

Risk Factors for Slow Viral Decline in COVID-19 Patients during the 2022 Omicron Wave

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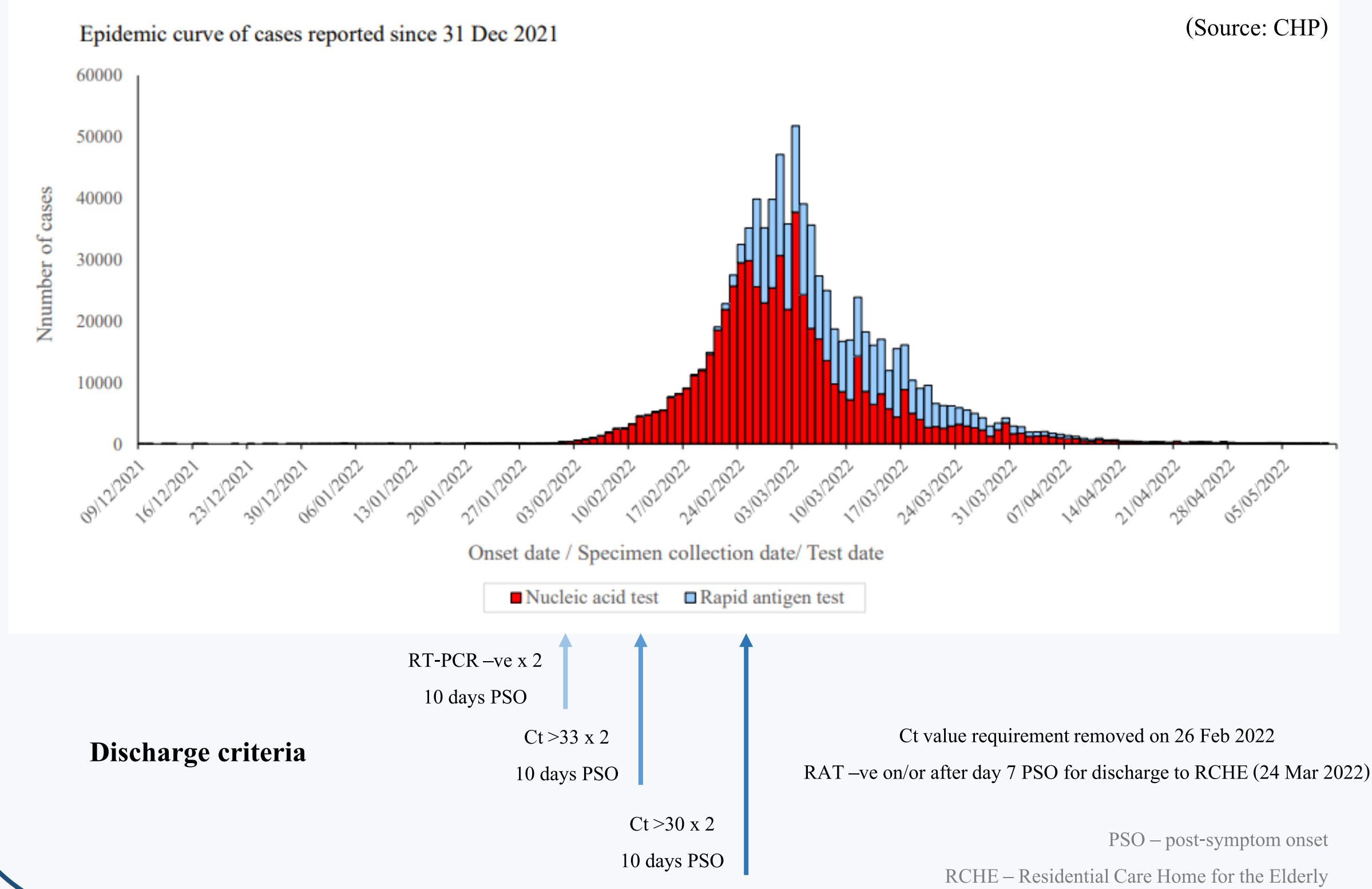
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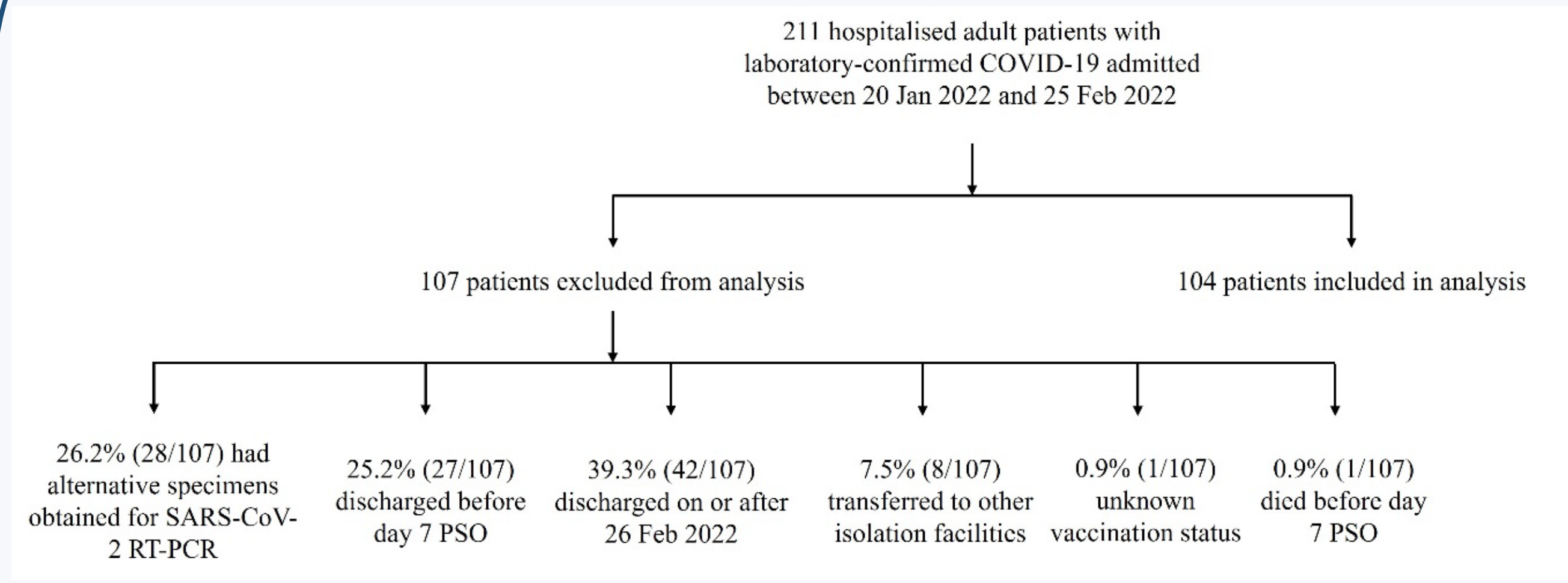
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BACKGROUND



RESULTS



- Viral load was highest (Ct value lowest) on days 1 PSO and gradually declined (Figure 1).
- No significant difference in the median peak viral loads between older and younger individuals and between fully vaccinated and non-fully vaccinated patients. However, on or after day 2 PSO, the viral load was generally lower in younger adults (<60 years old) than older adults (≥60 years old), and in fully vaccinated than non-fully vaccinated individuals.
- Older age, hypertension, hyperlipidaemia, and chronic kidney disease were associated with slow viral decline in univariate analysis on both day 7 and day 10 PSO, while incomplete or no vaccination was associated with slow viral decline on day 7 PSO only (Table 1).
- Older age was the only risk factor that remained statistically significant in multivariate analysis (Table 2).

Table 2. Result of multivariate analysis

Variable	P value	
	Day 7 PSO	Day 10 PSO
Age	0.016	0.018
Presence of chronic comorbidities	0.423	0.219
Hypertension	0.404	0.261
Hyperlipidaemia	0.377	0.370
Chronic kidney disease	0.998	0.109
Connective tissue disease	N.A.	0.999
Fully vaccinated	0.210	0.933

CONCLUSIONS

- Old age is an independent risk factor associated with slow viral decline in this retrospective cohort study conducted during the Omicron-dominant 2022 COVID-19 wave.
- Transmission-based precaution guidelines should take age into consideration when determining the timing of termination of isolation, especially in resource limited settings where testing capacity is limited.

METHODS

Patients

Adult patients admitted to Queen Mary Hospital for laboratory-confirmed COVID-19 between 20 January and 25 February 2022.

Inclusion criteria:

- ✓ Aged 18 years or above.
- ✓ At least one saliva tested positive by RT-PCR.
- ✓ At least one saliva specimen on or after day 7.

Exclusion criteria:

- ✗ Clinical information not available.
- ✗ COVID-19 vaccination status unknown.

Definition

Fully vaccinated – at least 2 doses of COVID-19 vaccines at least 14 days prior to symptom onset or first positive test.

Day 0 – the day of symptom onset or first positive SARS-CoV-2 test for asymptomatic patients.

Slow viral decline (SVD) – Ct value <30 for any specimen collected on or after day 7 PSO (SVD-7) or day 10 PSO (SVD-10).

Rapid viral decline (RVD) – at least one specimen on or after day 7 (or 10) and did not fulfil the criteria for SVD.

SARS-CoV-2 RT-PCR and lineage determination

Urgent request – GeneXpert XVI system (Cepheid, Sunnyvale, CA, USA).

Routine request – commercial real-time RT-PCR targeting the E gene (TIB Molbiol, Berlin, Germany).

Whole genome sequencing – Oxford Nanopore MinION (Oxford Nanopore Technologies, Oxford, UK).

Statistical analysis

IBM SPSS Statistics 28.0.1.0 or PRISM version 9.1.2 (GraphPad Software, San Diego, CA, USA).

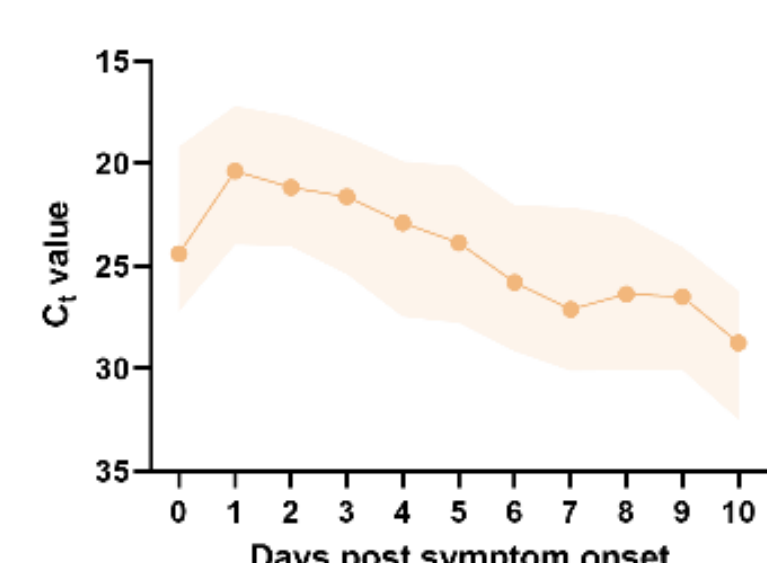
Ethical approval

Institutional Review Board of The University of Hong Kong/Hospital Authority Hong Kong West Cluster (UW 22-052).

Table 1. Comparison between patients with SVD and RVD on day 7 and day 10 PSO.

	Day 7 PSO			P value	Day 10 PSO			P value
	All patients (n=104)	SVD (n=84)	RVD (n=20)		All patients (n=79)	SVD (n=45)	RVD (n=34)	
Demographics								
Median age in years (interquartile range)	68 (47-76)	69 (53-76)	47 (34-74)	0.033	68 (45-76)	70 (55-80)	53 (36-74)	0.019
Age ≥60 years or above	66 (63.5)	58 (69)	8 (40)	0.001	48 (60.8)	33 (73.3)	15 (44.1)	0.011
Female sex	58 (55.8)	50 (59.5)	8 (40)	0.137	41 (51.9)	27 (60)	14 (41.2)	0.155
Chronic comorbidities								
Presence of chronic comorbidities	73 (70.2)	64 (76.2)	9 (45)	0.012	52 (65.8)	36 (80)	16 (47.1)	0.004
Hypertension	48 (46.2)	44 (52.4)	4 (20)	0.002	34 (43)	25 (55.6)	9 (26.5)	0.002
Hyperlipidaemia	41 (39.4)	38 (45.2)	3 (15)	0.020	28 (35.4)	21 (46.7)	7 (20.6)	0.019
Diabetes mellitus	26 (25)	24 (28.6)	2 (10)	0.148	15 (19)	11 (24.4)	4 (11.8)	0.246
Neurologic/cognitive disease	22 (21.2)	19 (22.6)	3 (15)	0.555	15 (19)	11 (24.4)	4 (11.8)	0.246
Chronic heart disease	16 (15.4)	14 (16.7)	2 (10)	0.731	11 (13.9)	8 (17.8)	3 (8.8)	0.335
Chronic kidney disease	17 (16.3)	17 (20.2)	0 (0)	0.038	10 (12.7)	9 (20)	1 (2.9)	0.037
Immunocompromised state	5 (4.8)	4 (4.8)	1 (5)	1.000	3 (3.8)	1 (2.2)	2 (5.9)	0.574
Chronic liver disease	6 (5.8)	6 (7.1)	0 (0)	0.593	4 (5.1)	3 (6.7)	1 (2.9)	0.630
Connective tissue disease	6 (5.8)	6 (7.1)	0 (0)	0.593	6 (7.6)	6 (13.3)	0 (0)	0.033
Pulmonary disease	8 (7.7)	6 (7.1)	2 (10)	0.648	6 (7.6)	3 (6.7)	3 (8.8)	1.000
COVID-19 vaccination history								
Fully vaccinated	51 (49)	37 (44)	14 (70)	0.047	46 (58.2)	24 (53.3)	22 (64.7)	0.362
BNT162b2	51 (100)	25 (67.6)	8 (57.1)	0.525	28 (60.9)	16 (66.7)	12 (54.5)	0.547
Booster dose	7 (13.7)	6 (16.2)	1 (7.1)	0.657	6 (13)	5 (20.8)	1 (4.5)	0.190
Lineage								
Omicron	94 (90.4)	75 (89.3)	19 (95)	0.683	69 (87.3)	38 (84.4)	31 (91.2)	0.502
Treatment								
Remdesivir	29 (27.9)	22 (26.2)	7 (35)	0.421	24 (30.4)	15 (33.3)	9 (26.5)	0.623
Severity of disease								
Symptomatic	78 (75)	63 (75)	15 (75)	1.000				
Require O2	3 (2.9)	3 (3.6)	0 (0)	1.000	2 (2.5)	1 (2.2)	1 (2.9)	1.000

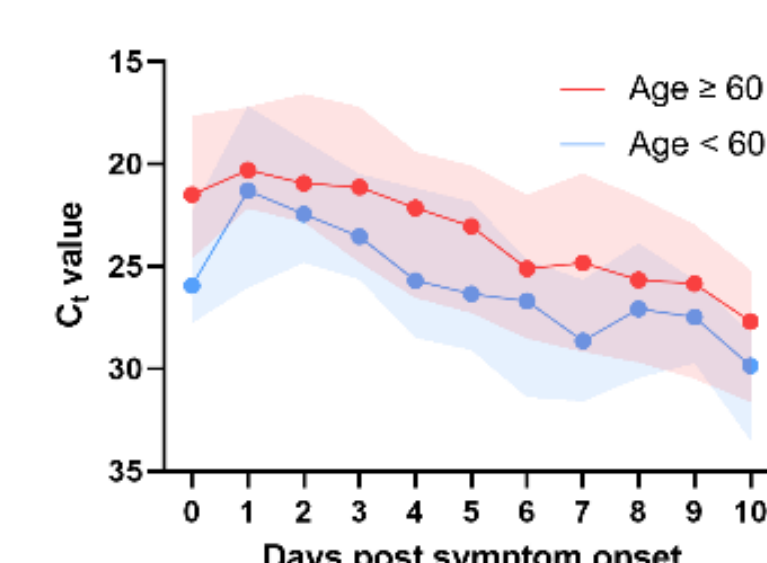
A



Number of patients

All ages 25 34 64 73 82 87 91 90 80 60 55

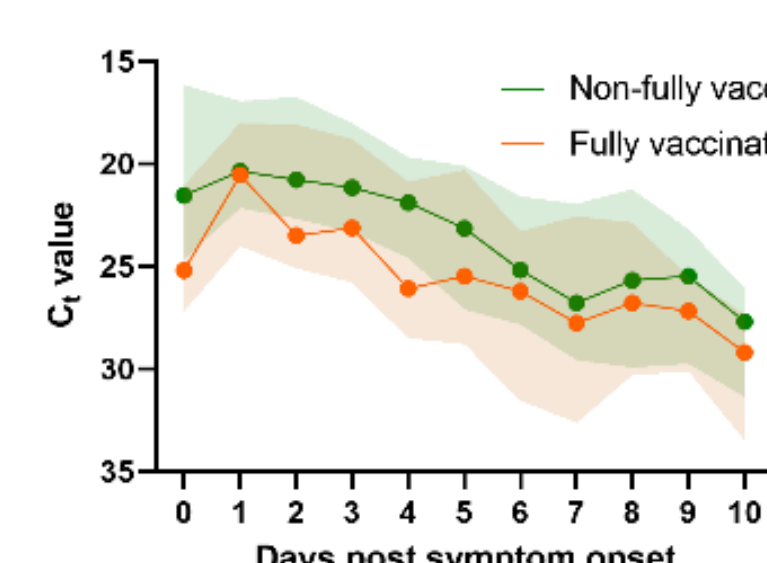
B



Number of patients

Age ≥ 60 11 21 36 46 49 54 56 55 54 42 38
Age < 60 14 13 28 27 33 33 35 35 26 18 17

C



Number of patients

Vaccinated 17 18 29 38 41 44 46 46 37 29 29
Unvaccinated 8 16 35 35 41 43 45 44 43 31 26

Figure 1. Serial changes of Ct value in saliva specimens. (A) All patients; (B) according to age; (C) according to vaccination status. Each dot represents the median viral load, and the shading represents the interquartile range.