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Healthcare-associated pneumonia: Diagnostic criteria and distinction from community-acquired pneumonia

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SUMMARY

Background: Traditionally, pneumonia developing in patients who receive healthcare services in the outpatient environment has been classified as community-acquired pneumonia (CAP). However, recent investigations suggest that this type of infection, known as healthcare-associated pneumonia (HCAP), is distinct from CAP in terms of its epidemiology, etiology, and risk for infection with multidrug-resistant (MDR) pathogens.

Methods: A Medline literature review of available clinical studies using the term HCAP was conducted to determine outcomes compared to CAP and effective empiric treatment strategies.

Results: Analysis of multi-institutional clinical data showed that mortality in hospitalized patients with HCAP is greater than that in CAP, and patients with HCAP received inappropriate initial empiric antibiotic treatment more frequently than CAP patients. The bacterial pathogens associated with HCAP also differed from CAP with potentially MDR Gram-positive and Gram-negative bacteria being more common in HCAP.

Conclusions: All patients hospitalized with suspected HCAP should be evaluated for their underlying risk of infection with MDR pathogens. Because HCAP is similar to hospital-acquired pneumonia (HAP), both clinically and etiologically, it should be treated as HAP until culture data become available.

1. Introduction

In recent years, the traditional distinction between community-acquired and hospital-acquired infections has become less clear, with some infections having mixed characteristics of both types.[1,2] Pneumonia occurring before hospital admission in patients with recent contact with the health system has been termed 'health-care-associated pneumonia' (HCAP), and has been proposed as a new category of respiratory infection that needs a distinct approach when selecting empiric antibiotic therapy.[3–9]

Since the publication of the 2005 update of the American Thoracic Society and Infectious Diseases Society of America (ATS/IDSA) nosocomial pneumonia guidelines, which incorporated for the first time the concept of HCAP, 12 studies have provided original data on HCAP.[4,6,10–19] On the basis of the published data, patients with recent or chronic contact with the healthcare system appear to be at increased risk of infection with multi-drug resistant (MDR) pathogens.[3,4] These pathogens are frequently not covered by the initial antimicrobial treatment recommended in guidelines for community-acquired pneumonia (CAP).[7] Many physicians are also unaware of the risk factors for HCAP and the clinical relevance of distinguishing it from CAP.[9,20] Since patients classified as having HCAP are often heterogeneous, and the studies published on HCAP sometimes differ in setting and methodology, some authors have criticized the concept of HCAP.[21]

Therefore, the aim of this paper is to critically review the available evidence on HCAP and to propose a summary of recommendations regarding the definition of HCAP.

2. Methods

A Medline literature review of available clinical studies using the term HCAP was conducted to determine outcomes compared to CAP and to identify risk factors for HCAP. The references of the identified citations were also reviewed for additional pertinent studies.

3. Results and discussion

3.1. Definitions of HCAP: the body of evidence

A correct recognition of risk factors for HCAP is crucial, because acceptance of a broader definition of HCAP could potentially

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Table 1
Definitions of HCAP used in different studies according to four criteria

Study [Ref.]	Previous hospitalization	Hemodialysis; home infusion therapy	Residence in a nursing home or LTCF	Immunosuppression
ATS/IDSA guidelines	At least 2 days in the preceding 90 days	Yes; within 30 days	Yes	Immunosuppressive disease and/or therapy[a]
Kollef et al. 2005	In the preceding 30 days	Yes	Yes	No
Micek et al. 2007	In the preceding 360 days	Yes	Yes	Corticosteroids (5 mg/day or more), HIV infection, solid organ or bone marrow transplant, radiation or chemotherapy for cancer in the past 6 months, inherited or acquired immunodeficiency
Carratalà et al. 2007	At least 2 days in the preceding 90 days	Yes; within 30 days	Yes	Intravenous chemotherapy in the 30 days before pneumonia
Webster et al. 2007	At least 2 days in the preceding 30 days	Yes; within 30 days	Yes	Intravenous chemotherapy in the 30 days before pneumonia
Shorr et al. 2008	In the preceding 90 days	Yes	Yes	Presence of neutropenia, concurrent use of an oral corticosteroid (at least 5 days of therapy) or other immunosuppressive agent, active chemotherapy for malignancy, or infection with HIV
Venditti et al. 2009	At least 2 days in the preceding 180 days	Yes; within 30 days	Yes	Intravenous chemotherapy in the 30 days before pneumonia
Shindo et al. 2009	At least 2 days in the preceding 90 days	Yes; within 30 days	Yes	No
Rello et al. 2010	At least 2 days in the preceding 90 days	Yes; within 30 days	Yes	Intravenous chemotherapy in the 30 days before pneumonia
Schreiber et al. 2008	In the preceding 90 days	Yes; within 30 days	Yes	Immunosuppressive therapy in the 30 days before pneumonia
Cecere et al. 2010	In the preceding 90 days	Yes	Yes	HIV infection, neutropenia in the past 2 weeks, use of $\geq$20 mg of prednisone per day, or other immunosuppressant drugs

HCAP, healthcare-associated pneumonia; ATS/IDSA, American Thoracic Society/Infectious Diseases Society of America; LTCF, long-term care facility; HIV, human immunodeficiency virus.
[a] Not included in the definition, but considered a risk factor for multidrug-resistant pathogens.

increase the use of antimicrobial drugs, produce selection pressure for MDR organisms, and increase the cost of healthcare.[21] According to the 2005 ATS/IDSA guidelines, HCAP includes any patient presenting with pneumonia with one of the following features: (1) hospitalization for two or more days in an acute care facility within 90 days of infection, (2) patients from a nursing home or long-term care facility (LTCF), (3) patients who attended a hospital or hemodialysis clinic, and (4) those who received intravenous antibiotic therapy, chemotherapy, or wound care within 30 days of infection.[3] These definitions have been incorporated by different authors in clinical studies (Table 1). Most studies considered prior hospitalization of at least 2 days in the 90 days preceding hospitalization as an important risk factor (Table 2).[12,15,16] However, other authors have found it useful to expand this interval to 180–360 days.[6,10] All HCAP studies are concordant in considering residence in a nursing home or in a LTCF and hemodialysis as risk factors for HCAP, and most authors also included immunosuppression as a potential risk factor.[6,10–12,14,16,18,19]

4. Role of MDR pathogens in patients with risk factors for HCAP

4.1. Previous hospitalization and previous antibiotic treatment

Exposure to the hospital environment creates an opportunity for pathogens not commonly present in the community to colonize the upper respiratory and gastrointestinal tracts of patients. This

Table 2
Percentage of patients included in four criteria for HCAP (including overlapping cases)

Study [Ref.]	Previous hospitalization	Hemodialysis	Residence in a nursing home or LTCF	Immunosuppression
Kollef et al. 2005	Not reported	11.6%[a]	49.6%	23.2%
988 patients (median age 73 years)				
Micek et al. 2007	93.3%	10%	28.1%	39.7%
431 patients (mean age 59.8 years)				
Carratalà et al. 2007	43.7%	31.7%	25.4%	11.9%[b]
126 patients (mean age 69.5 years)				
Webster et al. 2007	25%	0%	44%	31%
28 patients (mean age 67.8 years)				
Shorr et al. 2008	63%	6.7%	18.9	30%
639 patients (mean age 59.7 years)				
Venditti et al. 2009	80%	3.3%	10%	6.7%
90 patients (mean age 62.2 years)				
Shindo et al. 2009	39%	7.1%	61%	9.2%
141 patients (mean age 81.3 years)				
Rello et al. 2010	56.8%	2.3%	38.5%	18.2%
44 patients[c] (median age 77 years)				
Schreiber et al. 2008	22.1%	15.3%	26.8%	22.1%
190 patients (mean age 60.9 years)				
Cecere et al. 2010	24%	5%	30%	58%
164 patients (mean age 46.1 years)				

HCAP, healthcare-associated pneumonia; LTCF, long-term care facility.
[a] Patients with a history of chronic renal disease, not specified if undergoing hemodialysis therapy.
[b] Long-term corticosteroid use.
[c] Only cases of pneumococcal HCAP.