

LETTER

Association between time from SARS-CoV-2 onset to case confirmation and time to recovery across sociodemographic strata in Singapore

Amid the coronavirus disease-2019 (COVID-19) pandemic, one of the most important indices of healthcare systems' performance in addressing the drastically increased burden is the average time to recovery of patients, the minimization of which indicates a strong capacity in handling the crisis and avoiding a total collapse of the systems. Previous research has suggested the importance of early detection amid epidemic outbreaks to facilitate better management of the disease.¹ Nevertheless, seldom has any research examined the relationship between time from the onset of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) to case confirmation and time to recovery, as well as how this relationship varies across sociodemographic strata.

From the Singaporean official website on COVID-19,² I extracted the records of 221 recovered patients with symptomatic presentation in Singapore, where the mortality rate from SARS-CoV-2 was estimated at only 0.09% as of May 2020.³ Although a large fraction of the patient data was pending further update, the

currently available data will suffice for preliminary purposes. Using this data, a Poisson regression analysis was implemented to examine the aforementioned relationship, with age, sex and nationality specified as potential moderators respectively interacting with time from onset to case confirmation in relation to time to recovery. As only secondary analysis of publicly available data was involved, no ethics approval was required.

Results showed that being 10-year older was associated with 8% more time to recovery and one additional week from onset to case confirmation was associated with a 50.0% less time to recovery among Singaporean female. This inverse association was 17% weaker among male, 5% weaker being 10-year older and 69% weaker with other South East Asian nationalities. Full numeric results are tabulated as [table 1](#).

The observed inverse relationship between time from onset to case confirmation and time to recovery is possibly due to a lower severity of the condition among patients with only mild symptoms, which took longer to arouse medical attention but eventually less time to treat. The increased complexities among male and older patients suggested in previous research⁴ may explain the observed weaker negative association, because these patients may be more likely to develop severe symptoms regardless of the time from onset to case confirmation. Last, the weaker association among South East Asian patients was possibly because of the systematic testing for foreign workers

living in dormitories where notable outbreaks took place,⁵ such that time from onset to case confirmation no longer depended mainly on symptomatic presentation.

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REFERENCES

- Volchikov V, Titova O, Larin D, *et al*. Intensive care of patients with severe influenza during the epidemic in 2016. *Eur Respir J* 2017;**50**:PA2125.
- Singaporean Government. COVID-19 Singapore Dashboard. 2020. Available <https://co.vid19.sg/singapore/> (accessed 6 May 2020).
- Varley K. As virus deaths grow, two rich nations keep fatality below 0.1%. Bloomberg, 2020. Available <https://www.bloomberg.com/news/articles/2020-05-05/as-virus-deaths-grow-two-small-nations-keep-fatality-below-0-1>
- Li X, Xu S, Yu M, *et al*. Risk factors for severity and mortality in adult COVID-19 inpatients in Wuhan. *J Allergy Clin Immunol* 2020.
- Tan Y, Illmer A. Coronavirus: Singapore spike reveals scale of migrant worker /infections. BBC News, 2020. Available <https://www.bbc.com/news/world-asia-52320289>

Table 1 Relative risks (RR) of increased time to recovery from SARS-CoV-2 with 95% CIs estimated from Poisson regression

	RR (95% CI)	P value
Local transmission (imported case as referent)	0.85 (0.78, 0.93)	0.000
Age (in 10 years)	1.08 (1.04, 1.12)	0.000
Male (female as referent)	1.02 (0.91, 1.15)	0.735
Nationality (Singaporean as referent)		
Western nationalities	0.87 (0.72, 1.04)	0.131
South East Asian	0.84 (0.68, 1.04)	0.118
Other nationalities	1.00 (0.76, 1.30)	0.983
Number of days from onset to confirmation	0.50 (0.40, 0.63)	0.000
Interaction terms		
Age × Number of days from onset to confirmation	1.05 (1.01, 1.09)	0.016
Male × Number of days from onset to confirmation	1.17 (1.04, 1.33)	0.012
Western nationalities × Number of days from onset to confirmation	1.00 (0.77, 1.31)	1.000
South East Asian × Number of days from onset to confirmation	1.69 (1.24, 2.29)	0.001
Other nationalities × Number of days from onset to confirmation	0.83 (0.57, 1.20)	0.320

SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.