Using severe acute respiratory syndrome coronavirus-2 spike protein antibody serology in addition to the ISARIC-4C risk score to better discriminate adverse clinical outcomes in hospitalised patients with coronavirus disease 2019.

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic continues to threaten many countries globally. Large scale vaccination exercises have helped to reduce transmission and severity of disease.

The various risk assessment scores were derived prior to the advent of COVID-19 vaccinations. The ISARIC-4C mortality score is most commonly used in Singapore to predict clinical deterioration and mortality in hospitalised patients with COVID-19.

We sought to modify an existing clinical score (the ISARIC-4C mortality score) to include serological status to better prognosticate hospitalized patients with COVID-19.

METHODS

We examined the first 1781 consecutive hospitalized patients with polymerase chain reaction (PCR) confirmed COVID-19 from February 2020 to October 2021.

We divided the study population into those requiring intensive care and those who did not require throughout their inpatient stay. Baseline characteristics examined include medical comorbidities, vaccination status, SARS-CoV-2 serology spike protein, duration of fever and haemodynamics were compared (as shown in the table).

Adverse outcomes were defined as patients who required intensive care or mortality. Performance of the risk scores were measured by the area under receiver operating characteristic curves (AUC) in predicting adverse outcomes.

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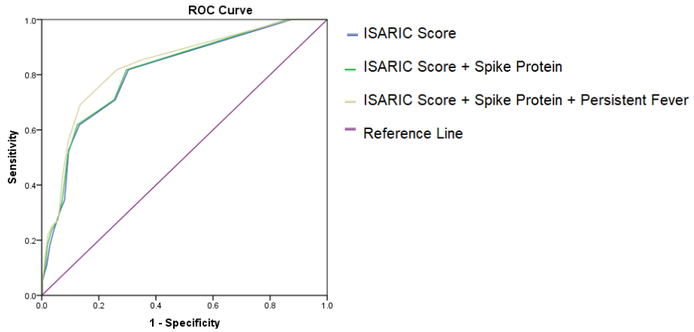
Parameter	Requiring intensive care (n=55)	Did not require intensive care (n=1726)	p-value
Age (years)	55.1 (±15.6)	41.7 (±14.4)	<0.001
Hypertension	30 (54.5%)	224 (13.0%)	<0.001
Hyperlipidaemia	23 (41.8%)	150 (8.7%)	<0.001
Diabetes mellitus	13 (23.6%)	117 (6.8%)	<0.001
Chronic kidney disease	4 (7.2%)	17 (2.0%)	<0.001
No past medical history	19 (34.5%)	1380 (80.0%)	<0.001
Vaccinated against COVID-19 (at least 1 dose)	9 (16.4%)	264 (15.3%)	0.829
Vaccinated against COVID-19 (at least 2 doses)	5 (9.1%)	225 (13.1%)	0.095
SARS-CoV-2 Serology Spike Titre	58.9 (±105.3)	144.2 (±116.2)	0.007
Temperature on admission (degC)	37.8 (±0.9)	37.2 (±0.8)	<0.001
Length of time with fever (days)	3.9 (±3.6)	1.0 (±2.0)	<0.001



Risk Score	Area under curve	p-value
ISARIC Score	0.80 (0.75 – 0.86)	<0.001
ISARIC + Spike Protein	0.81 (0.76 – 0.87)	<0.001
ISARIC + Spike Protein + Persistent Fever	0.84 (0.78 – 0.89)	<0.001

Parameter	Adjusted odds ratio (95% confidence interval)	p-value
ISARIC score	1.50 (1.37 – 1.63)	<0.001
Persistent fever >72 hours	7.63 (4.24 – 13.70)	<0.001
Positive SARS-CoV-2 Spike Protein Serology >75	0.15 (0.04 – 0.53)	0.003

RESULTS / DISCUSSION

The 55 patients requiring intensive care during their inpatient stay tended to have persistent fever beyond 72 hours and had lower titres of spike protein antibodies.

A high spike protein antibody titre >75 U/mL was independently protective for adverse outcomes outcomes even after adjusting for the ISARIC-4C score and the presence of persistent fever.

Adding the serological status and presence of persistent fever to the ISARIC-4C score improved its performance in predicting adverse outcomes (AUC 0.84, 95% CI 0.78-0.89).

CONCLUSION

Addition of the SARS-CoV-2 serology spike protein titre and prolonged fever to the ISARIC-4C mortality score helps to better prognosticate adverse clinical outcomes in hospitalised patients with COVID-19.