

PNEUMOCOCCAL INFECTION IN A COHORT OF 818 COVID-19 HOSPITALISED PATIENTS: RISK FACTORS AND OUTCOME

D. Tesoro, N. Gemignani, A. Tavelli, A. Cona, G. C. Marchetti, A. d'Arminio Monforte, R. Castoldi, G. Mulè

Clinic of Infectious Diseases, San Paolo Hospital, ASST Santi Paolo e Carlo, Department of Health Sciences, University of Milan

BACKGROUND

- Bacterial infections represent a known burden in patients affected by viral respiratory illnesses (e.g. previous influenza pandemics)
- Lower rate of bacterial co-pathogens in COVID-19 pneumonia, but little information about specific respiratory coinfections¹

1) Louise Lansbury, Benjamin Lim, Vadsala Baskaran, Wei ShenLim. Co-infections in people with COVID-19: a systematic review and meta-analysis. *Journal of Infection*. Volume 81, Issue 2, August 2020, Pages 266-275

AIMS

- Evaluate frequency and characteristics of pneumococcal coinfection in hospitalised COVID-19 patients
- Assess pneumococcal impact on clinical course and mortality

METHODS

- Retrospective cohort study (24th Feb – 30th Nov 2020) at San Paolo Hospital in Milan, Italy.
Calendar periods considered: Feb-Jun 2020 (1st semester) and Jul-Nov 2020 (2nd semester)
- All consecutive hospitalized COVID-19 patients tested for pneumococcal urinary antigen (PnUAg)
- PnUAg+ vs. PnUAg- patients
 - *Demographics*
 - *Medical history*
 - *Clinical Outcomes*

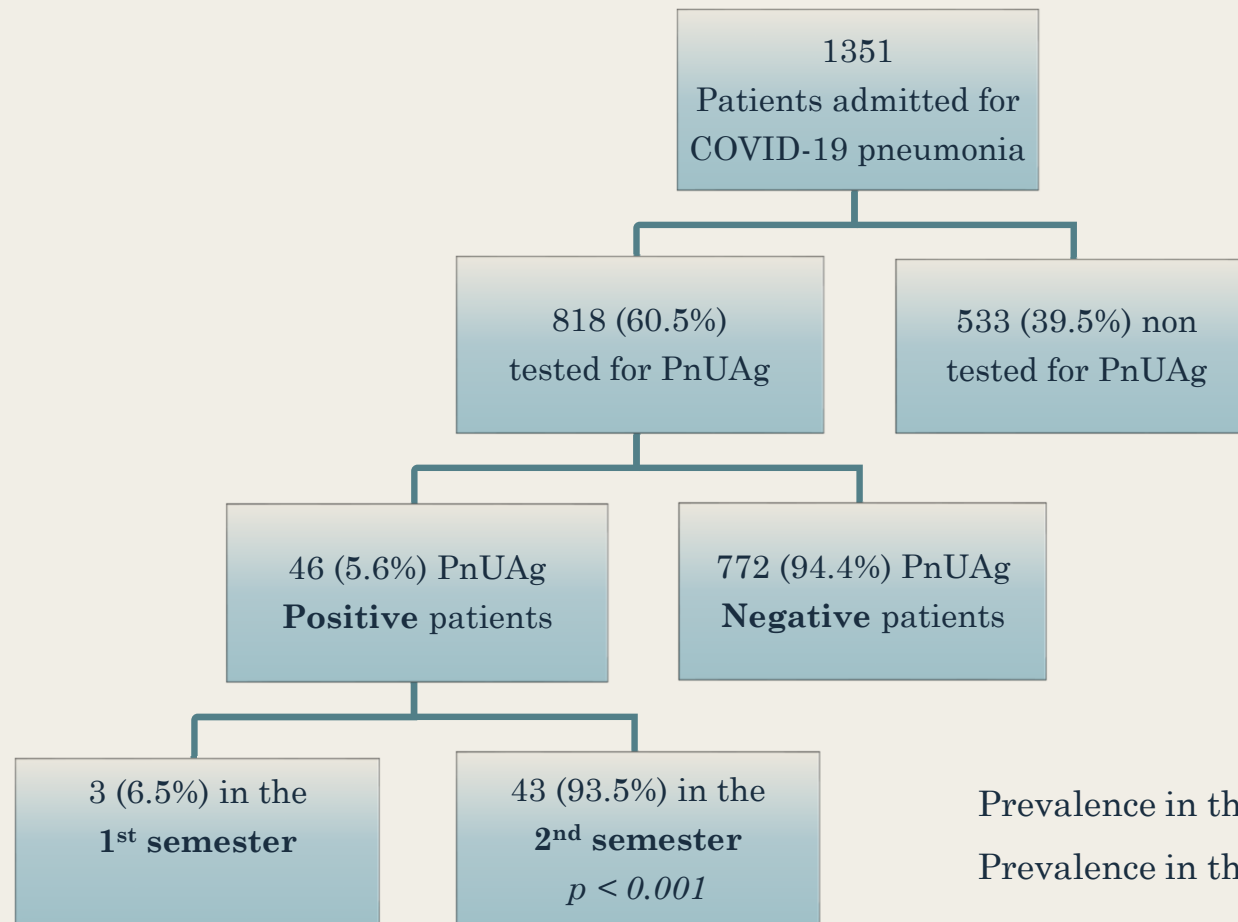
Outcomes

- I) Prevalence of PnUAg positivity in COVID-19 patients
- II) Risk factors for pneumococcal coinfection
- III) Clinical course and mortality of coinfecting patients

Statistical analysis:

- Prevalence of PnUAg+ has been calculated as number of PnUAg+ patients divided by total number of tested patients
- To compare characteristics of patients who had PnUAg+ vs. those who did not → Chi-square and Kruskal-Wallis test
- To identify factors associated with PnUAg+ → unadjusted and adjusted logistic regression model
- Association between PnUAg +/- and time to discharge has been estimated using standard survival analysis (Kaplan-Meier, log rank test) and unadjusted and adjusted Cox regression model, using death as competing risk event

RESULTS (1)



Prevalence in the 1st semester: 0.67%

Prevalence in the 2nd semester: 11.5%

	PnUAg+ patients N=46 (5.6%)	PnUAg- patients N=772 (94.4%)	Overall (N=818)	P value
Calendar period of hospital admission, N (%)				
First Semester (Feb-Jun 2020)	3 (6.5%)	441 (57.1%)	444 (54.3%)	<0.001
Second Semester (Jul-Nov 2020)	43 (93.5%)	331 (42.9%)	374 (45.7%)	
Gender, Male, N (%)	18 (39.1%)	509 (65.9%)	527 (64.4%)	<0.001
Smoking habit				0.020
Non smokers	2 (4.4%)	50 (6.5%)	52 (6.4%)	
Former smokers	4 (8.7%)	77 (10.0%)	81 (9.9%)	
Current smokers	4 (8.7%)	14 (1.8%)	18 (2.2%)	
Unknown	36 (78.3%)	631 (81.7%)	667 (81.5)	
Age, years, median (IQR)	71.5 (59-82)	66 (55-78)	66 (55-78)	0.104
Comorbidities, N (%)				
Cardiovascular disease	16 (34.8%)	210 (27.2%)	226 (27.6%)	0.264
Cerebrovascular disease	2 (4.4%)	59 (7.6%)	61 (7.5%)	0.409
Chronic pulmonary disease	15 (32.6%)	108 (14.0%)	123 (15.0%)	0.001
Hypertension	21 (45.7%)	371 (48.1%)	392 (47.9%)	0.751
Diabetes	8 (17.4%)	148 (19.2%)	156 (19.1%)	0.765
Acute myocardial infarction (IMA)	6 (13.0%)	106 (13.7%)	112 (13.7%)	0.895
Solid or haematological malignancy	7 (15.2%)	67 (8.7%)	74 (9.1%)	0.133
Chronic kidney disease	3 (6.5%)	46 (6.0%)	49 (6.0%)	0.876
Chronic liver disease	3 (6.5%)	31 (4.0%)	34 (4.2%)	0.408
HIV infection/AIDS	1 (2.2%)	6 (0.8%)	7 (0.9%)	0.318
Rheumatic diseases	1 (2.2%)	16 (2.1%)	17 (2.1%)	0.963

RESULTS (2)

	PnUAg+ patients N=46 (5.6%)	PnUAg- patients N=772 (94.4%)	Overall (N=818)	P value
COVID-19 severity at admission, N (%)				0.227
Mild	20 (43.5%)	332 (43.0%)	352 (43.0%)	
Severe	17 (37.0%)	360 (46.6%)	377 (46.1%)	
Critical	3 (6.5%)	24 (3.1%)	27 (3.3%)	
Asymptomatic	6 (13.0%)	56 (7.3%)	62 (7.6%)	
Laboratory tests at onset				0.104
CRP mg/dL, median (IQR)	82 (32.6-112.4)	58.6 (28.5-98.3)	59.5 (28.5-99.3)	
White blood cells*10 ³ /uL, median (IQR)	6.7 (4.1-10.3)	6.6 (5.0-9.3)	6.6 (5.01-9.3)	
Pneumonia at X-ray or CT scan, N (%)	36 (78.3%)	682 (88.3%)	718 (87.8%)	0.043
Highest grade of O2 therapy, N (%)				0.437
Invasive Mechanical Ventilation (IMV)	3 (6.5%)	77 (9.8%)	80 (9.8%)	
Non Invasive Mechanical Ventilation (NIMV)	2 (4.4%)	60 (7.8%)	62 (7.6%)	
C-PAP	18 (39.1%)	244 (31.6%)	262 (32.0%)	
O2 therapy low/high flow	16 (34.8%)	317 (41.2%)	333 (40.7%)	
No O2 therapy	7 (15.2%)	74 (9.6%)	81 (9.9%)	
Length of hospital stay, Median days (IQR)	12 (6-25)	11 (6-21)	11 (6-21)	0.626
Death, N (%)	12 (26.1%)	203 (26.3%)	215 (26.3%)	0.975

PnUAg+ vs. PnUAg-

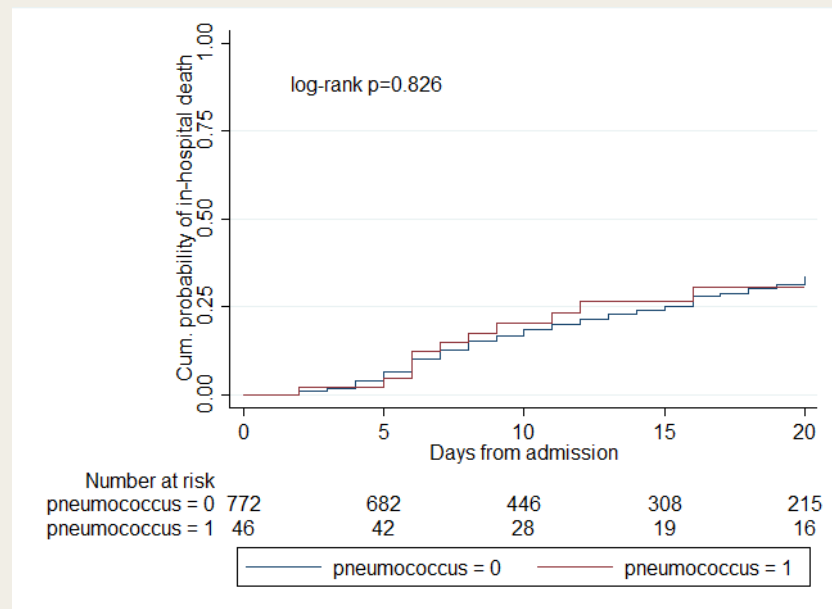
- No difference:
 - *Clinical severity & laboratory results*
 - *IMV, NIMV or C-PAP*
 - *In-hospital stay*
 - *In-hospital mortality*
- Lower rate of radiological pneumonia

RESULTS (2) - MULTIVARIABLE

	OR	95%CI	P	AOR*	95%CI	P
Age, per 10 years older	1.19	0.98-1.46	0.084	1.10	0.87-1.38	0.429
Gender, male (vs. female)	0.33	0.18-0.61	<0.001	0.37	0.19-0.72	0.003
Diabetes	0.89	0.40-1.94	0.780	0.85	0.36-1.97	0.701
Chronic kidney disease	1.05	0.57-1.92	0.876	1.16	0.59-2.28	0.669
Chronic pulmonary disease	2.97	1.55-5.69	0.001	2.58	1.22-5.45	0.013
Immunodepression	1.66	0.75-3.67	0.212	1.19	0.47-2.97	0.715
Severity						
Mild	0.56	0.22-1.46	0.237	1.32	0.44-3.94	0.615
Severe	0.44	0.17-1.16	0.099	0.96	0.32-2.84	0.944
Critical	1.16	0.27-5.05	0.837	2.40	0.45-12.54	0.299
Smoking habits						
Former smokers	1.30	0.23-7.36	0.768	0.48	0.65-3.63	0.484
Current smokers	7.14	1.18-43.12	0.032	3.27	0.38-27.71	0.277
Admission period						
Jul-Nov2020 (vs. Feb-Jun2020)	19.1	5.87-62.1	<0.001	20.34	6-06-68.2	<0.001

* Adjusted for all factors showed in table

RESULTS - LENGTH OF STAY



SHR= 0.95; p= 0.764; 95% C.I. 0.69-1.31

aSHR*= 0.86; p= 0.405; 95% C.I. 0.61-1.22

* Adjusted for age, gender, Charlson index, Chronic pulmonary disease, CRP, Ddimer, Severity of COVID-19 at admission, calendar period of hospital admission

CONCLUSIONS

- Female sex and chronic pulmonary disease represent risk factors for PnUAg positivity in COVID-19 disease.
- Pneumococcal coinfection was not associated with a more severe disease nor a worse outcome.
- Patients with PnUAg+ were mostly found during the 2nd semester of the year, as expected by the seasonality of pneumococcal infections.