

5 nursing strategies to prevent ventilator-associated pneumonia

These evidence-based practices minimize risk in critically ill adults.

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Healthcare-associated infections, such as ventilator-associated pneumonia (VAP), are the most common and most preventable complication of a patient's hospital stay. Their frequency and potential adverse effects increase in critically ill patients because of impaired physiology, including a blunted immune response and multi-organ dysfunction.

Traditionally, VAP rates have been measured as an indicator of quality of care. Despite recent initiatives to measure complications of mechanical ventilation and a decrease in incidence over the past few years, VAP remains an issue for critically ill adults, with mortality estimated as high as 10%.

This article reviews the top five evidence-based nursing practices for reducing VAP risk in critically ill adults.

1 Minimize ventilator exposure

The most important evidence-based practice for lowering VAP risk is minimizing a patient's exposure to mechanical ventilation, which can be achieved in two ways.

First, encourage and advocate for the use of noninvasive ventilation approaches, such as bilevel positive airway pressure or continuous positive airway pressure. The face masks used with these ap-



proaches can be uncomfortable for patients, but data from a small randomized clinical trial suggests that similar benefits can be achieved using a helmet instead. In addition to better patient comfort, helmets resulted in a significantly lower in-

tubation rate compared to face masks.

Second, when mechanical ventilation can't be avoided, work to minimize its duration. Ventilator-weaning protocols or evidence-based care bundles (for example,

the Awakening, Breathing Coordination, Delirium, and Early mobility [ABCDE] bundle) can be effective in shortening mechanical ventilation duration. Nurse-led and respiratory therapist-led ventilator-weaning protocols that include daily interruption of sedation and coordination with a spontaneous breathing trial have been effective in removing patients from mechanical ventilation quickly and appropriately. If a ventilator-weaning protocol doesn't exist on your unit, take the opportunity to design and develop one.

2 Provide excellent oral hygiene care

Oral health quickly deteriorates in mechanically ventilated patients. Some patients sustain injuries to the oral mucosa during the intubation procedure, and after intubation, patients are prone to dry mouth. These factors, in addition to a severely compromised immune system, can cause an increase in bacteria colonization in the oral mucosa, with the endotracheal tube serving as a direct route to the lungs.

Adequate oral care can reduce bacterial overgrowth and reduce the risk for infection. In a meta-analysis of more than 18 randomized controlled trials (RCTs), routine oral care with chlorhexidine reduced the incidence of VAP. Currently, no guidelines exist for oral hygiene frequency. A recent systematic review of 38 RCTs showed oral care being performed anywhere from one to four times a day.

Making oral care a routine part of a patient's assessment in the intensive care unit (ICU) is one way to enhance its frequency. Consider developing a unit-specific protocol with clear articulation of roles and responsibilities.

3 Coordinate care for subglottic suctioning

Aspiration of secretions that accumulate around a mechanically ventilated patient's endotracheal tube

can lead to VAP. Subglottic secretion suctioning can be performed by both the nurse and respiratory therapist to help prevent aspiration and subsequent VAP. A recent meta-analysis of 20 RCTs found that subglottic suctioning reduced the risk for VAP by 45% compared to patients who didn't receive this suctioning. Coordinating subglottic suctioning when conducting oral care may be a good way to cluster care and ensure both practices are routinely delivered.

4 Maintain positioning and encourage mobility

To reduce gastric reflux and aspiration, which can lead to VAP in mechanically ventilated patients, keep the head of the bed elevated between 30 and 45 degrees (semi-recumbent position).

Early mobility can be challenging, but it results in more ventilator-free days. Evidence supports the feasibility of early mobilization for critically ill patients, even shortly after intubation, as long as the patient isn't sedated. Early-mobility protocols include a progressive approach that transitions from dangling at the edge of the bed, to standing at the edge of bed, to marching in place, and then, for patients who can tolerate a higher level of activity, ambulating. For the best patient outcomes, coordinate exercise and mobilization with physical and occupational therapists.

5 Ensure adequate staffing

Adequate nurse staffing in the ICU, especially for mechanically ventilated patients, can help minimize VAP risk. It provides nurses with the time, opportunity, and resources to implement care practices that reduce risk, and it allows them to spend more time with their patients, which may lead to early identification of VAP and prompt treatment.

Healthy work environments and interprofessional collaboration have been associated with lowering the

risk for VAP. Two studies found that better nurse work environments, in conjunction with physician staffing, have implications for VAP risk. For example, in open ICUs where patients are managed by general physicians instead of specially trained critical care physicians, good nurse work environments can reduce VAP rates for mechanically ventilated patients.

Similarly, when nurses work in environments that support professional nursing practice (healthy nurse work environments), they are significantly less likely to report frequent VAP. These data provide support for you to collaborate with other nurses to ensure a supportive work environment. For example, develop shared governance models, engage in quality-improvement activities to enhance high-quality care, and encourage positive team interactions. Partnering with ICU physicians and the rest of the interprofessional team, especially respiratory therapists, is key to encouraging positive team interactions and reducing VAP risk.

Nurses perfectly positioned

Nurses are particularly well positioned to lead the healthcare team in VAP prevention. You can help minimize patients' exposure to mechanical ventilation, work collaboratively to develop a ventilator-weaning protocol, and ensure implementation of evidence-based care that minimizes VAP risk. ★

Visit www.americannursetoday.com/?p=26954 for a list of selected references.

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Catheter-Associated Urinary Tract Infection Prevention Tool

Streamlined Evidence-Based RN Tool: Catheter Associated Urinary Tract Infection (CAUTI) Prevention



Nurse-Driven CAUTI Prevention: Saving Lives, Preventing Harm and Lowering Cost.

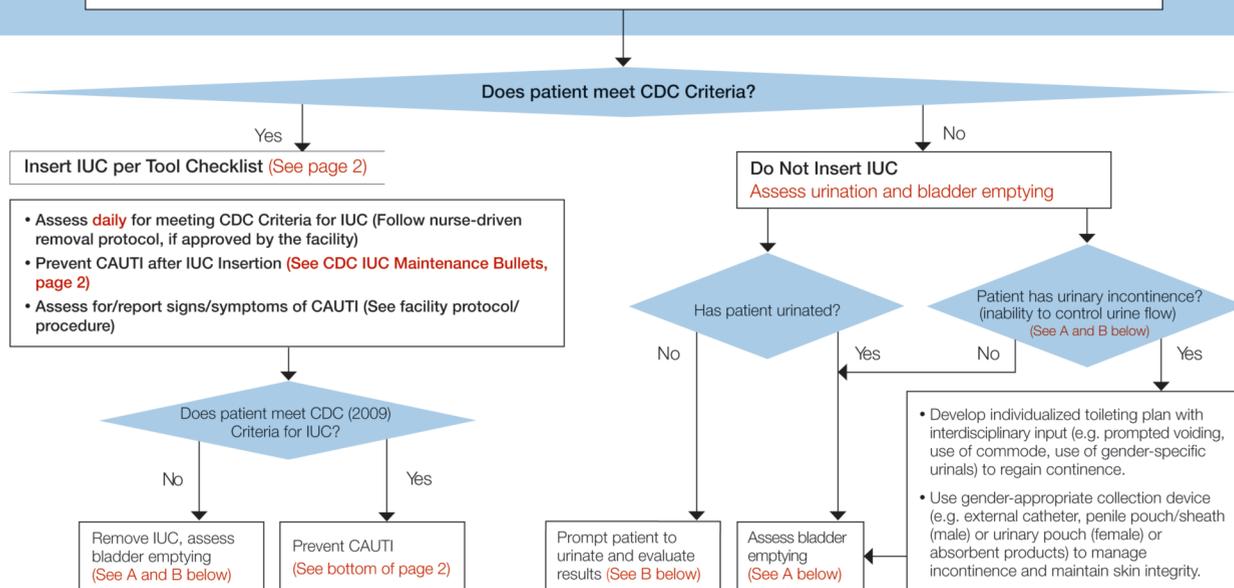
Key Practice Strategies to Reduce CAUTI: 1) Fewer Catheters Used, 2) Timely Removal and 3) Insertion, Maintenance and Post-Removal Care.

Informed by Guidelines for Prevention of Catheter-Associated Urinary Tract Infections (CDC, 2009).

BOX 1

CDC (2009) Criteria for Indwelling Urinary Catheter (IUC) Insertion:

- Acute urinary retention (sudden and painful inability to urinate (SUNA, 2008)) or bladder outlet obstruction
- To improve comfort for end-of-life care if needed
- Critically ill and need for accurate measurements of I&O (e.g., hourly monitoring)
- Selected surgical procedures (GU surgery/colorectal surgery)
- To assist in healing open sacral or perineal wound in the incontinent patient
- Need for intraoperative monitoring of urinary output during surgery or large volumes of fluid or diuretics anticipated
- Prolonged immobilization (potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)



Assess for Adequate Bladder Emptying

A. If Patient **HAS** urinated (voided) within 4-6 hours follow these guidelines:

- If minimum urinated volume ≤ 180 ml in 4-6 hours or urinary incontinence present, confirm bladder emptying.
 - Prompt patient to urinate/check for spontaneous urination within 2 hours if post-void residual (PVR) < 300-500 ml
 - Recheck PVR within 2 hours.*
 - Perform straight catheterization for PVR per scan ≥ 300-500 ml.
 - Repeat scan within 4-6 hours and determine need for straight catheterization.
 - Report to provider if retention persists ≥ 300-500ml.
 - Perform ongoing straight catheterization per facility protocol to prevent bladder overdistension and renal dysfunction (CDC, 2009), usually every 4-6 hours.
- If urinated >180 ml in 4-6 hours (adequate bladder emptying), use individual plan to promote/maintain normal urination pattern.

B. If Patient **HAS NOT** urinated within 4-6 hours and/or complains of bladder fullness, then determine presence of incomplete bladder emptying.*

- Prompt patient to urinate. If urination volume ≤ 180 ml, perform bladder scan.*

*Perform bladder scan (CDC, 2009) to determine PVR. If no scanner available, perform straight catheterization.

Indwelling Urinary Catheter (IUC) Insertion Checklist to Prevent CAUTI in the Adult Hospitalized Patient: Important Evidence-Based Steps.	Yes	Yes with Reminder	Comments
Before IUC insertion:			
1) Determine if IUC is appropriate per the CDC Guidelines (CDC, 2009) (See page 1, Box 1).			
2) Select smallest appropriate IUC (14 Fr., 5ml or 10 ml balloon is usually appropriate unless ordered otherwise).			
3) Obtain assistance PRN (e.g., 2-person insertion, mechanical aids) to facilitate appropriate visualization/insertion technique.			
4) Perform hand hygiene.			
Patient Preparation/Insertion of IUC:			
1) Perform peri-care , then, re-perform hand hygiene.			
2) Maintain strict aseptic technique throughout the actual IUC insertion procedure, re-perform hand hygiene upon completion. <ul style="list-style-type: none"> • Use <u>sterile gloves and equipment</u> and establish/maintain sterile field. • Do not pre-inflate the balloon to test it, as this is not recommended. 			
3) Insert IUC to appropriate length and check urine flow before balloon inflation to prevent urethral trauma. <ul style="list-style-type: none"> • In males, insert fully to the IUC “y” connection, or in females, advance ~1 inch or 2.5 cm beyond point of urine flow. 			
4) Inflate IUC balloon correctly: Inflate to 10 ml for catheters labeled 5 ml or 10 ml per manufacturer’s instructions.			
After IUC insertion completion:			
1) Perform Triple Action for IUC/Drainage System: <ul style="list-style-type: none"> • Secure IUC to prevent urethral irritation. • Position drainage bag below the bladder (but not resting on the floor). • Check system for closed connections and no obstructions/kinks. 			

Note: Refer to Expert Nurse for consults (e.g., urology, WOC, infection control, geriatrics, rehabilitation) and other team members per facility protocol to reduce iuc use and days and to manage complex care (e.g., incontinence, immobility).

BOX 2

Maintenance of IUC/Drainage System and Other Patient Care to Prevent CAUTI (CDC 2009)

- **Maintain appropriate catheter securement** per facility protocol/procedure and the drainage bag below the level of the bladder at all times (but not on the floor, even when emptying).
- **Empty the drainage bag regularly** using a separate, clean collecting container for each patient; avoid splashing, and prevent contact of the drainage spout.
- **Maintain unobstructed urine flow** by keeping the catheter and tube free from kinking.
- **Maintain a closed drainage system.**

- **If breaks in the closed system are noted** (e.g., disconnection, cracked tubing), replace the catheter and collecting system following above IUC insertion checklist.
- **Perform perineal hygiene** at a minimum, daily per facility protocol/procedure and PRN.
- **Use timely fecal containment device when appropriate for fecal incontinence.**
- **Teach nursing assistants and patient/family iuc maintenance.**

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