

# Zap VAP Decreased Ventilator-Associated Pneumonia with an Interdisciplinary Bundle

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## BACKGROUND

**Ventilator-Associated Pneumonia (VAP)** is the development of pneumonia 48 hours after endotracheal intubation.

- VAP increases morbidity and mortality due to prolonged ventilator dependence and increased length of stay.

Evidence supported VAP bundles as a means to reduce VAP

- Oral care, clean suctioning techniques, equipment management, positioning with head of bed elevation, and hand hygiene**

National VAP benchmark is **1.8 per 1000** ventilator days (National Health and Safety Network).

- Project site VAP rate in 2018, was **6 per 1000** ventilator days (VD).

## PURPOSE

To develop, implement, and evaluate a VAP bundle, called *ZapVAP*, that improved bedside care and decreased the VAP rate.

### Short term goal:

- Exceed 90% staff adherence with *ZapVAP*.
- Reduce the tracheal culture rate 50% after *ZapVAP* implementation.

### Long term goal:

- Reduce VAP rate below the National benchmark of 1.8 per 1000 VD.

## METHODS

This Nursing and Respiratory Therapy (RT) quality improvement project, implemented a VAP bundle in a 19-bed Pediatric Intensive Care Unit in an urban, academic medical center.

- Introduction:** Team Mobilization
  - Registered Nurses (RN), RTs, nurse assistants (NA), medicine, pharmacy, infectious disease were introduced to bundle
- Preparation:** Education and Resource Mobilization
  - Education competency
    - Post-test validation for RNs, RTs, & NAs
  - 100% of bundle supplies obtained
- Pre-Implementation:** roll-out of one bundle component/week
  - Ineffective oral care – oral care algorithm developed to improve effectiveness of oral care with tooth brushing
- Full Implementation:** all VAP bundle components implemented
  - Bedside, observations of bundle adherence tracked daily by RN/RT champions using checklist
  - Real-time feedback given at bedside
    - RN/RT monthly lottery with prizes for bundle adherence
  - Bi-weekly stakeholder communication of outcomes

## MEASURES

### VAP Bundle Adherence:

- Champions used observational checklist daily to measure staff adherence to VAP bundle (one tool per bed; scored yes/no)
- Adherence achieved when **all bundle components** were met

### VAP Rate:

- VAP = # ICD-10 code (for VAP) tracked in 2018/2019 and used to calculate a VAP rate.

$$\text{VAP Rate per 1000 VD} = (\# \text{ of ICD-10 (VAP) / VD}) \times 1000$$

### Positive Tracheal Culture (TC) Rate:

- Positive tracheal cultures tracked over the same months in 2018/2019
- Positive tracheal culture rate =  $[(\# \text{ positive tracheal cultures obtained greater than } >48 \text{ hours after intubation}) / \# \text{ of ventilated patients}] \times 100$

Observational Checklist

Date: \_\_\_\_\_ Total Number of Observations (ventilated patients only): \_\_\_\_\_  
Fully Adherent Observations: \_\_\_\_\_

**ORAL CARE:**

1) Correct, age appropriate oral care signs posted at the HOB? Y N  
Comment: \_\_\_\_\_

**EQUIPMENT MAINTENANCE:**

2) All oral care equipment changed in the last 24 hours? (washers/swabs) Y N  
3) Circuit tubing changed in the last 24 hours? Y N  
4) Ventilator circuit dated? Y N  
5) Suction tubing secure? (not found on the floor) Y N  
Comment: \_\_\_\_\_

**SUCTIONING TECHNIQUES:**

6) Is the in-line covered with a cap? Y N  
7) Is line dated with sticker? (change every 72 hours) Y N  
8) Is the suction tubing labeled? (EIT/CO) Y N  
Comment: \_\_\_\_\_

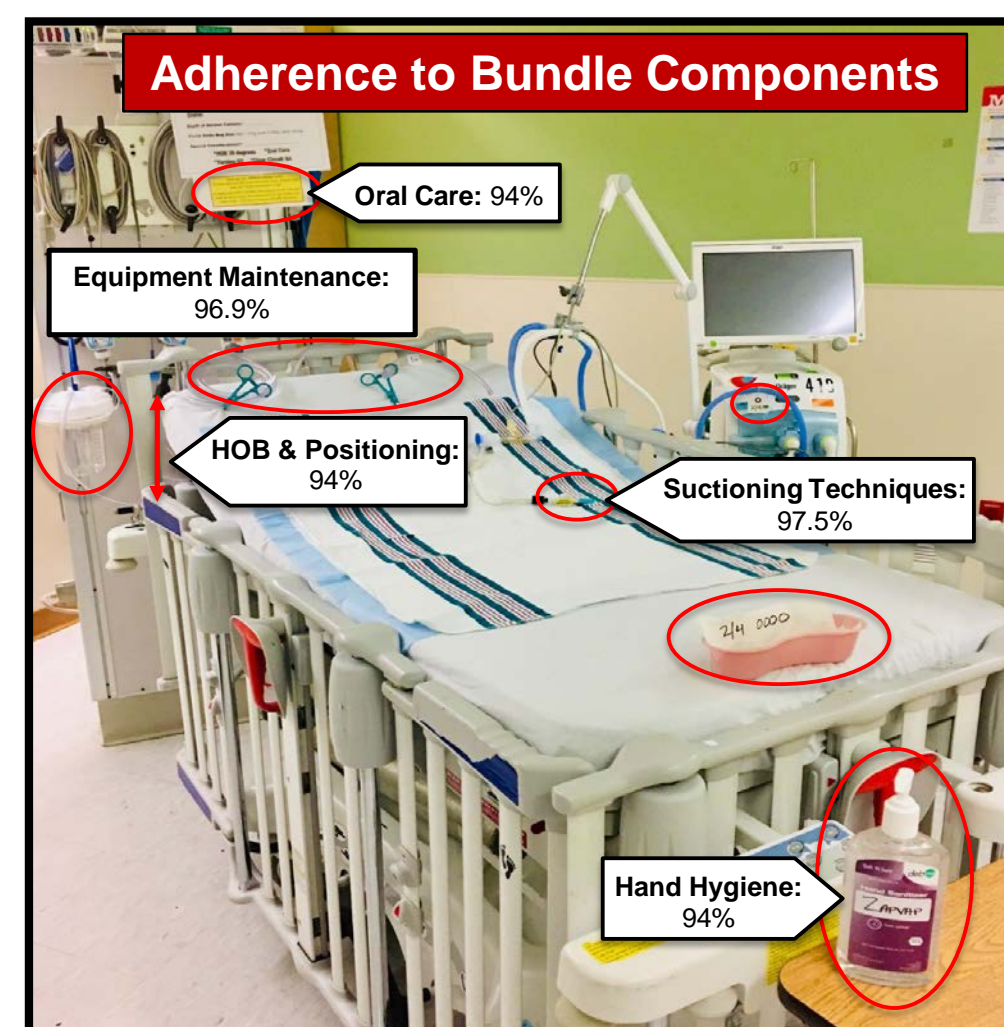
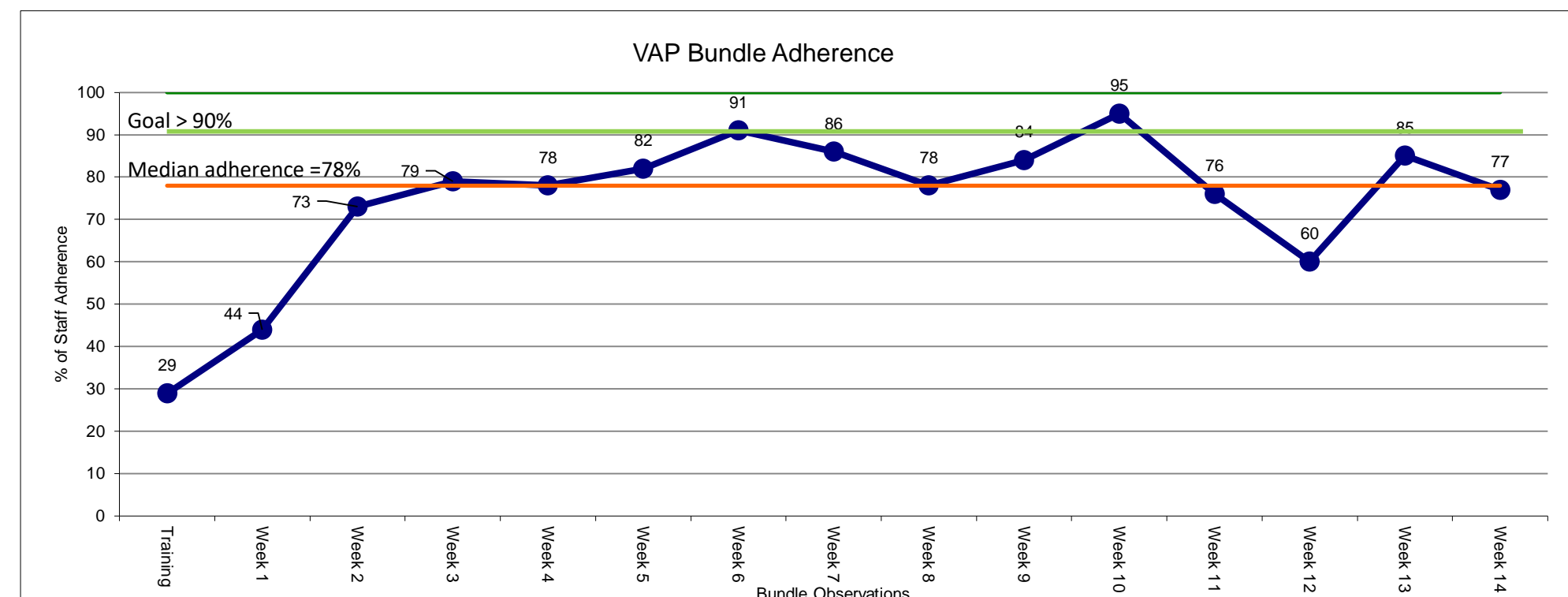
**HOB & POSITIONING:**

9) Measured HOB >30 degrees (or 15 degrees <1 year old, or reverse Trendelenburg)? Y N  
Comment: \_\_\_\_\_

**HAND HYGIENE:**

10) Sanitizer placed near the bed for easy use? (within arm reach of bed) Y N  
Comment: \_\_\_\_\_

## RESULTS



Circled items monitored with checklist by champions

	2018	2019	
VAP ICD-10 (N)	11	0	
VD (N)	1830	1496	
VAP Rate	6	0	
	Pre ZapVAP (Sept-Dec) 2018	Post ZapVAP (Sept-Dec) 2019	Result
Ventilated Patients (N)	66	90	+36%
Total TC (N)	69	58	-16%
Positive TC (N)	27	19	-30%
	2018	2019	Result
Positive TC >48 hours (N)	14	3	-79%
VD (N)	681	345	-50%
TC Rate	21.2%	3%	-18.2%

## DISCUSSION AND CONCLUSIONS

Following *VAP bundle* implementation:

- Median staff adherence to the entire bundle was 78%, while itemized adherence ranged from 94-99.7%.
- VAP rate decreased from 6:1000 VD to **0:1000 VD**.
- Tracheal culture rate **decreased 18.2%**.
  - Positive tracheal cultures **decreased 30%**.
  - Total tracheal cultures decreased 16%.

**An interdisciplinary, evidence-based VAP bundle can improve care and was effective in reducing VAP rates.**

- A **ZERO VAP rate** is attainable and best achieved through staff education, bedside observation, and evidence-based care that prevents VAP. This means less work/cost to obtain, process and treat VAP, which reduces bacterial exposure and required antibiotics.
- Outcome findings are consistent with prior literature that supported VAP bundles as a means to improve care and patient outcomes.
- Limitations include inability to control for alternative explanations or outcomes.
- Given the low patient risk and cost/benefit analysis, a VAP bundle is recommended as a feasible, high-value practice change.

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