Microbial Etiology of Community-Acquired Pneumonia in Immunocompromised Patients

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Introduction

- Community-acquired pneumonia (CAP) is a leading cause of infection related mortality in the United States

- Few studies have specifically evaluated the microbial etiology of CAP in immunocompromised patients

- Previous epidemiological studies are usually based on single center studies and there is a need for large population based studies

Objective

- Compare the microbial etiology of CAP in immunocompromised inpatients compared to immunocompetent inpatients using a large national US database

Methods

- Retrospective review

  - Adult patients admitted with a diagnosis of pneumonia

  - July 2010 - June 2015

  - 175 US hospitals participating in Premier

- Cases identified by an ICD-9-CM principal-diagnosis code of pneumonia

- Immunocompromised was defined by the receipt of immunosuppressive medications or ICD-9 codes for neutropenia/ hematological malignancy/ organ transplantation or comorbidities with AIDS.

- Each patient had to undergo a chest radiograph and be on antibiotics

- For the microbial etiology, patients were included if they had a positive culture or test collected by hospital day 0 through 3

- Patients with identical Gram negative organisms in blood and urine were excluded

Results

- A total of 168,159 patients had a diagnosis of pneumonia with a culture or other test performed on the first 3 days

- A pathogen was detected in 18.8% of the patients

- Overall, the median age was 72 years, 48% were female, 39% were admitted to the intensive care unit (ICU) and in-hospital mortality was 10.7%

- Among pathogen positive patients, 4,851 patients were identified as immunocompromised and 26,752 as immunocompetent.

- Almost all patients (99%) had at least one culture, blood (96%) and respiratory (51%).

- Among patients who were immunocompromised, the most common bacterial pathogens (compared to immunocompetent patients) were, *S. pneumoniae* (17.7% vs 19.0%), MRSA (13.1% vs 14.4%), MSSA (12.0% vs 11.8%), *P. aeruginosa* (12.0% vs 9.9%), *E. coli* (7.4% vs 6.4%), *K. pneumoniae* (5.8% vs 4.9%), *H. influenzae* (5.5% vs 5.5%), *M. pneumoniae* (3.0% vs 3.0%) and *L. pneumophila* (0.93% vs 1.2%).

**Figure 1: Pathogens detected in immunocompromised patients with community acquired pneumonia**
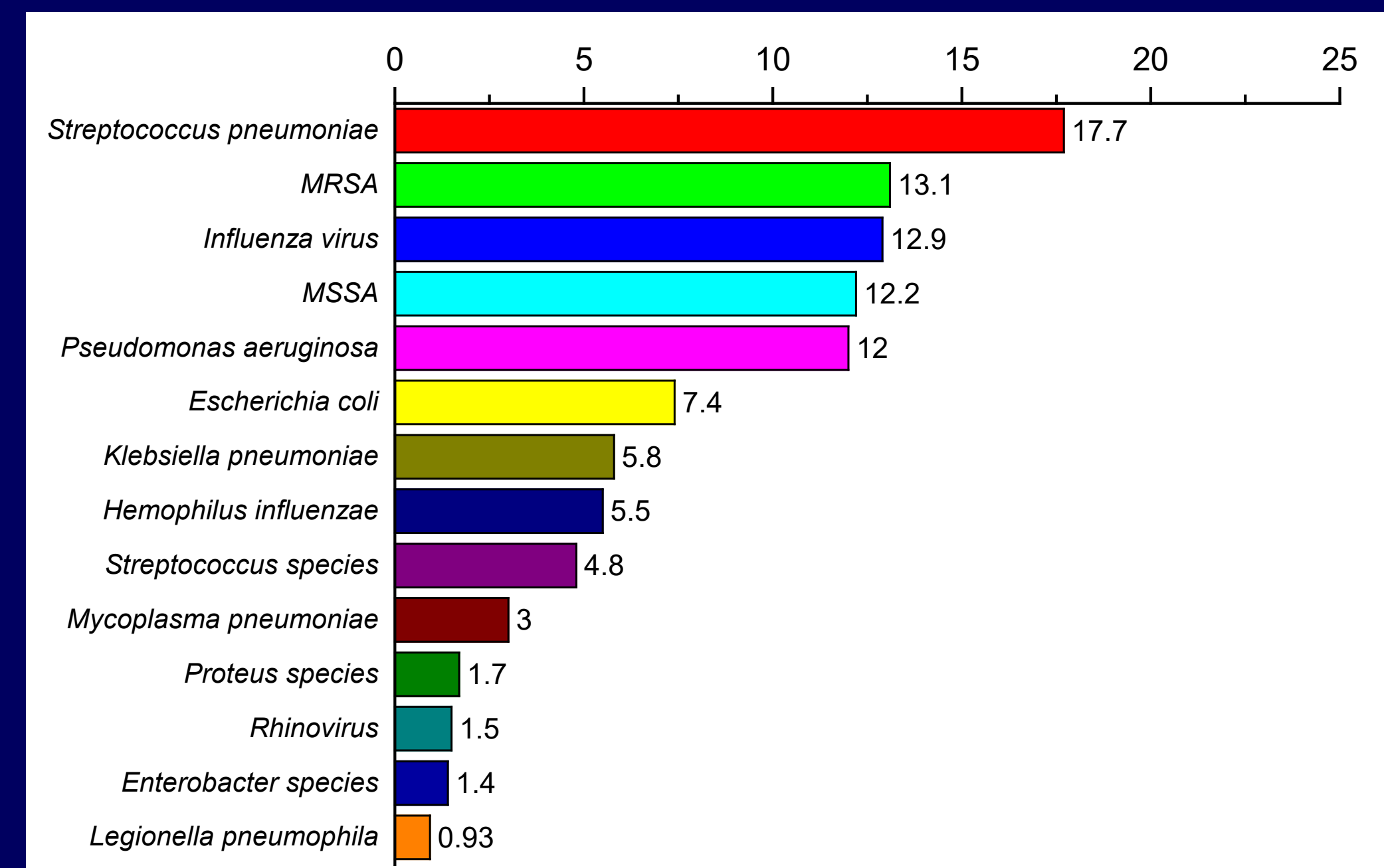
* X-axis represents percentage

Results

- Among viral pathogens, while the most common were influenza virus (12.9% vs 14.1%) followed by rhinovirus (1.5% vs 0.89%), immunocompromised patients has a higher prevalence of noninfluennza viruses (3.42% vs 2.43%).

- Figure 2 compares the etiology of CAP for immunocompromised vs. immunocompetent patients

Figure 2: Immunocompromized vs immunocompetent – comparison of pathogens detected in patients with community acquired pneumonia
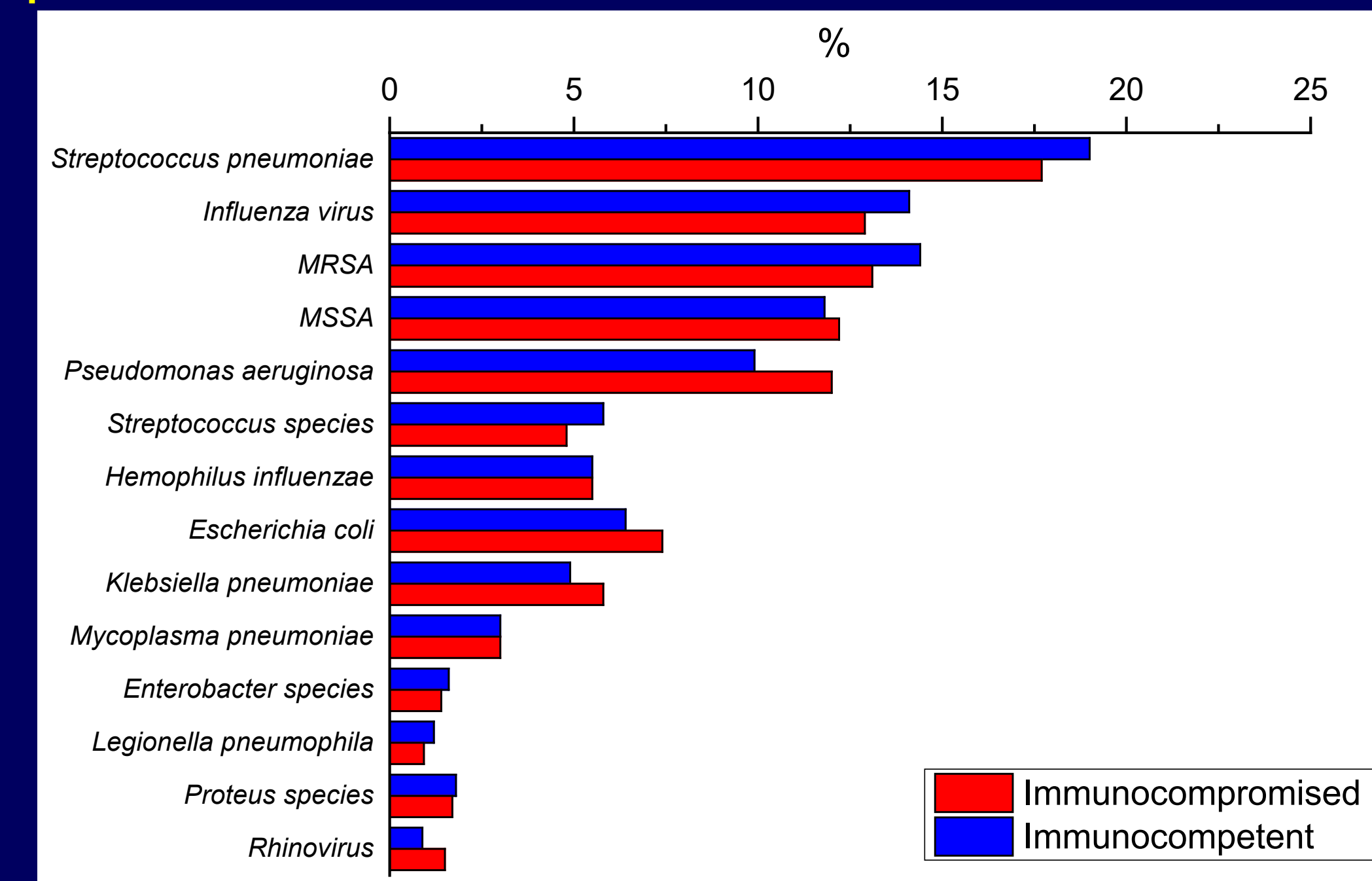
Conclusions

- In a large US inpatient sample, the causative organisms in immunocompromised patients did not differ much from those in immunocompetent patients.

- CAP pathogens in immunocompromised patients were more likely to involve gram-negative bacilli such as *P. aeruginosa* and *E. coli*, than gram-positive cocci.

- These findings may have implications when deciding on empiric therapy in these patients.