RDS (Respiratory Distress Syndrome)

Setting: **Inpatient** Population: **NICU** Keywords: **hyaline memrane, prematurity, respiratory**

Clinical Description

Care of the hospitalized infant experiencing early onset of pulmonary insufficiency in the delivery room or within 6 hours of birth, caused primarily from a surfactant deficiency that is characteristic in premature infants.

Key Information

- Early surfactant replacement and noninvasive positive pressure should be used to reduce the need for intubation and invasive positive pressure ventilation.
- LISA (less invasive surfactant administration) or INSURE (intubate, surfactant, extubate) is preferred due to improved outcomes.
- The use of inhaled nitric oxide is only supported by evidence when pulmonary hypertension is present.
- A practical approach, such as work of breathing and oxygen needs assessment, should be used to diagnose RDS to allow for surfactant and noninvasive positive pressure strategies that reduce the need for intubation.

Clinical Goals

By transition of care

A. The patient will demonstrate achievement of the following goals:

- Effective Oxygenation

B. Patient, family or significant other will teach back or demonstrate education topics and points:

- Education: Overview
- Education: Self Management
- Education: When to Seek Medical Attention

Correlate Health Status

Correlate health status to:

- prenatal and birth history, comorbidity, congenital anomaly
- gestational age, corrected age, day of life
- sex
- baseline assessment data
- physiologic status
- response to medication and interventions
- barriers to accessing care and services
- family/caregiver:
  - developmental level
  - health literacy
  - cultural and spiritual preferences
- safety risks
- social determinants of health
- family interaction
- plan for transition of care

RDS (Respiratory Distress Syndrome)

Signs/Symptoms/Presentation

- breath sounds abnormal
- cyanosis
- lung compliance decreased
- lung/airway resistance increased
- minute volume demand increased
- oxygen index increased
- oxygen requirement increased
- PaO2/FiO2 ratio decreased
- work of breathing increased

Vital Signs

- heart rate increased
- respiratory rate increased
- blood pressure increased or decreased
- SpO2 (peripheral oxygen saturation) decreased

Laboratory Values

- ABG (arterial blood gas) abnormal
- PaO2 (partial pressure of arterial oxygen) decreased

Diagnostic Results

- CXR (chest x-ray) abnormal

Problem Intervention(s)

Optimize Oxygenation, Ventilation and Perfusion

- Provide surfactant using the least invasive method of delivery.
- Provide respiratory support using noninvasive positive pressure, such as CPAP (continuous positive airway pressure) or bilevel CPAP; monitor the need for intubation.
- Avoid wide, rapid variations in PaO2 and PaCO2, including prolonged hyperoxia.
- Use lung protective ventilation strategy, such as volume targeted ventilation, low volume strategy ventilation and PEEP (positive end expiratory pressure).
- Promote early extubation to avoid further ventilator-induced lung injury.
- Consider sedation to manage ventilator asynchrony and refractory hypoxemia.
- Anticipate the need for adjunctive therapy, such as selective use of neuromuscular blocking agent, high-frequency ventilation, inhaled nitric oxide and extracorporeal life support.

Associated Documentation

- Airway/Ventilation Management (Infant)

General Education

- admission, transition of care
- orientation to care setting, routine
- advance care planning
- diagnostic tests/procedures
- opioid medication management
- oral health
- medication management
- pain assessment process
- safe medication disposal
- tobacco use, smoke exposure
- treatment plan

Safety Education

- call light use
- equipment/home supplies
- fall prevention
- harm prevention
- infection prevention
- MDRO (multidrug-resistant organism) care
- personal health information
- resources for support

Education: Overview

- description
- signs/symptoms

Education: Self Management

- home care
- infection prevention
- provider follow-up

Education: When to Seek Medical Attention

- unresolved/worsening symptoms

References

(2019). Walsh, B. K (Eds.), *Neonatal and pediatric respiratory care* . St. Louis: Elsevier. [Review Articles, Expert/Committee Opinion, Core Curriculum, Position Statements, Practice Bulletins]

Aldana-Aguirre, J. C.; Pinto, M.; Featherstone, R. M.; Kumar, M. Less invasive surfactant administration versus intubation for surfactant delivery in preterm infants with respiratory distress syndrome: A systematic review and meta-analysis. Archives of Disease in Childhood: Fetal and Neonatal Edition. 2017;102(1), F17-F23. doi:10.1136/archdischild-2015-310299 [Metasynthesis, Meta-analysis, Systematic Review]

American Heart Association. (2015, Updated). *Part 13: Neonatal resuscitation. Web-based integrated 2010 and 2015 American Heart Association Guidelines for cardiopulmonary resuscitation and emergency cardiovascular care* . Source [Quality Measures, Clinical Practice Guidelines]

Bamat, N.; Fierro, J.; Wang, Y.; Millar, D.; Kirpalani, H. Positive end-expiratory pressure for preterm infants requiring conventional mechanical ventilation for respiratory distress syndrome or bronchopulmonary dysplasia. Cochrane Database of Systematic Reviews. 2019;(2) doi:10.1002/14651858.CD004500.pub3 [Metasynthesis, Meta-analysis, Systematic Review]

Delara, M.; Chauhan, B. F.; Le, M. L.; Abou-Setta, A. M.; Zarychanski, R.; W'tJong, G. Efficacy and safety of pulmonary application of corticosteroids in preterm infants with respiratory distress syndrome: A systematic review and meta-analysis. Archives of Disease in Childhood-Fetal and Neonatal Edition. 2019;104(2), F137-F144. [Metasynthesis, Meta-analysis, Systematic Review]

Dobson, N. R.; Patel, R. M. The role of caffeine in noninvasive respiratory support. Clinical Perinatology. 2016;43(4), 773-782. doi:10.1016/j.clp.2016.07.011 [Review Articles, Expert/Committee Opinion, Core Curriculum, Position Statements, Practice Bulletins]

Ethawi, Y. H.; Abou Mehrem, A.; Minski, J.; Ruth, C. A.; Davis, P. G. High frequency jet ventilation versus high frequency oscillatory ventilation for pulmonary dysfunction in preterm infants. Cochrane Database of Systematic Reviews. 2016;(5) doi:10.1002/14651858.CD010548.pub2 [Metasynthesis, Meta-analysis, Systematic Review]

Gardner, S. L.; Carter, C. S.; Enzman-Hines, M.; Hernandez, J. A. (2016). *Merenstein and Gardner's handbook of neonatal intensive care* . St. Louis: Mosby, Elsevier. [Review Articles, Expert/Committee Opinion, Core Curriculum, Position Statements, Practice Bulletins]

Lau, C. S. M.; Chamberlain, R. S.; Sun, S. Less invasive surfactant administration reduces the need for mechanical ventilation in preterm infants: A meta-analysis. Global Pediatric Health. 2017;4 doi:10.1177/2333794X17696683 [Metasynthesis, Meta-analysis, Systematic Review]

Long, C.; Li, W.; Wanwei, L.; Jie, L.; Yuan, S. Noninvasive ventilation with heliox for respiratory distress syndrome in preterm infant: A systematic review and meta-analysis. Canadian Respiratory Journal. 2016;2016 doi:10.1155/2016/9092871 [Metasynthesis, Meta-analysis, Systematic Review]

Luo, J.; Chen, J.; Li, Q.; Feng, Z. Differences in clinical characteristics and therapy of neonatal acute respiratory distress syndrome (ARDS) and respiratory distress syndrome (RDS): A retrospective analysis of 925 cases. Medical Science Monitor. 2019;25, 4992-4998. doi:10.12659/MSM.915213 [Review Articles, Expert/Committee Opinion, Core Curriculum, Position Statements, Practice Bulletins]

National Institute for Health and Care Excellence (NICE). (2019). *Specialist neonate respiratory care for babies born preterm. NICE guideline [NG124]* . Source [Quality Measures, Clinical Practice Guidelines]

Rigo, V.; Lefebvre, C.; Broux, I. Surfactant instillation in spontaneously breathing preterm infants: A systematic review and meta-analysis. European Journal of Pediatrics. 2016;175(12), 1933-1942. doi:10.1007/s00431-016-2789-4 [Metasynthesis, Meta-analysis, Systematic Review]

Rivas-Fernandez, M.; Roque I Figuls, M.; Diez-Izquierdo, A.; Escribano, J.; Balaguer, A. Infant position in neonates receiving mechanical ventilation. Cochrane Database of Systematic Reviews. 2016;(11) doi:10.1002/14651858.CD003668.pub4 [Metasynthesis, Meta-analysis, Systematic Review]

Sweet, D. G.; Carnielli, V.; Greisen, G.; Hallman, M.; Ozek, E.; te Pas, A.; . . . & Speer, C. P. European consensus guidelines on the management of respiratory distress syndrome-2019 update. Neonatology. 2019;115(4), 432-450. [Quality Measures, Clinical Practice Guidelines]

Verklan, M. T.; Walden, M. (2015). *Core Curriculum for Neonatal Intensive Care Nursing* . St. Louis: Saunders, Elsevier. [Review Articles, Expert/Committee Opinion, Core Curriculum, Position Statements, Practice Bulletins]

Walsh, B. K.; Daigle, B.; DiBlasi, R. M>; Restrepo, R. D. AARC clinical practice guideline: Surfactant replacement therapy: 2013. Respiratory Care. 2013;58(2), 367-375. [Quality Measures, Clinical Practice Guidelines]