

Coronavirus 2019 (COVID-19) Infections Among Healthcare Workers, Los Angeles County, February - May 2020

Stacy Hartmann, MPH¹; Zachary Rubin, MD¹; Heidi Sato, PhD¹; Kelsey OYong, MPH¹; Dawn Terashita, MD, MPH¹; Sharon Balter, MD¹

¹Acute Communicable Disease Control, Los Angeles County Department of Public Health, Los Angeles, California, United States of America

Corresponding Author:

Stacy Hartmann

313 N. Figueroa St. Room 212

Los Angeles, CA 90012

Phone (213) 288-8589

Fax (213) 482-4856

SHartmann@ph.lacounty.gov

Summary

Healthcare workers are at a higher risk of COVID-19. Analyzing positive healthcare worker case-patient interviews leads to better understanding of the burden of disease in this high risk group, and public health officials can provide better resources, education, and guidance.

Abstract

Across the world, healthcare workers (HCW) are at a greater risk of infection by the novel coronavirus 2019 (COVID-19) due to the nature of their work. The Los Angeles County Department of Public Health (LAC DPH) set out to understand the impact of COVID-19 on healthcare facilities and HCWs by tracking and analyzing data from case-patient interviews of HCWs. As of May 31st, over three months into the pandemic, nearly 5,500 positive HCWs were reported to LAC DPH, representing 9.6% of all cases. Cases reported working in 27 different setting types, including outpatient medical offices, correctional facilities, emergency medical services, etc., with the highest proportion from long-term care facilities (46.6%) and hospitals (27.7%). Case-patients included both clinical and non-clinical roles, with nearly half (49.4%) of positive HCWs being nurses. Over two-thirds of HCWs (68.6%) worked at some point during their infectious period and nearly half (47.9%) reported a known exposure to a positive patient and/or co-worker within their facility. Overall, compared to all LAC cases, HCWs reported lower rates of hospitalization (5.3% vs. 12.2%) and death (0.7% vs. 4.3%) from COVID-19. There are many factors that increase HCWs risk of infection, including high risk work environment, limited supply of personal protective equipment, and even pressure to help and work during a pandemic. In response to these data, LAC DPH created resources and provided guidance for healthcare facilities to best protect their patients and staff during the COVID-19 pandemic.

Key Words: Infectious Disease, Surveillance, Pandemic, COVID-19, Public Health

Background

Los Angeles County (LAC) is a jurisdiction of over 10 million residents, served by 4,228 licensed healthcare facilities and thousands more non-licensed healthcare settings (1). Multiple reports (2,3,4) have demonstrated that healthcare workers (HCW) have been infected in high numbers since the initial reports of the novel coronavirus 2019 (COVID-19) transmission surfaced in December 2019. To assess the burden of COVID-19 on HCWs and determine possible exposures, LAC Department of Public Health (LAC DPH) analyzed case interview data from February through May 2020. LAC DPH tracks positive HCWs to understand the burden of COVID-19 on HCWs and to provide appropriate guidance.

Methods

In LAC, both medical providers and laboratories are mandated to report all COVID-19 positive cases to LAC DPH. All LAC residents who test positive for COVID-19 are interviewed by LAC DPH using a standardized form that identifies if the case-patient worked in a high-risk environment, such as a healthcare setting. Each case-patient was contacted three times to interview. In addition, outside jurisdictions email LAC DPH when they identify a case-patient working in a LAC high-risk environment. Occasionally, additional HCW cases were also identified during the course of COVID-19 outbreak investigations and direct communication from healthcare facilities.

HCWs were defined as any person working or volunteering in a licensed or non-licensed healthcare settings, including hospitals and skilled nursing facilities, as well as outpatient practices, mental health facilities, emergency medical services, etc. HCWs included both clinical staff that interacted directly with patients and non-clinical staff that worked in the healthcare industry but did not provide direct clinical care to patients. In addition, HCWs providing care in a non-healthcare settings,

such as school or correctional facility nurses, or caregivers in senior living facilities, were included. All HCWs, including staff, contractors, licensed independent practitioners, and volunteers, were included in analysis. From case-patient interviews and/or emailed reports, LAC DPH recorded occupational setting, occupational role, date of symptom onset, date last worked, known exposure, and if hospitalized for each HCW. A case-patient was determined to have worked during their infectious period if the date last worked was after, the same, or within 48 hours prior to the date of symptom onset. Exposure was split into two categories: healthcare and non-healthcare exposure. Healthcare exposure was defined as contact with a confirmed case while working in a healthcare setting. Due to limitations of the interview formatting, exact exposure was not always stated and a “not specified” option was added for each category. If the case-patient did not work more than three weeks prior to symptom onset date, they were considered to have a non-healthcare exposure. The extended time period, three weeks instead of two, was used to ensure the case-patient really had no healthcare exposure before even mild symptom onset. In addition, if COVID-19 death report forms identified an HCW, their information was tracked, along with co-morbidities.

HCWs that were not interviewed or where minimum information, occupational setting and role, was not provided by the reporting jurisdiction or facility were removed from analysis.

Results

Through May 31st, 2020, 57,118 confirmed COVID-19 cases in LAC were reported, of which interviews were conducted for approximately 60%. In this time, 5,458 confirmed HCWs were reported to LAC DPH, representing 9.6% of all LAC cases. After removing HCWs with incomplete information, 5,118 HCWs were included for analysis. These HCWs were reported from 27 different healthcare setting types (Table 1). Nearly half of all confirmed cases (46.6%) worked in a long-term

care setting, including skilled nursing facilities (SNFs), assisted living, and other senior residential communities. Over one-fourth of case-patients worked in a hospital (27.7%), including general and long-term acute care hospitals. HCWs from medical offices comprised 6.9% of the case-patients. All other settings (ex. home health, correctional facilities, emergency medical services, etc.) accounted for less than 4% each of the total HCW cases. Case-patients were identified among a range of occupational roles (Table 2), but nurses (including registered nurses, licensed vocational nurses, and certified nursing assistants) accounted for nearly half of all cases (49.4%). Caregivers in the home or within long-term care facilities were the second most common role (5.8%). Case-patients included both clinical HCWs, such as medical assistants (3.6%) and physicians (2.6%), and non-clinical roles, such as administrators (4.3%), environmental services (3.2%), and food services (2.9%).

HCWs reported symptom onset dates between February 13th and May 31st (Figure1), with two peaks on April 6th (2.2%) and April 20th (2.0%). Although May onset cases are likely still to be added from those interviewed in June, LAC is seeing a decline in HCW cases. At the end of April, HCWs represented 12.8% of all LAC cases, whereas only 9.6% at the end of May.

When asked if they had a known exposure to COVID-19, (Table 3), healthcare exposures within their facility accounted for nearly 44%, including contact with either a positive patient, co-worker, or both. Non-healthcare exposures, including infected family members or friends, or travel within 14 days of illness, was reported by 11.3% of cases. The remaining 45.1% were unknown exposures.

Using their reported date last worked, Table 4 provides information on when HCWs stopped working relative to their symptom onset. Nearly two-thirds worked during their infectious period, either on the day of symptom onset (24.2%), after symptom onset (22.4%), or within 48 hours prior to

symptom onset (17.6%). Over 12% reported not working more than 48 hours before symptom onset. The last day worked was unknown for 17.3% of HCW cases because one or more dates were missing. More than 6% of HCWs reported being completely asymptomatic.

At the time of interview, 5.3% of HCWs reported requiring hospitalization due to COVID-19. As of May 31st, there were 40 (0.7%) deaths among HCWs with confirmed COVID. Compared to the overall median age of reported HCWs, 42 years old (range 17 to 85), the median age of HCWs who died was higher at 60 years old (range 32 to 75). Twenty percent of those who died were older than 65 and 86.6% had a known co-morbidity.

Discussion

The COVID-19 pandemic has placed immense pressure on healthcare infrastructure and HCWs. It is likely that HCWs in LAC, and across the world, have been disproportionately infected with COVID-19 compared to the general public due to high rates of exposure in healthcare facilities, limited availability of personal protective equipment (PPE) nationwide, and delayed understanding of the risk of asymptomatic transmission of COVID-19. Pressure to work during the pandemic, lack of paid sick leave, and staffing shortages may have led many HCWs to work while symptomatic. Though our data are unable to capture the nature of the precise exposures of HCWs, nearly half knew of an exposure to patients and/or co-workers within their facility. This is similar to reports from China and Italy which found one patient could be the source of infection for 10 HCWs (5). Although LAC numbers are still higher than reports from China, which reported only 4% of cases were HCWs (6), LAC is seeing a decline in HCW cases. This is likely due to improved availability of PPE, better institutional infection control practices, and adoption of universal source control, all helping to

prevent new infections among HCWs in LAC. The Centers for Medicare and Medicaid Services (CMS) (7) mandated universal source control in long-term care facilities on April 2nd and the Centers for Disease Control and Prevention (CDC) mandated the same approach for acute care hospitals on April 13th (8). Anecdotally in LAC, many healthcare facilities adopted the practice earlier. Additionally, facilities implemented more stringent entry screening practices in April, screening all staff, patients, and visitors entering the facility for fever and respiratory symptoms. This may have helped to decrease the number of symptomatic HCWs caring for patients, as well as to identify suspected COVID-19 patients immediately upon entry.

Additionally, widespread testing is a major factor in understanding and controlling the spread of COVID-19. Testing of HCWs has been a priority from the outset of the pandemic in the setting of limited access to testing, but as testing capacity expanded, free city and county testing sites opened to those with symptoms at the end of March, prioritizing high risk individuals. In mid-April, all HCWs could get tested and by the beginning of May, any LAC resident could get tested, regardless of symptoms (9). Expansion of testing could account for the decreased proportion of HCW case-patients. It is also likely to increase the number of asymptomatic case-patients, leading to LAC DPH needing to better understand the risks of asymptomatic transmission.

Compared to the general LAC case-patients (10), HCW case-fatality rates and hospitalization rates are much lower; 0.7% and 5.3% for HCWs compared to 4.3% and 12.2%, respectively, for LAC overall. The significant difference in severity of COVID-19 presentation and mortality seen in HCWs compared to the general population case-patients is likely an artifact of the testing strategy but may also reflect the younger demographics of HCWs. This is suggested by the median age of HCWs, 42 years old (range 17 to 85 years), compared to 45 years old (range 1 month to 107 years) for all LAC

cases. An additional limitation of the data stems from the fact that interviewers were unable to interview approximately 40% of COVID-19 cases; thus, there may be additional HCW cases which have not been identified. Furthermore, many hospitalized cases were unable to be interviewed, which might have impacted our low hospitalization rate for HCWs.

In response to this data, LAC DPH was able to better focus resources. Teams were developed to work with distinct settings and provide guidance relevant to their specific needs. For example, as outpatient facilities fully re-opened following safer at home orders ending in May, LAC DPH dedicated a team to provide overall outpatient guidance, as well as specific recommendations for specialized settings, such as dentists, dialysis, outpatient surgery centers, etc.

Healthcare facilities and their workers are a vulnerable population during the COVID-19 pandemic. Not only are HCWs at risk of becoming ill themselves, but they also risk passing the infection to their patients, co-workers, families, and staff or patients at other locations if they work in multiple healthcare facilities. Healthcare facilities continue to face obstacles, most notably in PPE supply and staffing shortages. HCW infections declined following implementation of universal masking and more aggressive symptoms screening in facilities, suggesting that a stable supply of PPE and symptom checks can best protect not only HCW but also the populations they serve. These data may also provide lessons on how best to protect the community going forward as communities reopen and consider guidance on masking and symptom checking.

Funding and Conflict of Interest

There are no conflicts of interest or funding sources to disclose.

References

1. California Department of Public Health. Licensed & Certified Healthcare Facilities. April 2020. https://datavisualization.cdph.ca.gov/t/LNC/views/OpenDataFacility-FacilityCounts/FacilityCounts?iframeSizedToWindow=true&:embed=y&:showAppBanner=false&:display_count=no&:showVizHome=no
2. Centers for Disease Control and Prevention COVID-19 Response Team. Characteristics of Health Care Personnel with COVID-19 — United States, February 12–April 9, 2020. Morbidity and Mortality Weekly Report (MMWR) 2020;69:477–481. doi: <http://dx.doi.org/10.15585/mmwr.mm6915e6external icon>.
3. Wang D, Hu B, Hu C et al. . Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. J Am Med Assoc, doi:10.1001/jama.2020.1585.
4. Lai X, Wang M, Qin C, et al. Coronavirus Disease 2019 (COVID-2019) Infection Among Health Care Workers and Implications for Prevention Measures in a Tertiary Hospital in Wuhan, China. JAMA Netw Open. 2020;3(5):e209666. doi:10.1001/jamanetworkopen.2020.9666
5. Xiang B, Li P, Xinhui Yang , Shuyi Zhong , Anne Manyande , Maohui Feng , The impact of novel coronavirus SARS-CoV-2 among healthcare workers in hospitals: An aerial overview, AJIC: American Journal of Infection Control (2020), doi:https://doi.org/10.1016/j.ajic.2020.05.020
6. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From

the Chinese Center for Disease Control and Prevention. JAMA. 2020;323(13):1239–1242.
doi:10.1001/jama.2020.2648

7. Centers for Medicare and Medicaid Services. COVID-19 Long-Term Care Facility Guidance, April 2, 2020. <https://www.cms.gov/files/document/4220-covid-19-long-term-care-facility-guidance.pdf>.
8. Centers for Disease Control and Prevention. Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings. April 13, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html>.
9. County of Los Angeles. COVID-19: LA County Newsroom. March - June 2020. <https://covid19.lacounty.gov/covid19-2-2/newsroom/>
10. Los Angeles County Department of Public Health. COVID-19 Surveillance Dashboard. June 8, 2020. http://dashboard.publichealth.lacounty.gov/covid19_surveillance_dashboard/

Figure 1 Legend:

**Reported Date of Symptom Onset for COVID-19 Positive Healthcare Workers, Los Angeles County,
through May 31, 2020**

Accepted Manuscript

Table 1. Occupational Setting of Confirmed COVID-19 Healthcare Workers, Los Angeles County, through May 31, 2020

Setting	Count	Percent
Long-term Care Facility (Skilled Nursing, Assisted Living, Senior Residential)	2387	46.6%
Hospital	1418	27.7%
Outpatient	354	6.9%
Home Health	198	3.9%
EMS/First Responder	105	2.1%
Mental Health	87	1.7%
Dental	68	1.3%
Corrections/Detention	55	1.1%
Dialysis	49	1.0%
Pharmacy	48	0.9%
Urgent Care	34	0.7%
Substance Abuse	25	0.5%
Other	21	0.4%
Shelter or Other Congregate	28	0.4%
Hospice	18	0.4%
Laboratory	16	0.3%
Call Center	14	0.3%
Medical Equipment	12	0.2%
Chiropractor	11	0.2%
Surgery Center	10	0.2%
DPH Clinic	7	0.1%
Consultant	6	0.1%
Ophthalmology or Optometry Office	6	0.1%

Community Center	6	0.1%
Research	6	0.1%
School	3	0.1%
Airport	2	<0.1%
Not specified	124	2.4%

Table 2. Occupational Role of Confirmed COVID-19 Healthcare Workers, Los Angeles County, through May 31, 2020

Role	Count	Percent
Nurse	2526	49.4%
Caregiver	297	5.8%
Administration	220	4.3%
Medical Assistant	184	3.6%
Environmental Services	166	3.2%
Food Services	149	2.9%
Physician (excluding Radiologist and Ophthalmologist)	139	2.7%
Non-patient Facing Services (IT, sterile processing, research, call center, etc.)	132	2.6%
Physical/Occupational/Speech Therapist	129	2.5%
Patient Services (Referral Coordinators, etc.)	110	2.1%
Surgical or Other Specialized Technician (excluding x-ray)	79	1.5%
Pharmacist	68	1.3%
Psychiatrist/Therapist	68	1.3%
Receptionist/Check In	66	1.3%
Emergency Medical Technician/Paramedic/Firefighter	61	1.2%
Dentist/Orthodontist/Dental Assistant	56	1.1%
Social Worker	53	1.0%
Radiology (Radiologists, X-ray technicians, etc.)	49	1.0%
Activity Coordinator	42	0.8%
Mid-level Practitioner (Nurse Practitioner or Physician Assistant)	42	0.8%
Maintenance	36	0.7%
Respiratory Therapist	36	0.7%

Phlebotomist	31	0.6%
Security	30	0.6%
Specialty Medicine (Acupuncture, Optometry, Audiology, Chiropractor, Mortuary, etc.)	29	0.6%
Laboratory	24	0.5%
Medical Resident	22	0.4%
Transporter	21	0.4%
Student/Volunteer	16	0.3%
Infection Preventionist	4	0.1%
Not specified	233	4.6%

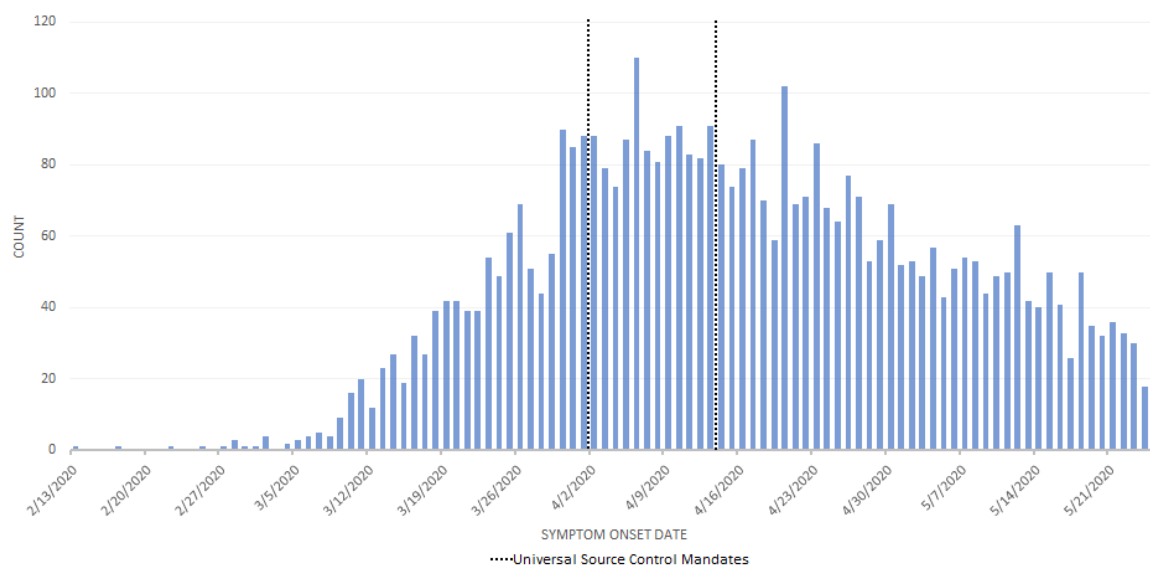
Table 3. Reported Exposure of COVID-19 Positive Healthcare Workers, Los Angeles County, through May 31, 2020

Healthcare Exposure	Count	Percent
Positive Patient	396	7.7%
Positive Healthcare Worker	167	3.3%
Both: Healthcare Worker and Patient	106	2.1%
Healthcare Not Specified	1562	30.5%
Non-Healthcare Exposure		
Household/Family Contact	321	6.3%
Travel	56	1.1%
Social/Community Contact	27	0.5%
Non-Healthcare Not Specified	172	3.4%
Unknown Exposure		
Reported Unknown Exposure	1850	36.1%
Did Not Answer Question	461	9.0%

Table 4. Reported Work History of COVID-19 Positive Healthcare Workers, Los Angeles County, through May 31, 2020

Worked During Infectious Period	Count	Percent
Day of symptom onset	1241	24.2%
After symptom onset	1146	22.4%
1 - 2 days before symptoms	902	17.6%
Did Not Work During Infectious Period		
More than 2 days before symptoms	631	12.3%
Asymptomatic	313	6.1%
Unknown	885	17.3%

Figure 1



Accepted Manuscript