



MANAGEMENT OF

Neonatal Hypoglycemia

2017 update

These guidelines were updated by Intermountain Healthcare’s Well Newborn Development Team and NICU Development Team under the guidance of Intermountain’s Women and Newborns Clinical Program. The guidelines are derived from analysis of the literature, clinical experience, and expert consensus.

► THE PROBLEM

Hypoglycemia is diagnosed in 15% of newborns. Prolonged or recurrent low glucose levels may lead to long-term neurodevelopmental sequelae.

Unfortunately, the exact parameters of normal blood glucose in the neonate remain controversial. Although neonates have a lower “normal” blood glucose range than older infants, a level that requires intervention in every newborn has not been defined. However, the level appears to be dependent on birth weight, gestational age, feeding method, postnatal age in hours, and an underlying cause of hypoglycemia. Also uncertain are the level and duration of hypoglycemia that cause damage — and the vulnerability, or lack thereof, of the brains of infants of differing gestational ages.

Because of this lack of clear definition of safe neonatal blood glucose levels, knowing when and how to screen and intervene can be difficult. These guidelines promote a pragmatic approach with a wide safety margin.

► GENERAL RECOMMENDATIONS

The following are generally recommended principles; detailed recommendations are given on [pages 2 and 3](#).

- 1. Initiate feeding.** Feeding should be initiated for all neonates as soon as the infant is ready, **preferably within 1 hour of birth**. Neonates who are not fed will have a physiologic drop in blood glucose, with a low at 1 to 1.5 hours of age. Feeding should be breast milk (colostrum) or infant formula, **NOT** dextrose-water. Colostrum, if available, is preferred to formula.
- 2. Assess risk factors and symptoms.** All neonates with risk factors or major symptoms (see table 1 below) should have blood glucose checked.
- 3. Screen and manage** based on initial feeding and assessment using the algorithms and notes on [pages 2 and 3](#).

TABLE 1. Symptoms and risk factors

Symptoms:	Risk Factors:
<ul style="list-style-type: none"> Seizures, coma, hypotonia, lethargy, tremors Jitteriness, irritability, weak or high-pitched cry Apneic episodes, cyanosis, tachypnea, grunting Hypothermic, temperature instability, poor suck or refusal to feed, tachycardia 	<ul style="list-style-type: none"> Premature <37 wk or LBW <2.5 kg SGA or IUGR (<10% for weight) Smaller discordant twin (>10% weight difference) Microphallus (<1 cm) or midline defect Maternal terbutaline, propranolol, or oral hypoglycemic agent during L&D Infant of a diabetic mother (IDM) LGA (>90% for weight) Apgar score ≤5 at 5 min Erythroblastosis fetalis Polycythemia (venous Hct >65) CPAP >3 hours

► WHAT’S INSIDE?

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What’s new in this update?

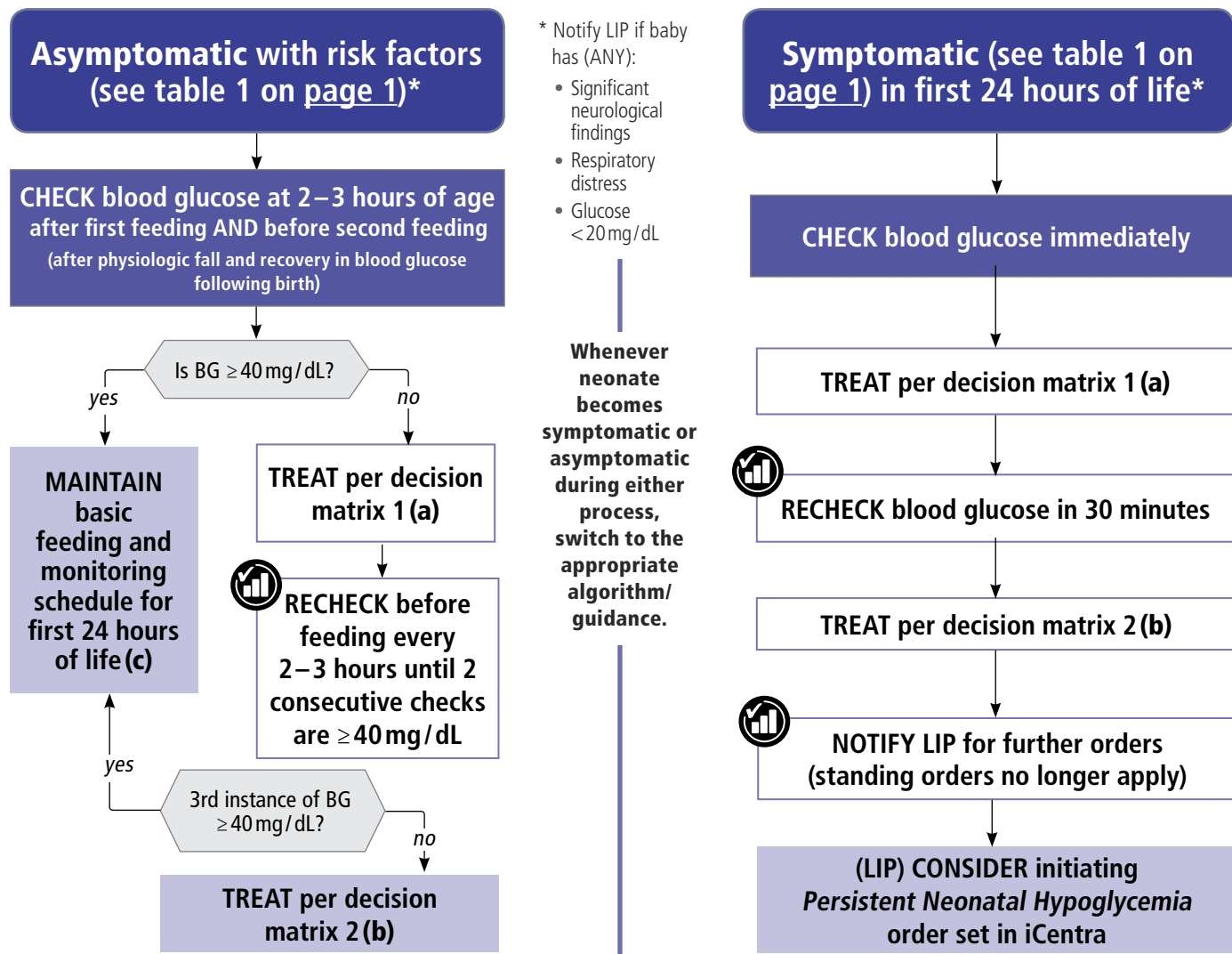
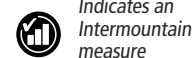
- **Screening.** For asymptomatic newborn with risk factors, delay initial blood glucose screen until **2–3 hours of age after 1st feeding and before 2nd feeding** (after the physiologic fall and recovery in blood glucose level following birth).
- **Treatment:**
 - New threshold for treatment is <40 mg/dL (lowered from <45 mg/dL).
 - Treat with dextrose gel 40% dose (400 mg/mL) (~0.5 ml/kg) per buccal (inner cheek) mucosa with 30-second massage, and feed infant.
- **LIP notification requirements.** Notify for further orders while proceeding with algorithm if:
 - Infant has significant neurological findings, respiratory distress, **blood glucose <20 mg/dL**
 - Blood glucose <40 mg/dL **AND** did not increase by 10 mg/dL after treatment with feeding and dextrose gel
 - Need for 3rd dose of dextrose gel

► MEASUREMENTS

- **Number of neonates who are:**
 - Checked for hypoglycemia at 2–3 hours of age
 - Given dextrose gel and fed if BG <40 mg/dL
- **Incidences in first 24 hours of life when:**
 - An LIP was notified.
 - A recheck was performed.
 - If BG <40 mg/dL at recheck.

 Indicates an Intermountain measure

▶ ALGORITHM: MANAGEMENT OF NEONATAL HYPOGLYCEMIA



ALGORITHM NOTES

(a) Decision matrix 1

GLUCOSE ≥ 40 mg/dL	INITIATE basic feeding and monitoring schedule (c)	NOTIFY LIP, and SEARCH for other symptom etiology
GLUCOSE < 40 mg/dL	<ul style="list-style-type: none"> • INITIATE basic feeding and monitoring schedule (c) • GIVE dextrose gel (d) <ul style="list-style-type: none"> – Recheck glucose 30 minutes after gel dose – Notify LIP if glucose still < 40 mg/dL and did not increase by 10 mg/dL 	
	ASYMPTOMATIC	SYMPTOMATIC

(b) Decision matrix 2

GLUCOSE ≥ 40 mg/dL	INITIATE basic feeding and monitoring schedule (c)	NOTIFY LIP, and SEARCH for other symptom etiology
GLUCOSE < 40 mg/dL	<ul style="list-style-type: none"> • Maintain basic feeding and monitoring schedule (c) • Confirm low BG at bedside (e) • Notify LIP for further orders (standing orders no longer apply) 	<ul style="list-style-type: none"> • Confirm low BG at bedside (e) • Feed and give dextrose gel (c) (d) • Notify LIP for further orders (standing orders no longer apply)
	ASYMPTOMATIC	SYMPTOMATIC

ALGORITHM NOTES, CONTINUED

(c) Basic feeding and monitoring schedule

- FEED baby per mother's preference:
 - Breastfeed minimum of 5–10 minutes
 - Feed expressed breast milk or formula (≈ 5 ml/kg) by bottle or by Supplemental Nursing System (SNS), if breastfeeding
 - May gavage feed baby if mother doesn't want baby to be bottle fed or use SNS or if unable to p.o. (if no signs of feeding intolerance present)
 - Continue feeding every 2–3 hours
- CHECK blood glucose prior to each feeding until 2 consecutive checks are ≥ 40 mg/dL
- RECHECK every 6 hours for the first 24 hours of life

(d) Dextrose gel 40% dosing (400 mg/mL) per buccal (inner cheek) mucosa with 30-second massage.*

Birthweight (kg)	Dose (mg)	Amount (mL)
1.500–1.750	300	0.75
1.751–2.250	400	1.00
2.251–2.750	500	1.25
2.751–3.250	600	1.50
3.251–3.750	700	1.75
3.751–4.250	800	2.00
4.251–4.750	900	2.25
4.751–5.250	1000	2.50

*Repeat dose per standing order, and notify LIP when giving dose at 3rd instance of low blood sugar.

(e) Confirm low blood glucose at bedside

- To confirm, USE:
 - Nova StatStrip (venipuncture)

OR

 - I-STAT (heel stick or venipuncture)
- SEND for STAT lab glucose **only if** bedside retesting cannot be done as described.
- If still asymptomatic, administer dextrose gel **(d)** and feed per mother's preference **(c)**.

► BIBLIOGRAPHY

- 1 Adamkin DH. Postnatal glucose homeostasis in late-preterm and term infants. *Pediatrics*. 2011;127:575-579.
- 2 Canadian Paediatric Society. Screening guidelines for newborns at risk for low blood glucose. *Paediatr Child Health*. 2004;9(10):723-729. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2724150/>. Accessed February 25, 2017.
- 3 Harris DL, Weston PJ, Harding JE. Incidence of neonatal hypoglycemia in babies identified as at risk. *J Pediatr*. 2012;161(5):787-791.
- 4 Harris DL, Weston PJ, Signal M, Chase JG, Harding JE. Dextrose gel for neonatal hypoglycaemia (the Sugar Babies Study): A randomized, double-blind, placebo-controlled trial. *Lancet*. 2013;382(9910):2077-2083.
- 5 McKinlay CJ, Alsweiler JM, Ansell JM, et al. Neonatal glycemia and neurodevelopmental outcomes at 2 years. *N Engl J Med*. 2015;373(16):1507-1518.
- 6 Stanley CA, Rozance PJ, Thornton PS, et al. Re-evaluating "transitional neonatal hypoglycemia: Mechanism and implications for management. *J Pediatr*. 2015;166(6):1520-1525.
- 7 Thornton PS, Stanley CA, De Leon DD, et al. Recommendations from the Pediatric Endocrine Society for evaluation and management of persistent hypoglycemia in neonates, infants, and children. *J Pediatr*. 2015;167(2):238-245.
- 8 Weston PJ, Harris DL, Battin M, et al. Oral dextrose gel for the treatment of hypoglycaemia in newborn infants. *Cochrane Database of Systematic Reviews*. 2016 May 4;(5):CD011027.

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► RESOURCES

Patient resources

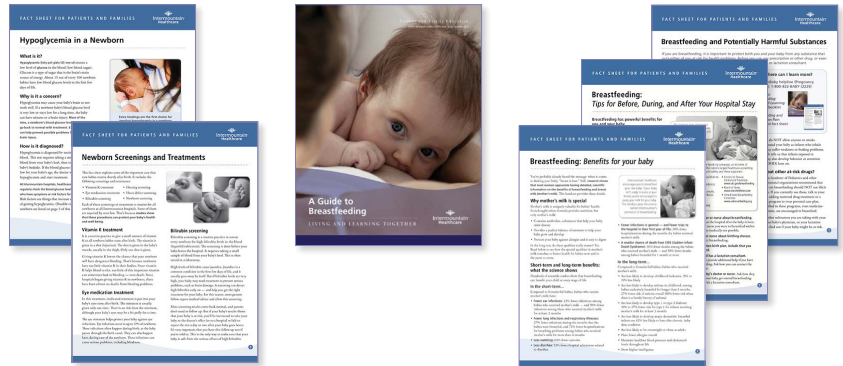
Intermountain publishes a number of related patient education materials (see below). To access these materials:

- As the iCentra EMR system is implemented, search for Intermountain items in the patient education module.
- Log in to intermountainphysician.net. Search for the patient education library under A–Z. Then, search the item number and title in the appropriate area.
- Use the iprintstore.org, Intermountain’s Online Library and Print Store, for one-stop access and ordering for all Intermountain materials such as fact sheets, booklets, and trackers. If you need any assistance, email printservices@imail.org.

Patient Information:

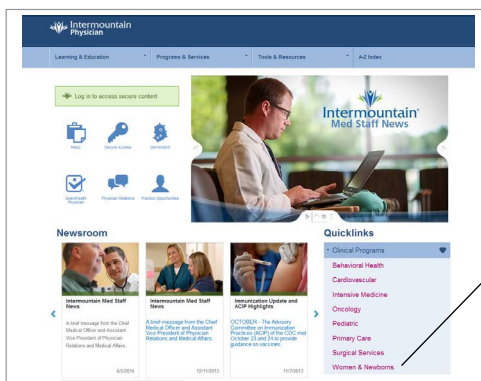
Fact sheets and booklets to help, including:

- [Hypoglycemia in the Newborn](#)
- [Newborn Screenings and Treatments](#)
- [A Guide to Breastfeeding \(booklet\)](#)
- [Breastfeeding: Benefits for your baby](#)
- [Breastfeeding: Tips for Before, During, and After Your Hospital Stay](#)
- [Breastfeeding and Potentially Harmful Substances](#)



Provider resources

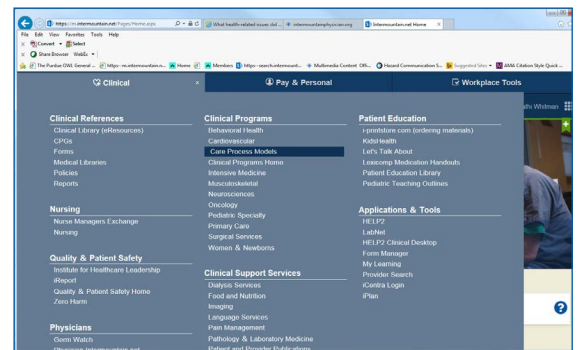
To find this CPM and its reference list, clinicians can go to intermountainphysician.org, and select **Women & Newborns** from the list of clinical programs on the right side of the screen. On the next screen, select the icon for **Care Process Models and Clinical Guidelines** indicated in the middle image below.



To find this CPM, clinicians can go to intermountainphysician.org



You can also access this and other system-wide care process models at intermountainhealthcare.net under the **Clinical** tab (see image below).



This CPM presents a model of best care based on the best available scientific evidence at the time of publication. It is not a prescription for every physician or every patient, nor does it replace clinical judgment. All statements, protocols, and recommendations herein are viewed as transitory and iterative. Although physicians are encouraged to follow the CPM to help focus on and measure quality, deviations are a means for discovering improvements in patient care and expanding the knowledge base. Send feedback to Jean Millar, Women & Newborn Clinical Program Director, Intermountain Healthcare (Jean.Millar@imail.org).