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VIEWPOINTS

# In Support of Universal Admission Testing for Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) During Significant Community Transmission

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Many hospitals have stopped or are considering stopping universal admission testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). We discuss reasons why admission testing should still be part of a layered system to prevent hospital-acquired SARS-CoV-2 infections during times of significant community transmission. These include the morbidity of SARS-CoV-2 in vulnerable patients, the predominant contribution of presymptomatic and asymptomatic people to transmission, the high rate of transmission between patients in shared rooms, and data suggesting surveillance testing is associated with fewer nosocomial infections. Preferences of diverse patient populations, particularly the hardest-hit communities, should be surveyed and used to inform prevention measures. Hospitals' ethical responsibility to protect patients from serious infections should predominate over concerns about costs, labor, and inconvenience. We call for more rigorous data on the incidence and morbidity of nosocomial SARS-CoV-2 infections and more research to help determine when to start, stop, and restart universal admission testing and other prevention measures.

**Keywords.** COVID-19; nosocomial SARS-CoV-2; infection control; asymptomatic screening; non-maleficence.

During the height of the coronavirus disease 2019 (COVID-19) pandemic, many hospitals implemented universal testing of all patient admissions in order to detect occult severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections and to prevent onward transmission [1, 2]. This practice was born of data documenting that many SARS-CoV-2 infections are asymptomatic, only mildly symptomatic, or presymptomatic, yet still highly contagious [3]. Universal testing thus joined an array of other infection-control measures designed to collectively reduce the risk of hospital-acquired SARS-CoV-2 for patients and healthcare personnel, including universal masking, physical distancing, limiting elective visits and procedures during surges, routine symptom screening for patients and staff, pre-procedure testing, respirator use during aerosol-generating procedures, extensive contact-tracing protocols, and vaccine requirements [4]. No single measure provided complete efficacy, but collectively they provided a layered system of protection.

The face of the pandemic has now changed. The fear and intense anxiety that COVID-19 initially evoked have given way to pandemic fatigue and a strong desire to return to normalcy. These wishes are bolstered by data indicating that the morbidity of SARS-CoV-2 infections has diminished considerably, presumably due to a combination of vaccines, natural infections, new variants, and effective treatments [5, 6]. The desire for normalcy was reflected and amplified by the declaration of the end of the public health emergency in May 2023.

Healthcare systems have accordingly rolled back many infection-control measures. In December 2022, the Society for Healthcare Epidemiology of America published a position paper recommending against universal testing of all hospital admissions, citing a lack of evidence for added benefit when used alongside other layers of infection-prevention controls, as well as its logistical challenges, costs, and possible adverse or unintended consequences [7].

In our view, asymptomatic screening in acute care hospitals still has value when viral activity in the community is significant. We acknowledge that the willingness of the public and healthcare personnel to sacrifice comfort, time, and costs to prevent SARS-CoV-2 infections is now much lower. However, infection-prevention measures in acute care hospitals must be more rigorous than in public and voluntary venues given the high vulnerability of hospitalized patients, many of whom are older, immunocompromised, have multiple

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comorbidities, and are already burdened with the illness prompting their admission. These factors put them at increased risk of severe SARS-CoV-2 infection and poor outcomes. We further note that even mild infections are associated with potential post-acute sequelae, disruptions in patient care, increased difficulty discharging patients to post–acute care facilities, onward transmission to staff, leading to illness and absences, patient and caregiver anxiety, and the possibility of seeding institutional clusters that amplify these effects and can require substantial resources to contain. We believe that hospitals have a strong ethical imperative to protect patients from infection and therefore advocate continuing universal screening of patients during periods of significant SARS-CoV-2 activity. We expand on the major reasons supporting our position below, while also calling for more research on optimal metrics for admission testing and other mitigation strategies that could support safe discontinuation or de-escalation without causing unintentional harm to patients.

## HOSPITAL-ACQUIRED SARS-CoV-2 INFECTIONS REMAIN COMMON BUT UNDERREPORTED AND UNDERAPPRECIATED

Studies conducted early in the pandemic suggested that 10–15% of hospitalized patients with COVID-19 acquired their infections while hospitalized [8]. These figures likely underestimated the true rate of nosocomial SARS-CoV-2 acquisition, since many patients who get infected are asymptomatic and thus not tested or only manifest symptoms after discharge. Despite widespread immunity and multiple infection-prevention measures, including universal masking and admission testing, the arrival of the highly transmissible Omicron variant in late 2021 led to an unprecedented surge in hospital-acquired SARS-CoV-2 infections [9]. In a 12-hospital network in Massachusetts, for example, there was a 62% increase in SARS-CoV-2 infections detected on hospital day 8 or later during the initial Omicron surge compared with the same period in the previous winter surge [10]. Almost 5% of hospitalized patients with COVID-19 during this period may have acquired their infection in the hospital.

Accurately measuring the current rate of hospital-acquired SARS-CoV-2 infections in the United States is extremely challenging since hospitals only report cases diagnosed more than 14 days after admission to public health agencies. This misses the vast majority of hospital-acquired infections given that average lengths of stay are well below 14 days and the median incubation period for current variants is only 2–3 days [11]. In contrast, the United Kingdom requires hospitals to report cases diagnosed more than 7 days after admission and posts individual hospital case counts on a publicly accessible website.

## PRESYMPTOMATIC OR ASYMPTOMATIC INDIVIDUALS POSE THE HIGHEST TRANSMISSION RISK

Rapid identification and isolation of potentially contagious individuals is a core component of infection prevention. The challenge with COVID-19 is that most transmissions are attributable to asymptomatic, presymptomatic, or paucisymptomatic individuals [3]. This mirrors the viral kinetics of SARS-CoV-2: viral load is highest in the 1–2 days before symptom onset, and therefore patients are most contagious before and immediately following symptom onset [12, 13]. In contrast, by the time patients with symptoms get sick enough to seek medical care, their viral loads tend to be lower [14]. In addition, symptom screening identifies these individuals so that they can be isolated immediately.

For these reasons, asymptomatic patients with early SARS-CoV-2 infections who are admitted to the hospital for reasons other than COVID-19 pose the highest risk to other patients and staff. Correspondingly, most SARS-CoV-2 clusters reported during the pandemic have occurred in non–COVID-19 wards [15–18]. Universal surgical masks (another layer of protection being discontinued in most hospitals) reduce but do not eliminate transmission risk; indeed, we have documented multiple instances of staff and patients infected by asymptomatic and presymptomatic staff and patients despite one or both parties wearing surgical masks [15, 19]. Respirators provide more effective protection against transmission but are only used by a minority of healthcare workers [20].

## TRANSMISSION RISK IN SHARED PATIENT ROOMS IS HIGH

The transmission rate from a patient with undiagnosed SARS-CoV-2 infection to an uninfected patient sharing the same room is 20–40% [21–23]. This high transmission rate likely reflects presymptomatic patients' high viral loads and the long intervals that patients in shared rooms share the same air space, leading to high cumulative exposure levels [23]. Given that many hospitals have a high percentage of shared rooms and patients generally have no choice as to their room assignment, stopping asymptomatic testing is difficult to defend when there is a reasonable chance of occult positive cases. A strategy that only targets patients in shared rooms for asymptomatic screening might be more justifiable, but in practice, this is challenging to implement because patients' bed assignments often change, room turnover is high, and patients still spend time in shared spaces like waiting areas for procedures and medical imaging. Similarly, targeting specific high-risk units for admission screening is conceptually attractive, but patients who are high risk (such as elderly or immunocompromised patients) are diverse and often widely distributed throughout the hospital.

## HOSPITAL-ACQUIRED SARS-CoV-2 INFECTIONS STILL CAUSE SUBSTANTIAL MORBIDITY AND MORTALITY

Mortality rates were extremely high for hospital-acquired COVID-19 early in the pandemic, driven in part by especially poor outcomes in elderly and immunocompromised patients [24, 25]. The morbidity and mortality associated with both community and hospital-acquired SARS-CoV-2 infections have steadily declined over time, yet even in the Omicron era crude mortality rates reported for hospital-acquired SARS-CoV-2 infections range from 3% to 13% [24, 26–29].

An important question that remains largely unanswered is the degree to which deaths in patients with hospital-acquired Omicron infections in the current era are attributable to COVID-19 versus their primary illness and/or underlying conditions. However, numerous studies have demonstrated that nosocomial acquisition of other respiratory viruses, such as influenza and respiratory syncytial virus, leads to worse outcomes, including longer hospital length-of-stay, respiratory failure, and mortality [30–35]. In addition, a recent retrospective analysis of 129 patients with hospital-acquired Omicron infections in London concluded that COVID-19 directly caused death in 3 patients (2.3%) and contributed in another 4 patients (3.1%) [28]. Interestingly, the authors of that analysis interpreted their findings as "low rates of harm" that should make infection-control programs roll back measures to prevent nosocomial transmission [28].

We take the opposite view. We believe that an infection that may cause or contribute to death in up to 5% of cases is one that hospitals should go to great lengths to prevent. Indeed, infection-control programs have traditionally spent substantial resources to prevent events with similar or lower morbidity and mortality, including *Clostridioides difficile*, catheter-associated urinary tract infections, nosocomial tuberculosis, methicillin-resistant *Staphylococcus aureus*, or vancomycin-resistant Enterococcus [36, 37]. Furthermore, even if nosocomial SARS-CoV-2 infection does not commonly lead to death, there are many other negative outcomes, including increased length of stay [38], more difficulty with discharge placements, deferred procedures, necessity for antiviral therapy and additional treatments, transmission risk to loved ones, psychological toll [39], changes in provider behaviors, and long-term sequelae from post–COVID-19 conditions [40].

## MORE TESTING IS ASSOCIATED WITH FEWER NOSOCOMIAL INFECTIONS AND BETTER OUTCOMES

Several modeling studies support the utility and cost-effectiveness of aggressive surveillance testing for SARS-CoV-2 in patients and healthcare personnel to prevent nosocomial transmission and clusters [41–44]. Some centers have reported on the yield specifically of asymptomatic admission testing for patients [45], but population-level studies on the potential impact of this practice on hospital-acquired SARS-CoV-2 infection rates have been lacking. To address this gap, we analyzed the association between ending universal admission SARS-CoV-2 testing in England and Scotland on 31 August and 28 September 2022, respectively, and the incidence of hospital-onset cases, defined as cases diagnosed more than 7 days after admission [46]. Since hospital-onset infection rates correlate closely with community incidence rates, we adjusted for changes in community incidence by calculating the weekly ratio between hospital-onset infections versus community infections estimated by the UK Office for National Statistics COVID-19 Infection Survey's near-weekly testing of randomly selected households for SARS-CoV-2. We assessed for temporal changes across 3 periods: Delta dominance with admission testing, Omicron dominance with admission testing (starting 14 December 2021), and Omicron dominance without admission testing. In Scotland, we found a significant immediate level of change after admission testing ended (41% relative increase; 95% confidence interval [CI]: 6–76%). Likewise, there was a significant level of change in England after admission testing ended (26% relative increase; 95% CI: 8–45%). Importantly, there were no other nationwide COVID-19–related infection-control policy changes at the time that mandatory admission testing stopped in these 2 countries.

## POTENTIAL DOWNSIDES OF ASYMPTOMATIC TESTING ARE REAL BUT DO NOT JUSTIFY UNIVERSAL DISCONTINUATION

Asymptomatic screening has real downsides, including costs, labor, and false-positive results that may lead to unnecessary isolation, delays in care, and anxiety. However, the direct costs of testing are low compared with the total costs of inpatient care ($55 per patient in 1 healthcare system [45]), and other downsides can be easily justified if testing reduces nosocomial transmission and clusters (which incur their own substantial costs due to increases in patient length of stay, staff absences, need for more testing, and other adverse outcomes). The positive-predictive value of screening tests varies considerably depending on the prevalence of virus circulating in the community; hence, we recommend re-instituting universal screening specifically when community rates are significant. Furthermore, potential false-positive results from nucleic acid amplification tests can be safely and quickly parsed using algorithms incorporating cycle threshold values and repeat testing to determine if they represent early acute infection, resolved remote infection, or false positives [47]. Application of these algorithms can be automated using clinical decision support and need not consume large amounts of time from infection-prevention personnel. Alternatively, hospitals can consider switching to rapid antigen assays, which are less likely to detect remote infections,

although this will come at the cost of reduced sensitivity (particularly with early infections before they progress to their most infectious stage) [48]. Furthermore, given current ample experience, isolation of SARS-CoV-2–positive patients is no longer a justification for delaying necessary medical treatment.

## HOSPITALS HAVE AN ETHICAL RESPONSIBILITY TO PROTECT PATIENTS FROM SARS-CoV-2

Finally, failure to protect hospitalized patients from hospital-acquired SARS-CoV-2, in our view, violates 2 of the 4 basic principles of medical ethics: non-maleficence and beneficence. Hospitals and providers have a professional and ethical obligation to protect those who entrust their health and their lives to us, and not to inflict harm on them (non-maleficence). Medical ethics also commands us to go out of our way to actively seek and positively achieve beneficial outcomes for our patients (beneficence). A third principle, justice, is jeopardized when we ignore the disproportionate toll of COVID-19 on Black, Native American, and Latino communities, and when we fail to consider the perspectives and needs of disabled people, immunocompromised populations, and elders.

Patients often require hospitalization under unpredictable circumstances and when they are at their most vulnerable. In contrast to other activities (such as going to restaurants or social events) patients often have no choice but to go to a hospital. How do we explain to a patient infected in a shared room why their roommate had not been tested when the cost of that test is comparable to what hospitals charge for a few doses of acetaminophen or a pair of gloves [49]? How do we explain this to a patient with an immunocompromising condition or risk factors for severe COVID-19 who then develops an acute complication or prolonged disability from this preventable infection?

Some will rightly argue that admission testing unto itself will not eliminate nosocomial infections and that stopping admission testing resembles other decisions that patients, healthcare personnel, and healthcare systems have made that increase nosocomial transmission risk. Examples include using surgical masks rather than respirators for source control, working with mild symptoms, allowing visitors to enter despite mild symptoms or following possible SARS-CoV-2 exposures, healthcare personnel and visitors opting not to test themselves despite compatible symptoms, and using clinical and work spaces with inadequate ventilation. We agree that these are additional sources of risk for nosocomial transmission but believe that admission testing is a lower-burden intervention compared with other measures (eg, requiring staff to wear respirators for all clinical encounters or overhauling hospital ventilation systems). Furthermore, we cannot let the perfect be the enemy of the good. No one infection-control measure is perfect, but integrating multiple imperfect measures into a comprehensive infection-control program provides superior overall protection. We believe that admission testing is an important brick in the wall of protection.

## PROPOSAL FOR A RESEARCH AGENDA

How are we to determine which measures to sustain or newly implement to protect our patients versus which measures to safely discontinue, and at which point in time? We propose a research agenda to help clarify these questions.

First, we need reliable metrics of community transmission rates and their associations with hospital-acquired infections in order to determine the absolute or dynamic thresholds that best predict increased risk of nosocomial transmission. These are needed to inform when to increase or decrease protective measures in hospitals (including universal admission testing). Wastewater viral RNA levels, where available, may be the most useful metric, since they capture community-wide data and are agnostic to individuals' choices about testing and reporting. Other potential options include the count of symptomatic community-onset infections admitted to hospitals, relative increases in the prescriptions for nirmaltrelvir, the total count of positive tests across a healthcare system's inpatient and outpatient systems, and/or the Centers for Disease Control and Prevention's influenza-like illness surveillance. The United Kingdom provides an exemplar of metrics of community infection rates by conducting ongoing, repeated cross-sectional testing of randomly selected households nationwide.

Second, we need reliable and up-to-date data on the frequency, morbidity, and attributable costs of healthcare-associated SARS-CoV-2 infections. Data on nosocomial COVID-19 rates should be collected and publicly reported. Our current metrics, however, are based largely on symptom-prompted testing. This underestimates the true incidence of SARS-CoV-2 and likely overestimates acute morbidity and mortality. Until we organize systematic surveillance for SARS-CoV-2 infections, including universal admission testing, serial surveillance after admission, and postdischarge testing, hospital leaders and public health decision makers will not have reliable estimates of the true burden of healthcare-associated SARS-CoV-2 infections. While this might not be feasible for all hospitals, public health officials should at the very least organize systematic surveillance in a representative sample of facilities in order to provide accurate estimates of the problem's scope.

Furthermore, it will be important to incorporate sequencing into analyses of possible hospital-acquired cases in order to better differentiate community-acquired versus hospital-acquired infections. Sequencing is underutilized in US infection-prevention programs compared with other countries such as the United Kingdom. The current reliance on 5-day or 7-day thresholds to differentiate hospital- versus community-acquired cases is crude, and sequencing studies conducted using pre-Omicron strains found that these

thresholds underestimate the incidence of hospital-acquired cases [50]. Omicron's shorter incubation period (~3 d) further exacerbates underestimation using 5-day or 7-day thresholds.

Third, preferences and attitudes of patients and their families should be ascertained. It is patients who confront the discomfort of testing and they and their families who bear the burden of nosocomial infection. Their preferences should be part of deliberations regarding diminished infection-prevention measures. Questionnaires are administered to patients frequently in most hospital systems, and their results are often unexpected. Including questions about a preference for or against asymptomatic testing can help inform decision making.

The inclusion of demographic factors in questionnaires is important. Others have documented that interest and willingness to forego SARS-CoV-2 prevention measures vary between communities [51]. Preferences for maintaining community precautions like masking are more prevalent among Black and Latino residents of the United States, whose communities have suffered far higher COVID-19 infection, death, and orphanhood rates than White communities. Without including demographics, the preferences of these groups may not be appreciated, further exacerbating the sharp inequities of the pandemic [52].

## CONCLUSIONS

Healthcare systems are understandably eager to roll back COVID-19 infection-prevention measures, but we urge hospitals to utilize universal admission SARS-CoV-2 testing during times of substantial community transmission and to closely monitor nosocomial infection rates as part of routine hospital surveillance efforts. The ongoing frequency of hospital-acquired SARS-CoV-2 infections, the elevated risk for poor short- and long-term outcomes in hospitalized patients, the transmission dynamics that favor asymptomatic spread, the high attack rate in shared rooms when 1 patient has an occult infection, the studies demonstrating associations between surveillance testing and reduced nosocomial transmission, the availability of simple algorithms to mitigate false-positive results, and ethical considerations are all important reasons why we must maintain vigilance in protecting patients from acquiring this still-morbid and potentially deadly infection within our hospitals. Admission testing unto itself will not eliminate nosocomial SARS-CoV-2 infections, but the available data suggest that it is a valuable component of a multifaceted infection-prevention strategy.

## Note

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