Sustained Reduction in Ventilator-Associated Pneumonia (VAP) Using a Two-Hospital, Multidisciplinary Approach that Includes Oral Care and Regular Staff Education

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Abstract

Background

VAP, defined as an airway infection that develops more than 48 hours after intubation, occurs in about 9% of mechanically ventilated patients admitted to the ICU. The rate of VAP increases as the duration of ventilation; and the rate of VAP increases to 20% in patients ventilated for longer than 72 hours.1

Infection with multiresistant bacteria occurs in up to 57% of patients with VAP.2

In a study of VAP by Schorr et al,231% of VAP cases were caused by Staphylococcus aureus, of which 38% were due to methicillin-resistant S. aureus (MRSA) strains. Other common causative organisms of VAP are Pseudomonas aeruginosa, Klebsiella pneumoniae, and Acinetobacter calcoaceticus.3

VAP increases the risk of mortality, length of mechanical ventilation and ICU stay, and medical costs.4

The risk of death can be twice as high in patients who develop VAP during mechanical ventilation than in those who do not develop pneumonia5 and even higher if caused by multiresistant organisms.1

Development of VAP can lead to up to 5 times longer duration of ventilation and up to 8 times longer hospital stay.6

Additional medical care costs can be more than $40000 per patient case.7 The presence of drug-resistant strains increases costs further.2

Ventilator-associated pneumonia (VAP) develops in about 9% of mechanically ventilated patients admitted to the ICU. The rate of VAP increases as the duration of ventilation, and the rate of VAP increases to 20% in patients ventilated for longer than 72 hours.1

Primary endpoint of the study was VAP defined as per the National Nosocomial Infections Surveillance System (NNIS) criteria.8 Implementation of the IHI ventilator bundle and oral care protocol included use of the following products and procedures:

- Oral care kit (IHI Care Oral Cleansing and Suctioning System, Sage Products, Inc, Cary, Ill)

- Protocol checklist used to verify completion of each component of the protocol

- Initial and regular scheduled education classes for the ICU nurses and respiratory care staff with the goal of reducing VAP rates

- Deep oropharyngeal suctioning and oral rinsing every 4 hours

- Tracheal suctioning performed every 4 hours

- Use of suction toothbrush to remove plaque and oral secretions

- Use of 1.5% hydrogen peroxide solution to mechanically clean the teeth and oral tissues

- Use of 0.05% cetylpyridinium chloride antiplaque solution

- Use of 0.1% chlorhexidine gluconate solution

- Application of a water-based oral moisturizer for the oral tissues and lips

- Different oral care kits and laminated protocols were provided to the wall of each ICU room for easy staff access.

Objective

In 2004, our hospitals instituted a multidisciplinary task force to implement a risk reduction strategy with the goal of reducing ventilator-associated pneumonia (VAP) rates. Both of our hospitals are community hospitals that admit between 9300 and 10400 patients each year. Both hospitals offer a full range of medical services, skilled nursing units, intensive care units (ICUs), birthing and women’s care services, inpatient and outpatient surgery, cancer treatment, bariatric approaches to obesity treatment, and diabetes management.

Methods

Conclusion

Results

We were able to reduce VAP rates to zero using a comprehensive program that included the use of a ventilator bundle, oral care program, and ongoing staff education. Although reductions in actual mortality or medical costs could not be determined from our data, it is possible that savings of up to $840000 ($40000 per VAP case) were realized over the 3 years that VAP rates were zero.

Lessons learned:

- Use of a comprehensive program that includes a ventilator bundle and thorough oral care can reduce VAP rates to zero.

- Ongoing staff education is an important factor in the success of this program because it ensures that a focus on VAP prevention is engrained into daily clinical practice.

- Inclusion of both ICU nurses and respiratory care teams in the protocol ensures that patients receive all evidence-based recommended interventions routinely, and that a productive collaboration between the 2 disciplines develops.

- Use of a daily ventilator checklist ensures completion of the tasks.

References


5 Sage Products, Inc, Cary, Ill.

6 Sage Products, Inc, Cary, Ill.

7 Sage Products, Inc, Cary, Ill.

8 Sage Products, Inc, Cary, Ill.