ZapVAP Decreases Ventilator-Associated Pneumonia (VAP) with Multidisciplinary Implementation of a VAP 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 that increases length of stay. Evidence supports bundles as means to reduce VAP • Oral care, 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 improves bedside care and decreases the VAP rate.

Short term goal • Exceed 80% adherence with ZapVAP • Reduce the sputum rate by 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, implements ZapVAP 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 receive presentation of ZapVAP • Preparation: Education and Resource Mobilization • Education Competency • Post-Test Completion: RNs: 93%, RTs: 80%, & NAS: 100% • 100% of bundle supplies obtained • Pre-Implementation: roll-out of one bundle component/week • Bedside audits identified by RN/RT champions • Ineffective oral care – algorithm developed to improve effectiveness of oral care with tooth brushing • Full Implementation: all bundle components implemented • Bedside, observational audits of bundle adherence tracked daily by project champions • Real-time feedback at bedside • RN/RT monthly lottery with prizes for ZapVAP adherence • Bi-weekly stakeholder communication of outcomes

MEASURES

ZapVAP Adherence: • Audit Tool measured adherence (one tool per bed; scored yes/no) • Adherence achieved when all ZapVAP components were met

VAP Rate: • VAP = ICD-10 VAP diagnosis tracked in 2018/2019 and used to calculate a VAP rate. • VAP Rate per 1000 VD = (VAP/VD) x 1000

Sputum Rate: • Sputum cultures (SC) tracked during pre/post intervention period and scored positive/negative • Sputum Rate per 1000 VD = [(Positive sputum cultures that occurred >48 hours after intubation)/VD] x 1000

RESULTS

ZapVAP Adherence:

<table>
<thead>
<tr>
<th>MONTH</th>
<th>VAP ICD-10 (N)</th>
<th>VD (N)</th>
<th>VAP Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
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<td></td>
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<td>2019</td>
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<td>Post</td>
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<td>2018</td>
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<tr>
<td>2019</td>
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</tbody>
</table>

ZapVAP Implementation Over 15 Weeks

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>2018</th>
<th>2019</th>
<th>Pct. Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Care</td>
<td>66</td>
<td>90</td>
<td>+36%</td>
</tr>
<tr>
<td>NPS</td>
<td>69</td>
<td>58</td>
<td>-16%</td>
</tr>
<tr>
<td>Positive</td>
<td>27</td>
<td>19</td>
<td>-30%</td>
</tr>
<tr>
<td>SC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;48 hours</td>
<td>14</td>
<td>3</td>
<td>-79%</td>
</tr>
<tr>
<td>VD</td>
<td>681</td>
<td>345</td>
<td>-50%</td>
</tr>
<tr>
<td>Sputum Rate</td>
<td>20.6</td>
<td>8.7</td>
<td>-58%</td>
</tr>
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REFERENCES


ACKNOWLEDGEMENTS

Thank you: Adrian Holloway, MD, Mary Jo Simne, MS, BSN, RN, Greg Ludvik MS, RRT-NPS, Helen Felps, MSN, RN, Jennifer Arrington, MS, RN, CPN, CNE, Mary Ellen Connolly, DNP, CRNP

Champions: Sarah Brangan, MSN, RN, Robby Guanzon, RRT, Sara Harppee, BSN, RN, Melanie Hershberger, MSN, RN, CCRN, Kelly Ho, BSN, RN, Kristen Lewis, BSN, RN, CCN, Katie Martin BS, RRT-NPS, Brittany O’Branski, BS, RRT-NPS, Megan Tuma BSN, RN, Carl Wikerson, AS, CRT, & Karen Wockenfuss, RRT-ACCS
Long title: ZapVAP Decreases Ventilator-Associated Pneumonia with an Interdisciplinary Bundle
Short title: ZapVAP Implementation

Background: Ventilator-associated pneumonia (VAP) is a preventable, hospital-acquired infection that increases morbidity and mortality with increased ventilator dependence and length of stay. VAP bundles incorporate evidence-based, clinical interventions that are low-cost and improve outcomes. The National Health and Safety Network set the VAP benchmark at 1.8 per 1000 ventilator days.

Aim: The purpose of this quality-improvement project is to implement a VAP bundle in a 19-bed Pediatric Intensive Care Unit (PICU) at a large tertiary hospital in the Mid-Atlantic region. The bundle, referred to as ZapVAP, standardizes best-practices for bedside care to eliminate VAP. ZapVAP includes (a) developmentally-appropriate oral care, (b) clean suction techniques, (c) equipment management, (d) positioning with head of bed elevation, and (e) hand hygiene. This nurse and respiratory therapist (RT) driven innovation aims to reduce the current VAP rate of 6:1000 ventilator days. ZapVAP received IRB approval and completed implementation December, 2019.

Innovation: During the planning phase, stakeholder buy-in was cultivated, and environmental structures, resources, and conditions were established to support the project. A customized 5-item, VAP bundle was developed after review of the evidence and tailored to the specific needs of the PICU. A developmentally-appropriate oral care algorithm improved effectiveness of oral care and performance initiatives were established for all five bundle objectives. Following approval from Nursing, RT, and Medicine team-members, ZapVAP education and training was provided by the project lead, along with nurse and RT champions to a total of 133 staff members (90 nurses, 35 RTs, and 8 nurse assistants) to achieve baseline competency of ZapVAP processes. Bundle supplies were produced and care-reminder-signs were placed at the head of each bed. Practice-change was monitored through random, bedside audits performed daily by champions, with real-time teaching in response to performance gaps. ZapVAP awareness among nurses and RTs is sustained through on-going audits, bulletin board updates, huddle scripts, and e-mails to multidisciplinary teams. ZapVAP teaching tools will be incorporated in PICU orientation for improved sustainability beyond implementation.

Outcomes: If any one of the bundle components was missed, then that bed was scored as non-adherent with ZapVAP. Final implementation data demonstrated performance improvement as high as 97% with all ZapVAP components being met. The following adherence increases were achieved: oral care 95%, clean suction techniques 95%, equipment maintenance 98.7%, head of bed elevation 98.6%, and hand hygiene 100%. High levels of ZapVAP adherence, resulted in a zero VAP rate in 2019. Tracking of sputum cultures before and after ZapVAP, supported this finding and further revealed a 30% decrease in positive sputum cultures with a 58% decrease in sputum rate.

Discussion: Regular performance of ZapVAP initiatives improved outcomes and reduced VAP in the PICU. Effective oral care and standardized equipment rotation were key, so Nurses and RTs are paramount to VAP prevention. Findings were consistent with prior evidence that supported VAP bundles. Limitations include inability to control for multiple variables. Given the low-risk and cost/benefit of ZapVAP, it is a feasible and highly-valued practice change.

Are you committed to ZapVAP?
References


