

## **Project Title**

Risk of COVID-19 complications stratified by SARS-CoV2 Spike Antibody Levels

## **Project Lead and Members**

Project lead: Ooi Say Tat

Project members: Nyein Chan Maung, Lin Yi

## **Organisation(s) Involved**

1 Division of Infectious Disease, Department of Medicine, Khoo Teck Puat Hospital

2 Clinical Epidemiology Unit, Khoo Teck Puat Hospital

## **Healthcare Family Group(s) Involved in this Project**

Medical

## **Applicable Specialty or Discipline**

Infectious Disease

## **Project Period**

Start date: 30/4/2021

Completed date: 12/12/2021

## **Aims**

For correlation between risk of severe COVID-19 and SARS-CoV2 Spike antibody levels

## **Background**

COVID-19 vaccination is associated with lower risk of COVID-19 complications. However, there is no available data to correlate level of SARS-CoV2 spike antibody to risk of COVID-19 complications. We aim to assess the risk of severe COVID-19 by SARS-CoV2 Spike antibody levels.

## Methods

Retrospective cohort study of all patients, admitted to general wards in Yishun Health for COVID-19 infection from April 30th to December 12th 2021 with the following criteria were included: (1) no pneumonia on CXR on admission; (2) non-reactive nucleocapsid antibody; (3) spike antibody performed. Subjects were assessed for development of severe COVID-19 defined by pneumonia requiring oxygen supplementation, ICU admission or death. Risk of severe COVID-19 stratified by anti-spike titres was estimated by proportions and its 95% confidence interval.

## Results

29 (9.7%) out of 298 patients with COVID-19 developed severe COVID-19 during the study period. Risk of severe COVID-19 stratified by anti-spike titres in category of <100 U/ml, 100-199 U/ml, 200-299 U/ml, 300-399 U/ml, 400-499 U/ml, 500-999 U/ml, ≥1000 U/ml were 20.5% (12.2% -31.2%), 25% (11.5% - 43.4%), 11.1% (1.3% - 34.7%), 15.4% (1.9% - 45.5%), 7.69% (0.2% - 36%), 0% (5 – 10.9%) and 0% (0%- 3.2%) respectively.

## Lessons Learnt

Anti-spike titres of SARS-CoV2 could be used for risk assessment for severe COVID-19.

## Conclusion

Low anti-spike titres of SARS-CoV2 correspond to higher risk of severe COVID.

## Additional Information

Singapore Health & Biomedical Congress (SHBC) 2022: COVID-19: Our Response to a new challenge (Poster category) – (Gold Award)

## Project Category

Applied/ Translational Research

Quantitative Research

## Keywords

Severe COVID-19, SARS-CoV2 Spike Antibody Levels.

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# Risk of COVID-19 complications stratified by SARS-CoV2 Spike Antibody Levels

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## INTRODUCTION

- COVID-19 vaccination is associated with lower risk of COVID-19 complications. However, there is no available data to correlate level of SARS-CoV2 spike antibody to risk of COVID-19 complications.
- We aim to assess the risk of severe COVID-19 by SARS-CoV2 Spike antibody levels.

## METHOD

- Retrospective cohort study of the patients with COVID-19 admitted to general wards in Yishun Health from April 30<sup>th</sup> to December 12<sup>th</sup>, 2021, with the following criteria were included: (1) no pneumonia on CXR on admission; (2) non-reactive nucleocapsid antibody; (3) spike antibody performed.
- Subjects were assessed for development of severe COVID-19 defined by pneumonia requiring oxygen supplement, ICU admission or death. Risk of severe COVID-19 stratified by anti-spike titres was estimated by proportions and its 95% confidence interval.

## RESULTS

- Twenty-nine (9.7%) out of 298 patients with COVID-19 developed severe COVID-19 during the study period. Risk of severe COVID-19 was highest in those with lower anti-spike titres in category of <100 U/ml and 100-199 U/ml. Median anti-spike titres of those with composite outcome was 87.37 U/ml with IQR (0.4-144.5) and median Isaric score was 10, IQR (8-12).
- Raised serum creatinine, CRP, LDH and lymphopenia were observed in those with severe COVID-19, consistent with clinical studies which were previously published (1-6).

## CONCLUSION

- Low anti-spike titres of SARS-CoV2 correspond to higher risk of severe COVID-19 and its complications.
- Anti-spike titres of SARS-CoV2 could be used for risk assessment for severe COVID-19.

## REFERENCES

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Table 1: Baseline demographics and clinical features of 298 patients with COVID-19 infection.

	Composite Outcome		P-value
	No N=269 (%)	Yes N=29 (%)	
Total patients N=298			
Age, Mean (SD)	61.9 (19.0)	75.4 (13.4)	<0.001
Female	113 (42.0)	11 (37.9)	0.67
Anti-S Ab Titre, Median [IQR]	649 [118.6, 3361]	87.37 [0.4, 144.5]	<0.001
Anti-N Ab Titre, Median [IQR]	0.083 [0.077, 0.091]	0.079 [0.078, 0.083]	0.056
ISARIC Score, Median [IQR]	6 [3, 8]	10 [8, 12]	<0.001
On Dialysis	6 (2.2%)	2 (6.9%)	0.14
Unvaccinated	20 (7.4%)	3 (10.3%)	0.32
1 Dose	25 (9.3%)	5 (17.2%)	
2 Doses	224 (83.3%)	21 (72.4%)	
WBC	6.2 [4.5, 7.4]	6.4 [4.2, 8.9]	0.810
Lymphocytes	1.18 [0.85, 1.71]	0.85 [0.50, 1.22]	<0.001
Creatinine	75, [62, 95]	103 [81, 145]	<0.001
CRP	12.3 [4.6, 30.7]	40.3 [13.9, 83.4]	0.160
Procalcitonin	0.08 [0.06, 0.13]	0.19 [0.10, 0.40]	0.001
LDH	199 [169, 239]	256 [202, 347]	<0.001
Monoclonal	16 (5.9%)	2 (6.9%)	0.870
Remdesivir	17 (6.3%)	10 (34.5%)	<0.001
Steroids	47 (17.5%)	25 (86.2%)	<0.001

Table 2: Severe COVID-19 stratified by SARS-CoV2 Spike Antibody Titres

Anti-S Titre (U/ml)	Number of patients N	Composite outcome		ICU/Death	
		N (%)	95% CI	N (%)	95% CI
<100	78	16(20.5%)	12.2%-31.2%	12(15.4%)	8.2%-25.3%
100-199	32	8(25%)	11.5%-43.4%	2(6.3%)	0.8%-20.8%
200-299	18	2(11.1%)	1.3%-34.7%	0(0%)	0%-18.5%
300-399	13	2(15.4%)	1.9%-45.5%	1(7.7%)	0.2%-36.0%
400-499	13	1(7.7%)	0.2%-36.0%	1(7.7%)	0.2%-36.0%
500-999	32	0(0%)	0%-10.9%	0(0%)	0%-10.9%
≥1000	112	0(0%)	0%-3.2%	0(0%)	0%-3.2%

