

Clinical Policy: NICU Apnea Bradycardia Guidelines

Reference Number: CP.MP.82

Date of Last Revision: 06/22

[Revision Log](#)

See [Important Reminder](#) at the end of this policy for important regulatory and legal information.

Description

The purpose of this guideline is to assist with continuity of care, discharge planning, and the transition to outpatient and home care of infants affected by ongoing neonatal apnea and bradycardia events. It will also serve as a guideline for the approval of continued stay for neonatal admissions. The recommendations below are based primarily on meta-analyses and practice patterns, as there are few random controlled trials in this area.

Guidelines

Infants **may** be considered ready for discharge from inpatient care for cardiorespiratory events or caffeine administration when meeting the guidelines in I, as applicable.

I. Discharge from inpatient care for significant cardiorespiratory events, all of the following:

- A. Infant demonstrates maturity of respiratory control and one of the following:
 1. Infant has had no **clinically significant** cardiorespiratory events (apnea and bradycardia) for 5 to 7 days prior to discharge and all of the following:
 - a. No apnea \geq 20 seconds;
 - b. No apnea $<$ 20 seconds with bradycardia of $<$ 80 beats per minute (may consider using a heart rate decrease $>$ 33.3% below baseline for older, more mature infants or those with a lower baseline heart rate);
 - c. No apnea $<$ 20 seconds with valid, prolonged oxygen desaturations $<$ 85% (excludes transient oxygen desaturation $<$ 85% unless requiring supplemental oxygen to resolve);
 - d. No bradycardia $<$ 70 beats per minute (unrelated to feedings);
 - e. No events requiring stimulation, artificial ventilation (bagging or intubation), or supplemental oxygen support to restore normal breathing, heart rate, and oxygenation;
 2. Significant events (as defined in I.A.1) continue to near-term or longer and all of the following:
 - a. Cardiorespiratory events appear, after evaluation for potential causes of apnea, to be associated with gastro-esophageal reflux;
 - b. Appropriate anti-reflux measures appear to resolve bradycardia or apnea (note: 5 days of observation may not be required in this case);
 3. The infant is having non-clinically significant, self-limited apnea spells (without color change or severe bradycardia) and all of the following:
 - a. Does not require stimulation to breathe again;
 - b. Will be discharged to home with a cardiorespiratory monitor;
 - c. There has not been a clinically significant cardiorespiratory event (defined in I.A.1) for 3-7 days prior to discharge;

- d. Parents or caregivers have demonstrated proficiency in managing the cardiorespiratory monitor, providing stimulation, and completed infant CPR training;
- B. If nasal cannula airflow is introduced to address apnea/bradycardia events, the infant should be free of clinically significant events (defined in I.A.1) for 5 to 7 days on the same level of support contemplated for the infant's discharge;
- C. Infant has not received caffeine citrate for at least 7 days prior to planned discharge;
- D. No additional condition(s) requiring inpatient care.

Note:

- Cardiorespiratory events associated with feeding are not uncommon in premature infants due to incoordination of sucking, swallowing and breathing. The significance of these events should be evaluated on an individual basis (e.g., severity of bradycardia, degree of desaturation, intervention(s) required, etc.). Episodes associated with oral feedings may not be the same as episodes recorded while sleeping. Parents should be instructed in the technique of identifying feeding problems and correcting them.
- Caffeine has a relatively long half-life and levels may be therapeutic in preterm infants for as long as 7 days or more after discontinuation. It is appropriate to observe an infant for 7 days after the withdrawal of caffeine, but since the discontinuation often occurs well before discharge, a "caffeine countdown" should not typically prolong the date of discharge.^{1-4, 6}
- An assessment of cardiorespiratory stability in a car seat is recommended prior to discharge for infants born at < 37 weeks gestation or with other risk factors for respiratory compromise (e.g., neuromuscular, orthopedic problems).
- Parents or caregivers are encouraged to attend an infant CPR class.

Background

Apnea of prematurity is a common condition of premature infants, often closely associated with bradycardia.^{4,7} The condition often results in prolonged lengths of stay in the neonatal intensive care units, as well as considerable parental anxiety. Each infant admitted to the NICU undergoes a unique hospital experience based upon their gestational age with discharge heavily dependent upon, at a minimum, the attainment of physiological maturity.¹⁴

The Committee on Fetus and Newborn has defined apnea of prematurity as a cessation of breathing that lasts for at least 20 seconds or is of shorter duration but accompanied by bradycardia, cyanosis or pallor in an infant younger than 37 weeks' gestational age. Most cases are resolved by 37 weeks' post-conceptual age; however, infants born at 24 to 28 weeks gestation frequently have apnea that persists longer, often to 44 weeks post-conceptual age.⁴

Episodes of bradycardia may be associated with oral feedings and also with apnea events that occur while sleeping.⁷ Bradycardia associated with feeding that resolves with interruption of feeding is generally not regarded as a reason to delay discharge.^{4,10} Pathologic bradycardia (not associated with feeding) may be treated with pharmacologic or non-pharmacologic therapy. Non-pharmacologic measures include supplemental oxygen, artificial ventilation, and physical stimulation.⁷

CLINICAL POLICY
NICU Apnea Bradycardia Discharge Guidelines

Methylxanthine therapy, typically theophylline or caffeine, is the primary pharmacologic treatment for apnea of prematurity. Despite both agents having similar efficacy for decreasing episodes of apnea and bradycardia, results from a meta-analysis of five small trials of 108 infants noted considerably reduced adverse reactions with caffeine use versus theophylline use. Caffeine is recommended for infants with apnea of prematurity as an alternative to theophylline or supportive care alone.⁷ Caffeine citrate has a mean half-life of approximately 100 hours with some variation noted relative to gestational age at birth and chronological age.¹⁴ Because of its relatively long half-life in infants of < 33 weeks’ gestation, caffeine citrate has been ideal for once per day dosing in most infants. Also, because of the relatively large therapeutic index, the drug has been considered relatively safe. Maintenance dosing begins 24 hours after the loading dose at 5-10 mg/kg daily. Routine drug levels are not necessary unless there are signs of caffeine toxicity, such as tachycardia.^{7,15} Infants who fail to respond to caffeine therapy might require intubation, mechanical ventilation, or nasal intermittent positive pressure ventilation (NIPPV).⁷

Cardiorespiratory home monitoring is indicated when an infant has an ongoing medical condition that increases risk for apnea, airway obstruction, or hypoxemia. Such conditions include, but are not limited to, the following:

- Persistent apnea of prematurity or apnea of infancy
- Chronic lung diseases (e.g., bronchopulmonary dysplasia), especially those requiring supplemental oxygen, positive airway pressure, or mechanical ventilatory support
- Congenital myasthenic syndromes
- Tracheostomy or other airway abnormalities.¹²

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Policy created Specialist review – Neonatal Pulmonologist	06/13	06/13
Added under <i>I</i> that infants <28 weeks gestation might need a longer event-free period prior to discharge. <i>I.E.</i> added heart rate. Added under <i>III</i> that parents should be encouraged to room overnight with infant before discharge. Removed “continuous nasogastric feeding” under <i>III</i> as cardiorespiratory monitoring would only detect late complications of aspiration. Minor wording changes made throughout policy for clarity. Specialist reviewed.	06/16	06/16
References reviewed and updated. Changed wording in <i>I</i> for clarity. Added statement to description that guidelines are based on practice patterns and meta-analyses, due to lack of controlled trials.	06/17	06/17
Revised statement in section I, clarifying “possibly longer” to “up to 7 days”. Changed < 28 weeks gestation to < 32 weeks gestation. References reviewed and updated. Replaced in background, “A target level of 10-20ug/ml is sought.” with “The therapeutic trough serum concentration is 5 to 25 mg/L” as per UpToDate. Clarified statement under II. Caffeine that discontinuation of caffeine “often” occurs before discharge. Specialist reviewed- Neonatologist	05/18	05/18

CLINICAL POLICY
NICU Apnea Bradycardia Discharge Guidelines

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Restructured guidelines and specified that these are “guidelines.” In discharge criteria for significant events and on home respiratory monitoring, added that the infant has no other conditions requiring inpatient care. Reworded sections headings and organized information accordingly. Changed all instances of “parents” to “parents or caregivers.” Combined caffeine criteria section into the “discharge for significant cardiorespiratory events” section.	1/19	
Removed option in I.A. for preterm infants to be free of clinically significant events for 7 days vs. 5. Moved section III on home cardiorespiratory monitoring to background, except for requirement that caregiver attends CPR class, which was moved to criteria in I.3. Reviewed by pediatric pulmonologist, pediatrician, and neonatologist.	05/19	05/19
References reviewed and updated	05/20	05/20
References reviewed and updated.	04/21	05/21
In I.A.1 and I.B., changed requirement for no clinically significant events before discharge from “5” to “5-7” days. Changed “review date” in the header to “date of last revision” and “date” in the revision log header to “revision date.”	06/21	06/21
Annual review completed. Expanded criteria I.A.3.c. into two criteria points by adding criteria I.A.3.d. Changed “child’s” to “infant’s” in criteria I.B. Reworded criteria former criteria I.E, now I.D., for clarity. Moved criteria I.E. and I.F. to notes section. Minor rewording in description, original notes, and background with no clinical significance. References reviewed and updated. Specialist reviewed.	06/22	06/22

References

1. Alere. Neonatal clinical management guideline. Eighth edition. American Academy of Pediatrics Committee on Fetus and Newborn. Hospital discharge of the high-risk neonate. *Pediatrics* 2008; 122:1119.3.
2. Darnall RA, Kattwinkel J, Nattie C, Robinson M. Margin of safety for discharge after apnea in preterm infants. *Pediatrics*. 1997; 100:795–801. doi:10.1542/peds.100.5.795
3. Eichenwald EC, Aina A, Stark AR. Apnea frequency persists beyond term gestation in infants delivered, at 24 to 28 weeks. *Pediatrics* 1997; 100:3 354-359.
4. Eichenwald EC; Committee on Fetus and Newborn, American Academy of Pediatrics. Apnea of prematurity. *Pediatrics*. 2016;137(1):10.1542/peds.2015-3757. doi:10.1542/peds.2015-3757
5. Johns Hopkins HealthCare LLC. Optum Neonatal Clinical Management Guidelines Summary: Optum Neonatal Clinical Management Guidelines 9th Edition.
6. Lorch SA, Srinivasan L, Escobar GJ. Epidemiology of apnea and bradycardia resolution in premature infants. *Pediatrics*. 2011;128(2):e366-e373. doi:10.1542/peds.2010-1567
7. Martin, R. Management of apnea of prematurity. UpToDate. www.uptodate.com. Updated May 21, 2020. Accessed April 11, 2022.
8. National Institutes of Health, Consensus Development Conference on Infantile Apnea and Home Monitoring, Sept 29 to Oct 1, 1986. *Pediatrics*.1987; 79:292.

CLINICAL POLICY

NICU Apnea Bradycardia Discharge Guidelines

9. Chandrasekharan P, Rawat M, Reynolds AM, Phillips K, Lakshminrusimha S. Apnea, bradycardia and desaturation spells in premature infants: impact of a protocol for the duration of 'spell-free' observation on interprovider variability and readmission rates. *J Perinatol*. 2018;38(1):86-91. doi:10.1038/jp.2017.174
10. Jefferies AL; Canadian Paediatric Society, Fetus and Newborn Committee. Going home: Facilitating discharge of the preterm infant. *Paediatr Child Health*. 2014;19(1):31-42.
11. Bodamer OA. Neuromuscular junction disorders in newborns and infants. UpToDate. www.uptodate.com. Updated September 20, 2021. Accessed April 11, 2022.
12. Corwin MJ. Use of home cardiorespiratory monitors in infants. UpToDate. www.uptodate.com. Updated February 16, 2021. Accessed April 11, 2022.
13. Smith VC, Stewart J. Discharge planning for high-risk newborns. UpToDate. www.uptodate.com. Updated July 20, 2021. Accessed April 11, 2022.
14. Anderson N, Narvey M; Canadian Paediatric Society, Fetus and Newborn Committee. Discharge of the preterm infant position paper. Posted March 4, 2022. Accessed at <https://cps.ca/documents/position/discharge-planning-of-the-preterm-infant>. Accessed April 11, 2022.
15. Long JY, Guo HL, He X, et al. Caffeine for the Pharmacological Treatment of Apnea of Prematurity in the NICU: Dose Selection Conundrum, Therapeutic Drug Monitoring and Genetic Factors. *Front Pharmacol*. 2021;12:681842. Published 2021 Jul 26. doi:10.3389/fphar.2021.681842

Important Reminder

This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. The Health Plan makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved. "Health Plan" means a health plan that has adopted this clinical policy and that is operated or administered, in whole or in part, by Centene Management Company, LLC, or any of such health plan's affiliates, as applicable.

The purpose of this clinical policy is to provide a guide to medical necessity, which is a component of the guidelines used to assist in making coverage decisions and administering benefits. It does not constitute a contract or guarantee regarding payment or results. Coverage decisions and the administration of benefits are subject to all terms, conditions, exclusions and limitations of the coverage documents (e.g., evidence of coverage, certificate of coverage, policy, contract of insurance, etc.), as well as to state and federal requirements and applicable Health Plan-level administrative policies and procedures.

This clinical policy is effective as of the date determined by the Health Plan. The date of posting may not be the effective date of this clinical policy. This clinical policy may be subject to applicable legal and regulatory requirements relating to provider notification. If there is a discrepancy between the effective date of this clinical policy and any applicable legal or regulatory requirement, the requirements of law and regulation shall govern. The Health Plan

CLINICAL POLICY

NICU Apnea Bradycardia Discharge Guidelines

retains the right to change, amend or withdraw this clinical policy, and additional clinical policies may be developed and adopted as needed, at any time.

This clinical policy does not constitute medical advice, medical treatment or medical care. It is not intended to dictate to providers how to practice medicine. Providers are expected to exercise professional medical judgment in providing the most appropriate care, and are solely responsible for the medical advice and treatment of members/enrollees. This clinical policy is not intended to recommend treatment for members/enrollees. Members/enrollees should consult with their treating physician in connection with diagnosis and treatment decisions.

Providers referred to in this clinical policy are independent contractors who exercise independent judgment and over whom the Health Plan has no control or right of control. Providers are not agents or employees of the Health Plan.

This clinical policy is the property of the Health Plan. Unauthorized copying, use, and distribution of this clinical policy or any information contained herein are strictly prohibited. Providers, members/enrollees and their representatives are bound to the terms and conditions expressed herein through the terms of their contracts. Where no such contract exists, providers, members/enrollees and their representatives agree to be bound by such terms and conditions by providing services to members/enrollees and/or submitting claims for payment for such services.

Note: For Medicaid members/enrollees, when state Medicaid coverage provisions conflict with the coverage provisions in this clinical policy, state Medicaid coverage provisions take precedence. Please refer to the state Medicaid manual for any coverage provisions pertaining to this clinical policy.

Note: For Medicare members/enrollees, to ensure consistency with the Medicare National Coverage Determinations (NCD) and Local Coverage Determinations (LCD), all applicable NCDs, LCDs, and Medicare Coverage Guidelines should be reviewed prior to applying the criteria set forth in this clinical policy. Refer to the CMS website at <http://www.cms.gov> for additional information.

©2016 Centene Corporation. All rights reserved. All materials are exclusively owned by Centene Corporation and are protected by United States copyright law and international copyright law. No part of this publication may be reproduced, copied, modified, distributed, displayed, stored in a retrieval system, transmitted in any form or by any means, or otherwise published without the prior written permission of Centene Corporation. You may not alter or remove any trademark, copyright or other notice contained herein. Centene® and Centene Corporation® are registered trademarks exclusively owned by Centene Corporation.