

## Nitric Oxide Therapy - Inhaled (INO Therapy)

Date of Origin: 04/2011

Last Review Date: 10/28/2020

Effective Date: 11/02/2020

Dates Reviewed: 3/12, 12/12, 11/13, 09/14, 10/15, 11/16, 10/2017, 10/2018, 10/2019, 10/2020

Developed By: Medical Necessity Criteria Committee

### I. Description

Inhaled nitric oxide (INO) improves gas exchange, decreases inflammation, and is a selective pulmonary vasodilator. It was approved by the FDA in 1999 as a treatment for persistent pulmonary hypertension in infants. Its use has expanded to other conditions such as management of pulmonary hypertension in repair of congenital heart disease and during heart catheterization to determine pulmonary vasoreactivity. INO therapy is used in conjunction with ventilatory support to treat pulmonary hypertension in neonatal patients, post meconium aspiration, and related birth defects.

### II. Criteria: CWQI HCS-0038

A. Moda Health considers INO therapy medically necessary for **1 or more** of the following conditions:

- a. Hypoxic respiratory failure in term and near-term infants with a gestational age of at least 34 weeks when **All** of the following criteria are met:
  - i. Absence of a congenital diaphragmatic hernia; and
  - ii. Failure, contraindication to, or intolerance to conventional therapy (high-frequency ventilation, high concentrations of oxygen, hyperventilation, alkalosis induction, neuromuscular blockade, or sedation) or is expected to fail.
- b. Diagnostic use of INO as a method of assessing pulmonary vasoreactivity in patients with pulmonary hypertension.
- c. For postoperative management of pulmonary hypertensive crisis in infants and children with congenital heart disease.

B. NOTE – INO therapy is considered medically necessary for no longer than 14 days if the oxygen desaturation has been resolved. Refer to the medical director if INO therapy is requested for more than 14 days

C. Moda Health considers all other indications for INO therapy experimental and investigational. INO for indications other than those listed above have not been identified as widely used and generally accepted in nationally recognized peer-reviewed medical literature

### III. Information Submitted with the Prior Authorization Request:

1. Chart notes from ordering specialist including history and physical
2. Treatment history
3. Treatment plan

### IV. CPT or HCPC codes covered:

| Codes | Description  |
|-------|--|
| 94002 | Ventilation assist and management, initiation of pressure or volume preset ventilators for assisted or controlled breathing; hospital inpatient/observation, initial day         |
| 94003 | Ventilation assist and management, initiation of pressure or volume preset ventilators for assisted or controlled breathing; hospital inpatient/observation, each subsequent day |
| 94004 | Ventilation assist and management, initiation of pressure or volume preset ventilators for assisted or controlled breathing; nursing facility, per day                           |

### V. Annual Review History

| Review Date | Revisions  | Effective Date |
|-------------|--|----------------|
| 12/2012     | Annual Review: Added table with review date, revisions, and effective date.                              | 01/01/2013     |
| 11/13       | Annual Review: No change   | 11/27/2013     |
| 09/14       | Annual Review: No change   | 09/30/2014     |
| 07/15       | Added ICD-9 and ICD-10 Codes   | 07/2015        |
| 10/15       | Annual Review: changed title to Nitric Oxide Therapy – Inhaled, no change to criteria; added ICD10 codes | 10/28/2015     |
| 11/16       | Annual Review – removed ICD-9 codes  | 11/30/2016     |
| 10/2017     | Annual Review – moved to new template  | 10/25/2017     |
| 10/2018     | Annual Review- no changes  | 10/2018        |
| 10/2019     | Annual Review: No changes  | 11/01/2019     |
| 10/2020     | Annual Review: No changes  | 11/02/2020     |

### VI. References

1. Angus DC, Clermont G, Linde-Zwirble WT, Musthafa AA, Dremsizov TT, Lidicker J, Lave JR; NO-06 Investigators. Healthcare costs and long-term outcomes after acute respiratory distress syndrome: A phase III trial of inhaled nitric oxide. *Crit Care Med*. 2006 Dec;34(12):2883-90.
2. Hibbs AM, Walsh MC, Martin RJ, Truog WE, Lorch SA, Alessandrini E, Cnaan A, Palermo L, Wadlinger SR, Coburn CE, Ballard PL, Ballard RA. One-year respiratory outcomes of preterm infants enrolled in the Nitric Oxide (to prevent) Chronic Lung Disease trial. One-year respiratory outcomes of preterm infants enrolled in the Nitric Oxide (to prevent) Chronic Lung Disease trial. *J Pediatr*. 2008 Oct;153(4):525-9.

3. American Academy of Pediatrics. Committee on Fetus and Newborn. Use of inhaled nitric oxide. *Pediatrics*. 2000 Aug;106(2 Pt 1):344-5. Reaffirmation Apr 1, 2010 Accessed March 21, 2012 at: <http://aappolicy.aappublications.org/cgi/content/full/pediatrics;106/2/344>
4. Arul N, Konduri GG. Inhaled nitric oxide for preterm neonates. *Clin Perinatol*. 2009;36(1):43-61
5. Badesch DB, Abman SH, Simonneau G, Rubin LJ, McLaughlin VV. Medical therapy for pulmonary arterial hypertension: updated ACCP evidence-based clinical practice guidelines. *Chest*. 2007 Jun;131(6):1917-28.
6. Bizzarro M, Gross I. Inhaled nitric oxide for the postoperative management of pulmonary hypertension in infants and children with congenital heart disease. *Cochrane Database Syst Rev*. 2005;(4):CD005055.
7. Field D, Elbourne D, Hardy P, Fenton AC, Ahluwalia J, Halliday HL, Subhedar N, Heinonen K, Aikio O, Grieve R, Truesdale A, Tomlin K, Normand C, Stocks J; INNOVO Trial Collaborating Group. Neonatal ventilation with inhaled nitric oxide vs. ventilatory support without inhaled nitric oxide for infants with severe respiratory failure born at or near term: the INNOVO multicentre randomised controlled trial. *Neonatology*. 2007;91(2):73-82.
8. Finer NN, Barrington KJ. Nitric oxide for respiratory failure in infants born at or near term. *Cochrane Database Syst Rev*. 2006;(4):CD000399.
9. Galiè N, Hoepfer MM, Humbert M, Torbicki A, Vachiery JL, Barbera JA, Beghetti M, Corris P, Gaine S, Gibbs JS, Gomez-Sanchez MA, Jondeau G, Klepetko W, Opitz C, Peacock A, Rubin L, Zellweger M, Simonneau G; ESC Committee for Practice Guidelines (CPG), Vahanian A, Auricchio A, Bax J, Ceconi C, Dean V, Filippatos G, Funck-Brentano C, Hobbs R, Kearney P, McDonagh T, McGregor K, Popescu BA, Reiner Z, Sechtem U, Sirnes PA, Tendera M, Vardas P, Widimsky P; Document Reviewers, Sechtem U, Al Attar N, Andreotti F, Aschermann M, Asteggiano R, Benza R, Berger R, Bonnet D, Delcroix M, Howard L, Kitsiou AN, Lang I, Maggioni A, Nielsen-Kudsk JE, Park M, Perrone-Filardi P, Price S, Domenech MT, Vonk-Noordegraaf A, Zamorano JL. Guidelines for the diagnosis and treatment of pulmonary hypertension: The Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS), endorsed by the International Society of Heart and Lung Transplantation (ISHLT). *Eur Heart J*. 2009 Oct;30(20):2493-537. Accessed March 21, 2012 at: <http://www.escardio.org/guidelines-surveys/esc-guidelines/Pages/GuidelinesList.aspx>.
10. Hayward, CS; Kelly, RP; MacDonald, PS (1999). "Inhaled nitric oxide in cardiology practice". *Cardiovascular research* **43** (3): 628–38. doi:10.1016/S0008-6363(99)00114-5. PMID 10690334.
11. Hermon MM, Burda G, Golej J, Boigner H, Stoll E, Kitzmüller E, Wollenek G, Pollak A, Trittenwein G. Methemoglobin formation in children with congenital heart disease treated with inhaled nitric oxide after cardiac surgery. *Intensive Care Med*. 2003 Mar;29(3):447-52. Epub 2003 Jan 21.
12. Hoehn T, Krause MF, Buhner C. Meta-analysis of inhaled nitric oxide in premature infants: An update. *Klin Padiatr*. 2006;218(2):57-61.
13. Huddy CL, Bennett CC, Hardy P, et al; INNOVO Trial Collaborating Group. The INNOVO multicentre randomised controlled trial: Neonatal ventilation with inhaled nitric oxide versus ventilatory support without nitric oxide for severe respiratory failure in preterm infants: follow up at 4-5 years. *Arch Dis Child Fetal Neonatal Ed*. 2008;93(6): F430-F435.
14. Kinsella JP, Walsh WF, Bose CL, et al. Inhaled nitric oxide in premature neonates with severe hypoxemic respiratory failure: A randomized controlled trial. *Lancet*. 1999; 354:1061-1065.

15. Konduri GG, Vohr B, Robertson C, Sokol GM, Solimano A, Singer J, Ehrenkranz RA, Singhal N, Wright LL, Van Meurs K, Stork E, Kirpalani H, Peliowski A, Johnson Y; Neonatal Inhaled Nitric Oxide Study.
16. Marks JD, Schreiber MD. Inhaled nitric oxide and neuroprotection in preterm infants. Clin Perinatol. 2008;35(4):793-807, viii.
17. Inhaled nitric oxide in term and near-term infants: Neurodevelopmental follow-up of the Neonatal Inhaled Nitric Oxide Study Group (NINOS). J Pediatr. 2000;136(5):611-617.
18. Sharma S. Adult respiratory distress syndrome. In: BMJ Clinical Evidence. London, UK: BMJ Publishing Group; August 2006.
19. Walsh MC, Hibbs AM, Martin CR, Cnaan A, Keller RL, Vittinghoff E, Martin RJ, Truog WE, Ballard PL, Zadell A, Wadlinger SR, Coburn CE, Ballard RA; NO CLD Study Group. Two-year neurodevelopmental outcomes of ventilated preterm infants treated with inhaled nitric oxide. J Pediatr. 2010 Apr;156(4):556-61. e1
20. Ware LE. Inhaled nitric oxide in infants and children. Crit Care Nurs Clin North Am. 2002;14(1):1-
21. DiBlasi RM, Myers TR, Hess DR. Evidence-based clinical practice guideline: inhaled nitric oxide for neonates with acute hypoxic respiratory failure. Respir Care. 2010 Dec;55(12):1717-45. Review.
22. Physician Advisors

## Appendix 1 – Applicable Diagnosis Codes:

| Codes  | Description   |
|--------|---|
| I27.0  | Primary pulmonary hypertension                      |
| I27.1  | Kyphoscoliotic heart disease                        |
| I27.2  | Other secondary pulmonary hypertension              |
| I27.82 | Chronic pulmonary embolism                          |
| I27.89 | Other specified pulmonary heart diseases            |
| I97.3  | Postprocedural hypertension                         |
| P07.36 | Preterm newborn, gestational age 33 completed weeks |
| P07.37 | Preterm newborn, gestational age 34 completed weeks |
| P07.38 | Preterm newborn, gestational age 35 completed weeks |
| P07.39 | Preterm newborn, gestational age 36 completed weeks |
| P22.0  | Respiratory distress syndrome of newborn            |
| P24.01 | Meconium aspiration with respiratory symptoms       |
| P28.5  | Respiratory failure of newborn                      |
| P29.3  | Persistent fetal circulation                        |
| P36.9  | Bacterial sepsis of newborn, unspecified            |
| P84    | Other problems with newborn                         |
| Q33.1  | Accessory lobe of lung                              |
| Q33.2  | Sequestration of lung                               |
| Q33.3  | Agenesis of lung                                    |
| Q33.4  | Congenital bronchiectasis                           |
| Q22.5  | Ectopic tissue in lung                              |
| Q33.6  | Congenital hypoplasia and dysplasia of lung         |

|        |  |
|--------|--|
| Q33.8  | Other congenital malformations of lung                         |
| Q33.9  | Congenital malformation of lung, unspecified                   |
| Q34.0  | Anomaly of pleura  |
| Q34.1  | Congenital cyst of mediastinum                                 |
| Q34.8  | Other specified congenital malformations of respiratory system |
| Z98.89 | Other specified postprocedural states                          |

## Appendix 2 – Centers for Medicare and Medicaid Services (CMS)

Medicare coverage for outpatient (Part B) drugs is outlined in the Medicare Benefit Policy Manual (Pub. 100-2), Chapter 15, §50 Drugs and Biologicals. In addition, National Coverage Determination (NCD) and Local Coverage Determinations (LCDs) may exist and compliance with these policies is required where applicable. They can be found at: <http://www.cms.gov/medicare-coverage-database/search/advanced-search.aspx>. Additional indications may be covered at the discretion of the health plan.

Medicare Part B Covered Diagnosis Codes (applicable to existing NCD/LCD):

| Jurisdiction(s): 5, 8 | NCD/LCD Document (s): |
|-----------------------|-----------------------|
|                       |                       |
|                       |                       |

| NCD/LCD Document (s): |
|-----------------------|
|                       |

| Medicare Part B Administrative Contractor (MAC) Jurisdictions |  |                                    |
|---|--|------------------------------------|
| Jurisdiction  | Applicable State/US Territory          | Contractor                         |
| F (2 & 3)   | AK, WA, OR, ID, ND, SD, MT, WY, UT, AZ | Noridian Healthcare Solutions, LLC |