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## Commentary

# Protecting patients and peers from healthcare personnel with respiratory viral infections

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Respiratory viral transmission in health care is common and consequential. During community surges in respiratory viral activity, 15%–25% of respiratory viral infections diagnosed in hospitalized patients may be acquired in the hospital.[1–3] Crude mortality rates for patients with healthcare-associated Omicron infections and influenza are high and similar at about 6%.[4,5] Patients who acquire Omicron while hospitalized are 60% more likely to die compared to similar but uninfected patients.[6] Healthcare personnel are also at risk for workplace transmission. Whole genome sequencing studies suggest that about a quarter of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) infections in healthcare personnel were potentially acquired at work, typically from peers and patients not known to be infected at the time of exposure.[7,8] Healthcare personnel infections lead to lost workdays, exacerbate staffing shortages, and sometimes catalyze poor health outcomes.

One of the pillars of mitigating respiratory virus transmission for healthcare organizations is requiring infected staff to stay away from work. There is considerable controversy and variation, however, in rules about when healthcare personnel can return to work.[9] The US Centers for Disease Control and Prevention (CDC) currently recommend healthcare personnel infected with SARS-CoV-2 stay away for 10 days after symptom onset or 7 days if they test negative within the preceding 48 hours, presuming their symptoms have improved and ≥24 hours have elapsed since fever resolved. Longer periods are recommended for workers with severe infections and/or compromised immune systems. Healthcare personnel infected with influenza, by contrast, are simply advised to stay away from work until fever has resolved for ≥24 hours.

Current recommendations on how long to exclude healthcare personnel with SARS-CoV-2 infections are largely based on studies of viral shedding which document that shedding resolves in most immunocompetent people by 10 days from symptom onset. Current recommendations for influenza were set back in 2009 and were primarily based on household transmission studies from the early months of the 2009 H1N1 pandemic that found that people with influenza most frequently infected household members early in the course of illness and most had fever.[10,11] Fever from H1N1 tended to resolve after 2–4 days, so advising people to isolate until 24 hours after the fever resolved translated into an isolation period of about 3–5 days.

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As the differences in the morbidity and mortality of SARS-CoV-2 versus other respiratory viruses become less apparent, so does the basis for providing different isolation guidance for healthcare personnel infected with different viruses.[12–14] In conjunction with CDC's broader move to simplify and unify public guidance on protective measures against respiratory viruses, CDC officials undertook a systematic review published in this issue of *Infection Control & Hospital Epidemiology* to determine risk periods for transmission for SARS-CoV-2 Omicron variant and influenza.[15]

The investigators evaluated 3 questions: (1) how long do infected people shed virus per culture or quantitative polymerase chain reaction assay? (2) what is the relationship between the resolution of fever and viral shedding? and (3) what is the serial interval between when an index case develops symptoms and when someone infected by the index case develops symptoms? The third question follows from the recognition that viral shedding alone is a poor proxy for infectivity. People can continue to test positive for respiratory viruses long after they are no longer functionally contagious either because the amount of virus they're shedding is not clinically meaningful, the virus they're shedding is inactivated by host antibodies, or they may be shedding non-viable residual RNA alone. Serial interval studies, by contrast, provide insight into when actual transmissions take place under real-world conditions.

The investigators identified 43 eligible studies that collectively evaluated 16,855 participants (range 8–11,512 per study). These studies documented considerable variation between people in time to resolution of shedding, correlation with resolution of fever, and serial intervals amongst transmission pairs. The investigators consequently summarized findings as the number of days until selected percentages of trial participants reached each end point.

The investigators found that ≥70% of people stopped shedding the Omicron virus by day 9 after symptom onset and ≥90% of people by day 10. Similarly, ≥70% of people stopped shedding influenza virus by day 7 and ≥90% by day 9. Shedding continued for up to 4 days after the resolution of fever for people infected with the Omicron variant, and for at least 3 days after fever resolved in up to 70% of people infected with seasonal influenza.

At first blush, these studies appear to support long isolation periods for healthcare personnel infected with SARS-CoV-2 or influenza. The serial interval analysis, however, generated a different picture. Across 14 studies of Omicron transmission pairs, most of whom were from the same household, serial intervals were 3 days for ≥50% of people, 5 days for ≥70%, 7 days for ≥80%, and 9 days for 100% of people. Similarly, across 14 studies of influenza

transmission pairs, also mainly among householders, serial intervals were 3 days for ≥50% of people, 5 days for ≥70%, 6 days for ≥80%, and 7 days for 100% of people. The investigators further reasoned that serial intervals overestimate periods of contagiousness because they include the lag between when the infection recipient is first inoculated and when symptoms develop (the incubation period). They therefore subtracted estimated minimum incubation periods from these serial intervals to better approximate how long the people in these studies were contagious. On this basis, they reasoned that ≥80% of people infected with Omicron and influenza are contagious for 5 days counting from symptom onset (7-day serial interval for Omicron minus a 2-day incubation period; 6-day serial interval for influenza minus a 1-day incubation period).

The investigators did not make a formal recommendation in their paper on whether or how the CDC ought to modify its return-to-work guidance based on their analysis. The study authors presented their findings, however, at the November 2024 Healthcare Infection Practices Advisory Committee (HICPAC) meeting. There they proposed allowing healthcare personnel with suspected or confirmed respiratory viral infections to return to work as soon as 3 days after symptom onset (so long as their symptoms are improving and fever has resolved for ≥24 hours) but requiring them to wear a mask for source control through day 7 after symptom onset. The recommendation was favorably received by HICPAC but must now go through formal federal review and approval channels before it might become CDC's official guidance.

Although the authors' systematic approach to informing updated return-to-work guidance is laudable, it is unclear how well one can generalize from transmission patterns in households to transmission in health care. Exposures in households are more likely to be close range, continuous, and to occur in poorly ventilated spaces compared to exposures in health care; this may bias them toward shorter serial interval estimates. Moreover, the question in healthcare is not when do most transmissions take place but rather when are transmissions no longer likely to occur. On the other hand, the generally shorter, episodic, and better-ventilated exposures in health care are less likely to result in transmission,[16] and the authors' use of time intervals until ≥80% of transmissions occurred rather than median intervals may have mitigated the risk that household transmission studies are biased towards shorter serial intervals.

Notwithstanding the limitations of extrapolating from predminantly household-based serial interval estimates, the authors' recommendations to HICPAC were a reasonable compromise between minimizing the risk of infected healthcare personnel transmitting respiratory viruses to patients and colleagues versus minimizing workplace disruptions caused by extended absences and disincentivizing people against getting tested and/or sharing their results with their employer.

Nonetheless, it is critical to realize that healthcare personnel isolation is only one component of a comprehensive respiratory virus mitigation strategy and return-to-work policies only address a small fraction of the infected healthcare personnel time-exposure continuum. More than a third of people infected with SARS-CoV-2 or influenza are asymptomatic or only mildly symptomatic.[17] These workers most likely won't recognize the need to get tested and stay home. Second, both SARS-CoV-2 and influenza are contagious for 1–2 days before symptoms start. Hence many transmissions will occur before healthcare personnel realize they are sick and recognize the need to isolate themselves. Third, willingness to test and stay home is variable. Presenteeism (the perceived necessity of working even when sick) is rife within health care.[18] Furthermore, even workers who wish to stay home when symptomatic may be disinclined to test and report if this will compel them to stay away for longer than if they simply wait until they feel better.

For these reasons, we favor universal interventions that mitigate transmission risk at all times of increased risk and from all members of the healthcare force, not just those who choose to test, test positive, and tell their employer. We favor mandatory masking for all patient interactions when community transmission rates are elevated.[19] Evidence continues to accumulate that masking healthcare personnel when community transmission rates are high is associated with substantial reductions in hospital-acquired SARS-CoV-2, influenza, RSV, and other viruses.[20–23] Similarly, mandating SARS-CoV-2 and influenza vaccines for healthcare personnel is not only associated with fewer nosocomial infections and fewer sick days but may also lower patient mortality rates, particularly in long-term care settings.[24]

It makes sense to require infected healthcare personnel to stay home for the first few days of illness since transmission rates are maximal early in the course of illness. But stay-at-home requirements alone will not mitigate transmissions from asymptomatic and presymptomatic workers, those who elect not to test, and those who minimize their symptoms or continue working despite being symptomatic. Universal masking during periods of enhanced respiratory viral activity and mandatory SARS-CoV-2 and influenza vaccines are 2 complementary measures necessary to further protect patients from these common and potentially deadly complications of health care.

**Competing interests.** None related to the current study.

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