Positional apnea/ airway obstruction
 - Respiratory instability in upright car seat or other infant positioning devices.
- Decreased ability for infant to achieve skills in midline and flexion
 - Used for coping, self-regulation, and transitioning between states
 - Development of postural control (including pull to sit, midline head control in supine, airway protection in prone)
 - Long term impact on hand-eye coordination
- Contribution to development of musculoskeletal deformities
 - Specifically, deformational plagiocephaly
 - Exacerbated by intrauterine crowding
 - Potentially contractures in other areas from decreased active movements
- Decreased oral motor tone
 - Weak suck, inability to maintain pacifier in mouth independently
 - Airway compromise if retrognathia

b. Poor state regulation:

All infants move through a variety of states during the day from sleep, through awake, to irritable. The term ‘state control’ refers to the ability to make smooth transitions between states, and to the ability to maintain the appropriate state for activities of daily living (e.g. sleep, feeding, play).

- Unpredictable and/or fast transitions between states
- Decreased endurance
 - General difficulties with energy conservation, secondary to inconsolable fussing or poor reserves
 - Decreased periods of alert
 - This may impact on energy available for feeding
- Irritability
 - May require variable/ different strategies for soothing (compared to term infant)
 - May display different infant cues (compared to term infant)
 - May display decreased ability to develop social, visual skills

c. Decreased Brain Volume/ Immaturity/ Abnormal responses to stimuli (immature ANS):

- Increase/decrease heart rate
- Abnormal respiratory rate
- Color changes: mottling, flushing, pallor, cyanosis
- Other: startling, regurgitation, hiccups, sneezes, yawns
- Decreased ability to modulate multiple sensory inputs (auditory/ noise, visual/light, tactile/touch, movement/ rocking)



d. When to consider referral to Developmental Therapy Services (OT, PT, SLP):

Referral to developmental therapists requires a Licensed Independent Provider (LIP) referral via EPIC. Developmental therapists are based in the NICU, but are available to consult to the maternity floors as needed

Consider Referral to Developmental Therapy (OT, PT, SLP) for the following:

- Family difficulty/unsafe with handling infant, or expressing concern
- Infant difficulty with lifting head/ not demonstrating airway protection during skin to skin.
- Inability to maintain head in midline when awake while supine with potential airway obstruction
- Unable to bring hands to mouth/ face/ midline- affecting ability to perform self-coping activities.
- Limited active movements, i.e. kicking during diaper changes
- Congenital plagiocephaly/ torticollis or obvious development of neck preference
- Quick, disorganized transitions between sleeping and waking
 - Inability to regulate sleep cycles
- Excessive irritability with difficulty calming
 - Caregivers expressing concern with ability to soothe
- Inability to transition to alert state for long enough to feed with eyes open (30-45 minutes)
- Difficulty socializing with parents: i.e. fix on face, track to voice, explore environment
- Consistent immaturity (ANS responses) during routine caregiving
- Concerns about parent's ability to read infant cues
- Queries regarding feeding skills/ state/ behavior
- Queries regarding feeding equipment
- Concerns about family-infant bonding



Focus of Healthcare Professional While Baby in Hospital

- Assess parent competence/ comfort with handling and moving infant safely
- Education re: positioning in devices
 - Limited use of devices once discharged home
- Motor/ developmental/ play activities
 - Monitor and encourage family to promote the following:
 - upper and lower extremities moves against gravity fully and symmetrically during diaper changes/ when unswaddled
 - turns head to right and left when on back
 - fixes on caregiver face and tracks face to right and left
 - alerts and orients to voice
 - tummy time (see Appendix)
- Supine safe sleep/ positioning
 - Parent Education (DPNM Safe Sleep CPG)
- Varied head position during supine sleep to prevent development of plagiocephaly/ torticollis
 - Potential for plagiocephaly or torticollis to impact future developmental skills
 - Provide caregiver education for varied positions when held/ awake for development of postural muscles
 - See Appendix with specific Torticollis/Plagiocephaly information
- Assessing infant cues and providing caregiver education:
 - Engagement and disengagement cues
- State Regulation/soothing strategies
 - Caregiver education for handling and facilitated supports
- Importance of sleep in facilitating brain growth
 - Caregiver education regarding different sleep states and environment for sleeping
- Monitor feeding abilities
- Importance of nutrition in facilitating brain growth
- Promoting positive experiences with the following:
 - Touch, Massage/ Kangaroo Care
 - Vestibular input (gentle rocking)
 - Singing/ Reading
 - Visual skills/ tracking

Refer to developmental appendix at the end of CPG for engagement and disengagement cues, basic strategies to promote state regulation, as well as parent handouts for basic motor/play activities and information regarding prevention of plagiocephaly/ torticollis.



VII. DISCHARGE CRITERIA

Late preterm infants are at twice the risk for rehospitalization in the first months of life compared to their full term counterparts. No late preterm infant should be discharged home prior to 48 hours of age and many can be expected to require 4-5 days or longer to reach discharge readiness.

a. Feeding

Discharge home should not be considered until after at least 24hrs of successful feeding[24] with minimum weight parameters as follows:

- BW 2500gm or more: no more than 10% weight loss[24]; <8% weight loss on DOL 3[25, 26] (adequate intake documented by volume)
- BW 2200gm – 2500gm: above parameters and stabilizing weight for 1-2 days
- BW <2200gm: above parameters and minimum 15-30gm daily weight gain for at least 2 days

Lactation consult on discharge day should include a feeding plan in writing (for family and to send to PCP) including:

- Review of feeding cues[26]
- Feeding schedule : BF-10-12x/24hrs; bottle 8-10x/24hrs[26]
- Length of feedings (20 min)[24]
- Volume of any supplements and method of supplemental feeding (SNS, cup, finger, bottle)
- Nonnutritive suckling recommendations
- Recommendations regarding supplement fortification if needed
- Directions for use of feeding diaries (paper or app) to monitor ins/outs until seen by PCP
- Directions for hand expression and use of pump as indicated

For infants who are bottle fed, a feeding review using the feeding equipment that the family intends to use at home should be performed prior to discharge.

- While in the hospital parents should demonstrate competence with feeding their infant whether breast and/or bottle feeding. This should be evaluated and assisted by nursing, however. Developmental therapists are available if families are determined to require extra supports.
- Ideally parents should bring in their identified feeding equipment from home to trial while in the hospital to ensure ability to effectively feed with home feeding equipment
- Parents should receive education on cleaning feeding equipment, as well as preparation, storage, and heating of feeds

b. Thermoregulation

- a. Stable axillary temps for at least 24hrs in open crib



c. Jaundice screening – Using Bhutani nomogram

WNH B.8 Infant Bilirubin Screening

[Hyperbilirubinemia CPG link here](#)

The increased rate of rise in bilirubin in LPIs needing phototherapy begins between 48 and 72 hours of age [27] . Discharge parameters using the Bhutani curves are as follows:

- Discharge prior to 72 hours of age only if the TCB is < 40th %ile.

Discharge after 72 hours of age only if the TCB is < 75th%ile **and/or** at least 2 mg/dL below the phototherapy threshold.

d. Other routine screening and health care maintenance (HCM)

LPIs should receive all the same HCM as their term counterparts.

- Immunization
 - Hepatitis B vaccine
All infants should receive hepatitis B vaccine at birth; babies under 2000gm should receive vaccine at discharge or at 1 month of age, whichever comes first
 - Tdap and Influenza vaccination
All household contact of newborns should receive Tdap and Influenza vaccines
- Hearing screening with referral if necessary for BAER's
WNH H.3 Newborn Hearing Screening
- CCHD screening
WNH C.6 Critical Congenital Heart Disease Screening
- Newborn screening sample to State Lab between 24 and 48 hours of age and within 72 hrs of discharge
[WNH S.6 Obtaining Newborn Screening Specimen](#)

VIII. POST-DISCHARGE CARE

a. Primary care visits

All late preterm infants should be seen by their primary care provider within 24-48 hours after discharge. It is recommended that babies are seen by their primary care provider at least weekly until birth weight is reached. More frequent follow up visits in the first several weeks of life may be necessary due to jaundice, poor growth, feeding difficulties, or family anxiety.

b. Lactation support

Ongoing lactation support is important to optimize breastfeeding outcomes and support good growth and nutrition. Mothers should be provided with community resources prior to hospital discharge and primary care providers should ensure this ongoing support is accessed.



c. VNA Services

Care Coordination will request VNA services for all late preterm newborns within 1-2 days after discharge unless decided otherwise by the baby's attending physician

d. Referral for Early Intervention and other Developmental Services

Discharge considerations and guidance for parents and healthcare professions are of particular importance with regards to the late preterm population. Evidence supports that after adjusting for neonatal co morbidities, the late preterm infant had the same rates of need for Early Intervention (EI) Services as very preterm infants at 12 months of age.[20] It has also been reported that with high rates in the United States there are needs for EI services for the late preterm infant that persists through 36 months. Additionally, 10-13% increase risk for disability at 3 and 4 years old.[22] Recommendations in the literature support academic readiness intervention, developmental follow-up through the preschool years, and Early Intervention.[20, 22, 28]

Relevant Referral Criteria for Early Intervention in Healthy Late Preterm Infants [29]:

- Automatic referral for EI if there is an established risk or established developmental delay due to medical condition with expectation for delay:
 - Neurological or metabolic diagnosis, dysfunction
 - Chromosomal anomaly or genetic disorder
 - Vision loss not corrected by medical intervention or prosthesis
 - Permanent hearing loss of any degree

OR

Any combination of at least 4 of the following:

- Child Characteristics:
 - Birth weight < 1200 g
 - Gestational Age < 32 weeks
 - NICU admission > 5 days
- APGAR < 5 at 5 minutes
- Total hospital stay > 25 days in 6 months
- IUGR, SGA
- Weight for age or weight for height < 5th percentile
- Weight for age loss > 2 major centiles in 3 month (< 12 months), or > 2 major centiles in 6 months (12-36 months)
- Chronic feeding difficulties
- Insecure attachment/ interactional difficulties
- Suspected central nervous system abnormality



- Family Characteristics:
 - Maternal age at infant's birth < 17; or maternal history of > 3 births before age 20
 - Maternal education less than or equal to 10 years
 - Caregiver/parent chronic illness or disability affecting caregiving
 - Lack of family social supports
 - Homelessness, or lack of adequate food, clothing, shelter
 - Open or confirmed child protective services investigation, including if child in foster care
 - History of domestic violence and/or substance abuse in home

- If infant is referred for developmental therapy services while inpatient, and does not qualify based on established risk, or combination of 4 at risk factors, the developmental therapy team can perform a standardized assessment to determine if infant is currently displaying developmental delays:
 - Meets criteria if demonstrating > 30% delay in developmental areas (motor, social, cognitive...)
 - Infant is < 1.5 standard deviation below mean for age

Note: Infants referred to Early Intervention Services may not start to receive therapy services in the home for several weeks.

Infants who do not qualify for Early Intervention Services, and those who do qualify for Early Intervention Services who want additional therapy services, can access therapy input through some hospital and independent providers for a fee. Individual providers may vary in what they charge, and insurance providers may vary in what they will reimburse.

Infants with feeding difficulties can be referred to specialist feeding therapy providers for outpatient follow-up:

- MGH Feeding Team: 617-724-0770
- BCH Feeding Team: 617-355-7727, feedingandswallowingscheduling@childrens.harvard.edu
- BCH Growth & Nutrition Program (GI, Nutrition, Feeding) 617-355-7713, GNP@childrens.harvard.edu

IX. PARENT EDUCATION AND INFORMATION

Patient Folder: "Information about your Late Preterm Baby" (in both English and Spanish) contains:

- Welcome letter
- Important information about your Baby's car seat test
- Car Safety for Tiny Babies
(https://www.cookchildrens.org/SiteCollectionDocuments/HomeHealth/Education/CarSafety/CHH_CarSafety_CarSafetyforTinyBabies.pdf)
- infant only car seat list (www.saferidenews.com)



- AWHONN Late preterm Infant initiative (https://www.awhonn.org/awhonn/content.do?name=02_PracticeResources/2C3_Focus_NearTermInfant.htm)
- It's my Birthday, give me a hug (http://massbreastfeeding.org/wp-content/uploads/2013/06/SkinToSkin_English_6-29-11.pdf)
- Caring for your Late Preterm Infant Breastfeeding Tips for Parents
- Developmental Needs of Your Late Preterm Baby

Education is incremental and repeated as needed throughout the birth hospitalization. Baby-parent focused education is easier to remember and more likely to be understood.

- This begins with admission and continues until discharge.
- Subjects include but are not limited to:
 - Back to sleep – model during admission; decrease SIDS risk
 - Attention to adequate warmth of dressing and wrapping
 - Review/point out feeding cues:
 - Opening eyes
 - Moving head back and forth
 - Opening mouth, tongue protrusion
 - Rooting, sucking on hands/fingers
 - Crying (a late hunger cue) – calm before attempting to feed
 - Review/point out signs of stress/overstimulation (i.e. disengagement cues):
 - Review/point out signs of relaxation/readiness to engage (i.e. engagement cues)
(See Appendix for above)
- Review issues of rest for mother and baby, avoidance of excess visitors/passing around of baby; overstimulation/stress during early weeks. Parents need food, help with laundry, errands, childcare
entertaining guests is too much of a stress on family with a new baby; especially one born prematurely.
- Review signs and symptoms of illness, importance of good hand-washing, avoidance of contact with anyone who is ill (children under 5yo may be ill without clear signs and symptoms)
- Consider risks (eg. Social supports, substance abuse, financial, pets, etc.) and provide extra support to ensure a safe home

X. PARENT MENTAL HEALTH

Mothers of late preterm infants are at increased risk for anxiety and decreased confidence and competence. Social Service consultation should be requested for all LPI families unless decided otherwise by the care team.



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