

VECTOR OR VICTIM: SARS-COV-2 INFECTION IN HEALTHCARE WORKERS AND THEIR HOUSEHOLD CONTACTS AT THE UNIVERSITY OF NORTH CAROLINA MEDICAL CENTER

Team

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The COVID-19 pandemic now accounts for more than 1.1 million confirmed infections and nearly than 70,000 deaths in the United States (US), along with unprecedented disruption to social networks and economic systems. The causative agent, the SARS-CoV-2 coronavirus, is primarily spread from person-to-person through the inhalation or direct contact with aerosolized droplets. Frontline healthcare workers (HCW) are at increased risk of infection due to frequent exposure to and close contact with infected patients and contaminated surfaces. Shortages of critical personal protective equipment (PPE) may further exacerbate this risk. A review of the epidemiological data from the site of the initial COVID-19 outbreak in Wuhan, China showed that 63% of HCWs were infected with SARS-CoV-2, many of who developed severe disease. While data from US facilities is still emerging, an analysis of case reports submitted to the Centers for Disease Control and Prevention (CDC) found nearly 10,000 cases of COVID-19 among HCWs.

Infected HCWs can also contribute to disease transmission, both in the hospital setting and in the community. When infection results in overt clinical symptoms, identifying and isolating infected HCWs is relatively straightforward. However, a large proportion - perhaps as high as 25% - of SARS-CoV-2 infected individuals are asymptomatic or develop only mild symptoms and thus are unlikely to seek care. Yet, even asymptomatic individuals can transmit infections to others. Outside of the hospital, little is known about the role HCWs play in the transmission of SARS-CoV-2, particularly among household members and close contacts. The potential for HCWs to transmit the disease to immediate family is, however, a source of considerable stress that may adversely impact mental health and job performance.

Therefore, there is an urgent need to quantify the incidence of SARS-CoV-2 infections among HCWs and the determine how these individuals may contribute to within hospital and community transmission. This information will guide the development and implementation of effective screening and prevention measures that seek to protect HCWs, patients, and communities. The overarching goal of this project is to quantify and describe the risk of SARS CoV-2 infection among frontline healthcare workers, ancillary support staff, and their family members amidst the COVID-19 pandemic. Our hypothesis is that these individuals are at high risk for exposure and subsequent infection, but being younger and healthier than the general population, may not experience severe disease that would prompt urgent care seeking and diagnostic testing. Moreover, the family members of infected HCW may be at increased risk of infection. To accomplish this goal, we will:

AIM 1: Determine the incidence rate of SARS CoV-2 infection, defined as laboratory-confirmed RT-PCR (clinical) or the development of antibodies (sub-clinical), among a cohort of 300 frontline HCWs and ancillary support staff at the University of North Carolina Medical Center (UNCMC).

AIM 2: Document potential risk factors for infection among participants with confirmed infection to include contact with infected patients and exposure outside of the hospital.

The proposed project has received seed funding from the UNC School of Medicine and Gillings School of Global Public Health. The study team has received the required ethical approvals and enrollment is expected to begin soon. Additional funds are requested to (i) support a robust research staff to ensure high-quality data collection and (i) enable to the study to continue beyond the initial 2-3 month period provided by the seed funding. The extended period of observation will be especially important given the high probability of a second “peak” in late 2020.

IMPACT TO THE STATE (300 word limit)

- *Description of the problem or challenge being addressed and how the problem impacts those in the state of North Carolina*
- *Describe how the proposed research will provide impactful solutions to the described problem to help the state of North Carolina*

Frontline **healthcare workers** (HCW) are at increased risk of infection due to frequent exposure to and close contact with infected patients and contaminated surfaces. Shortages of critical personal protective equipment (PPE) may further exacerbate this risk. A review of the epidemiological data from the site of the initial COVID-19 outbreak in Wuhan, China showed that 63% of HCWs were infected with SARS-CoV-2, many of who developed severe disease. While data from US facilities is limited, an analysis of case reports submitted to the Centers for Disease Control and Prevention (CDC) in early April found nearly 10,000 cases of COVID-19 among HCWs.

Infected HCWs can also contribute to disease transmission, both in the hospital setting and in the community. Outside of the hospital, little is known about the role HCWs play in the transmission of SARS-CoV-2, particularly among household members and close contacts. The potential for HCWs to transmit the disease to immediate family is, however, a source of considerable stress that may adversely impact mental health and job performance.

The overarching goal of this project is to quantify and describe the risk of SARS-CoV-2 infection among frontline healthcare workers, ancillary support staff, and their family members amidst the COVID-19 pandemic. To accomplish this goal, we will determine the incidence rate of SARS CoV-2 infection, defined as laboratory-confirmed RT-PCR (clinical) or documented seroconversion (sub-clinical), among a cohort of 300 frontline HCWs and ancillary support staff at the UNC Medical Center (UNCMC) along with a subset of their household family members and/or household contacts. We will document potential risk factors for infection among participants with confirmed infection to include contact with infected patients and exposures outside of the hospital. This information will guide the development and implementation of effective screening and prevention measures that seek to protect HCWs, patients, and communities.

MILESTONES (300 word limit)

Description of what will be accomplished and what can be delivered by August 31, 2020, and by Dec. 31, 2020. The start date will be June 1, 2020.

August 31,2020 Milestones

- 1) Recruitment and enrollment of full cohort (300 HCWs)
- 2) Baseline demographic data and seroprevalence results
- 3) Incidence of clinical and sub-clinical infections over 3-month period
- 4) 30+ household investigations (2 visits each)
- 5) Preliminary results of blue-tooth network tracking (i.e. exposure times)

December 31, 2020 Milestones

- 1) Longitudinal follow-up of cohort participants
- 2) Incidence of clinical and sub-clinical infections over 6-month period
- 3) 60+ household investigations (2 visits each)
- 4) Results of blue-tooth network tracking (i.e. exposure times)
- 5) 1st Peer-reviewed manuscript submitted
- 6) Application to external funding source (i.e. NIH, CDC) to extend cohort
- 7) Dissemination event including medical center leadership describing key findings such as:
 - a) Overall rate of SARS-CoV-2 infections among HCWs
 - b) Specific occupational risk factors associated with infection
 - c) Rate of infection among households of HCWs
 - d) Impact of COVID-19 on mental health

BUDGET JUSTIFICATION (200 word limit)

Funds are limited. We encourage all teams to revisit their budget and determine if it can be reduced.

Total Budget: \$315,000

Personnel/Staff

\$139,511

Key personnel include Drs. Ross Boyce and Allison Aiello, who are co-leading the project. Both are requesting modest support (2% FTE) for their efforts. Support for additional co-investigators from Hospital Medicine and Infectious Diseases, who will serve as key liaisons to the target populations are also included at modest levels (5-10% FTE).

Given the intense workload associated with frequent (i.e. every 2 week) follow up of participants, we are requesting support for a study coordinator and a full-time research assistant, along with another 0.5 FTE research assistant. At least one of these individuals will have phlebotomy training to augment CTRC staff. Additional part-time support for regulatory affairs and data management is required. We will also employ a few students on an hourly basis to support observations of PPE use and other routine activities such as transportation of samples between the CTRC and the laboratory.

Supplies

\$111,381

Funds are requested for sample collection, processing, and testing. This includes nasal swabs, COVID-19 rapid diagnostic tests, and reagents for serological testing.

Contracted Services

\$59,256

Level I CTRC visit costs

Travel

\$2,352

Publication

\$2,500

Personnel Table

Personnel includes faculty, staff, coordinators, postdocs, students					Budget to Dec, 31 2020		
Name	Role	Base Salary	Effort	Requested Salary	Fringe Benefits	Total	
EHRA Salary				17,459	6,660	24,119	
Boyce, Ross	Co-PI	135,000	2%	1,350	572	1,922	
Aiello, Allison*	Co-PI	209,545	2%	2,096	647	2,743	
Cicccone, Emily	Co-I	88,000	10%	4,400	1,731	6,131	
Reyes, Raquel	Co-I	196,000	5%	4,900	1,883	6,783	
Alavian, Naseem	Co-I	188,500	5%	4,713	1,827	6,540	
SHRA Salary				9,818	4,333	14,151	
TBD	Data Manager	67,840	25%	8,480	3,685	12,165	
TBD	Regulatory Associate	53,508	5%	1,338	648	1,986	
Grad Student				0	0	0	
Temps				60,680	24,629	85,309	
Jasmine Taylor	Coordinator	58,000	100%	29,000	10,403	39,403	
Christy Chung	Research Assistant	42,240	100%	21120	8,433	29,553	
TBD	Research Assistant	42,240	50%	10560	5,793	16,353	
Fringe Pool						13,680	
Students (Hourly)	PPE Observers					13,680	
Non-Personnel Expenses						177,741	
Total						315,000	

*Gillings SPH Employee