Supplementary Material

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Supplementary Section 1. COVID-19 severity, criticality, and fatality classification

Severe Coronavirus Disease 2019 (COVID-19) disease was defined per the World health Organization (WHO) classification as a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infected person with "oxygen saturation of <90% on room air, and/or respiratory rate of >30 breaths/minute in adults and children >5 years old (or ≥60 breaths/minute in children <2 months old or ≥50 breaths/minute in children 2–11 months old or ≥40 breaths/minute in children 1–5 years old), and/or signs of severe respiratory distress (accessory muscle use and inability to complete full sentences, and, in children, very severe chest wall indrawing, grunting, central cyanosis, or presence of any other general danger signs)" [1]. Detailed WHO criteria for classifying SARS-CoV-2 infection severity can be found in the WHO technical report [1].

Critical COVID-19 disease was defined per WHO classification as a SARS-CoV-2 infected person with "acute respiratory distress syndrome, sepsis, septic shock, or other conditions that would normally require the provision of life sustaining therapies such as mechanical ventilation (invasive or non-invasive) or vasopressor therapy" [1]. Detailed WHO criteria for classifying SARS-CoV-2 infection criticality can be found in the WHO technical report [1].

COVID-19 death was defined per WHO classification as "a death resulting from a clinically compatible illness, in a probable or confirmed COVID-19 case, unless there is a clear alternative cause of death that cannot be related to COVID-19 disease (e.g. trauma). There should be no period of complete recovery from COVID-19 between illness and death. A death due to COVID-19 may not be attributed to another disease (e.g. cancer) and should be counted independently of preexisting conditions that are suspected of triggering a severe course of COVID-19". Detailed WHO criteria for classifying COVID-19 death can be found in the WHO technical report [2].

Supplementary Section 2. Laboratory Methods

Real-time reverse-transcription polymerase chain reaction testing

Nasopharyngeal and/or oropharyngeal swabs were collected for PCR testing and placed in Universal Transport Medium (UTM). Aliquots of UTM were: extracted on a QIAsymphony platform (QIAGEN, USA) and tested with real-time reverse-transcription PCR (RT-qPCR) using TaqPath™ COVID-19 Combo Kits (Thermo Fisher Scientific, USA) on an ABI 7500 FAST (Thermo Fisher, USA); tested directly on the Cepheid GeneXpert system using the Xpert Xpress SARS-CoV-2 (Cepheid, USA); or loaded directly into a Roche cobas® 6800 system and assayed with a cobas® SARS-CoV-2 Test (Roche, Switzerland). The first assay targets the viral S, N, and ORF1ab gene regions. The second targets the viral N and E-gene regions, and the third targets the ORF1ab and E-gene regions.

All PCR testing was conducted at the Hamad Medical Corporation Central Laboratory or Sidra Medicine Laboratory, following standardized protocols.

Supplementary Table 1. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for case-control studies.

	Item No	Recommendation	Main text page
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Abstract
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	Introduction
Methods			
Study design	4	Present key elements of study design	Material and Methods ('Study design')
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Material and Methods ('Study design') & Figure 1
Participants	6	(*a*) Give the eligibility criteria, and the sources and Methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls	Material and Methods ('Study design') & Figure 1
		(*b*) For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Material and Methods ('Study design'), Table 1, & Sections S1 and S2
Data sources/ measurement	8	For each variable of interest, give sources of data and details of Methods of assessment (measurement). Describe comparability of assessment Methods if there is more than one group	Material and Methods ('Study design' & 'Statistical analysis'), & Sections S1 and S2
Bias	9	Describe any efforts to address potential sources of bias	Material and Methods ('Study design', paragraphs 5-6 & 'Statistical analysis')
Study size	10	Explain how the study size was arrived at	Figure 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Material and Methods ('Study design'), Table 1, & Sections S1 and S2
Statistical Methods	12	(*a*) Describe all statistical Methods, including those used to control for confounding	Material and Methods ('Statistical analysis')
		(*b*) Describe any Methods used to examine subgroups and interactions	Material and Methods ('Statistical analysis')
		(*c*) Explain how missing data were addressed	Not applicable, see Material and Methods ('Study design', paragraph 1)
		(*d*) If applicable, explain how matching of cases and controls was addressed	Material and Methods ('Study design', paragraph 6 & 'Statistical analysis', paragraph 1)
		(*e*) Describe any sensitivity analyses	Material and Methods ('Statistical analysis', paragraph 2)
Results			
Participants	13	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Results, paragraph 1 & Figure 1
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Results, paragraphs 2-3 & Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Not applicable, see Material and Methods ('Study design', paragraph 1)
Outcome data	15	Report numbers in each exposure category, or summary measures of exposure	Results, paragraphs 4-5 & Table 2
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Results, paragraphs 4-5 & Table 2
		(*b*) Report category boundaries when continuous variables were categorized	Table 1
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Results, paragraph 4 & Table 2

Discussion			
Key results	18	Summarise key results with reference to study objectives	Discussion, paragraphs 1-3
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion, paragraphs 4-6
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion, paragraph 7
Generalisability	21	Discuss the generalisability (external validity) of the study results	Discussion, paragraph 5
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Funding

References

[1] World Health Organization. COVID-19 clinical management: living guidance, https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2021-1; 2021 [accessed May 15, 2021].
[2] World Health Organization. International guidelines for certification and classification (coding) of COVID-19 as cause of death. Document Number: WHO/HQ/DDI/DNA/CAT, https://www.who.int/classifications/icd/Guidelines_Cause_of_Death_COVID-19-20200420-EN.pdf?ua=1; 2021 [accessed May 15, 2021].