



## Evaluation & Management of a Patient with Respiratory Failure

Description of the Activity	<p>Respiratory failure is one of the most commonly encountered diagnoses in the critically ill. All surgical intensivists must be able to identify and manage mild to severe acute respiratory failure with its diverse causes and presentations. Regardless of clinical setting and resource availability, intensivists should feel comfortable performing a range of invasive and noninvasive interventions tailored to the management of injured and noninjured adults and children based on their scope of practice.</p>
Functions	<ul style="list-style-type: none"><li>❖ Resuscitation<ul style="list-style-type: none"><li>➤ Use the patient's history and clinical condition to tailor the diagnosis of respiratory failure, particularly in high-risk conditions.</li><li>➤ Identify the indications for, opportunity for, and limits of noninvasive ventilation.</li><li>➤ Recognize the need for and the principles of advanced airway management, including the selection of approach, potential complications, and management.</li><li>➤ Demonstrate familiarity with specific modes of mechanical ventilation, including their limitations.</li></ul></li><li>❖ Ongoing Management<ul style="list-style-type: none"><li>➤ Identify and respond to patients who are failing noninvasive ventilation, recognizing the need for invasive ventilation.</li><li>➤ Identify and respond to the potential complications of mechanical ventilation, including interpretation of ventilator alarms and waveforms.<ul style="list-style-type: none"><li>▪ Identify and manage patient/ventilator dyssynchrony.</li></ul></li><li>➤ Incorporate guideline-based management of critically ill patients with respiratory failure.</li><li>➤ Incorporate evidence-based lung-protective ventilatory management strategies.</li><li>➤ Demonstrate familiarity with advanced ventilator management techniques, positioning, and pharmacologic adjuncts.</li><li>➤ Recognize the indications and principles of bronchoscopy for diagnostic or therapeutic purposes, recognizing its risks and complications.<ul style="list-style-type: none"><li>▪ Perform bronchoscopy.</li></ul></li><li>➤ Recognize and manage ventilator infections.<ul style="list-style-type: none"><li>▪ Tailor the choice of antibiotics using evidenced-based guidelines and hospital antibiograms.</li></ul></li><li>➤ Identify indications for tracheostomy in long-term ventilatory management and its associated complications.</li><li>➤ Identify and respond to the need for thoracic decompression and its procedural complications.</li></ul></li><li>❖ Transition of Care<ul style="list-style-type: none"><li>➤ Demonstrate understanding of ventilatory weaning and extubation principles.</li><li>➤ Recognize the failure of conventional ventilatory management, initiate referral to lung rescue centers, and initiate goals-of-care conversations.</li></ul></li></ul>



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### Scope

- ❖ In scope
  - Acute respiratory distress syndrome (ARDS)
  - Aspiration
  - Asthma exacerbation
  - Bronchoscopy
  - Chronic obstructive pulmonary disease (COPD)
  - Cricothyroidotomy
  - Flail chest
  - Intubation
  - Noninvasive mechanical ventilation
  - Obstructive sleep apnea (OSA)/obesity hypoventilation syndrome (OHS)
  - Pleural effusion
  - Pneumonia
  - Pulmonary contusion
  - Pulmonary embolism
  - Pulmonary hypertension
  - Smoke inhalation
  - Spinal cord injury
  - Tension hemothorax/pneumothorax
  - Thoracentesis/chest tube
  - Tracheobronchial injury
  - Tracheostomy (excludes procedure, given alternative specialties)
  - Transfusion-associated circulatory overload (TACO)/transfusion-related acute lung injury (TRALI)
  - Ventilator management, including advanced techniques



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Level	Resuscitation	Ongoing Management	Transition of Care
<b>1</b>  <b>Limited Participation</b> Demonstrates limited critical care knowledge and skills  <b>Framework:</b> What a learner directly out of residency should know  Performs ICU procedures on straightforward patients but requires supervision/direction for more complex patients/procedures  Requires continuous direct supervision by the attending for patient management	<ul style="list-style-type: none"><li>• Describes basic modes of noninvasive ventilation and requires assistance with patient selection</li><li>• With prompting, initiates interventions for airway management and respiratory support in a patient with impending respiratory failure (eg, HFNC)</li><li>• Demonstrates understanding of basic modes of invasive mechanical ventilation but needs assistance to initiate it</li><li>• Demonstrates limited familiarity with airway adjuncts for oxygenation/ventilation in a high-risk patient (eg, oral airway, nasal trumpet, bag valve mask)</li><li>• Recognizes the potential for respiratory deterioration in a trauma patient with injuries such as rib fracture, pulmonary contusion, or inhalation injury</li><li>• Recognizes immediately life-threatening respiratory conditions, such as tension pneumothorax, aspiration, and airway obstruction</li><li>• Performs procedural interventions such as chest drainage procedures and bronchoscopy with direction</li></ul>	<ul style="list-style-type: none"><li>• Recognizes evidence-based guidelines in respiratory care practice</li><li>• Identifies basic ventilator alarms (eg, high peak pressures, low tidal volume)</li><li>• Interprets ventilator waveforms in the care of a mechanically ventilated patient with guidance</li><li>• Recognizes the contribution of chronic respiratory conditions to acute respiratory failure (eg, COPD)</li><li>• Demonstrates understanding of indications for bronchoscopy</li><li>• Identifies when a patient is failing conventional management techniques</li><li>• Diagnoses respiratory infections and initiates antimicrobial therapy tailored to individual risk factors</li><li>• Identifies readiness for ventilator weaning but needs assistance to implement specific strategies</li></ul>	<ul style="list-style-type: none"><li>• With assistance, identifies a patient physiologically ready for ventilatory weaning and extubation</li><li>• Identifies the benefit of tracheostomy in a patient on long-term ventilation</li><li>• Identifies the limitations of institutional respiratory support capabilities with prompting (eg, ECLS)</li><li>• Recognizes the need for and initiates a goals-of-care conversation</li></ul>
<b>2</b>  <b>Direct Supervision</b>	<ul style="list-style-type: none"><li>• Selects noninvasive respiratory support modalities for a patient likely to benefit from them</li></ul>	<ul style="list-style-type: none"><li>• Incorporates evidence-based guidelines into clinical practice</li></ul>	<ul style="list-style-type: none"><li>• Recognizes indicators of success and failure of ventilatory weaning and extubation</li></ul>



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<p>Initiates straightforward management for many critical illnesses but requires active direction for further management and complex critical illnesses</p> <p><b>Framework:</b></p> <p>Demonstrates a sufficient fund of knowledge for basic critical care and some knowledge of complex critical illness</p> <p>Performs ICU procedures on straightforward patients but may require supervision/direction for more complex patients/procedures</p> <p>The attending gives active help throughout to direct the clinical course.</p>	<ul style="list-style-type: none"><li>• Initiates an intervention for airway management and respiratory support in a patient with impending respiratory failure</li><li>• Initiates basic ventilatory settings for a patient with respiratory failure after intubation and identifies some limitations of standard modes of mechanical ventilation</li><li>• Demonstrates familiarity with airway adjuncts for oxygenation/ventilation in a high-risk patient (eg, oral airway, nasal trumpet, bag valve mask) and selects the correct adjunct in a straightforward patient</li><li>• Initiates appropriate support therapies (analgesia, noninvasive pulmonary support) in a trauma patient at risk for deterioration, with injuries such as rib fracture, pulmonary contusion, or inhalation injury</li><li>• Initiates management of immediately life-threatening respiratory conditions, such as tension pneumothorax, aspiration, or airway obstruction</li><li>• Performs procedural interventions such as chest drainage procedures and bronchoscopy independently in a straightforward patient</li></ul>	<ul style="list-style-type: none"><li>• Responds to basic ventilator alarms with indicated interventions</li><li>• Interprets ventilator waveforms in the care of a mechanically ventilated patient</li><li>• Takes initial steps to address altered physiology in a patient with chronic respiratory conditions (eg, nebulizers, optimizing respiratory rate, tidal volume)</li><li>• With supervision, performs therapeutic and diagnostic bronchoscopy for high-risk conditions such as inhalational injury</li><li>• Demonstrates familiarity with advanced lung rescue therapies in the face of worsening respiratory failure based on institutional protocols (eg, prone positioning)</li><li>• Identifies appropriate duration of antibiotic therapy guided by lab and clinical data</li><li>• Identifies readiness for ventilator weaning and performs weaning maneuvers with assistance</li></ul>	<ul style="list-style-type: none"><li>• Refers for and considers timing of tracheostomy but needs assistance to put it in the context of the patient's physiology</li><li>• Recognizes the limitations of institutional respiratory support capabilities (eg, ECLS)</li><li>• Initiates a culturally appropriate goals-of-care conversation</li></ul>



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<p><b>3</b></p> <p><b>Indirect Supervision</b></p> <p>Manages most critical illnesses but may require guidance for more complex patients or atypical presentations</p> <p><u>Framework:</u></p> <p>Demonstrates a sufficient fund of knowledge for basic and most complex critical care</p> <p>Independently performs most ICU procedures and supervises procedures on straightforward patients</p> <p>The learner can manage a critically ill patient in straightforward circumstances but may require input to manage the most complicated ICU patients.</p>	<ul style="list-style-type: none"><li>• Optimizes noninvasive support modalities for a surgical and trauma patient when indicated</li><li>• Independently initiates interventions for airway management and respiratory support in a patient with impending respiratory failure</li><li>• With some guidance, demonstrates familiarity with advanced ventilator techniques for a patient failing conventional mechanical ventilation strategies</li><li>• Demonstrates expertise with airway adjuncts for oxygenation/ventilation in a high-risk patient (eg, oral airway, nasal trumpet, bag valve mask) and selects the correct combination of adjuncts for a more complex patient</li><li>• Initiates appropriate support therapies (analgesia, noninvasive pulmonary support) in a complex trauma patient at risk for deterioration with injuries such as rib fracture, pulmonary contusion, or inhalation injury</li><li>• Initiates management of immediately life-threatening respiratory conditions (eg, tension pneumothorax, aspiration, airway obstruction) in a straightforward patient</li><li>• Performs procedural interventions such as bronchoscopy, chest drainage, or</li></ul>	<ul style="list-style-type: none"><li>• Incorporates evidence-based guidelines for management of acute respiratory failure and uses available clinical decision support tools in a straightforward patient</li><li>• Manages ventilator dyssynchrony using pharmacologic adjuncts and ventilator adjustments</li><li>• Interprets ventilator waveforms and adjusts ventilator settings as indicated in the care of a mechanically ventilated patient</li><li>• Addresses altered physiology in a patient with chronic respiratory conditions</li><li>• Performs therapeutic and diagnostic bronchoscopy with indirect supervision for high-risk conditions such as inhalational injury</li><li>• Initiates advanced lung rescue therapies in the face of worsening respiratory failure based on institutional protocols (eg, prone positioning)</li><li>• Applies evidence-based guidelines to the management of a patient with a respiratory infection</li><li>• Identifies readiness for ventilator weaning and performs weaning maneuvers</li></ul>	<ul style="list-style-type: none"><li>• Incorporates pharmacologic and supportive adjuncts in ventilator liberation strategies</li><li>• Refers for and considers timing of tracheostomy, incorporating the context of the patient's physiology</li><li>• Identifies a patient who would benefit from referral for an advanced intervention (eg, ECLS)</li><li>• Facilitates culturally competent multidisciplinary conversations with a patient/caregiver(s) regarding goals of care</li></ul>



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	cricothyroidotomy in a complex and high-risk patient		
<p><b>4</b></p> <p><b>Practice Ready</b> Independently manages complex critical illnesses and leads a critical care team</p> <p><b>Framework:</b> Demonstrates an attending-level fund of knowledge</p> <p>Independently performs and supervises procedures</p> <p>The attending is available at the request of the learner but is not routinely needed for common or complex critical illness.</p>	<ul style="list-style-type: none"><li>• Implements strategies to address a patient for whom noninvasive ventilation has failed</li><li>• Initiates harm-mitigating strategies (eg, noninvasive management, low tidal volume ventilation, fluid status optimization) to prevent respiratory decompensation</li><li>• Implements advanced strategies to address a patient for whom conventional invasive ventilation (eg, prone positioning, ECLS) has failed</li><li>• Anticipates the difficult airway and manages it with advanced techniques</li><li>• Adjusts appropriate support therapies (analgesia, noninvasive pulmonary support) and customizes them to the response of a complex trauma patient at risk for deterioration with injuries such as rib fracture, pulmonary contusion, or inhalation injury</li><li>• Independently assesses and definitively manages immediately life-threatening respiratory conditions (eg, tension pneumothorax, aspiration, airway obstruction)</li><li>• Leads the team in a procedural intervention in a complex or high-risk</li></ul>	<ul style="list-style-type: none"><li>• Incorporates evidence-based guidelines for management of acute respiratory failure and uses available clinical decision support tools in a complex patient</li><li>• Manages ventilator dyssynchrony using pharmacologic adjuncts and ventilator adjustments in a complex patient</li><li>• Interprets ventilator waveforms and adjusts ventilator settings as indicated in the care of a complex, mechanically ventilated patient</li><li>• Mitigates respiratory comorbidities in a complex patient (eg, breath stacking in a patient with COPD)</li><li>• Supervises therapeutic and diagnostic bronchoscopy for high-risk conditions such as inhalational injury when indicated</li><li>• Addresses challenges that arise with advanced lung rescue therapies in the face of worsening respiratory failure</li><li>• Manages respiratory infections in a complex patient</li><li>• Develops and implements a weaning strategy in even a highly complex patient</li></ul>	<ul style="list-style-type: none"><li>• Initiates weaning from advanced respiratory support modalities (eg, drop and stretch)</li><li>• Considers timing of tracheostomy, incorporating the context of a complex patient's physiology, such as a patient on anticoagulation or with recent neck surgery</li><li>• Refers a patient who would benefit from advanced interventions (eg, ECLS)</li><li>• Leads culturally competent multidisciplinary conversations with a patient/caregiver(s) regarding goals of care</li></ul>



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	patient (eg, chest drainage, bronchoscopy, cricothyrotomy)		