Pediatric Respiratory Distress (Croup)

(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, respiratory failure, and respiratory 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

- Suspected croup (history of stridor or history of barky cough)

Exclusion Criteria

- Presumed underlying cause that includes one of the following:
    - Anaphylaxis
    - Asthma
    - Bronchiolitis (wheezing **less than** 2 yo)
    - Foreign body aspiration
    - Submersion
    - Drowning
    - Epiglottitis

Patient Management

Assessment

1. History
    a. Onset of symptoms (history of choking)
    b. Concurrent symptoms (fever, cough, rhinorrhea, tongue or lip swelling, rash, labored breathing, foreign body aspiration)
    c. Sick contacts
    d. Treatments given
    e. Personal history of asthma, wheezing, or croup in past
2. Exam
    a. Full set of vital signs (T, BP, RR, P, O_2 sat
    b. Presence of stridor at rest or when agitated
    c. Description of cough
    d. Other signs of distress (grunting, nasal flaring, retracting)
    e. Color (pallor, cyanosis, normal)
    f. Mental status (alert, tired, lethargic, unresponsive)

Treatment and Interventions

1. Monitoring
    a. Use pulse oximetry and end-tidal CO_2 ($ETCO_2$) routinely as an adjunct to other forms of respiratory monitoring.
    b. Perform ECG monitor only if there are no signs of clinical improvement after treating respiratory distress.

2. Airway
    a. Administer oxygen as appropriate for dyspnea or distress with a target of achieving greater than 93% saturation for most acutely ill patients.
    b. Suction the nose and/or mouth (via bulb, Yankauer®, or suction catheter) if excessive secretions are present.
3. Inhaled medications
    a. Administer **epinephrine nebulized*[PARA]*** nebulized, to all children with croup, in respiratory distress, with signs of stridor at rest. This medication should be repeated at this dose with unlimited frequency for ongoing distress.
        - 0.5mL of 2.25% solution nebulized
    b. Note: Humidified oxygen or mist therapy is **not** indicated.
4. Medications: Consider **steroid** administration for suspected croup **[PARA]**
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. Improvement of oxygenation and/or respiratory distress with non-invasive positive pressure ventilation adjuncts:
    a. Administer continuous positive airway pressure (CPAP) or Bi-level positive airway pressure ***[EMT]*** for severe respiratory distress.
    b. Utilize bag-valve-mask ventilation in children with respiratory failure.
7. Use non-visualized airways and **intubation *[PARA]***- only if bag-valve-mask ventilation fails. The airway should be managed in the least invasive way possible.

Patient Safety Considerations

1. Routine use of lights and sirens is not recommended during transport.
2. Patients who receive inhaled epinephrine should be transported to definitive care.

Notes and Educational Pearls Key Considerations

- Upper airway obstruction can have inspiratory, expiratory, or biphasic stridor.
- Foreign bodies can mimic croup, it is important to ask about a possible choking event.
- Impending respiratory failure is indicated by:
    - Change in mental status such as fatigue and listlessness.
    - Pallor.
    - Dusky appearance.
    - Decreased retractions.
    - Decreased breath sounds with decreasing stridor.
- Without stridor at rest or other evidence of respiratory distress, inhaled medications may not be necessary.

Pertinent Assessment Findings

- Respiratory distress (retractions, wheezing, stridor)
- Decreased oxygen saturation
- Skin color
- Neurologic status assessment
- Reduction in work of breathing after treatment
- Improved oxygenation after breathing

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

- 9914223—Medical-Respiratory Distress-Croup 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 or tracheal tugging
- Breath sounds
- Air entry
- Mental status
- Color

Performance Measures

- Time to administration of specified interventions in the protocol
- Frequency of administration of specified interventions in the protocol

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. Ausejo M, Saenz A, Pham B, et al. The effectiveness of glucocorticoids in treating croup: meta-analysis. *West J Med.* 1999;171(4):227-32.
3. Bjornson CL, Klassen TP, Williamson J, et al. A randomized trial of a single dose of oral dexamethasone for mild croup. Pediatric Emergency Research Canada Network. *N Engl J Med.* 2004;351(13):1306-13.
4. Bjornson C, Russell KF, Vandermeer B, Durec T, Klassen TP, Johnson DW. Nebulized epinephrine for croup in children. *Cochrane Database Syst Rev.* 2011;(2):CD006619.
5. 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.
6. 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.
7. 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.
8. Gausche M, Lewis RJ, Stratton SJ, et al. Effect of out-of-hospital pediatric endotracheal intubation on survival and neurological outcome. *JAMA.* 2000;283(6):783-90.
9. Grosz AH, Jacobs IN, Cho C, Schears GJ. Use of helium-oxygen mixture to relieve upper airway obstruction in a pediatric population. *Laryngoscope.* 2001;111(9):1512-4.
10. *Guideline for the Diagnosis and Management of Croup*. Alberta, ON, Canada: Alberta Medical Association; 2013. http://www.topalbertadoctors.org/uploads/croup_guideline.pdf and http://www.topalbertadoctors.org/download/254/croup_summary.pdf. Accessed August 25, 2017.
11. 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.
12. Hunt RC, Brown LH, Cabinum ES, et al. Is ambulance transport time with lights and siren faster than that without? *Ann Emerg Med.* 1995;25(4):507-11.
13. Keahey L, Bulloch B, Becker AB, Pollack CV, Clark S, Camargo CA. Initial oxygen saturation as a predictor of admission in children presenting to the emergency department with acute asthma. *Ann Emerg Med.* 2002;40(3):300-7.
14. Kline-Krammes S, Reed C, Giuliano JS Jr., et al. Heliox in children with croup: a strategy to hasten improvement. *Air Med J*. 2012;31(3):131-7.
15. Kunkel NC, Baker MD. Use of racemic epinephrine, dexamethasone, and mist in the outpatient management of croup. *Pediatr Emerg Care*. 1996;12(3):156-9.
16. Kuzma K, Sporer KA, Michael GE, Youngblood GM. When are prehospital intravenous catheters used for treatment? *J Emerg Med.* 2009;36(4):357-62.
17. Lacher ME, Bausher JC. Lights and siren in pediatric 911 ambulance transports: are they

being misused? *Ann Emerg Med.* 1997;29(2):223-7.
18. Moses JM, Alexander JL, Agus MSD. 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.
19. Neto GM, Kentab O, Klassen TP, Osmond MH. A randomized controlled trial of mist in the acute treatment of moderate croup. *Acad Emerg Med.* 2002;9(9):873- 9.
20. Russell KF, Liang Y, O'Gorman K, Johnson DW, Klassen TP. Glucocorticoids for croup. *Cochrane Database Syst Rev.,* 2011 Jan 19;(1):CD001955. Scolnik D, Coates AL, Stephens D, Da Silva Z, Lavine E, Schuh S. Controlled delivery of high vs low humidity vs mist therapy for croup in emergency departments: a randomized controlled trial. *JAMA*. 2006;295(11):1274-80.
21. Spaite DW, Valenzuela TD, Criss EA, Meislin HW, Hinsberg PA. prospective in- field comparison of intravenous line placement by urban and nonurban emergency medical services personnel. *Ann Emerg Med.* 1994;24(2):209-14.
22. 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.
23. Stoney PJ, Chakrabarti MK. Experience of pulse oximetry in children with croup. *J Laryngol Otol.* 1991;105(4):295-8.
24. Vorwerk C, Coats T. Heliox for croup in children. *Cochrane Database Syst Rev*. 2012;(10):CD006822.
25. Warner GS. Evaluation of the effect of prehospital application of continuous positive airway pressure therapy in acute respiratory distress. *Prehosp Disast Med.* 2010;25(1):87-91.
26. Westley CR, Cotton EK, Brooks JG. Nebulized racemic epinephrine by IPPB for the treatment of croup: a double-blind study. *Am J Dis Child.* 1978;132(5):484-7.