One Evidence Based Protocol Doesn’t Fit All: Brushing Away Ventilator Associated Pneumonia in Trauma Patients

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Objectives

» Understand how evidence based (EBP) oral hygiene program can reduce ventilator associated pneumonia (VAP) in mechanically ventilated (MV) trauma patients by recognizing risk & prognostic factors.

» Understand importance of measuring nurses’ attitudes, beliefs, training, education, & frequency of oral hygiene in trauma Intensive Care Unit (ICU) to promote change.
Significance

- National Healthcare Safety Network (NHSN) reported trauma ICU 2\textsuperscript{nd} to burn ICU in VAP.\textsuperscript{1}
- Represent 83\% nosocomial pneumonias.\textsuperscript{2}
- Systemic inflammatory response at onset of VAP in trauma pt. correlated with non-response to antimicrobial treatment \& mortality.\textsuperscript{3}
Significance

» Higher head & neck injury score > 4, cervical fracture with neurological deficits, or Glasgow Coma Scale < 6, predicted VAP with 97% specificity & positive predictive value 90%.³

» Independent risk factors: Spinal cord, thoracic, abdominal, severe head trauma, witnessed aspiration, emergent intubation, tube feeds, hypotension & blunt trauma.³

» Colonization of oropharynx: Risk factor. ⁴⁻¹⁶
Attitude, Beliefs, Frequency Oral Care

» Nurses’ Attitudes
  – Difficult & unpleasant. 8,10,20,19,21

» 59 European ICU’s. 22
  – Important, high priority (88%).
  – Difficult to perform (68%).
  – Did not result in better oral health in prolonged MV (37%).
Attitudes, Beliefs, Frequency Oral Care

» 102 ICU’s/556 nurses U.S. ²⁰
  – High priority for MV pt.’s (91%).
  – Cleaning oral cavity difficult (63%) & unpleasant (43%).
  -> 60% found mouths of MV pt.’s became worse longer they were MV.
Attitudes, Beliefs, Frequency Oral Care

» Nursing Survey: Ireland.\(^\text{23}\)
  
  – Patient comfort & prevent infection.
  
  – Not performed as frequently as should.

  – Barriers: Lack of equipment, time constraints, education, & nursing priority.
Attitudes, Beliefs, Frequency Oral Care

» National Survey ICU Nurses. 24
  – 218: High priority, but did not implement.
  – Tooth brushing: 44%.

» Survey American Association Critical Care Nurses. 25
  – 47% > 7 yrs. critical care performed more frequently. Discrepancies between actual care & policy.
Purpose

» Evaluate EBP oral hygiene intervention to reduce VAP in trauma patients who are MV by recognizing risk and prognostic factors.

» Measure relationships among nurses’ attitudes, beliefs, training, education and frequency of delivery of oral hygiene.
Research Question

» Will EBP oral hygiene intervention reduce VAP rates in trauma pts.

» Will nurses’ attitudes, beliefs, training, education and frequency of oral hygiene influence EBP oral hygiene intervention.
Design and Setting

» Descriptive Pre/Post design with oral hygiene data reanalyzed to examine effects in medical-surgical (M/S) and trauma subgroups who are MV in two ICU’s in a Level One Trauma Community Hospital.
Instruments and Measures

CDC Guidelines:
- MV > 48 hrs.
- Exhibit 3/5:
  - Fever
  - Leukocytosis
  - Sputum (color &/or amt.)
  - X-ray: New/progressive infiltrates
  - ↑ oxygen needs.
Instruments and Measures

» **Staff:** 27-item survey to assess current oral care practice, training, & attitudes among nurses.¹⁹
Data Collection

» VAP rates per 1000 vent days.
» Infection control practitioners collect data.
» Surveys pre & post EBP protocol.
» Disclaimer letter with staff survey.
» Staff survey anonymous.
» Participation voluntary.
» Pts. not consented, low risk, standard practice.
Intervention

» EBP Oral Care Protocol:

- Brush teeth, gums, surface of tongue & palate q 12 hrs with pediatric soft bristled toothbrush.
- Swab with mouth moisturizer to lips & oral membranes q 4 hrs.
- Education: Organism colonization of oropharynx, microhabitat & translocation to lungs. 30-34
Treatment Fidelity: Oral Care Protocol

– Staff education & training.
– Monthly agenda item staff & shared leadership meeting.
– Observation pre & post intervention.

• Ventilator Bundle: Head of Bed, Sedation Vacation, Deep Vein Thrombosis Prophylaxis, Peptic Ulcer Disease Prophylaxis.
Data Analysis

» Nurses' attitudes & beliefs: SPSS 17.0.
» Descriptive statistics: Nurse demographics.
» Continuous variables: Means & standard deviations.
» Categorical variables:
  – Percentages
  – Analyzed with Fisher exact test
Data Analysis

»Comparison between groups.
  – Two sample t-tests with data normally distributed.
  – Mann Whitney U test with data not normally distributed.

»Poisson regression with log link:

»Level of significance: $P < 0.05$. 
Results

» 144 surveys: 77 pre & 67 post intervention.
» (52%) 57 Trauma: 41 (72%) pre & 35 (61%) post.
» (48%) 50 M/S: 36 (72%) pre & 32 (64%) post.
» 2% MSN, 31% BSN, 62% ADN, & 5% Diploma
» Mean yr.’s critical care: 10.72(± 8.754): (46%) days & (49%) nights.
» (43%) 26/60 Trauma & (33%) 17/51 M/S: CCRN.
» (50%) 30/60 Trauma: TNCC.
<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>N</th>
<th>Mean ± Standard Deviation</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate time to provide oral care at least daily.</td>
<td>Pre</td>
<td>77</td>
<td>4.82 ± 0.53</td>
<td>0.419706</td>
<td>142</td>
<td>0.675</td>
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<tr>
<td></td>
<td>Post</td>
<td>67</td>
<td>4.78 ± 0.67</td>
<td>0.413063</td>
<td>125.3696</td>
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<tr>
<td>Adequate training in providing oral care.</td>
<td>Pre</td>
<td>77</td>
<td>4.3 ± 1.19</td>
<td>-2.55723</td>
<td>142</td>
<td>0.012</td>
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<tr>
<td></td>
<td>Post</td>
<td>67</td>
<td>4.72 ± 0.65</td>
<td>-2.6567</td>
<td>120.2344</td>
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<tr>
<td>Supplies available to provide oral care.</td>
<td>Pre</td>
<td>77</td>
<td>3.9 ± 1.44</td>
<td>-3.33794</td>
<td>142</td>
<td>0.001</td>
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<tr>
<td></td>
<td>Post</td>
<td>67</td>
<td>4.57 ± 0.86</td>
<td>-3.45095</td>
<td>126.427</td>
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<tr>
<td>Toothbrushes provided by hospital are suitable.</td>
<td>Pre</td>
<td>76</td>
<td>3.47 ± 1.33</td>
<td>-2.09409</td>
<td>141</td>
<td>0.038</td>
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<tr>
<td></td>
<td>Post</td>
<td>67</td>
<td>3.91 ± 1.14</td>
<td>-2.11487</td>
<td>140.8736</td>
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</tbody>
</table>

Mean Difference Nurses’ Attitudes Pre/Post Intervention. Change in nurses’ beliefs pre-admission colonization (p=0.027), adequate training (p=0.012), suitable equipment (p=0.038), available supplies (p=0.001).
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<th>df</th>
<th>Sig. (2-tailed)</th>
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<tbody>
<tr>
<td>Oral care very high priority for MV pt.’s</td>
<td>Pre 77</td>
<td>4.74 ± 0.55</td>
<td>0.769855</td>
<td>142</td>
<td>0.443</td>
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<td></td>
<td>Post 67</td>
<td>4.66 ± 0.75</td>
<td>0.753656</td>
<td>119.2109</td>
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<td>Cleaning oral cavity unpleasant.</td>
<td>Pre 77</td>
<td>2.94 ± 1.265</td>
<td>-1.46444</td>
<td>142</td>
<td>0.145</td>
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<td>Post 67</td>
<td>3.24 ± 1.22</td>
<td>-1.46778</td>
<td>140.3744</td>
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<tr>
<td>Oral cavity difficult area to clean.</td>
<td>Pre 77</td>
<td>3.56 ± 1.09</td>
<td>0.689811</td>
<td>141</td>
<td>0.491</td>
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<tr>
<td></td>
<td>Post 66</td>
<td>3.44 ± 0.95</td>
<td>0.697536</td>
<td>140.9845</td>
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<tr>
<td>No matter what I do, mouths of MV pt.’s get worse longer MV.</td>
<td>Pre 75</td>
<td>3.48 ± 1.16</td>
<td>1.609435</td>
<td>140</td>
<td>0.110</td>
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<td>Post 67</td>
<td>3.14 ± 1.29</td>
<td>1.599138</td>
<td>133.2029</td>
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</table>
Trauma rates: ↑ 6.4% to 10.0% (P = 0.346)
M/S rates: ↓ 3.3% to 1.0% (p = 0.042).
Trauma rates: No change pre/post implementation.
M/S rates: significant change (p=0.038).
Trauma: Toothbrush use 12 hr’s or less = 71%.
Significant changes in frequency of oral care post intervention.
1= never, 2= daily, 3= q 12 hrs, 4= q 8 hrs, 5= q 4 hrs, 6= q 1-3 hrs.
Trauma: Swab with moisture agents 4 hr’s or less = 88.6%.
1= never, 2= daily, 3= q 12 hrs, 4= q 8 hrs, 5= q 4 hrs, 6= q 1-3 hrs.
Recommendations

» Recent literature supports Chlorhexidine 0.12% oral swab q 12 hrs in trauma pt.’s. \(^\text{18}\)

» Mechanical intervention: Brush teeth, gums, surface of tongue, & palate with pediatric soft bristled toothbrush q 12 hrs.

» Pharmacologic intervention: Apply 0.12% Chlorhexidine with swab to oral cavity q 12 hrs, wait 30 minutes after application before brushing teeth or applying mouth moisturizer.
Conclusions

» Trauma pt.’s present with unique characteristics that compromise oral care.

» Understanding risk, prognostic factors, mechanisms of transmission & systemic inflammatory response is important.

» Consider nurses’ attitudes and beliefs for optimal change implementation.
References


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