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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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Marion Giry (1), Marie Gueudin (2), Déborah Boyer (1), Adeline Baron (2), Gaetan Beduneau (1), Soumaya Skallil (2), Steven Grange (1), Dorothée Carpentier (1), Fabienne Tamion (1), Christophe Girault (1), Benoit Misset (3)

(1) Rouen University Hospital, Medical ICU, F-76000, Rouen, France (2) Rouen University Hospital, Department of Microbiology, F-76000, Rouen, France (3) Liège University Hospital, ICU, Liège, Belgium

# **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-pharyngal 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).

<u>Image 1</u>: ePlex Respiratory Pathogen Panel device

#### Result

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%.

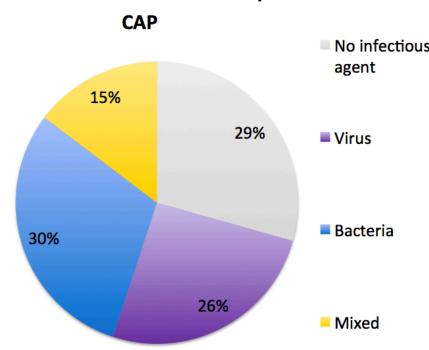


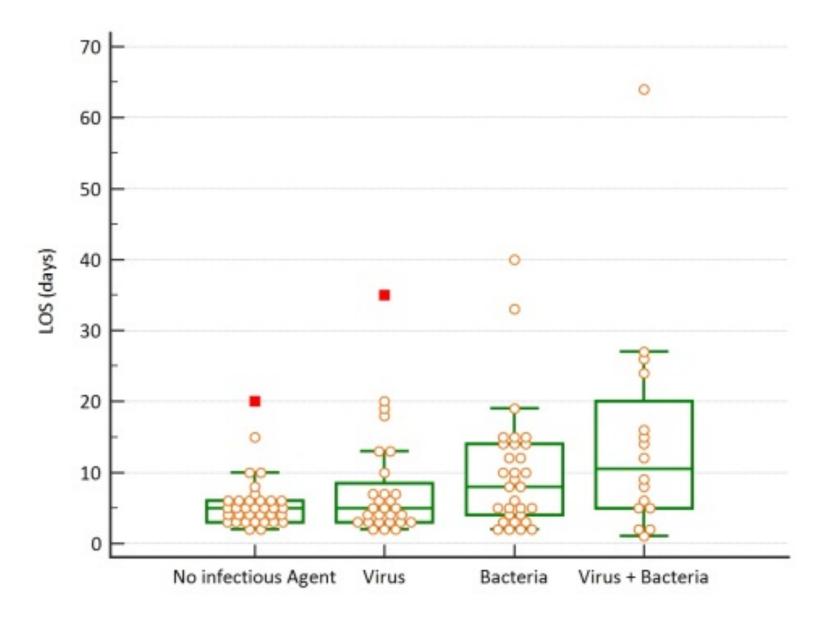
Figure 1: Ratio of bacteria and viruses among CAP

Pathogens 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

<u>Table 1:</u> 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.



<u>Figure 2</u>: 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.