Reply to Hoffmann and Wolf

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Dear Editor:

We are grateful to Hoffmann and Wolf for their interest and comments [1] on our recently published article describing the case-fatality ratio (CFR) of COVID-19 in Hong Kong [2].

We agree with Hoffmann and Wolf that age plays a critical role in determining CFR across the world. In fact, even in our relatively young cohort, age was one of the major independent predictors for adverse outcomes [2]. However, age distribution of the infected population cannot entirely explain the varying CFRs among different countries. For example, from the Figure presented by Hoffman and Wolf, CFRs varied from 2% to 6% in regions with 10-15% of patients aged ≥70 years old [1].

A recent country-level analysis of fifty countries with the highest number of COVID-19 reported cases showed that population age was not associated with COVID-19 mortality on multivariable analysis, while the number of nurses per million population and other socioeconomic factors independently correlated with COVID-19 mortality [3]. This analysis also provided evidence that effective public health interventions which were able to lessen transmission increased recovery rates among COVID-19 patients, most likely via prevention of health system overcapacity [3]. Another multi-country analysis involving 169 countries demonstrated that the number of tests as well as hospital beds per population were independently associated with COVID-19 mortality, after adjusting for proportion of aged persons in the country [4]. These data did support the importance of testing strategies, access to medical care, and healthcare capacity in determining outcomes in patients with COVID-19.

In our multivariable analysis, COVID-19 was independently associated with lower risk of adverse outcomes, after adjustment of age and other host characteristics [2]. We agree with Hoffmann and Wolf that the latest overall CFR had risen in Hong Kong due to more infections observed in older age groups. However, comparisons of the CFRs between SARS and our more recent COVID-19 cohort involving older age groups consistently showed significantly lower CFRs in COVID-19 among all age groups (Table) [5].

Lastly, since the major objective of our study was to determine predictors of CFR and adverse outcomes in infected patients, our results provided guidance on policies to reduce mortality among those who were infected. We fully agree that the importance of public health intervention to prevent transmission, especially among high-risk groups, can never be understated in this pandemic [6, 7, 8].

Potential Conflicts of Interest

G.L. reports advisory committee fees, speaker fees, and research grants from Merck and Gilead Sciences; and advisory committee fees and research grants from GSK. D.H. reports advisory committee member fees from Roche, outside the submitted work. T.Y. reports advisory committee member and speaker fees from Gilead Sciences. G.W. reports advisory committee member fees and research grants from Gilead Sciences; and speaker fees from Abbott, Abbvie, Bristol-Myers Squibb, Echosens, Furui, Gilead Sciences, Janssen and Roche.

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Table. Case fatality ratio in 30 days of COVID-19 and SARS patients in Hong Kong in different age groups

Age group	COVID-19 (n, %)[1]	SARS (n, %)	P-value
All	105/5088 (2.1%)	180/1670 (10.8%)	<0.001
<60 years	3/3797 (0.08%)	55/1299 (4.2%)	<0.001
60-69 years	13/770 (0.2%)	26/121 (21.5%)	<0.001
70-79 years	27/314 (8.6%)	48/135 (35.6%)	<0.001
≥80 years	62/207 (30.0%)	51/115 (44.3%)	0.013

[1]Patients diagnosed as of 30 September 2020, followed until 20 October 2020.