Comprehensive Clinical Profile Analysis on Community COVID-19 Infections Using a Regular Non-symptom Based Testing Approach in Hong Kong

5

Yawei Wang (PhD)
Primary Supervisor: Prof Dennis Kai Ming Ip

YW Wang[a], HC So[a], NNY Tsang[a], BJ Cowling[a], GM Leung[a], DKM Ip[a]

a. WHO Collaborating Centre for Infectious Disease Epidemiology and Control, School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong Special Administrative Region, China

Background

Detailed understanding of the clinical profile of an infection, including the typical symptoms, illness duration, and the associated impact on daily activities is a fundamental prerequisite for informing any appropriate downstream decisions on its management and control. For SARS-CoV-2 infection, however, crucial gaps remained regarding the understanding of its symptom profiles and the potential implications for public health policy.

Objectives

Report a comprehensive examination of the clinical profile of SARS-CoV-2 infections in terms of the risk of being symptomatic upon infection, symptom severity, duration, and progression, and examine the impact of different vaccine types on the clinical profiles among a representative community cohort in Hong Kong during a large wave of Omicron BA.2.

Methods

Based on a surveillance initiative, we followed-up a cohort of individuals ≥5 years of age in Hong Kong during an Omicron BA.2 epidemic. Infections were prospectively ascertained with regular weekly rapid antigen testing irrespective of symptoms, and reported with detailed symptom profiles on an online platform. Any infections confirmed by PCR were also documented. We analyzed the asymptomatic proportion, symptom patterns, severity, duration. We also investigate the associations between demographic factors (gender, age, vaccination, chronic disease status) and likelihood of having symptoms, severity, and symptom duration among all infections and with stratification by vaccine type (BNT162b2 and CoronaVac). the local vaccination policy stipulates identical vaccines for primary series but allowed optional switching for boosters. People received either one or two doses were categorized as having the primary series (BB or CC), while those also received a third dose were categorized as having a booster (BB-B, CC-C, BB-C, or CC-B).

Results

Of 10,234 participants followed for a mean of 82 days, 1,126 tested positive, with 24.6% of infections being asymptomatic. Gender and chronic disease status had no effect on risk of being symptomatic upon infection. Adults (≥18-59 years) were associated with significantly higher risks (Adjusted OR 1.78, 95%CI 1.11, 2.81) of having symptoms among all infections. Among all the infections, receipt of a booster dose reduced the likelihood of being symptomatic upon infection by approximately 50% (Adjusted OR 0.45, 95%CI 0.28,0.72) compared to unvaccinated individuals, while receiving a primary series had no effect on the risk of being symptomatic when infected (Table 1). On stratified analysis by vaccine types, the protective effects of booster against being symptomatic upon infection were largely maintained in both vaccine types, with a similar and significant effect size (56%) for BB-B, but becoming much smaller and becoming insignificant for CC-C (43%). In the CCB group, an even higher and significant protective effect was demonstrated (66%). On the other hand, vaccination status remained with no impact on either symptom duration or severity on stratified analysis by vaccine types (Table 2). Cough was reported in almost all adult cases (Figure 1). Fever was very commonly reported in children in the first week (82.6%) but only reported in half of adult infections (Figure 2). For the symptomatic cases, only 27.7% reported any severe symptoms causing significant disturbance to the activity of daily living, with none suffered from severe complication nor need to be hospitalized. The median symptom duration was 9.5 days, and longer for those with underlying medical conditions.

Table 1 The determinants of being symptomatic among all infections (n=1126)

	Symptomatic Infections (N=852), No. (Row %)	Asymptomatic Infections (N=274), No. (Row%)	Adjusted OR (95% CI)	p-value
Total	852 (75.4)	274(24.6)		
Gender				
Female (ref)	468(75.4)	152(24.6)	1	
Male	384(75.5)	122(24.5)	1.10(0.83, 1.45)	0.52
Age group, years				
5-17 (ref)	80(70.2)	34(29.8)	1	
18-59	614(77.5)	179(22.5)	1.78(1.11, 2.81)	0.02
≥60	158(70.5)	66(29.5)	1.15(0.66, 1.99)	0.63
Vaccination status				
Unvaccinated	153(78.1)	43(21.9)	1	
Primary	552 (78.1)	152(21.9)	0.92(0.61,1.36)	0.68
Booster	147(64.8)	79(35.2)	0.45(0.28,0.72)	<0.001
Chronic disease				
Without (ref)	657(74.6)	220(25.4)	1	
With	195 (78.7)	54(21.3)	1.34(0.92,1.96)	0.13

Table 2 The Effects of vaccine status on being symptomatic, having a long symptom duration, and having severe symptom with stratification by vaccine type

		CoronaVac received (CC and CC-C, n=278)	BNT162b2 received (BB and BB-B, n=617)	CoronaVac received and CoronaVac+ BNT162b2 received (CC and CCB, n=252)	Corona Vac received (CC and CC-C, n=278)	BNT162b2 received (BB and BB-B, n=617)	CoronaVac received and CoronaVac+ BNT162b2 received (CC and CCB, n=252)
		Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Being symptomatic	Unvaccinated (ref)	1		1		1	
	Primary	0.85 (0.53, 1.38)	0.52	0.94 (0.61, 1.44)	0.78	0.83 (0.51, 1.34)	0.46
	Booster	0.57 (0.29, 1.14)	0.11	0.44 (0.26, 0.75)	0.003	0.34 (0.15, 0.74)	0.006
With a longer symptom duration	Unvaccinated (ref)	1		1		1	
	Primary	0.74 (0.44, 1.22)	0.24	0.76 (0.49, 1.18)	0.22	0.75 (0.45, 1.25)	0.27
	Booster	0.76 (0.33,1.67)	0.50	0.76 (0.40, 1.32)	0.39	0.67 (0.20, (1.92)	0.48
With severe symptom	Unvaccinated (ref)	1		1		1	
	Primary	1.02 (0.64, 1.62)	0.93	0.88 (0.59, 1.30)	0.52	1.02 (0.64, 1.62)	0.94
	Booster	0.61 (0.30, 1.25)	0.18	0.61 (0.34, 1.06)	0.08	0.76 (0.29, 2.02)	0.58

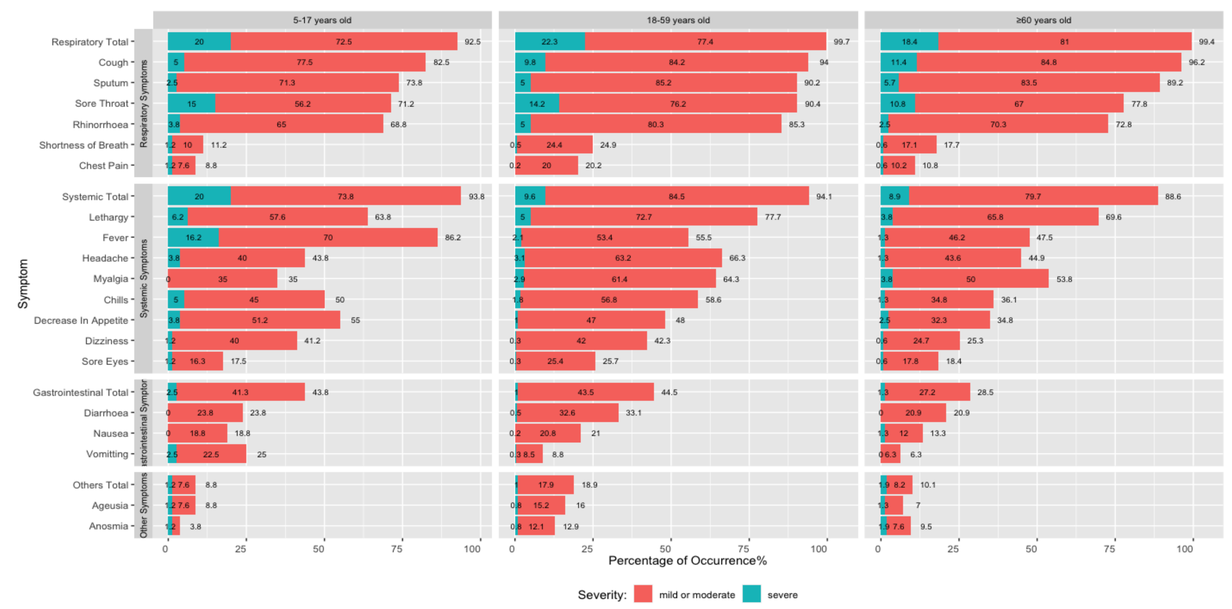

Figure 1 The percentage of each symptom by severity amongst different age groups.

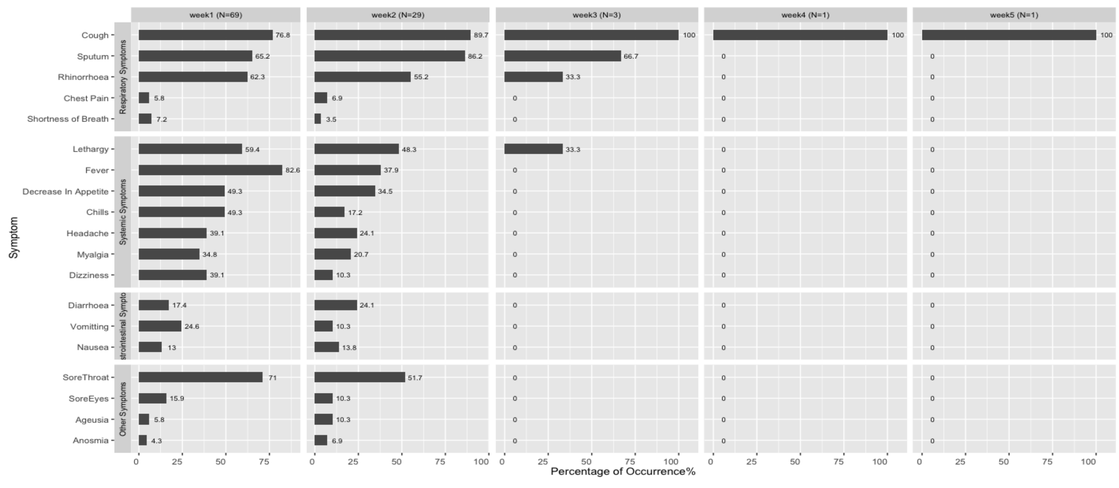

Figure 2 Symptom profile in different weeks among symptomatic infections aged 5-17

Conclusion

We found that Omicron BA.2 infections in a highly vaccinated population were generally mild, suggested the need for more sensitive screening approaches beyond temperature screening, and supported the need for a booster dose for protection against being symptomatic infection. Our finding highlights the importance of comprehensible clinical profile assessment based on a representative sample from the community.

References

Mefsin YM, Chen D, Bond HS, Lin Y, Cheung JK, Wong JY, Ali ST, Lau EHY, Wu P, Leung GM, Cowling BJ. Epidemiology of Infections with SARS-CoV-2 Omicron BA.2 Variant, Hong Kong, January-March 2022. Emerg Infect Dis. 2022 Sep;28(9):1856-1858. doi: 10.3201/eid2809.220613. Epub 2022 Aug 1. PMID: 35914518; PMCID: PMC9423929.

Acknowledgements

This initiative was funded by the Henry Fok Foundation and the Henry Fok Foundation and the Health Bureau of the Hong Kong SAR Government (COVID-19FHB). The authors are grateful for all participants who have contributed to the surveillance initiative, and our team of research staff and healthcare workers.