

Oxygen Weaning in the Premature Infant (Outpatient)

ALGORITHM

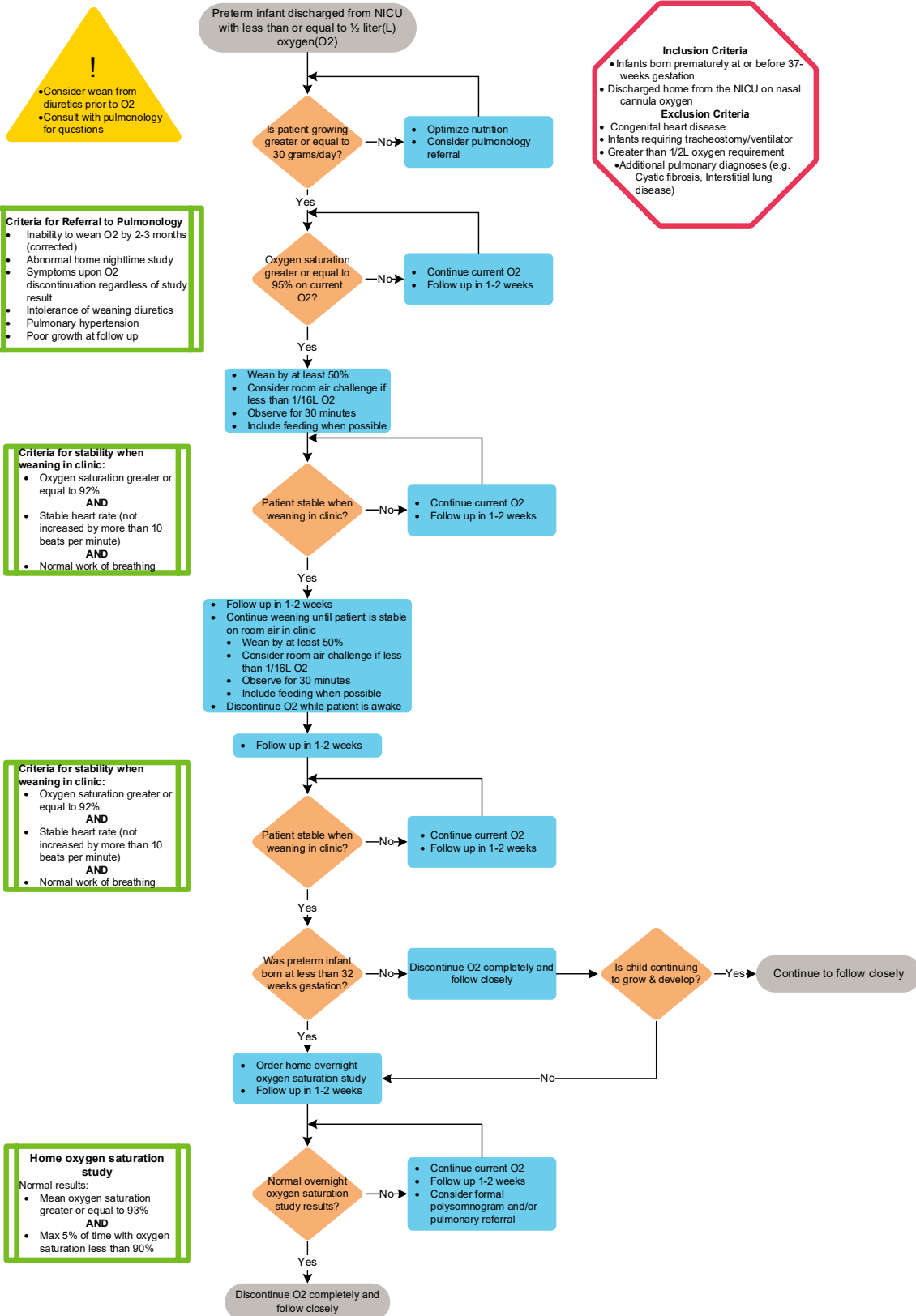


TABLE OF CONTENTS

[Algorithm](#)

[Target Population](#)

[Background | Definitions](#)

[Initial Evaluation](#)

[Clinical Management](#)

[Laboratory Studies | Imaging](#)

[Therapeutics](#)

[Parent | Caregiver Education](#)

[References](#)

[Clinical Improvement Team](#)

TARGET POPULATION

Inclusion Criteria

- Infants born prematurely at or before 37-weeks gestation
- Discharged home from the NICU on nasal cannula oxygen

Exclusion Criteria

- Congenital heart disease
- Infants requiring tracheostomy/ventilator
- Greater than 1/2L Oxygen requirement
- Additional pulmonary diagnoses e.g. Cystic Fibrosis, Interstitial lung disease.

BACKGROUND | DEFINITIONS

Modern advances have resulted in increased survival of preterm infants, yet the incidence of bronchopulmonary dysplasia (BPD, the chronic lung disease of prematurity) has not changed. For this reason, premature infants are increasingly discharged from the neonatal intensive care unit (NICU) with home oxygen therapy. Primary care providers are then tasked with determining how best to wean the oxygen in the outpatient setting. These clinicians must also determine which patients need additional testing and should be referred to a pulmonologist.

There are not currently accepted standard guidelines for weaning premature infants from supplemental oxygen in the outpatient setting. In one study, only 8% of pediatric pulmonologists used a standardized protocol for weaning oxygen and there is limited evidence about these practices in primary care. In 2019, an expert panel representing the American Thoracic Society published formal clinical practice guidelines for home oxygen therapy for children. However, the panel confirmed the lack of evidence-based guidelines for weaning/discontinuing home oxygen and agreed unanimously that “a large, prospective trial comparing weaning strategies is needed.” These guidelines included a consensus-based approach to weaning home oxygen which is consistent with this clinical pathway.

INITIAL EVALUATION

- Infant met criteria in the NICU for home oxygen therapy.
- Infant discharged on home oxygen therapy with instructions to follow up at outpatient primary care setting (PCP).

CLINICAL MANAGEMENT

PCP Team Members' Roles and Responsibilities:

Prior to first appointment at PCP, infant possibly identified as premature and/or on home oxygen therapy (ideally NICU discharge summary received and reviewed by PCP)

Team huddle to identify infants eligible for possible initiation of O2 wean Clinical Care Guideline prior to their arrival

Role of MA:

- Obtain on check-in the infant's vital signs, pulse ox, height/weight and head circumference
- Identify the need for possible O2 wean during clinic visit based on discussion with parent at check-in and/or prior team huddle
- Inform RN and PCP of infant status of O2 dependency
- Leave pulse ox on infant when rooming.

Role of RN:

- Continue the initial triage including assessment of O2 tank and assessment of the infant's respiratory status once the infant is roomed
- Monitor for O2 desaturations or signs of respiratory distress
- Communicate clinical status of infant and pulse ox results to PCP
- Coordinate next steps in therapy including faxing letter or order to home healthcare agency for changes in home oxygen therapy prescription or for overnight pulse ox studies.
- Implement the standing order to begin wean prior to PCP coming into exam room (currently pending approval)

Role of PCP:

- Keep an updated problem list to include premature infant X-weeks gestation (P07.21-P07.39), BPD (ICD10 code: P27.1), current level of O2 (ICD10 code: Z99.81) and whether patient is on diuretics (ICD10 code: Z79.899)
- Complete a full clinical assessment including a history and PE
- Refer to [algorithm](#) for O2 weaning
- Follow criteria for Referral to Pulmonology as this guideline does not address how to wean other respiratory medications including diuretics.

History

- Document any recent difficulty breathing as well as any episodes off of oxygen and how the infant did. In addition, document any concerns about feeding or sleeping as infants who are hypoxic or still having respiratory distress may have trouble feeding and sleeping.

Physical Exam

- Evaluate the infant's weight gain with a goal of at least 30g/day of weight gain to allow for appropriate catch up growth in a premature infant.
- Document respiratory rate and any increased work of breathing noted on exam (abdominal breathing, retractions, flaring).

Criteria for Referral to Pulmonology

- Discharged on $\frac{1}{2}$ LNC or Greater
- Respiratory symptoms/concerns regardless of oxygen status
- Inability to wean O₂ by 2-3 months (corrected)
- Abnormal home nighttime study (or symptoms upon O₂ discontinuation regardless of study result)
- Intolerance of weaning diuretics
- Pulmonary hypertension
- Poor growth at follow up

LABORATORY STUDIES | IMAGING

- All premature infants on oxygen should have routine pulse oximetry at every visit.
- The only additional laboratory study to order is an overnight pulse oximetry study if the infant meets criteria.

THERAPEUTICS

Oxygen: Titrate oxygen to goal of oxygen saturation greater than 95%

PARENT | CAREGIVER EDUCATION

- Expected clinical course
- Proper techniques for suctioning and airway maintenance
- Signs of worsening clinical status and when to call their PCP
- Proper hand hygiene
- Smoking Cessation Counseling
 - Quit line: 1 (800) 630-QUIT
 - Quitnet: www.co.quitnet.org
 - Caregiver Smoking Cessation Clinic at the Child Health Clinic
 - DIMENSIONS program at University of Colorado Hospital

Links to Patient-Caregiver Education

- [Home Oxygen Therapy-In Care of Kids-English](#)
- [Home Oxygen Therapy-In Care of Kids-Spanish](#)
- [Smoking cessation handouts-In Care of Kids-English](#)
- [Smoking cessation handouts-In Care of Kids-Spanish](#)

REFERENCES

1. Northway, W. H., Rosan, R. C., & Porter, D. Y. (1967). Pulmonary disease following respirator therapy of hyaline-membrane disease. Bronchopulmonary dysplasia. *The New England Journal of Medicine*, 276(7), 357–368
2. Stoll BJ, Hansen NI, Bell EF, Walsh MC, Carlo WA, Shankaran S, et al.; Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network. Trends in care practices, morbidity, and mortality of extremely preterm neonates, 1993-2012. *JAMA* 2015;314:1039–1051.
3. Palm, K., Simoneau, T., Sawicki, G., & Rhein, L. (2011). Assessment of Current Strategies for Weaning Premature Infants From Supplemental Oxygen in the Outpatient Setting. *Advances in Neonatal Care : Official Journal of the National Association of Neonatal Nurses*, 11(5), 349–356.
4. Yeh, J., McGrath-Morrow, S. A., & Collaco, J. M. (2016). Oxygen weaning after hospital discharge in children with bronchopulmonary dysplasia. *Pediatric Pulmonology*, 51(11), 1206–1211.
5. Hayes, D., Wilson, K. C., Krivchenia, K., Hawkins, S. M. M., Balfour-Lynn, I. M., Gozal, D., et al. (2019). Home Oxygen Therapy for Children. An Official American Thoracic Society Clinical Practice Guideline. *American Journal of Respiratory and Critical Care Medicine*, 199(3), e5–e23.



CLINICAL IMPROVEMENT TEAM MEMBERS

Baker, Christopher, MD | Pulmonary Medicine
Lockspeiser, Tai, MD, MHPE | Child Health Clinic
Clark, Catherine, CNS | Child Health Clinic
Lenssen, Maureen, PNP | Child Health Clinic
Houin, Satya, MD | Neonatology/Perinatology
Kiley, Robert, MD | CSH NICU Medication Director
Chaput, Melissa, MS | Manager, CSH Respiratory Care

Papantonakis, Tina, MD | Outpatient Clinical Medical Director
Harrington, James, MD | Greenwood Pediatrics
Sharisse Arnold-Rehring, MD | Kaiser Permanente
Lalit Bajaj, MD, MPH | Emergency Medicine
Brecht, Nicole | DME Coordinator
Ficco, Elizabeth | Clinical Effectiveness

APPROVED BY

Clinical Pathways and Measures Review Committee – June 16, 2020
 Pharmacy & Therapeutics Committee – N/A

| | |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANUAL/DEPARTMENT | Clinical Pathways/Quality |
| ORIGINATION DATE | June 16, 2020 |
| LAST DATE OF REVIEW OR REVISION | June 16, 2020 |
| COLORADO SPRINGS REVIEW BY |  Mike DiStefano, MD Chief Medical Officer, Colorado Springs |
| APPROVED BY |  Lalit Bajaj, MD, MPH Medical Director, Clinical Effectiveness |

REVIEW | REVISION SCHEDULE

Scheduled for full review on June 16, 2024

Clinical pathways are intended for informational purposes only. They are current at the date of publication and are reviewed on a regular basis to align with the best available evidence. Some information and links may not be available to external viewers. External viewers are encouraged to consult other available sources if needed to confirm and supplement the content presented in the clinical pathways. Clinical pathways are not intended to take the place of a physician's or other health care provider's advice, and is not intended to diagnose, treat, cure or prevent any disease or other medical condition. The information should not be used in place of a visit, call, consultation or advice of a physician or other health care provider. While the information presented attempts to be as accurate as possible, it should not be relied upon as being comprehensive or error-free. Furthermore, this document and the information it contains may not be distributed externally or reproduced for external distribution in any form without express written permission of Children's Hospital Colorado. The information presented is provided for use solely at your own risk on an "as-is" basis. Any person or entity reviewing this document and the information it contains should conduct their own review of the specified topic(s) and customize the information to meet their specific needs. Children's Hospital Colorado accepts no liability for the content, or for the consequences of any actions taken on the basis of the information provided. CHCO declares no affiliation, sponsorship, nor any partnerships with any listed organization, or its respective directors, officers, employees, agents, contractors, affiliates, and representatives.

Discrimination is Against the Law. Children's Hospital Colorado complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex. Children's Hospital Colorado does not exclude people or treat them differently because of race, color, national origin, age, disability, or sex.

Children's Hospital Colorado provides free aids and services to people with disabilities to communicate effectively with us, such as: Qualified sign language interpreters, written information in other formats (large print, audio, accessible electronic formats, other formats). Children's Hospital Colorado provides free language services to people whose primary language is not English, such as: Qualified interpreters, information written in other languages.

If you need these services, contact the Medical Interpreters Department at 720.777.9800.

If you believe that Children's Hospital Colorado has failed to provide these services or discriminated in another way on the basis of race, color, national origin, age, disability, or sex, you can file a grievance with: Corporate Compliance Officer, 13123 E 16th Avenue, B450, Aurora, Colorado 80045, Phone: 720.777.1234, Fax: 720.777.7257, corporate.compliance@childrenscolorado.org. You can file a grievance in person or by mail, fax, or email. If you need help filing a grievance, the Corporate Compliance Officer is available to help you.

You can also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, electronically through the Office for Civil Rights Complaint Portal, available at ocrportal.hhs.gov/ocr/portal/lobby.jsf, or by mail or phone at: U.S. Department of Health and Human Services 200 Independence Avenue, SW Room 509F, HHH Building Washington, D.C. 20201 1-800-368-1019, 800-537-7697 (TDD) Complaint forms are available at www.hhs.gov/ocr/office/file/index.html.

Children's Hospital Colorado complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex.

ATENCIÓN: si habla español, tiene a su disposición servicios gratuitos de asistencia lingüística. Llame al 1-720-777-9800.

CHÚ Ý: Nếu bạn nói Tiếng Việt, có các dịch vụ hỗ trợ ngôn ngữ miễn phí dành cho bạn. Gọi số 1-720-777-9800.

주의: 한국어를 사용하시는 경우, 언어 지원 서비스를 무료로 이용하실 수 있습니다. 1-720-777-9800 번으로 전화해 주십시오

注意: 如果您使用繁體中文, 您可以免費獲得語言援助服務。請致電1-720-777-9800。

ВНИМАНИЕ: Если вы говорите на русском языке, то вам доступны бесплатные услуги перевода. Звоните 1-720-777-9800.

ማስታወሻ: የሚናገሩት ቋንቋ አማርኛ ከሆነ የትርጉም አርዳታ ድርጅቶቹ: በነጻ ሊያግዙዎት ተዘጋጅተዎልዎልዎልዎልዎል ወደ ሚስተለው ቁጥር ይደውሉ 1-720-777-9800 (መስማት ለተሳናቸው).

ملحوظة: إذا كنت تتحدث انكر اللغة، فإن خدمات المساعدة اللغوية تتوفر لك بالمجان. اتصل برقم 1-720-777-9800 (رقم)

ACHTUNG: Wenn Sie Deutsch sprechen, stehen Ihnen kostenlos sprachliche Hilfsdienstleistungen zur Verfügung. Rufnummer: 1-720-777-9800.

ATTENTION : Si vous parlez français, des services d'aide linguistique vous sont proposés gratuitement. Appelez le 1-720-777-9800.

ध्यान बनु होस् तपाइले नेपाल बोलनहनछ भन तपाइको निम्त भाषा सहायता सवाहरू नःशलक रूपमा उपलब्ध छ । फोन गनु होस्रू 1-720-777-9800 ।

PAUNAWA: Kung nagsasalita ka ng Tagalog, maaari kang gumamit ng mga serbisyo ng tulong sa wika nang walang bayad. Tumawag sa 1-720-777-9800.

注意事項: 日本語を話される場合、無料の言語支援をご利用いただけます。1-720-777-9800 まで、お電話にてご連絡ください。

Nti: O buṛu na asụ Ibo, asụsụ aka oasụ n'efu, defu, aka. Call 1-720-777-9800.