COVID-MATCH65 – A prospectively derived clinical decision rule for severe acute respiratory syndrome coronavirus 2

Authors: Jason A Trubiano BBiomedSci MBBS PhD,1,2,3†, Sara Vogrin MBBS MBiostat,5, Olivia C Smibert MBBS1,3, Nada Marhoon GradDipSci BSc6, Adrian A Alexander BMSc MD,4, Kyra Y L Chua MBBS PhD1, Fiona L James BBiomedSci1, Nicholas RL Jones MBBS2,4, Sam E Grigg MBBS1, Cecilia LH Xu MBBS1, Nasreen Moini MBBS2,4, Sam R Stanley M.S (MLT)7, Michael T Birrell MBBS1, Morgan T Rose MBBS1, Claire L Gordon BMedsci MBBS PhD,1,8, Jason C Kwong MBBS PhD1,8*, Natasha E Holmes MBBS PhD1,6*

*Co-senior author

Affiliations:
1. Department of Infectious Diseases, Austin Health, Heidelberg, Australia
2. Department of Medicine (Austin Health), University of Melbourne, Heidelberg, Australia
3. Department of Infectious Diseases and The National Centre for Infections in Cancer, Peter MacCallum Cancer Centre, Parkville, Australia
4. Department of General Medicine, Austin Health, Heidelberg, Australia
5. Department of Medicine (St Vincent’s Hospital), University of Melbourne, Fitzroy, Australia
6. Data Analytics Research and Evaluation (DARE) Centre, Austin Health and University of Melbourne, Heidelberg, Australia
7. Electronic Medical Record and Information and Communications Technology Services, Austin Health, Heidelberg, Australia
8. Department of Microbiology and Immunology, University of Melbourne, Peter Doherty Institute for Infection and Immunity, Melbourne, Australia.

Abbreviated title: COVID-MATCH65

†Corresponding author: A/Prof Jason Trubiano

Department of Infectious Diseases, Australia; 145 Studley Road, Heidelberg, VIC, Australia 3084
Phone: +61 3 94966676 Fax: + 61 3 9496677 E: jason.trubiano@austin.org.au

Conflicts of interest – Nil Word Count – 1255 Keywords – SARS-CoV-2, diagnosis, PCR, risk

Declaration – This data has not been previously presented or published

NOTE: This preprint reports new research that has not been certified by peer review and should not be used to guide clinical practice.
Abstract

Due to the ongoing COVID-19 pandemic and increased pressure on testing resources, understanding the clinical and epidemiological features closely associated with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is vital at point of care to enable risk stratification. We demonstrate that an internally derived and validated clinical decision rule, COVID-MATCH65, has a high sensitivity (92.6%) and NPV (99.5%) for SARS-CoV-2 and could be used to aid COVID-19 risk-assessment and resource allocation for SARS-CoV-2 diagnostics.
Background

The COVID-19 pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first reported in China and has now infected over 9 million people globally (1). A range of clinical symptoms and syndromes have been reported in confirmed COVID-19 (2-4). However, there have been limited prospective reports of the clinical and epidemiological predictors of COVID-19 infection (5). We report on the clinical and epidemiological predictors of COVID-19 from a uniquely derived prospective database and present a point-of-care COVID-19 clinical decision tool.

Methods

A COVID-19 rapid assessment screening clinic was established at Austin Health on 11 March 2020 with prospective electronic medical record (EMR; eMethods) data of patients presenting to the clinic systematically collected by medical staff from 11 March to 22 April 2020. Patients were predominantly adults - children over 6 months were seen at clinician discretion. Modifications to the EMR were made during the study period to align with the Victorian Department of Health and Human Services (DHHS) testing criteria (6) (eMethods). Only those patients that met the DHHS criteria for SARS-CoV-2 testing had nasopharyngeal swab collected for SARS-Cov-2 nucleic acid detection by polymerase chain reaction (PCR). Patients with swabs that had SARS-CoV-2 nucleic acid detected were termed “COVID-19 test positive”; those with swabs where SARS-CoV-2 nucleic acid was not detected were termed “COVID-19 test negative”. This study was approved by the Austin Health Human Research and Ethics Committee.

Derivation and Internal Validation Cohort

Clinical data from the data collection tool (baseline demographics, clinical symptoms, clinical observations) and COVID-19 testing results were extracted from Austin Health EMR platform (Cerner®) by the Data Analytics Research and Evaluation (DARE) Centre (Austin Health/University of Melbourne).

Statistical analysis
All results are presented according to TRIPOD guidelines(7). Categorical variables are presented as frequency (percentage) and continuous variables as median (interquartile range [IQR]). Fisher’s exact test or rank sum test were used to compare characteristics between tested and not tested patients. To determine the predictors of a positive COVID-19 test, a multivariable logistic regression with backward stepwise procedure was used, eliminating variables with p>0.10 and re-inclusion of variables with p<0.05. Bootstrapping was used for internal validation. Further details on variable selection, model development and performance, internal validation and score derivation are outlined in eMethods.

Results

Study population and setting

During the study period 4359 assessments were performed in 4226 patients (eTable 1). For those with multiple presentations (n=118) only their first testing date was used (for patients that were not tested, their first assessment was taken). Median (IQR) number of daily assessments was 96 (71, 134) with an average of 51% of patients being tested each day (eFigure1).

COVID-19 testing

Testing was performed on 2976 patients (70%). The characteristics of those with suspected COVID-19, stratified by testing performed status, is outlined in eTable 2. The most frequently reported symptoms in both groups were any fever (reported or documented), cough, sore throat and coryza as outlined in eTable 2.

COVID-19 test positivity

Of the 2976 patients that were tested, 41 were excluded from the analysis due to pending results (n=38) or indeterminate results (n=3). The prevalence of a positive COVID-19 test in the final cohort was 3.7% (108/2935). Characteristics of those patients with a positive COVID-19 test are shown in Table 1.
Demographic, epidemiological and clinical factors associated with a positive COVID-19 test

The characteristics associated with a positive COVID-19 test in univariate and multivariable analysis are shown in Table 2. The seven features associated with a COVID-19 test on multivariable analysis were summarized in the mnemonic COVID-MATCH65 (Figure 1). The model showed good discrimination (AUC = 0.843, Hosmer-Lemeshow chi²=4.96, p=0.762) and calibration (calibration slope = 1.00, Brier score = 0.03, product-moment correlation between observed and predicted probability = 0.35). Internal validation showed minimal mean optimism of 0.007 with internally validated AUC of 0.836 (eFigure 2 & 3). The resulting score ranges from -1 to 6.5 points with score ≤ 1 representing low risk of a positive test (<1%) and scores above 4 having beyond 20% probability of a positive test (Figure 1).

The positive and negative results for each COVID-MATCH65 score are outlined in eTable 2. A score of at least 1.5 was shown to have 92.6% (95% CI 85.9%, 96.7%) sensitivity, 51.3% (49.4, 53.1) specificity, 6.8% (5.5, 8.2) positive predictive value and 99.5% (98.9, 99.8) negative predictive value of identifying a patient who was COVID-19 test positive (eTable 3). COVID-MATCH65 also retains a high NPV with increasing prevalence of COVID-19 (30% prevalence) (eTable 4).

Admission to hospital

A total of 15 COVID-19 positive patients (14%) were admitted to hospital. Median (IQR) COVID-MATCH65 score in admitted was 3.5 (2.5, 4.5) while in non-admitted it was 3 (2.5, 4). Score was not predictive of admission (OR 1.04, 95%CI: 0.70, 1.53, p=0.852). Variables predictive of admission were oxygen saturation (SpO2) < 97%, shortness of breath, male gender and not being exposed to confirmed case/international travel (eTable 5).

Discussion

Whilst the clinical features of COVID-19 have been well reported, robust prospective from patients presenting for COVID-19 assessment that are both SARS-CoV-2 positive and negative on testing remains absence. Therefore, to date an accurate assessment of the clinical predictors associated with a
positive SARS-CoV-2 test has been ill defined. Whilst fever has been the predominant presenting feature of confirmed COVID-19 cases from published inpatient populations(4), it was in fact observed less frequently (36.5%) in our outpatient cohort, potentially the result of earlier presentation (5 days[median] from symptom onset). Bajema et al.(5) reported fever in 68% in a retrospective cohort study (n=210) from the USA with similar incidence rate of COVID-19 positive tests to our cohort (5% USA vs. 4.7% AUS). Whilst in the earliest reports from confirmed cases in China the figures were 83-98%(2, 3). Whilst coryza and sore throat were frequently reported, the presence of either was in fact a negative predictor of COVID-19 infection. Anosmia or ageusia as seen in other emerging studies was a strong predictor of a positive COVID-19 test(8). Whilst contact and/or international travel was a predictor of COVID-19 infection in our model, as seen in US model from Challenger et al.(9), it may be less relevant in outbreak settings and during periods of travel bans, however these criteria alone are not required for a patient to be at high risk of COVID-19.

Our model has some limitations, including the single centre prospective data source, jurisdictional guided testing criteria, testing of symptomatic only patients and absence of external validation. However, only one small retrospective US cohort (n =49 COVID-19 positive /n= 98 COVID-19 negative)(9) and two non-peer reviewed publications from China have examined the role of clinical decision rules from large datasets - Meng et al. (n = 620 outpatients; 48.7% positive)(10) and Song et al.(11) (n = 304 inpatients; 24.0% positive), both limited by requirement for clinical and laboratory parameters. COVID-MATCH65 uses readily available clinical information without laboratory test results, with a score of 1.5 associated with high sensitivity and NPV, enabling application in the outpatient and potentially early inpatient setting. Further risk stratification can be made with the scoring tool (lowest risk [< 1 in 100] to extreme risk [1 in 1]), aiding diagnostic approaches in patients with suspected COVID-19. In a pandemic where diagnostic resources are limited in both low- and high-income settings,(12) risk stratification of those likely to have COVID-19 is urgently required and tools such as COVID-MATCH65 can aid the front-line clinician. We encourage readers to urgently employ and validate COVID-MATCH65 in their own datasets, as it is likely to aid clinicians at point-of-care especially via an open access web platform (http://COVID-MATCH65.austin.org.au).
Funding - Investigator initiated study, no direct funding received for this project. Individual researchers are supported by career grants as outlined - J. A. T. is supported by a National Health and Medical Research Council (NHMRC) Early Career Research Grant (GNT 1139902), Royal Australasian College of Physicians (RACP) Research Establishment Fellowship and postdoctoral scholarship from the National Centre for Infections in Cancer (NCIC). C.L.G. is supported by a NHMRC Early Career Fellowship (GNT 1160963), Royal Australasian College of Physicians (RACP) Research Establishment Fellowship and University of Melbourne Early Career Research Grant. O.C.S is supported by a National Health and Medical Research Council (NHMRC) Postgraduate Scholarship (GNT 1191571). J.C.K. is supported by a NHMRC Early Career Fellowship (GNT 1142613).

Author contributions – JAT, NEH, OS, JCK, KYC – Study design, manuscript preparation, manuscript review; SV – statistical analysis; AA, NM, MTB, SEG, CLX – data collection, manuscript review; MR, SS – data collection and database design; NJ, FLJ – manuscript review. All authors have read and approved the manuscript.

Acknowledgements – Nil
References

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med. 2020;382(8):727-33.
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497-506.
3. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020;395(10223):507-13.
4. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020.
5. Bajema KL, Oster AM, McGovern OL, Lindstrom S, Stenger MR, Anderson TC, et al. Persons Evaluated for 2019 Novel Coronavirus - United States, January 2020. MMWR Morb Mortal Wkly Rep. 2020;69(6):166-70.
6. DHHS. Current Victorian coronavirus disease (COVID-19) case-definition and testing criteria 2020 [Available from: https://www.dhhs.vic.gov.au/health-services-and-general-practitioners-coronavirus-disease-covid-19].
7. Wynants L, Van Calster B, Bonten MMJ, Collins GS, Debray TPA, De Vos M, et al. Prediction models for diagnosis and prognosis of covid-19 infection: systematic review and critical appraisal. BMJ. 2020;369:m1328.
8. Trubiano JA, Vogrin S, Kwong JC, Homes N. Alterations in smell or taste - Classic COVID-19? Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. 2020.
9. Challenger D, Challenger G, Gow-Lee V, Fida M, Shah A, O’Horo J. Screening for COVID-19: Patient Factors Predicting Positive PCR Test. Infect Control Hosp Epidemiol. 2020;1-7.
10. Feng C, Huang Z, Wang LF. A novel triage tool of artificial intelligence assisted diagnosis aid system for suspected covid-19 pneumonia in fever clinics. medRxiv [Preprint]. 2020.
11. Qi X, Jiang Z, Yu Q. Machine learning-based CT radiomics model for predicting hospital stay in patients with pneumonia associated with SARS-CoV-2 infection: a multicenter study. 2020.
12. Cheng MP, Papenburg J, Desjardins M, Kanji J, Quach C, Libman M, et al. Diagnostic Testing for Severe Acute Respiratory Syndrome-Related Coronavirus-2: A Narrative Review. Ann Intern Med. 2020.
| Factor                              | Overall | Not detected | Detected |
|------------------------------------|---------|--------------|----------|
| N                                  | 2935    | 2827         | 108      |
| Age, years, median (IQR)           | 39 (29, 53) | 38 (29, 52) | 51 (33, 62) |
| Sex - male                         | 1071 (36.5%) | 1016 (35.9%) | 55 (50.9%) |
| Comorbidities                      |         |              |          |
| Cardiovascular disease             | 105 (3.6%) | 101 (3.6%) | 4 (3.7%) |
| Diabetes                           | 85 (2.9%) | 84 (3.0%) | 1 (0.9%) |
| Hypertension                       | 262 (8.9%) | 245 (8.7%) | 17 (15.7%) |
| ACEI/ARB treatment                 | 98 (3.3%) | 89 (3.1%) | 9 (8.3%) |
| Smoking                            | 259 (8.8%) | 256 (9.1%) | 3 (2.8%) |
| Chronic renal or liver disease     | 21 (0.7%) | 21 (0.7%) | 0 (0.0%) |
| Immunosuppressed                   | 90 (3.1%) | 87 (3.1%) | 3 (2.8%) |
| Chronic respiratory disease        | 343 (11.7%) | 339 (12.0%) | 4 (3.7%) |
| Pregnancy                          | 38 (1.3%) | 38 (1.3%) | 0 (0.0%) |
| Overseas health facility exposure  | 114 (3.9%) | 112 (4.0%) | 2 (1.9%) |
| Australian health facility exposure| 902 (30.7%) | 890 (31.5%) | 12 (11.1%) |
| Any contact or overseas travel     | 1182 (40.3%) | 1093 (38.7%) | 89 (82.4%) |
| Contact with known COVID-19 positive patient | 508 (17.3%) | 446 (15.8%) | 62 (57.4%) |
| Overseas travel (incl. cruise)     | 723 (24.6%) | 684 (24.2%) | 39 (36.1%) |
| Days from arrival to symptom onset, median (IQR) | 2 (-1, 6) | 2 (-1, 6) | 1 (-1, 3) |
| Number of symptoms                 |         |              |          |
| 0                                  | 49 (1.7%) | 45 (1.6%) | 4 (3.7%) |
| 1                                  | 243 (8.3%) | 240 (8.5%) | 3 (2.8%) |
| 2                                  | 540 (18.4%) | 526 (18.6%) | 14 (13.0%) |
| 3                                  | 669 (22.8%) | 646 (22.9%) | 23 (21.3%) |
| 4                                  | 646 (22.0%) | 623 (22.0%) | 23 (21.3%) |
| 5 or more                          | 788 (26.8%) | 747 (26.4%) | 41 (38.0%) |
| Symptoms                           |         |              |          |
| Any fever                          | 1119 (38.1%) | 1063 (37.6%) | 56 (51.9%) |
| Fever > 38 C                       | 274 (9.3%) | 260 (9.2%) | 14 (13.0%) |
| Fever subjective                   | 905 (30.8%) | 859 (30.4%) | 46 (42.6%) |
| Sore throat                        | 2038 (69.4%) | 1983 (70.1%) | 55 (50.9%) |
| Sinusitis                          | 14 (0.5%) | 13 (0.5%) | 1 (0.9%) |
| Cough                              | 2042 (69.6%) | 1956 (69.2%) | 86 (79.6%) |
| Shortness of breath                | 897 (30.6%) | 868 (30.7%) | 29 (26.9%) |
| Chest pain                         | 71 (2.4%) | 68 (2.4%) | 3 (2.8%) |
| Anosmia                            | 75 (2.6%) | 64 (2.3%) | 11 (10.2%) |
| Ageusia                            | 81 (2.8%) | 69 (2.4%) | 12 (11.1%) |
| Anosmia or ageusia                 | 126 (4.3%) | 109 (3.9%) | 17 (15.7%) |
| Coryza                             | 1606 (54.7%) | 1559 (55.1%) | 47 (43.5%) |
| Diarrhoea                          | 483 (16.5%) | 457 (16.2%) | 26 (24.1%) |
| Other GI symptoms                  | 63 (2.1%) | 62 (2.2%) | 1 (0.9%) |
| Malaise/myalgia/arthralgia         | 1410 (48.0%) | 1339 (47.4%) | 71 (65.7%) |
| Headache                           | 402 (13.7%) | 381 (13.5%) | 21 (19.4%) |
|                          |         |         |         |
|--------------------------|---------|---------|---------|
| Asymptomatic             | 25 (0.9%) | 23 (0.8%) | 2 (1.9%) |
| Days since symptom onset, median (IQR) | 3 (1, 6) | 3 (1, 6) | 4 (2, 7) |
| Clinical signs           |         |         |         |
| SPO2, median (IQR)       | 98 (97, 99) | 98 (97, 99) | 98 (96, 99) |
| Temperature Tympanic, median (IQR) | 36.6 (36.3, 36.9) | 36.6 (36.3, 36.9) | 36.7 (36.3, 37.1) |
| Systolic Blood Pressure, median (IQR) | 133 (121, 147) | 132 (121, 147) | 134 (122, 146) |
| Diastolic Blood Pressure, median (IQR) | 82 (75, 89) | 81 (75, 89) | 83.5 (78, 88) |
| Respiratory Rate, median (IQR) | 18 (16, 18) | 18 (16, 18) | 18 (17, 18) |
| Pulse Rate, median (IQR)  | 83 (73, 94) | 84 (73, 94) | 82 (73, 93.5) |
| Discharge destination     |         |         |         |
| Discharged               | 1895 (64.6%) | 1802 (63.7%) | 93 (86.1%) |
| Transferred to ED        | 18 (0.6%) | 18 (0.6%) | 0 (0.0%) |
| Transferred to ward      | 1 (<0.1%) | 1 (<0.1%) | 0 (0.0%) |
| Unknown                  | 1021 (34.8%) | 1006 (35.6%) | 15 (13.9%) |

**Abbreviations:** N, number; IQR, interquartile range; SPO2, oxygen saturation; ACEI, angiotensin-converting-enzyme inhibitor; ARB, angiotensin receptor blocker; GI, gastrointestinal; ED, emergency department.
### Table 2: Univariate & multivariable analysis of features associated with a positive COVID-19 test (SARS-CoV-2 nucleic acid Detected)

| Variables considered for inclusion | Overall | COVID-19 positive test | Univariate analysis | Multivariable analysis | Presence in 1000 bootstrap replications, %* | Points |
|-----------------------------------|---------|------------------------|---------------------|------------------------|------------------------------------------|--------|
| Age 65+                           | 254 (8.7%) | 19 (17.6%)             | 2.35 (1.41, 3.93)   | 0.001                  | 2.80 (1.56, 5.04)                      | 1.03 (0.45, 1.62) | 0.001 | 75 | 1 |
| Male sex                          | 1071 (36.5%) | 55 (50.9%)             | 1.85 (1.26, 2.72)   | 0.002                  |                                          |                    |      | 50 |   |
| Hypertension                      | 262 (8.9%) | 17 (15.7%)             | 1.97 (1.15, 3.36)   | 0.013                  |                                          |                    |      | 50 |   |
| Contact with known COVID-19 positive patient or overseas travel | 1182 (40.3%) | 89 (82.4%)             | 7.43 (4.50, 12.27)  | <0.001                 | 14.24 (7.92, 25.63)                     | 2.66 (2.07, 3.24) | <0.001 | 100 | 2.5 |
| Any fever (documented or reported) | 1119 (38.1%) | 56 (51.9%)             | 1.79 (1.22, 2.63)   | 0.003                  | 1.59 (1.03, 2.43)                      | 0.46 (0.03, 0.89) | 0.035 | 71 | 0.5 |
| Coryza or sore throat             | 2455 (83.6%) | 73 (67.6%)             | 0.39 (0.26, 0.59)   | <0.001                 | 0.36 (0.23, 0.58)                      | -1.01 (-1.48, -0.55) | <0.001 | 99 | -1 |
| Cough                             | 2042 (69.6%) | 86 (79.6%)             | 1.74 (1.08, 2.80)   | 0.022                  |                                          |                    |      | 52 |   |
| Shortness of breath*              | 897 (30.6%) | 29 (26.9%)             | 0.83 (0.54, 1.28)   | 0.394                  |                                          |                    |      |    |   |
| Anosmia or ageusia                | 126 (4.3%) | 17 (15.7%)             | 4.66 (2.68, 8.09)   | <0.001                 | 13.67 (6.89, 27.13)                     | 2.62 (1.93, 3.30) | <0.001 | 100 | 2.5 |
| Diarrhoea                         | 483 (16.5%) | 26 (24.1%)             | 1.64 (1.05, 2.58)   | 0.031                  |                                          |                    |      | 26 |   |
| Myalgia or Malaise                | 1410 (48.0%) | 71 (65.7%)             | 2.13 (1.42, 3.19)   | <0.001                 | 2.20 (1.41, 3.44)                      | 0.79 (0.45, 1.35) | 0.001 | 96 | 1 |
| Headache                          | 402 (13.7%) | 21 (19.4%)             | 1.55 (0.95, 2.53)   | 0.079                  |                                          |                    |      | 36 |   |
| SPO2 <97%                         | 473 (16.1%) | 36 (33.3%)             | 2.73 (1.81, 4.13)   | <0.001                 | 2.46 (1.57, 3.87)                      | 0.90 (0.45, 1.35) | <0.001 | 93 | 1 |
| Temperature ≥37.5 C               | 174 (5.9%) | 11 (10.2%)             | 1.85 (0.97, 3.53)   | 0.060                  |                                          |                    |      | 15 |   |
| Systolic blood pressure >140 mmHg* | 1082 (36.9%) | 43 (39.8%)             | 1.14 (0.77, 1.69)   | 0.518                  |                                          |                    |      |    |   |
| Diastolic blood pressure >80 mmHg | 1623 (55.3%) | 72 (66.7%)             | 1.65 (1.10, 2.47)   | 0.016                  |                                          |                    |      | 54 |   |
| Respiratory rate <16/min or >20/min* | 196 (6.7%) | 7 (6.5%)               | 0.97 (0.44, 2.11)   | 0.934                  |                                          |                    |      |    |   |
| Pulse rate ≤60/min or >100/min    | 486 (16.6%) | 11 (10.2%)             | 0.56 (0.30, 1.06)   | 0.073                  |                                          |                    |      | 51 |   |

*Not considered for inclusion due to p<0.200

**Abbreviations:** OR, odds ratio; CI, confidence interval; SPO2, oxygen saturation
**Figure 1:** COVID-19 clinical decision rule – COVID-MATCH65

| Condition                                      | Points |
|------------------------------------------------|--------|
| COVID-19 patient exposure or international travel† | 2.5    |
| Myalgia/malaise                                | 1      |
| Anosmia or ageusia                             | 2.5    |
| Temperature (any reported fever)               | 0.5    |
| Coryza/sore throat                             | -1     |
| Hypoxia - oxygen saturation $< 97\%$†          | 1      |
| 65 years or older                              | 1      |

**COVID - MATCH65 Scoring Assessment**

- **[4]** Low risk of COVID-19 - 0.5% (1 in 200 suspected COVID-19 patients)
- **[1-1.5]** Moderate risk of COVID-19 - 1.5% (1 in 66 suspected COVID-19 patients)
- **[2-3.5]** High risk of COVID-19 - 6% (1 in 16 suspected COVID-19 patients)
- **[4-4.5]** Very high risk of COVID-19 - 20% (1 in 5 suspected COVID patients)
- **[>5]** Extreme risk of COVID-19 - 50% (1 in 2 suspected COVID patients)

† Within last 14 days before symptom onset. ‡ On room air.