USING AN EVIDENCE-BASED VENTILATOR-ASSOCIATED PNEUMONIA PREVENTION BUNDLE WITH A COMPLIANCE CHECKLIST TO REDUCE VAP RATES

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INTRODUCTION

Background

- VAP is one of the most serious nosocomial infections and accounts for approximately 25% of infections that occur in the intensive care unit (ICU) (Sedwick et al., 2012).
- VAP can increase the length of stay (LOS) in the ICU by 4 to 19 days (Sedwick et al., 2012).
- VAP is the leading cause of death among hospital-acquired infections and has an attributable mortality rate that ranges from 15% to 47% and a crude death rate of 5% to 65% (Croce et al., 2013; Muscedere et al., 2008).
- The cost of care for a patient with VAP is approximately $40,000 to $75,000 higher per occurrence (Sedwick et al., 2012).
- Review of literature found VAP prevention bundles are not as effective if compliance rates are not high.

PICOT Question

In mechanically ventilated adult surgical and trauma patients in the ICU (P), how does implementation of an evidence-based VAP prevention bundle with a daily checklist to ensure compliance (I) compared to the same VAP prevention bundle without a daily checklist (C), affect the incidence of VAP (O) over a 3-month period (T)?

VENTILATOR BUNDLE CHECKLIST
(Individual Patient)

Patient:_____

Admit Date:_____

ICU Day	1	2	3	4	5	6	7	8	9	10
1. Head of the Bed 30°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Daily sedative interruption and daily assessment of readiness to extubate	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. PUD Prophylaxis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. DVT Prophylaxis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Daily Oral Care with Chlorhexidine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Objectives

1. VAP rates for adult acute care surgery/trauma patients will decrease by 10% three months after the implementation of the VAP bundle daily checklist.

2. ICU length of stay (LOS) for adult acute care surgery/trauma patients will decrease by an average of three days three months after the implementation of the VAP bundle daily checklist.

MATERIALS AND METHODS

Design
Descriptive, longitudinal, QI project to evaluate the effectiveness of a VAP prevention bundle compliance checklist

Setting
14-bed adult trauma/surgical ICU within a Level I trauma center in Columbia, MO

Intervention
A daily compliance checklist consisting of IHI VAP bundle elements completed by the nursing staff and respiratory therapists each shift

Tools/Measure

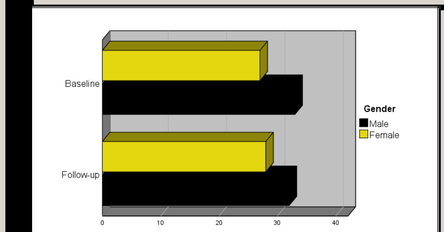
Using simple random sampling, 60 charts were chosen from the list of available charts for the baseline and follow-up chart review. Descriptive statistics were utilized to provide an overview of the project sample. Nominal level data was analyzed with the Chi-square of Independence and the *phi* coefficient (ϕ) was used as an index to describe the magnitude of the effect from the intervention with values .10, .30, and .50 corresponding to small, medium, and large respectively. Ratio level data was analyzed with the Independent t-test and the Cohen's *d* coefficient was used as an index to describe the magnitude of the effect from the intervention with values .20, .50 .80 corresponding with small, medium, and large respectively. IBM SPSS Statistics version 24 (Chicago, IL) was used for statistical analysis. The level of significance was set at $p \leq .05$.

RESULTS

Demographics

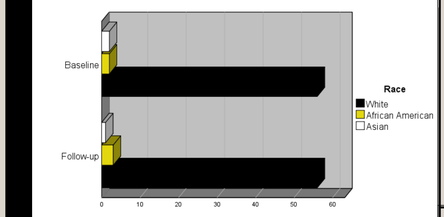
Age

- The mean age for the baseline group was 51years (*SD* = 21.21), and 54 years (*SD* = 22.85) for the follow-up group.
- There was no statistically significant difference in age between the baseline and follow-up groups, t(118) = -.625, *p* = .53, 95% CI [-10.49, 5.45].



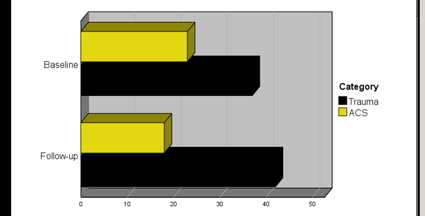
Gender

- The gender of the baseline group was predominately male (55%, *n* = 33), and 45% female (*n* = 45).
- Gender in the follow-up group included 53% male (*n* = 32) and 47% female (*n* = 28).
- There was no statistical significant difference between gender in the baseline and follow-up groups, χ^2 (1) = 0.034, *p* = .86.



Race

- The overall sample race was predominantly White (93%, n = 112), with the remaining participants being Black (4.2%, n = 5), and Asian (2.5%, n = 3).
- There was no statistically significant difference in race between the baseline and follow-up groups, χ2 (2) = .533, p = .77.



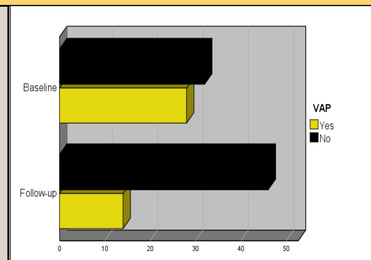
Type of Admission

- The type of admission for patients (ACS or trauma) in the baseline group was predominately trauma (62%, n = 37), and 38% ACS (n = 23).
- Type of admission in the follow-up group included 70% trauma admissions (n = 42) and 30% ACS admissions (n = 18).
- There was no statistical significant difference between type of admissions in the baseline and follow-up groups, χ2 (1) = 0.926, p = .34.

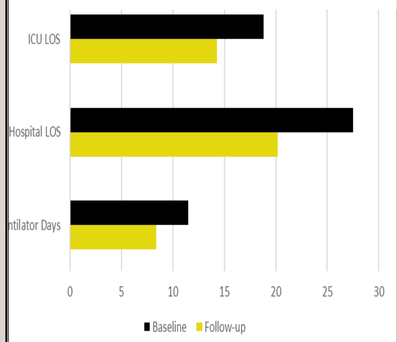
RESULTS

VAP Rates

- There was a decrease from 47% at baseline to 23.3% in the follow-up group, which was statistically and clinically significant, χ2 (1) = 7.179, p = .01, Φ = .2.
- There was a 43% reduction in VAP in the follow-up group when compared to the baseline group, OR = .57, 95% CI [.36, .90].



- Decrease in ICU LOS from 18.8 (SD = 14.4) to 14.3 (SD = 8.9); statistically and clinically significant, t(98) = 2.1, p = .04, 95% CI [.21, 8.89], d = .4.
- Decrease in the hospital LOS from 27.5 (SD = 19.9) to 20.2 (SD = 10.5); statistically and clinically significant, t(89) = 2.5, p = .01, 95% CI [1.48, 13.05], d = .5.
- Decrease in ventilator days from 11.5 (SD = 8.1) to 8.4 (SD = 4.0); statistically and clinically significant, t(87) = 2.7, p = .01, 95% CI [.83, 5.47], d = .5.



CONCLUSIONS

- **Objective 1:** VAP rates for adult acute care surgery/trauma patients will decrease by 10% three months after the implementation of the VAP bundle daily checklist. **MET.** There was a 43% reduction in VAP in the follow-up group when compared to the baseline group.

- **Objective 2:** ICU LOS for adult acute care surgery/trauma patients will decrease by an average of three days three months after the implementation of the VAP bundle daily checklist. **MET**. Average ICU LOS decreased from 18.8 to 14.3 (average 4.5 days).

Approximate cost savings:

- *ICU LOS*: $1.7 million
- *Hospital LOS*: $379,176 in addition to the cost savings of the shortened ICU LOS
- *Ventilator days*: $402,318

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