

## OPERATIONAL DEFINITION

### MEASUREMENT: Ventilator Associated Pneumonia (VAP)

#### I. Description and Rationale

This measure answers the question: How often are patients harmed due to the occurrence of ventilator associated pneumonia?

The current version of the National Healthcare Safety Network (NHSN) Manual: Patient Safety Component Protocol, will serve as the official reference guide for rules around defining/reporting ventilator associated pneumonia cases.

#### II. Population Definition

The patient population for this measure is defined per the patient population operational definition. Inpatient and observational stay patients will be included in the measure.

##### Inclusion criteria

Any patient treated by the hospital who has the opportunity/risk of acquiring the infection.

##### Exclusion criteria

Pneumonia must not be present or incubating at the time of admission into the hospital. For most infections, this means that the infection does not become evident until 48 hours or more after admission, but each infection must be assessed individually.

#### III. Data Source(s)

Each hospital will report data using their own collection methods until specific high detection methods are prescribed by the network.

#### IV. Sampling and Data Collection Plan

VAP cases are assigned to the month when the infection occurred.

#### V. Calculation

**Numerator:** Number of patients contracting ventilator associated pneumonia, as defined by CDC guidelines.

\*\*\* This definition is in transition and will be reviewed and updated as appropriate by the VAP Hospital Acquired Condition Team.

**Denominator:** Total number of ventilation days during the time period.

**Number of ventilator associated pneumonia cases per 1000 ventilation days  
(Numerator/Denominator) x 1000**

#### VI. Data Quality Audit Procedures

Hospitals should develop their own procedures for auditing data quality until quality auditing procedures are suggested by the network.

**VII. Notes**

N/A

**VIII. Experts/Resources**

[www.cdc.gov/nhsn](http://www.cdc.gov/nhsn)

<http://www.cdc.gov/nhsn/PDFs/pscManual/6pscVAPcurrent.pdf>

**IX. Attachments**

N/A

**X. Revision History**

Version	Primary Author(s)	Description of Version	Date Completed
Version 1	Karen Zieker	Version 1	30-Mar-2012

# SPS PREVENTION BUNDLE

## Ventilator-Associated Pneumonia (VAP)

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## I. Background & Team

VAP (Ventilator-Associated Pneumonia) is the 7th largest contributor to harm caused across the SPS network. In 2011, approximately 16 children were harmed each month as a result of VAP across the Phase I SPS hospitals (n=33). The VAP team formed in May of 2012 to develop strategies consistent with high reliability concepts to reduce harm caused by VAP, and released the first recommended bundle to the network. In 2013, Phase II hospitals (n=55) joined the network and the number of children harmed per month increased to 25, using their 2012 baseline data.

The network strategy has been successful with a 48% VAP rate reduction across the network as of July 2014. Using data obtained from the SPS network as well as external evidence in the medical literature, the VAP team has identified those bundle elements within the first recommended VAP bundle that when reliably implemented are highly likely to result in decreased harm to hospitalized children.

As a result, SPS is stratifying bundle elements based on their level of evidence to assist hospitals in prioritizing their efforts at designing and implementing evidence-based bundles for VAP and the other aviator HACs:

- *Standard Element:* Strong evidence suggests that implementation of this element is associated with significant decrease in patient harm; **all SPS hospitals should implement and measure reliability of this element.**
- *Recommended Element:* Preliminary data and clinical expert opinion support the implementation of this element; **SPS hospitals should strongly consider implementing this element.**

### Subject Matter Expert

Grace Lee, Boston Children's Hospital

### SPS Staff

Laurie Mustin, Senior Quality Outcomes Manager

Erin Goodman, Project Specialist

Carrie Hughes, Project Coordinator

Gowri Madhavan, Data Analyst

## II. Prevention Bundle Elements - Overview

### SPS Standard Elements

- Not applicable

### SPS Recommended Elements

- Readiness to Extubate
- Head of Bed Elevation
- Minimize Disruption of the Circuit
- Oral Hygiene

### III. Prevention Bundle Elements – Evidence Reviewed

Bundle Element	SHEA (2014) – Grading of the Quality of Evidence	Evidence Cited (Numbers refer to Reference Section)
<b>Readiness to Extubate</b> - Assess readiness to extubate daily* *Performed minimally once per day	Grade II - Pediatric Grade III - Neonates	1
<b>Head of Bed Elevation</b> - Elevate head of bed to 30 -45 degrees (non-neonates)* *Performed minimally once per day	Grade III - Pediatric Grade III - Neonates	1, 2, 8
<b>Minimize Disruption of the Circuit</b> – Inspect ventilator circuit for gross contamination daily, and if present change circuit.* *Performed minimally once per day	Grade II - Pediatric Grade III – Neonates Grade 1 - Adults	1, 2, 6, 7
<b>Oral Hygiene</b> -Perform oral hygiene minimally every 12 hours*	Grade III– Pediatrics No Grade Available – Neonates	1, 2, 5

#### SHEA (2014) – Grading of the Quality of Evidence

- **I. High** - Highly confident that the true effect lies close to that of the estimated size and direction of the effect. Evidence is rated as high quality when there is a wide range of studies with no major limitations, there is little variation between studies, and the summary estimate has a narrow confidence interval.
- **II. Moderate** - The true effect is likely to be close to the estimated size and direction of the effect, but there is a possibility that it is substantially different. Evidence is rated as moderate quality when there are only a few studies and some have limitations but not major flaws, there is some variation between studies, or the confidence interval of the summary estimate is wide.

- **III. Low** - The true effect may be substantially different from the estimated size and direction of the effect. Evidence is rated as low quality when supporting studies have major flaws, there is important variation between studies, the confidence interval of the summary estimate is very wide, or there are no rigorous studies, only expert consensus.

#### IV. Prevention Bundle Elements – Recommended Approaches

Prevention Bundle Element	Recommended Approaches
<b>Recommended Elements</b>	
<p><b>Readiness to Extubate</b> - Assess readiness to extubate daily* *Performed minimally once per day</p>	<ul style="list-style-type: none"> <li>• Ongoing assessment of readiness to extubate with minimum documentation at least every 24 hours.</li> <li>• Every day the care team should actively discuss whether the patient still needs to be intubated and what steps are necessary to move towards extubation.</li> </ul>
<p><b>Head of Bed Elevation</b> - Elevate head of bed to 30 -45 degrees (non-neonates)* *Performed minimally once per day</p>	<ul style="list-style-type: none"> <li>• Keep the head of the bed elevated to 30-45 degrees for all ventilated patients beyond infancy.</li> <li>• Consider the use of a visual measuring device (e.g. protractor painted on bedside) to ensure the angle is correct.</li> </ul>
<p><b>Minimize Disruption of the Circuit</b> – Inspect ventilator circuit for gross contamination daily, and if present change circuit.* *Performed minimally once per day</p>	<ul style="list-style-type: none"> <li>• Perform inspection of circuit at least every 8 hours for condensation and/or gross contamination. Drain condensation. Only change circuit for gross contamination.</li> <li>• Visually inspect ventilator for condensation or contamination.</li> <li>• Change ventilator circuit when visibly soiled.</li> <li>• Drain ventilator circuit if fluid has accumulated.</li> <li>• Avoid changing of the ventilator circuit on a routine basis.</li> </ul>
<p><b>Oral Hygiene</b> -Perform oral hygiene minimally every 12 hours*</p>	<ul style="list-style-type: none"> <li>• Brushing teeth and gums with a soft bristle toothbrush and product for plaque removal, or use a gauze and sterile water for patients without teeth.</li> <li>• Consider Perform oral care (moistening mouth and lips, removal of oropharyngeal secretions) before repositioning patient.</li> </ul>



## V. Measurement- Prevention Bundle Reliability

Measurement	Formula	Recommendations	Reporting Period
Reliability of VAP Bundle	Number of audits totally compliant with bundle / Number of audits completed* x 100	<ul style="list-style-type: none"> <li>Your bundle reliability data should include <b>all</b> the SPS Standard elements</li> <li>SPS strongly encourages hospitals to also include the SPS Recommended Elements.</li> <li>Hospitals can choose to include additional elements. Please note that including too many (&gt;5) elements may confuse and overwhelm care providers so proceed with caution.</li> <li>Measure your bundle as ALL or None. See Reference 8 for IHI description of All on None.</li> <li>Minimum of 20 audits per month. If procedures are fewer than 20, then include all procedures.</li> </ul>	Monthly

## VI. Spotlight Tools

We have asked hospitals for some of their spotlight tools, and have highlighted a few in this [folder](#). The highlighted categories are: Bundle Measure Methodology, PDSAs and Interventions, Risk Assessment, Training, and Failure Analysis.

## VII. Spotlight Hospitals

Please click [here](#) to view the Sharing Hospitals' Innovation for Network Engagement (SHINE) report.

## VIII. References

1. SHEA (2014) - Strategies to Prevent Ventilator-Associated Pneumonia in Acute Care Hospitals: 2014 Update. Michael Klompas, MD, MPH; Richard Branson, MSc, RRT; Eric C. Eichenwald, MD; Linda R. Greene, RN, MPS, CIC; 5 Michael D. Howell, MD, MPH; 6 Grace Lee, MD; Shelley S. Magill, MD, PhD; Lisa L. Maragakis, MD, MPH; Gregory P. Priebe, MD; Kathleen Speck, MPH; 11 Deborah S. Yokoe, MD, MPH; 2 Sean M. Berenholtz, MD, MHS
2. CDC (2003) GUIDELINES FOR PREVENTING HEALTH-CARE-ASSOCIATED PNEUMONIA, 2003 Recommendations of CDC and the Healthcare Infection Control Practices Prepared By: Ofelia C. Tablan, M.D.1, Larry J. Anderson, M.D.2, Richard Besser, M.D.3 Carolyn Bridges, M.D.2, Rana Hajjeh, M.D

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7. Kollef MH, Shapiro D, Fraser VJ, et al. Mechanical ventilation with or without 7-day circuit changes: a randomized controlled trial. *Ann Intern Med* (1995);123:168—74
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## IX. Revision History

I. Version	Primary Author(s)	Description of Version	Date Completed
Version 1	Katie Hilbert	Initial Draft	9- Nov - 2012
Version 2	Greg Priebe, Sharyl Wooton	Evidence, Reliability, and Standards of Care.	29 – Jan -2012
Version 3	Erin Goodman & Sharyl Wooton (on behalf of the HAC Co-Leader Team)	Format & Release of the new SPS Prevention Bundle content	12 – 12 - 2014
Version 4	SPS Staff	Contact information updated	4-5-17

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