

Survival Analysis and Risk Factors in COVID-19 Patients in Victoria

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Background

- Coronavirus (COVID-19) has a high morbidity and mortality burden resulting in a pandemic that has overwhelmed hospitals internationally.
- Mortality risk is more prevalent with increase in age.
- Certain comorbidities such as diabetes, hypertension and conditions that contribute to a weakened immune system have been documented to increase risk of mortality.
- Understanding the survival outcomes for patients hospitalised with COVID-19 is needed.

Aims

- Determine risk factors for mortality among COVID-19 patients in Victoria.
- Estimate the impact these factors have on survival outcomes.

Methods

- A retrospective cohort study of routine surveillance data from the Department of Health (DH), Victoria was conducted. Adult patients with COVID-19 were admitted at any point between 12 July 2021 - 31 January 2023.
- Cohort was stratified by admission to hospital, ICU and ventilated at any point.
- Cox Regression was fitted to estimate Hazard Ratios (HR) for survival, using time to event as admission date until the date of death, or being censored on 31 January 2023. Covariates included sex, Socioeconomic Status Quintile (SESQ), age, hospital facility, COVID-19 wave, vaccination status and presence of comorbidity.
- Comorbidity data was sourced from Victorian Emergency Minimum Dataset, and included patients coded with one of the following condition when admitted to the hospital: diabetes, hypertension, chronic respiratory diseases, cancer, immune diseases, chronic kidney disease, neurological conditions and cardiovascular diseases.

Results

- Over the study period, the cohort comprised of 33,616 individuals (median age 70 years) hospitalised with COVID-19 in Victoria.
- Of the people hospitalised, 1,292 (3.71%) were admitted to ICU, 912 (2.26%) were ventilated, and 2,058 (5.91%) people died.

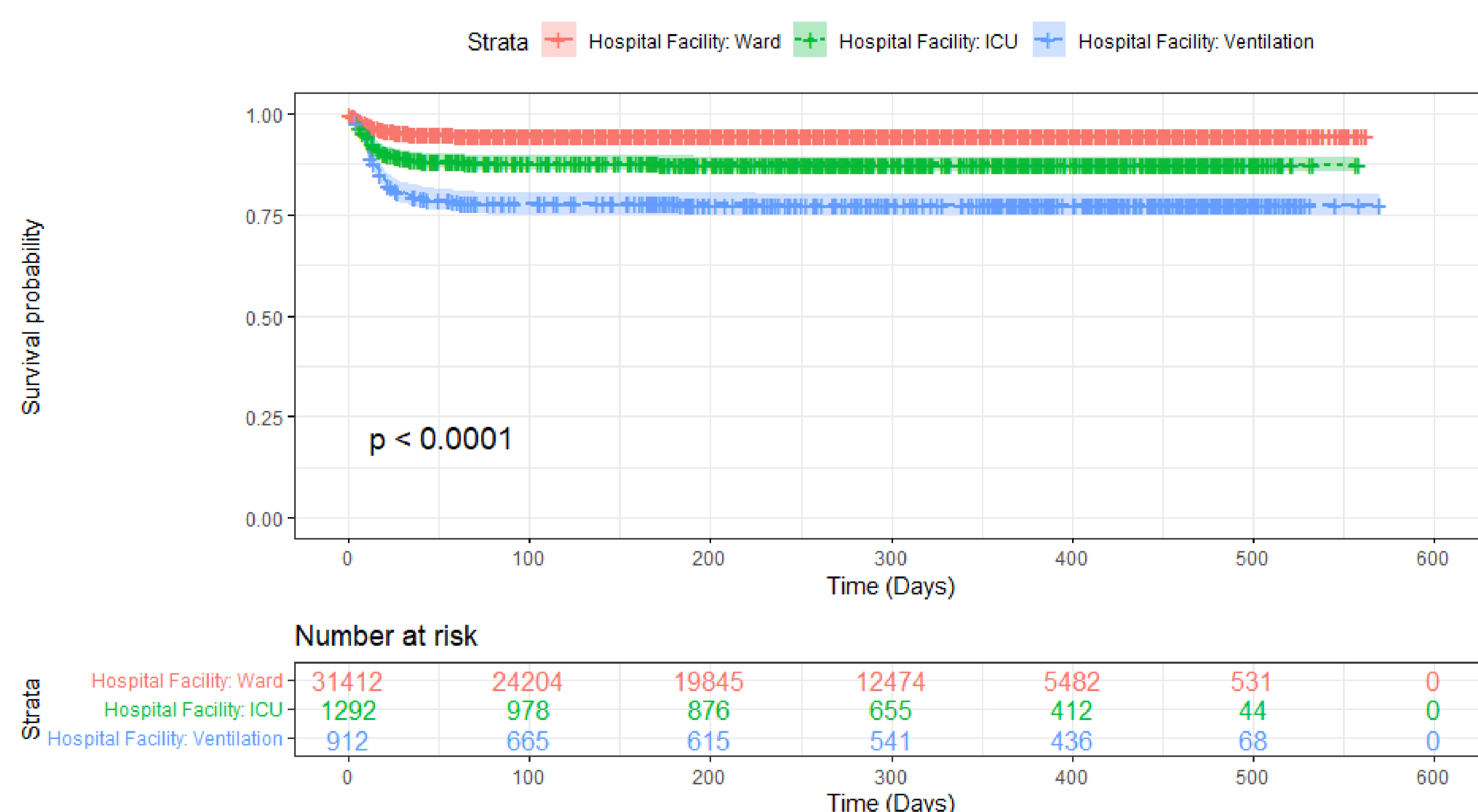
Table 1. Adjusted Cox proportional model identifying risk factors associated with mortality for patients diagnosed with COVID-19

Variable	aHR	95% CI	P-value
Sex:Male	1.37	(1.26–1.50)	<0.001
SESQ:2	0.82	(0.69–0.97)	0.022
SESQ:3	0.94	(0.80–1.09)	0.404
SESQ:4	0.88	(0.77–1.00)	0.054
SESQ:5	0.93	(0.81–1.07)	0.306
Age	1.08	(1.08–1.08)	<0.001
Hospital Facility:ICU	3.33	(2.82–3.94)	<0.001
Hospital Facility:Ventilated	7.94	(6.75–9.34)	<0.001
Wave:Omicron BA.4/BA.5	1.18	(1.00–1.39)	0.050
Wave:Omicron BA.1	1.36	(1.16–1.61)	<0.001
Wave:Omicron BA.2	1.04	(0.88–1.23)	0.625
Wave:Delta	1.61	(1.36–1.90)	<0.001
vaccination:1	0.68	(0.55–0.83)	<0.001
vaccination:2	0.74	(0.66–0.84)	<0.001
vaccination:3	0.43	(0.38–0.48)	<0.001
vaccination:4+	0.26	(0.22–0.30)	<0.001
Comorbidity:Yes	1.50	(1.38–1.64)	<0.001

aHR= adjusted hazard ratio, 95% CI = 95% confidence interval, ICU = intensive care unit. Reference variables: Sex = Female, SESQ = 1, Hospital facility = Ward, Wave = Polyclonal, Comorbidity = No, Vaccination = Unvaccinated/unknown.

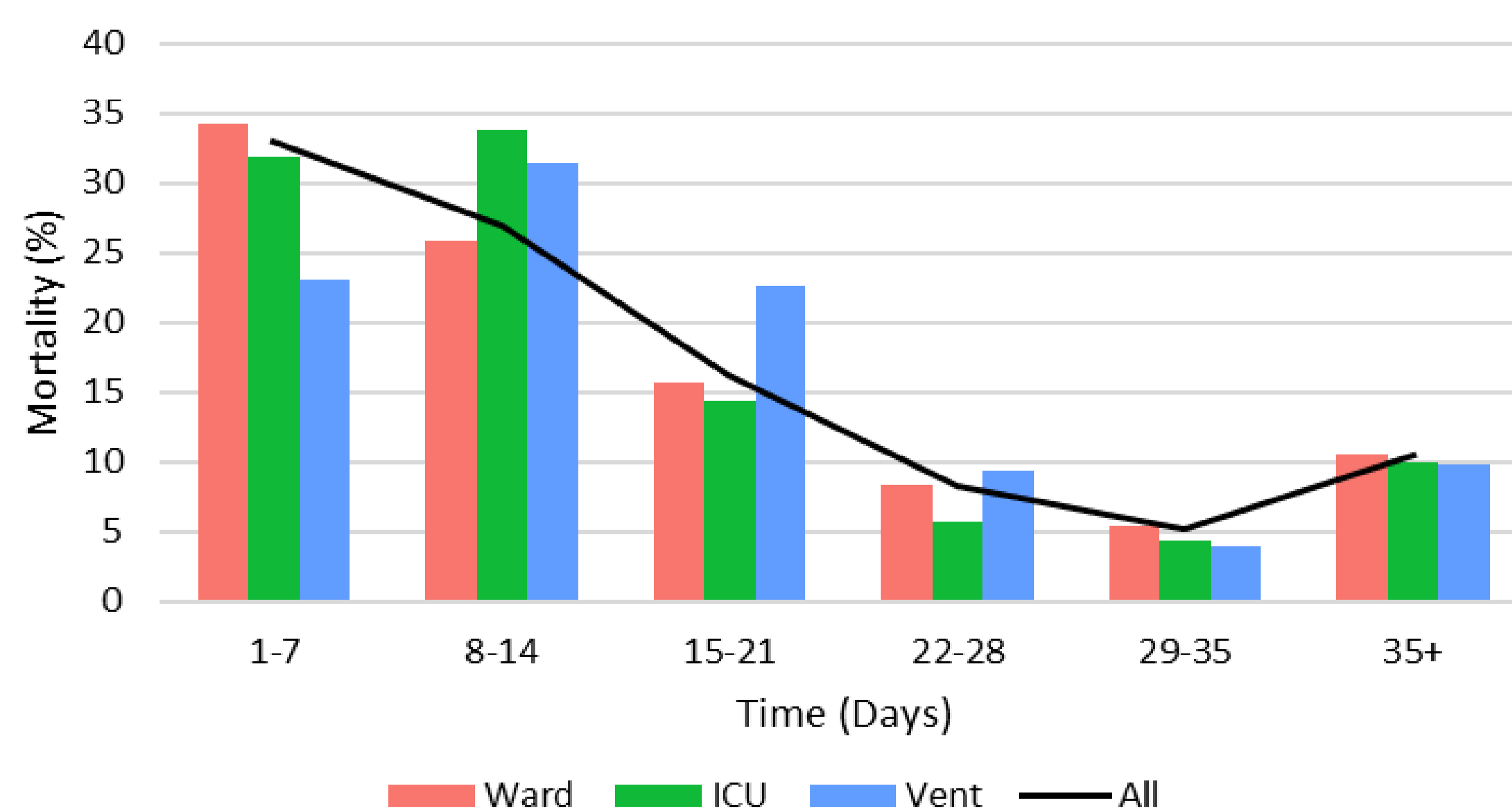
- Table 1 shows, after adjustment for confounders, that older age, males, admission to ICU and requiring ventilation were significantly associated with risk of mortality among patients with COVID-19.
- Survival probability for patients diagnosed with COVID-19 was 91.7%.
- Survival probability 14 days post-admission decreased to 96.3% and further declined to 94.7% 30 days after admission.

Figure 1. Kaplan-Meier survival plot and number of COVID-19 patients at risk stratified by hospital facility (ward/ICU/ventilated)



- Admission into ICU and ventilation was found to have largest impact on survival probability. Survival probability was 87.3% when admitted to ICU and 77.5% when ventilated (Figure 1).

Figure 2. Duration between hospital admission and COVID-19 patient mortality stratified by hospital facility (ward/ICU/ventilation)



- 60.0% of deaths occurred within 14 days post admission, and 84.4% of deaths occurred within 28 days post admission (Figure 2).
- Being in the ward, ICU, or ventilated did not have a substantial impact on the timing of deaths (Figure 2).

Conclusion

The mortality rate of COVID-19 patients admitted to hospital is high. Risk factors that are associated with increased mortality are old age, male, not fully vaccinated, Delta/Omicron BA.1 variant, ICU/ventilation and pre-existing condition. The findings presented will help mitigate fatalities by identifying high-risk patients.

Disclosure of Interest Statement

No conflicts of interest to declare.



Department of Health