Figure 2

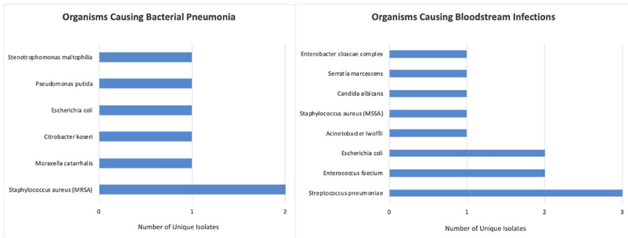

Figure 2a: Respiratory culture isolates in cases of COVID-19 patients with bacterial pneumonia
Figure 2b: Organisms isolated from blood cultures in cases of COVID-19 patients with bloodstream infection

Among patients with coinfection, the 30-day mortality rate was 45% (9 of 20). Diagnoses of BSI (OR, 6.35; 95% CI, 1.41–26.30) and bacterial pneumonia (OR, 9.34; 95% CI, 2.01–46.34) were associated with increased mortality. Of the data available, 12 (63%) of 19 patients with coinfection had elevated procalcitonin levels (ie, >0.50). At the time of COVID-19 diagnosis, the median absolute lymphocyte count in patients who died was 0.7 K/mm^3 (95% CI, 0.6–1.12) in comparison to 1 K/mm^3 (95% CI, 0.7–1.4) in patients who survived at 30 days. **Conclusions:** Our analysis of hospitalized COVID-19 patients with advanced age and underlying comorbid conditions demonstrated that coinfections were infrequent but that they were independently associated with increased mortality. This finding highlights the need for better tools to diagnose the presence or absence of bacterial and fungal coinfection in COVID-19 patients. Our findings also emphasize the need for judicious use of antimicrobials while discerning which patients are at risk of critical illness and mortality.

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Characteristics of healthcare personnel who reported concerns related to PPE use during care of COVID-19 patients

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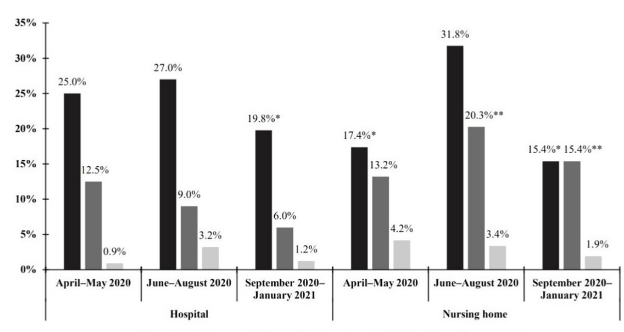
Background: Healthcare facilities have experienced many challenges during the COVID-19 pandemic, including limited personal protective equipment (PPE) supplies. Healthcare personnel (HCP) rely on PPE, vaccines, and other infection control measures to prevent SARS-CoV-2 infections. We describe PPE concerns reported by HCP who had close contact with COVID-19 patients in the workplace and tested positive for SARS-CoV-2. **Method**: The CDC collaborated with Emerging Infections Program (EIP) sites in 10 states to conduct surveillance for SARS-CoV-2 infections in HCP. EIP staff interviewed HCP with positive SARS-CoV-2 viral tests (ie, cases) to collect data on demographics, healthcare roles, exposures, PPE use, and concerns about their PPE use during COVID-19 patient care in the 14 days before the HCP's SARS-CoV-2 positive test. PPE concerns were qualitatively coded as being related to supply (eg, low quality, shortages); use (eg, extended use, reuse, lack of fit test); or facility policy (eg, lack of guidance). We calculated and compared the percentages of cases reporting each concern type during the initial phase of the pandemic (April–May 2020), during the first US peak of daily COVID-19 cases (June–August 2020), and during the second US peak (September 2020–January 2021). We compared percentages using mid-*P* or Fisher exact tests (α = 0.05). **Results:** Among 1,998 HCP cases occurring during April 2020–January 2021 who had close contact with COVID-19 patients, 613 (30.7%) reported ≥1 PPE concern (Table 1). The percentage of cases reporting supply or use concerns was higher during the first peak period than the second peak period (supply concerns: 12.5% vs 7.5%; use concerns: 25.5% vs 18.2%; p

Table. Characteristics of HCP cases with close contact with COVID-19 patients in the workplace, April 2020–January 2021

	HCP cases (N=1,998)
Sex, no. (%)[a]	
Female	1,542 (77.2)
Male	445 (22.3)
Age group in years, no. (%)[b]	
<30	517 (25.9)
≥30	1,460 (73.1)
Race and ethnicity, no (%)[c]	
White, non-Hispanic	935 (46.8)
Black, non-Hispanic	432 (21.6)
Hispanic	337 (16.9)
Asian, non-Hispanic	187 (9.4)
Native Hawaiian or other Pacific Islander, non-Hispanic	18 (0.9)
American Indian or Alaska Native, non-Hispanic	8 (0.4)
Multiple races, non-Hispanic	35 (1.8)
Healthcare role, no. (%)	
Registered nurse	689 (34.5)
Certified nursing assistant	316 (15.8)
Licensed practical nurse	108 (5.4)
Physician	129 (6.5)
Administrative personnel	69 (3.5)
Other[d]	687 (34.3)
Facility type, no. (%)	
Hospital	1,243 (62.2)
Nursing home	449 (22.5)
Other[e]	306 (15.3)
Specimen collection date of positive SARS-CoV-2 test, no. (%)[f]	
April–May 2020	279 (14.0)
June–August 2020	584 (29.2)
September 2020–January 2021	1,132 (56.7)
Reported ≥1 PPE concern, no. (%)	613 (30.7)
Use concern	413 (20.7)
Supply concern	193 (9.7)
Facility policy concern	43 (2.2)

[a]Sex was not reported for 11 cases.
[b]Age was not reported for 21 cases.
[c]Race was not reported for 46 cases.
[d]Other healthcare roles include home health personnel, surgical or medical technicians, medical assistants, nurse practitioners, emergency medical services personnel, physical therapists, radiology technicians, respiratory therapists, occupational therapists, and phlebotomists.
[e]Examples of other facility types include outpatient clinics, urgent care clinics, free-standing emergency rooms or departments, mental health facilities, and detal clinics.
[f]Specimen collection dates of positive SARS-CoV-2 tests were not reported for 3 cases.

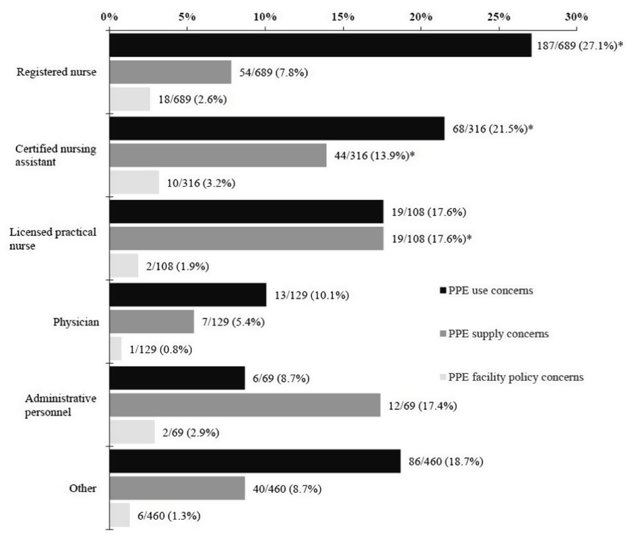
Figure 1. Personal protective equipment (PPE) concerns reported by HCP cases with close contact with COVID-19 patients, stratified by facility type, April 2020–January 2021



*p<0.05 using mid-P exact test when compared with the percentage of cases working in the same facility type and reporting PPE use concerns from June–August 2020

**p<0.05 using mid-P exact test when compared with the percentage of cases working in hospital and reporting PPE supply concerns during the same time period

Figure 2. Personal protective equipment (PPE) concerns reported by HCP cases with close contact with COVID-19 patients, stratified by healthcare role, April 2020–January 2021



* p<0.05 using mid-P or Fisher exact test when compared with the percentage of physician cases reporting the same PPE concern type

Conclusions: Although lower percentages of HCP cases overall reported PPE concerns after the first US peak, our results highlight the importance of developing capacity to produce and distribute PPE during times of increased demand. The difference we observed among selected groups of cases may indicate that PPE access and use were more challenging for some, such as nonphysicians and nursing home HCP. These findings underscore the need to ensure that PPE is accessible and used correctly by HCP for whom use is recommended.
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Subject Category: COVID-19
Improved assay for detecting SARS-CoV-2 from nonporous hospital surfaces using surrogate human coronavirus OC43
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Background: Understanding SARS-CoV-2 persistence on surfaces can help inform transmission risk from surfaces in healthcare and community settings. A sensitive viral infectivity assay is crucial for the detection of infective virus in environmental investigations. The conventional cell culture-based infectivity assay is limited by the time dependence, subjectivity, and insensitivity of cytopathic effect (CPE) scoring. We validated an integrated cell-culture and reverse-transcription quantitative RT-PCR method (cc-RT-qPCR) to improve SARS-CoV-2 detection and reduce detection time. We compared cc-RT-qPCR with CPE-scored cell culture to evaluate assay sensitivity of recovered virus from stainless-steel coupons simulating nonporous healthcare surfaces. **Method:** Human ß-coronavirus OC43, a model strain for SARS-CoV-2, was propagated on HRT-18G cells in growth medium at 33°C in a 5% CO_2 incubator. The OC43 infectivity was determined by cell culture with a 10-fold dilution series of viral samples in 96-well plates, and incubation for 7 days at 33°C to confirm CPE. Plates were CPE-scored and TCID50 was calculated using the Reed-Muench method. For the cc-RT-qPCR assay, CPE-negative wells were interrogated for viral intracellular replication using RT-PCR; infectivity was based on a titer increase of ≥ 2 logs 7 days after inoculation using RT-qPCR. CPE-positive or replicative virus-harboring cells were enumerated to determine $TCID_{50}$. The sensitivity of both CPE-scored cell culture and cc-RT-qPCR assays were evaluated by inoculating 105 $TCID_{50}$/mL OC43 in infection media and artificial saliva matrices onto coupons and dried in an environmental chamber at 26°C and 57% relative humidity for 6 hours. Viral eluates from coupons served as test samples. **Results:** Low-titer infectious OC43 (0.75 log10) was detected by both methods 7 days after incubation; however, infectivity confirmation required 4 and 6 days after incubation, respectively, for cc-RT-qPCR and CPE-scored cell culture methods. When cells were inoculated with OC43 at titer range 1.75–4.75 $\log_{10}$, CPE presented at 4–5 days after incubation, while viral replication was already detected at 3 days after incubation via RT-PCR. Upon virus titration, cc-RT-qPCR demonstrated greater sensitivity, detecting up to 1 $\log_{10}$ higher of infectious OC43 than cell culture alone at 0 and 6 hours ($P \leq .05$) dried in infection medium and 0 hours ($P \leq .05$) in saliva. **Conclusions:** Our data demonstrated greater sensitivity and shorter times to detect viral replication by cc-RT-qPCR, minimizing potential for false-negative results with cell culture alone. This sensitive assay may provide investigators with quicker results for informing infection control practices to reduce risk of transmission from deposited bodily fluids on surfaces, eg, coughing and sneezing.
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Disclosures: None

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Poster Presentation - Top Poster Award
Subject Category: COVID-19
Work system factors affecting COVID-19 PPE use: A human factors approach to analysis of video recordings of emergency department clinical work
Esosa Nosakhare; Shawna Perry; Susan Peterson; Frankie Catalfumo; Kelly Osei, Kelly Williams; Maia Bradley; Marium Sultan; Oluseyi Daodu; Nivedha Prabhu and Ayse Gurses

Background: The effectiveness of PPE in preventing self-contamination of healthcare workers (HCWs) and transmission of pathogens (airborne and contact) in the emergency department (ED) is highly dependent on consistent, appropriate use of and other interactions (eg, storing, cleaning, etc) with the PPE. Pre–COVID-19 studies focused primarily on individual HCW contributions to incorrect or suboptimal PPE use. We conducted an analysis of ED video recordings using a human-factors engineering framework (ie, The Systems Engineering Initiative for Patient Safety, SEIPS), to identify work-system–level contributions to inappropriate PPE usage by HCWs while they provide care in their actual clinical care environment. **Methods:** In total, 47 video sessions (each ~15 minute) were recorded between June 2020 and May 2021 using a GoPro camera in an 8-bed pod area, designated for persons under investigation (PUI) and confirmed COVID-19–positive patients, in an ED of a large, tertiary-care, academic medical center. These recordings captured a 'landscape view': 2 video cameras were set up to capture the entire ED pod area and HCWs as they provided care. A team with hemorrhagic fever expertise, infection prevention and control expertise, and ED expertise reviewed each video together and extracted data using a semistructured form. **Results:** Guided by the 5 components of the SEIPS work system model, (ie, task, physical environment, person, organization, tools and technology), multiple work system failure points influencing HCWs appropriate use of PPE were identified. For example, under the task component, HCWs were observed not doffing and donning in recommended sequence. Also, inconsistencies with COVID-19 status signage on a patient's door and ambiguous labelling of work areas designated as clean (donning) and dirty (doffing) sites acted as a barrier to appropriate PPE use under the physical