

SARS-CoV-2 Seroprevalence in Health Care Workers at a Tertiary Care Center in San Bernardino, CA Kathleen Louise Valenzuela, MD¹; April Wilson, MD²; Paul Herrmann, MD³; James Pappas, MD¹; Jennifer Veltman, MD¹ ¹Internal Medicine, ²Employee Health, ³Pathology and Human Anatomy: Loma Linda University Health, Loma Linda, CA

Purpose

To determine the protective effect of early implementation of protective measures by measuring seroprevalence of SARS-CoV-2 antibody among high risk health care workers at Loma Linda University Health (LLUH).

Methods

- **Setting:** Employee Health and Occupational Medicine offered free antibody testing to employees at LLUH, a Tertiary care university hospital in San Bernardino county with 17,939 employees.
- **Inclusion criterion:** 658 Employees at LLUH voluntarily underwent antibody testing from March 1, 2020 to May 30, 2020. Missing data was not excluded.
- **Data Extraction:** The demographics, occupation, and symptoms were confidentially obtained by Employee Health, then de-identified and analyzed by a study team.
- Antibody Test: Serologic detection of immunoglobulins against the SARS-CoV-2 virus was performed using the Nirmidas COVID-19 (SARS-CoV-2 infection) IgM/IgG antibody detection kit exactly as outlined within the instructions contained in the package insert. The antibody detection kit was validated using patient serum obtained from hospitalized patients who had been tested for the presence of the virus by PCR. Serum had been collected from the patients for routine labs during their hospitalization and then frozen and stored at -20°C. Sensitivity and specificity were determined at 5 days and 14 days post positive SARS-CoV-2 PCR assay. Internal validation of the test was performed and at 5 days post positive PCR assay the sensitivity and specificity were 75% and 97% respectively using serum specimens from 71 patients. At 14 days post positive PCR assay the sensitivity approached 100% while the specificity remained 97% utilizing serum specimens from 79 patients.

LLUH protective measures against healthcare-associated transmission

- Mandatory training of enhanced precaution protocols
- Closing most outpatient clinic operations mid-March through mid-May and converted to video visits
- Closing the operating room to all non-elective cases from March through May
- Designating rooms in the operating room for COVID-positive cases
- Starting April 5, testing all patients to be admitted for COVID-19
- Starting March 23, requiring loop face masks for all employees
- Symptoms screening for all persons prior to entry of the building
- Using N-95 masks and eye protection for employees with direct patient care to all persons under investigation (PUI's) as well as COVID-positive patients (one N-95 per employee per day)
- Cohorting COVID-positive patients to specific areas in acute care, ED, and ICU
- Limiting visitors significantly; no visitors on COVID designated units
- Exposure notifications to employees exposed by COVID-positive patients or COVID-positive employees

Results

COVID-19

31/658 (4.7%) Subjects tested positive for SARS-CoV2 IgM or IgG antibodies, triggering antigen testing

• Following positive antibody testing, employees were encouraged to return for antigen testing. 29/31 returned for antigen testing, of these 5 were antigen positive and were removed from active work duty for a 10 day quarantine.



Figure 1: Most common symptoms reported by antibody-positive subjects.

- 18/31 (58.0%) antibody-positive subjects reported COVID-19 related symptoms within 2 months of the antibody test
- 2 subjects were hospitalized for COVID-19 and subsequently discharged to home
- The occupation of antibody-positive subjects
- 14/31 (45.2%) Registered Nurses
- 7/31 (22.6%) Patient Care Aides
- 4/31 (12.9%) Technologists
- 2/31 (6.5%) Primary Providers



Figure 2: Occupations of antibody positive employees **Known exposures**

- 16/31 (51.6%) known work exposure from COVID-19 coworker or patient
- 6 reported having contact with a patient not wearing the provided face mask
- 5/31 (16.1%) known home exposure
- 2/31 (6.5%) with both known home and work exposure
- 8/31 (25.8%) with no known exposures

- 1/31 (3.2%) Food Services • 1/31 (3.2%) Administration
- 2/31 (6.5%) Unknown

In this retrospective voluntary screening study for the SARS-CoV-2 antibodies among LLUH employees, 4.7% (31/658) were seropositive. In comparison to similar studies of seroprevalence in healthcare workers, LLUH had a lower seroprevalence. 4.9% was noted in a VA study by Dimcheff et al, 6% in a multistate hospital network study by Self et al, 6.4% in a Belgium hospital by Steensels et al, 6.9% in a Detroit study by Akinbami et al, and 7.6% in a Nashville study by Stubblefield et al. LLUH's lower prevalence is possibly due to the early and universal protective measures implemented by LLUH.

The majority (18/31) of seropositive employees reported symptoms, but 42% were asymptomatic. Similar rates of asymptomatic seropositive subjects were observed in other studies. 42.1% in Stubblefield et al, 38% in Shields et al, 29% in Dimcheff et al, and 29% in Self et al. These observations emphasize the importance of universal mask policy, even when not engaged in patient care to prevent transmission among healthcare workers who are asymptomatic viral carriers of SARS-CoV-2.

The limitations of this study include the voluntary nature of the study which adds bias. This study is a single-center design and retrospective, with no data available for seronegative employees. Though 45% (14/31) of seropositive employees were employed by the nursing department, there is no data on seronegative employees to comment on an occupational risk as we do not know the occupation of those who were found to be seronegative. Of note, nursing staff were at higher risk compared to physicians in seroprevalence in Akinbami et al and housekeeping staff was found to be at higher risk compared to other occupations in Shields et al. Our study includes testing of 3.7% employees (658/17939). Also, If an employee was tested in the first 7 days in his/her disease, the antibody test would result as negative.

- transmission to employees

Shields A, et al.: SARS-CoV-2 seroprevalence and asymptomatic viral carriage in healthcare workers: a cross-sectional study. Thorax 2020;0:1-6

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Discussion

Conclusions

• LLUH's early protective measures against hospital-associated COVID-19 transmission were overall effective in preventing work-related COVID-19

• Asymptomatic infection with the SARS-CoV-2 virus is a concern and supports universal protective measures (such as masking) in the workplace.

References