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Impact of respiratory viruses in intensive care unit patients with community-acquired pneumonia : a one-year retrospective single-centre study

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Background

Pneumonia is the **most frequent** community-acquired infection responsible for Intensive Care Unit (ICU) admission. Rapid **multiplex PCR** enables early diagnosis of respiratory infections in daily routine testing. Few studies have been described since this technique has been made available in routine.

Objectives

To assess the **prevalence and distribution** of pathogens among ICU patients with community-acquired pneumonia (CAP) and the relationship with **severity and outcome**.

Methods

We conducted a **retrospective** analysis of data obtained in a French 27 ICU-bed medical unit admitting around 1,000 patients a year. From November 2016 to October 2017, **naso-pharyngeal swabs** from 223 patients were collected within **72h after admission** to ICU and tested for 24 pathogens using the sample to answer **ePlex Respiratory Pathogen Panel** which delivered results in 1.5 hours (multiplex PCR). For bacteria testing, we used standard techniques (sputum, bronchial aspiration, bronchoalveolar lavage or blood culture).



Image 1: ePlex Respiratory Pathogen Panel device

Results

A total of **109 patients** had CAP, 39 had aspiration or opportunistic pneumonia, 22 non-pulmonary infections, 11 pulmonary edema, 19 exacerbations of chronic lung disease, and 24 other diagnoses. Patients with CAP had the following characteristics: age 60 +/- 16 years, male sex 60%, length of stay (LOS) in ICU 8.7 +/- 9.0 days, mechanical ventilation 45% and mortality 11%.

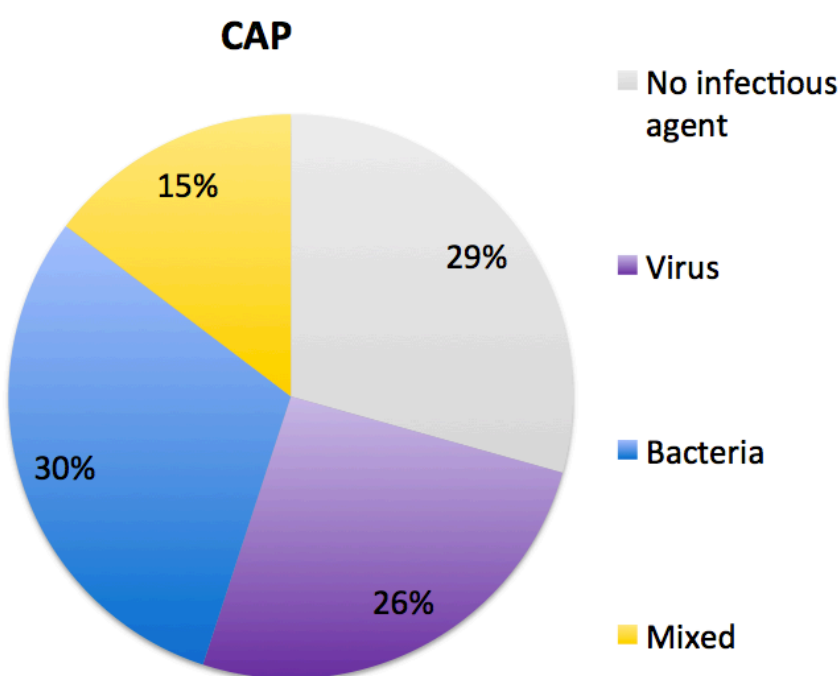


Figure 1: Ratio of bacteria and viruses among CAP

Pathogens	Patients number
No infectious agent	34
Virus only	28
Bocavirus	1
Coronavirus	2
Influenza A	6
Influenza A + Rhinovirus/Enterovirus	1
Adenovirus	2
Metapneumovirus	1
Rhinovirus/Enterovirus	10
Parainfluenza	4
RSV + Rhinovirus/Enterovirus	1
Bacteria only	31
Citrobacter koseri + S. aureus	1
E. coli	2
H. influenzae	4
L. pneumophila	2
Mycoplasma pneumoniae	1
P. aeruginosa	1
S. aureus	1
S. haemolyticus	1
S. pneumoniae	13
S. pneumoniae + E. coli	1
S. pneumoniae + H. influenzae	2
Others bacteria	2
Virus and bacteria	16
Influenza A + P. aeruginosa	1
Influenza A + S. aureus + M. catarrhalis	1
Influenza A + S. pneumoniae	2
Influenza A + S. pneumoniae + M. catarrhalis	1
Influenza A + Streptococcus pyogenes	1
Metapneumovirus + S. aureus	1
Metapneumovirus + S. pneumoniae	1
Rhinovirus/Enterovirus + H. influenzae	1
Rhinovirus/Enterovirus + S. pneumoniae	3
Parainfluenza + H. influenzae	1
Parainfluenza + S.pneumoniae	1
RSV + Adenovirus + L. pneumophila	1
RSV + S. pneumoniae	1
Total	109

Table 1: Distribution of pathogens among CAP

The main detected bacteria were ***S. pneumonia*** (23%) and ***H. influenza*** (6,5%). The main viruses were **Rhinovirus/Enterovirus** (14 %), **Influenzae A** (11 %) and **Parainfluenzae virus** (5%) and the most frequent virus-bacteria associations were ***S. pneumoniae* with Influenzae A** (3%) and ***S. pneumoniae* with Rhinovirus/Enterovirus** (3%).

The **SAPS 2** score was higher in the mixed group (p = 0.02). The **ICU-LOS** was 5.6 (no agent), 7.7 (virus), 10.0 (bacteria) and 14.8 (mixed) days respectively (p=0.05). **Mortality** was 9,4% (no agent), 7,2% (virus), 15,2% (bacteria) and 6,3% (mixed) with no statistical difference.

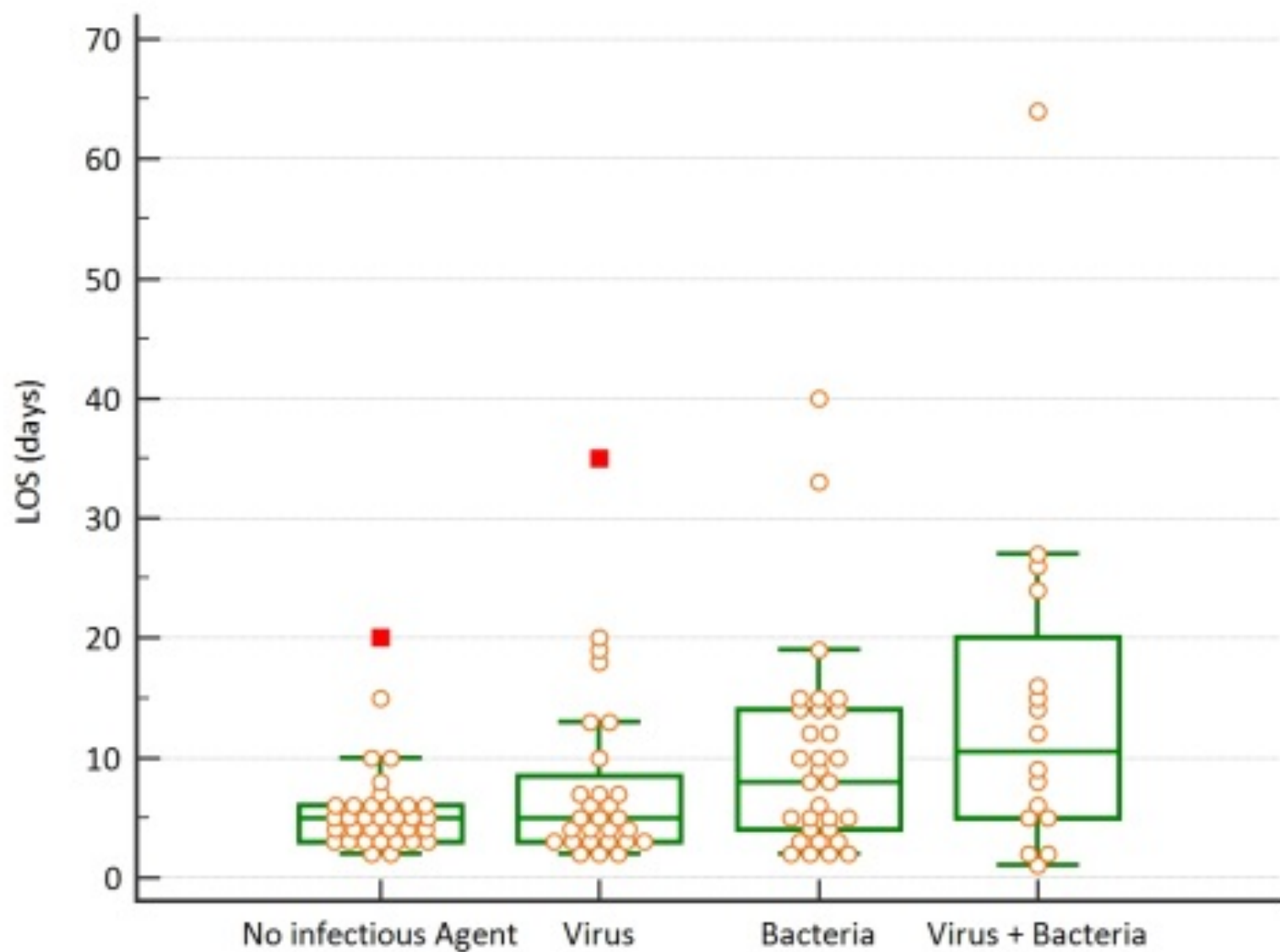


Figure 2 : Box-and-Whisker plot representing the distribution of the LOS depending of the 4 groups of patients.

Conclusion

In our ICU population, **respiratory viruses** were present in **40% of CAP**. Patients with **mixed infections** had **longer ICU-LOS**. These results are consistent with other studies made on this topic (*Voriot et al., Critical Care, 2016*). More studies are needed to evaluate if the implementation of rapid diagnostic testing using multiplex PCR could reduce overuse of antibiotics in patients with CAP.