Pediatric Respiratory Distress (Bronchiolitis)

(Adapted from an evidence-based guideline created using the National Prehospital Evidence-Based Guideline Model Process)

Aliases

None noted

Patient Care Goals

1. Alleviate respiratory distress.
2. Promptly identify respiratory distress, failure, and/or arrest, and intervene for patients who require escalation of therapy.
3. Deliver appropriate therapy by differentiating other causes of pediatric respiratory distress.

Patient Presentation

Inclusion Criteria

Child less than 2 yo typically with diffuse rhonchi or an otherwise undifferentiated illness characterized by rhinorrhea, cough, fever, tachypnea, and/or respiratory distress

Exclusion Criteria

1. Anaphylaxis
2. Croup
3. Epiglottitis
4. Foreign body aspiration
5. Submersion
6. Drowning
7. Asthma

Patient Management

Assessment

1. History
    a. Onset of symptoms
    b. Concurrent symptoms (e.g. fever, cough, rhinorrhea, tongue/lip swelling, rash, labored breathing, foreign body aspiration)
    c. Sick contacts
    d. History of wheezing
    e. Treatments given
    f. Number of emergency department visits in the past year
    g. Number of admissions in the past year
    h. Number of ICU admissions ever
    i. History of prematurity
    j. Family history of asthma, eczema, or allergies
2. Exam
    a. Full set of vital signs (T, BP, RR, P, O_2 saturation)
    b. Air entry (normal vs. diminished)
    c. Breath sounds (wheezes, crackles, rales, rhonchi, diminished, clear)
    d. Signs of distress (grunting, nasal flaring, retracting, stridor)
    e. Weak cry or inability to speak full sentences (sign of shortness of breath)
    f. Color (pallor, cyanosis, normal)
    g. Mental status (alert, tired, lethargic, unresponsive)
    h. Hydration status (+/- sunken eyes, delayed capillary refill, mucus membranes moist vs. tacky, fontanel flat vs. sunken)

Treatment and Interventions

1. Pulse oximetry and end-tidal CO_2 ($ETCO_2$)***:*** *Use* routinely as an adjunct to other forms of respiratory monitoring.
2. ECG ***:*** *Perform* only if there are no signs of clinical improvement after treating respiratory distress.
3. Airway
    a. Administer oxygen as appropriate for dyspnea or distress with a target of achieving greater than 93% saturation for most acutely ill patients. Escalate from a nasal cannula to a simple face mask to a non- breather mask as needed, in order to maintain normal oxygenation.
    b. Suction the nose and/or mouth (via bulb, Yankauer®, or suction catheter) if excessive secretions are present.
4. Inhaled medications: Administer **nebulized epinephrine [PARA]** (to children in severe respiratory distress with bronchiolitis (e.g. coarse breath sounds) in the prehospital setting if other treatments (e.g. suctioning, oxygen) fail to result in clinical improvement.
    a. Dose: 0.5mL of 2.25% solution nebulized
5. Utility of IV placement and fluids: Place IVs only in children with respiratory distress for clinical concerns of dehydration, or when administering IV medications ***[AEMT].***
6. Steroids: Are generally not efficacious, and not given in the prehospital setting.
7. Improvement of oxygenation and/or respiratory distress with **non-invasive positive pressure ventilation *[EMT]*** adjuncts:
    a. Administer continuous positive airway pressure (CPAP), Bi-level positive airway pressure (BiPAP), or **high flow nasal cannula (HFNC) [PARA]**, when available, for severe respiratory distress.
    b. Utilize bag-valve-mask ventilation in children with respiratory failure.
8. Supraglottic devices and intubation:
    a. Utilize non-visualized airways and **intubation *[PARA]*** only if bag-valve-mask ventilation fails.
    b. Manage the airway in the least invasive way possible.

Patient Safety Considerations

Routine use of lights and sirens is not recommended during transport.

Notes and Educational Pearls Key Considerations

- Nasal Suctioning can be a very effective intervention to alleviate distress, since infants are obligate nose breathers.
- Insufficient data exist to recommend the use of inhaled steam or nebulized saline.
- Though albuterol has previously been a consideration, the most recent evidence does not demonstrate a benefit in using it for bronchiolitis.
- Ipratropium and other anticholinergic agents should not be given to children with bronchiolitis in the prehospital setting.

Pertinent Assessment Findings

- Frequent reassessment is necessary to determine if interventions have alleviated signs of respiratory distress or not.

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

- 9914221—Medical-Respiratory Distress-Bronchiolitis Protocol Age Category: 3602005—Pediatric Only

Key Documentation Elements

- Document key aspects of the exam to assess for a change after each intervention:

- Respiratory rate
- Oxygen saturation
- Use of accessory muscles
- Breath sounds
- Air entry
- Mental status
- Color

Performance Measures

1. CPAP utilization
2. Time to administration of specified interventions in the protocol
3. Rate of administration of accepted therapy (whether or not certain medications or interventions were given)
4. Change in vital signs (heart rate, blood pressure, temperature, respiratory rate, pulse oximeter, capnography values)
5. Time to administration of specified interventions in the protocol
6. Number of advanced airway attempts
7. Mortality

References

1. Abramo TJ, Wiebe RA, Scott SM, Primm PA, McIntyre D, Mydlyer T. Noninvasive capnometry in a pediatric population with respiratory emergencies. *Pediatr Emerg Care.* 1996;12(4):252- 4.
2. Al-Ansari K, Sakran M, Davidson BL, El Sayyed R, Mahjoub H, Ibrahim K. Nebulized 5% or 3% hypertonic or 0.9% saline for treating acute bronchiolitis in infants. *J Pediatr.* 2010;157(4): 630-4.
3. Cambonie G, Milési C, Jaber S, et al. Nasal continuous positive airway pressure decreases respiratory muscles overload in young infants with severe acute viral bronchiolitis. *Intensive Care Med.* 2008;34(10):1865-72.
4. Chavasse R, Seddon P, Bara A, McKean M. Short acting beta2-agonists for recurrent wheeze in children under two years of age. *Cochrane Database Syst Rev.* 2002;(3):CD002873.
5. Chowdhury MM, McKenzie SA, Pearson CC, et al. Heliox therapy in bronchiolitis: phase III multicenter double-blind randomized controlled trial. *Pediatrics.* 2013;131(4):661-9.
6. Corneli HM, Zorc JJ, Mahajan P, et al. A multicenter, randomized, controlled trial of dexamethasone for bronchiolitis. *N Engl J Med.* 2007;357(4):331-9.
7. Denver Metro Airway Study Group. A prospective multicenter evaluation of prehospital airway management performance in a large metropolitan region. *Prehosp Emerg Care.* 2009;13(3):304-10.
8. Ehrlich PF, Seidman PS, Atallah O, Haque A, Helmkamp J. Endotracheal intubations in rural pediatric trauma patients. *J Pediatr Surg.* 2004;39(9):1376-80.
9. Everard ML, Bara A, Kurian M, Elliot TM, Ducharme F. Anticholinergic drugs for wheeze in children under the age of two years. *Cochrane Database Syst Rev.* 2002;(1):CD001279.
10. Freedman SB, Haladyn JK, Floh A, Kirsh JA, Taylor G, Thull-Freedman J. Pediatric myocarditis: emergency department clinical findings and diagnostic evaluation. *Pediatrics.* 2007;120(6): 1278-85.
11. Gausche-Hill M, Lewis RJ, Stratton SJ, Haynes BE, Gunter CS, Goodrich SM, et al. Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome. *JAMA.* 2000;283(6):783-90.
12. Grewal S, Ali S, McConnell DW, Vandermeer B, Klassen TP. A randomized trial of nebulized 3% hypertonic saline with epinephrine in the treatment of acute bronchiolitis in the emergency department. *Arch Pediatr Adolesc Med.* 2009;163(11):1007-12.
13. Hartling L, Russell KF, Patel H, Klassen TP, Liang Y. Epinephrine for bronchiolitis. *Cochrane Database Syst Rev.* 2004;(1):CD003123.
14. Ho J, Casey B. Time saved with use of emergency warning lights and sirens during response to requests for emergency medical aid in an urban environment. *Ann Emerg Med.* 1998;32(5):585-8.
15. Ho J, Lindquist M. Time saved with the use of emergency warning lights and siren while

responding to requests for emergency medical aid in a rural environment. *Prehosp Emerg Care.* 2001;5(2):159-62.
16. Hunt RC, Brown LH, Cabinum ES, Whitley TW, Prasad NH, Owens JCF, et al. Is ambulance transport time with lights and siren faster than that without? *Ann Emerg Med.* 1995;25(4): 507-11.
17. Javouhey E, Barats A, Richard N, Stamm D, Floret D. Non-invasive ventilation as primary ventilatory support for infants with severe bronchiolitis. *Intensive Care Med.* 2008;34(9):1608-14.
18. Kuzma K, Sporer KA, Michael GE, Youngblood GM. When are prehospital intravenous catheters used for treatment? *J Emerg Med.* 2009;36(4):357-62.
19. Lacher ME, Bausher JC. Lights and siren in pediatric 911 ambulance transports: are they being misused? *Ann Emerg Med.* 1997;29(2):223-7.
20. Lashkeri T, Howell JM, Place R. Capnometry as a predictor of admission in bronchiolitis. *Pediatr Emerg Care*. 2012;28(9):895-7.
21. Liet JM, Ducruet T, Gupta V, Cambonie G. Heliox. Inhalation therapy for bronchiolitis in infants. *Cochrane Database Syst Rev.* 2010;(4):CD006915.
22. Martinon-Torres F, Rodriguez-Nunez A, Martinon-Sanchez JM. Heliox therapy in infants with acute bronchiolitis. *Pediatrics.* 2002;109(1):68-73.
23. Moses JM, Alexander JL, Agus MS. The correlation and level of agreement between end-tidal and blood gas PCO_2 in children with respiratory distress: a retrospective analysis. *BMC Pediatr.* 2009;9:20.
24. Mussman GM, Parker MW, Statile A, Sucharew H, Brady PW. Suctioning and length of stay in infants hospitalized with bronchiolitis. *JAMA Pediatr.* 2013;167(5):414-21.
25. Ralston RL, Lieberthal H, Meissner HC, et al. Clinical practice guideline: the diagnosis, management, and prevention of bronchiolitis. *Pediatrics.* 2014;134:e1474–502.
26. Skjerven HO, Hunderi JO, Brügmann-Pieper SK, et al. Racemic adrenaline and inhalation strategies in acute bronchiolitis. *N Engl J Med.* 2013;368(24):2286- 93.
27. Spaite DW, Valenzuela TD, Criss EA, Meislin HW, Hinsberg P. A prospective in- field comparison of intravenous line placement by urban and nonurban emergency medical services personnel. *Ann Emerg Med.* 1994;24(2):209-14.
28. Stiell IG, Spaite DW, Field B, et al. Advanced life support for out-of-hospital respiratory distress. *N Engl J Med.* 2007;356(21):2156-64.
29. Thia LP, McKenzie SA, Blyth TP, Minasian CC, Kozlowska WJ, Carr SB. Randomized controlled trial of nasal continuous positive airways pressure (CPAP) in bronchiolitis. *Arch Dis Child.* 2008;93(1):45-7.
30. Umoren R, Odey F, Meremikwu MM. Steam inhalation or humidified oxygen for acute bronchiolitis in children up to three years of age. *Cochrane Database Syst Rev.* 2011;(1):CD006435.
31. Wang HE, Mann NC, Mears G, Jacobson K, Yealy DM. Out-of-hospital airway management in the United States. *Resuscitation.* 2011;82(4):378-85.
32. Zhang L, Mendoza-Sassi RA, Wainwright C, Klassen TP. Nebulized hypertonic saline solution for acute bronchiolitis in infants. *Cochrane Database Syst Rev.* 2008 Oct 8;(4):CD006458.