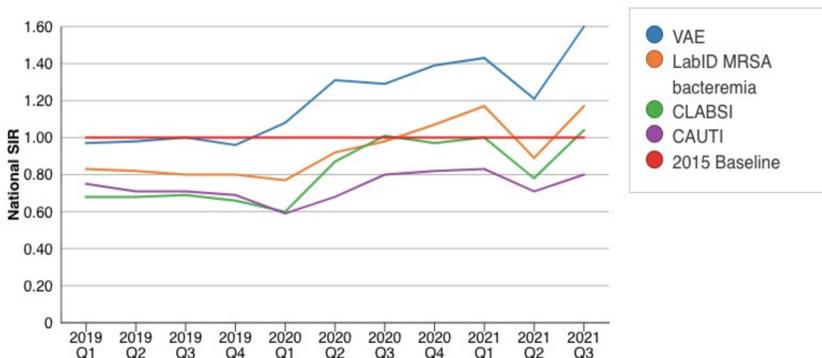


Background

- Ventilator associated pneumonia (VAP) occurs in mechanically ventilated patients when oral or nasal secretions aspirate into the lungs past the endotracheal cuff causing pneumonia (Honan, 2018)
- VAP is a hospital acquired pneumonia that develops 48 hours after the initiation of mechanical ventilation (Honan, 2018)
- VAP is one of the most frequent complications that arise from the use of mechanical ventilation in patients in intensive care units (ICU)
- Interventions are implemented to reduce the incidence of VAP in ICU such as elevation of the head of the bed (HOB) between 30-45 degrees

Significance

- VAP is a cause of mortality in critical care units, in a study that researched the increasing hospitalizations due to VAP from 2013-2019 found that mortality from VAP occurred in 20.08% of patients diagnosed (Patel et al, 2022)
- Median hospital length of stay is 20 days and the median cost of hospitalization due to VAP was \$83,311 (Patel et al, 2022)
- Ventilator associated events (VAE) related to hospital acquired illnesses increased by 44% in ICUs after the beginning of Covid pandemic (CDC, 2022)
- The increased incidence of ventilator associated infections due to increased patients mechanically ventilated from Covid shows that there is need for interventions
- The intervention of HOB elevation is an effective and affordable intervention that can be implemented easily in mechanically ventilated patients



Source: CDC, Covid- 19 Impact on HAIs

Literature Review

Author & Year	Elements of Study	Major Findings
Liu et al. (2020)	- Randomized controlled trial - Implementation of ventilator care bundles - HOB elevation at 30-45° - Daily chlorhexidine oral care - Hand hygiene - Daily sedation vacation - 4,716 ICU patients studied between years 2017-2019, divided into 2 groups	- Increased compliance and adherence → significant improvement in intervention group - Ventilator use ratio → reduced - VAP incidence → lowered significantly
Canan et al. (2020)	- Randomized controlled multi-arm trial - Efficacy of 30-45° vs <30° HOB - 60 patients located in the ICU	- HOB <30° → 55% VAP occurrence rate - HOB 30-45° → 26% VAP occurrence rate
Sen et al. (2016)	- Retrospective review - 314 mechanically-ventilated in the ICU - Implementation of VAP prevention bundle - HOB at 30° - Daily oral care - DVT prophylaxis - Daily sedation break	- 2008 → VAP rate = 15.4% - 2012 → VAP rate = 9.1% - In the years during implementation, patients had a lower risk of developing VAP compared to other analyzed years
Hassankhani et al. (2017)	- Single blind prospective randomized controlled clinical trial - 60° HOB elevation vs 45° HOB elevation	- 60° HOB → 20% VAP occurrence rate - higher lung compliance and tidal volumes - 45° HOB → 73% VAP occurrence rate
Ghezeljeh, et al. (2018)	- Controlled randomized clinical trial - 120 ventilated patients divided into 3 groups of 40 - 30° vs 45° vs control - Logistic regression model evaluated effects of varying variables on VAP incidence	- Control group → 52.5% acquired VAP - 30° HOB → 32.5% acquired VAP - 45° HOB → 20% acquired VAP - Reduced incidence of VAP with HOB
Burja et al. (2018)	- Quasi-experimental study - Single-center retrospective study - Implementation of VAP prevention bundle - 55 patients in no-VAP-B group - 74 patients in VAP-B group	- No-VAP-B group → 41.8% developed VAP - 30.9% developed late VAP - VAP-B group → 25.7% developed VAP - 3.5% developed late VAP
Eom et al. (2014)	- Quasi-experimental study - Multi-center design at 6 hospitals - VAP bundles implemented for several months	- Before implementation, 57 patients with VAP - After implementation, 7 patients with VAP

- Key words: Ventilator-associated Pneumonia, Head of Bed Elevation, Mechanically-Ventilated Patients, Intensive Care Unit, Incidence, 45-degree HOB, 30-degree HOB
- Databases: CINAHL, PubMed
- Inclusion criteria: Mechanically-ventilated patients with an endotracheal tube, located in the intensive care unit

Synthesis of Findings

- Increase in head of bed elevation of 30° or higher has proven to be effective in reducing VAP by more than 20% consistently in several studies
- Decreased head of bed elevation leads to increased risk of contracting VAP due to aspiration and increased likelihood of bacteria within tracheal and oral secretions to fall back into the lungs.
 - This is also why ventilator associated pneumonia bundles like frequent oral care are also effective at reducing VAP incidence.
- Elevation of the head of bed allows for increased lung compliance which has been found to be associated with decreased chance of contracting VAP.
- Burja et al., Liu et al., Eom et al., and Sen et al., all studied the effect of VAP bundles which included HOB elevation along with 6-7 other interventions, thus changes in the VAP rates could be a result of a combination of interventions and not solely HOB elevation

Results

- A relationship exists between HOB elevation and reduced incidences of VAP
- The higher the elevation (>30°) → higher reduction in VAP incidences
- Implementation of a VAP bundle reduced rates of VAP in mechanically-ventilated patients
- Bassi et al. 2017 → contradicts majority of findings
 - Study produced inconclusive results
 - VAP rates for Trendelenburg → 0.5%
 - VAP rates for semi recumbent → 4%

Implications for Nursing Practice

- Elevation of the head of the bed should be mandatorily implemented for all mechanically ventilated patients unless contraindicated
 - Nursing documentation should include this aspect of care, expressing the patient's current HOB elevation in degrees, to ensure steps to preventing VAP are being met
- VAP prevention bundles should be a source of education on units throughout hospitals
 - Education regarding the benefits of performing oral care at frequent intervals, raising the HOB, and how this reverses the natural occurrence of VAP will help healthcare workers to be compliant in performing VAP preventative interventions

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