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Concise Communication

Comparison of coronavirus disease 2019 (COVID-19) symptoms at diagnosis among healthcare personnel before and after the emergence of the omicron variant

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Abstract

We used a self-reporting system to compare symptom frequency of hospital personnel with coronavirus disease 2019 before and after the emergence of the Omicron variant. Omicron was more likely to result in asymptomatic carriage (7% vs 12%; $P = .009$), and fewer symptoms were observed in those with booster vaccination.

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The rapid spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Omicron variant poses major challenges to infection control efforts across healthcare systems. The surge of cases among healthcare personnel (HCP) has contributed to staffing shortages at many facilities. A recent meta-analysis found that a high proportion of HCP with coronavirus disease 2019 (COVID-19) have asymptomatic infection and may be a potential source of nosocomial transmission.[1] Reports continue to emerge that the Omicron variant of SARS-CoV-2 produces less severe disease than previous strains.[2] An understanding of how the Omicron variant affects vaccinated and boosted HCP is critical to the development of optimal infection prevention strategies to protect HCP and patients.

We describe symptomatology at diagnosis among HCP infected with the SARS-CoV-2 Omicron variant compared to those diagnosed with previous variants to ascertain clinical disease severity in Omicron-infected HCP and assess the impact of COVID-19 booster vaccination on symptom frequency.

Methods

Our institution implemented a symptom self-reporting application for HCP who test positive for SARS-CoV-2. Any HCP who tests positive by polymerase chain reaction (PCR) for SARS-CoV-2 performed at our microbiology laboratory as part of routine surveillance testing or symptomatic testing, or self-reports a positive test of any type performed outside of our institution, receives an intake survey via e-mail. Data gathered as part of the intake survey include date of positive test, date of symptom onset, and symptoms (fever, chills, fatigue, headache, myalgias, rhinorrhea, pharyngitis, abdominal pain, nausea or vomiting, loss of smell and/or taste, diarrhea, cough, dyspnea, and 'other'). These data were paired with HCP COVID-19 vaccine history.

By December 25, 2021, 55% of the ~20,000 HCP at our institution had received a booster vaccine and 99.3% were considered fully vaccinated. The CDC estimates that as of December 25, 2021, the B.1.1.529 Omicron lineage accounted for ~90% of circulating SARS-CoV-2 in New York.[3]

We retrospectively reviewed symptom frequency among HCP diagnosed with COVID-19 between May 1, 2021, and October 31, 2021 (ie, the pre-Omicron phase) and between December 25, 2021, and January 10, 2022 (ie, the Omicron phase). HCP who did not complete the intake survey or who were not fully vaccinated per CDC criteria were removed from the analysis.[4] HCP who completed the survey but did not report a date of symptom onset and recorded no symptoms were presumed to be asymptomatic. Among HCP who tested positive between December 25, 2021, and January 10, 2022, we also compared symptom frequency by COVID-19 vaccine booster status. Booster breakthrough infection was defined as symptom onset occurring ≥14 days after receiving a COVID-19 booster vaccine. In cases with no known date of symptom onset, booster breakthrough infection was defined as a positive test occurring ≥14 days after receiving the booster vaccine.

Data were exported and analyzed using R studio version 1.3.1093 software, and the χ^2 analysis was applied, with $P < .05$ considered statistically significant. The Memorial Sloan Kettering Cancer Center Institutional Review Board reviewed the study and granted a Health Insurance Portability and Accountability Act waiver of authorization.

Results

At the study institution, the first case of COVID-19 due to the SARS-CoV-2 Omicron variant was diagnosed on December 10,

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Table 1. Symptom Frequency Among Healthcare Personnel With COVID-19 Before and After the Omicron Variant Became the Established Circulating SARS-CoV-2 Strain

Symptom	Before Omicron (N = 361), No. (%)	Omicron (N = 1,520), No. (%)	χ^2 Value	*P* Value
Asymptomatic	26 (7)	183 (12)	6.911	.009
At least 1 symptom	335 (93)	1,337 (88)		
Fever	112 (31)	489 (32)	0.176	.675
Abdominal pain	16 (4)	100 (7)	2.323	.127
Chills	111 (31)	504 (33)	0.770	.380
Cough	210 (58)	940 (62)	1.654	.198
Diarrhea	47 (13)	129 (8)	7.066	.008
Fatigue	210 (58)	803 (53)	3.351	.067
Headache	185 (51)	811 (53)	0.521	.471
Loss of smell/ taste	105 (29)	95 (6)	160.095	<.001
Myalgias	161 (45)	708 (47)	0.460	.497
Nausea/ vomiting	24 (7)	145 (10)	2.982	.084
Rhinorrhea	209 (58)	774 (51)	5.686	.017
Dyspnea	29 (8)	160 (10)	2.006	.157
Pharyngitis	159 (44)	983 (65)	52.034	<.001

Table 2. Symptom frequency Among Healthcare Personnel With COVID-19 Due to the Omicron Variant by Vaccine Booster Status

Symptom	No Booster Breakthrough (N = 894), No. (%)	Booster Breakthrough (N = 626), No. (%)	χ^2 Value	*P* Value
Asymptomatic	97 (11)	86 (14)	2.900	.089
At least 1 symptom	797 (89)	540 (86)		
Fever	330 (37)	159 (25)	22.366	<.001
Abdominal pain	65 (7)	35 (6)	1.690	.194
Chills	349 (39)	155 (25)	33.865	<.001
Cough	578 (65)	362 (58)	7.270	.007
Diarrhea	86 (10)	43 (7)	3.587	.058
Fatigue	492 (55)	311 (50)	4.234	.040
Headache	535 (60)	276 (44)	36.717	<.001
Loss of smell/ taste	71 (8)	24 (4)	10.604	.001
Myalgias	462 (52)	246 (39)	22.681	<.001
Nausea/ vomiting	100 (11)	45 (7)	6.817	.009
Rhinorrhea	454 (51)	320 (51)	0.017	.898
Dyspnea	112 (13)	48 (8)	9.234	.002
Pharyngitis	566 (63)	417 (67)	1.758	.185
Other	80 (9)	72 (12)	2.667	.103

followed by a steep rise in Omicron cases, and by December 25, 99% of cases were due to the Omicron variant based on internal sequencing results (data not shown).

Overall, there were 524 and 2,265 HCP who tested positive for COVID-19 during the pre-Omicron and Omicron phases, respectively. However, 163 HCP in the pre-Omicron group and 21 HCP in the Omicron group who were not fully vaccinated were excluded from the analysis. Of the remaining HCP, data were available for 361 HCP (100%) in the pre-Omicron group as contact tracing was performed for all HCP during this period. Contact tracing had been suspended during the Omicron surge, but 1,520 HCP (68%) in the Omicron group self-completed the survey.

In the pre-Omicron group, 26 (7%) of 361 HCP who tested positive for COVID-19 were asymptomatic. The median number of symptoms per HCP was 5 (interquartile range [IQR], 3–7). The 3 most common symptoms were cough (n = 210, 58%), fatigue (n = 210, 58%), and rhinorrhea (n = 209, 58%).

Among 1,520 HCP in the Omicron group, 183 (12%) were asymptomatic (Table 1). The median number of symptoms per HCP was 4 (IQR, 2–7). The 3 most common symptoms were pharyngitis (n = 983, 65%), cough (n = 940, 62%), and headache (n = 811, 53%). Also, 116 (8%) had had prior COVID-19 infection (median time to reinfection, 408 days; range, 125–660 days) and 626 (41%) qualified as booster breakthrough (Table 2). HCP with booster breakthrough were less likely to have fever, chills, cough, fatigue, headache, loss of smell and/or taste, myalgias, nausea or vomiting, and dyspnea. The median numbers of symptoms were 5 (IQR, 3–7) among the non–booster breakthrough cases and 4 (IQR, 2–6) among the booster breakthrough cases. During the limited follow-up period, only a single hospitalization was reported in a fully vaccinated HCP who had not received a booster vaccine dose.

Discussion

Our study was conducted at a large tertiary care cancer center with >20,000 employees and in the region of the United States impacted earliest by the Omicron surge. Although the asymptomatic rate was not different between fully vaccinated and boosted HCP, asymptomatic presentation at diagnosis was more common during the Omicron period. Booster breakthrough infections were associated with a lower median number of symptoms at onset, and no hospitalizations were recorded in any booster breakthrough infection compared to 1 hospitalization in a fully vaccinated HCP. The 2 most common symptoms among HCP with Omicron breakthrough infection were pharyngitis and cough, which is consistent with a recent publication measuring symptom frequency among patients with Omicron vaccine breakthrough infection.[5]

The chronic shortage of frontline HCP has been a growing challenge to effective healthcare delivery services throughout the COVID-19 pandemic. Primary and breakthrough infections from the rapid spread of the Omicron variant have exacerbated staffing shortages across the country.[6] An understanding of symptom frequency among HCP infected with Omicron can contribute to the development and implementation of effective infection control practices to protect frontline staff and patients.

Early studies from South Africa suggested that the Omicron variant was associated with milder illness than prior SARS-CoV-2 variants.[2,7] We found that HCP diagnosed with the Omicron variant were more likely to be asymptomatic (7% vs 12%; *P* = .009) at the time of diagnosis. This finding is in line

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with recent studies suggesting that asymptomatic carriage from Omicron may be a major factor in the widespread, rapid dissemination of this variant.[8]

Our study should be interpreted in the context of several limitations. First, the retrospective design of our study precludes any demonstration of causality between booster administration and higher rate of asymptomatic infections. Second, the suspension of contact tracing efforts during the Omicron surge represents a change in data collection protocol, which may have contributed to differences in symptom frequency because survey responses are known to vary by mode of data acquisition.[9] Third, the time in the course of their illness that HCP completed the survey varied because time from COVID-19 diagnosis to survey self-completion during the Omicron surge lagged behind survey completion with a contact tracer during the pre-Omicron period, which could have skewed the symptom report.

Improved source control and expanded surveillance testing as capacity permits are paramount to workforce preservation in the face of this highly transmissible variant. Despite the challenges and overwhelming case burden in HCP over a short period, infections in boosted HCP were mild and none resulted in hospitalization.

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Conflicts of interest. All authors report no conflicts of interest relevant to this article.

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