

Limited clinical value of early repeat RT-PCR testing for SARS-CoV-2

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The analytic performance of the gold standard diagnostic test for severe acute respiratory syndrome coronavirus (SARS-CoV-2), reverse transcription polymerase chain reaction (RT-PCR), has been described.¹ However, data on its clinical performance, which may be affected by pre-analytical factors — such as stage of illness, anatomic sample site, and sample collection — are more limited.²

We therefore assessed the frequency and characteristics of discordant repeat SARS-CoV-2 RT-PCR results between 1 June and 21 July 2020, during the second wave of coronavirus disease 2019 (COVID-19) in Melbourne. During this period, our laboratory at Royal Melbourne Hospital performed 15 358 SARS-CoV-2 RT-PCR tests from 12 569 unique persons, using published methods³ (Box 1); 12 215 tests (80%) were for people who attended health services for SARS-CoV-2 testing, and 3143 (20%) for symptomatic or asymptomatic health care workers. We applied a risk-based approach to screening; for all patients admitted to hospital who met the Victorian Department of Health and Human Services case definition for suspected COVID-19,⁴ two consecutive negative combined deep nasal/oropharyngeal swabs, or one negative combined deep nasal/oropharyngeal swab and one negative sputum or tracheal aspirate were required before transmission-based infection control precautions were discontinued (Supporting Information, table). Our study was approved by the Melbourne Health Human Research Ethics Committee (reference, QA2019134).

Of the 12 569 people tested, 2218 (17.6%) with initial negative results underwent repeat testing; 1391 had repeat tests within seven days of the first, 25 of whom (1.8%) had initial negative results followed by a positive result on a subsequent test (Supporting Information, figure). Each of these 25 people had at least one epidemiological risk factor (known contact with a person with confirmed COVID-19, contact with a confirmed outbreak in health care or residential settings, or health care occupational exposure; Box 2). Although a detailed assessment

of epidemiological risk factors could not be performed for all individuals tested during the study period for comparison, this finding is notable, given the relatively low prevalence of COVID-19 in Victoria during this period (peak rate of infection, 54.2 cases per 100 000 population⁵). Twelve of the 25 people were asymptomatic at the time of their first test, the sample for which was collected following a known exposure, suggesting that these samples were collected during the viral incubation period, rather than the initial negative results being false negatives. Of the 1105 patients who underwent repeat SARS-CoV-2 RT-PCR testing within 24 hours of initial tests, only one repeat test result (for a sputum sample) was positive; RT-PCR detection of SARS-CoV-2 is more sensitive when testing sputum specimens than nasopharyngeal swab samples.⁶

Our findings suggest that progression from a negative to a positive RT-PCR result within seven days was infrequent during a period of low SARS-CoV-2 prevalence, and occurred only in people with defined epidemiological risks. A risk-based approach to repeat testing for SARS-CoV-2 could therefore safely reduce the need for repeat sampling. Our findings informed a change in local hospital policy; repeat swabs were no longer routinely required for hospitalised patients who were not in defined epidemiological risk groups. When SARS-CoV-2 prevalence is low, a risk-based approach to screening could improve patient flow in health care settings, moderate the need for personal protective equipment, reduce patient discomfort, and conserve limited testing reagents.

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1 Characteristics of all people tested for SARS-CoV-2 at the Royal Melbourne Hospital, 1 June – 21 July 2020*

Characteristic	Total number	One test only	Repeat tests		
			Within 7 days	Within 72 hours	Within 24 hours
Unique persons	12 569	10 318	1391	1168	1105
Age (years), median (IQR)	35 (27–50)	34 (26–46)	61 (37–79)	67 (47–81)	69 (49–82)
Sex (women)	7462 (59%)	6228 (60%)	662 (48%)	523 (45%)	483 (44%)
SARS-CoV-2-positive (first or subsequent test)	286 (2.3%)	209 (2.0%)	25 (1.8%)	7 (0.6%)	1 (0.1%)

IQR = interquartile range; SARS-CoV-2 = severe acute respiratory syndrome coronavirus.

* Includes all people, regardless of outcome of the first test.

2 Characteristics of people tested twice within seven days for SARS-CoV-2 at the Royal Melbourne Hospital, 1 June – 21 July 2020, who were negative on the first test and positive on a subsequent test

Characteristic	Repeat tests		
	Within 7 days	Within 72 hours	Within 24 hours
Unique persons	25	7	1
Age (years), median (IQR)	31 (27–82)	37 (30–61)	39
Sex (women)	18 (72%)	5 (71%)	1 (100%)
Time between results (days), median (IQR)	3.3 (3.0–4.1)	2.6 (1.7–2.9)	0.9
Epidemiological risk factors for COVID-19	25 (100%)	7 (100%)	1 (100%)
One risk factor	17 (68%)	5 (71%)	1 (100%)
Two risk factors	8 (32%)	2 (29%)	0
COVID-19 contact	12 (48%)	3 (43%)	0
Confirmed outbreak	10 (40%)	4 (57%)	1 (100%)
Health care worker	11 (44%)	2 (29%)	0
Symptoms: initial swab			
Asymptomatic	12 (48%)	3 (43%)	0
Symptomatic	12 (48%)	4 (57%)	1 (100%)
Unknown	1 (4%)	0	0
Symptoms: repeat swab			
Asymptomatic	1 (4%)	0	0
Symptomatic	20 (80%)	6 (86%)	1 (100%)
Unknown	4 (16%)	1 (14%)	0

COVID-19 = coronavirus disease 2019; IQR = interquartile range; SARS-CoV-2 = severe acute respiratory syndrome coronavirus. ◆

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Supporting Information

Additional Supporting Information is included with the online version of this article.