





## Commentary

# Asymptomatic screening for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) as an infection prevention measure in healthcare facilities: Challenges and considerations

Thomas R. Talbot MD, MPH<sup>1</sup> , Mary K. Hayden MD<sup>2</sup>, Deborah S. Yokoe MD, MPH<sup>3</sup>, Anurag N. Malani MD<sup>4</sup>, Hala A. Amer MD, MPH, PhD<sup>5</sup>, Ibukunoluwa C. Kalu MD<sup>6</sup> , Latania K. Logan MD MSPH<sup>7</sup>, Rebekah W. Moehring MD, MPH<sup>6</sup> , Silvia Munoz-Price MD PhD<sup>8</sup>, Tara N. Palmore MD<sup>9</sup> , David J. Weber MD, MPH<sup>10</sup>, Sharon B. Wright MD, MPH<sup>11</sup> and for the SHEA Board of Trustees

<sup>1</sup>Vanderbilt University Medical Center, Nashville, Tennessee, United States, <sup>2</sup>Rush University Medical Center, Chicago, Illinois, United States, <sup>3</sup>University of California, San Francisco, San Francisco, California, United States, <sup>4</sup>Trinity Health Michigan, Ann Arbor, Michigan, United States, <sup>5</sup>National Research Center, Cairo, Egypt, <sup>6</sup>Duke University Medical Center, Durham, North Carolina, United States, <sup>7</sup>Emory University School of Medicine, Atlanta, Georgia, United States, <sup>8</sup>Virginia Commonwealth University, Richmond, Virginia, United States, <sup>9</sup>George Washington University School of Medicine & Health Sciences, Washington, DC, United States, <sup>10</sup>The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, United States and <sup>11</sup>Beth Israel Deaconess Medical Center, Boston, Massachusetts, United States

### Executive summary

Testing of asymptomatic patients for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) (ie, “asymptomatic screening”) to attempt to reduce the risk of nosocomial transmission has been extensive and resource intensive, and such testing is of unclear benefit when added to other layers of infection prevention mitigation controls. In addition, the logistic challenges and costs related to screening program implementation, data noting the lack of substantial aerosol generation with elective controlled intubation, extubation, and other procedures, and the adverse patient and facility consequences of asymptomatic screening call into question the utility of this infection prevention intervention. Consequently, the Society for Healthcare Epidemiology of America (SHEA) recommends against routine universal use of asymptomatic screening for SARS-CoV-2 in healthcare facilities. Specifically, preprocedure asymptomatic screening is unlikely to provide incremental benefit in preventing SARS-CoV-2 transmission in the procedural and perioperative environment when other infection prevention strategies are in place, and it should not be considered a requirement for all patients. Admission screening may be beneficial during times of increased virus transmission in some settings where other layers of controls are limited (eg, behavioral health, congregate care, or shared patient rooms), but widespread routine use of admission asymptomatic screening is not recommended over strengthening other infection prevention controls. In this commentary, we outline the challenges surrounding the use of asymptomatic screening, including logistics and costs of implementing a screening program, and adverse patient and facility consequences. We review data pertaining to the lack of substantial aerosol generation during elective controlled intubation, extubation, and other procedures, and we provide guidance for when asymptomatic screening for SARS-CoV-2 may be considered in a limited scope.

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In 2020, as the coronavirus disease 2019 (COVID-19) pandemic exploded across the world, infection prevention experts rapidly undertook key actions to limit and ideally prevent the spread of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) within healthcare facilities. Balancing the precautionary principle with the limited data on virus transmission, these actions were appropriately extensive, numerous, and erred on the side of caution. As the role of asymptomatic and presymptomatic infection and silent

transmission became apparent, one such action was the extensive use of universal laboratory testing of asymptomatic patients (ie, “asymptomatic screening”). The rationale for asymptomatic screening is to identify those persons who may be infected with SARS-CoV-2 virus yet unaware of such infection. Serving as a nidus for healthcare-associated transmission of the virus, these “silently” infected persons could potentially lead to increased harm to patients and healthcare personnel (HCP). Recently, questions on the impact of asymptomatic screening, the unintended harms from such testing, and the lack of data clearly supporting routine use of this practice have emerged. In this commentary, we review the practice of asymptomatic screening for the purposes of infection prevention in healthcare settings, and we outline recommendations for the use of this strategy moving forward.

**Author for correspondence:** Thomas R. Talbot, MD, MPH, A2200 Medical Center North, 1161 21st Ave South, Nashville, TN 37232. E-mail: [tom.talbot@vumc.org](mailto:tom.talbot@vumc.org)

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Broad screening of asymptomatic patients allows for early institution of isolation precautions, and postponements for infected patients of nonemergent procedures that may generate aerosols of respiratory particles. Such screening could, theoretically, limit facility outbreaks of COVID-19. Although largely used among patients upon facility admission or prior to a variety of procedures, asymptomatic screening has also been used to follow-up inpatients initially negative for SARS-CoV-2 on admission as an added screening measure before initiation of immunosuppressive therapies, as periodic assessments of unvaccinated HCP, and as a tool to allow an HCP exposed to a person with COVID-19 to return to work. Notably, preprocedure asymptomatic screening has also been proposed as a patient-specific risk assessment for postoperative complications. An increase in such complications following current or recent (within 8 weeks) SARS-CoV-2 infection has been described,<sup>1-5</sup> but these studies have largely included data obtained before widespread COVID-19 vaccination, availability of effective therapies, and population immunity. Also, these studies may not have included or stratified risk for asymptotically infected patients, may not have distinguished risk by surgery type or indication, and may have been confounded by factors such as patient comorbidities, indication for surgery, and frailty. The use of asymptomatic screening for the purpose of preprocedural risk assessment for postprocedural complications is not within the scope of this commentary.

As the pandemic evolved, asymptomatic patient screening had some unintended consequences. Adverse outcomes related to asymptomatic testing include (1) delays in patient placement and therefore receipt of appropriate levels of care, (2) delayed patient transitions of care and subsequent capacity strains from prolonged lengths of stay,<sup>6</sup> (3) postponement of necessary procedures, (4) strains on laboratory and testing personnel and resources, and (5) increased costs. At a tertiary-care cancer center, the direct cost to identify a single asymptotically infected patient through preprocedure testing was \$12,514,<sup>7</sup> and admission testing at an academic health system cost an added \$54.50 per admission.<sup>8</sup> Importantly, assessments of the costs associated with asymptomatic screening are affected by the prevalence of infection in the population tested and the type of test utilized (eg, antigen vs a molecular test). An increasing number of studies have noted the relatively low yield of identification of so-called “silent” infections, with positivity rates from such testing often falling below 1%. Because such testing often utilizes highly sensitive nucleic acid amplification testing (NAAT), which can detect residual SARS-CoV-2 RNA for a prolonged period after infection resolution, a positive test may not equate to active infection or contagiousness. Prolonged detection in the absence of recoverable virus is not infrequent, and in several studies, most asymptomatic patients identified as “COVID-19 positive” by asymptomatic screening using PCR testing were deemed noninfectious based on clinical findings, serologic data, and presence of a high cycle threshold (Ct) value.<sup>8-10</sup>

Although asymptomatic screening has been included in some state COVID-19 guidance,<sup>11</sup> the Centers for Disease Control and Prevention (CDC) currently has no recommendation advising laboratory screening of asymptomatic patients on admission to most types of healthcare facilities or before certain procedures. One exception is a limited recommendation for admission testing of nursing home residents during periods of higher community transmission.<sup>12</sup> Nonetheless, the practice of asymptomatic screening has been widespread. With increased population immunity to SARS-CoV-2, milder clinical outcomes, greater access to effective vaccines and therapeutics, and an increased published experience

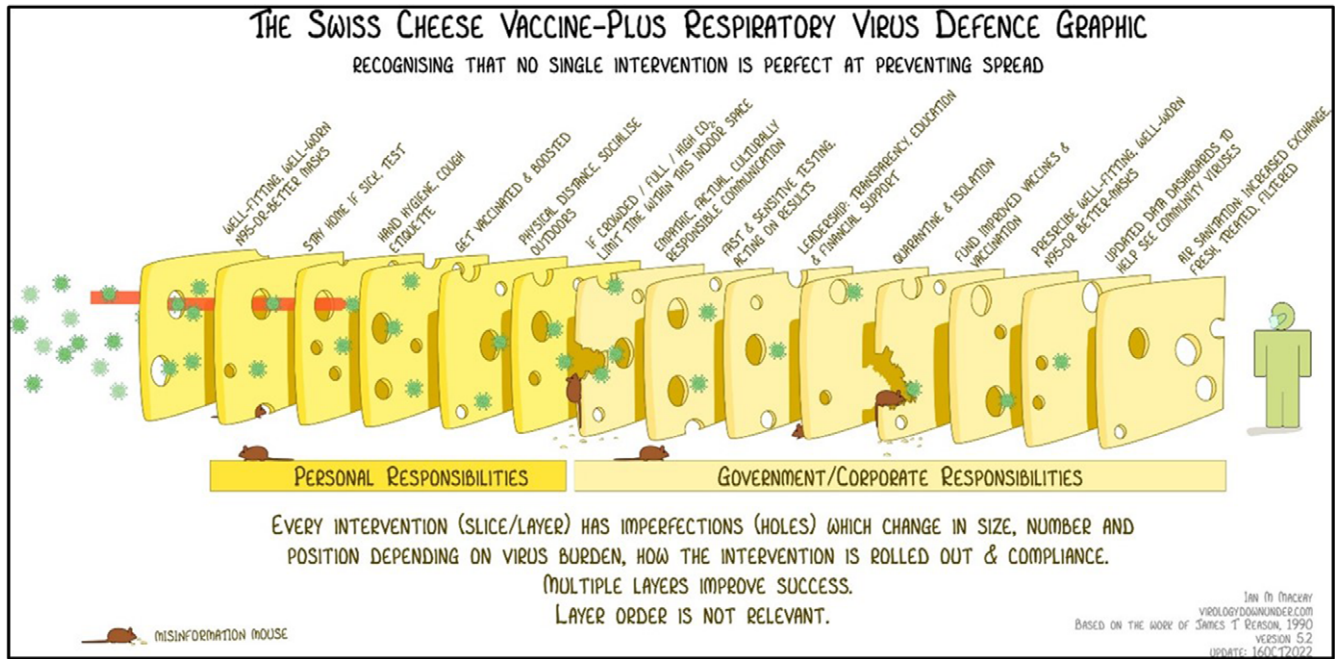
concerning asymptomatic screening, it is important to assess the impact of this intervention and how it should fit into infection prevention programs moving forward.

A core tenet of infection prevention relies on the use of multiple layered interventions and the hierarchy of controls to prevent pathogen spread. The “Swiss cheese” model of preventing respiratory virus transmission depicts each individual intervention as a wall that blocks transmission, but because no intervention is 100% protective, each wall has inherent holes (hence the term “Swiss cheese”) (Fig. 1).<sup>13</sup> Adding more interventions reduces the risk that all layers will be breached (ie, that transmission will occur). Key interventions that are important to reduce the risk of respiratory virus spread in healthcare facilities include patient symptom screening, avoidance of HCP presenteeism, optimization of ventilation, environmental cleaning, hand hygiene, source control with masking, isolation of suspect and confirmed infected patients, and vaccination of patients and HCP. In the setting of these layered hierarchies of control, the added benefit of asymptomatic screening is uncertain.

When introducing new interventions, it is essential to assess their added benefit and, as importantly, their unintended consequences.<sup>14,15</sup> Particularly important is to understand how specific interventions can disproportionately affect disadvantaged populations who have limited access to care and medical resources (ie, fewer nearby testing sites or inability to miss work for testing). For example, in discussions on universal face-mask use among HCP, some have advocated for widespread use of N95 or other respirators, noting the improved filtration and data regarding detection of SARS-CoV-2 RNA and culturable viruses in small aerosols that may not be filtered adequately by surgical or procedure masks. Noting the increased discomfort and potential impact on device wearing for prolonged periods of time with respirators<sup>16</sup> and some data showing no significant difference in HCP respiratory viral infections between respirator and surgical mask use, others have argued that in many instances the differential “in vitro” benefit in filtration from the respirator may be reduced during real-world use (ie, in vivo, so to speak). In other words, having a single layer of “cheese” with fewer holes may not affect transmission and may not be as effective as anticipated once put into use. In this same light, it is important to assess the use of asymptomatic screening as an infection prevention tool within healthcare facilities with examinations of benefits, harms, and considerations for determining use of this testing strategy.

### **Does laboratory-based asymptomatic screening reduce SARS-CoV-2 transmission to other patients or HCP?**

Although asymptomatic screening will detect some asymptotically infected persons (albeit often at a low number in published studies to date), the role of undetected asymptomatic infection as a nidus for transmission of healthcare-associated infections has only been described in a few instances.<sup>17</sup> Studies showing a positive impact of such screening on important patient outcomes related to transmission are very limited and of a low quality of evidence (ie, use of historical controls). A study at an inpatient psychiatric facility noted a reduction in the incidence of nosocomial COVID-19 infection from 9.6 cases per 100 at-risk patients to 1.1 cases per 100 after the start of universal testing of all admitted patients,<sup>18</sup> but the unique nature of a behavioral health facility (eg, more congregate living arrangements, more challenges with routine infection prevention strategies like hand hygiene and mask wearing) affects the translation of these findings to other settings. In addition, no



**Fig. 1.** The “Swiss cheese” model of respiratory virus transmission prevention.

information was provided about community COVID-19 levels; it is possible that the reduction of infections noted merely mirrored decreases in community incidence. In contrast, the move away from universal preprocedure testing to a more targeted program (in which only ~25% of all patients were tested) was not associated with an increase in healthcare-associated COVID-19 among HCP at an academic health system in Spain.<sup>19</sup> The lack of more evidence showing an impact of asymptomatic testing on these key outcomes may indicate that, in the framework of other layers of protection and controls, adding another layer does not affect the end result.

### Does laboratory-based asymptomatic screening lead to adverse outcomes?

A variety of possible adverse and unintended consequences related to asymptomatic screening have been proposed (Table 1).<sup>15</sup> Although some have been anecdotally noted, more studies have illustrated possible adverse outcomes associated with asymptomatic screening. An examination of the impact of admission testing at an emergency department (ED) of an academic health system detected an increase in ED length of stay (LOS) by 1.89 hours.<sup>20</sup> Although this increase may seem like a small amount of time, this busy ED cared for >70,000 patients during the study period, and even a small increase in LOS can have adverse downstream consequences related to patient throughput. Another study focused on behavioral health patients reported a more pronounced increase in the LOS (average increase, 7.3 hours) attributed to universal admission testing.<sup>21</sup> Testing has led to an increase in costs<sup>7,8</sup> and placement of noninfectious patients into isolation precautions.<sup>8–10,19</sup> Finally, negative asymptomatic testing could lead to a false sense of reduced risk, particularly with preprocedure testing, where negative tests from 48–72 hours before the procedure are allowed. A patient who tests negative 3 days prior to a procedure may be infected yet screened too early to have a positive test result or may become infected in the interim before the procedure. That patient will be treated as a “noninfected” patient, which may lead to less compliance with other important

interventions (eg, masking) by HCP and failure to test for SARS-CoV-2 if the patient subsequently develops symptoms.

### Using an infection prevention risk assessment to guide asymptomatic screening programs

Another foundational practice in infection prevention is the analysis of the specific patients, procedures, and environment of an individual facility to identify situations where the risk of pathogen transmission is increased and, hence, added layers of protection may be necessary (ie, an infection prevention risk assessment). Using this approach with asymptomatic screening, one can examine specific factors to consider when weighing the need for such testing as an infection prevention tool:

- **Community incidence and transmission of COVID-19.** Because healthcare-associated transmission risk is related to changes in the community incidence of disease, infection prevention interventions may need adjust in relation to community infection rates. The CDC currently uses 2 metrics that indicate community burden of COVID-19: “COVID-19 community level,” which utilizes markers of inpatient COVID-19 surges (COVID-19 admission rates and percentage of staffed inpatient beds by COVID-19 patients), and “community transmission” level, which utilizes broader metrics of overall case rates and test positivity to note transmission and is the metric intended for use by healthcare facilities.<sup>22</sup> The terminology for these 2 metrics has led to confusion, however, because there are numerous reports of healthcare facilities inappropriately using the COVID-19 community-level metric (which is focused on only severe cases of infection and healthcare surges) to relax interventions such as universal face-mask requirements. In addition to the community-transmission level, other metrics that can signal an increased risk or likelihood of healthcare-associated transmission of SARS-CoV-2, such as the incidence of healthcare-facility onset of COVID-19 (eg, cases diagnosed after admission day 7),

**Table 1.** Unintended Adverse Consequences of Laboratory Screening for SARS-CoV-2 among Asymptomatic Persons

• Strain on testing and laboratory resources (including personnel)
• Strain on personnel involved with specimen collection
• Unnecessary isolation of non-infectious patients
• Inappropriate antiviral treatment (if test is a false positive)
• Prolonged length of stay
• Reduced number of available inpatient beds and limited surge capacity
• Possibly delayed medical care
• Patient costs and inconvenience
• False security in a negative result

wastewater detection of SARS-CoV-2 RNA, and HCP absenteeism (either related to COVID-19 infection or as a measure of staffing shortages), should be utilized.

- *Patient populations.* Some areas of a facility may care for patients at relatively high risk for complications from COVID-19 or who cannot mount a protective immune response to vaccination. Admission to locations such as stem cell transplant or hematologic malignancy units may warrant a lower threshold to institute asymptomatic screening. In addition, areas where patients may be less likely to report new symptoms or adhere to other infection prevention practices may also equate to a higher risk. A patient's COVID-19 vaccination status has also been utilized to guide the risk of transmission and the need for asymptomatic screening. Although vaccinated individuals have been noted to have a lower likelihood of infection (even in the setting of SARS-CoV-2 variants) and shorter duration of viral shedding when compared to unvaccinated persons in some studies, other studies that used data obtained later in the pandemic during circulation of newer variant strains of SARS-CoV-2 have reported minimal differences in key transmission indicators between vaccinated and unvaccinated persons.<sup>23</sup> In addition, with the availability of booster vaccinations, attempting to implement a testing program with nuances between primarily vaccinated versus “up-to-date” (ie, has received all available recommended boosters) versus unvaccinated individuals becomes increasingly challenging to implement.
- *Facility layout.* Shared patient-care areas can create added challenges related to infection prevention and blocking transmission of respiratory pathogens. Healthcare facilities with semiprivate patient rooms or units that utilize congregate or group settings, such as in behavioral health, may create environments in which healthcare-associated transmission is more challenging to prevent and asymptomatic screening may help avert transmission.
- *Procedures that may increase the risk of healthcare-associated transmission.* The use of preprocedure testing is intended to identify those asymptotically infected patients who are scheduled to undergo a procedure that might increase the risk of virus transmission, a so-called “aerosol-generating procedure” or AGP. Defining which procedures are true AGPs that can increase transmission risk, however, is fraught with challenges. Data from retrospective studies of infected HCP (with SARS-CoV, novel influenza, and SARS-CoV-2 most commonly) have contributed to the lists of AGPs, but these data are prone to recall bias and do not provide more nuanced detail regarding the procedures. For example, intubation and extubation have been

noted in several studies as procedures associated with occupational acquisition of respiratory viruses,<sup>24</sup> but an elective controlled intubation is quite different than an intubation conducted emergently. Retrospective studies have not determined whether the risk noted with intubation was due to all types of intubation or only to less-controlled emergent procedures. Nonetheless, because of the labelling of all intubation and extubation procedures as AGPs, a large number of presurgical patients have been required to undergo pre-procedure testing.

Recent data have indicated that the level of aerosol generation with elective intubation, extubation, and operative airway management is minimal, several orders of magnitude lower than that of a volitional cough. Thus, most intubation and extubation procedures should not be defined as AGPs and do not warrant pre-procedure asymptomatic screening for infection prevention purposes.<sup>25,26</sup> Similar studies examining aerosol generation from procedures such as nasal endoscopy, flexible laryngoscopy, airway suctioning, and various forms of high-flow oxygen delivery have similarly questioned the classification of these procedures as AGPs.<sup>27,28</sup> In an operative environment, with specific ventilatory parameters and baseline use of personal protective equipment, the addition of preprocedure screening may have very limited benefit, if any.

A similar re-evaluation of the necessity, impact, and unintended consequences of preprocedure asymptomatic screening has occurred with nonoperative procedures. The American Gastroenterology Association, who in 2020 recommended the use of asymptomatic screening for upper and lower endoscopic procedures during periods of intermediate or higher COVID-19 activity,<sup>29</sup> revisited their recommendations in 2021. Currently, they recommend against the use of routine screening for upper and lower endoscopy, citing issues around possible unintended patient harms.<sup>30</sup>

### Moving forward regarding asymptomatic screening as an infection prevention strategy

Considering these issues, calls for more detailed guidance on when and how to utilize asymptomatic screening as an infection prevention intervention have increased. Unfortunately, although we are now nearing the end of the third year of the COVID-19 pandemic, the challenge in crafting any sort of standardized guideline continues to center on very limited data assessing the true impact, both positive and negative, of this strategy. In addition, available evidence must be examined in the context of when during the pandemic such studies occurred (ie, before or after widespread COVID-19 vaccination, during periods of higher or lower disease prevalence, and in relationship to currently circulating SARS-CoV-2 variants, to list just a few key factors). Thus, support and funding are needed for high-quality studies to examine the use of asymptomatic screening. Key questions that need such support and study include the following:

- Does asymptomatic screening add benefit to the already existing layers of protection?
- If so, what are the triggers and metrics to institute such screening?
- Are there specific populations, settings, procedures, or scenarios where asymptomatic screening has greater impact?
- What are the unintended consequences of asymptomatic screening? Can these be mitigated?

- Is an approach that solidifies universal strategies more sustainable among frontline HCP than approaches that rely on interventions to “turn on and off” based on local risk?
- What is a sensitive and specific marker of infectiousness in patients with COVID-19 infection?

In conclusion, the use of asymptomatic screening is a unique yet resource-intensive tool that arguably has been overused. Prior to implementation of a large-scale asymptomatic screening program, strengthening existing layers of protection (eg, move to universal N95 respirator use when performing certain procedures on any patient, active versus passive screening of HCP for signs of COVID-19, reducing higher-risk unit layouts to remove semiprivate areas, enhanced ventilation) is a more practical and reasonable approach. Ramping up and reducing screening can be laborious, including activating and decommissioning testing sites; procuring testing supplies and reagents; redirecting personnel to collect, process, and test specimens; reconfiguring the test ordering process; and educating patients and personnel. Facility risk assessments in conjunction with metrics that suggest ongoing transmission of SARS-CoV-2 (despite strengthening existing layers of control and assessment of compliance with infection prevention measures) or particularly at-risk populations (eg, congregate or behavioral health settings, transplant units) should drive whether asymptomatic screening should be added to institutional practices. Although it is imperative to prevent healthcare-associated spread of respiratory pathogens, we must critically assess interventions that, when added upon core layers of infection prevention, may not attain the intended impact and may have unintended consequences for patients and HCP.

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