

## SARS-CoV-2 Infection Among Health Care Workers

### *SARS-CoV-2 Infection Epidemiology Among Health Care Workers:*

Since the beginning of the pandemic, the SARS-CoV-2 (COVID 19) virus has caused more than 97 million infections and more than 2 million deaths.<sup>1</sup> During this time healthcare workers (HCWs) have put themselves at risk to provide essential front-line care for infected patients.

Based on data from the United States Centers for Disease Control and Prevention (CDC) from February 2020 to July 2020, HCWs accounted for 11-14% of COVID 19 cases.<sup>2</sup> This same study found that nursing was the most frequently identified single occupation type (30%) and nursing and residential care facilities were the most common job setting (67%).

HCWs are at an increased risk COVID 19 acquisition. One study of almost 100,000 HCWs and more than 2,000,000 non-HCWs found a 3.4 fold higher hazard ratio for reporting a positive COVID 19 test in HCWs compared to non-HCWs.<sup>3</sup> However, several studies suggest that HCWs are more likely to experience mild infections due to the protective effects of universal masking and personal protective equipment (PPE).<sup>4</sup> This newsletter summarizes prevention strategies for HCW and details important scenarios associated with HCW COVID acquisition.

### *Preventing SARS-CoV-2 Infections in the Health Care Setting:*

The CDC recommends several mitigation strategies to reduce COVID transmission in the hospital.<sup>5</sup>

Screening patients and HCWs for COVID 19 symptoms plays an important role in preventing nosocomial spread of COVID 19. Patients and HCWs should be screened prior to and upon entering into a healthcare setting. At a minimum HCWs should monitor themselves for COVID 19 symptoms and contact occupational health for additional

guidance. HCWs should also be educated about the need to report COVID 19 exposures inside and outside of work to occupational health in order to determine the need for work restrictions, testing, and quarantining. Temperature screening is controversial and has several limitations: fever is not specific to COVID 19<sup>6</sup>, the incubation period is anywhere<sup>7</sup> from 2 to 14 days, and not everyone infected with COVID 19 develops fever. In addition, different methods of thermal screening have different specificities and sensitivities, and there is a lack of evidence on their accuracies and effectiveness.<sup>8,9</sup> Moreover, screening employees and patients will not be completely effective as asymptomatic individuals or individuals with non-specific symptoms may pass screening.<sup>10</sup>

Universal Masking can also reduce the transmission of COVID 19 to patients and HCWs, particularly from pre-symptomatic or asymptomatic individuals. Universal masking is recommended for all patients, visitors and HCWs in the healthcare setting.<sup>5,11</sup> The benefit of universal masking has been demonstrated in several papers. For example, 238 patients were exposed to a HCW infected with COVID 19; only 1 clear case of transmission occurred when neither the HCW nor the patient was wearing a mask.<sup>12</sup> Two other studies demonstrated a reduction in COVID-19 infections among HCWs after implementation of universal masking.<sup>13,14</sup> In our study at Duke we observed a significant decrease in the cumulative incidence rate of healthcare-acquired SARS-CoV-2 infections among HCWs one week following implementation of universal masking for HCWs. The cumulative incidence rates in community-acquired cases and cases with no clear source of acquisition did not significantly change, however, and continued to mirror the cumulative incidence rates of SARS-CoV-2 in the communities surrounding Duke Health.

PPE also reduces the risk of COVID 19 transmission to HCWs and is recommended by the IDSA, CDC and WHO.<sup>5,15-17</sup> In fact, direct evidence from the early stages of the COVID-19 pandemic provide information about the risk of infection among HCP and the effectiveness of N95 respirators and surgical masks. Approximately 30% of unprotected HCWs

(wearing no masks) exposed to COVID 19 patients developed infection.<sup>18</sup>

Lastly, an important component of preventing COVID 19 transmission in the health care setting and in the community is “social distancing” or avoiding close contact with others. The CDC defines close contact as less than 6 feet for more than 15 minutes.<sup>5</sup> However, this practice is very challenging in the health care setting where a myriad of clinicians interact in spaces that are not designed for social distancing. Distancing is recommended for all forms of interaction, when possible.

Despite ongoing emphasis on and implementation of these strategies, we continue to observe COVID 19 infections and outbreaks among HCWs.

#### *Nosocomial Transmission of SARS-CoV-2 to Health Care Workers:*

HCWs are exposed to COVID 19 at work and in the community. In fact, the majority of cases of HCW infection are from community transmission. Community transmission rates are reflective in HCW rates.<sup>3,13</sup> One study found that although HCWs remained exposed to a high volume of COVID 19 patients, HCW COVID 19 rates showed sharp declines that temporally coincided with the decline in community cases observed.<sup>19</sup> Furthermore, the authors noted that PPE and infection control standards and procedures were unlikely to account for this decline as they remained comprehensive, stringent, and largely unchanged since the onset of the pandemic.

At work HCWs are certainly at risk of acquiring COVID 19 from interacting with COVID 19-positive patients and visitors. A detailed epidemiologic study supplemented by phylogenetic analyses documented how a single unexpected case of COVID 19 led to 6 infection clusters involving 5 hospital wards and an outside nursing home and dialysis unit. Infection was ultimately confirmed among 80 staff members and 39 patients, 15 of whom died.<sup>20</sup>

At this point of the pandemic, the biggest risk of HCW acquisition in the work place is from other HCW. Few studies exist looking at nosocomial cases in HCWs following the institution of universal masking. However, the few studies that do exist suggest that interactions in break

rooms and common work spaces from HCW to HCW play an important role in transmission. At Duke we found that “unmasked exposure to another [health care worker] rather than exposure to known infected patients resulted in the most [SARS-CoV-2] cases among staff after implementation [of universal masking].”<sup>21</sup> A cluster of at least 55 infections at Baystate Medical Center in Massachusetts in July 2020 was traced back to “staff who convened in a breakroom and removed their masks.”<sup>22</sup> In an outbreak at Brigham and Women’s Hospital in Boston, hospital epidemiologists identified a number of important contributing factors, including that “lack of physical distancing among staff while unmasked and eating.”<sup>23</sup> One additional study that looked at a nosocomial cluster of COVID 19 infections in HCWs noted that a common practice in breakrooms by HCWs was “to remove masks to eat lunch while sitting in close proximity to one another”.<sup>24</sup> From these few studies, we can conclude that nosocomial outbreaks of COVID 19 among HCWs is likely to occur due to poor masking adherence and masking fatigue, particularly when in breakrooms.

#### *Our Experience at Duke University Health System:*

In a preliminary study of Duke University Health System HCWs from 11/1/20 to 1/20/21 we identified 1,330 COVID 19-positive HCWs despite universal facemask requirements, routine symptom screening, and rigorous attention to PPE. Nurses were the most common employee category to acquire COVID 19; 378 (28%) of the COVID 19 HCWs were classified as nurses.

Based on interviews with HCWs, we determined that 757 (57%) COVID 19 infections were confirmed or likely community-acquired, 475 (36%) were unknown acquisition, and 98 (7%) were healthcare-acquired/nosocomial. Of the 98 healthcare-acquired cases, 83 (85%) were transmitted from another HCW, 14 (14%) were transmitted from a patient, and 1 infection was acquired through a visitor (1%). Moreover, 357 (27%) of COVID 19-positive HCWs were exposed to a COVID 19-positive household member, 233 (18%) were exposed to a COVID-19 family member outside of the house, 289 (22%) reported traveling in the 14 days prior to their COVID 19 diagnosis, and 569 (43%) reported participating in a gathering outside of the home without masking.

We have identified several clusters of HCW COVID 19 infections. Of the 15 clusters that we identified, 4 of the clusters occurred as a result of HCWs interacting with each other in the community. The remaining 11 clusters were linked to interactions while at work. These clusters may not be surprising, as 513 (39%) of the 1330 HCWs who tested positive worked while they were experiencing symptoms.

#### *Preventing SARS-CoV-2 Infection in Health Care Workers:*

Regular, flexible, and convenient testing with short turnaround times and adequate and statutory sick leave should be made available to all health care workers, with systems in place to ensure progression of training for medical trainees. We found that a large proportion of HCWs came to work with symptoms and some caused outbreaks of COVID 19 infections amongst HCWs. Symptom screening alone will not sufficiently eliminate presenteeism; thus, HCW must be regularly reminded of the risks of working with symptoms and the importance or reporting even mild symptoms.

We also need to address break room behavior and interactions among HCWs. Break rooms and common work areas are important sites of nosocomial transmission. While in these areas, social distancing is inconsistent and PPE is removed.<sup>25</sup> In our small cohort, we observed that a large majority of the 83 healthcare-acquired cases transmitted from another HCW occurred in the break room. Adequate, well-ventilated, and ideally dedicated space must be provided for breaks from daily work activities and mealtimes for health care workers, with processes in place to ensure that these are staggered to minimize contact and conversation during these higher-risk periods.

Ongoing education emphasizing social distancing inside and outside of work is paramount in decreasing the interactions that may lead to transmission of COVID 19 between HCWs.

This data also reinforces the need for HCWs to receive COVID 19 vaccines. As previously mentioned, HCW are going to continue to be at risk of exposure to COVID 19 in both the healthcare setting and the community. Vaccination will not only protect the health of HCWs, but will also protect health care capacity. When HCWs are sick,

they are unable to provide the critical care that is needed for patients and the healthcare system. Vaccinated HCWs will also be less likely to spread the virus to those that they are caring for and their co-workers.

#### *Changing Practices in the Post-Vaccine Era:*

For several reasons infection prevention practices will have to stay in place despite the fact that COVID 19 vaccines have arrived. First, the efficacy of the two mRNA vaccines is superb and offers a 95% reduction in the rate of symptomatic COVID 19 acquisition in randomized trials. However, this still means that 1 in 20 people may still acquire COVID 19. Second, the vaccine will take time to take effect. For maximum protection recipients need to have both shots and the vaccines are given at least 21 days apart (21 days for Pfizer and 28 days for Moderna). Even after that time, a person can expect to reach the ideal level of immunity about 2 weeks after his or her second shot. Lastly, detailed data has not shown whether the vaccines offer “sterilizing immunity”, in which those who are vaccinated can’t contract or pass on the virus at all. Until more research is done there is a possibility that people who are vaccinated can still become infected without symptoms and spread COVID 19 to those who have not yet received the vaccine.

#### **So, for now we must keep calm and mask on!**

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