Mortality comparison between ICU patients with SARS-CoV2 infection during 2020-2022 in ICU: a retrospective study

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INTRODUCTION

In late 2019, a new coronavirus currently known as severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2), was identified as the cause of a clutch of pneumonia cases in Wuhan, a city in China's Hubei province. It spread rapidly, causing a worldwide pandemic. In February 2020, the World Health Organization (WHO) has named the disease COVID-19, which stands for coronavirus disease 2019.

Regarding italy, the pandemic explosion occurred starting in the lombardy region. in lombardy hospitals there was an unprecedented increase in the number of hospitalizations for acute respiratory failure in a short period of time, quickly saturating the available healthcare resources , including beds in icu.

PURPOSE

Aim of this study is to compare mortality rate and factors related to mortality in patients with SARS-CoV2 related ARDS admitted to Bergamo hospital's ICU from 2020 to 2022.

METHODS

We retrospective analyzed all patients admitted to ICU with COVID-19 related ARDS between 2020 and 2022. We divided the patients into 3 waves according to the peaks of maximum incidence: "I wave" ranged between March and April 2020; "II wave" between March and April 2021; "III wave" between December 2021 and March 2022 (Figure 1).

We analyzed mortality with Kaplan-Meier Survival Analysis and compared historic and clinical characteristics, and laboratory data with 2 way Analysis of Variance (ANOVA) test.

RESULTS AND DISCUSSION

170 patients were enrolled: 36 patients in I wave, 58 patients in II wave, and 76 patients in III wave respectively. No demographic and baseline differences were identified between groups (data not shown).

90-days mortality in I wave was 31%; in II wave was 5% and in III wave was 25%, with a significant difference between waves (p=0,029) (Figure 2).

ANOVA analysis between I and II wave showed a significant reduction in 90-day mortality in II wave, which we attributed both to earlier access to hospital and intensive care, and to a lower clinical severity at ICU entry (SAPS score) in II wave (Table 1).

The higher mortality rate in III wave compared to that in II wave cannot be explained by the timing of access to care, neither by the clinical severity at ICU admission, neither by the applied treatment (data not shown), except for the infusion rate of monoclonal antibodies which was higher in III wave (p<0,001) (Table 2). Moreover, ANOVA analysis between II and III wave showed higher incidence of VAP (p=0,025) and septic shock (p=0,012) in III wave compared to II wave (Table 2).

CONCLUSION

In our opinion, data obtained from this study are very interesting because highlighted the importance of timely access to appropriate treatment. Moreover, they cast a doubt on the relationship between the infusion of monoclonal antibodies and the increase in the incidence of VAP and septic shock, and even a relationship with an increase in mortality rate which is nevertheless in contrast with data from literature.[1,2]

However, given the small sample size of our study, it is not easy to state any confirm conclusions regarding the above differences. Hopefully integration with data from COVID-19 patients admitted in the others Bergamo's ICU during the same time period, could allow a more conclusive analysis.

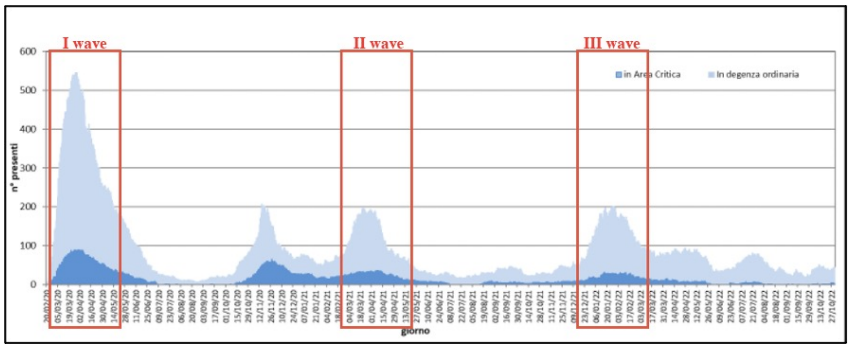

Figure 1. COVID-19 waves

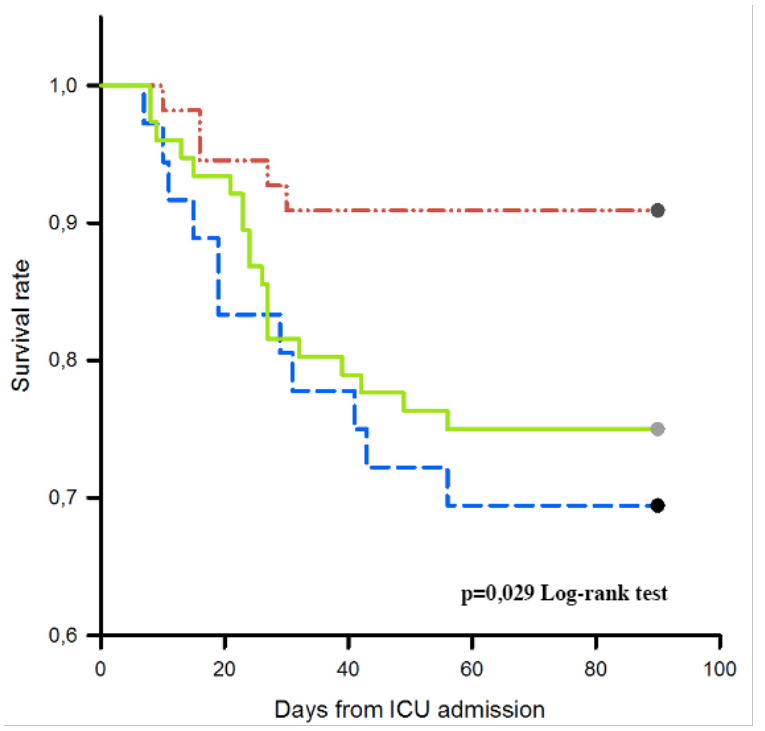

Figure 2. Kaplan-Meier Survival Analysis

	I wave	II wave	III wave	p- value
SOFA at admission	5 [4-7]	4 [3-4]	4 [3-6]	0,005§
SAPS at admission	40 [32-48]	31 [22-39]	33 [26-59]	0,019§
Days from symptoms to ED	8 [6-10]	6 [4-7]	6 [5-10]	0,003§
Days from ED to NIV	1 [1-3]	1 [1-3]	1 [1-1]	<0,001#
Days from ED to ICU	4 [2-12]	2 [1-3]	1 [1-3]	< 0,001§ *

§ p<0,05 for I *vs* II wave; # p<0,05 for II *vs* III wave; * p<0,05 for I *vs* III wave

Table 1. Timing of care access and ICU admission severity

	II wave	III wave	p- value
IL6 receptor antagonist infusion	13 (22%)	52 (68%)	<0,001
Ventilato Acquired Pneumonia (VAP)	17 (29%)	38 (50%)	0,025
Septic Shock	4 (7%)	19 (25%)	0,012

Table 2. ANOVA of II wave *vs* III wave

References

[1] REMAP-CAP Investigators et al. Interleukin-6 Receptor Antagonist in critically III Patients with Covid -19. N Engl J Med 384, 1491-1502 (2021).

[2] WHO Rapid Evidence Appraisal for COVID -19 Therapies REACT Working Group et al. Association Between Administration of IL Antagonists and Mortality Among Patients Hospitalized for Covid -19: A Meta Analysis. JAMA 326, 499-518 (2021)