

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 2nd to burn ICU in VAP.¹
- Represent 83% nosocomial pneumonias.²
- Systemic inflammatory response at onset of VAP in trauma pt. correlated with non-response to antimicrobial treatment & mortality.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.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.¹⁷

Instruments and Measures

» CDC Guidelines:

– MV > 48 hrs.

– Exhibit 3/5:

- Fever
- Leukocytosis
- Sputum (color &/or amt.)
- X-ray: New/progressive infiltrates
- ↑ oxygen needs.²⁸

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.²⁹

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:

- Measure differences in VAP rates historically & post intervention using SAS 9.2.

» 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(\pm 8.754): (46%) days & (49%) nights.
- » (43%) 26/60 Trauma & (33%) 17/51 M/S: CCRN.
- » (50%) 30/60 Trauma: TNCC.

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).

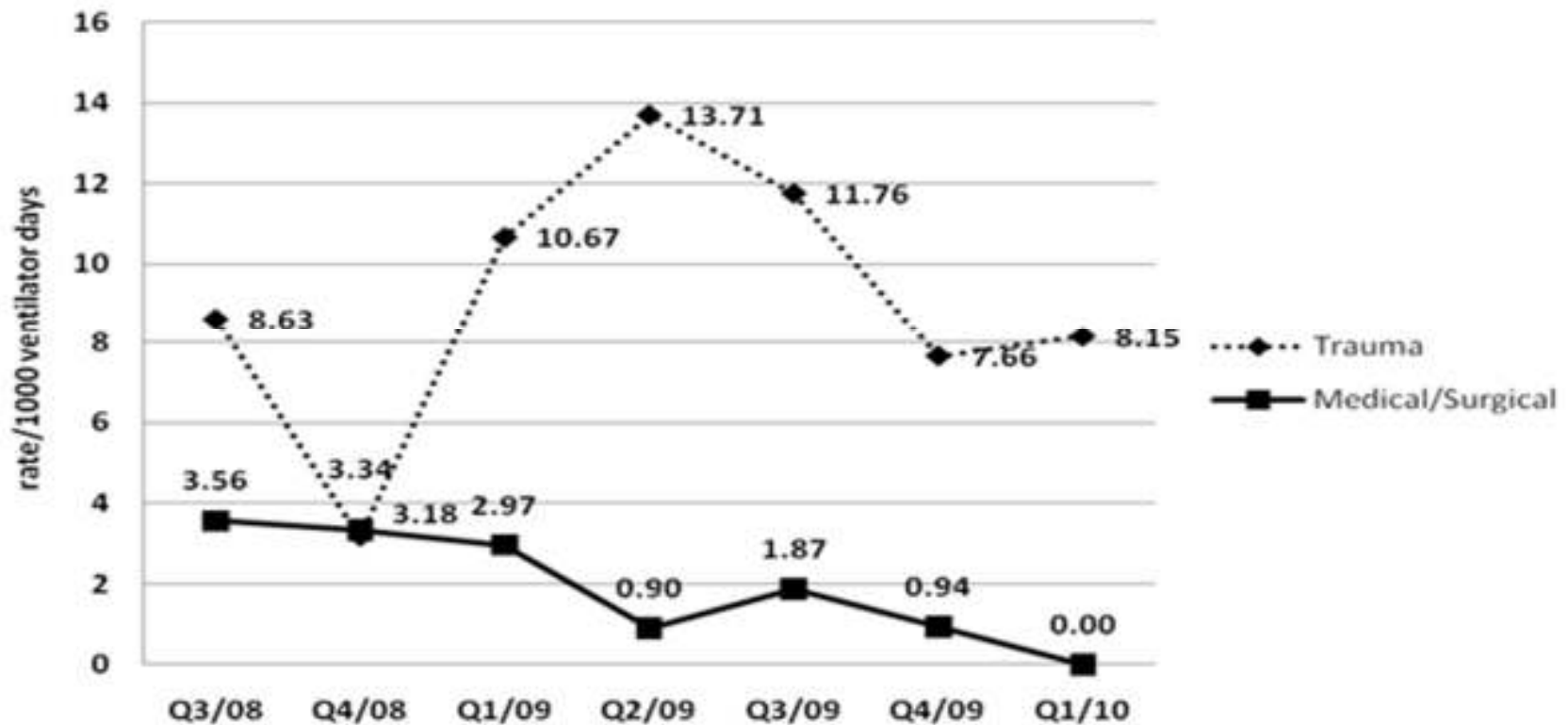
| | Time | N | Mean ± Standard Deviation | t | df | Sig. (2-tailed) |
|----------------------------------------------------|------|----|---------------------------|----------|----------|-----------------|
| Adequate time to provide oral care at least daily. | Pre | 77 | 4.82 ± 0.53 | 0.419706 | 142 | 0.675 |
| | Post | 67 | 4.78 ± 0.67 | 0.413063 | 125.3696 | |
| Adequate training in providing oral care. | Pre | 77 | 4.3 ± 1.19 | -2.55723 | 142 | 0.012 |
| | Post | 67 | 4.72 ± 0.65 | -2.6567 | 120.2344 | |
| Supplies available to provide oral care. | Pre | 77 | 3.9 ± 1.44 | -3.33794 | 142 | 0.001 |
| | Post | 67 | 4.57 ± 0.86 | -3.45095 | 126.427 | |
| Toothbrushes provided by hospital are suitable. | Pre | 76 | 3.47 ± 1.33 | -2.09409 | 141 | 0.038 |
| | Post | 67 | 3.91 ± 1.14 | -2.11487 | 140.8736 | |

Mean Difference Nurses' Attitudes Pre/Post EBP Intervention.

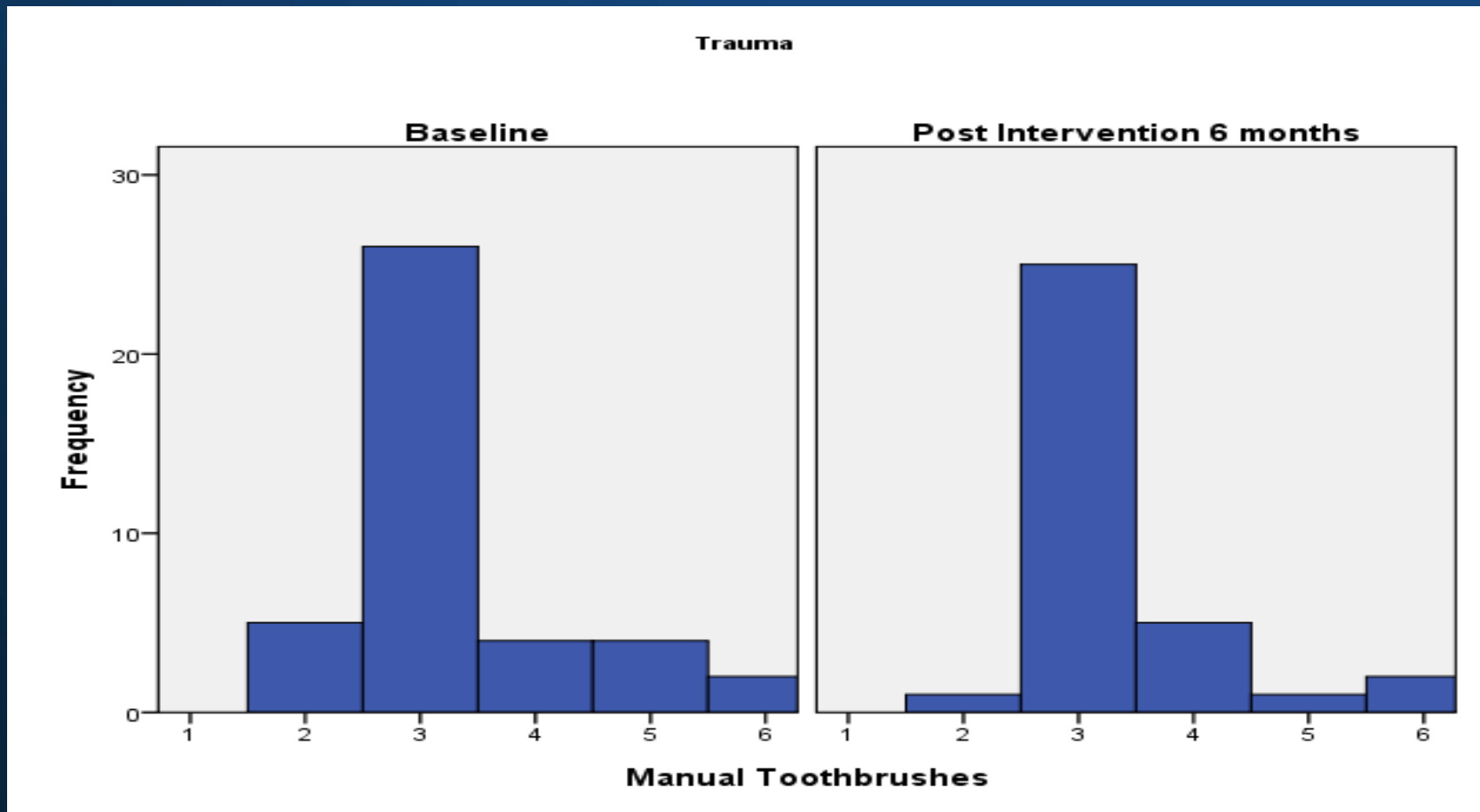
| | Time | N | Mean ± Standard Deviation | t | df | Sig. (2-tailed) |
|--------------------------------------------------------------|------|----|---------------------------|----------|----------|-----------------|
| Oral care very high priority for MV pt.'s | Pre | 77 | 4.74 ± 0.55 | 0.769855 | 142 | 0.443 |
| | Post | 67 | 4.66 ± 0.75 | 0.753656 | 119.2109 | |
| Cleaning oral cavity unpleasant. | Pre | 77 | 2.94 ± 1.265 | -1.46444 | 142 | 0.145 |
| | Post | 67 | 3.24 ± 1.22 | -1.46778 | 140.3744 | |
| Oral cavity difficult area to clean. | Pre | 77 | 3.56 ± 1.09 | 0.689811 | 141 | 0.491 |
| | Post | 66 | 3.44 ± 0.95 | 0.697536 | 140.9845 | |
| No matter what I do, mouths of MV pt.'s get worse longer MV. | Pre | 75 | 3.48 ± 1.16 | 1.609435 | 140 | 0.110 |
| | Post | 67 | 3.14 1.29 | 1.599138 | 133.2029 | |

Trauma rates: \uparrow 6.4% to 10.0% ($P = 0.346$)
M/S rates: \downarrow 3.3% to 1.0% ($p = 0.042$).
Trauma rates: No change pre/post implementation.
M/S rates: significant change ($p=0.038$).

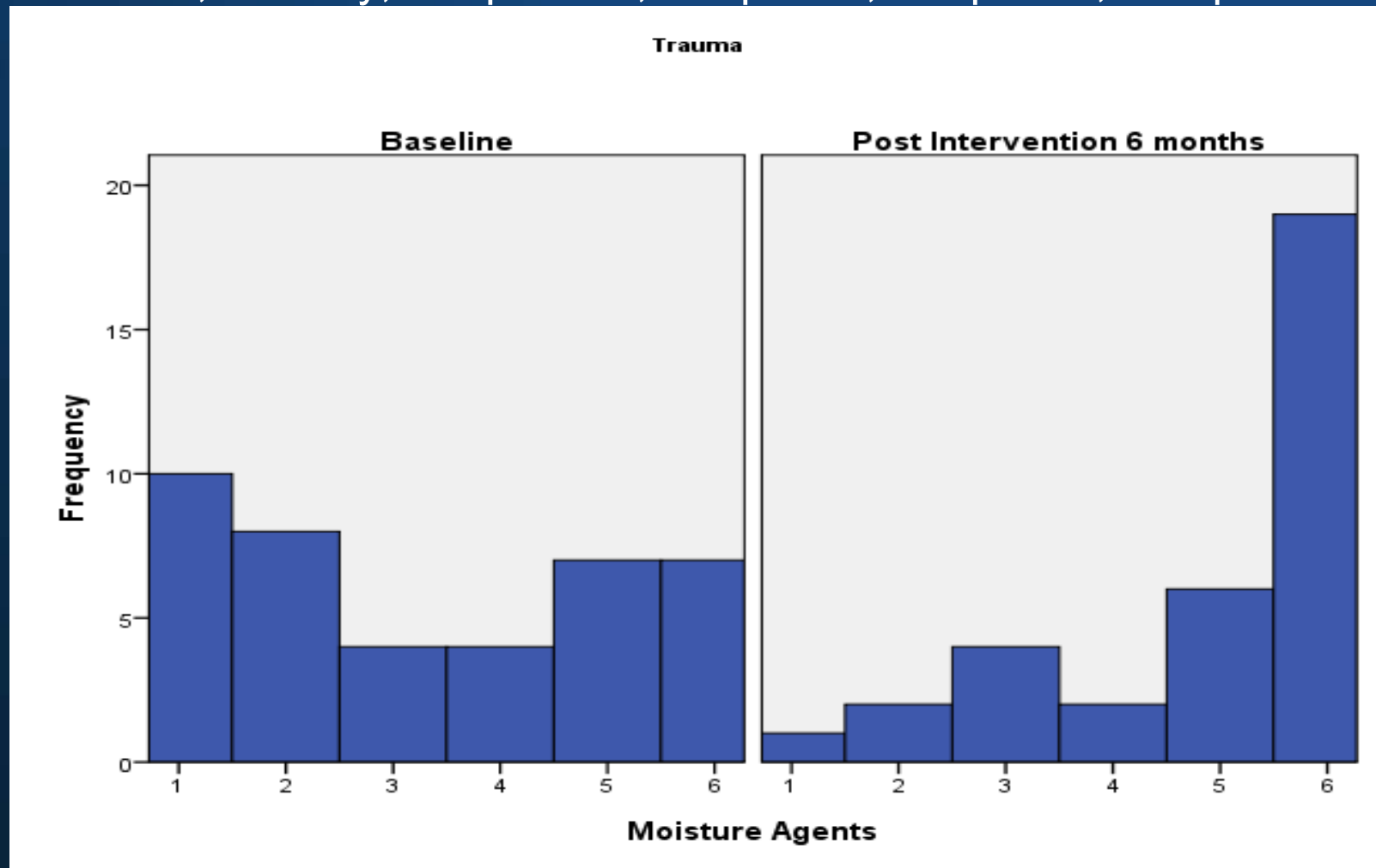
Ventilator Associated Pneumonia Rates



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. 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.

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