Communicable Diseases Intelligence

Time taken by individuals with respiratory symptoms to present to primary care: a descriptive study of assessments at Australian General Practitioner-led respiratory clinics

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Original Article

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Abstract

Effective control of coronavirus disease 2019 (COVID-19) has been challenging, in part due to significant asymptomatic and pre-symptomatic transmission of disease. Reducing the time between symptom onset and COVID-19 testing and isolation allows enhanced outbreak control. The purpose of this study is to describe the time taken by participants to present to general practitioner-led (GP) respiratory clinics for assessment following the development of symptoms, and to explore associations between demographic and geographic characteristics and the time to presentation.

A total of 314,148 participants, who were assessed in GP respiratory clinics between 1 February and 31 August 2021, were included in the analysis. The median age of participants at presentation was 33 years (interquartile range, IQR: 15–49).

The median time from development of symptoms to presentation for assessment at GP respiratory clinics was 2 days (IQR: 1–3). Participants were more likely to present within one day of symptom onset if they were aged between 15 and 64 years (43.4%), lived in urban areas (40.9%) or were non-Indigenous (40.2%). Participants in New South Wales and Victoria had twice the odds (OR 2.01; 95% confidence interval (CI): 1.95, 2.08) of presenting at a GP respiratory clinic within one day of symptom onset in August 2021, when there was a COVID-19 outbreak in those states, than they did in March 2021, when there was no COVID-19 outbreak in Australia.

The number of days from symptom onset to presentation at a GP respiratory clinic was strongly associated with the presence of a COVID-19 outbreak. Participant age, location of the clinic, and Indigenous status of participants were also associated with the time to presentation. This study highlights the importance of recognising COVID-19 as a potential cause of symptoms, as well as the importance of providing easily accessible, and culturally appropriate, testing facilities for the population.

Keywords: COVID-19; Coronavirus disease 2019; SARS-CoV-2; respiratory symptoms; primary health care; public health response; testing; Australia

Introduction

Coronavirus disease 2019 (COVID-19), which is caused by the novel coronavirus SARS-CoV-2, has had rapid global spread since it first emerged in November 2019.[1] The SARS-CoV-2 virus can be transmitted by close contact with an infectious person, including between one and three days before symptom onset.[2–5] The significant contribution of pre-symptomatic and asymptomatic transmission of SARS-CoV-2, estimated to account for 69% of all transmission, presents a challenge to public health authorities seeking to minimise the number of new cases of COVID-19.[2–4,6–8]

To reduce the risk of community transmission, individuals are encouraged to get tested and to isolate as soon as they develop upper respiratory tract infection symptoms that may be attributable to COVID-19.[9,10] If they test positive, their contacts are required to quarantine.[11] The time to isolation and consequent notification of, and quarantining of, contacts has been found to be the most important factor for enhancing the effectiveness of contact tracing.[12]

There is currently little public data on the time taken for people with symptoms of respiratory infection to present for COVID-19 assessment and testing. Understanding the factors that may influence the time to presentation for COVID-19 testing may inform more targeted communication with specific population groups regarding the importance of early testing if individuals develop symptoms of respiratory infection. This study describes the time to presentation for primary care assessment following the development of respiratory infection symptoms, including associations between demographic characteristics and geographic location.

Methods

Data collection and participants

Commencing in March 2020, one hundred and fifty GP Respiratory Clinics were established across Australia as part of the Australian Government's COVID-19 pandemic response.[13] These clinics were designed for the assessment and treatment of individuals with undifferentiated respiratory symptoms.[14] Testing for COVID-19 was conducted as part of the clinical encounter where indicated. Approximately 87% of individuals assessed at GP respiratory clinics were also tested for COVID-19. The majority of individuals seen at these clinics did not test positive for COVID-19.

As part of the clinical encounter, data collected from each patient were entered into an online form which had compulsory fields including demographics, date of presentation and symptom onset date (this latter variable was only collected from 1 February 2021). Patients were asked to consent to their de-identified data being shared with the Australian Government Department of Health and local health authorities. Data from individuals who consented to sharing were transmitted daily to the Department of Health where they were held as a single dataset.

Individuals who presented between 1 February and 31 August 2021, and who gave consent for their data to be shared, were included in this study. Observations where the number of days to presentation to a GP respiratory clinic exceeded 14 days were excluded from the analysis, as were those with no symptoms and no symptom onset date. Region of the clinic was classified using a Modified Monash Scale, with category one classified as urban, and categories two to seven classified as rural.

The primary outcome of interest was the number of days to presentation from symptom onset.

Data analysis

Data analysis was performed in Stata 17.[15] Continuous variables were examined using medians and interquartile ranges (IQR) and categorical data using counts and percentages. Chi-square test with unadjusted odds ratios (OR) and 95% confidence intervals (95% CI) were initially used to identify possible associations in

univariate analysis between presentation within one day and demographic variables, location of the clinic, and whether an active COVID-19 outbreak was occurring. Multivariable logistic regression was used to investigate the magnitude of associations between independent variables and time to presentation for assessment at GP respiratory clinics. Inference was based on 5% level of significance.

Ethics approval

The study was approved by the James Cook University Human Ethics Committee (Human Ethics Approval Number H8524).

Results

Participants

Of the 763,600 assessments that occurred in GP respiratory clinics from 1 February to 31 August 2021, there were 697,486 (91.3%) who gave consent for their data to be shared. Of these, 314,148 (45.0%) were included in the analysis as they had a date of onset of their symptoms recorded and they presented within 14 days of symptom onset.

Demographic data for participants is presented in Table 1. The median age of participants at presentation was 33 years (IQR: 15–49). Of participants, 57.8% (n = 181,107) were female, 4.8% (n = 13,531) identified as Aboriginal and/or Torres Strait Islander people and 54.0% (n = 169,608) presented to clinics in urban areas. Analysis of the characteristics of the eligible population and of the participants analysed showed that the demographic features of each group were similar.

Time to presentation at GP respiratory clinics from symptom onset

The number of days between development of symptoms and presentation to a GP respiratory clinic is shown in Figure 1. The largest proportion of participants (38.97%) presented within one day and 83.2% presented within four days of symptom onset.

Median days to presentation, and rates of presentation within one day, for different demographic and geographic cohorts are shown in Table 2. The median time from development of symptoms to presentation for assessment at GP respiratory clinics was two days (IQR: 1–3). This was similar across most groups considered, as shown in Table 2.

Effect of a COVID-19 outbreak

Participants in New South Wales and Victoria had twice the odds (OR 2.01; 95% CI: 2.59, 2.85) of presenting at a GP respiratory clinic within one day of symptom onset in August 2021, when there was a COVID-19 outbreak in those states, than in March 2021, when there was no COVID-19 outbreak in Australia. Participants in Western Australia, South Australia, Queensland and Tasmania, which did not have COVID-19 outbreaks in either March or August 2021, had higher odds of presenting within one day during August 2021 than in March 2021 (OR 1.09; 95% CI: 1.04, 1.15).

Multivariable analysis

The results from the univariate analysis were largely unchanged on multivariable analysis. The positive effect of COVID-19 outbreaks on the odds of presenting within one day to a GP respiratory clinic was maintained when the analysis was adjusted for other variables, including sex, Indigenous status, age, location, state or territory and month of encounter. Participants who presented in urban areas, those who presented during the month of August 2021, as well as participants who presented in New South Wales and Victoria, had higher odds of presenting within one day than other participants. Being of working age also had a sizable effect on the odds of presenting within one day. Participants aged 15 to 64 years had higher odds of presenting within one day than did both participants aged under 15 years (adjusted

Table 1: Characteristics of participants presenting to GP respiratory clinics in Australia, 1 February to 31 August 2021

		Frequency (n = 314,148)	Percentage (%)
Sex[a]	Female	181,107	57.8
	Male	132,462	42.2
Indigenous status[b]	Indigenous	13,531	4.8
	Non-Indigenous	267,083	95.2
Age group (years)[c]	< 15	74,850	24.0
	15−64	210,095	67.3
	> 64	27,362	8.8
Location	Urban	169,608	54.0
	Rural	144,540	46.0
Jurisdiction	Australian Capital Territory	1,145	0.4
	New South Wales	101,269	32.2
	Northern Territory	3,851	1.2
	Queensland	72,580	23.1
	South Australia	13,761	4.4
	Tasmania	5,742	1.8
	Victoria	107,115	34.1
	Western Australia	8,685	2.8

a   Data on sex was not recorded for 579 participants.

b   Data on Indigenous status was not recorded for 33,534 participants (10.7%). Demographic analysis should therefore be interpreted with caution.

c   Data on age of participants was not recorded for 1,841 participants.

odds ratio, AOR 1.68; 95% CI: 1.65, 1.71) and participants aged 65 years and older (AOR 1.44; 95% CI: 1.40, 1.48). Conversely, Aboriginal and/or Torres Strait Islander participants had lower odds of presenting within one day than did non-Indigenous participants.

When analysis was limited to New South Wales in August 2021 (i.e. during an outbreak), the adjusted odds ratios by different factors, including Indigenous status, sex, region and age were not markedly different, with the overall pattern being maintained.

Discussion

This study found that, generally, the interval between development of symptoms and presentation to a GP respiratory clinic was short,

with a median of two days. This is an important finding as there is little published research in this area, and encouraging a large proportion of COVID-19 cases to isolate and test as soon as they develop symptoms is important to reduce transmission in the community, both from the initial case and from contacts of that case through early contact tracing. A previous Canadian study found that the median time taken for patients with mild respiratory symptoms to present to their general practitioner was seven days.[16] However, the applicability of these findings to the current setting are limited, as the Canadian study was not conducted during a pandemic where motivations to attend and have a diagnostic test for respiratory symptoms were markedly different.

Figure 1: Number of days between symptom onset and presentation to GP respiratory clinics, 1 February to 31 August 2021
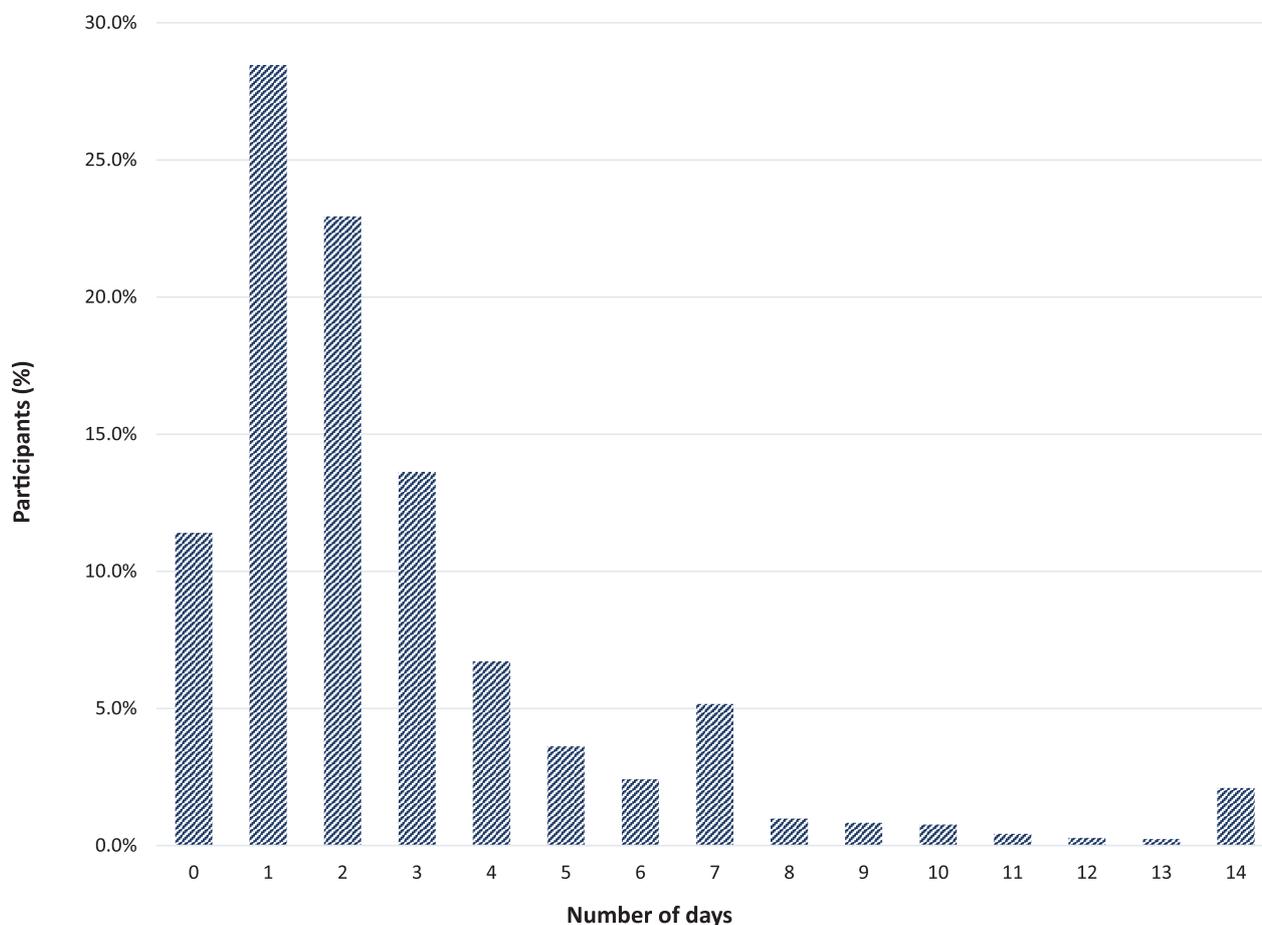
Our study found that 39.9% of participants were tested within one day of symptom onset. This is a lower rate than that reported during the COVID-19 outbreak in New South Wales between June and September 2021, where between 50% and 60% of cases were reported to have isolated within one day of symptom onset.[17] However, the latter range would have included a large number of individuals who were being tested because they were close contacts and so may largely be a measure of contact tracing effectiveness. A particular strength of our study is that it gives an indication of the willingness of a population with, overall, a low pre-test probability of COVID-19, to get tested when they have symptoms only, rather than getting tested because they have been identified as being close contacts.

The strongest independent factor for presentation within one day in this study was that of being in a state or territory with an active outbreak. A reason for this association may have been that participants were more likely to recognise and attribute their symptoms to COVID-19 if there were known cases in their community. Previous studies have indicated that barriers to SARS-CoV-2 testing include lack of recognition of symptoms as being potentially caused by COVID-19.[18–21] Clear communication to the public regarding the potential symptoms of COVID-19, which can include very mild symptoms, is important to assist people to recognise the possibility of COVID-19 and so to present for testing for public health surveillance purposes.

Previous studies have identified that barriers to timely presentation for COVID-19 testing

Table 2: Median time to presentation and rates of presentation within one day to a GP respiratory clinic, by demographic and geographic characteristics, 1 February to 31 August 2021

		Median days (IQR)	Presentation within 1 day (%)	OR	95% CI	p value[a]
Sex	Female	2 (1, 3)	39.19	0.93	0.92, 0.95	p < 0.01
	Male	2 (1, 3)	40.81	Ref		
Indigenous status	Indigenous	2 (1, 4)	30.62	0.66	0.63, 0.68	p < 0.01
	Non-Indigenous	2 (1, 3)	40.23	Ref		
Age group (years)	< 15	2 (1, 4)	31.90	Ref		p < 0.01
	15–64	2 (1, 3)	43.45	1.64	1.61, 1.70	
	> 64	2 (1, 4)	34.80	1.14	1.11, 1.17	
Location	Urban	2 (1, 3)	40.92	1.10	1.08, 1.12	p < 0.01
	Rural	2 (1, 3)	38.64	Ref		
Jurisdiction[b]	ACT	3 (1, 5)	26.81	0.46	0.41, 0.53	p < 0.01
	NSW	2 (1, 3)	44.16	Ref		
	NT	3 (2, 4)	23.58	0.39	0.36, 0.42	
	Qld	2 (1, 4)	32.03	0.60	0.58, 0.61	
	SA	3 (1, 5)	26.79	0.46	0.44, 0.48	
	Tas.	3 (2, 5)	14.54	0.22	0.20, 0.23	
	Vic.	2 (1, 3)	46.52	1.10	1.08, 1.12	
	WA	3 (2, 5)	19.92	0.31	0.30, 0.33	
All participants	March 2021	2 (1, 3)	38.08	Ref		p < 0.01
	August 2021	1 (1,3)	50.55	1.66	1.62, 1.71	
NSW and Vic.	March 2021	2 (1, 3)	42.76	Ref		p < 0.01
	August 2021	1 (0, 2)	60.03	2.01	1.95, 2.08	
Qld, SA, WA and Tas.	March 2021	2 (1, 4)	29.90	Ref		p < 0.01
	August 2021	2 (1, 4)	31.78	1.09	1.04, 1.15	

a   Chi-square p value.

b   ACT: Australian Capital Territory; NSW: New South Wales; NT: Northern Territory; Qld: Queensland; SA: South Australia; Tas.: Tasmania; Vic.: Victoria; WA: Western Australia.

include asymptomatic infection; lack of access to testing; perception of ineligibility for testing; fear of the test itself; and concerns regarding the consequences of a positive result, such as the requirement to isolate or a negative impact on their employment due to no paid sick leave.[18–20,22,23] Regions affected by COVID-19 outbreaks during August 2021 were subject to public health restrictions, including stay-at-home orders.[24,25]

This may have reduced participants' concerns regarding consequences of testing, such as the requirement to isolate.

Factors found to be associated with lower odds of presenting within one day included rural location, children aged younger than 15 years, adults older than 64 years and being of Aboriginal and/or Torres Strait Islander origin. Lower odds of presenting within one day in

Table 3: Factors associated with presentation to a GP respiratory clinic within one day of symptom onset on multivariable analysis, 1 February to 31 August 2021

		Adjusted odds ratio[a]	95% Confidence Interval
Sex	Female	0.92	0.90, 0.93
	Male	Ref	
Indigenous status	Indigenous	0.82	0.79, 0.85
	Non-Indigenous	Ref	
Age group (years)	< 15	Ref	
	15−64	1.68	1.65, 1.71
	> 64	1.14	1.10, 1.18
Location	Urban	1.25	1.23, 1.27
	Rural	Ref	
Jurisdiction[b]	ACT	0.42	0.36, 0.48
	NSW	Ref	
	NT	0.44	0.41, 0.48
	Qld	0.56	0.55, 0.58
	SA	0.47	0.45, 0.49
	Tas.	0.24	0.22, 0.26
	Vic.	1.13	1.11, 1.15
	WA	0.31	0.29, 0.33
Month of encounter	February	0.76	0.74, 0.78
	March	0.60	0.59, 0.62
	April	0.51	0.49, 0.52
	May	0.44	0.43, 0.45
	June	0.48	0.47, 0.49
	July	0.69	0.68, 0.71
	August	Ref	

a   Adjusted for sex, age, Indigenous status, location (urban or rural), state or territory and month of encounter.

b   ACT: Australian Capital Territory; NSW: New South Wales; NT: Northern Territory; Qld: Queensland; SA: South Australia; Tas.: Tasmania; Vic.: Victoria; WA: Western Australia.

rural areas compared with urban areas may reflect reduced access to healthcare in rural areas.[26] Although it is difficult to determine from the results of this study, Aboriginal and/or Torres Strait Islander participants may have been less likely to present within one day than non-Indigenous participants due to factors including: inequity in access to healthcare; reluctance to use mainstream health services; reduced access to social supports; and distrust of Government.[27] These findings underpin the importance of ensuring culturally appropriate and accessible testing.

Several factors may explain the higher odds of presenting within one day among participants aged 15 to 64 years than among children and older adults. Participants in the 15−64 year age

group may have been more likely to be required to leave home to fulfil essential work commitments, so increasing their perceived and actual risk of exposure to COVID-19. This age group may also have had financial incentives to present earlier for testing, including lack of paid sick leave, and they may have also required a negative COVID-19 test before returning to work. This may also be supported by the finding that participants aged 15 to 64 years had increased adjusted odds of presenting within one day during an outbreak compared to younger and older age groups.

This study highlights that early presentation for testing, following development of symptoms, is important and achievable. Early detection and isolation of cases is essential to help reduce community transmission of COVID-19.[28] Even as Australia has moved towards a 'living with COVID-19' phase, early identification of cases and contact tracing will continue to be important.[29] Effective communication regarding the importance of testing for symptomatic individuals—including targeted messaging to higher risk groups—and ensuring that testing is easily accessible are essential. Further, several novel treatments for COVID-19 require early initiation of treatment to provide optimum benefit.[30] These individuals therefore require early testing so they can be identified and managed appropriately. Further studies examining reasons for delayed presentation would be useful to improve early identification of positive cases, leading to reduced transmission and timely treatment.

Limitations

This study involved analysis of a large dataset comprising 314,148 assessments conducted in GP respiratory clinics, which are located throughout Australia.[14] Although this represents fewer than 5% of all COVID-19 tests conducted during the study period in Australia, one of the strengths of this dataset are that they are systematically collected as part of the patient assessment. Only 45% of assessments conducted during the period examined in this study recorded a symptom onset date, leading to potential selection bias. Analysis of the characteristics of eligible population and participants analysed showed that the demographic features of each group were similar. However, there was a difference in relation to location, with 67% of all individuals assessed in GP respiratory clinics during the study period presenting at an urban location compared with 54% of the participants included in this study presenting at an urban location. It is unlikely that this difference reduces the validity of this study on the basis that failure to record the symptom onset date was not linked with individual characteristics of participants.

Measurement bias is possible both in relation to recording of data by each GP respiratory clinic and in the recall of symptom onset dates by participants. While data were collected according to systematic pro-forma, variability is likely due to multiple data collectors across multiple clinics. The overall impact of these factors is unknown. However, we do not expect there to be systematic bias that would alter the main finding of time to presentation.

Conclusion

This study demonstrated that the median number of days to presentation at a GP respiratory clinic following onset of symptoms was relatively short. This study's findings of the groups less likely to present in a timely fashion highlights the importance of recognising COVID-19 as a potential cause of symptoms as well as providing easily accessible, and culturally appropriate, testing facilities for the population. Continued efforts should be made to direct clear and effective messages to target populations to encourage early presentation for testing to allow better control of COVID-19 outbreaks.

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