

COVID-19 and healthcare workers: emerging patterns in Pamplona, Asia and Boston

Protecting healthcare workers (HCWs) is essential to safely maintaining healthcare systems during the coronavirus (COVID-19) pandemic [1]. A Dutch study of various hospitals during the early outbreak, found a 0–10% attack rate for reverse transcription-polymerase chain reaction (RT-PCR) diagnosed COVID-19 among HCWs with mild viral symptoms [2]. In several Asian countries, HCWs constituted >20% of presumptive occupational COVID-19 cases during the early outbreak [3]. At the Cambridge Health Alliance (CHA), the cumulative attack rate for RT-PCR-confirmed COVID-19 in the workforce is consistent with the Dutch report (>2.5%), with rates increasing from the early phase to the ‘surge’ phase (operation at high capacity with predominantly SARS-CoV-2-positive patients).

A consistent picture of clinical COVID-19 among HCWs is emerging. The three most common symptoms are cough, fever and myalgia [4–6]. However, cough is non-specific, whereas systemic symptoms/signs (fever, body temperature $\geq 37.5^{\circ}\text{C}$, myalgia and headache) and anosmia/ageusia are much more frequent in HCWs with RT-PCR-confirmed COVID-19 compared to those testing negatively [6]. On the other hand, HCWs at both CHA and Pamplona with no symptoms or isolated sore throat/nasal congestion symptoms typically have negative SARS-CoV-2 RT-PCRs.

During a pandemic, HCWs can be infected through travel, at home, in their communities or at work due to unprotected exposure to contagious patients, from infected co-workers and contaminated clinical environments. However, there are reassuring signs that personal protective equipment (PPE) (masks/respirators, gloves, eye protection and gowns), hand hygiene and distancing are effective measures in preventing COVID-19 among HCWs. In Pamplona, preliminary serology results for SARS-CoV-2 antibodies among HCWs on the ‘frontline’ (emergency room, inpatient and ICU wards) demonstrated similar seroprevalence results as compared to non-frontline personnel from the rest of the healthcare system. Further evidence of PPE effectiveness against SARS-CoV-2 comes from swab sampling from HCW PPE after caring for COVID-19 patients. No evidence of SARS-CoV-2 contamination was found on the surface of these gowns, face visor

masks, N95 masks or goggles [7,8]. However, at CHA and Pamplona, occupational transmission has been documented in two situations: from infected HCWs to other HCWs; or to HCWs from patients admitted for non-COVID-19 indications, where precautions were not taken, and COVID-19 symptoms manifested later.

There is also evidence of community-driven infection with multiple positives seen in HCWs residing in towns with high SARS-CoV-2 attack rates. These persons are more likely to be diagnosed at work because of testing priorities (as of 15 April 2020, CHA HCWs were 6.7 times more likely to be receive an RT-PCR than an average Massachusetts resident).

Regardless of workplace infection control strategies, a critical challenge has been the ideal return to work strategy for HCWs who have contracted COVID-19. Strategies based on RT-PCR are safe, but often delay return to work, because positive assays may persist for weeks due to their high sensitivity. Research on viral shedding suggests that quantitative RT-PCR SARS-CoV-2 testing using a viral culture viability threshold may be useful [9,10], as can convalescent antibody testing, but all strategies remain empirical at this point [11].

Fan-Yun Lan
Alejandro Fernandez-Montero
Stefanos N. Kales
e-mail: skales@hsph.harvard.edu

References

1. Fraher EP, Pittman P, Frogner BK, *et al.* Ensuring and sustaining a pandemic workforce. *N Engl J Med* 2020. doi:10.1056/NEJMp2006376.
2. Reusken CB, Buiting A, Bleeker-Rovers C, *et al.* Rapid assessment of regional SARS-CoV-2 community transmission through a convenience sample of healthcare workers, the Netherlands, March 2020. *Euro Surveill* 2020;25:2000334.
3. Lan FY, Wei CF, Hsu YT, Christiani DC, Kales SN. Work-related Covid-19 transmission. *medRxiv* 2020. <https://www.medrxiv.org/content/10.1101/2020.04.08.20058297v1.full.pdf> (5 May 2020, date last accessed).
4. CDC COVID-19 Response Team. Characteristics of health care personnel with COVID-19 - United States,

- February 12–April 9, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:477–481.
5. Chow EJ, Schwartz NG, Tobolowsky FA *et al.* Symptom screening at illness onset of health care personnel with SARS-CoV-2 infection in King County, Washington. *J Am Med Assoc* 2020. doi:10.1001/jama.2020.6637.
 6. Lan FY, Filler R, Mathew S *et al.* COVID-19 symptoms predictive of healthcare workers' SARS-CoV-2 PCR results. *SSRN* 2020.
 7. Ong SWX, Tan YK, Sutjipto S *et al.* Absence of contamination of personal protective equipment (PPE) by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). *Infect Control Hosp Epidemiol* 2020. doi:10.1017/ice.2020.91.
 8. Ong SWX, Tan YK, Chia PY *et al.* Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient. *J Am Med Assoc* 2020. doi:10.1001/jama.2020.3227.
 9. Liu Y, Yan LM, Wan L *et al.* Viral dynamics in mild and severe cases of COVID-19. *Lancet Infect Dis* 2020. doi:10.1016/S1473-3099(20)30232-2.
 10. Wölfel R, Corman VM, Guggemos W *et al.* Virological assessment of hospitalized patients with COVID-2019. *Nature* 2020. doi:10.1038/s41586-020-2196-x.
 11. Rueda-Garrido JC, Vicente-Herrero T, del Campo MT *et al.* Return-to-work guidelines for the COVID-19 pandemic. *medRxiv* 2020.