

## Medications

- Amoxicillin
  - Aminopenicillin, Antibiotic (Jones & Bartlett Learning, 2021).
  - Antibiotic given to treat pneumonia (Jones & Bartlett Learning, 2021).
  - Before administration, assess patient for penicillin allergy. Monitor patient for symptoms of allergic reaction after administration (Jones & Bartlett Learning, 2021).
- Albuterol sulfate
  - Adrenergic, Bronchodilator (Jones & Bartlett Learning, 2021).
  - Rescue inhaler treats bronchospasm, reducing wheezing and shortness of breath (Jones & Bartlett Learning, 2021).
  - Nurse should monitor patient's serum potassium level because albuterol can cause transient hypokalemia (Jones & Bartlett Learning, 2021).
- Budesonide
  - Corticosteroid, Anti-asthmatic/anti-inflammatory (Jones & Bartlett Learning, 2021).
  - Provides maintenance therapy for asthma (Jones & Bartlett Learning, 2021).
  - Budesonide should be used cautiously in children because it can stunt growth (Jones & Bartlett Learning, 2021).
- Famotidine
  - Histamine-2 blocker, Antulcer agent (Jones & Bartlett Learning, 2021).
  - Used to treat gastroesophageal reflux disease (GERD)(Jones & Bartlett Learning, 2021). GERD is seen in patients with obstructive airway disorder exacerbations, such as asthma (Hinkle et al., 2022).
  - Monitor patient for bloody vomit or black stools and report these findings to the provider (Jones & Bartlett Learning, 2021).
- Prednisolone
  - Glucocorticoid, Immunosuppressant (Jones & Bartlett Learning, 2021).
  - Treats uncontrolled asthma taking inhaled corticosteroids and long-acting bronchodilators (Jones & Bartlett Learning, 2021).
  - Prednisolone can delay bone growth in children, so patient's growth pattern must be monitored (Jones & Bartlett Learning, 2021).

## Demographic Data

**Admitting diagnosis:** Acute respiratory failure

**Age of client:** 2 years 8 months (born at 32 weeks, corrected age 2 years 6 months)

**Sex:** Male

**Weight in kgs:** 13.6 kg

**Allergies:** No Known Allergies

**Date of admission:** 8/29/22

**Psychosocial Developmental Stage:** Autonomy vs. Shame/Doubt

**Cognitive Development Stage:** Preoperational

## Admission History

The patient's mother brought him to the ED three days after the onset of URI symptoms and coughing. The patient was experiencing asthma exacerbation. The patient presented with retractions and a fever of 101° F. The patient was tachypneic with respirations in the 60s. He had diminished breath sounds, expiratory wheezes, and oxygen saturation of 88 - 90% on room air. The patient had one episode of post-tussive emesis. The mother reports decreased PO intake but normal urinary output. The patient has had positive sick contact. The mother states that the patient had taken his Albuterol to manage symptoms, but not his Symbicort.

## Pathophysiology

### Disease process:

Acute respiratory failure is the sudden impairment of the lungs' ventilation or perfusion mechanisms that causes inadequate gas exchange or oxygenation of the blood (Hinkle et al., 2022). The underlying ventilation failure mechanisms that cause acute respiratory failure include central nervous system impairment, neuromuscular dysfunction, musculoskeletal dysfunction, or pulmonary dysfunction (Hinkle et al., 2022). Examples of oxygenation failure mechanisms that cause acute respiratory failure include pneumonia, heart failure, and pulmonary embolisms (Hinkle et al., 2022). Acute respiratory failure may also arise from opioid-induced respiratory depression or hypoventilation following anesthesia (Hinkle et al., 2022).

The patient's acute respiratory failure was the result of pulmonary dysfunction. The pulmonary dysfunction resulted from an asthma exacerbation triggered by the rhinovirus infection. Asthma is a complex disease process characterized by reversible airway inflammation and long-term airway narrowing. Narrowing includes bronchoconstriction, airway edema, hyperresponsiveness, and airway remodeling (Hinkle et al., 2022). The body's mast cells, macrophages, T lymphocytes, eosinophils, and eosinophils influence the inflammatory process (Hinkle et al., 2022). Viral respiratory infections are a common trigger for asthma symptoms and exacerbations (Hinkle et al., 2022). The patient's viral infection perpetuated the inflammatory response and attracted white blood cells to the area. Subsequently, the patient experienced increased vasoconstriction, bronchoconstriction, and mucus secretion (Hinkle et al., 2022). These factors directly contributed to the pulmonary dysfunction that was the underlying cause of acute respiratory failure.

### S/S of disease:

The early signs of acute respiratory failure are symptoms associated with oxygenation impairment (Hinkle et al., 2022). Early signs include restlessness, fatigue, headache, dyspnea, ill hunger, tachycardia, and increased blood pressure (Hinkle et al., 2022). As acute respiratory failure progresses, symptoms such as confusion, tachypnea, central cyanosis, and diaphoresis arise (Hinkle et al., 2022). If left untreated, a patient will progress into respiratory arrest (Hinkle et al., 2022). A patient's physical assessment in acute respiratory failure may include accessory muscle use, decreased breath sounds, or other symptoms related to the underlying disease process causing respiratory failure (Hinkle et al., 2022). The patient presented to the ED with progressive signs and symptoms of acute respiratory failure, including tachypnea. The patient's respirations were over sixty per minute. The patient also had diminished breath sounds and retractions.

### Method of Diagnosis:

Hypoxemia and hypercapnia with acidosis define acute respiratory failure. (Hinkle et al., 2022). Acute respiratory failure is distinguished from chronic respiratory failure by the speed of onset and persistence of symptoms (Hinkle et al., 2022). Acute respiratory failure has a sudden onset, whereas chronic respiratory failure can be insidious (Hinkle et al., 2022). Additionally, chronic respiratory failure persists much longer after the initial episode (Hinkle et al., 2022). The presence of chronic respiratory acidosis is also indicative of chronic respiratory failure (Hinkle et al., 2022). Differentiating between the two types of respiratory failure is important because the management varies from acute to chronic (Hinkle et al., 2022).

### Treatment of disease:

Medical management of acute respiratory failure aims to correct the underlying cause and restore adequate gas exchange (Hinkle et al., 2022). The patient may require endotracheal intubation and mechanical ventilation (Hinkle et al., 2022). Nursing management of acute respiratory failure includes monitoring the patient's responsiveness, vital signs, and arterial blood gases (Hinkle et al., 2022). The nurse should assess the patient's respiratory system and other areas of concern (Hinkle et al., 2022). For example, an intubated patient should have mouth care, skin care, a turning schedule, and range of motion exercises to prevent complications (Hinkle et al., 2022). As the patient's status improves, the nurse should educate the patient or family about the underlying disorder and how to manage the complications (Hinkle et al., 2022).

The patient received continuous nebulization therapy in the ED. Once admitted, nebulization was changed to Q2 and then Q4 on 9/1/22. The patient tolerated these changes with no weakness of breath or disorientation. The nebulization therapy delivered albuterol sulfate and budesonide to treat the patient's asthma exacerbation. Prednisolone was given to the patient orally to treat the uncontrolled asthma symptoms. The patient also received amoxicillin to treat pneumonia. These medications treat the underlying cause of acute respiratory failure. The patient did not require intubation.

## Relevant Lab Values/Diagnostics

### Labs

- Respiratory pathogens panel
  - Rhinovirus/enterovirus detected
  - Normal: not detected
  - The viral infection caused bronchospasm and copious mucus production, which exacerbated the patient's asthma and threw the patient into acute respiratory failure (Hinkle et al., 2022).

### Diagnostic Imaging

- Chest X-ray on 8/30/22
  - Peribronchial cuffing indicative of small airway disease
  - Patchy opacities in lung bases, improved compared to 8/29/22.
  - Possible trace right pleural effusion
  - Normal: Normal lungs and surrounding structures (Pagana et al., 2021)
  - The findings of the chest x-ray are consistent with the patient's diagnosis. Peribronchial cuffing is a sign of various conditions, including an acute asthma episode. The patchy opacities in lung bases could be indicative of atelectasis or pneumonia. The patient has amoxicillin ordered to treat pneumonia. The opacities have improved during the patient's admission. The possible trace pleural effusion could also be caused by pneumonia.

## Medical History

**Previous Medical History:** Asthma

**Prior Hospitalizations:** The patient was admitted to PICU for asthma exacerbations (on 5/8/22 and 10/6/21).

**Past Surgical History:** N/A

**Social needs:** Parents were not present and did not visit during the patient's admission.

## Active Orders

- Contact/droplet isolation
  - The patient's respiratory pathogen panel detected rhinovirus/enterovirus. Using PPE breaks the chain of infection at the mode of transmission by protecting one's portal of entry.

<b>Assessment</b>	
<b>General</b>	The patient is alert and active. The patient makes eye contact when addressed and follows age-appropriate, simple commands. He uses speech, language, and motor skills spontaneously. The patient does not appear to be in acute distress.
<b>Integument</b>	The skin color is white, and the tone is appropriate for the patient. Skin is slightly cool, smooth, and dry upon palpation. Skin turgor normal mobility. No rashes or lesions. <b>Some light bruising bilaterally on the shins.</b> No drains or lines are present. Normal quantity and distribution of hair. Nails normal without clubbing or cyanosis. – <b>Bruising is appropriate for patient’s developmental abilities and consistent with the patient’s level of coordination/balance.</b>
<b>HEENT</b>	The Head, facial features, and neck are symmetrical. Neck has a full range of motion and no masses palpable. Trachea midline without deviation. Thyroid and lymph nodes are not palpable. Bilateral carotid pulses are palpable, 2+. No visible or palpable deformities or lesions on the auricles of ears. Bilateral sclera white and bilateral cornea clear. No discharge from eyes. The septum is midline, and turbinates are pink and moist with no visible bleeding. Oral mucosa is pink and moist overall, with no signs of bleeding or lesions. Fair dentition. The uvula is midline. The soft palate rises and falls symmetrically. The hard palate is intact.
<b>Cardiovascular</b>	Clear S1 and S2 sounds heard without murmurs, gallops, or rubs. Normal rate and rhythm. PMI palpable at 5 <sup>th</sup> intercostal space at midclavicular line. Capillary refill less than 3 seconds on fingers and toes, bilaterally. Peripheral pulses 2+ throughout, bilaterally. No Jugular vein distention.
<b>Respiratory</b>	Normal rate and rhythm of respirations. <b>Expiratory wheezing bilaterally, anteriorly and posteriorly.</b> Respiratory effort is nonlabored, with no accessory muscle use. – <b>Expiratory wheezing is a consistent finding with an asthma exacerbation triggered by a viral infection. Expiratory wheezing suggests bronchospasm or obstruction of the upper airway (Hinkle et al., 2022).</b>
<b>Genitourinary</b>	Skin intact. No rashes present. Normal urinary output.
<b>Gastrointestinal</b>	Protuberant abdomen, appropriate for age. The abdomen is soft and non-tender. No organomegaly or masses were noted upon palpation of all four quadrants. Bowel sounds are normoactive in all four quadrants.
<b>Musculoskeletal</b>	All extremities have a full range of motion. Upper and lower extremity strength equal, bilaterally. Age-appropriate gait.
<b>Neurological</b>	PERRLA. Patient alert and active.
<b>Most recent VS (highlight if abnormal)</b>	<p><b>Time:</b> 0830</p> <p><b>Temperature:</b> <b>97.2° F</b> – Temperature lower than expected (Holman et al., 2019). Room temperature increased, and the patient was dressed in effort to raise his temperature.</p> <p><b>Route:</b> Axillary</p> <p><b>RR:</b> 28</p> <p><b>HR:</b> 134 bpm</p>

	<p><b>BP and MAP:</b> 126/75 and 96</p> <p><b>Oxygen saturation:</b> 96%</p> <p><b>Oxygen needs:</b> Patient on room air, no supplemental oxygen needed at present.</p>
<b>Pain and Pain Scale Used</b>	0 - FLACC

<p><b>Nursing Diagnosis 1</b></p> <p>Risk for ineffective airway clearance related to bronchospasms and increased pulmonary secretions as evidenced by adventitious lung sounds (Phelps, 2020).</p>	<p><b>Nursing Diagnosis 2</b></p> <p>Risk for impaired gas exchange related to acute respiratory failure as evidenced by hypoxemia (Phelps, 2020).</p>	<p><b>Nursing Diagnosis 3</b></p> <p>Risk for ineffective breathing pattern related to bronchoconstriction in response to viral infection as evidenced by tachypnea (Phelps, 2020).</p>
<p><b>Rationale</b></p> <p>The nursing student heard expiratory wheezes during the patient's physical assessment.</p>	<p><b>Rationale</b></p> <p>The patient presented to the ED with an oxygen saturation of 88 - 90% on room air.</p>	<p><b>Rationale</b></p> <p>The patient presented in the ED with respirations per minute in the 60s.</p>
<p><b>Interventions</b></p> <p><b>Intervention 1:</b> Auscultate lungs for adventitious breath sounds.</p> <p><b>Intervention 2:</b> Give bronchodilators and other drugs as ordered and monitor effectiveness.</p>	<p><b>Interventions</b></p> <p><b>Intervention 1:</b> Administer and monitor oxygen therapy as ordered to enhance oxygenation.</p> <p><b>Intervention 2:</b> Record intake and output to evaluate the patient's hydration status.</p>	<p><b>Interventions</b></p> <p><b>Intervention 1:</b> Assess and record respiratory rate and depth and monitor pulse oximetry readings.</p> <p><b>Intervention 2:</b> Maintain elevation of the head of the bed to promote maximum lung expansion.</p>
<p><b>Evaluation of Interventions</b></p> <ol style="list-style-type: none"> <li>1. Adventitious sounds will be absent.</li> <li>2. Patient's airway will remain patent.</li> </ol>	<p><b>Evaluation of Interventions</b></p> <ol style="list-style-type: none"> <li>1. Patient's oxygen saturation will continue to be 90% or greater.</li> <li>2. Patient will be sufficiently hydrated to thin and clear secretions.</li> </ol>	<p><b>Evaluation of Interventions</b></p> <ol style="list-style-type: none"> <li>1. Patient's respiratory rate will continue to stay within normal limits.</li> <li>2. Patient will continue demonstrating adequate breathing patterns with easy, unlabored respirations.</li> </ol>

### References (3):

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Holman, H. C., Williams, D., Sommer, S., Johnson, J., Wheless, L., Wilford, K., & McMichael, M. G. (2019). *RN nursing care of children review module* (11<sup>th</sup> ed.).  
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Jones & Bartlett Learning. (2021). *2021 Nurse's drug handbook* (20<sup>th</sup> ed.). Jones & Bartlett Learning.

Pagana, K. D., Pagana, T. J., & Pagana, T. N. (2021). *Mosby's diagnostic & laboratory test reference* (15<sup>th</sup> ed.). Mosby.

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