The Centers for Disease Control and Prevention (CDC)

NHSN e-News

Ventilator-Associated Event (VAE) Surveillance for Adults Special Edition

As many NHSN users know, surveillance for ventilator-associated pneumonia (VAP) is challenging. The current surveillance definitions for pneumonia (PNEU) are complex and contain many subjective elements, including the requirement for chest x-ray evidence of pneumonia. The NHSN team has been working since 2009 to develop a more objective, reliable approach to VAP surveillance. A lot has happened since the last NHSN Newsletter update on changes to the approach VAP surveillance. One year ago, the CDC collaborated with several professional societies and organizations as well as other federal partners to convene a VAP Surveillance Definition Working Group to focus on finalizing a new approach to surveillance for adult patients (see Table). This new approach, surveillance for Ventilator-Associated Events (VAE), will be implemented for use in NHSN in January 2013. It will replace in-plan VAP surveillance for adult patients (≥18 years of age).

The VAE algorithm—which is a surveillance algorithm and not intended for use in the clinical management of patients—consists of 3 tiers of definitions: Tier 1, Ventilator-Associated Conditions (VAC); Tier 2, Infection -related Ventilator-Associated Complications (IVAC); and Tier 3, Possible and Probable VAP (see Figure). The first two tiers, VAC and IVAC, were developed to be appropriate for the potential future uses of public reporting and pay-for-performance programs. Definitions included in the third tier of the VAE algorithm, Possible and Probable VAP, were developed for healthcare facilities to use in internal quality improvement efforts.

Information on the VAE surveillance definition algorithm has been made available by several professional societies and organizations to their members and is also posted on the NHSN website: www.cdc.gov/nhsn/psc_da-vae.html. We have already received many questions about the new surveillance algorithm, and would like to share with you answers to some of these questions.

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Inside this issue:

1) What types of healthcare facilities is VAE surveillance conducted in?

- VAE surveillance is conducted in acute care hospitals, long term acute care hospitals, and inpatient rehabilitation facilities.

2) When will I have to report VAE to NHSN?

- There is no federal requirement to report VAE at present. VAE reporting is not currently included in the Centers for Medicare & Medicaid Services (CMS) Hospital Inpatient Quality Reporting (IQR) program. It is not known whether VAE will be incorporated in the CMS Hospital IQR Program in the future. Whether you are required to report VAE to NHSN or not may depend on rules and regulations or other factors in your local area and/or your state.
- You will be able to collect data on VAEs using the new algorithm in January 2013 and into the NHSN reporting application in mid-February 2013.

3) What is happening to PNEU/VAP?

- When VAE becomes available for use in NHSN in 2013, you will no longer be able to report in-plan VAP events occurring in adult patients to NHSN.
- In 2013, you will still be able to conduct in-plan surveillance for VAP in mechanically-ventilated infants and children and off-plan surveillance for VAP in mechanically-ventilated adults, as well as off-plan surveillance for PNEU in non-mechanically ventilated patients of any age.

4) Can I choose to conduct in-plan surveillance for only one specific site within the VAE algorithm? For example, can I decide that I will only conduct surveillance for IVAC?

- No. In 2013, conducting in-plan VAE surveillance means applying the entire VAE surveillance definition algorithm to each patient eligible for VAE surveillance.

5) Are there patients that are not included in VAE surveillance?

- Persons under the age of 18 years at the time of event onset and those who are receiving high frequency ventilation or extracorporeal life support are excluded from VAE surveillance.

6) What are you doing to modify VAP surveillance in infants and children?

- We convened a special working group to review and modify the VAE surveillance definition algorithm to make it appropriate for use in infants and children. The working group's first meeting was held on September 6, 2012. We hope to have neonatal and pediatric VAE algorithms available for use in NHSN in 2014.

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7) I would like to start VAE surveillance in my facility in 2013. What steps can I take now to prepare?

- Review the definition algorithm and make note of the data elements that will be needed to detect VAEs. Keep in mind that for most patients, the only data elements that will be needed are the daily minimum levels of positive end-expiratory pressure (PEEP) and fraction of inspired oxygen (FiO_2). For those patients who meet VAC criteria based on changes in PEEP and FiO_2, you will need to go on to gather additional information, such as temperature and white blood cell count—but even then, this information is gathered from within a defined window of time: the 5-day period defined by the two days before, the day of, and the two days after VAE onset.
- Develop relationships with your colleagues in the Respiratory Care/Respiratory Therapy Department and with your intensive care unit colleagues—they may be able to assist you in gathering or organizing the ventilator data you will need to detect VAEs (i.e., PEEP and FiO_2 information).
- Participate in VAE training opportunities as they become available.
- Develop a plan for organizing the VAE data elements into a spreadsheet or worksheet—this will make the events easier to detect and will make surveillance more efficient. A basic example of a VAE worksheet is provided in the informational PDF document available on the VAE webpage: www.cdc.gov/nhsn/psc_da-vae.html.

8) Where can I get more information?

- Go to www.cdc.gov/nhsn/psc_da-vae.html. Check this page frequently—updates are coming soon, including the draft surveillance protocol (along with frequently-asked questions and draft forms) and a sample worksheet. Keep in mind that the draft protocol and forms are subject to change, prior to implementation of VAE surveillance in NHSN in 2013.
- Send your questions to nhsn@cdc.gov.

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Table. VAP Surveillance Definition Working Group organizations and members and non-CDC federal participants

Organization	*Working Group Member/Participant*
American Association of Critical-Care Nurses	Ms. Suzanne Burns and Ms. Beth Hammer
American Association for Respiratory Care	Dr. Dean Hess
American College of Chest Physicians	Drs. Robert Balk and David Gutterman
American Thoracic Society	Drs. Nicholas Hill and Mitchell Levy
Association of Professionals in Infection Control and Epidemiology	Ms. Linda Greene
Council of State and Territorial Epidemiologists	Ms. Carole VanAntwerpen
Healthcare Infection Control Practices Advisory Committee Surveillance Working Group	Dr. Daniel Diekema
Infectious Diseases Society of America	Dr. Edward Septimus
Society for Healthcare Epidemiology of America	Dr. Michael Klompas
Society of Critical Care Medicine	Drs. Clifford Deutschman, Marin Kollef, and Pamela Lipsett
U.S. Department of Health and Human Services, Office of Healthcare Quality	Dr. Don Wright
National Institutes of Health	Dr. David Henderson

Figure. Ventilator-Associated Events (VAE) Surveillance Definition Algorithm

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 two calendar days immediately preceding the first day of increased daily minimum PEEP or FiO_2.

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

1) Minimum daily FiO_2 values increase ≥ 0.20 (20 points) over the daily minimum FiO_2 in the preceding two calendar days (the baseline period), for ≥ 2 calendar days.
2) Minimum daily PEEP values increase ≥ 3 cmH_2O over the daily minimum PEEP in the preceding two calendar days (the baseline period), for ≥ 2 calendar days.

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Ventilator-Associated Condition (VAC)

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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)* is started, and is continued for ≥ 4 calendar days.

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Infection-related Ventilator-Associated Complication (IVAC)

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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:

1) Purulent respiratory secretions (from one or more specimen collections)

- Defined as secretions from the lungs, bronchi, or trachea that contain ≥ 25 neutrophils and ≤ 10 squamous epithelial cells per low power field [lpf, x100].
- If the laboratory reports semi-quantitative results, those results must be equivalent to the above quantitative thresholds.

2) Positive culture (qualitative, semi-quantitative or quantitative) of sputum*, endotracheal aspirate*, bronchoalveolar lavage*, lung tissue, or protected specimen brushing*

**Excludes the following:*

- Normal respiratory/oral flora, mixed respiratory/oral flora or equivalent
- *Candida* species or yeast not otherwise specified
- Coagulase-negative *Staphylococcus* species
- *Enterococcus* species

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Possible Ventilator-Associated Pneumonia

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:

1) Purulent respiratory secretions (from one or more specimen collections—and defined as for possible VAP) AND one of the following:
- Positive culture of endotracheal aspirate*, ≥ 10^5 CFU/ml or equivalent semi-quantitative result
- Positive culture of bronchoalveolar lavage*, ≥ 10^4 CFU/ml or equivalent semi-quantitative result
- Positive culture of lung tissue, ≥ 10^4 CFU/g or equivalent semi-quantitative result
- Positive culture of protected specimen brush*, ≥ 10^3 CFU/ml or equivalent semi-quantitative result

**Same organism exclusions as noted for Possible VAP.*

2) One of the following (without requirement for purulent respiratory secretions):

- Positive pleural fluid culture (where specimen was obtained during thoracentesis or initial placement of chest tube and NOT from an indwelling chest tube)
- Positive lung histopathology
- Positive diagnostic test for *Legionella* spp.
- Positive diagnostic test on respiratory secretions for influenza virus, respiratory syncytial virus, adenovirus, parainfluenza virus, rhinovirus, human metapneumovirus, coronavirus

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Probable Ventilator-Associated Pneumonia

Contact NHSN at the following:

The Center for Disease Control and Prevention (CDC)

MS-A24

1600 Clifton Road

Atlanta, GA 30333

E-mail: nhsn@cdc.gov

CDC's NHSN Website: www.cdc.gov/nhsn

The National Healthcare Safety Network (NHSN) is a voluntary, secure, Internet-based surveillance system that integrates patient and healthcare personnel safety surveillance systems managed by the Division of Healthcare Quality Promotion (DHQP) at CDC.

During 2008, enrollment in NHSN was opened to all types of healthcare facilities in the United States, including acute care hospitals, long-term acute care hospitals, psychiatric hospitals, rehabilitation hospitals, outpatient dialysis centers, ambulatory surgery centers, and long term care facilities.