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## Concise Communication

# Coronavirus disease 2019 (COVID-19) among nonphysician healthcare personnel by work location at a tertiary-care center, Iowa, 2020–2021

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**Abstract**

We describe COVID-19 cases among nonphysician healthcare personnel (HCP) by work location. The proportion of HCP with coronavirus disease 2019 (COVID-19) was highest in the emergency department and lowest among those working remotely. COVID-19 and non–COVID-19 units had similar proportions of HCP with COVID-19 (13%). Cases decreased across all work locations following COVID-19 vaccination.

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Healthcare personnel (HCP) work on the frontlines of the coronavirus disease 2019 (COVID-19) response, potentially putting them at a higher risk of infection, and subsequently exposing patients and colleagues. A wide range of COVID-19 incidence rates among HCP have been reported (0.3%–52%).[1,2] The Centers for Disease Control and Prevention (CDC) suggests that HCP should avoid sharing work responsibilities between COVID-19 units and other units. Some HCP are hesitant to work on COVID-19 units due to concerns of acquiring severe acute respiratory coronavirus virus 2 (SARS-CoV-2) from patients. We report trends of COVID-19 among HCP and the association between COVID-19 cases and work location in the hospital.

## Methods

The University of Iowa Hospitals & Clinics (UIHC) is an 860-bed, academic medical center. All HCP at UIHC were required to notify the University Employee Health Clinic (UEHC) if they tested positive for SARS-CoV-2. The UEHC recorded all employee COVID-19 cases whether they were diagnosed at UIHC, self-reported (home test), or diagnosed elsewhere. All HCP with COVID-19 were required to stay home for at least 10 days and could return to work if asymptomatic or symptoms improved and they were fever free for 24 hours after 10 full days. We retrospectively collected COVID-19–associated data for HCP from UEHC between June 2020 and July 2021. The data included age, sex, job title, work location, history of COVID-19, and date of positive SARS-CoV-2 test if they had a history of COVID-19. We excluded HCP who did not have a designated work location or who worked on multiple units during the same shift (eg, medicine resident, hospitalist, etc) to assess the association between COVID-19 and work location. Job titles were divided into 5 categories: (1) nurse, (2) medical assistant, (3) technician, (4) clerk, and (5) others (eg, patient access, billing office, etc). Some staff worked remotely from March 17, 2020, until July 6, 2021. Work locations were divided into 6 categories: (1) emergency department (ED), (2) COVID-19 unit, (3) non–COVID-19 unit, (4) clinic, (5) perioperative units, and (6) remote work.

Designated COVID-19 units comprised either airborneisolation rooms or modified airborne isolation rooms (using air scrubbers with high-efficiency particulate air filters vented out the window to create negative airflow). Air exchanges per hour (ACH) in COVID-19 units were 14–18 ACH, and in non–COVID-19 units

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**Table 1.** Comparison of Demographics Between Healthcare Personnel With and Without COVID-19, 2020–2021, Iowa

| Variable | SARS-CoV-2 Positive (N = 758) | SARS-CoV-2 Negative (N = 6,213) | *P* Value |
|---|---|---|---|
| **Age, mean y (range)** | 35.1 (19–72) | 38.4 (18–78) | |
| Quartile 1 (19 ≤ age < 28), no. (column %) | 232 (30.6) | 1,552 (25.0) | <.01 |
| Quartile 2 (28 ≤ age < 36), no. (column %) | 207 (27.3) | 1,416 (22.8) | |
| Quartile 3 (36 ≤ age < 49), no. (column %) | 186 (24.5) | 1,600 (25.8) | |
| Quartile 4 (49 ≤ age < 79), no. (column %) | 133 (17.6) | 1,645 (26.4) | |
| **Sex, no. (column %)** | | | |
| Female | 655 (86.4) | 5,193 (83.6) | .045 |
| Male | 103 (13.6) | 1,020 (16.4) | |
| **Job title, no. (row %)** | | | <.01 |
| Medical assistant (N = 394) | 64 (16.5) | 330 (83.8) | |
| Nurse (N = 4,030) | 489 (12.1) | 3541 (87.9) | |
| Technician (N = 323) | 34 (10.5) | 289 (89.5) | |
| Clerk (N = 221) | 21 (9.5) | 200 (90.5) | |
| Other (N = 2,003) | 150 (7.5) | 1,853 (92.5) | |
| **Location, no. (row %)** | | | <.01 |
| Emergency department (N = 188) | 32 (17.0) | 156 (83.0) | |
| COVID-19 units (N = 370) | 47 (12.7) | 323 (87.3) | |
| Non–COVID-19 units (N = 2,576) | 326 (12.7) | 2,250 (87.3) | |
| Clinics (N = 1,972) | 217 (11.0) | 1,755 (89.0) | |
| Perioperative (N = 479) | 45 (9.4) | 434 (90.6) | |
| Remote work (N = 1,386) | 91 (6.6) | 1,295 (93.4) | |

Note. HCP, healthcare personnel.

they ranged from 2 to 8 ACH. During the study period, HCP were required to wear a medical-grade mask, gown, gloves, and eye protection or face shield when caring for patients with laboratory-confirmed COVID-19 or patients under investigation for COVID-19. A respirator (ie, N95) was required only when aerosol-generating procedures were performed. In healthcare settings outside COVID-19 patient rooms, universal masking was in place.

## Results

Of 18,229 HCP registered at UEHC, 6,971 HCP had a discrete working location recorded. Among them, 758 (10.8%) were diagnosed with COVID-19. Of these 758 HCP, 658 (86.8%) were diagnosed before COVID-19 vaccines became available at UIHC in December 2020. The mean age of HCP with COVID-19 was 35 years, and the mean age of HCP without COVID-19 was 38 years ($P < .01$). The highest COVID-19 incidence was observed in November 2020 when Iowa had the highest community incidence. The job title with the highest proportion of HCP with COVID-19 was medical assistant (16.5%), followed by nurses (12.1%). The location with the highest proportion of COVID-19 cases was the ED (17%), followed by both COVID-19 and non–COVID-19 units (12.7%), clinics (11.0%), perioperative units (9.4%), and remote work setting (6.6%) ($P < .01$). Differences in COVID-19 case proportions by location became nonsignificant after COVID-19 vaccines became available in December 2020 (Fig. 1).

## Discussion

The proportion of HCP with COVID-19 was highest in the ED and lowest among those working remotely. COVID-19 and non–COVID-19 units had similar proportions of HCP with COVID-19. Cases decreased across all work locations following COVID-19 vaccination.

In our hospital, the proportion of HCP with COVID-19 was highest in the ED. Although this association has not been well established, these results are similar to data published in New York City and Iran.[2,4] HCP in the ED may have been exposed to patients during the peak of their infectious period. Emergent aerosol-generating procedures, such as cardiopulmonary resuscitation, without proper PPE might have contributed to higher rates. During the study period, our policy was to isolate any patient who presented to the ED with respiratory symptoms to a designated area upon screening. However, a previous study demonstrated that SARS-CoV-2 transmission from asymptomatic individuals accounted for ~60% of all transmissions.[5] Stricter infection control measures, such as increased air exchanges and universal N95 use, should be considered for HCP in the ED during periods of high community transmission.[6,7]

Whether working on COVID-19 units is associated with an increased risk of acquiring COVID-19 remains a controversial topic; data have been inconsistent.[8–10] COVID-19 units and non–COVID-19 units had similar proportions of HCP with COVID-19 at UIHC. This finding might suggest that infection control practices reduced the risk of SARS-CoV-2 acquisition

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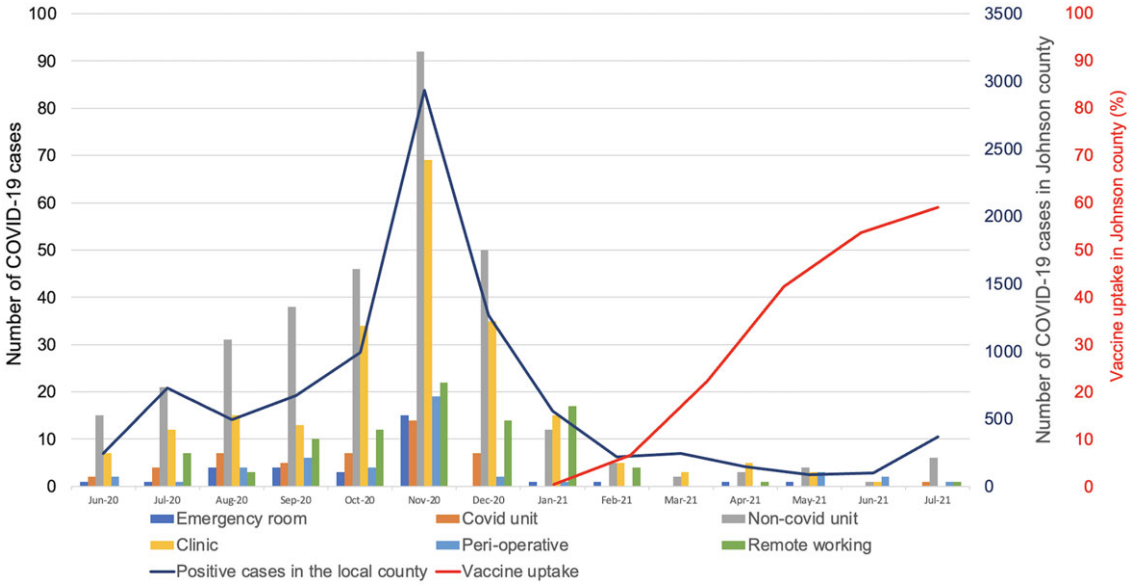


**Fig. 1.** Trend of COVID-19 cases among healthcare personnel at a Midwestern tertiary-care hospital by work location and COVID-19 cases in the local county, 2020–2021.

from patients with known or suspected COVID-19. All rooms in the COVID-19 units had high air exchange rates and negative pressure. Patients admitted for COVID-19–related reasons may have had a lower viral load by the time they were admitted. Transmission risk may be higher from patients on non–COVID-19 units who were not suspected to have COVID-19. Ensuring the availability of appropriate PPE, keeping safety measures and guidelines updated, and monitoring compliance of infection control measures are essential to reduce the risk of acquiring COVID-19 for frontline HCP in non–COVID-19 units.

The proportion of HCP with COVID-19 was second lowest among those working in perioperative locations such as preoperative or recovery areas. All patients underwent preprocedure testing during the study period, which may have contributed to a smaller proportion of HCP acquiring COVID-19. The job title of medical assistant was associated with the highest case proportion. These HCP perform a variety of tasks involving close patient contact, which may put them at increased risk.

This study had several limitations. HCP without dedicated work locations were not included. COVID-19 data obtained from UEHC included self-reported history and some HCP may have been diagnosed with COVID-19 outside our institution but did not report to UEHC. In addition, information on whether HCP with SARS-CoV-2 were symptomatic was not available. COVID-19 vaccine information for individual HCP was protected by UEHC and was not used in this study. However, vaccine uptake among HCP at UIHC was >90% by September 1, 2021. We did not ascertain whether HCP acquired COVID-19 at work or in the community. Some studies have shown that COVID-19 incidence among HCP is primarily influenced by community incidence and household exposures rather than the workplace.[11] We did not include whether an HCP had had patient contact. We did not obtain race data and did not evaluate the COVID-19 incidence among HCP by race.

In conclusion, special infection control strategies including increased air exchanges and stricter PPE and vaccination policies may be needed for HCP in the ED, for those with higher risk job titles, and in areas with low vaccine uptake. COVID-19 among HCP by location became comparable following the availability of COVID-19 vaccines.

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