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SHORT COMMUNICATION

Asymptomatic COVID-19 – implications for the control of transmission in South Africa

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Running head: Asymptomatic COVID-19 in workplaces, South Africa

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SUMMARY

Asymptomatic COVID-19 may contribute significantly to the pandemic trajectory based on global biological, epidemiological and modelling evidence. A retrospective analysis was done to determine the proportion of asymptomatic COVID-19 in the workplace during the lockdown period from 27 March to 31 May 2020. We found that nearly 45% of cases were asymptomatic at the time of the first test. This high proportion of asymptomatic COVID-19 cases has implications for interventions, such as enforcing quarantine of all close contacts of COVID-19 cases regardless of symptoms.

KEY WORDS: SARS-CoV-2; symptom; subclinical infection; essential services; occupational exposure

Asymptomatic COVID-19 may contribute to the pandemic trajectory.[1] The positivity rates of COVID-19 seroprevalence studies are higher than the proportions with a history of clinical symptoms of COVID-19, suggesting a high proportion of asymptomatic infections.[1] In Spain, COVID-19 seroprevalence was 5%, with one third of participants being asymptomatic.[2] The proportion of asymptomatic COVID-19 in adults can reach 56%,[3] but data from sub-Saharan Africa are limited. Globally, as in South Africa, case definitions and testing strategies to identify COVID-19 cases has changed with evolving evidence, leading to the inclusion of testing of asymptomatic contacts when resources and capacity permits.[4,5]

In the present study, we aimed to describe the proportion of asymptomatic COVID-19 identified through outbreak investigations among essential workplace clusters in South Africa from 8 March until 18 May 2020, which includes the time of the highly restrictive lockdown.

METHODS

Essential workplaces

Following SARS-CoV-2 importation into South Africa, a national state of disaster was declared, with a nationwide lockdown restricting movement and limiting business operations to essential services only. These included the healthcare, law enforcement, and correctional services, food and beverage producers, and essential grocery retail.

Outbreak investigations

Outbreak investigations were carried out nationwide following identification of confirmed COVID-19 cases in essential services through passive surveillance of persons with COVID-19 symptoms. Contacts were defined as anyone in the workplace within 1 metre of a confirmed case for longer than 15 minutes, or those who shared a workspace (including break rooms or work-related transport) with a confirmed case. RT-PCR tests were conducted on nasopharyngeal swabs[4] of all workplace contacts regardless of symptoms, and the presence of symptoms was recorded.

Identification of subjects included in the analysis

This was a retrospective analysis including ‘all SARS-CoV-2 PCR-positive cases identified during investigation of outbreaks at essential services that occurred during lockdown’. A subset of cases were followed up approximately 2 weeks after the first test. The presence of symptoms were

documented and repeat nasopharyngeal swabs were taken. De-identified data of cases (age, sex, essential service type, initial test date, follow-up date, COVID-19 symptoms at initial and follow-up tests) were extracted from outbreak investigations across the country.

Data analysis was performed using R v3.6.2 (R Computing, Vienna, Austria). We described the proportion of asymptomatic COVID-19 cases initially and at follow-up, and used logistic regression to assess the association between having symptoms at the time of first diagnosis with age, sex and industry sector.

Informed consent was waived for this secondary analysis of routine de-identified data collected for the COVID-19 outbreak response. Ethics approval was obtained from the Human Research Ethics Committee at Stellenbosch University, Cape Town (N20/05/019_COVID-19) and the University of Cape Town, Cape Town, South Africa (460/2020).

RESULTS

Of 887 confirmed COVID-19 cases (75% female) identified at 13 essential workplaces from 8 March to 18 May 2020, the median age was 37 years (interquartile range [IQR] 29–48; Table 1). The proportion of asymptomatic COVID-19 cases at time of first testing was 43.7%. Men were less likely to be asymptomatic than women (adjusted odds ratio [aOR] 0.69, 95% confidence interval [CI] 0.47–1.00), and those in correctional services (aOR 47.27, 95% CI 16.80–197.98) and the pharmaceutical industry (aOR 2.03; 95% CI 1.21–3.40) were more likely to be asymptomatic than those from other sectors (Table 2). A total of 112 cases were followed up for a median of 16 days (IQR 10–20). Of the 52 who were asymptomatic, 17.3% subsequently developed symptoms; hence, 36.6% were asymptomatic throughout follow-up.

DISCUSSION

Among SARS-CoV-2-positive cases identified during outbreak investigations shortly after SARS-CoV-2 importation into South Africa, we identified a high proportion of asymptomatic COVID-19 cases in essential workplace clusters. Of the cases followed up, 36.6% remained asymptomatic. Our findings have implications for the implementation of interventions designed to control the epidemic, case identification and testing, and the force of infection generally and that prevalent in South Africa at the time. There is biological,[3] epidemiological[6] and modelling[7] evidence for transmission of SARS-CoV-2 from asymptomatic people. Whereas vaccines are the most

sustainable method for controlling the epidemic, the reality is that in sub-Saharan Africa, vaccines are unlikely to be widely available in the immediate future. The high proportion of asymptomatic COVID-19 cases in our study indicates that adherence to interventions such as case isolation and quarantine of close contacts, should continue to be pursued as an effective public health intervention to control SARS-CoV-2 transmission.

In resource-limited countries, careful consideration must be made regarding testing strategies. In our study, testing of asymptomatic contacts allowed identification of a substantial proportion of persons who did not meet symptom-based testing criteria. Therefore, in addition to testing symptomatic persons for SARS-CoV-2, consideration should be given to testing of asymptomatic close contacts to limit transmission. The high asymptomatic proportion of cases has epidemiological and public health implications. First, estimates of the number of infections and attack rates are likely an underrepresentation, especially if case detection relies on passive surveillance and testing of symptomatic persons. Second, high numbers of asymptomatic infections will increase the rate at which susceptible persons acquire infection (the force of infection). In our context, the force of infection during this time may have contributed to the failure of lockdown to successfully contain COVID-19. Our data are helpful for modelling studies to support pandemic response activities, which take into account the reproductive number and the proportion of infections that are asymptomatic and/or that can be transmitted while asymptomatic.[8–10] In our setting, we observed variations in the proportion of asymptomatic COVID-19 within the essential service sector. Although those in correctional services had a much greater odds of being asymptomatic (aOR 47.27, 95% CI 16.80–197.98) than other sectors, the importance of this is unclear.

A source of variation and a limitation of our study lies in the subjective nature of symptoms, recall bias or contextual incentives to over or underreport symptoms, such as fear of being ostracised. Additionally, we do not to compare cycle thresholds of RT-PCR results, as these tests were done across different laboratories using different test methodologies.

The high proportion of asymptomatic cases of COVID-19 indicates the need for strict quarantine of all contacts, with or without SARS-CoV-2 testing of asymptomatic cases, in order to prevent and contain outbreaks.

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Conflict of interests: none declared.

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Table 1 Age and sex distribution of COVID-19 cases in essential service clusters by sector category, 8 March–18 May 2020

	Age group, years							
	<20 *n* (%)	20–29 *n* (%)	30–39 *n* (%)	40–49 *n* (%)	50–59 *n* (%)	60–69 *n* (%)	70–79 *n* (%)	>80 *n* (%)
Health	8 (2.9)	40 (14.7)	82 (30.0)	49 (17.9)	46 (16.8)	33 (12.1)	19 (6.7)	8 (2.9)
Female	6 (2.2)	27 (9.9)	37 (13.5)	33 (12.1)	20 (7.3)	23 (8.4)	8 (2.9)	5 (1.8)
Male	1 (0.4)	10 (3.6)	42 (15.4)	13 (4.8)	25 (9.2)	9 (3.3)	11 (4.0)	3 (1.1)
Correctional services	1 (1.1)	20 (22.0)	27 (29.7)	34 (37.4)	7 (7.7)	2 (2.2)	—	—
Female	1 (1.1)	20 (22.0)	27 (29.7)	31 (34.1)	6 (6.6)	2 (2.2)	—	—
Male	—	—	—	3 (3.3)	1 (1.1)	—	—	—
Food and beverage	—	2 (25)	4 (50)	1 (12.5)	—	1 (12.5)	—	—
Female	—	1 (12.5)	2 (25)	1 (12.5)	—	1 (12.5)	—	—
Male	—	1 (12.5)	2 (25)	—	—	—	—	—
Long-term care facility	—	4 (7.1)	9 (16.1)	10 (17.9)	14 (25)	3 (5.4)	4 (7.1)	12 (21.4)
Female	—	4 (7.1)	9 (16.1)	8 (14.3)	13 (23.2)	2 (3.6)	1 (1.8)	10 (17.9)
Male	—	—	—	2 (3.6)	1 (1.8)	1 (1.8)	3 (5.4)	2 (3.6)
Pharmaceutical	—	24 (25.5)	41 (43.6)	21 (22.3)	6 (6.4)	2 (2.1)	—	—
Female	—	19 (20.2)	35 (37.2)	21 (22.3)	6 (6.4)	2 (2.1)	—	—
Male	—	5 (5.4)	6 (6.4)	—	—	—	—	—
Retail	3 (0.8)	129 (36.5)	126 (35.7)	54 (15.3)	41 (11.6)	—	—	—
Female	2 (0.6)	104 (29.5)	95 (26.9)	44 (12.5)	29 (8.2)	—	—	—
Male	1 (0.3)	25 (7.1)	31 (8.8)	10 (2.9)	12 (3.4)	—	—	—

Table 2 Characteristics of COVID-19 cases among essential service clusters by presence of symptoms and association between age, sex and essential service sector and having symptoms at first test using logistic regression, 8 March–18 May 2020

	Total *n* (%)	Asymptomatic *n* (%)	Symptomatic *n* (%)	Univariable model			Multivariable model		
				OR	95% CI	*P* value	OR	95% CI	*P* value
Sex									
Female	655	279 (47.3)	311 (52.7)				Reference		
Male	220	60 (30.6)	136 (69.4)	0.49	0.35–0.69	<0.001	0.69	0.47–1.00	0.049
Age years									
16–32	274	120(43.8)	154 (56.2)				Reference		
33–49	345	165(47.8)	180 (52.2)	1.18	0.86–1.62	0.318	0.92	0.62–1.36	0.685
≥50	179	64 (35.8)	115 (64.2)	0.71	0.48–1.05	0.089	0.90	0.50–1.60	0.726
Industry sector									
Correctional services	88	85 (96.6)	3 (3.4)	49.66	17.97–206.05	<0.001	47.27	16.80–197.98	<0.001
Food and beverage	8	4 (50)	4 (50)	1.75	0.41–7.56	0.435	1.85	0.42–8.11	0.395
Health	267	97 (36.3)	170 (63.7)				Reference		
Long-term care facilities	33	17 (51.5)	16 (48.5)	1.86	0.90–3.88	0.094	1.90	0.90–4.06	0.092
Pharmaceutical	90	49 (54.4)	41 (45.6)	2.09	1.29–3.41	0.003	2.03	1.21–3.40	0.007
Retail	312	97 (31.1)	215 (68.9)	0.79	0.56–1.12	0.183	0.79	0.54–1.16	0.230

OR = odds ratio; CI = confidence interval.