

## Simulation 1: Two Year-Old Child in Respiratory Distress

### Opening Scenario (Links to Section 1)

You are the respiratory therapist in a 300 bed community hospital working the evening shift. At 8:30 PM you are called to the Emergency Department to assist in the management of a child in respiratory distress.

<b>Section #: 1</b>	Type: IG	Links from: Opening Scenario	Links to Section #(s): 2
Perfect Score: 12		Minimum Pass Score: 10	
<p>Upon arrival at the bedside you observe an agitated 2 year old male child weighing about 12 kg on a nasal cannula at 1 L/min surrounded by anxious patients. The attending resident asks you to evaluate the child.</p> <p>(SELECT AS MANY as you consider indicated in this Section)</p>			
Requested Information	Data	Score	
Complete blood count	Pending	+1	
Arterial blood gas	Pending	+1	
Laryngoscopy	Physician disagrees	-1	
AP chest X-ray	Pending	+2	
Lateral neck X-ray	Pending	+2	
Breath sounds	Audible stridor with inspiratory and expiratory wheezing	+2	
Vital signs	HR 120 RR 28 BP 102/66 T 102 F	+1	
SpO2	87%	+1	
Recent history	Parents report child has had runny nose, sore throat, mild fever for past two days with cough and hoarse cry worsening over last eight hours	+2	
Bedside spirometry (FVC)	Physician disagrees	-1	

<b>Section #: 2</b>	Type: DM	Links from Section #: 1	Links to Section #(s): 3	
Perfect Score: 2		Minimum Pass Score: 1		
<p>ABG results: pH = 7.33; PCO<sub>2</sub> = 47 torr; HCO<sub>3</sub> = 25 mEq/L; PO<sub>2</sub> = 55 torr; SaO<sub>2</sub> = 88%.  AP chest X-ray indicates some narrowing of the upper tracheal mucosa; lateral X-ray reveals haziness in the subglottic region with the hypopharynx overdistended. CBC indicates mild lymphocytosis.</p> <p>(CHOOSE ONLY ONE unless you are directed to “Make another selection in this section.”)</p>				
Action/Recommendation		Response to Selection	Response Score	Link to Section
Increase O <sub>2</sub> flow to 2 L/min and recommend 2 puffs albuterol (Proventil) via MDI+holding chamber		Physician disagrees. Make another selection in this section.	-1	
Recommend cool mist tent therapy with 40% O <sub>2</sub>		Physician disagrees. Make another selection in this section.	-2	
Increase O <sub>2</sub> flow to 2 L/min and recommend aerosol with one 5 mL ampule of tobramycin (300 mg) (TOBI) treatment via SVN		Physician disagrees. Make another selection in this section.	-2	
Increase O <sub>2</sub> flow to 2 L/min and recommend aerosol treatment with 0.25 mL 2.25% racemic epinephrine in 3 mL NS via SVN		Physician agrees	+2	3
Increase O <sub>2</sub> flow to 2 L/min, repeat blood gas and observe child for worsening symptoms		Physician disagrees. Make another selection in this section.	-2	

<b>Section #:3</b>	Type: IG	Links from Section #: 2	Links to Section #(s): 4	
Perfect Score: 5		Minimum Pass Score: 3		
<p>20 minutes after increasing the O<sub>2</sub> flow to 2 L/min and providing the racemic epinephrine aerosol treatment, you reassess the child.</p> <p>(SELECT AS MANY as you consider indicated in this Section)</p>				
Requested Information		Data	Score	
SpO <sub>2</sub>		93%	+1	
Negative inspiratory force (NIF/MIP)		Physician disagrees	-1	
Breath sounds		Decreased breath sounds with continued audible stridor, barking cough and wheezing	+2	
Bedside spirometry (FVC)		Physician disagrees	-1	
Vital signs		HR 112 RR 26 BP 104/65	+1	
Repeat chest X-ray		Physician disagrees	-1	
General appearance		No evidence of cyanosis, normal consciousness, mild subcostal retractions	+1	
Bronchial provocation test with methacholine		Physician disagrees	-2	
Exhaled nitric oxide concentration		Physician disagrees	-2	
Blood eosinophil count and IgE concentration		Physician disagrees	-1	

<b>Section #:4</b>	Type: DM	Links from Section #: 3	Links to Section #(s): 6
Perfect Score: 2		Perfect Score: 2	
<p>Based on current assessment of the child, which of the following would you now recommend?</p> <p>(CHOOSE ONLY ONE unless you are directed to “Make another selection in this section.”)</p>			
Action/Recommendation	Response to Selection	Response Score	Link to Section
Increase the O2 flow to 4 L/min and repeat ABG	Physician disagrees. Make another selection in this section.	-1	
Repeat aerosol treatment with racemic epinephrine via SVN and recommend IM dexamethasone	Physician agrees	+2	6
Intubate the child and initiate SIMV with pressure support	Physician disagrees. Make another selection in this section.	-2	
Repeat aerosol treatment with racemic epinephrine followed by 2 mL 0.5 mg nebulized budesonide (Pulmicort) via SVN	Physician agrees	+2	6
Provide aerosol treatment with 0.25 mL 0.5% albuterol (Proventil) in 3 mL NS via SVN	Physician disagrees. Make another selection in this section.	-1	

<b>Section #: 6</b>	Type: IG	Links from Section #: 5	Links to Section #(s): 7
Perfect Score: 8		Minimum Pass Score: 6	
<p>30 minutes later, you reassess the child.</p> <p>(SELECT AS MANY as you consider indicated in this Section)</p>			
Requested Information	Data	Score	
SpO2	85%	+1	
General appearance	Moderate respiratory distress with mild suprasternal and intercostal retractions	+2	
Breath sounds	Stridor and wheezing persist	+2	
Arterial blood gas	Pending	+1	
Repeat chest X-ray	Physician disagrees – not done	-1	
Level of consciousness	Conscious and still agitated	+1	
Percent shunt	Physician disagrees – not done	-1	
Electrocardiogram (ECG)	Physician disagrees – not done	-1	
Bedside spirometry (FVC)	Physician disagrees – not done	-1	
Vital signs	HR 130 RR 32	+1	

<b>Section #: 7</b>	Type: DM	Links from Section #: 6	Links to Section #(s): 8	
Perfect Score: 2		Minimum Pass Score: 2		
<p>10 minutes later, the following ABG results are reported: pH = 7.5; PCO<sub>2</sub> = 31 torr; HCO<sub>3</sub> = 25 mEq/L; PO<sub>2</sub> = 53 torr. Otherwise the child remains conscious and agitated with tachypnea, tachycardia, mild retractions, and mild stridor and wheezing. Which of the following would you recommend now?</p> <p>(CHOOSE ONLY ONE unless you are directed to “Make another selection in this section.”)</p>				
Action/Recommendation		Response to Selection	Response Score	Link to Section
Repeat the racemic epinephrine aerosol treatment with 0.50 mL 2.25% racemic epinephrine		Physician disagrees. Make another selection in this section.	-2	
Initiate noninvasive positive pressure ventilation via oronasal mask; IPAP 20 cm H <sub>2</sub> O, EPAP 5 cm H <sub>2</sub> O, 30% O <sub>2</sub>		Physician disagrees. Make another selection in this section.	-2	
Intubate and initiate pressure-limited ventilation, peak pressure = 30 cm H <sub>2</sub> O + 8 cmH <sub>2</sub> O PEEP, 40% O <sub>2</sub>		Physician disagrees. Make another selection in this section.	-2	
Maintain current therapy and reassess the child in 30 minutes		Physician disagrees. Make another selection in this section.	-2	
Switch the child to 100% O <sub>2</sub> via nonrebreathing mask at 4-6 L/min, repeat blood gas and carefully monitor the child		Physician agrees	+2	8

<b>Section #: 8</b>	Type: DM	Links from Section #: 7	Links to Section #(s): 9	
Perfect Score: 2		Perfect Score: 2		
<p>15 minutes later, the parents call you to the bedside, stating that their son “has become sleepy and hard to rouse.” The new ABG results are: pH = 7.21; PCO<sub>2</sub> = 65 torr; HCO<sub>3</sub> = 26 mEq/L; PO<sub>2</sub> = 180 torr. Upon quick assessment, the child is lethargic, breathing at 14/min, heart rate 100/min, with worsened stridor/wheezing. Which of the following would you recommend now?</p> <p>(CHOOSE ONLY ONE unless you are directed to “Make another selection in this section.”)</p>				
Action/Recommendation		Response to Selection	Response Score	Link to Section
Initiate continuous bronchodilator therapy with albuterol at 5 mg per hour		Physician disagrees. Make another selection in this section.	-2	
Replace the nonrebreathing mask with a nasal cannula at 4 L/min		Physician disagrees. Make another selection in this section.	-2	
Call the rapid response team, initiate manual ventilation with O <sub>2</sub> and admit the child to pediatric ICU		Physician agrees	+2	
Repeat the racemic epinephrine aerosol treatment with 0.50 mL 2.25% racemic epinephrine		Physician disagrees. Make another selection in this section.	-2	
Call a Code Blue/Code 99 and begin cardiac compressions		Physician disagrees. Make another selection in this section.	-2	

<b>Section #: 9</b>	Type: DM	Links from Section #: 8	Links to Section #(s): End
Perfect Score: 2		Minimum Pass Score: 2	
<p>While receiving manual bag + mask ventilation with 100% O<sub>2</sub>, the child is transferred to Pediatric ICU where the attending physician writes an order to institute mechanical ventilation to manage acute hypercapnia. Which of the following would you recommend?</p> <p>(CHOOSE ONLY ONE unless you are directed to “Make another selection in this section.”)</p>			
Action/Recommendation	Response to Selection	Response Score	Link to Section
Intubate and initiate volume-limited SIMV; rate = 25/min; TV = 8 mL/kg; PSV = 6 cm H <sub>2</sub> O; PEEP 5 cm H <sub>2</sub> O; FIO <sub>2</sub> = 0.50	Physician agrees – end simulation	+2	End
Intubate and initiate pressure-limited A/C; rate = 25/min; peak pressure = 20 cm H <sub>2</sub> O; PSV = 6 cm H <sub>2</sub> O; PEEP 5 cm H <sub>2</sub> O; FIO <sub>2</sub> = 0.50	Physician agrees – end simulation	+2	End
Intubate and initiate volume-limited A/C; rate = 12/min; TV = 12 mL/kg; PEEP 10 cm H <sub>2</sub> O; FIO <sub>2</sub> = 1.00	Physician disagrees. Make another selection in this section.	-2	
Initiate noninvasive ventilation by nasal mask; spon/timed mode with rate = 20/min; IPAP = 20 cm H <sub>2</sub> O; EPAP = 5 cm H <sub>2</sub> O; FIO <sub>2</sub> = .50	Physician agrees – end simulation	+2	End
Intubate and initiate pressure-limited A/C; rate = 25/min; peak pressure = 35 cm H <sub>2</sub> O; PSV = 6 cm H <sub>2</sub> O; PEEP 5 cm H <sub>2</sub> O; FIO <sub>2</sub> = 0.50	Physician disagrees. Make another selection in this section.	-2	

### Individual Response Scoring (Used for All RTBoardReview.com Simulations)

Score	Meaning
+2	Essential/optimum to identifying or resolving problem
+1	Likely helpful in identifying or resolving problem
0	Neither helpful nor harmful in identifying or resolving problem
-1	Unnecessary or potentially harmful in identifying or resolving problem
-2	Wastes critical time in identifying problem or causes direct harm to patient
-3	Results in life-threatening harm to patient

### Summary Scoring of Simulation 01

Section	IG Max	IG Min	DM Max	DM Min
1	12	10		
2			2	1
3	5	3		
4			2	1
6	8	6		
7			2	2
8			2	2
9			2	2
<b>TOTALS</b>	<b>25</b>	<b>19</b>	<b>10</b>	<b>8</b>

**RTBoardReview.com**  
**Simulation 1 – 2 Year-Old in Respiratory Distress**  
**Condition/Diagnosis: Croup (Laryngotracheobronchitis)**

**Case Management Pointers for Croup (Laryngotracheobronchitis)**

- Croup occurs most commonly in children 6 months – 3 years old
- Symptoms occur abruptly usually evening/nighttime and include hoarseness, barking cough, inspiratory stridor, low to no fever
- Differential diagnosis: bacterial tracheitis (high fever), epiglottitis (no barking cough but dysphagia + drooling and thumb sign on lateral neck X-ray), foreign body aspiration (history + X-ray)
- AP chest and lateral neck X-rays useful in differentiating croup ('steeple' sign) from epiglottitis ('thumb' sign)
- Initial Rx: O<sub>2</sub> as needed, racemic epinephrine via aerosol (repeat x 3), steroid (oral or IM; budesonide aerosol an option)
- Heliox therapy can lessen symptoms of obstruction and should be considered if repeat racemic epinephrine treatment fails; administer by high-flow cannula or nonrebreather
- If symptoms persist for > 4 hours after initial Rx, recommend admission with frequent monitor
- If the rare case (< 1%) where symptoms persist, obstruction worsens, consciousness decreases, and/or respiratory acidosis develops recommend intubation/mechanical ventilation

**Follow-up Resources**

*Standard Text Resources:*

Des Jardins, T., & Burton, G.G. (2011). Croup syndrome: laryngotracheobronchitis and acute epiglottitis (Chapter 39). In *Clinical Manifestations and Assessment of Respiratory Disease*, 6th Ed. Maryland Heights, MO: Mosby-Elsevier.

*Useful Web Links:*

Alberta Medical Association. Guideline for the diagnosis and management of croup. Alberta Clinical Practice Guidelines 2005 Update.

[http://topalbertadoctors.org/download/254/croup\\_summary.pdf](http://topalbertadoctors.org/download/254/croup_summary.pdf)

Muñiz, A. *Croup*. E-Medicine/Medscape. <http://emedicine.medscape.com/article/962972-overview>

Bjornson, C.L. & Johnson, D.W. (2007). Croup in the paediatric emergency department. *Paediatr Child Health*, 12, 473–477.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2528757/pdf/pch12473.pdf>

Zoorob R., Didani M., & Murray, J. (2011). Croup: An overview. *Am Fam Phys*, 83, 1067-1073. <http://www.aafp.org/afp/2011/0501/p1067.pdf>