Objective of the intervention

The goal of the project was to reduce rates of ventilator-acquired pneumonia (VAP) by 50% in combined adult intensive care units (ICUs) within 6 months of project initiation.

Background

VAP is a nosocomial infection that occurs in patients receiving mechanical ventilatory support for at least 48 hours. The mortality rate for ventilated patients who develop VAP is 46%, compared with 32% for ventilated patients who do not develop VAP. It is estimated that each case of VAP increases hospitalization costs by about $40,000.

To reduce the occurrence of VAP, the Institute for Healthcare Improvement (IHI) developed a series of interventions known as the “ventilator bundle.” The intervention involves elevation of the head of the bed to 30°, daily breaks in sedation, daily assessment of the readiness to extubate, peptic ulcer disease prophylaxis, and deep venous thrombosis prophylaxis.

Proper education of the health care staff and daily monitoring of compliance with the ventilator bundle are crucial to the success of this intervention program.

Routine oral care with the use of a hydrogen peroxide-containing kit administered in conjunction with the ventilator bundle results in a further reduction in VAP rates.

Intervention methods

The rate of VAP, calculated as the number of cases per 1000 ventilator days, in patients in adult ICUs was compared with the Historical control rate.

An IHI VAP team was established to review current VAP initiatives.

Health care staff was educated on the ventilator bundle, oral care, and prevention of VAP.

The ventilator bundle was implemented in all adult ICUs and step down units caring for adult ventilated patients. All members of the patient care team collaborated to implement the ventilator bundle.

A formal process was developed to evaluate compliance with the following IHI ventilator bundle initiatives:

- Elevate the head of the bed to 30°
- Provide a daily sedation vacation and assess the readiness to extubate
- Provide peptic ulcer disease prophylaxis
- Provide deep vein thrombosis prophylaxis
- Review current oral care procedures, add oral care to the ventilator bundle, and change oral care procedure to an oral cleansing and suction system
- Perform oral care every 2 hours with an oral care kit that contains a hydrogen peroxide–containing oral rinse and a mouth moisturizer
- Perform tooth brushing twice daily

Daily audits of ventilator bundle compliance were performed, and the audit results were communicated weekly to all involved units.

Audit results were reported to individual ICUs, the IHI VAP Team, the Adult Critical Care Committee, and the Infection Control Surveillance Committee.

References:

Results

Reduced incidence of VAP as a result of the prevention interventions

- The rate of VAP was 0% for 471 consecutive days in the medical-surgical ICU (Memorial Campus) and for 430 consecutive days in the Coli medical-surgical ICU (St. Joseph’s Campus).

Lessons learned

- The intervention program (education of staff, daily checks of compliance with the ventilator bundle, and implementation of a new oral care protocol) resulted in a decrease in VAP rates in all ICUs.

- Education of the staff about the benefits of VAP prevention, the proper implementation of the VAP bundle, and routine oral care procedures improved the rate of compliance needed to prevent VAP.

- The implementation of a formal procedure to evaluate compliance with the ventilator bundle initiatives (elevate the head of the bed to 30°, daily sedation vacation, assessment of readiness to extubate, peptic ulcer disease prophylaxis, and deep vein thrombosis prophylaxis when indicated) helped to reduce the risk of VAP.

- The addition of an oral care procedure (tooth cleaning twice daily and oral care every 2 hours—suctioning, secretions, to the ventilator bundle and the change to the Q2 oral cleanser and suction system reduced oral bacterial counts, which helped to reduce the risk of VAP.

- The implementation of weekly audits and the dissemination of the audit results to the other team members encouraged compliance and reinforced the benefits of the prevention interventions.

References:

VAP Rate per 1000 Ventilator Days, 6-month data per unit

- VAP bundle with Q2 oral care with ongoing staff education

- VAP was initiated June 2006 with ongoing staff education