NHSN Device-Associated Modules: VAE & PedVAE

Housekeeping

- **This call is being recorded, and the recording and slides will be posted to the State HAI website.**
- **Please use the chat-box for any questions.**
- **Questions will be answered at the end.**

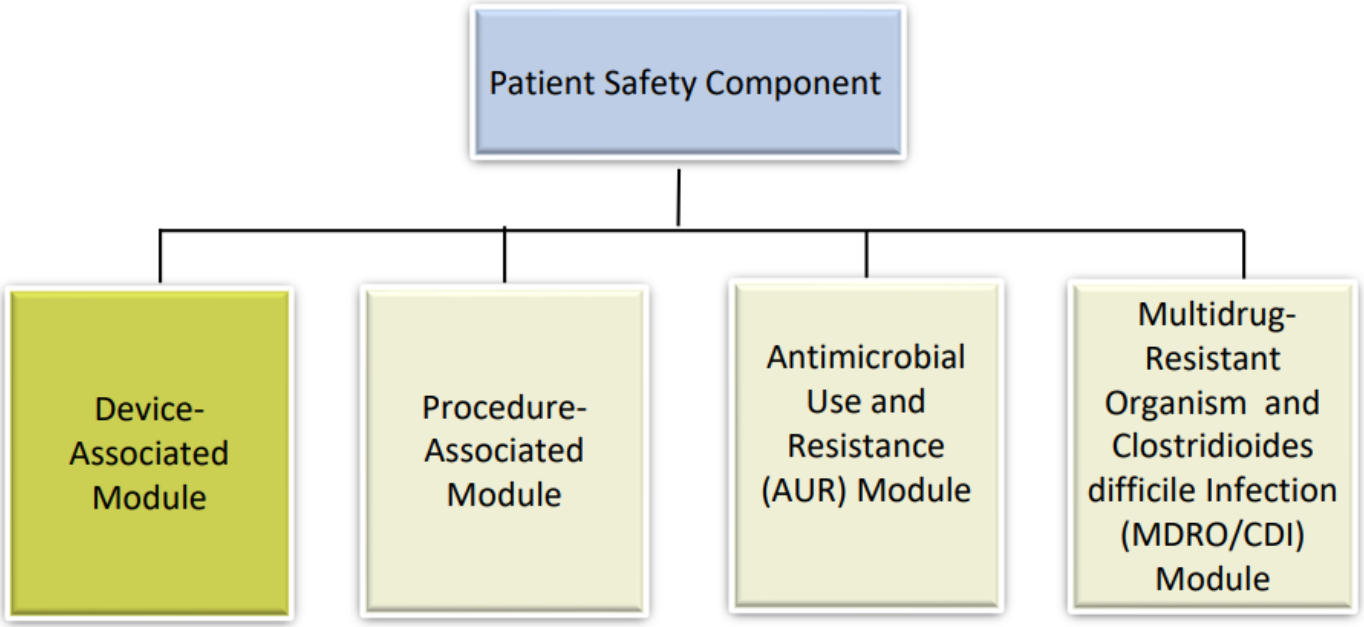
Agenda

- NHSN background
- 2023 Updates
- Reporting requirements
- Surveillance Definitions
- Denominator data
  - Definitions & data entry
- Numerator data
  - HAI Definitions
  - VAE Definitions
  - PedVAE Definitions
- Resources

NHSN Background

NHSN Background

Patient Safety Component Background



VAE Section History

- **Prior to 2013, surveillance for ventilator-associated events was limited to VAP.**

- **One drawback is that radiographic findings of pneumonia were required in VAP event recording.**
  - **Evidence suggests that this is not an accurate way to identify VAP due to the subjectivity in technique, interpretation, and reporting.**
    - **Especially in inter-facility comparisons and public reporting situations.**

- **Another issue, was the lack of a sensitive or specific definition for VAP, with broad criteria and definitions that were unreliable.**

- **These limitations also stunt prevention efforts, as valid and reliable data is critical for prevention strategy assessment.**

VAE Section History

- **The VAE surveillance algorithm was implemented in 2013 to identify a broad range of conditions that occur in ventilated adults.**
  - **These criteria were made specifically to be objective and possibly automated to ensure both easy implementation and utilization of electronic health records to identify events.**

- **The PedVAE section has a similar history, with a group formed also in 2013 to define its criteria.**
  - **Unfortunately, there was insufficient data at the time, so the group was postponed until 2015.**

- **At that time, a study on pediatric events demonstrated that changes in the Fraction of Inspired Oxygen (FiO_2) and Mean Airway Pressure (MAP) were associated with events that prolonged patient stay and increased mortality.**

- **In 2019, PedVAE was introduced as a section following VAE in the Patient Safety Component.**

VAE/PedVAE 2023 Updates

2023 Updates: VAE

- **Additions:**
  - **Molnupiravir and nirmatrelvir were added to the appendix: List of Antimicrobial Agents Eligible for IVAC, PVAP**
- **Clarifications:**
  - **None**
- **Deletions:**
  - **None**

2023 Updates: PedVAE

- **Additions:**
  - **Molnupiravir and nirmatrelvir were added to the appendix: List of Eligible Antimicrobial Agents**
- **Clarifications:**
  - **Definitions section of Chapter 11 was restructured for improved flow of information, including moving inclusion and exclusion criteria to their own section. No significant changes were made to the content.**
- **Deletions:**
  - **None**

TDH/CMS Reporting Requirements

Reporting Requirements for VAE

Required Reporting:

Facility Type	Location(s)
Long-term acute care facilities (LTACs)	Adult Inpatient Locations only

Eligible for Surveillance (VAE):

Facility Type	Location(s)
Acute Care Hospitals (ACHs)	Adult inpatient locations
LTACs	Adult inpatient locations
Inpatient Rehabilitation Facilities (IRFs)	Adult inpatient locations

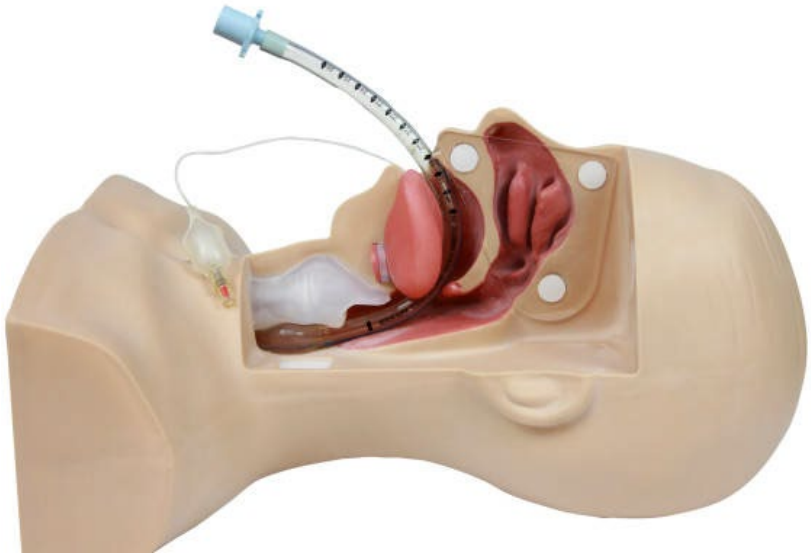
Eligible for Surveillance (PedVAE):

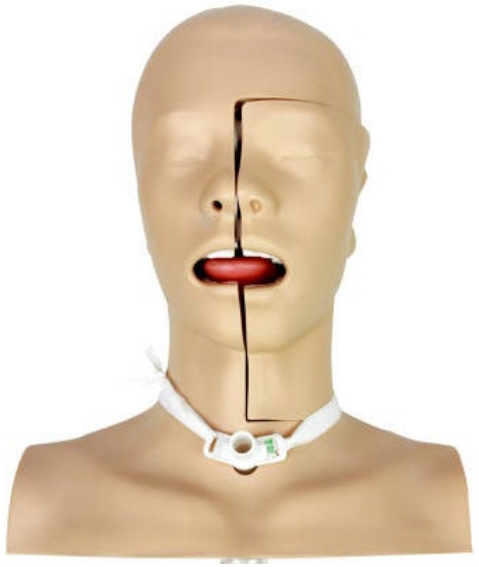
Facility Type	Location(s)
ACHs	Pediatric inpatient locations Neonatal inpatient locations
LTACs	Pediatric inpatient locations Neonatal inpatient locations
IRFs	Pediatric inpatient locations Neonatal inpatient locations

Definitions for Surveillance

Basic Definitions

- **Ventilator: A device used to support, assist, or control respiration (inclusive of the weaning period) through the application of positive pressure to the airway when delivered via an artificial airway, specifically oral/nasal endotracheal or tracheostomy tube.**
  - **NOTE: Ventilation and lung expansion devices that deliver positive pressure to the airway (for example, CPAP, BiPAP, Bi-level, IPPB, and PEEP) via non-invasive means (for example, nasal prongs, nasal mask, full face mask, total mask, etc.) are not considered ventilators unless positive pressure is delivered via an artificial airway (oral/nasal endotracheal or tracheostomy tube).**



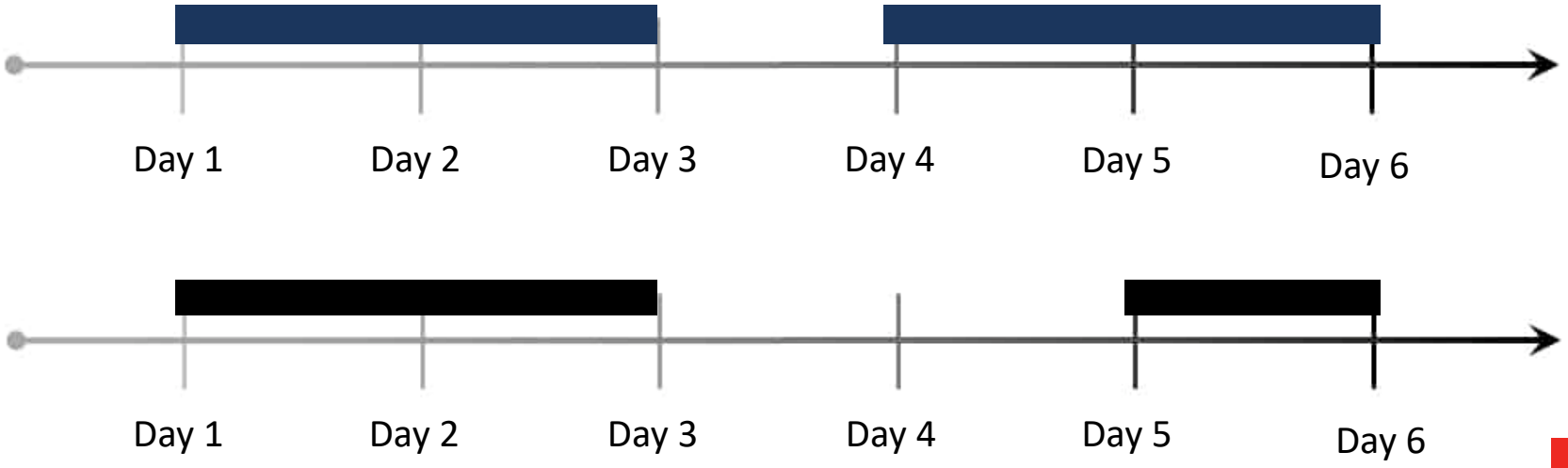


Not a ventilator

Basic Definitions

- **Episode of Mechanical Ventilation: Defined as a period of days during which the patient was mechanically ventilated for some portion of each consecutive day.**
  - **NOTE: A break in mechanical ventilation of at least one full calendar day, followed by reintubation and/or reinitiation of mechanical ventilation during the same hospitalization, defines a new episode of mechanical ventilation.**

Episodes of Mechanical Ventilation:



Basic Definitions

- **Fraction of Inspired Oxygen (FiO2): The fraction of oxygen in inspired gas.**
  - **For example, the FiO2 of ambient air is 0.21; the oxygen concentration of ambient air is 21%.**
- **In patients on mechanical ventilation, the FiO2 is one of the key parameters that can be adjusted depending on the patient's oxygenation needs.**
  - **It is typically in the range of 0.30 (oxygen concentration of 30%) to 1.0 (oxygen concentration of 100%).**

Basic Definitions

- **Daily Minimum FiO2: The lowest value of FiO2 during a calendar day that is set on the ventilator and maintained for > 1 hour. In circumstances where there is no value that is documented to have been maintained for > 1 hour (for example, the lowest value of FiO2 is set late in the calendar day, mechanical ventilation is discontinued early in the calendar day, FiO2 settings are changed very frequently throughout the calendar day) the daily minimum FiO2 should default to the lowest FiO2 setting during the calendar day (regardless of how long that setting was maintained).**

EXAMPLE: The patient is intubated at 6 pm. FiO_2 is set at the following values through the remainder of the calendar day:

Time	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm
FiO_2	1.0	0.8	0.5	0.5	0.8	0.8

In this example, the daily minimum FiO_2 for the purposes of VAE surveillance is 0.5. FiO_2 settings are being monitored and recorded every hour. There are two consecutive hours where the FiO_2 setting is noted to be 0.5 (8 pm and 9 pm), and therefore required minimum duration of > 1 hour is met.

VAE Definitions

- **Positive End-Expiratory Pressure (PEEP): A technique used in respiratory therapy in which airway pressure greater than atmospheric pressure is achieved at the end of exhalation by the introduction of a mechanical impedance to exhalation.**
- **In patients on mechanical ventilation, PEEP is one of the key parameters that can be adjusted depending on the patient's oxygenation needs and is typically in the range of 0 to 15 cmH2O.**

VAE Definitions

- **Daily Minimum PEEP: The lowest value of PEEP during a calendar day that is set on the ventilator and maintained for > 1 hour. In circumstances where there is no value that is documented to have been maintained for > 1 hour (for example, the lowest value of PEEP is set late in the calendar day, mechanical ventilation is discontinued early in the calendar day, PEEP settings are changed very frequently throughout the calendar day) the daily minimum PEEP should default to the lowest PEEP setting during the calendar day (regardless of how long that setting was maintained).**

EXAMPLE: The patient is intubated at 6 pm. PEEP is set at the following values through the remainder of the calendar day:

Time	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm
PEEP (cmH_2O)	10	8	5	5	8	8

In this example, the daily minimum PEEP for the purposes of VAE surveillance is 5 cmH_2O. PEEP settings are being monitored and recorded every hour. There are two consecutive hours where the PEEP setting is noted to be 5 cmH_2O (8 pm and 9 pm), and therefore required minimum duration of > 1 hour is met.

Basic Definitions

- **Mean Airway Pressure (MAP): The average pressure exerted on the airway and lungs from the beginning of inspiration until the beginning of the next inspiration.**
- **In patients on mechanical ventilation, MAP is the most powerful influence on oxygenation and is determined by:**
  - **positive end-expiratory pressure (PEEP)**
  - **peak inspiratory pressure (PIP)**
  - **inspiratory time**
  - **frequency**

PedVAE Definitions

- **Daily Minimum MAP: The lowest value of MAP during a calendar day.**

Basic Definitions

- **Date of Event: The date of onset of worsening oxygenation. This is defined as the first calendar day in which the daily minimum PEEP or FiO2 increases above the thresholds outlined in the VAE definition algorithm (specifically day 1 of the required ≥ 2-day period of worsening oxygenation following a ≥ 2-day period of stability or improvement on the ventilator).**
  - **NOTE: The "date of event" is NOT the date on which all VAE criteria have been met. It is the first day (of a ≥ 2-day period) on which either of the worsening oxygenation thresholds (for PEEP or FiO2) is met.**

EXAMPLE: A patient is intubated in the Emergency Room for severe community-acquired pneumonia and admitted to the MICU (day 1). The patient stabilizes and improves on days 2-5, with a daily minimum FiO_2 of 0.35 (35%) on days 4 and 5. On day 6, the patient experiences respiratory deterioration, and requires a minimum FiO_2 of 0.60 (60%) on days 6 and 7, meeting the criteria for a VAC. The date of the VAC event is day 6.

Basic Definitions

- **VAE Window Period: This is the period of days around the date of event (specifically the day of onset of worsening oxygenation) within which other VAE criteria must be met. It is usually a 5-day period and includes the 2 days before, the day of, and the 2 days after the VAE date of event (specifically the first day of worsening oxygenation, the day of VAE onset).**
  - **In cases where the VAE date of event corresponds to MV day 3 or day 4, the window period described above may only be a 3-day or a 4-day window, because it can NOT include any days before the 3rd day of MV.**

Basic Definitions

- **14-day Event Period: VAEs are defined by a 14-day period, starting on the day of onset of worsening oxygenation (the date of event, day 1). A new VAE cannot be identified or reported until this 14-day period has elapsed.**

Basic Definitions

- **New Antimicrobial Agent: Defined as any agent listed that is initiated on or after the third calendar day of mechanical ventilation AND in the VAE Window Period. The agent is considered new for the purposes of this definition if it was NOT given to the patient on either of the 2 days preceding the current start date.**
  - **The antimicrobial agent(s) must have been given by one of the routes of administration outlined, and therapy with one or more new antimicrobial agents must be continued for at least 4 calendar days.**

Basic Definitions

Appendix. List of Antimicrobial Agents Eligible for IVAC, PVAP

Antimicrobial Agent	
AMIKACIN	
AMPHOTERICIN B	
AMPHOTERICIN B LIPOSOMAL	
AMPICILLIN	
AMPICILLIN/SULBACTAM	
ANIDULAFUNGIN	
AZITHROMYCIN	
AZTREONAM	
BALOXAVIR MARBOXIL	
CASPOFUNGIN	
CEFAZOLIN	
CEFEPIME	
CEFIDEROCOL	
CEFOTAXIME	
CEFOTETAN	
CEFOXITIN	
CEFTAROLINE	
CEFTAZIDIME	
CEFTAZIDIME/AVIBACTAM	
CEFTOLOZANE/TAZOBACTAM	
CEFTRIAXONE	
CEFUROXIME	
CIPROFLOXACIN	
CLARITHROMYCIN	
CLINDAMYCIN	
COLISTIMETHATE	
DALBAVANCIN	
DELAFLOXACIN	
DOXYCYCLINE	
ERAVACYCLINE	
ERTAPENEM	
FLUCONAZOLE	
FOSFOMYCIN	
GEMIFLOXACIN	
GENTAMICIN	
IMIPENEM/CILASTATIN	
IMIPENEM/CILASTATIN/RELEBACTAM	
ISAVUCONAZONIUM	
ITRACONAZOLE	
LEFAMULIN	
LEVOFLOXACIN	
LINEZOLID	
MEROPENEM	
MEROPENEM/VABORBACTAM	
METRONIDAZOLE	
MICAFUNGIN	
MINOCYCLINE	
MOLNUPIRAVIR	*added in 2023 update
MOXIFLOXACIN	
NAFCILLIN	
NIRMATRELVIR (includes NIRMATRELVIR/RITONAVIR)	*added in 2023 update
OMADACYCLINE	
ORITAVANCIN	
OSELTAMIVIR	
OXACILLIN	
PENICILLIN G	
PERAMIVIR	
PIPERACILLIN/TAZOBACTAM	
PLAZOMICIN	
POLYMYXIN B	
POSACONAZOLE	
QUINUPRISTIN/DALFOPRISTIN	
REMDESIVIR	
RIFAMPIN	
SULFAMETHOXAZOLE/TRIMETHOPRIM	
TEDIZOLID	
TELAVANCIN	
TETRACYCLINE	
TIGECYCLINE	
TOBRAMYCIN	
VANCOMYCIN, intravenous only	
VORICONAZOLE	
ZANAMIVIR	

Basic Definitions

Table 1: Definitions of routes of administration

Route of Administration[a]	Definition[b]
Intravenous	An intravascular route that begins with a vein.
Intramuscular	A route that begins within a muscle.
Digestive Tract	A route that begins anywhere in the digestive tract extending from the mouth through rectum.
Respiratory Tract	A route that begins within the respiratory tract, including the oropharynx and nasopharynx.

[a]Other routes of administration are excluded (for example, antibiotic locks, intraperitoneal, intraventricular, irrigation, topical).

[b]Definitions per SNOMED Reference Terminology

Basic Definitions

- **Qualifying Antimicrobial Day (QAD): A day on which the patient was administered an antimicrobial agent that was determined to be "new" within the VAE Window Period. Days on which a new antimicrobial agent is administered count as QADs. Days between administrations of a new antimicrobial agent also count as QADs if there is a gap of no more than 1 calendar day between administrations. By contrast, days between administrations of different antimicrobial agents do NOT count as QADs.**

EXAMPLE: A patient is intubated and mechanically ventilated on hospital day 1 in the MSICU. Ceftriaxone and azithromycin are started on day 1 and administered daily. After 3 days of improving respiratory status, the patient's oxygenation deteriorates on days 4 and 5, with a daily minimum PEEP that is 4 cmH_2O higher than it was on days 2 and 3. Criteria for the VAC definition are met; the date of the event is hospital day 4. Ceftriaxone is discontinued and meropenem is begun on day 5. Azithromycin is continued. In this case, meropenem is a new antimicrobial agent: 1) it was begun on day 5 of mechanical ventilation, and 2) within the VAE Window Period (on the day after VAE onset), and 3) it was not given to the patient on either of the 2 days preceding the current start date. By contrast, ceftriaxone and azithromycin would not be considered new antimicrobial agents, since they were begun on day 1 of mechanical ventilation and continued daily into the VAE Window Period.

Denominator Data

Data Entry

- **Denominator Data Collected:**
  - **Patient Days**
  - **Device Days**
- **Optional Denominator Data:**
  - **Episodes of Mechanical Ventilation**
    - **The EMV denominator is determined by counting all patients in the location who are on mechanical ventilation on the first day of the month regardless of eligibility for inclusion in VAE surveillance. Then, on each subsequent day of the month, count each additional patient that is started on mechanical ventilation.**
    - **This would include those that are admitted to the location already on mechanical ventilation, those that are newly ventilated, and any previously ventilated patients who have new episodes of mechanical ventilation occurring during the same month. The sum of the count for the first day and each subsequent day of the month is entered in NHSN.**

Denominator Data

- **Denominator data collection options**
  - **Daily**
    - **Manual**
    - **Electronic (Post-validation: 3 months of ± 5% of manual counts)**

- **For VAE:**
  - **NOTE: All ventilator days are counted, including ventilator days for patients on mechanical ventilation for < 3 days, and patients on high frequency ventilation and other therapies excluded from VAE surveillance. Patients with tracheostomies who are undergoing weaning from mechanical ventilation using tracheostomy collar trials are included in ventilator day counts if they spend some portion of the day on mechanical ventilation at a time that overlaps with the daily time during which ventilator day counts are performed.**
  - **NOTE: In addition to the total number of patients on ventilators on each day of surveillance, the number of patients on ventilators who are on the APRV mode of mechanical ventilation or related modes (which is a subset of all patients on ventilators) can optionally be indicated on the appropriate form (CDC 57.117 and 57.118).**

- **For PedVAE:**
  - **NOTE: All ventilator days are counted, including ventilator days for patients on mechanical ventilation for < 3 days, and ventilator days for patients on extracorporeal life support or paracorporeal membrane oxygenation who are excluded from PedVAE surveillance. Patients with tracheostomies who are undergoing weaning from mechanical ventilation using tracheostomy collar trials are included in ventilator day counts if they spend some portion of the day on mechanical ventilation at a time that overlaps with the daily time during which ventilator day counts are performed.**

TN

Numerator Data

HAI Definitions: VAE

VAE Surveillance:

VAC → IVAC → PVAP

Exclusions

- **Patients on high frequency ventilation, extracorporeal life support, or paracorporeal membrane oxygenation are EXCLUDED from VAE surveillance during periods of time when the support is in place the entire calendar day.**

- **If the date of event is on or after the date of documentation of evidence of consent AND the patient is being supported for organ donation purposes, the event should not be reported as a VAE.**

Inclusions

- **Patients must be mechanically ventilated for at least 4 calendar days to fulfill VAE criteria (where the day of intubation and initiation of mechanical ventilation is day 1). The earliest date of event for VAE (the date of onset of worsening oxygenation) is day 3 of mechanical ventilation.**

- **Patients on Airway Pressure Release Ventilation (APRV) or related modes are INCLUDED, but when this mode is in use the VAE period of stability or improvement on the ventilator and the period of worsening oxygenation should be determined by changes in FiO2 only, since changes in PEEP as indicated in this surveillance algorithm may not be applicable to APRV.**

- **Patients who are receiving a conventional mode of mechanical ventilation while in the prone position and patients who are receiving a conventional mode of mechanical ventilation while receiving nitric oxide therapy, helium-oxygen mixtures, or epoprostenol therapy are INCLUDED in VAE surveillance.**

HAI Definitions: (VAE) VAC

Patient has a baseline period of stability or improvement on the ventilator, defined by ≥ 2 calendar days of stable or decreasing daily minimum* FiO_2 or PEEP values. The baseline period is defined as the 2 calendar days immediately preceding the first day of increased daily minimum PEEP or FiO_2.

*Daily minimum defined by lowest value of FiO_2 or PEEP during a calendar day that is maintained for > 1 hour.

After a period of stability or improvement on the ventilator, the patient has at least one of the following indicators of worsening oxygenation:

1) Increase in daily minimum* FiO_2 of ≥ 0.20 (20 points) over the daily minimum FiO_2 of the first day in the baseline period, sustained for ≥ 2 calendar days.
2) Increase in daily minimum* PEEP values of ≥ 3 cmH_2O over the daily minimum PEEP of the first day in the baseline period†, sustained for ≥ 2 calendar days.

*Daily minimum defined by lowest value of FiO_2 or PEEP during a calendar day that is maintained for > 1 hour.

†Daily minimum PEEP values of 0-5 cmH_2O are considered equivalent for the purposes of VAE surveillance.

Ventilator-Associated Condition (VAC)

Practice Case 1

- **Joy is admitted on HD 1 for acute exacerbation of COPD and is intubated the same day. She continues to improve on the ventilator daily with PEEP values between 0 - 4 cm H_2O for HD 2 and 3 and FiO_2 values at .45 both days. On HD 4, her daily minimum PEEP increases from 5 cmH_20 to 10 cmH_20 while her daily FiO_2 remains at 0.45. The next day her daily minimum PEEP remains at 10 cm H_2O.**

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1	Intubated (VD 1)				
2					
3					
4	PEEP increased				
5	PEEP increased				
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

Practice Case 1

- **Joy is admitted on HD 1 for acute exacerbation of COPD and is intubated the same day. She continues to improve on the ventilator daily with PEEP values between 0 - 4 cm H_2O for HD 2 and 3 and FiO_2 values at .45 both days. On HD 4, her daily minimum PEEP increases from 5 cmH_20 to 10 cmH_20 while her daily FiO_2 remains at 0.45. The next day her daily minimum PEEP remains at 10 cm H_2O.**

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1	Intubated (VD 1)				
2					
3					
4	PEEP increased				
5	PEEP increased				
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

VAC – DOE: HD 4

HAI Definitions: (VAE) IVAC

On or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, the patient meets both of the following criteria:

1) Temperature > 38 °C or < 36°C, **OR** white blood cell count ≥ 12,000 cells/mm^3 or ≤ 4,000 cells/mm^3.

AND

2) A new antimicrobial agent(s) (see Appendix for eligible antimicrobial agents) is started and is continued for ≥ 4 qualifying antimicrobial days (QAD).

Infection-related Ventilator-Associated Complication (IVAC)

Practice Case 2

- **John presents to the hospital for admission and is intubated on HD 1. He remains stable on the ventilator with PEEP of 2.0 cmH_2O and FiO_2 of 35%. On HD 4 he is noted to have a white-blood cell count of 13,000 cells/mm^3 and is started on ertapenem IV. On HD 5 his FiO_2 is increased to 65% and is increased again to 75% on HD 6.**

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1	Intubated (VD 1)				
2					
3					
4	High WBC				
5	Worse FiO_2				
6	Worse FiO_2				
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Practice Case 2

- **John presents to the hospital for admission and is intubated on HD 1. He remains stable on the ventilator with PEEP of 2.0 cmH_2O and FiO_2 of 35%. On HD 4 he is noted to have a white-blood cell count of 13,000 cells/mm^3 and is started on ertapenem IV. On HD 5 his FiO_2 is increased to 65% and is increased again to 75% on HD 6.**

IVAC – DOE: HD 5

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1	Intubated (VD 1)				
2					
3					
4	High WBC				
5	Worse FiO_2				
6	Worse FiO_2				
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

HAI Definitions: (VAE) PVAP

On or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, ONE of the following criteria is met (**taking into account organism exclusions specified in the protocol**):

1) Criterion 1: Positive culture of one of the following specimens, meeting quantitative or semi-quantitative thresholds[†] as outlined in protocol, without requirement for purulent respiratory secretions:
   - Endotracheal aspirate, ≥ 10^5 CFU/ml or corresponding semi-quantitative result
   - Bronchoalveolar lavage, ≥ 10^4 CFU/ml or corresponding semi-quantitative result
   - Lung tissue, ≥ 10^4 CFU/g or corresponding semi-quantitative result
   - Protected specimen brush, ≥ 10^3 CFU/ml or corresponding semi-quantitative result
2) Criterion 2: Purulent respiratory secretions (defined as secretions from the lungs, bronchi, or trachea that contain ≥ 25 neutrophils and ≤ 10 squamous epithelial cells per low power field [lpf, x100])[†] **PLUS** organism identified from one of the following specimens (to include qualitative culture, or quantitative/semi-quantitative culture without sufficient growth to meet Criterion #1):
   - Sputum
   - Endotracheal aspirate
   - Bronchoalveolar lavage
   - Lung tissue
   - Protected specimen brush
3) Criterion 3: One of the following positive tests:
   - Organism identified from pleural fluid (where specimen was obtained during thoracentesis or within 24 hours of chest tube placement; pleural fluid specimens collected after a chest tube is repositioned or from a chest tube in place > 24 hours are not eligible for PVAP)
   - Lung histopathology, defined as: 1) abscess formation or foci of consolidation with intense neutrophil accumulation in bronchioles and alveoli; 2) evidence of lung parenchyma invasion by fungi (hyphae, pseudohyphae, or yeast forms); 3) evidence of infection with the viral pathogens listed below based on results of immunohistochemical assays, cytology, or microscopy performed on lung tissue
   - Diagnostic test for *Legionella* species
   - Diagnostic test on respiratory secretions for influenza virus, respiratory syncytial virus, adenovirus, parainfluenza virus, rhinovirus, human metapneumovirus, coronavirus

[†] If the laboratory reports semi-quantitative results, those results must correspond to the quantitative thresholds. Refer to Table 2 and 3.

Possible Ventilator-Associated Pneumonia (PVAP)

Practice Case 3

- **On HD 7, John had a positive diagnostic test for *Legionella* species.**

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1	Intubated (VD 1)				
2					
3					
4	High WBC				
5	Worse FiO_2				
6	Worse FiO_2				
7	*Legionella spp.* Positive test				
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Practice Case 3

- **On HD 7, John had a positive diagnostic test for *Legionella* species.**

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1	Intubated (VD 1)				
2					
3					
4	High WBC				
5	Worse FiO_2				
6	Worse FiO_2				
7	*Legionella spp.* positive test				
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

PVAP – DOE: HD 5
Pathogen: *Legionella spp.*

HAI Definitions: PedVAE

Patient has a baseline period of stability or improvement on the ventilator, defined by ≥ 2 calendar days of stable or decreasing daily minimum* FiO_2 or MAP values. The baseline period is defined as the 2 calendar days immediately preceding the first day of increased daily minimum MAP or FiO_2.

*Daily minimum FiO_2 is defined as the lowest value of FiO_2 documented during a calendar day that is maintained for > 1 hour.
Daily minimum MAP is the lowest value documented during the calendar day.
For patients < 30 days old, daily minimum MAP values 0-8 cm H_2O are considered equal to 8 cmH_2O for the purposes of surveillance.
For patients ≥ 30 days old, daily minimum MAP values 0-10 cmH_2O are considered equal to 10 cmH_2O for the purposes of surveillance.

After a period of stability or improvement on the ventilator, the patient has at least one of the following indicators of worsening oxygenation:

1) Increase in daily minimum FiO_2 of ≥ 0.25 (25 points) over the daily minimum FiO_2 of the first day in the baseline period, sustained for ≥ 2 calendar days.
2) Increase in daily minimum MAP values of ≥ 4 cmH_2O over the daily minimum MAP of the first day in the baseline period, sustained for ≥ 2 calendar days.

Pediatric Ventilator-Associated Event (PedVAE)

Practice Case 4

- **Lilly, a 3 y/o girl is admitted and on HD 2 is intubated. From HD 2 to HD 5 her MAP and FiO_2 values steadily improve to 8 cm H_2O and 30% respectively. On HD 6, her FiO_2 increases from 30% to 60% and then on HD 7 to 65%.**

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1					
2	Intubated				
3					
4					
5					
6	Worse FiO_2				
7	Worse FiO_2				
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					

Practice Case 4

- **Lilly, a 3 y/o girl is admitted and on HD 2 is intubated. From HD 2 to HD 5 her MAP and FiO_2 values steadily improve to 8 cm H_2O and 30% respectively. On HD 6, her FiO_2 increases from 30% to 60% and then on HD 7 to 65%.**

PedVAE – DOE: HD 6

Hospital Day	Sign/Sx	DOE	Window Period	Event Period	Qualifying Abx Day
1					
2	Intubated				
3					
4					
5					
6	Worse FiO_2				
7	Worse FiO_2				
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					

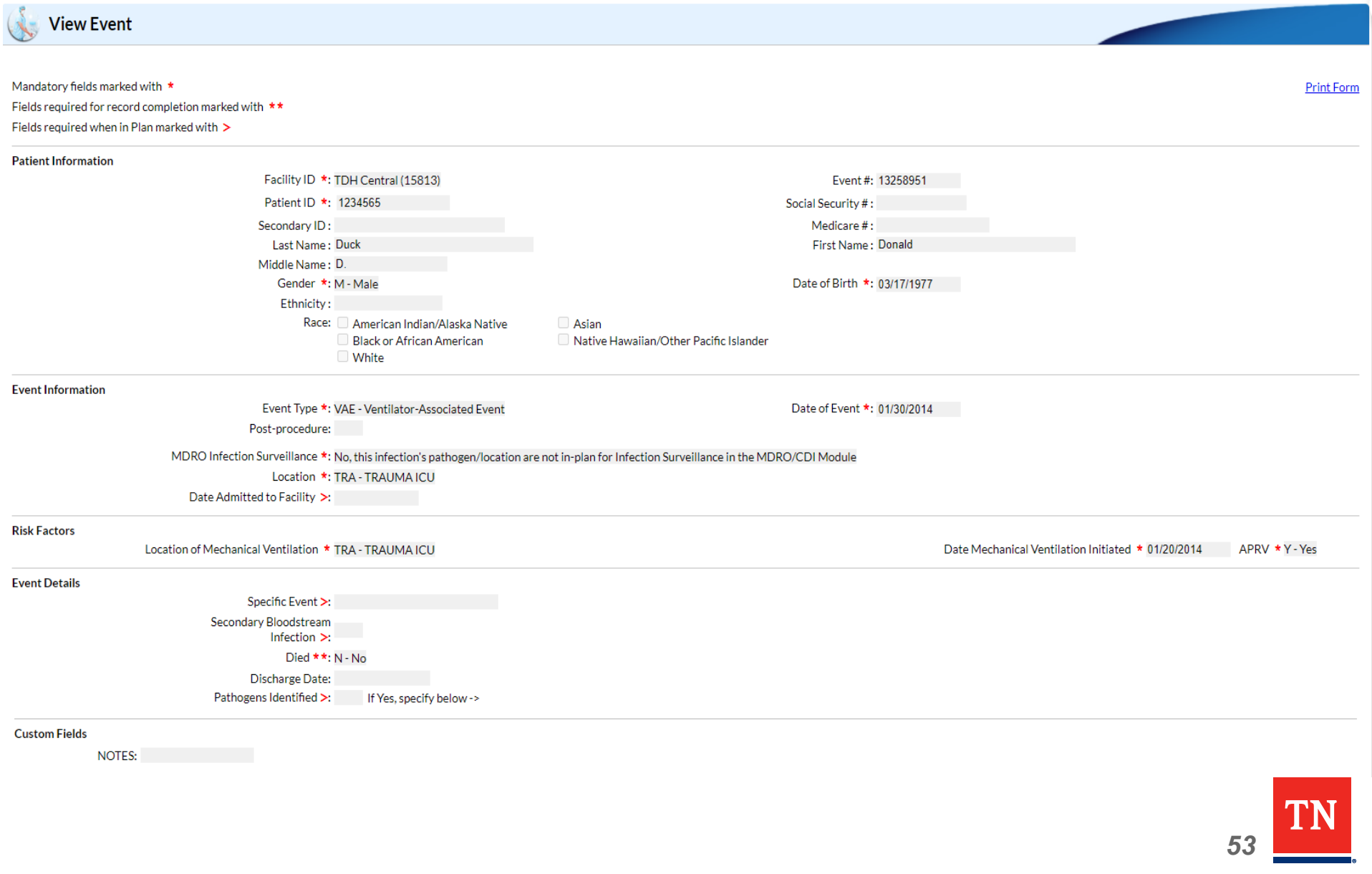
VAE Rate

VAE Rate

- **Rate of VAE per 1000 ventilator days**
  - **VAE Rate per 1000 ventilator days =** $\frac{No.of\ VAEs}{No.of\ Ventilator\ Days}$***1000**
- **Rate of VAE per 100 episodes of mechanical ventilation (EMV)**
  - **VAE Rate per 100 EMV =** $\frac{No.of\ VAEs}{No.of\ EMV}$***100**

Reporting VAE/PedVAE in NHSN

Reporting Events in NHSN



View Event

Mandatory fields marked with *
Fields required for record completion marked with **
Fields required when in Plan marked with >

Print Form

Patient Information

Facility ID *: TDH Central (15813)
Event #: 13258951
Patient ID *: 1234565
Social Security # :
Secondary ID :
Medicare # :
Last Name : Duck
First Name : Donald
Middle Name : D.
Gender *: M - Male
Date of Birth *: 03/17/1977
Ethnicity :
Race: American Indian/Alaska Native; Asian; Black or African American; Native Hawaiian/Other Pacific Islander; White

Event Information

Event Type *: VAE - Ventilator-Associated Event
Date of Event *: 01/30/2014
Post-procedure:
MDRO Infection Surveillance *: No, this infection's pathogen/location are not in-plan for Infection Surveillance in the MDRO/CDI Module
Location *: TRA - TRAUMA ICU
Date Admitted to Facility >:

Risk Factors

Location of Mechanical Ventilation * TRA - TRAUMA ICU
Date Mechanical Ventilation Initiated * 01/20/2014
APRV * Y - Yes

Event Details

Specific Event >:
Secondary Bloodstream Infection >:
Died **: N - No
Discharge Date:
Pathogens Identified >: If Yes, specify below ->

Custom Fields

NOTES:

Reporting Events in NHSN

NHSN
NATIONAL HEALTHCARE SAFETY NETWORK

OMB No. 0920-0666
Form Approved
Exp. Date: 01/31/24
www.cdc.gov/nhsn

Ventilator-Associated Event (VAE)

Page 1 of 4 *required for saving **required for completion

Facility ID:	Event #:
*Patient ID:	Social Security #:
Secondary ID:	Medicare #:
Patient Name, Last:	First: Middle:
*Gender: F M Other	*Date of Birth:
Ethnicity (Specify):	Race (Specify):
*Event Type: VAE	*Date of Event:
Post-procedure VAE: Yes No	Date of Procedure:
NHSN Procedure Code:	ICD-10-PCS or CPT Procedure Code:

*MDRO Infection Surveillance:

☐ Yes, this infection's pathogen & location are in-plan for Infection Surveillance in the MDRO/CDI Module

☐ No, this infection's pathogen & location are **not** in-plan for Infection Surveillance in the MDRO/CDI Module

*Date Admitted to Facility:	*Location:

* Location of Mechanical Ventilation Initiation: _____ *Date Initiated: __/__/____ APRV: Yes No

Event Details

*Specific Event: ☐ VAC ☐ IVAC ☐ PVAP

*Specify Criteria Used:

STEP 1: VAC (≥1 REQUIRED)

☐ Daily min FiO_2 increase ≥ 0.20 (20 points) for ≥ 2 days† **OR** ☐ Daily min PEEP increase ≥ 3 cm H_2O for ≥ 2 days†

†*after 2+ days of stable or decreasing daily minimum values.*

STEP 2: IVAC

☐ Temperature > 38°C or < 36° **OR** ☐ White blood cell count ≥ 12,000 or ≤ 4,000 cells/mm³

AND

☐ A new antimicrobial agent(s) is started, and is continued for ≥ 4 days

STEP 3: PVAP

☐ Criterion #1: Positive culture of one of the following specimens, meeting quantitative or semi-quantitative thresholds as outlined in protocol,‡ without requirement for purulent respiratory secretions:

☐ Endotracheal aspirate ☐ Lung tissue
☐ Bronchoalveolar lavage ☐ Protected specimen brush

OR

☐ Criterion #2: Purulent respiratory secretions‡ (defined in the protocol) plus organism(s) identified from one of the following specimens:‡

☐ Sputum ☐ Lung tissue
☐ Endotracheal aspirate ☐ Protected specimen brush
☐ Bronchoalveolar lavage

OR

☐ Criterion #3: One of the following positive tests (as outlined in the protocol):‡

☐ Organism(s) identified from pleural fluid ☐ Diagnostic test for *Legionella* species
☐ Lung histopathology ☐ Diagnostic test for selected viral pathogens

‡*collected after 2 days of mechanical ventilation and within +/- 2 days of onset of increase in FiO_2 or PEEP.*

*Secondary Bloodstream Infection: Yes No	COVID-19: Yes No If Yes: ☐Confirmed ☐Suspected
**Died: Yes No	VAE Contributed to Death: Yes No
Discharge Date:	*Pathogens Identified: Yes No *If Yes, specify on pages 2-3

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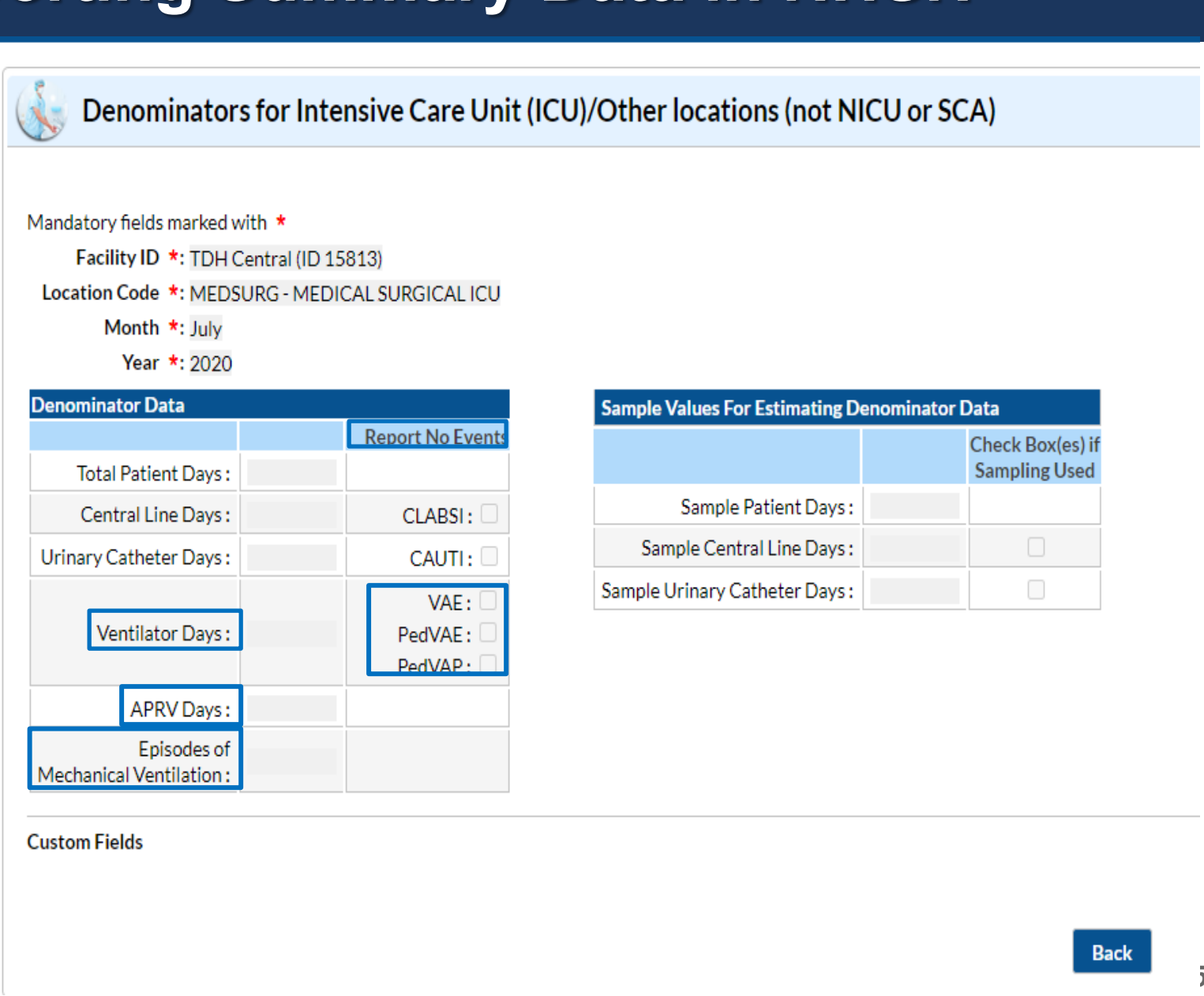
Ventilator-Associated Event (VAE)

Pathogen #	Gram-positive Organisms	
	Staphylococcus coagulase-negative (specify species if available):	CEFOX/OX S R N; VANC S I R N
	____*Enterococcus faecium* ____*Enterococcus faecalis* ____*Enterococcus* spp. (Only those not identified to the species level)	DAPTO S S-DD N S R N; GENTHL[1] S R N; LNZ S I R N; VANC S I R N
	Staphylococcus aureus	CIPRO/LEVO/MOXI S I R N; CEFOX/METH/OX S R N; CEFTAR S S-DD I R; CLIND S I R N; DAPTO S N S N; DOXY/MINO S I R N; GENT S I R N; LNZ S R N; RIF S I R N; TETRA S I R N; TMZ S I R N; VANC S I R N

Pathogen #	*Gram-negative Organisms*	
	Acinetobacter (specify species) _____	AMK S I R N; AMPSUL S I R N; CEFTAZ/CEFOT/CEFTRX S I R N; CEFEP S I R N; CIPRO/LEVO S I R N; COL/PB S R N; DORI/MERO S I R N; DOXY/MINO S I R N; GENT S I R N; IMI S I R N; PIPTAZ S I R N; TMZ S I R N; TOBRA S I R N
	Escherichia coli	AMK S I R N; AMP S I R N; AMPSUL/AMXCLV S I R N; AZT S I R N; CEFAZ S I R N; CEFTAZ S I R N; CEFOT/CEFTRX S I R N; CEFEP S I/S-DD R N; CEFTAVI S R N; CEFTOTAZ S I R N; CIPRO/LEVO/MOXI S I R N; COL/PB[†] I R N; DORI/IMI/MERO S I R N; DOXY/MINO/TETRA S I R N; ERTA S I R N; GENT S I R N; IMIREL S I R N; MERVAB S I R N; PIPTAZ S I R N; TIG S I R N; TMZ S I R N; TOBRA S I R N
	Enterobacter (specify species) _____	AMK S I R N; AZT S I R N; CEFTAZ S I R N; CEFOT/CEFTRX S I R N; CEFEP S I/S-DD R N; CEFTAVI S R N; CEFTOTAZ S I R N; CIPRO/LEVO/MOXI S I R N; COL/PB[†] I R N; DORI/IMI/MERO S I R N; DOXY/MINO/TETRA S I R N; ERTA S I R N; GENT S I R N; IMIREL S I R N; MERVAB S I R N; PIPTAZ S I R N; TIG S I R N; TMZ S I R N; TOBRA S I R N
	____*Klebsiella pneumoniae* ____*Klebsiella oxytoca* ____*Klebsiella aerogenes*	AMK S I R N; AMPSUL/AMXCLV S I R N; AZT S I R N; CEFAZ S I R N; CEFTAZ S I R N; CEFOT/CEFTRX S I R N; CEFEP S I/S-DD R N; CEFTAVI S R N; CEFTOTAZ S I R N; CIPRO/LEVO/MOXI S I R N; COL/PB[†] I R N; DORI/IMI/MERO S I R N; DOXY/MINO/TETRA S I R N; ERTA S I R N; GENT S I R N; IMIREL S I R N; MERVAB S I R N; PIPTAZ S I R N; TIG S I R N; TMZ S I R N; TOBRA S I R N
	Pseudomonas aeruginosa	AMK S I R N; AZT S I R N; CEFTAZ S I R N; CEFEP S I R N; CEFTAVI S R N; CEFTOTAZ S I R N; CIPRO/LEVO S I R N; COL/PB S I R N; DORI/IMI/MERO S I R N; GENT S I R N; PIPTAZ S I R N; TOBRA S I R N

Reporting Summary Data in NHSN



Denominators for Intensive Care Unit (ICU)/Other locations (not NICU or SCA)

Mandatory fields marked with *

Facility ID *: TDH Central (ID 15813)

Location Code *: MEDSURG - MEDICAL SURGICAL ICU

Month *: July

Year *: 2020

Denominator Data

		Report No Events
Total Patient Days :		
Central Line Days :		CLABSI : ☐
Urinary Catheter Days :		CAUTI : ☐
Ventilator Days :		VAE : ☐ PedVAE : ☐ PedVAP : ☐
APRV Days :		
Episodes of Mechanical Ventilation :		

Sample Values For Estimating Denominator Data

		Check Box(es) if Sampling Used
Sample Patient Days :		
Sample Central Line Days :		☐
Sample Urinary Catheter Days :		☐

Custom Fields

Back

TN

Data Entry

Denominators for Intensive Care Unit (ICU)/Other Locations (not NICU or SCA)

Page 1 of 1

*required for saving
Facility ID: *Location Code: *Month: *Year:

Date	*Number of Patients	**Number of patients with 1 or more **central lines**	**Number of patients with a **urinary catheter**	**Number of total patients on a **ventilator**	Number of patients **on APRV**	Number of **Episodes of Mechanical Ventilation**
1						
2						
3						
4						
5						

Data Entry

Denominators for Neonatal Intensive Care Unit

Page 1 of 4

*Required for saving

**Conditionally required

Facility ID: *Location Code: *Month:

Birth Weight Categories

Date:	≤750 g					751-1000 g					1001-1500 g					
	Pt*	**CL	**VNT	UrC	EMV	Pt*	**CL	**VNT	UrC	EMV	Pt*	**CL	**VNT	UrC	EMV	Pt*
1.																
2.																
3.																
4.																

Upcoming Trainings

- **Webinars –**
  - **LAB ID Surveillance**
    - **Monday, February 13th, 10 a.m. CT**
  - **AU/AR**
    - **Monday, February 27th, 10 a.m. CT**
  - **NHSN Analysis**
    - **Monday, March 6th, 10 a.m. CT**

Upcoming Trainings

- **Case Study Sessions**
  - **Thursday, March 9th, 1 p.m. – 4 p.m. CT**
  - **Wednesday, March 15th, 8 a.m. – 11 a.m. CT**
  - **Friday, March 17th, 8 a.m. – 11 a.m. CT**

Resources

NHSN Resources

- **VAE: VAE | PSC | NHSN | CDC**
- **PedVAE: PedVAE | PSC | NHSN | CDC**

- **Patient Safety Component Manual**
  - **VAE: Ventilator-associated Event (VAE)**
  - **PedVAE: Pediatric Ventilator-associated Event (PedVAE)**

Contact

- **TDH HAI Program:**
  - HAI.Health@tn.gov

- **NHSN:**
  - NHSN@cdc.gov
  - **NHSN Website:** NHSN | CDC