VENTILATOR-ASSOCIATED PNEUMONIA AND MULTIDRUG-RESISTANT MICROORGANISMS: A COMPARISON BETWEEN PRE-COVID-19 AND COVID-19 CRITICAL PATIENTS

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BACKGROUND

The COVID-19 pandemic increased the number of ICU-mechanically ventilated (MV) patients showing ventilator-associated pneumonia (VAP). However, the comparison between the incidence of VAP in this cohort and a control group is lacking.

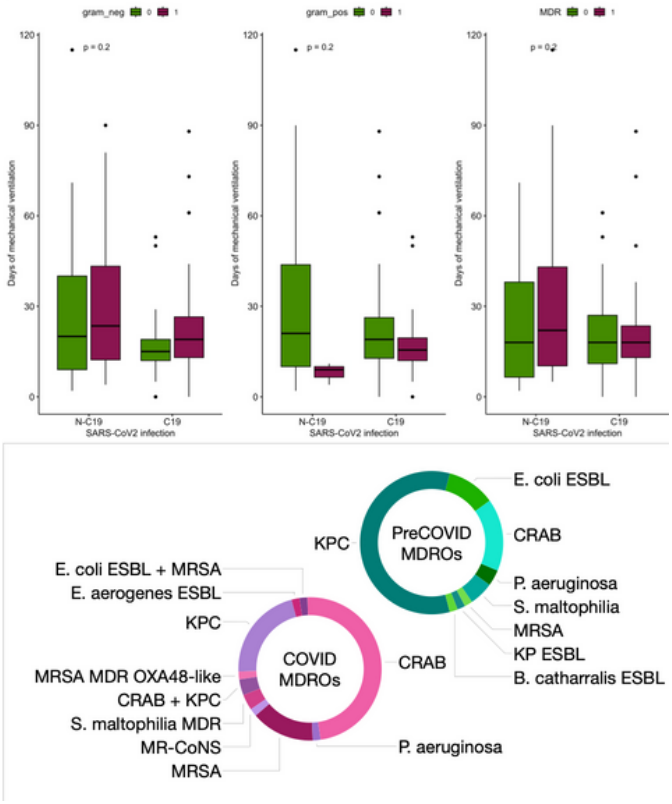

Figure 1A. Relationship between Gram-negative, Gram-positive, MDR microorganisms and duration of MV.
Figure 1B. Isolated MDROs.

RESULTS

Among 241 COVID-19 patients and 252 pre-COVID patients, microbiologically confirmed VAP occurred in 112 (46.47%) and 78 (30.95%) patients, respectively (Table 1).
Gram-negative microorganisms accounted for 71% vs 37% of VAP in COVID-19 and control group, respectively, while Gram-positive bacteria were the causative agent in 28% vs 4%, respectively.
MDROs-related VAP was lower in the COVID-19 group (52% vs 69%, p=0.021). Acinetobacter baumannii was the most frequently identified microorganism (52%) in the COVID-19 group while Klebsiella pneumoniae accounted for 60% of microorganisms in the control group (Figure 1 B).
Median ICU length of stay (LOS) was similar between the two time periods (25.50 vs 24.00 days; p=0.511). ICU (69%) and in-hospital mortality (73%) were higher in COVID-19 patients (p<0.001 and p=0.002 respectively). Gram-negative microorganisms seem to contribute to a longer duration of MV in both populations (p=0.231) while MDROs seem to be associated with a longer duration of MV in the control group (Figure 1A).

METHODS

We compared COVID-19 patients admitted to the ICU at the Città della Salute e della Scienza University Hospital of Turin (Italy) between March 2020 and December 2021 with a retrospective cohort of ICU-mixed patients admitted between June 2016 and March 2018 (pre-COVID control group). Definition of VAP and multidrug-resistant organisms (MDROs) are based on current literature (1,2).

Descriptive data	VAP in pre-COVID (n=78)	VAP in COVID+ (n=112)	p-value
Age (years), median (IQR)	68.50 (56-77)	63.50 (54-71)	**0.005**
Sex (male), n (%)	55.00 (71%)	85.00 (76%)	0.407
BMI (kg/m2), median (IQR)	24.87 (23-29)	28.39 (26-31)	**0.003**
SAPS II score, at admission (N=168), median (IQR)	54.00 (43-62)	50.00 (41-57)	0.099
Cardiovascular disease, n (%)	29.00 (37%)	18.00 (16%)	**<0.001**
Chronic lung disease, n (%)	13.00 (17%)	13.00 (12%)	0.318
Immunosoppressive therapy, n (%)	19.00 (24%)	6.00 (5%)	**<0.001**
Associated BSI/CRBSI, n (%)	27.00 (35%)	17.00 (15%)	**0.002**
IMV days (N=182), median (IQR)	20.00 (9-43)	18.00 (12-24)	0.231
Tracheostomy during stay, n (%)	33.00 (42%)	18.00 (16%)	**0.040**
Septic shock, n (%)	23.00 (29%)	53.00 (47%)	**0.014**
In-hospital mortality (N=188), n (%)	33.00 (43%)	81.00 (73%)	**0.002**
Mortality in the ward (N=189), n (%)	26.00 (33%)	77.00 (69%)	**<0.001**
Hospital LOS, days (=183), median, (IQR)	61.00 (29-90)	25.50 (19-33)	**<0.001**
ICU LOS, days (N=188), median (IQR)	25.50 (14-49)	24.00 (17-32)	0.511
Gram negative (N=185), n (%)	29.00 (37%)	76.00 (71%)	**0.011**
Gram positive (N=186), n (%)	3.00 (4%)	30.00 (28%)	**0.017**
Virus (N=186), n (%)	2.00 (3%)	0.00 (0%)	0.094
Fungi (N=186), n (%)	2.00 (3%)	0.00 (0%)	0.094
MDR (N=185), n (%)	54.00 (69%)	56.00 (52%)	**0.021**

Table 1. Population characteristics and descriptive data.

CONCLUSIONS

Our analysis showed that VAP was more frequent in the COVID-19 cohort. Although ICU and in-hospital mortality were higher during the pandemic period, the frequency of MDROs seems to be higher in the pre-pandemic period. Further analyses highlighting risk factors, antimicrobial resistance characteristics and COVID-19 specific role are needed.

References
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(2) Magiorakos AP, Srinivasan A, Carey RB, et al. Clin Microbiol Infect. 2012;18(3):268-281.