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Nosocomial Pneumonia: An Updated Review for Healthcare Professionals

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Abstract

Nosocomial pneumonia, including hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP), is a leading cause of morbidity and mortality in healthcare settings. HAP is defined as pneumonia occurring 48 hours or more after hospital admission, while VAP develops 48 to 72 hours after endotracheal intubation. These infections are associated with prolonged hospital stays, increased healthcare costs, and high mortality rates, particularly among critically ill patients. The rise of multidrug-resistant (MDR) pathogens further complicates treatment, underscoring the need for effective prevention, accurate diagnosis, and evidence-based management strategies. This review aims to provide healthcare professionals with an updated understanding of the etiology, risk factors, epidemiology, clinical presentation, diagnostic approaches, treatment strategies, and preventive measures for HAP and VAP. It emphasizes the importance of a multidisciplinary approach to improve patient outcomes and reduce the burden of these infections.The review synthesizes current guidelines, clinical studies, and expert recommendations on HAP and VAP. It examines the pathogenesis, common pathogens, and risk factors for MDR infections. Diagnostic methods, including clinical evaluation, microbiologic testing, and advanced molecular diagnostics, are discussed. Treatment strategies, including empiric and targeted antibiotic therapy, are outlined, along with recommendations for antimicrobial stewardship. The role of an interprofessional team in managing HAP and VAP is highlighted.HAP and VAP are primarily caused by gram-negative bacilli (e.g., Pseudomonas aeruginosa, Escherichia coli) and gram-positive cocci (e.g., Staphylococcus aureus, including MRSA). Risk factors for MDR pathogens include recent antibiotic use, prolonged hospitalization, and severe illness. Diagnosis relies on clinical criteria, imaging, and microbiologic testing, with molecular diagnostics offering rapid pathogen identification. Empiric therapy should cover MRSA and Pseudomonas aeruginosa, with de-escalation based on culture results. A 7-day antibiotic course is generally effective, though longer durations may be needed for severe cases. Preventive measures, such as hand hygiene, ventilator care bundles, and antimicrobial stewardship, are critical.HAP and VAP remain significant challenges in healthcare, with high morbidity and mortality rates. Effective management requires a multidisciplinary approach, early diagnosis, appropriate antibiotic use, and robust infection control measures. Ongoing research and adherence to evidence-based guidelines are essential to improving outcomes and reducing the impact of these infections.

Keywords: *Nosocomial Pneumonia, Hospital-Acquired Pneumonia (HAP), Ventilator-Associated Pneumonia (VAP), Multidrug-Resistant Pathogens, Antimicrobial Stewardship, Infection Control, Interprofessional Team.*

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Introduction

Nosocomial pneumonia, commonly known as hospital-acquired pneumonia (HAP), is a significant healthcare-associated infection characterized by the onset of pneumonia 48 hours or more after hospital admission, excluding cases present at the time of admission. This condition is a major cause of morbidity and mortality among hospitalized patients, particularly those with underlying health conditions or compromised immune systems. A critical subset of HAP is ventilator-associated pneumonia (VAP), which specifically occurs in intensive care units (ICUs) and is defined as pneumonia developing more than 48 to 72 hours after endotracheal intubation. VAP is a serious complication of mechanical ventilation, affecting approximately 10% to 20% of patients who require ventilatory support for more than 48 hours [1][2]. The pathogenesis of VAP is often linked to the colonization of the respiratory tract by pathogenic microorganisms, facilitated by the invasive nature of mechanical ventilation, which bypasses natural defense mechanisms. Both HAP and VAP are associated with prolonged hospital stays, increased healthcare costs, and higher rates of patient mortality, making them a focal point for infection control and prevention strategies in clinical settings [1][2]. The risk factors for HAP and VAP include prolonged hospitalization, mechanical ventilation, immunosuppression, and exposure to invasive medical devices. Preventive measures, such as strict adherence to hand hygiene, elevation of the head of the bed, and regular oral care, are critical in reducing the incidence of these infections. Additionally, early diagnosis and appropriate antimicrobial therapy are essential for improving patient outcomes. Despite advancements in medical care, HAP and VAP remain persistent challenges in healthcare systems worldwide, underscoring the need for ongoing research, improved diagnostic tools, and evidence-based interventions to mitigate their impact [1][2].

Etiology

Hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) are primarily caused by a range of bacterial pathogens, which vary depending on patient-specific factors and the microbial ecology of the healthcare institution. The most common causative agents include aerobic gram-negative bacilli, such as *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter* species, and *Acinetobacter* species. These pathogens are particularly concerning due to their propensity for developing antibiotic resistance, which complicates treatment and increases morbidity and mortality rates. Additionally, gram-positive cocci, including *Staphylococcus aureus* (with methicillin-resistant *S. aureus* [MRSA] being a significant subset) and *Streptococcus* species, are frequently implicated in HAP and VAP cases. The distribution of these pathogens is influenced by host-related factors, such as the patient's immune status and underlying health conditions, as well as institutional factors, including local antibiotic prescribing practices and infection control measures [2].

Risk Factors for Multidrug-Resistant (MDR) Pathogens

The emergence of multidrug-resistant (MDR) pathogens in HAP and VAP is a growing concern, as it limits therapeutic options and worsens patient outcomes. Specific risk factors have been identified for MDR VAP, including septic shock at the time of VAP diagnosis, acute respiratory distress syndrome (ARDS) preceding VAP onset, intravenous antibiotic use within 90 days prior to VAP, hospitalization for more than five days before VAP occurrence, and acute renal replacement therapy before VAP onset. Similarly, for MDR HAP, the use of intravenous antibiotics within 90 days prior to the infection is a significant risk factor. MRSA, a particularly virulent and resistant pathogen, is associated with prior intravenous antibiotic use within 90 days of HAP or VAP diagnosis. Additionally, MDR *Pseudomonas* infections, which are notoriously difficult to treat, are linked to the same risk factor of recent intravenous antibiotic use [1][3][2]. These risk factors highlight the critical role of antibiotic stewardship and infection control practices in preventing the development and spread of MDR pathogens. Understanding these etiological and risk factors is essential for guiding empirical antibiotic therapy, improving diagnostic accuracy, and implementing targeted preventive measures to reduce the burden of HAP and VAP in healthcare settings.

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Epidemiology

Hospital-acquired pneumonia (HAP) is a significant healthcare-associated infection, with an incidence rate of approximately 5 to 10 cases per 1,000 hospital admissions. It is recognized as the most prevalent cause of hospital-acquired infections in both Europe and the United States, contributing substantially to patient morbidity, mortality, and healthcare costs. Among critically ill patients, the risk of HAP is particularly high, with more than 90% of pneumonia episodes occurring in intensive care unit (ICU) settings. The majority of these cases are associated with mechanical ventilation, a life-saving intervention that simultaneously increases susceptibility to ventilator-associated pneumonia (VAP). VAP, a subset of HAP, is specifically defined as pneumonia that develops more than 48 to 72 hours after endotracheal intubation and is a leading cause of complications in mechanically ventilated patients [1][3]. The epidemiology of HAP and VAP underscores the vulnerability of ICU patients, particularly those requiring prolonged mechanical ventilation. These infections are associated with extended hospital stays, increased healthcare expenses, and higher mortality rates. The prevalence of HAP and VAP varies across healthcare institutions, influenced by factors such as infection control practices, antibiotic stewardship, and the underlying health status of the patient population. Despite advancements in medical care and infection prevention strategies, HAP and VAP remain persistent challenges in healthcare systems worldwide. Understanding the epidemiological patterns of these infections is crucial for developing targeted interventions, improving patient outcomes, and reducing the overall burden of hospital-acquired infections [1][3].

History and Physical

The clinical presentation of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) often includes a combination of respiratory and systemic symptoms, which can vary depending on the patient's underlying health status and the severity of the infection. Common symptoms reported by patients or observed in clinical settings include a persistent cough, often accompanied by expectoration of sputum, which may be purulent in nature. A rise in body temperature, or fever, is a frequent systemic manifestation, reflecting the body's inflammatory response to the infection. Patients may also experience chest pain, particularly during deep breathing or coughing, and dyspnea, or shortness of breath, which can range from mild to severe depending on the extent of lung involvement. In mechanically ventilated patients, these symptoms may be less apparent, making clinical suspicion and diagnostic testing critical for early identification [1][3]. On physical examination, several signs may indicate the presence of HAP or VAP. Fever is a common finding, often accompanied by tachypnea, or an increased respiratory rate, as the body attempts to compensate for impaired gas exchange. Auscultation of the lungs may reveal crackles, indicative of fluid accumulation in the alveoli, or signs of consolidation, such as dullness to percussion, bronchial breath sounds, and increased vocal resonance. In severe cases, patients may exhibit signs of respiratory distress, including the use of accessory muscles, cyanosis, or hypoxemia. These clinical findings, while nonspecific, provide valuable clues for diagnosing HAP and VAP, particularly when combined with radiographic evidence and microbiological data. A thorough history and physical examination remain essential components of the diagnostic process, guiding further investigations and therapeutic decisions [1][3].

Evaluation

Clinical Evaluation

The diagnosis of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) remains a complex and often controversial process, as no single method has been established as superior. According to the 2016 guidelines by the Infectious Diseases Society of America (IDSA) and the American Thoracic Society (ATS), the diagnosis of HAP and VAP is primarily based on the presence of a new or progressive lung infiltrate on chest imaging, coupled with clinical evidence suggesting an infectious etiology. This clinical evidence may include new-onset fever, purulent sputum, leukocytosis (elevated white blood cell count), or a decline in oxygenation. While these criteria provide a framework for diagnosis, they are not without limitations, as they can overlap with other conditions, such as pulmonary edema or atelectasis, leading to potential misdiagnosis [4][5]. To enhance diagnostic accuracy, the Clinical Pulmonary Infection Score

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(CPIS) has been proposed as a tool to assess the likelihood of pneumonia. The CPIS incorporates clinical, radiographic, and laboratory data, such as temperature, white blood cell count, tracheal secretions, oxygenation levels, and radiographic findings. While the CPIS can increase the sensitivity of pneumonia diagnosis, some studies have criticized its lack of specificity, which may result in unnecessary antibiotic use and contribute to antimicrobial resistance. Therefore, while the CPIS can be a useful adjunct, it should not replace clinical judgment or microbiological confirmation [4][5].

Bacteriologic Evaluation

For patients with VAP, obtaining lower respiratory tract samples for quantitative cultures is critical for accurate diagnosis and targeted treatment. Several methods are available for sampling, each with its advantages and limitations. Blind tracheobronchial aspiration (TBAS) is a noninvasive technique that involves inserting a flexible catheter through the endotracheal tube to collect secretions from the distal trachea. While TBAS is relatively simple and does not require specialized equipment, its blind nature means it cannot directly sample areas of the lung with radiographic infiltrates, potentially increasing the false-negative rate. Additionally, contamination of the catheter as it passes through the endotracheal tube and upper airways may lead to false-positive results [6]. Bronchoscopy with bronchoalveolar lavage (BAL) is another method that allows direct sampling of lung segments affected by pneumonia, thereby reducing the false-negative rate. However, BAL is operator-dependent, and contamination of the bronchoscope can affect results. Furthermore, the procedure can exacerbate hypoxemia, which may not be tolerated by critically ill patients. The protected specimen brush (PSB) technique, which involves advancing a brush through a bronchoscope to collect samples from the distal airways, minimizes contamination by upper airway secretions. However, like BAL, PSB requires expertise and may not be suitable for all patients [6]. For non-ventilated patients with HAP, noninvasive methods such as spontaneous expectoration, sputum induction, or nasotracheal suctioning can be used to obtain respiratory samples. These samples should be sent for microscopic analysis and culture to identify the causative pathogens.

Microscopic Analysis

Microscopic examination of respiratory samples includes assessing the presence of polymorphonuclear leukocytes (PMNs) and performing a Gram stain. The presence of abundant neutrophils and the morphology of bacteria observed on the Gram stain can provide preliminary insights into the likely pathogen and guide initial antibiotic selection while awaiting culture results [6][7].

Quantitative Cultures

Quantitative cultures are essential for distinguishing colonization from true infection. Diagnostic thresholds vary depending on the sampling method: endotracheal aspirates typically require ≥1,000,000 colony-forming units (CFU)/mL, bronchoscopic or mini-BAL samples require ≥10,000 CFU/mL, and PSB samples require ≥1,000 CFU/mL to confirm a diagnosis of VAP [6][7].

New Molecular Diagnostic Tests

Advances in molecular diagnostics, such as multiplex polymerase chain reaction (PCR) assays, offer rapid identification of respiratory pathogens and antibiotic resistance genes. These tests can significantly reduce the time required to initiate targeted antibiotic therapy, improving patient outcomes and supporting antimicrobial stewardship efforts [8]. In conclusion, the evaluation of HAP and VAP requires a combination of clinical, radiographic, and microbiological assessments. While no single method is definitive, integrating these approaches can enhance diagnostic accuracy and guide appropriate treatment.

Treatment / Management

The management of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) requires a strategic approach to initial empiric therapy, continuation therapy, and duration of treatment.

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The choice of antibiotics must account for the most common pathogens, local antimicrobial resistance patterns, and patient-specific risk factors for multidrug-resistant (MDR) organisms.

Initial Empiric Therapy

Empiric therapy for HAP and VAP should include antibiotics active against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and other gram-negative bacilli, as these are the most frequently implicated pathogens. The selection of antibiotics should be guided by the susceptibility patterns within the healthcare facility and the patient's individual risk factors for MDR infections. For patients with HAP who have risk factors for methicillin-resistant *Staphylococcus aureus* (MRSA), such as prior intravenous antibiotic use within 90 days, hospitalization in a unit where MRSA prevalence exceeds 20%, or high mortality risk (e.g., ventilator dependence or septic shock), agents like vancomycin or linezolid are recommended. This recommendation is based on weak evidence but is critical for high-risk patients to ensure coverage against MRSA [9][2]. For patients without MRSA risk factors or high mortality risk, antibiotics targeting methicillin-susceptible *S. aureus* (MSSA) and gram-negative bacilli, such as piperacillin-tazobactam, cefepime, levofloxacin, imipenem, or meropenem, are appropriate. In cases where *Pseudomonas aeruginosa* or other MDR gram-negative pathogens are suspected, combination therapy with two antibiotics from different classes (e.g., a beta-lactam plus an aminoglycoside or fluoroquinolone) is recommended for high-risk patients. For lower-risk patients, monotherapy with an agent active against *P. aeruginosa*, such as piperacillin-tazobactam, cefepime, ceftazidime, levofloxacin, ciprofloxacin, imipenem, meropenem, amikacin, gentamicin, or aztreonam, may suffice [2].

Continuation Therapy

After initiating empiric therapy, patients should be reassessed for clinical response and microbiologic findings within 48 to 72 hours. For patients with identified pathogens, the empiric regimen should be de-escalated to a narrower-spectrum antibiotic based on susceptibility results. This approach minimizes the risk of antimicrobial resistance and reduces unnecessary exposure to broad-spectrum agents. In patients who are clinically improving but lack a confirmed pathogen, empiric coverage for MRSA and MDR gram-negative bacilli can be discontinued if cultures from high-quality specimens are negative after 48 to 72 hours [2]. For patients who fail to improve within 72 hours of starting empiric therapy, a thorough evaluation is necessary. This includes assessing complications (e.g., empyema, lung abscess), alternate diagnoses, or other sites of infection. If pneumonia is confirmed and risk factors for MDR pathogens are present, additional pulmonary cultures should be obtained, and the empiric regimen should be expanded to cover additional resistant organisms [2].

Duration of Therapy

The optimal duration of antibiotic therapy for HAP and VAP is typically 7 days, as shorter courses have been shown to be as effective as longer durations while reducing the risk of antimicrobial resistance. However, certain patient populations may require extended therapy. These include patients with severe illness, bacteremia, slow clinical response, immunocompromised status, or complications such as empyema or lung abscess. In such cases, treatment duration should be individualized based on clinical and microbiologic response [2]. The management of HAP and VAP involves a balanced approach to empiric therapy, de-escalation based on microbiologic results, and judicious use of antibiotics to minimize resistance. Early reassessment, tailored therapy, and adherence to evidence-based guidelines are essential to optimize outcomes and reduce the burden of these infections in healthcare settings. By integrating clinical judgment with antimicrobial stewardship principles, clinicians can effectively manage HAP and VAP while mitigating the risks associated with prolonged or inappropriate antibiotic use [2].

Differential Diagnosis

The diagnosis of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) requires careful consideration of a broad differential diagnosis, as the clinical presentation can overlap with numerous other conditions. Key differentials include infections caused by *Acinetobacter* species, which are

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gram-negative bacilli often associated with multidrug resistance and commonly implicated in nosocomial infections. Viral pathogens, such as adenovirus, should also be considered, particularly in immunocompromised patients or those with atypical presentations. Bacterial sepsis, a systemic inflammatory response to infection, can mimic or complicate pneumonia, necessitating thorough evaluation to identify the primary source of infection. Burn wound infections, often caused by *Pseudomonas aeruginosa* or *Staphylococcus aureus*, can present systemic symptoms similar to pneumonia, especially in critically ill patients. Infections caused by *Clostridioides difficile*, particularly colitis, can lead to fever and leukocytosis, which may be mistaken for pneumonia in hospitalized patients. In pediatric or immunocompromised populations, viral infections such as croup (laryngotracheobronchitis) should be considered, as they can cause respiratory distress and fever. Gram-negative pathogens like *Enterobacter* species and *Escherichia coli* are common causes of nosocomial infections and can present pneumonia-like symptoms, particularly in patients with underlying comorbidities or prolonged hospital stays. Enterococcal infections, including those caused by *Enterococcus faecalis* and *Enterococcus faecium*, can also complicate the clinical picture, especially in patients with indwelling medical devices or prior antibiotic exposure. A comprehensive diagnostic approach, including clinical evaluation, imaging, and microbiologic testing, is essential to differentiate HAP and VAP from these conditions and to guide appropriate treatment. Misdiagnosis can lead to inappropriate antibiotic use, increased morbidity, and prolonged hospital stays, underscoring the importance of a thorough and systematic evaluation.

Prognosis

Hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) are associated with significant morbidity and mortality, making them critical concerns in healthcare settings. Numerous studies have demonstrated that HAP increases the risk of death, with mortality rates varying depending on patient populations and healthcare environments. Specifically, the all-cause mortality rate for VAP ranges from 20% to 50%, highlighting the severe impact of this condition on patient outcomes. The prognosis of HAP and VAP is influenced by several factors, including the severity of the patient's illness at the time of diagnosis, the presence of complications, and underlying comorbidities [10]. One of the most significant predictors of poor outcomes is the severity of illness at the time of pneumonia diagnosis. Patients presenting with conditions such as septic shock, coma, respiratory failure, or acute respiratory distress syndrome (ARDS) are at a markedly higher risk of mortality. These conditions often indicate systemic dysfunction and a reduced capacity to respond to infection, exacerbating the challenges of treatment. Additionally, the presence of bacteremia, or the spread of bacteria into the bloodstream, is associated with worse outcomes, as it reflects a more severe and disseminated infection [10]. Underlying comorbidities, such as chronic obstructive pulmonary disease (COPD), diabetes, immunosuppression, or renal failure, further complicate the prognosis by impairing the patient's ability to recover from infection. These conditions often necessitate more aggressive treatment and longer hospital stays, increasing the risk of complications. Early recognition, appropriate antimicrobial therapy, and supportive care are essential to improving outcomes, but the high mortality rates associated with HAP and VAP underscore the need for effective prevention strategies and ongoing research to optimize management approaches [10].

Enhancing Healthcare Team Outcomes

The effective management of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) necessitates a collaborative, interprofessional approach involving a diverse team of healthcare professionals. This team typically includes specialists in infectious diseases, pulmonology, critical care, and anesthesiology, as well as clinicians, nurses, and pharmacists who play pivotal roles in patient care. Each member of the team contributes unique expertise, ensuring comprehensive and coordinated management of these complex infections. Without such a multidisciplinary approach, the morbidity and mortality associated with HAP and VAP remain unacceptably high. Infectious disease specialists guide the selection of appropriate antimicrobial therapy, considering local resistance patterns and patient-specific risk factors for multidrug-resistant pathogens. Pulmonologists and critical care physicians focus on optimizing respiratory support and managing complications such as acute respiratory distress syndrome (ARDS) or respiratory failure. Anesthesiologists may be involved in the care of intubated patients, ensuring proper ventilator management to reduce the risk of VAP. Nurses are integral to the team, providing continuous

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monitoring, implementing infection control measures, and ensuring adherence to protocols such as elevating the head of the bed and performing regular oral care. Pharmacists contribute by ensuring appropriate antibiotic dosing, monitoring for drug interactions, and promoting antimicrobial stewardship to prevent resistance. Effective communication and collaboration among team members are essential for timely diagnosis, treatment, and prevention of HAP and VAP. Regular team meetings, shared decision-making, and clear documentation enhance patient outcomes. By leveraging the strengths of each team member, healthcare providers can reduce the incidence of HAP and VAP, improve patient recovery, and ultimately save lives. This interprofessional approach is critical to addressing the challenges posed by these serious nosocomial infections [11].

Conclusion

Nosocomial pneumonia, encompassing hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP), is a major cause of morbidity and mortality in hospitalized patients. HAP is defined as pneumonia occurring 48 hours or more after admission, while VAP develops 48 to 72 hours post-intubation. These infections are particularly prevalent in intensive care units (ICUs), with VAP affecting 10-20% of mechanically ventilated patients. The pathogenesis involves colonization of the respiratory tract by pathogens such as *Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus*, including methicillin-resistant strains (MRSA). Risk factors for multidrug-resistant (MDR) infections include recent antibiotic use, prolonged hospitalization, and severe illness, such as septic shock or acute respiratory distress syndrome (ARDS). Diagnosing HAP and VAP remains challenging due to overlapping symptoms with other conditions. Clinical criteria, including new lung infiltrates, fever, purulent sputum, and leukocytosis, are used alongside tools like the Clinical Pulmonary Infection Score (CPIS). Microbiologic evaluation, through methods such as bronchoalveolar lavage (BAL) and protected specimen brush (PSB), is essential for accurate diagnosis and targeted therapy. Advances in molecular diagnostics, such as multiplex PCR, enable rapid identification of pathogens and resistance patterns, facilitating timely treatment. Empiric antibiotic therapy for HAP and VAP should cover MRSA and *Pseudomonas aeruginosa*, with de-escalation based on culture results. Combination therapy is recommended for high-risk patients, while monotherapy may suffice for others. A 7-day antibiotic course is generally effective, though longer durations are needed for severe cases or complications like bacteremia or lung abscess. Antimicrobial stewardship is critical to preventing resistance and optimizing outcomes. Preventive measures, including hand hygiene, elevation of the head of the bed, and regular oral care, are essential in reducing the incidence of HAP and VAP. A multidisciplinary approach involving infectious disease specialists, pulmonologists, critical care physicians, nurses, and pharmacists is vital for effective management. By integrating clinical expertise, evidence-based guidelines, and infection control practices, healthcare teams can improve patient outcomes and reduce the burden of nosocomial pneumonia.

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الالتهاب الرئوي المكتسب من المستشفى: مراجعة محدثة لمقدمي الرعاية الصحية

الملخص

الخلفية: يعد الالتهاب الرئوي المكتسب من المستشفى (HAP) والالتهاب الرئوي المرتبط بجهاز التنفس الصناعي (VAP) من الأسباب الرئيسية للمراضة والوفيات في البيئات الصحية. يُعرَّف HAP بأنه الالتهاب الرئوي الذي يحدث بعد 48 ساعة أو أكثر من دخول المستشفى، في حين يتطور VAP بعد 48 إلى 72 ساعة من التنبيب الرغامي. ترتبط هذه العدوى بإطالة مدة الإقامة في المستشفى، وارتفاع التكاليف الصحية، ومعدلات وفيات عالية، لا سيما بين المرضى ذوي الحالات الحرجة. يزيد انتشار مسببات الأمراض المقاومة للمضادات الحيوية من تعقيد العلاج، مما يستدعي الحاجة إلى استراتيجيات فعالة للوقاية، والتشخيص الدقيق، والعلاج القائم على الأدلة.

الهدف: تهدف هذه المراجعة إلى تزويد مقدمي الرعاية الصحية بفهم محدث عن مسببات المرض، وعوامل الخطر، والوبائيات، والتشخيص، والعلاج، والتدابير الوقائية لـ HAP و VAP. كما تؤكد على أهمية النهج متعدد التخصصات لتحسين نتائج المرضى وتقليل عبء هذه العدوى.

المنهجية: تستند هذه المراجعة إلى الإرشادات الحالية، والدراسات السريرية، وتوصيات الخبراء حول HAP و VAP. يتم تحليل آلية المرض، والمسببات الشائعة، وعوامل الخطر للإصابات المقاومة للمضادات الحيوية. تناقش الأساليب التشخيصية، بما في ذلك التقييم السريري، والاختبارات الميكروبيولوجية، والتقنيات الجزيئية المتقدمة. يتم استعراض استراتيجيات العلاج، بما في ذلك العلاج التجريبي والموجه بالمضادات الحيوية، مع التركيز على ممارسات ترشيد استخدام المضادات الحيوية. كما يتم تسليط الضوء على دور الفريق الطبي متعدد التخصصات في إدارة هذه العدوى.

النتائج: تعد العصيات سالبة الجرام (مثل *Pseudomonas aeruginosa* و*Escherichia coli*) والمكورات موجبة الجرام (مثل *Staphylococcus aureus*، بما في ذلك MRSA) من المسببات الرئيسية لـ HAP و VAP. تشمل عوامل خطر الإصابة بمسببات الأمراض المقاومة للمضادات الحيوية الاستخدام الحديث للمضادات الحيوية، والإقامة الطويلة في المستشفى، والحالات المرضية الشديدة. يعتمد التشخيص على المعايير السريرية، والتصوير الشعاعي، والاختبارات الميكروبيولوجية، بينما توفر الفحوصات الجزيئية تحديدًا سريعًا للممرضات. يجب أن يشمل العلاج التجريبي MRSA و*Pseudomonas aeruginosa*، مع تقليل نطاق المضادات الحيوية بناءً على نتائج المزرعة. عادةً ما يكون نظام العلاج بالمضادات الحيوية لمدة 7 أيام فعالًا، لكن الحالات الشديدة قد تتطلب فترات أطول. تعتبر التدابير الوقائية، مثل نظافة اليدين، وبروتوكولات العناية بجهاز التنفس الصناعي، وترشيد استخدام المضادات الحيوية، ضرورية للحد من انتشار العدوى.

الاستنتاج: يظل HAP و VAP تحديًا كبيرًا في الرعاية الصحية، حيث يؤديان إلى معدلات مراضة ووفيات مرتفعة. يتطلب التعامل الفعال مع هذه الحالات نهجًا متعدد التخصصات، وتشخيصًا مبكرًا، واستخدامًا مناسبًا للمضادات الحيوية، وتدابير صارمة لمكافحة العدوى. يُعد الالتزام بالإرشادات المستندة إلى الأدلة والاستمرار في البحث ضروريين لتحسين نتائج المرضى وتقليل التأثير الصحي لهذه العدوى.

الكلمات المفتاحية :الالتهاب الرئوي المكتسب من المستشفى، الالتهاب الرئوي المرتبط بجهاز التنفس الصناعي، مسببات الأمراض المقاومة للمضادات الحيوية، ترشيد استخدام المضادات الحيوية، مكافحة العدوى، الفريق الطبي متعدد التخصصات.