Postoperative patients are among the groups at highest risk for developing ventilator-associated pneumonia (VAP), one of the leading causes of morbidity and mortality in ICU patients.

The Surgical Care Improvement Project (SCIP), a national quality partnership, is targeting VAP as one of 4 types of major surgical complications to prevent.

What causes VAP?

Most VAP is thought to result from aspirating oropharyngeal secretions into the lungs. Endotracheal intubation is a major risk factor because it interrupts the body’s anatomic and physiologic defenses against aspiration.

VAP is categorized as early- or late-onset:

• **Early-onset VAP:** Occurs within 3 to 4 days of mechanical ventilation and is commonly caused by community-acquired, antibiotic-sensitive organisms such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Staphylococcus aureus*.

• **Late-onset VAP:** Typically caused by antibiotic-resistant nosocomial organisms such as *Pseudomonas aeruginosa*, Methicillin-resistant *S aureus*, and *Acinetobacter* or *Enterobacter* species.

The later the onset, and the longer the patient is intubated, the higher the rates of patient morbidity and mortality. It’s estimated that the incidence of VAP increases by 1% to 3% for each day the patient is intubated, and the risk of death is as much as tenfold.

Practical prevention

Practicality is important in developing a protocol to reduce the incidence of VAP. Practical measures are more likely to be carried out consistently.

These preventative steps are in place at Wake Forest University Baptist Medical Center in Winston-Salem, NC.

**Raise head of bed**

Practicality was the deciding factor in whether to raise the head of the bed of intubated patients 30 degrees instead of 45 degrees, as some of the literature suggests.

“We wanted the head of the bed up, but we also needed buy-in from the ICU nurses,” says Duncan Hite, MD, associate professor of medicine and director of medical intensive care and critical care research.

The higher the head of the bed, the more patients slump, and the more work it is for the nurses to pull them back up. Heavy patients increase the injury risk to nurses.

The hospital has seen its VAP rates improve with the head of the bed elevated 30 degrees, and the ICU team sees it as a practical decision, he says.

**Clear the nose**

Getting tubes out of the nose is another preventive measure. All endotracheal and gastric tubes should be placed via the mouth in patients who will need to be on a ventilator for some time after surgery, Dr. Hite advises. Tubing in the nose promotes sinusitis, particularly if the tube is in place for any length of time. Sinusitis is a major risk factor for pneumonia because infected secretions from the sinuses trickle into the airway.
The majority of patients at Wake Forest are no longer intubated nasally. The same goes for the gastric tube in intubated patients.

After the patient is taken off the ventilator, the gastric tube can be moved to the nose so the patient can talk. If an intubated patient is admitted to the ICU with a gastric tube in the nose, nurses are asked to change it to the mouth within 48 hours.

**Oral care**

The latest big push and the hardest to implement has been oral care recommendations. These include brushing the teeth, swabbing the back of the mouth, and rinsing the mouth with chlorhexidine twice a day.

The chlorhexidine rinse, the newest step, has been the easiest. Teeth brushing and swabbing are more complicated, plus they are recommended every 2 to 4 hours, “a fair amount of work,” says Dr Hite.

Most pieces of the VAP program at Wake Forest have a high degree of compliance—over 90% to 95%. Oral care has been the hardest because it is so labor intensive.

**Endotracheal suctioning tube**

OR nurses may notice anesthesiologists inserting a special kind of endotracheal (ET) tube in patients who will be on the ventilator after surgery. Called a continuous subglottic secretions suctioning tube (CSST), the tube is different than conventional ET tubes because it has a port for suctioning secretions from the mouth and nose that pool on top of the tube’s cuff.

Though Wake Forest adopted CSSTs initially as part of VAP prevention, the tubes were dropped because of problems with managing them. The suction lumen is narrow and plugs easily. The tubes are also much more expensive than regular ET tubes. Since dropping the CSSTs, VAP rates have not changed, Dr Hite notes.

**Weaning protocol**

Respiratory therapists screen intubated patients daily to see if they are candidates for spontaneous breathing trials (SBTs). If patients meet the criteria, the therapists are empowered to automatically move ahead with an SBT.

Though early weaning affects VAP rates, Dr Hite sees weaning protocols primarily as a means to remove patients from ventilators earlier rather than as a preventive measure for VAP.

**Stress-ulcer prophylaxis**

Intubated patients are at higher risk for stress-ulcer bleeding, but there is conflicting data on prophylaxis for stress ulcers. There are 2 schools of thought on prophylaxis:

- Give sucralfate, which maintains acid production in the stomach, reducing bacterial growth and thus reducing the risk of VAP. But not lowering gastric acidity increases the risk for gastric bleeding.
- Give histamine-2 blockers and antacids to inhibit gastric acid secretion, which protects the gastric mucosa. But with decreased acidity, colonization of pathologic organisms can increase, which could raise the risk for VAP.

After assessing risks and benefits, Wake Forest has continued its past protocol of administering Zantac, a histamine-2 blocker, because it is less expensive than sucralfate, and the literature does not clearly demonstrate sucralfate is superior.

**Part of admission orders**

To implement the VAP protocol uniformly and make sure the steps are followed properly, Wake Forest has made the protocol part of its ICU admission order set. This way, each section of the protocol can be activated when needed.

—Judith M. Mathias, RN, MA

More on SCIP is available at www.medqic.org/scip.

OR Manager’s special SCIP supplement is posted at www.ormanager.com. Print copies are now available.
References


SCIP targets VAP
SCIP measures for postoperative ventilator-associated pneumonia:

Process measures
- Number of days ventilated surgical patients had documentation of elevation of the head of the bed through postoperative day 7
- Number of days ventilated surgical patients had documentation of stress ulcer disease prophylaxis through postoperative day 7
- Number of surgical patients whose medical records contained an order for a ventilator weaning protocol or clinical pathway

Outcome measures
- Number of surgical patients diagnosed with postoperative ventilator-associated pneumonia during index hospitalization

Fast facts on postop VAP
Postoperative ventilator-associated pneumonia:
- occurs in 9% to 40% of intubated patients, depending on risk factors
- has an associated high mortality of 30% to 60%
- increases hospital stay 7 to 9 days on average
- adds an estimated direct cost of more than $40,000 per patient per admission

Who is at risk?
Risk factors for VAP include:
- factors that enhance microorganism colonization of the oropharynx
- conditions that favor aspiration of oropharyngeal secretions into the respiratory tract or reflux secretions from the gastrointestinal tract
• conditions requiring prolonged use of mechanical ventilation that may expose the patient to contaminated respiratory devices and contact with contaminated hands, mainly from health care workers
• patient factors, such as very young and old age, malnutrition, and underlying conditions including immunosuppression.

Source: Centers for Disease Control and Prevention (CDC), American Thoracic Society, Infectious Diseases Society of America.

Preventing VAP

An integrated, comprehensive, evidence-based VAP prevention strategy is needed. Failing to take preventive measures and initiate prompt, appropriate therapy for VAP increases morbidity and mortality in postoperative intubated patients.

Key measures include:

Elevate the head of an intubated patient’s bed 30 degrees

VAP frequently develops from aspiration of oropharyngeal or gastroesophageal secretions. Accumulation of contaminated secretions above the endotracheal tube cuff may contribute to the risk of aspiration. Elevating the head of the bed decreases the pooling of secretions and helps reduce gastroesophageal reflux.

Place intubated patients on ulcer prophylaxis

Ventilated patients are at higher risk for stress ulcer bleeding. Medications such as histamine-2 blockers and antacids inhibit gastric acid secretion and protect the gastric mucosa. But this creates a dilemma: Decreasing gastric acidity can lead to an increase in the colonization of pathologic organisms, which can increase the risk for VAP. Sucralfate, a prophylactic agent that does not substantially alter gastric pH levels, can be given instead. But not lowering gastric acidity increases the risk for gastric bleeding. Risks and benefits need to be weighed before choosing which medication to administer.

Place patients on a weaning protocol

Having a protocol to evaluate all ventilated patients for weaning makes it more likely patients will be weaned rapidly, reducing the risk of VAP.