

Community-Acquired Pneumonia: A Review of Current Diagnostic Criteria and Management

Incorporating a case example, the authors discuss 2019 ATS/IDSA guidelines and their implications for nursing care.

ABSTRACT: Among the most common causes of U.S. adult hospitalizations, pneumonia accounted for nearly 50,000 deaths in the United States in 2017. This article provides nurses with a thorough update on pneumonia risk factors, signs and symptoms, and diagnostic criteria, as well as inpatient treatment recommendations and recommendations for discharge and prevention, including the nurse's role in patient and family teaching. The article also details key similarities and differences between the new 2019 guideline jointly developed by the American Thoracic Society and the Infectious Diseases Society of America on diagnosis and treatment of adults with community-acquired pneumonia and their earlier 2007 guideline. One crucial difference is the growing recognition that the etiology of pneumonia is changing, necessitating the abandonment of prior categorizations of pneumonia type when determining antibiotic coverage in favor of reliance on local epidemiology and validated risk factors for antimicrobial resistance.

Keywords: community-acquired pneumonia, pneumonia, respiratory management

A .S. is a 68-year-old man who presented to his primary care provider with a nonproductive cough, pleuritic chest pain, fever, and shortness of breath. (This case is a composite based on our experience.) He is a retired truck driver who lives alone and has chronic obstructive pulmonary disease (COPD), hypertension, and type 2 diabetes, and smokes half a pack of cigarettes per day. He has had COPD exacerbations

twice a year for the last three years that required outpatient treatment with oral antibiotics and steroids. His last exacerbation was successfully treated two months ago with azithromycin and an oral steroid taper.

His vital signs were taken in the provider's office and included a heart rate of 102 beats per minute, blood pressure of 109/65 mmHg, a respiratory rate of 33 breaths per minute, and an oral temperature

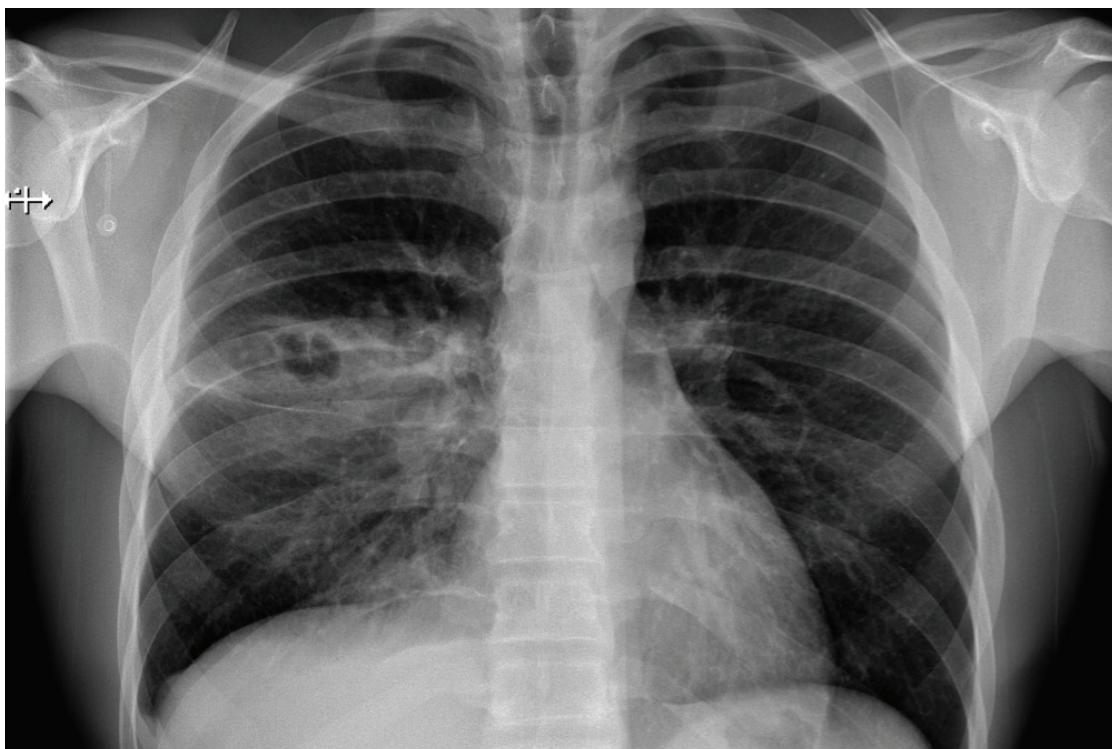


Figure 1. Methicillin-resistant *Staphylococcus aureus* community-acquired pneumonia. The X-ray shows right middle lobe consolidation. Image courtesy of Dr. Callum Smith / Radiopaedia.org / <https://radiopaedia.org/cases/54686>.

of 100.6°F. He said he'd felt poorly for several days, but when he woke up that morning, he was short of breath and so fatigued that he had difficulty getting out of bed to get dressed. On auscultation, bronchial breath sounds were heard in all lung fields with faint crackles in the right middle lobe. A chest X-ray taken in the office showed consolidation in the right middle lobe (see Figure 1), confirming a diagnosis of pneumonia.

Typically, following diagnosis, the health care provider will determine an appropriate treatment setting based on patient assessment, symptoms, and one of several available risk scores such as the CRB-65, CURB-65, or Pneumonia Severity Index. In this case, blood was drawn for a basic metabolic panel and complete blood count, and the primary care provider assessed the severity of A.S.'s pneumonia using the CRB-65 (confusion, respiratory rate of 30 or more breaths per minute, systolic blood pressure less than 90 mmHg or diastolic blood pressure less than or equal to 60 mmHg, and age 65 years or older) to determine the need for hospitalization based on his risk of mortality.¹ A.S. scored one point for being 65 or older and one for his respira-

tory rate, for a total score of 2 on the four-point CRB-65 scale. A severity score of 2 indicates likely need for hospitalization.¹ Taking into account the patient's comorbid conditions, lack of a caregiver at home, and worsening fatigue and shortness of breath, it was decided to send him to the ED for further treatment and hospitalization.

BACKGROUND: KEEPING UP WITH PNEUMONIA'S CHANGING ETIOLOGY

Pneumonia is an acute infection of the parenchyma of the lung that until recently was classified as either community-acquired pneumonia (CAP) or health care-associated pneumonia (HCAP). However, the new 2019 guideline jointly developed by the American Thoracic Society (ATS) and the Infectious Diseases Society of America (IDSA) recommends abandoning use of the prior categorization of HCAP in determining antibiotic coverage for CAP in favor of emphasis on local epidemiology and validated risk factors for antimicrobial resistance.² This change arose from the recognition that treatment decisions hinge on the causative pathogen and severity of disease; whether patients acquire

pneumonia in a health care setting or in the community, they should not be treated for multidrug-resistant pathogens unless they either have the risk factors for these pathogens or meet validated criteria for severity. The 2019 ATS/IDSA guideline reaffirms many recommendations in the 2007 guideline and incorporates new evidence in treatment recommendations. See Table 1 for a comparison of the guidelines.²

CAP is traditionally caused by *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Mycoplasma pneumoniae*, *Staphylococcus aureus*, *Legionella* species, *Chlamydia pneumoniae*, or *Moraxella catarrhalis*.² In addition, the ATS/IDSA guideline committee observed that gram-negative multidrug-resistant pathogens such as *Pseudomonas aeruginosa* and methicillin-resistant *S. aureus* (MRSA) have become more common, and that widespread use of the pneumococcal conjugate vaccine has contributed to

a changing microbial etiology of CAP.² Vaccination of young children with pneumococcal conjugate vaccine has reduced the incidence of CAP both directly and through herd immunity.^{3,4} Pneumonia fell from the most common cause of U.S. adult hospitalizations in 2010, aside from childbirth, to the fourth most common cause in 2015.⁵ It has been overtaken by septicemia, congestive heart failure, and osteoarthritis. However, pneumonia accounted for nearly 50,000 deaths in the United States in 2017.⁶

Risk factors. Older adults are at greater risk for pneumonia than adults younger than 65 years of age and are also more likely to die from it. If they survive, older patients can take months to years to return to baseline exercise tolerance, cognitive and cardiac function, and quality of life.

Risk factors that contribute to acquiring CAP or to having a more severe case include being age 65

Table 1. Differences between the 2019 and 2007 ATS/IDSA Community-Acquired Pneumonia Guidelines

Recommendation	2007 ATS/IDSA Guideline	2019 ATS/IDSA Guideline
Sputum culture	Primarily recommended in patients with severe disease	Now recommended in patients with severe disease as well as in all inpatients empirically treated for MRSA or <i>Pseudomonas aeruginosa</i>
Blood culture	Primarily recommended in patients with severe disease	Now recommended in patients with severe disease as well as in all inpatients empirically treated for MRSA or <i>P. aeruginosa</i>
Macrolide monotherapy	Strong recommendation for outpatients	Conditional recommendation for outpatients based on resistance levels
Use of procalcitonin	Not covered	Not recommended to determine need for initial antibacterial therapy
Use of corticosteroids	Not covered	Recommended not to use. May be considered in patients with refractory septic shock
Use of health care–associated pneumonia category	Accepted as introduced in the 2005 ATS/IDSA hospital-acquired and ventilator-associated pneumonia guidelines	Recommend abandoning this categorization. Emphasis on local epidemiology and validated risk factors to determine need for MRSA or <i>P. aeruginosa</i> coverage. Increased emphasis on deescalation of treatment if cultures are negative
Standard empiric therapy for severe CAP	β-lactam/macrolide and β-lactam/fluoroquinolone combinations given equal weight	Both accepted but stronger evidence in favor of β-lactam/macrolide combination
Routine use of follow-up chest imaging	Not addressed	Recommended not to obtain. Patients may be eligible for lung cancer screening, which should be performed as clinically indicated

ATS = American Thoracic Society; CAP = community-acquired pneumonia; IDSA = Infectious Diseases Society of America; MRSA = methicillin-resistant *Staphylococcus aureus*.

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years or older; having a history of chronic lung diseases, diabetes, stroke, or heart disease; aspiration; altered mental status; malnutrition; and immunosuppression.⁴ Lifestyle factors that increase this risk include smoking, substance abuse (alcohol, opioids), communal living (jails, shelters, long-term care facilities), and homelessness.⁴ Viral respiratory tract infections such as influenza and coronavirus disease 2019 (COVID-19) can not only cause viral pneumonia but also increase the risk of developing bacterial pneumonia in both hospital and community settings. Furthermore, coinfection with both severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and other respiratory viruses has been reported, so, at this time, patients with one confirmed respiratory illness should also be tested for SARS-CoV-2.⁷

across sites; however, the two risk factors most consistently associated with these pathogens are prior infection with either one or hospitalization and treatment with antibiotics in the last 90 days.² The 2019 guideline recommends further diagnostic testing when these risk factors are present to facilitate antimicrobial stewardship. If the causative organism can be quickly identified, empirical therapy can be deescalated if resistant organisms are not present or antibiotic therapy can be more appropriately targeted if they are.²

For outpatients without comorbidities of chronic heart, lung, liver, or renal disease and without diabetes, alcoholism, malignancy, asplenia, or the risk factors discussed above for MRSA or *P. Aeruginosa*, the guideline committee recommends pharmacological treatment with either

Older adults are at greater risk for pneumonia than adults younger than 65 years of age and are also more likely to die from it.

Signs and symptoms. The signs and symptoms of CAP can include a productive or nonproductive cough, dyspnea, pleuritic pain, fever, tachycardia, and hypotension. Older adults are more likely to have atypical symptoms such as acute functional or cognitive decline and may present initially with tachypnea without cough or fever.⁸ Wootton and colleagues report that 97% of CAP symptoms should resolve within 10 days, although full recovery can take six to eight weeks depending on disease severity and overall patient health.⁹

Guideline recommendations. The new 2019 ATS/IDSA guideline recognizes that, depending on the setting, clinical diagnosis of CAP may or may not be confirmed with a chest radiograph for evidence of infiltrates. Sputum and blood cultures are not routinely recommended in the outpatient setting; however, a sputum Gram stain, culture of respiratory secretions, and blood cultures are recommended prior to antibiotic therapy in the hospital setting for patients who are classified as having severe CAP or have risk factors for *P. aeruginosa* or MRSA. Routine urinary antigen tests for *Legionella pneumophila* and *S. pneumoniae* are recommended only if there are risk factors such as exposure to an outbreak, recent travel, or severe CAP.² Risk factors for infection with *P. aeruginosa* and MRSA vary

amoxicillin, doxycycline, or a macrolide antibiotic (if local pneumococcal resistance is less than 25%) such as azithromycin or clarithromycin.² For patients with comorbidities, the committee recommends combination therapy with amoxicillin-clavulanate or cephalosporin with either a macrolide or doxycycline. Alternately, a respiratory fluoroquinolone may be used as monotherapy in these patients.

Since A.S. has chronic lung disease and was treated for a COPD exacerbation within the past three months with a macrolide antibiotic, he is at risk for developing resistance to the macrolides. On admission to the hospital, A.S. was started empirically on iv moxifloxacin, a respiratory fluoroquinolone. Compared with oral administration, iv administration promotes more rapid and more predictable drug distribution to achieve an effective therapeutic response.¹⁰

INITIAL PATIENT MANAGEMENT

A.S. was febrile, hypotensive, tachycardic, and tachypneic when he arrived in the ED accompanied by his daughter. Initial treatment included the administration of an antipyretic, iv fluids, oxygen therapy, antibiotics, a rapid influenza test, and because of the current pandemic, a molecular

COVID-19 test. A rapid influenza molecular assay is preferred over a rapid diagnostic test.² He was also given a 500 mL fluid bolus of normal saline to improve blood pressure. To address tachypnea and the crackles heard in the right middle lobe, a respiratory therapist administered albuterol via nebulization, after which a nurse assessed the response. Corticosteroids are not recommended except in pneumonia with refractory septic shock.²

- deep breathing and coughing
- use of incentive spirometry
- chest percussion

Deep breathing and coughing and the use of incentive spirometry facilitate alveolar expansion and mobilization and the expectoration of sputum. Deep breathing followed by a deep cough expands the alveoli in all lobes of the lung and loosens secretions, making them easier to expectorate. Patients

**If patients are experiencing pleuritic pain,
they may be reluctant to take a deep breath and cough;
not doing so could result in atelectasis.**

Nursing care. Upon A.S.'s admission to the telemetry unit, the nurse connects him to cardiac telemetry monitoring and conducts a head-to-toe assessment with a focused appraisal of the respiratory system. The nurse auscultates for breath sounds in all lung fields, comparing left to right in each field and listening for the presence of adventitious breath sounds such as crackles and wheezes. If adventitious sounds are present, the nurse asks the patient to take a deep breath and cough and then repeats the auscultation to determine if breath sounds improve with coughing. If the patient produces sputum, the nurse assesses the color, amount, and viscosity, and notes the presence of an odor. If the patient has not provided a sputum specimen for Gram stain and culture, the nurse can obtain it at this time.

If patients are experiencing pleuritic pain, they may be reluctant to take a deep breath and cough; not doing so could result in atelectasis. Absent or diminished breath sounds at the base of the lung may indicate the presence of a parapneumonic effusion or atelectasis.¹¹ A parapneumonic effusion is a collection of fluid in the pleural space adjacent to the affected part of the lung; depending on its volume, thoracentesis may be required to aid the patient's breathing efforts.¹¹ In addition to breath sounds, the nurse monitors oxygen saturation and respiratory effort and rate to identify early deterioration of respiratory status.

Respiratory management. Performance of respiratory hygiene is an important set of interventions to improve the patient's respiratory effort and to mobilize and expectorate sputum. It includes the following:

will need to be taught to use the incentive spirometer and the nurse should monitor the volume of inspired air and encourage the patient to use the spirometer every two to three hours while awake. While no specific volume may be stated in the provider's order, the nurse should encourage the patient to take as deep a breath as possible, with the goal of increasing the volume with subsequent use. The nurse documents the inspiratory volume the patient achieves in order to identify changes in the volume over time.

Chest percussion is accomplished by cupping the hands and firmly but gently tapping over all the lung fields. While effective in loosening sputum, chest percussion is labor intensive and can be time consuming. Teaching family members to perform chest percussion lets them be involved in their family member's care. An alternative to manual chest percussion is the use of a vest that provides high-frequency chest wall oscillation. According to Hristara-Papadopoulos and colleagues, high-frequency chest wall oscillation is as effective as manual percussion in facilitating expectoration of sputum, improving lung function, and providing adequate chest physiotherapy.¹² A handheld Acapella device is also used to assist in expectoration by providing high-frequency oscillation and positive expiratory pressure. The device causes intermittent airway resistance during expiration and provides a vibrating waveform that loosens sputum. Also, the positive expiratory pressure created keeps the airways open, making it easier to mobilize secretions.

In patients with COPD, after recovery from CAP, referral to pulmonary rehabilitation may be indicated. Pulmonary rehabilitation is an inter-

disciplinary program that assists patients in developing exercise tolerance through strength training, disease self-management education, energy conservation techniques, and psychosocial support.¹³ It improves health-related quality of life by increasing muscle strength and endurance, reducing hospital admissions, improving feelings of depression and anxiety, and relieving dyspnea.¹³

Infection control. Cough hygiene is an essential aspect of patient education to prevent the spread of respiratory infections. The Centers for Disease Control and Prevention (CDC) recommends that individuals with respiratory symptoms cover their nose and mouth with a tissue when sneezing or coughing and dispose of the tissue in the nearest trash receptacle. If a tissue is not readily available, the preferred method is to cough into the “wing” or bent elbow or upper arm. To prevent the spread of respiratory infections, coughing or sneezing into the hand should be discouraged. Refer to current CDC guidelines for added protections from respiratory illness during the COVID-19 pandemic, including wearing a cloth or surgical mask over mouth and nose for patients and appropriate personal protective equipment for health care providers.

an oxygen saturation level of 88% to 92% to decrease the risk of developing oxygen-induced hypercapnia.¹⁴

Mobility. Patients with pneumonia should be positioned with the head of the bed elevated to 30° to promote lung expansion, enhance sputum expectoration, and decrease the work of breathing. Turning patients from side to side mobilizes sputum and maximizes ventilation and perfusion through alveolar recruitment.¹⁵ It is also an opportunity to perform chest percussion. When positioning patients with unilateral pneumonia in a side-lying position, the nurse should place the patient with the good lung down to facilitate ventilation and perfusion of the side with pneumonia. If a patient with pneumonia also has COPD, sitting in a semi-Fowler or high Fowler position, assuming a tripod position, and using a pursed-lip breathing method may decrease the work of breathing.

In addition to turning and positioning, promoting early mobility by encouraging the patient to get out of bed is vital as well. Prior to initiating this effort, assess the need for tools and equipment, such as a walker, cane, or lift assist, to safely transfer and handle the patient. The Banner Mobility Assessment

Out-of-bed activities such as sitting on the edge of the bed and walking promote lung expansion and sputum expectoration and decrease fall risk.

Hand hygiene is another important factor in preventing the spread of bacteria. Health care settings may provide alcohol-based hand gel for ease of frequent hand hygiene. Caregivers should encourage patients to avoid touching their nose, eyes, or mouth to prevent the spread of bacteria as well.

Oxygen therapy. Supplemental oxygen therapy may be indicated in patients with pneumonia if their oxygen saturation level as measured by pulse oximetry is below 90% or if arterial blood gas results include a partial pressure of oxygen level of less than 80%. These results indicate hypoxia in patients with normal lung function but may not in patients with chronic lung disease. Adding moisture to the oxygen (humidification) helps liquefy sputum and prevent drying of the nasal passages. Use of supplemental oxygen in patients with COPD requires close monitoring and titration to maintain

Tool instructs the nurse in guiding patients through a four-step functional task measure to determine their level of mobility.¹⁶ The four steps are level one, sit and shake; level two, stretch and point; level three, stand; and level four, walk.

Out-of-bed activities such as sitting on the edge of the bed and walking promote lung expansion and sputum expectoration and decrease fall risk. Patients with loss of functional mobility should have a physical therapy consult to assess the safety of out-of-bed activities. Prior to discharge, a physical therapist should recommend a short-term rehabilitation facility stay or home physical therapy based on independent mobility and safety concerns. Early mobility aligned with a patient’s capabilities can aid in preventing complications of immobility such as deconditioning, deep-vein thrombosis, urinary tract infections, pressure injuries, and pneumonia.¹⁷

Hydration and nutrition are other considerations in the management of pneumonia. Patients may experience a fluid deficit because of increased insensible loss from expectoration of sputum and diaphoresis from defervescence. The patient may also experience anorexia because of acute illness and from the work of breathing, a condition that can affect hydration and nutritional status. Encourage fluid replacement by increasing oral intake. Correct dehydration, reverse hypotension, and improve renal function with oral or IV fluids. The nurse monitors patient intake and output to assess hydration status and identify early signs and symptoms of fluid overload. Signs include increased respiratory effort, cough with production of clear or blood-tinged sputum, and the presence of crackles with auscultation of the lung fields.

hypoxia, or sleep deprivation. Discharge needs to be evaluated by the case manager and social worker may include meal preparation, assistance with activities of daily living, referral to a home health care agency, smoking cessation support, and assistance with prescription medication management.

Potential complications. Patients admitted with an acute respiratory infection need to be monitored for the development of key complications such as hypoxia and sepsis. Patients with these complications may exhibit signs of lethargy, confusion, restlessness, or anxiety. Changes in mentation, laboratory results, and vital signs may indicate changes in the patient's status. The nurse should collect and review these data and report changes to the NP, physician, or physician assistant. Laboratory results indicative of sepsis include elevated serum lactate

It's important to educate patients on follow-up management of their condition to decrease the chance of hospital readmission.

Patients with pneumonia may tire easily, which makes it challenging to meet their nutritional needs. Patients who are acutely ill may need small, frequent meals that are high in protein and low in carbohydrates. Acute illness, such as pneumonia, creates physiological stress and increases protein and energy demands. Amino acids can be rapidly released from skeletal muscles to meet these increased requirements.¹⁸ Release of these amino acids can lead to a negative protein balance and loss of muscle mass. Another factor in loss of muscle mass is bed rest, which can result in skeletal muscle atrophy and functional decline. Encourage increased oral intake of high-quality protein, with the goal of 1 to 1.3 g/kg of protein per day in older adults.¹⁹ The nurse should request a dietary consult to identify food choices to meet the patient's nutritional needs. If possible, the postdischarge care provider should be included.

Early discharge planning. Early in a patient's hospitalization, case management and social work should be consulted in preparation for discharge. Family members or those caring for the patient should be included in all education regarding discharge management. This is important, because the patient may be experiencing inhibited learning and have a short attention span due to dyspnea,

levels (greater than 2 mmol/L), abnormally high (greater than 12,000 mm³) or low (less than 4,000 mm³) white blood cell count, increase in creatinine level from baseline, and decreased platelet count.²⁰ Tachycardia, hypotension, tachypnea, decreased urine output, and elevated serum lactate levels are indicative of decreased tissue perfusion. The body temperature of patients with sepsis may be low (below 36°C) or elevated (above 38.3°C) and in either case needs to be evaluated and monitored frequently. Vital signs should be monitored every four hours for prompt recognition of status change. Once vital signs are stable, this frequency can be adjusted to the routine of the unit. Focused respiratory assessment can identify the increased work and rate of breathing; the presence of crackles can indicate fluid overload. These symptoms or changes in patient status should be discussed with the health care provider in case additional interventions are needed.

An assessment tool such as the Sequential Organ Failure Assessment (SOFA) and the quick SOFA (qSOFA) assist in determining changes in patient status and development of sepsis.^{21,22} The SOFA is an eight-item assessment tool often used in ICUs to determine changes in organ function and to clinically identify a patient with sepsis.²² The qSOFA is a three-item assessment that looks at respiratory rate,

change in mental status, and systolic blood pressure.²¹ Baseline SOFA and qSOFA scores are assumed to be 0, unless acute or chronic organ dysfunction is present.²² Organ dysfunction is indicated by a qSOFA score of greater than 2.²¹ Using the qSOFA may lead to earlier identification of patients at risk for clinical deterioration and need for resuscitation and empirical antibiotic treatment.

Patients receiving antibiotics are at risk for secondary infections. Oral candidiasis, also known as thrush, can develop, and is identified by white or creamy patches on the tongue. Gastrointestinal distress or diarrhea can also occur. Some patients can develop *Clostridioides difficile* infections, resulting in severe diarrhea that can be uncomfortable, debilitating, and challenging to treat.

DISCHARGE INSTRUCTIONS

A.S. has been hospitalized for three days and is now being discharged home. It's important to educate patients on follow-up management of their condition to decrease the chance of hospital readmission. It's been reported that 17% to 25% of patients hospitalized with pneumonia are readmitted within 30 days, at a cost of \$10 billion annually.²³ In 2012, the Centers for Medicare and Medicaid Services implemented the Hospital Readmissions Reduction Program to reduce payments to hospitals with excess readmissions; pneumonia readmissions was an important area of focus.²³ As part of the discharge process, the case manager may assist A.S. in making a follow-up appointment with his primary care provider and set up a postdischarge phone call to answer any questions regarding his care.

In preparation for discharge, the primary care provider will perform medication reconciliation and review all current medications with A.S. and his daughter. The nurse and pharmacist will educate A.S. on the importance of taking all medications as prescribed and completing all the antibiotics even if he feels better. Completion of the antibiotics is important to prevent recurrence of symptoms or the development of drug-resistant organisms. A.S. and his daughter should be educated on the signs and symptoms to report to his primary care provider. These include elevated temperature; chills; change in sputum color, especially if blood is noted; increase in shortness of breath; and a lack of improvement in activity tolerance and energy levels. As previously noted, most CAP symptoms should resolve in 10 days; if not, the patient should contact the primary care provider. Slowly increasing physical activity as tolerated is a key element of recovery. The respiratory therapist should reinforce with the patient the importance of using the incentive spirometer, coughing and deep breathing, and use of pursed-lip breathing.

Patients need to be alerted to the potential secondary effects of antibiotic therapy such as oral candidiasis or diarrhea and instructed to notify the primary care provider if these develop. For people age 65 or older, the CDC recommends annual influenza vaccination and an initial 23-valent pneumococcal polysaccharide vaccine (PPSV23), to be repeated five years later.²⁴ Evidence indicates that use of the 13-valent pneumococcal conjugate vaccine (PCV13) in children has increased herd immunity and reduced rates of pneumonia in adults.³ In 2019, the CDC issued an updated recommendation that deemphasized the use of PCV13 in adults age 65 or older.²⁵

When A.S. returns home, he should be encouraged by his daughter and home health aide to eat nutritious food and maintain adequate fluid intake. Oral care should be encouraged to prevent dental plaque buildup and to monitor for oral candidiasis. Oral hygiene is important, as dental plaque can initiate the development of dental caries and periodontal disease; dental bacteria can also relocate to the respiratory system and lead to the development of pneumonia.²⁶ A.S. will need to take frequent rest breaks to conserve energy and decrease the incidence of fatigue. He should be encouraged to avoid crowds and people who have a respiratory illness to prevent a relapse. He should also be encouraged to obtain the PPSV23 as directed by his primary care provider and an annual influenza vaccine. Smoking cessation should also be encouraged. Continued smoking increases risk of CAP and progression of COPD. Hand hygiene should be frequently performed to assist in breaking the chain of transmission of bacteria and viruses.

CONCLUSION

Prevention of pneumonia rests on three pillars: annual influenza vaccination for all patients, pneumococcal vaccination for at-risk patients, and smoking cessation for patients who smoke.⁴ This approach to prevention illustrates the need for a robust public health and primary care effort. Immunizations and smoking cessation are primary and secondary prevention measures, respectively, that should be initiated in annual outpatient well visits long before illness occurs. Furthermore, like education on handwashing and infection control, immunizations and smoking cessation are interventions nurses are especially qualified to promote and perform. ▼

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