Preventing hospital-acquired pneumonia

Implementing a fundamental nursing skills bundle can reduce risk.

By Carolyn D. Meehan, PhD, RN, and Catherine McKenna, MSN, RN



LEARNING OBJECTIVES

- 1. Identify risk factors for hospital-acquired pneumonia (HAP).
- 2. Discuss bundled strategies for preventing HAP.

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Hospital-acquired PNEUMONIA (HAP), which includes ventilator-associated pneumonia (VAP) and nonventilator hospital-acquired pneumonia (NVHAP), is a well-documented hospital complication that's diagnosed when patients demonstrate signs and symptoms of pneumonia 48 or more hours after hospital admission; VAP is diagnosed when signs and symptoms of pneumonia appear 48 hours after intubation.

HAP, an inflammatory condition of the lung parenchyma, has the highest mortality rate of any hospital-acquired infection (HAI) in the United States. VAP comprises about 38% of HAP cases; NVHAP is underreported as a hospital complication.

> Consequences of HAP include prolonged lengths of stay in the hospital, expensive medical treatments, and discharge to a long-term care facility. Avoiding these consequences depends on nursing care that is based on a fundamental nursing skills bundle and delivered in conjunction with an interprofessional team.

Causes and risk factors

The most common cause of HAP is aspiration of microorganisms that originate in the patient's nasal, oropharyngeal, and gastric flora. Several factors place patients at risk for aspiration, including dysphagia, coughing, and altered mental status as a result of stroke, seizures, or substance use disorder. For patients who've had a stroke, pneumonia resulting from aspiration is a leading cause of death.

Other patients at risk for aspiration include those with neuromuscular diseases (such as Parkinson's disease and muscular dystrophy), mouth sores, esophageal blockages due to tumor or radiation treatment, neurologic changes (for example, alteration of the glossopharyngeal nerve after a stroke), chronic pulmonary disease (which can result in poor cough or inspiratory effort), and GI conditions that cause severe nausea and vomiting. In addition, patients receiving proton pump inhibitors or histamine H2 antagonists to raise the pH of gastric secretions have an increased incidence of HAP. The reduction of the acidity of gastric secretions may allow microorganisms in the gut to proliferate, potentially causing HAP if vomit is aspirated.

Even healthy patients may experience aspiration. Almost half of healthy individuals have episodes of silent aspiration during sleep, which they tolerate without significant disease progression. But when they're hospitalized and their health status is compromised, their risk for developing pneumonia increases.

HAP also can be acquired from pathogens transmitted via healthcare workers and hospital equipment. For this reason, all healthcare workers must strictly adhere to infection prevention standards, especially when caring for patients in the acute care setting, who are at a greater risk for developing pneumonia because they may be immunocompromised or malnourished, at an advanced age, or have multiple comorbidities.

Assessment and diagnosis

HAP is the second most common HAI after catheter-associated urinary tract infections. Patients on any unit in the hospital can develop NVHAP, which can result in transfer to intensive care.

To prevent HAP, nurses should be alert for aspiration symptoms and intervene quickly and appropriately. Signs of respiratory distress—such as stridor, tachypnea, tachycardia, and drop in oxygen saturation—warrant immediate nursing interventions. Pain when swal-

lowing, a feeling that food is getting stuck in the throat, and difficulty swallowing should alert nurses to possible dysphagia. Early HAP diagnosis can be achieved with pulse oximetry, chest x-ray, complete blood count with differential, and sputum culture.

Management

Several fundamental therapeutic nursing interventions—adhering to infection prevention standards, elevating the head of the bed 30 to 45 degrees to prevent aspiration, ensuring good oral hygiene (cleaning teeth, gums, tongue, dentures), increasing patient mobility with ambulation to three times a day as appropriate, encouraging coughing and deep breathing, and instructing patients in the use of incentive spirometry—are associated with reducing HAP risk. Most hospitals don't routinely monitor this fundamental nursing inter-

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Oral care tips

Research supports providing staff with a specific oral care protocol for patients to reduce the incidence of hospital-acquired pneumonia. Nurses should:

- use a soft-bristle toothbrush or an electric suction toothbrush if the patient can't brush his or her own teeth
- use toothpaste that contains sodium bicarbonate
- thoroughly examine the oral cavity, including the teeth and gingiva; for patients receiving antibiotics, watch for oropharyngeal candidiasis
- ensure that patients' dentures are cleaned after each meal and before bedtime
- use a mouthwash without alcohol to complete oral care.

vention skills bundle to ensure effective HAP prevention, so nurses should take the lead in strategizing the implementation of these care protocols.

Infection prevention standards

Hospitalization in acute care settings impacts patients' immune response, so hospital staff must follow infection prevention measures to lower the risk of developing HAIs, including HAP. Hand hygiene is an effective measure to prevent HAI and frequently is the focus of staff education. Studies show that access to bedside antiseptic hand scrubs contributes to an increase in hand hygiene adherence, which can lead to an overall reduction in HAIs. In addition, face masks can be effective at reducing transmission of airborne pathogens such as those that cause pneumonia and influenza. Also, healthcare worker influenza vaccination is key to preventing HAP; antiviral prophylaxis should be provided to patients during a flu outbreak.

Head of bed elevation

Elevating the head of the bed is a simple intervention that may reduce aspiration risk. Raising the head of the bed to at least 30 degrees as a deterrent to microaspiration in patients on a ventilator has been well documented; some research suggests that 45 degrees is ideal for these patients. However, aspiration

not associated with a ventilator is common in acute care patients, making aspiration risk assessment vital to safe nursing practice. If the assessment reveals that a patient is at risk for aspiration, elevating the head of the bed should be included in an HAP nursing intervention bundle.

For patients with an altered mental status, including those with lethargy or sedation, the head of the bed should be elevated to at least 30 degrees when they are at rest. If tolerated, increasing the head of the bed to high Fowler's position during mealtimes and when administering medications can help prevent aspiration.

When caring for patients with a nasogastric tube for feeding, nurses should follow the evidence-based practice of ensuring that an x-ray has verified tip placement before feeding and maintain the head of the bed at more than 30 degrees at all times. Nurses also should document a thorough abdominal assessment, including measuring residual feeding, and talk to the healthcare provider about using a prokinetic agent such as metoclopramide, which has been shown to help reduce aspiration in patients with a feeding tube.

Oral care

HAP is most commonly caused by gram-negative bacilli and Staphylococcus aureus that may flourish in the oral cavity of patients in acute care settings. Research has shown that standardized oral care reduces bacteria in the mouth, and several studies have reported a significant decrease in HAP with an effective twice-daily oral brushing program. (See Oral *care tips.*)

Most nursing schools teach oral care, but providing it and helping patients perform it is reported to be very low. Evidence also suggests that oral care is poorly documented by nursing staff, which may indicate that staff education is needed to improve adherence and documentation. Linking oral care to nursing assessment and educating staff on this best practice for preventing pneumonia may improve patient outcomes and reduce HAP in acute care settings.

Studies also have shown that HAP prevention in surgical patients should begin with oral care before intubation. This nursing intervention may reduce microbial growth in the oral airway postoperatively when done in conjunction with other bundle interventions. Educating staff on this practice and adding specific oral care guidelines to the preoperative checklist may help reduce this postop complication.

Increased mobility

Early and intensive mobility interventions reduce the incidence of HAP and the effects of deconditioning that accompany prolonged bed rest. Elderly patients and those with chronic diseases are at high risk for functional decline in as little as 72 hours if they're on unnecessary bed or chair confinement. Unfortunately, although evidence supports early mobilization to reduce HAP, most patients still spend more than 60% of their time in bed. Barriers to early mobility include lack of time, concerns about patient safety, patients' physiologic instability, lack of appropriate equipment to safely transfer patients, and insufficient personnel to assist with ambulating.

Nurses can take an active role in assessing safe patient transfers and ambulation to reduce fall risk. For example, they can complete the Banner Mobility Assessment Tool (BMAT) to assess basic balance and mobility. The BMAT is a valid and reliable tool for nurses to use at the bedside to determine patient mobility and the appropriate safety equipment needed to assist in transfers and early ambulation.

After patient safety is established, interventions such as getting the patient out of bed at least three times a day has been shown to significantly reduce the incidence of HAP. Adequate pain control is necessary to achieve patient mobility goals. Having an individualized schedule of analgesics and avoiding oversedation before getting out of bed may help patients meet mobility goals. Nurses should partner with physical therapy to develop safe interventions, such as supervised walking programs, to reduce the effects of prolonged bed rest.

Coughing, deep breathing, and incentive spirometry

Coughing, deep breathing, and incentive spirometry have long been essential components in preventing NVHAP in postoperative patients. Because more than half of NVHAP patients are on a medical unit, adding these nursing interventions for nonsurgical patients as well is helpful. Coughing and deep breathing improve the expectoration of secretions and increase chest wall expansion to help reduce NVHAP. And some evidence suggests that controlled inspiration using incentive spirometry can improve oxygenation and reduce pulmonary complications. However, no clear guidelines exist for the routine use of incentive spirometry in preventing NVHAP.

The incentive spirometer may act as a physical reminder to patients that coughing and deep breathing are important to prevent pulmonary infections. But protocols for the use of incentive spirometers vary widely among nurses and respiratory therapists, leading to reports of patient confusion. Therefore, a combination of the interventions discussed (patient education, elevation of the head of bed, early ambu-

lation, oral care, coughing and deep breathing, and incentive spirometry) appears to be the best way to prevent NVHAP.

Resources, education, and collaboration

Many of the interventions to prevent HAP are part of basic evidence-based nursing practice. Because of this, nurses can take the lead in developing and implementing prevention strategies within their scope of practice and monitor outcomes.

Nurse leaders should provide the appropriate resources-equipment and personnel-so staff can achieve HAP reduction outcomes. Resources may include proper oral care equipment (such as electric suction toothbrushes, mouthwash, dental floss, and denture care items) and safe and effective mobility tools (such as gait belts, slide sheets, and proper lifting equipment). In addition, nurses must be properly educated in the use of any new or unfamiliar equipment so they feel confident about its use and are more likely to use it. Designating team champions on acute care units to assist in achieving HAP prevention goals also may help encourage staff intervention adherence.

Healthcare organizations should provide education workshops to promote the use of fundamental interventions to reduce HAP. Including patients and family in the education process and the plan of care upon admission also may help improve outcomes.

A multidisciplinary team approach to prevention is the most effective strategy in reducing VAPs.



As part of hospital-acquired pneumonia (HAP) prevention, nurses should initially focus on the principles of infection prevention and monitor each element of the fundamental skills bundle (head of bed elevation, oral hygiene, patient mobility, and coughing and deep breathing) to reduce HAP risk. Then they should collaborate with the interprofessional team as needed to ensure the best outcomes. For example:

- When risk factors for aspiration are identified, nurses should initiate a consult with speech therapy to determine additional prevention strategies, such as a swallowing screen for early diagnosis of potential aspiration.
- For elderly patients, nurses should discuss treatment options with the primary care provider and pharmacist to avoid polypharmacy, which may contribute to aspiration.
- If pain is limiting patient mobility, nurses should consult with the pain management team to find therapies that will offer relief without detrimental side effects.
- For patients at nutritional risk (such as those with a body mass index less than 18 or a prealbumin below 16 mg/dL), nurses should collaborate with nutritional support services to provide supplements as indicated.

According to Klompas and colleagues, a multidisciplinary team approach to prevention is the most effective strategy in reducing VAP; the same is true for NVHAP. This approach includes a comprehensive team of physicians; nurses; physical, speech, and respiratory therapists; nutritionists; and pharmacologists. Bedside nurses are in an excellent position to take the lead in initiating this type of team collaboration and communicating with the interprofessional healthcare team on the most effective HAP prevention protocols. (See *Interprofessional collaboration*.)

Nursing's focus

HAP is an underreported and understudied complication of hospitalization with significant patient morbidity and mortality. It's responsible for increases in hospital costs, lengths of stay, and discharges to long-term care facilities.

Several fundamental nursing interventions have been associated with decreasing HAP risk; however, no standardized protocols exist for effectively monitoring and documenting them. A fundamental skills bundle that includes best practices for infection prevention, oral care, early mobility, elevation of the head of the bed, and coughing and deep breathing may help improve outcomes, especially for high-risk patients. Staff education about these protocols may increase buy-in at the unit level. Nursing's focus should be on educating staff and ongoing research for these preventive strategies while also working with patients, families, and an interprofessional team of healthcare providers, and to emphasize the interventions' importance.

The authors work at West Chester University in West Chester, Pennsylvania. Carolyn D. Meehan is an associate professor of nursing and prelicensure program coordinator. Catherine McKenna is a clinical skills lab coordinator.

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1. Which patient is at highest risk for aspiration that could lead to hospital-acquired pneumonia (HAP)?

- a. A man with a compound fracture of the tibia
- b. A 32-year-old woman who had an appendectomy
- c. A woman who had an acute myocardial infarction
- d. A 76-year-old man with Parkinson's disease

2. Which statement about aspiration risk is correct?

- a. Healthy patients are not at risk for aspiration.
- b. GI conditions with mild nausea frequently result in aspiration.
- c. Esophageal blockages due to tumor or radiation treatment can put patients at risk for aspiration.
- d. Pneumonia caused by aspiration is an uncommon cause of death in patients who have had a stroke.

3. Which class of drugs is most likely to put patients at risk for aspiration?

- a. Proton pump inhibitors
- b. Antiarrhythmics
- c. Analgesics
- d. Beta blockers

4. The head of the bed of a patient with lethargy who is at risk for aspiration should be elevated to at least

- a. 10 degrees.
- b. 15 degrees.
- c. 20 degrees.
- d. 30 degrees.

5. To prevent aspiration and subsequent HAP in patients receiving enteral feedings via a nasogastric tube, nurses should

- a. be sure tip placement is confirmed by auscultation before the initial feeding.
- b. measure residual feedings and document abdominal assessments.
- c. elevate the head of the patient's bed 90 degrees.
- d. avoid administering prokinetic agents such as metoclopramide.

6. Which of the following should be part of an oral care protocol for preventing HAP?

- a. Use a mouthwash without alcohol to complete the care.
- b. Use a mouthwash with alcohol to complete the care.
- c. Use a toothpaste without sodium bicarbonate.
- d. Use a toothpaste with potassium bicarbonate.

7. Which statement about mobility and reduction of HAP is correct?

- a. Patients should be kept in bed during the first 72 hours of hospitalization to avoid the risk of falls.
- b. Elderly patients are at high risk for functional decline in as little as 96 hours if not active.
- c. Nurses can use the Banner Mobility Assessment Tool (BMAT) to assess basic balance and mobility.
- d. Most patients in the hospital spend more than 80% of their stay in bed.

8. All of the following statements about incentive spirometry are correct *except*

- a. Incentive spirometry may reduce pulmonary complications.
- b. Protocols for the use of incentive spirometers vary widely among nurses and respiratory therapists.
- c. Incentive spirometry may improve oxygenation.
- d. There are clear guidelines for incentive spirometry for preventing nonventilator HAP.

9. Which statement about the role of interprofessional collaboration in preventing HAP is correct?

- a. The team should include only physicians; nurses; and physical, speech, and respiratory therapists.
- b. The team should include only physicians, nurses, nutritionists, and pharmacists.
- c. When risk factors for aspiration are identified, nurses should initiate a consult with speech therapy.
- d. Nurses should work with physical therapy to keep a patient with pain in bed until he or she is pain free.

10. Patients with poor nutrition, which places them at risk for HAP, include those with

- a. a body mass index less than 48.
- b. a body mass index less than 18.
- c. a prealbumin higher than 18 mg/dL.
- d. a prealbumin higher than 25 mg/dL.