27th ECCMID Vienna, Austria 22 – 25 April 2017
The congress of ESCMID

RESPIRATORY VIRUSES IN HOSPITAL-ACQUIRED PNEUMONIA IN AN INTENSIVE CARE UNIT: A MONOCENTRE RETROSPECTIVE STUDY

Paul Loubet, Guillaume Voiriot, Nadhira Fidouh, Mathilde Neuville
Lila Bouadma, François-Xavier Lescure, Diane Descamps, Jean-François Timsit, Yazdan Yazdanpanah, Benoit Visseaux

iame UMR 1137 Infection • Antimicrobials • Modelling • Evolution
université PARIS DIDEROT PARIS 7
Instituts thématiques Inserm Institut national de la santé et de la recherche médicale
ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS

Transparency Declaration

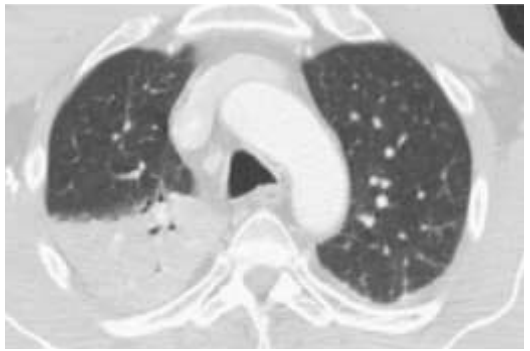
I have received :

- **personal fees** (lectures) from **Pfizer**
- **non-financial support** (travel and accommodation paid) from
  - **Sanofi Pasteur**,
  - **Pfizer**,
  - **Gilead,**
  - **Bristol-Myers Squibb**

INTRODUCTION

Hospital-Acquired Pneumonia and Respiratory Viruses

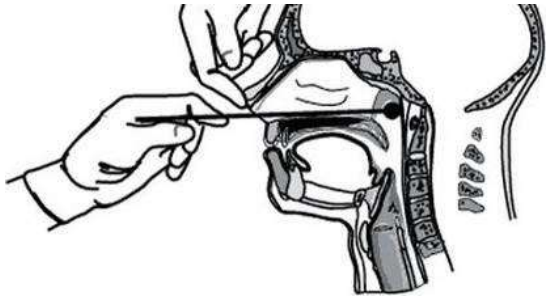
- 2nd most common nosocomial infection (1st in ICU)
- 1st cause of death by nosocomial infection (up to 50% in VAP)



- Microbiology :
  - Bacteria +++ (*P. aeruginosa*, *S. aureus*, *Enterobacteria)*
  - Respiratory viruses :

Improvement of virological detection technique: multiplex PCR

Hong et al. Plos One 2014: 22.5% (59/262)



Objectives

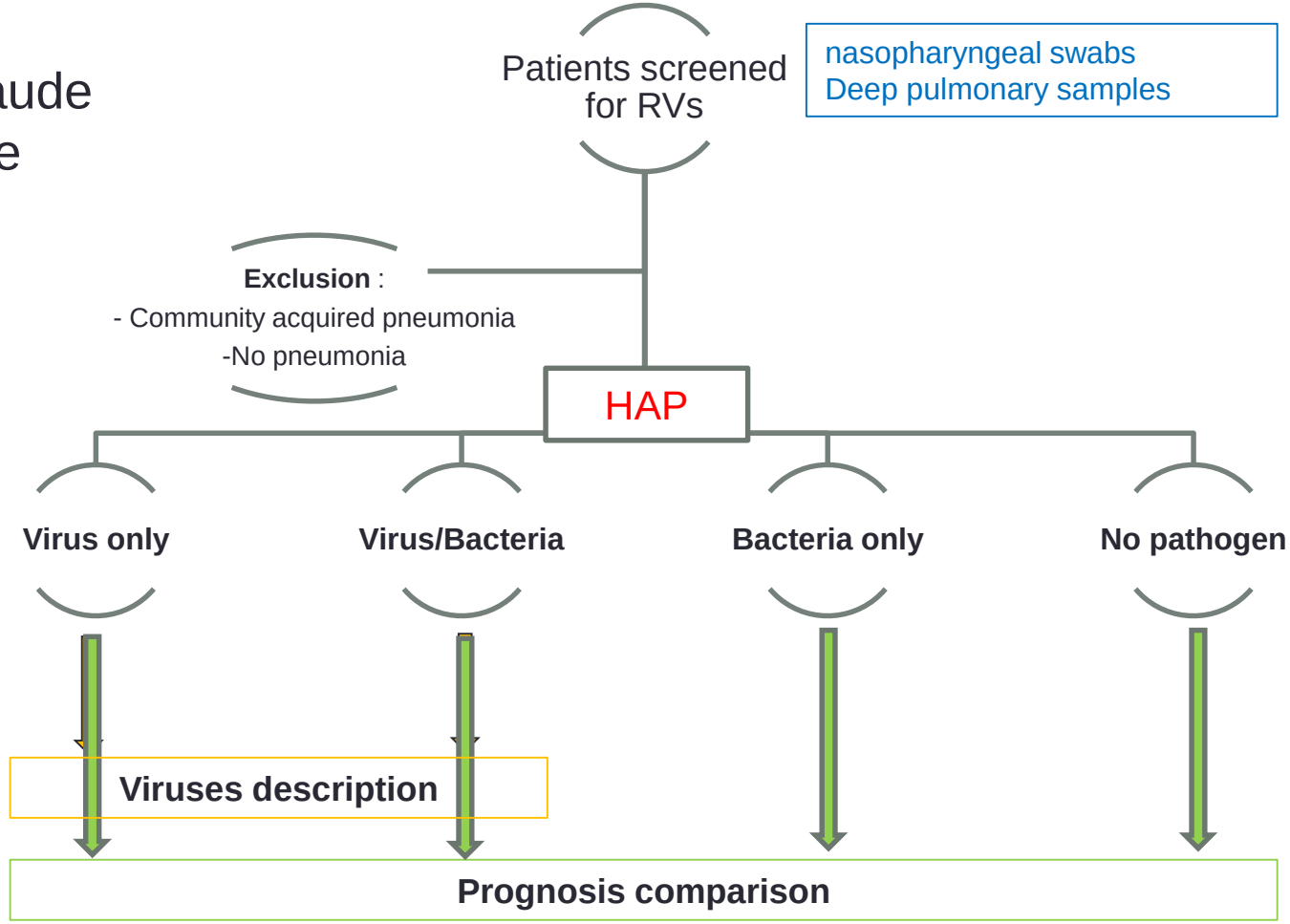
- To describe the proportion and types of respiratory viruses in Hospital-Acquired Pneumonias in ICU

- To assess the impact of respiratory viruses on prognosis

METHODS

Study Design

- Single-center, retrospective study
- Intensive Care Unit, Bichat-Claude Bernard Hospital, Paris, France
- May 2014 and April 2016



Definitions

- Virological detection:
  - mPCR assay, AnyplexTM II RV16 Detection kit (Seegene® Inc., Seoul, Korea)

- Microbiological results:
  - Bacteriology (sputum, BAL fluid, Blood cultures)
  - Mycology & Parasitology (sputum, BAL fluid)
  - Virology : HSV & CMV (BAL fluid)

- Prognosis:
  - In-hospital mortality
  - D28 mortality
  - Mean ICU length of stay

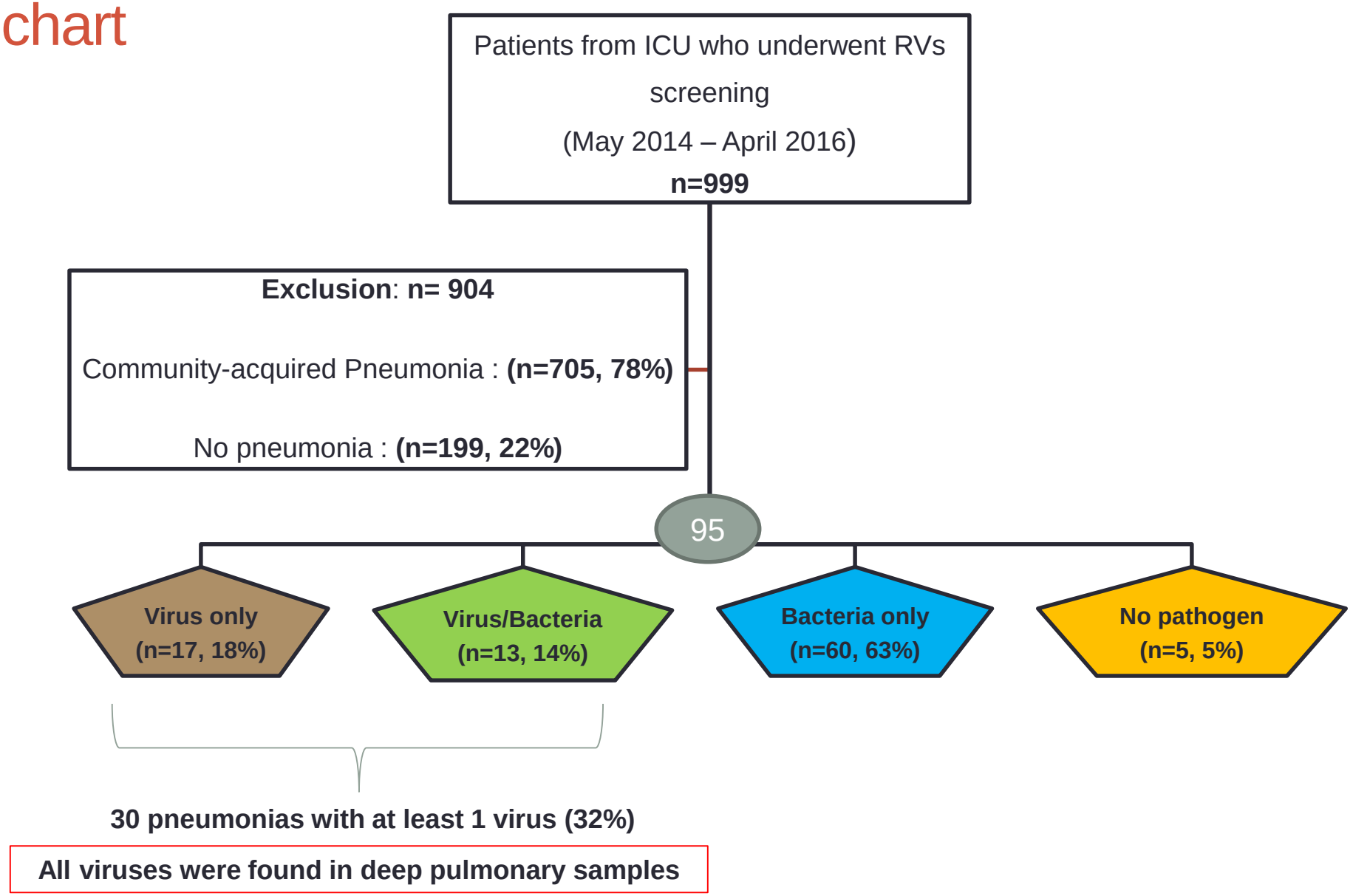
Virus et bactéries respiratoires (Recherche par PCR)

Prélèvement: Ecouvillon nasal

Adénovirus	Négative
Entérovirus	Négative
Virus Influenza A	Négative
Virus Influenza B	Négative
Virus Parainfluenza 1	Négative
Virus Parainfluenza 2	Négative
Virus Parainfluenza 3	Négative
Virus Parainfluenza 4	Négative
Métapneumovirus	Négative
Virus respiratoire syncytial A	Négative
Virus respiratoire syncytial B	Négative
Rhinovirus	Négative
Coronavirus	Négative
Coronavirus 229E	Négative
Coronavirus NL63	Négative
Coronavirus OC43	Négative
Bocavirus	*Positive
Mycoplasma pneumoniae	Négative
Chlamydia pneumoniae	Négative
Legionella pneumophila	Négative
Bordetella pertussis	Négative
Bordetella parapertussis	Négative

RESULTS

Flow chart


Patients from ICU who underwent RVs screening
(May 2014 – April 2016)
n=999
Exclusion: n= 904
Community-acquired Pneumonia : (n=705, 78%)
No pneumonia : (n=199, 22%)
95
Virus only
(n=17, 18%)
Virus/Bacteria
(n=13, 14%)
Bacteria only
(n=60, 63%)
No pathogen
(n=5, 5%)
30 pneumonias with at least 1 virus (32%)
All viruses were found in deep pulmonary samples

Demographics, clinical characteristics according to pathogens identified

	Total	Virus only (n=17)	Bacteria only (n=60)	Virus/Bacteria Coinfection (n=13)	p-value
Age, years (median [IQR])	61 [52-69]	61 [50-66]	61.5 [54.5-69]	58 [53-65]	0.68
Male, n(%)	71 (75)	13 (76)	44 (73)	11 (85)	0.76
Active smoking, n(%)	30 (32)	7 (41)	16 (27)	5 (38)	0.39
Underlying conditions, n(%)	64 (67)	13 (76)	40 (67)	11 (85)	0.40
Structural Lung Disease	27 (28)	6 (35)	1 (23)	5 (38)	0.38
Chronic Heart Failure	16 (17)	3 (18)	11 (19)	1 (8)	0.83
End-Stage Renal Failure	5 (5)	2 (12)	3 (5)	0	0.37
Liver cirrhosis	3 (3)	0	3 (5)	0	1.0
Diabetes mellitus	36 (37)	8 (47)	22 (37)	4 (31)	0.62
Immunocompromised State, n(%)	41 (46)	10 (59)	22 (37)	9 (69)	0.05
Solid Transplant Recipient	24 (27)	6 (35)	16 (27)	2 (15)	0.49
Solid Cancer	3 (3)	1 (6)	2 (3)	0	1.0
Malignant Blood Disease	3 (3)	1 (6)	1 (2)	1 (8)	0.26
Immunosuppressive treatment	31 (34)	8 (47)	18 (30)	8 (47)	0.38
HIV (Uncontrolled)	4 (4)	0	3 (5)	1 (8)	0.58
Autoimmune disease	5 (6)	1 (6)	1 (2)	3 (23)	0.01
Hospital stay prior to HAP diagnosis, median [IQR], days	17 [9-36]	26 [9-46]	16 [9-37]	17 [9-20]	0.72
SAPS II Score at admission, median [IQR]	52 [34-61]	44 [30-57]	55 [35-63]	47 [37-63]	0.35

Microbiology

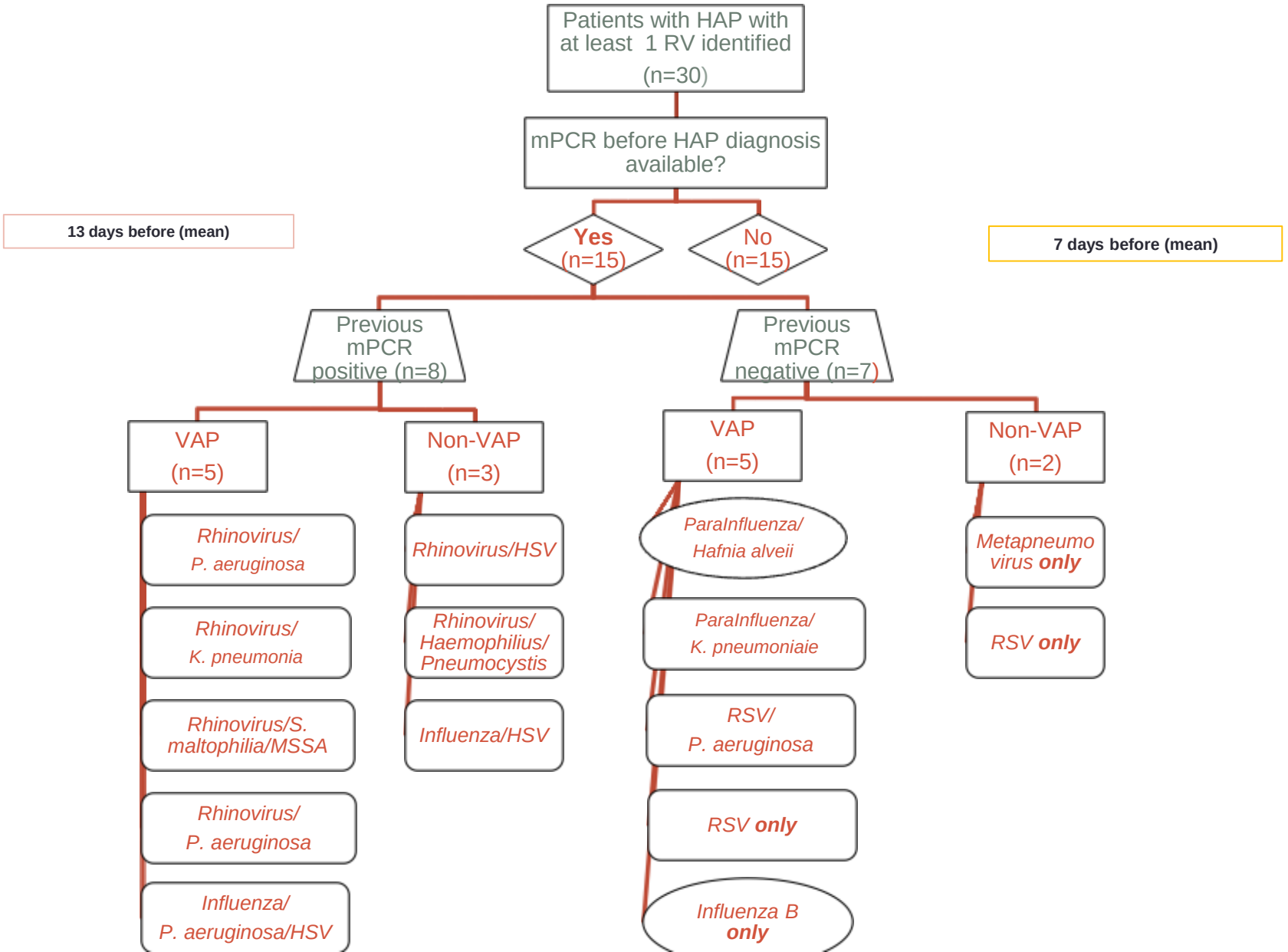
Bacteria (n=90)	N(%)
Non-fermenting Gram-negative bacilli	37 (39)
Pseudomonas aeruginosa	29 (31)
Stenotrophomonas maltophilia	6 (6)
Acinetobacter baumanii	2 (2)
Enterobacteria	34 (36)
Enterobacter species	12 (13)
Escherichia coli	8 (8)
Klebsiella species	7 (7)
Hafnia alveii	4 (4)
Proteus mirabilis	1 (1)
Citrobacter koserii	1 (1)
Serratia marcescens	1 (1)
MSSA	10 (11)
Others	9 (9)
Enterococcus species	4 (4)
Haemophilius influenza	3 (3)
Branhamella catarrhalis	2 (2)

Respiratory Viruses (n=30)	N(%)
Influenza	8 (8)
Rhinovirus	8 (8)
RSV	5 (5)
Parainfluenza	4 (4)
Bocavirus	2 (2)
Adenovirus	1 (1)
Coronavirus	1 (1)
Metapneumovirus	1 (1)

Prognosis

	Total	Virus only (n=17)	Bacteria only (n=60)	Virus/Bacteria Coinfection (n=13)	p-value
ICU length of stay after HAP diagnosis in patients alive at release, median [IQR], days	14 [4-26]	5 [3-11]	14.5 [5.5-25.5]	31 [18-48]	0.0002
In-hospital mortality	38 (40)	6 (35)	24 (40)	8 (62)	0.30
Mortality at Day 28	40 (42)	7 (41)	25 (42)	8 (62)	0.45

Chronic shedding/Hospital-acquired



DISCUSSION & CONCLUSION

Discussion

- RVs were identified in 32% of HAP (screened for RVs)
- Hong *et al.* South Korea : 22.5%, no impact on outcome
- Limitations:
  - Selection bias: 66% of all HAP over the same period
    - Patients included were more often immunocompromised

Conclusion

- Respiratory viruses are frequent in HAP
- More frequent in immunocompromised patients
- Virus/Bacteria co-infection seems to be more severe
- RVs found in HAP could be divided in two categories:
  - (i) community-acquired viruses with chronic shedding (i.e. mainly rhinovirus) in immunocompromised patients, associated with other microorganisms at the time of HAP.
  - (ii) hospital-acquired viruses (RSV, parainfluenza, influenza and human metapneumovirus) in debilitated patients with prolonged hospitalization.
- How to interpret pathogenicity and viral/bacterial coinfection ?
- Need for further systematic prospective studies

THANK YOU