Field Guide: Ventilator-Associated Events

Definition and Harm Impact

An essential, life-saving therapy for patients with critical illness and respiratory failure is mechanical ventilation. More than 300,000 patients receive mechanical ventilation in the United States each year.\(^1\)\(^2\)\(^3\) Ventilator-associated events (VAEs) are complications that can occur in patients receiving mechanical ventilation. These complications include, and are not limited to: ventilator associated pneumonia (VAP), sepsis, acute respiratory distress syndrome (ARDS), and pulmonary embolism. Mortality rates in patients with acute lung injury secondary to mechanical ventilation has been estimated to range from 24 percent in persons 15–19 years of age to 60 percent for patients 85 years and older.\(^4\) VAE is also associated with higher healthcare costs and extended lengths of stay.\(^5\)

In January 2013, the National Healthcare Safety Network (NHSN) adopted a new definition for VAEs, which includes three definition tiers within the VAE algorithm: (1) ventilator-associated condition (VAC), (2) infection-related ventilator-associated complication (IVAC), and (3) possible ventilator associated pneumonia (PVAP).\(^6\)

Measurement

The Hospital Improvement Innovation Network (HIIN) goal for improvement in VAE is a reduction in rates by 20 percent from baseline (2015). The NHSN Surveillance Algorithm is used to measure VAE events. The definition for the three tiers of the VAE algorithm include (1) ventilator-associated conditions (VACs), which is the number of events that meet the criteria of VAC (numerator) over the total number of ventilator days for each location under surveillance during the data collection period (denominator); (2) Infection-related ventilator-associated condition (IVACs), which is the number of events that meet the criteria of IVAC (numerator) over the total number of ventilator days for each location under surveillance during the data collection period (denominator); and (3) possible ventilator-associated pneumonia (PVAP), which is the number of events that meet the criteria of PVAP (numerator) over the total number of ventilator days for each location under surveillance during the data collection period (denominator).
Improvement efforts are aimed at decreasing the duration of mechanical ventilation, mortality, length of stay, and costs associated with VAE. The ABCDEFG bundle described below was developed by the Society of Critical Care Medicine to improve the health of ventilated patients by breaking the cycle of deep sedation and prolonged ventilation, reducing the incidence and duration of intensive care unit (ICU) delirium, improving mobility, improving patient comfort, reducing the risk of infection, and decreasing the risk of morbidity. The bundle approach provides a means to incorporate evidence-based interventions into patient care.

- **A**—Assess, prevent, and manage pain
  - Evaluate pain and find the appropriate tools for assessment, treatment, and prevention.
  - Assume pain is present, look for behavioral clues, ask family members about pain behaviors.

- **B**—Both Spontaneous Awakening Trial (SAT) and Spontaneous Breathing Trial (SBT)
  - Consider wake-up and breath protocol to promote synergy of SAT and SBT.
  - Implement interdisciplinary team-driven protocols.

- **C**—Choice of sedation
  - Understand the importance of defining the depth of sedation choosing the right medication.
  - Importance of rapid offset/rapid onset, predictable dose response, promotion of natural sleep.
  - Implement standardized scale such as Richmond Agitation-Sedation Scale (RASS) for assessing sedation.

- **D**—Delirium: assess, prevent, and manage
  - Understand delirium risk factors and find tools for assessment, treatment, and prevention.
  - Standardize evaluation of delirium with Confusion Assessment Method for ICU (CAM-ICU).
  - Lower lighting, draw shades, and use sun/moon graphics for time of day orientation.

- **E**—Early mobility and exercise
  - Early progressive mobility protocol with patient’s current mobility as the starting point and goal of returning to his/her baseline.
  - Get the right people involved (e.g., physical therapy and respiratory therapy) as a partner when walking ventilated patient.

- **F**—Family engagement and empowerment
  - Partner by helping with reminders on elevating head of bed (HOB), hand hygiene, and oral care.

- **G**—Getting there
  - Implement steps to preventing VAP:
    - Raise the head of the patient’s bed between 30–40 degrees, use visual cues.
    - Standardize computerized physician order entry (CPOE) to include peptic ulcer disease (PUD) prophylaxis and venous thromboembolism (VTE) protocol prophylaxis.
    - Provide daily mouth care with an antiseptic while the patient is ventilated—hang oral care tools in visible location at HOB.
  - Communicate through rounds/huddles—include a multidisciplinary team, as well as patient and family members, using visual charts to note interventions.
  - Measure often: Share results with team members and incorporate learnings along the way.
Engaging Patients and Families

The family can be engaged to prevent social isolation as a result of mechanical ventilation. Family members are the stewards of the patient’s cognitive and baseline function, critical data as care is delivered. Engaging the family can be done through open visiting hours, using their voice to speak to and reorient the patient, speaking softly using simple familiar words including sharing about family and friends. Family members should be encouraged to bring in sensory aides (eyeglasses, hearing aids), decorate the room with reminders of home, and document the journey with an ICU diary.

Resources and Guides for Hospitals

- Society of Critical Care Medicine—ICU Liberation: ABCDEF Bundle: [http://www.iculiberation.org/Bundles/Pages/default.aspx](http://www.iculiberation.org/Bundles/Pages/default.aspx)

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