Clinical features and 28-day mortality predictors of vaccinated patients admitted to ICU with CoViD-19

STELLA Claudia[1], BERARDI Cecilia[1], CHIARITO Annalisa[1], GENNENZI Veronica[2], POSTORINO Stefania[2], SETTANNI Donatella[2], CESARANO Melania[2], XHEMALAJ Rikardo[1], TANZARELLA Eloisa Sofia[2], CUTULI Salvatore Lucio[2], ANTONELLI Massimo[1,2], DE PASCALE Gennaro[1,2]

[1]*Department of Intensive Care, Fondazione Policlinico Universitario A. Gemelli, Rome, Italy*
[2]*Department of Emergency, Intensive Care Medicine and Anesthesia, Fondazione Policlinico Universitario A. Gemelli, Rome, Italy*

INTRODUCTION

Immunization deriving from vaccination against Coronavirus disease (CoViD-19) tends to wane over time with a **decline of effectiveness** after 120 days, although an acceptable coverage against severe forms and death is reported to be maintained longer. Moreover, a "**booster**" dose is necessary against certain variants (i.e. Omicron) and in at-risk patients (such as elderly, immunocompromised, etc.).

In the intensive care unit (**ICU**), vaccinated patients were **older** and had a **higher number of comorbidities** (i.e. chronic heart disease (CHD), diabetes mellitus (DM), chronic renal disease (CKD), chronic obstructive pulmonary disease (COPD) and immunosuppression). **Risk factors for mortality** essentially overlapped with the conditions predisposing to ICU admission in the pre-vaccination era, while fewer studies focused on populations of only vaccinated patients.

Thus, the **aim** of this study was to describe the main **characteristics of vaccinated** patients according to the time intercurred from the last immunization and to identify the **predictors of 28-day mortality** in a hub-ICU.

METHODS

Study design: monocentric retrospective, with enrollment from June 2021 to May 2022.

Inclusion criteria: >18 years, at least one dose of vaccine, admitted to ICU for acute respiratory failure (ARF).

Definitions: Full vaccination was defined as a complete primary cycle from <120 days or a booster dose from >14 days; all the other patients were named partially vaccinated.

MAIN RESULTS

160 out of 676 patients admitted to ICU with SARS-CoV2 infection were enrolled.

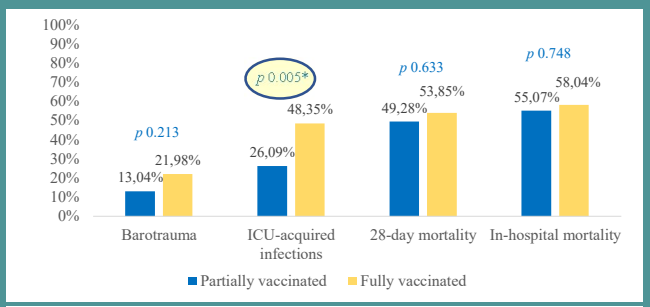
Fully vaccinated were **younger**, more frequently **immunocompromised**, affected by at least one comorbidity, especially **CKD** and were **hospitalized for longer time** before ICU admission (Tab.1).

Clinical outcomes did not differ between partially and fully vaccinated, with the exception of ICU-acquired infections (Fig.1).

Independent **predictors of 28-day mortality** were: older age, COPD, immunosuppression and a worse clinical presentation (lower PiO2/FiO2 and septic shock at admission).

	Total cohort (n=160)	Partially vaccinated (n=69)	Fully vaccinated (n=91)	p value
DEMOGRAPHICS AND COMORBIDITIES				
Age, years	71 [61.8-78]	74 [66-79]	69 [60-77.5]	.029*
Gender (male)	111 (69.38%)	44 (63.77%)	67 (73.63%)	.226
>1 comorbidity	136 (85.00%)	54 (78.26%)	82 (90.11%)	.045*
BMI ≥ 30kg/m^2	24 (15.00%)	11 (15.94%)	13 (14.29%)	.825
CHD	53 (33.13%)	19 (27.54%)	34 (37.36%)	.236
COPD	40 (25.00%)	24 (34.78%)	16 (17.58%)	.016*
Diabetes	47 (29.38%)	24 (34.78%)	23 (25.27%)	.222
CKD	47 (29.38%)	14 (20.29%)	33 (36.26%)	.035*
Immunosuppression	48 (30.00%)	12 (14.39%)	36 (39.56%)	.003*
CLINICAL ICU PRESENTING FEATURES				
Pre-ICU, days	3 [1-8]	3 [1-5]	4 [1-12]	.04*
PaO_2/FiO_2	109 [83-146.5]	100 [81.5-144]	114 [83.5-152]	.364
Ongoing IMV	50 (31.25%)	20 (28.99%)	30 (32.97%)	.610
Septic Shock	44 (27.50%)	20 (28.99%)	24 (26.37%)	.724
AKI III	26 (16.25%)	8 (11.60%)	18 (19.78%)	.198
Barotrauma	16 (10.00%)	6 (8.70%)	10 (10.99%)	.792
Pulmonary embolism	12 (7.50%)	4 (5.80%)	8 (8.79%)	.556
Concomitant infection	58 (36.25%)	22 (31.88%)	36 (39.56%)	.407

Tab.1 Main differences among partially and fully vaccinated



▲ Fig.1 Diffences in clinical outcomes among partially and fully vaccinated.
▼Tab.2 Independent predisposing factors to 28-day mortality.

Variables	Survivors (n=77)	Non survivors (n=83)	P value	OR (95%CI)
Age, years	67 [59.5-75]	75 [66-79]	.005*	1.05 (1.01-1.08)
Gender (male)	59 (71.08%)	52 (62.65%)	.400	0.71 (0.32-1.58)
COPD	13 (15.66%)	27 (32.53%)	.012*	3.05 (1.28-7.30)
Immunosuppression	15 (18.07%)	33 (39.76%)	.002*	3.70 (1.63-8.40)
PaO_2/FiO_2	122 [92-175]	100 [71-133]	.009*	0.99 (0.98-0.99)
Septic Shock	12 (14.46%)	32 (38.55%)	.022*	2.74 (1.16-6.48)

CONCLUSIONS

Despite a full vaccination cycle, severe COVID-19 may occur in patients with relevant comorbidities, especially immunosuppression and CKD.

Clinical outcomes are independent from the time intercurred from the last administration and the number of doses. The only exception is the increased incidence of ICU-acquired infections, likely due to longer hospitalization time before ICU and more frequent immunosuppression.

Older age, COPD, immunosuppression and worse clinical presentation are predictors of 28-day mortality.

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