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Original article

Community-acquired pneumonia and positive urinary antigen tests: Factors associated with targeted antibiotic therapy

Pneumonies aiguës communautaires avec antigènes solubles urinaires positifs : facteurs associés à une antibiothérapie ciblée

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Abstract

Background. – The use of rapid microbiological tests is supported by antimicrobial stewardship policies. Targeted antibiotic therapy (TAT) for community-acquired pneumonia (CAP) with positive urinary antigen test (UAT) has been associated with a favorable impact on outcome. We aimed to determine the factors associated with TAT prescription.

Patients and methods. – We conducted a retrospective multicenter study including all patients presenting with CAP and positive UAT for *Streptococcus pneumoniae* or *Legionella pneumophila* from January 2010 to December 2013. Patients presenting with aspiration pneumonia, coinfection, and neutropenia were excluded. CAP severity was assessed using the Pneumonia Severity Index (PSI). TAT was defined as the administration of amoxicillin for pneumococcal infection and either macrolides or fluoroquinolones (inactive against *S. pneumoniae*) for Legionella infection.

Results. – A total of 861 patients were included, including 687 pneumococcal infections and 174 legionellosis from eight facilities and 37 medical departments. TAT was prescribed to 273 patients (32%). Four factors were found independently associated with a lower rate of TAT: a PSI score ≥ 4 (OR 0.37), Hospital A (OR 0.41), hospitalization in the intensive care unit (OR 0.44), and cardiac comorbidities (OR 0.60). Four other factors were associated with a high rate of TAT: positive blood culture for *S. pneumoniae* (OR 2.32), Hospitals B (OR 2.34), E (OR 2.68), and H (OR 9.32).

Conclusion. – TAT in CAP with positive UAT was related to the hospitals as well as to patient characteristics.

Keywords: Community-acquired pneumonia; Urinary antigen test; *S. pneumoniae*; Legionella; Antimicrobial stewardship

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Résumé

Introduction. – L'utilisation des tests rapides est recommandée pour le bon usage des antibiotiques. L'antibiothérapie ciblée des pneumonies aiguës communautaires (PAC) avec antigènes urinaires positifs (AUP) est associée à un meilleur pronostic. Notre objectif était de déterminer les facteurs associés à la prescription d'une antibiothérapie ciblée.

Patients et méthodes. – Étude multicentrique rétrospective incluant tous les patients avec une PAC, avec AUP pour le pneumocoque ou *Legionella pneumophila* (janvier 2010–décembre 2013). Les patients présentant une pneumonie d'inhalation, une co-infection ou une neutropénie étaient exclus. La gravité de la PAC était estimée par score de Fine. L'antibiothérapie ciblée était définie par l'administration d'amoxicilline pour une infection à pneumocoque ou d'un macrolide ou d'une fluoroquinolone (inactive sur le pneumocoque) dans la légionellose.

Résultats. – Au total, 861 patients inclus : 687 infections à pneumocoque et 174 légionelloses de huit établissements de santé et 37 services médicaux. Une antibiothérapie ciblée était prescrite dans 273 cas (32 %). Quatre facteurs apparaissaient reliés à un faible taux d'antibiothérapie ciblée : un score de Fine ≥ 4 (OR 0,37), l'hôpital A (OR 0,41), une hospitalisation en réanimation et une comorbidité cardiaque (OR 0,60). Quatre autres facteurs étaient associés à un taux élevé d'antibiothérapie ciblée: une hémoculture positive pour le pneumocoque (OR 2,32), les hôpitaux B (OR 2,34), E (OR 2,68) et H (OR 9,32).

Conclusion. – L'antibiothérapie ciblée dans le cadre d'une PAC documentée par AUP est fonction des établissements de santé et des caractéristiques des patients.

Mots clés : Pneumonie aiguë communautaire ; Antigènes urinaires ; Pneumocoque ; Legionella ; Bon usage des antibiotiques

Various guidelines recommend the use of an empirical antibiotic therapy including amoxicillin-clavulanic acid, third-generation cephalosporins or respiratory quinolones for community-acquired pneumonia (CAP) requiring in-hospital care. This antibiotic therapy can be qualified as having a broad antibacterial spectrum of activity [1–3].

However, the key concept in infectious disease management is microbial identification and susceptibility testing allowing for the selection of appropriate antibiotics. Accordingly, reassessing antibiotic prescriptions on Day 3 is a major goal in clinical practice for outcome improvement and for reducing the emergence of multidrug-resistant bacteria [4].

Urinary antigen tests (UAT) for *Streptococcus pneumoniae* and Legionella may be performed as part of the microbiological investigation for CAP. However, international guidelines are not unanimous regarding antibiotic reassessment in case of a positive UAT. This may be due to the non-optimal sensitivity and specificity of the test, in particular for *S. pneumoniae* [5–9].

Previous studies demonstrated that targeted antibiotic therapy (TAT) following a positive UAT could be used with no deleterious impact on clinical outcome [10–14]. We have also recently demonstrated that amoxicillin prescribed for severe CAP with positive UAT for *S. pneumoniae* was associated with a favorable outcome compared with other antibiotics [15].

Although Legionella or *S. pneumoniae* UATs have been widely prescribed over the past 15 years, their positivity rarely leads to TAT [16,17] and factors associated with TAT have not been specifically studied. We aimed to determine the factors contributing to TAT prescription based on a positive UAT for Legionella or *S. pneumoniae*.

1. Methods

1.1. Population and study design

We conducted a retrospective multicenter study including all adult patients with a positive UAT for *S. pneumoniae* or Legionella from January 2010 to December 2013.

Participating facilities are part of a profesionnal multidisciplinary network for antibiotic stewardship, which main goals are the homogenization of practices, performance of audits, and clinical researches [18–20].

Positive UATs were selected from the computerized database of the related laboratories.

The inclusion criterion was a primary discharge diagnosis of CAP in adult patients for whom a positive UAT was obtained during the study period.

Exclusion criteria were healthcare-associated infection (defined as a diagnosis established ≥ 48 hours after hospital admission), exacerbation of chronic obstructive pulmonary disease, and meningitis for which *S. pneumoniae* UAT might be positive. Also, we excluded patients whose medical records indicated aspiration pneumonia, and/or co-infection, and/or neutropenia.

Clinical data, therapeutic strategies, and outcomes were collected from patients' charts. Comorbidities were defined as the prescription of the related specific treatment before hospital admission, or during hospital stay if the diagnosis was newly established. Disease severity was evaluated using the Pneumonia Severity Index (PSI).

A positive UAT may have different impacts on antibiotic treatment prescription. If the results are immediately available, TAT may be the first course of antibiotics. If UAT results are

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