Covid Testing and Screening in Health Care Settings »

A Science-Driven Approach to Protecting Patient, Health Care Worker, and Public Health

More than 15 months into the Covid-19 pandemic, the coronavirus is still spreading in communities across the United States and around the world. As of June 11, 2021, the U.S. Centers for Disease Control and Prevention (CDC) reports that nearly 80 percent of counties have moderate, substantial, or high levels of Covid-19 transmission and that more than 300 people continue to die each day from Covid-19.[1]

Prevention of Covid-19 transmission within health care facilities requires multiple measures, including case detection and isolation, ventilation, respiratory protection, vaccines, and more. Even as Covid-19 vaccination rates increase, testing and screening programs remain important to detect and isolate cases in health care facilities.

Covid vaccines are important public health tools, but no vaccine is 100 percent effective. Even with high rates of vaccination, workplace protections in health care settings, including Covid testing and screening, remain vital to protect patient and health care worker health and safety.

This issue brief outlines the science-driven approach to protecting patient, health care worker, and public health. Section 1 details what testing, screening, and isolation protocols should be in place to prevent Covid-19 transmission within health care facilities. Section 2 provides the scientific evidence and rationale for the protocols in Section 1.

SECTION 1: TESTING, SCREENING, AND ISOLATION PROTOCOLS FOR HEALTH CARE FACILITIES

Identification and isolation of all SARS-CoV-2 infections — among patients, visitors, and staff — is paramount to preventing transmission within health care facilities. Approximately half of all transmission events are from asymptomatic cases and those not yet experiencing symptoms (asymptomatic or pre-symptomatic transmission).[2,3] Diagnostic tests are necessary to identifying Covid cases but diagnostic tests by themselves are not perfect; false negatives can occur (See Section 2 for additional rationale and scientific evidence). Therefore, a precautionary approach to testing and screening for SARS-CoV-2 in individuals entering health care facilities is necessary.

Section 1 has three parts »

A. SARS-CoV-2 Precautionary Testing and Screening for Patients
B. Visitor Screening and Testing
C. Health Care Worker Testing and Screening

A. SARS-COV-2 PRECAUTIONARY TESTING AND SCREENING FOR PATIENTS

All patients should be assessed for SARS-CoV-2 infection prior to entrance or admission to the facility. There are three criteria that should inform an assessment of whether a patient is considered confirmed, possible, or a non-Covid case (Table 1).

Table 1. **Patients: Precautionary Testing & Screening for SARS-CoV-2**

Criteria for Testing and Screening for SARS-CoV-2	*Assessment of Confirmed, Possible, or Non-Covid Status*
(1) Diagnostic test for SARS-CoV-2.	+ If a diagnostic test for SARS-CoV-2 is positive, then the patient should be classified as a **confirmed Covid-19 patient.** - If a diagnostic test for SARS-CoV-2 is negative, then assess criteria (2) and (3).
(2) Screening for Covid-19 symptoms.	+ If one or more Covid-19 symptoms is reported by a patient, then the patient should be classified as a **possible Covid-19 patient.** - If diagnostic test for SARS-CoV-2 is negative and no Covid-19 symptoms are reported by the patient, then assess criteria (3).
(3) Screening for previous 14-day exposure history to Covid-19.	+ If exposure to a known Covid-19 case in the previous 14 days is reported by a patient, then the patient should be classified as a **possible Covid-19 patient.** - If diagnostic test is negative, no Covid-19 symptoms are reported, and no exposure to a known Covid-19 case in the previous 14 days is reported by a patient, then the patient should be classified as a **non-Covid patient**.

Covid-19 and Non-Covid-19 Zones

Health care facilities should establish **separate, dedicated zones** for confirmed, possible, and non-Covid-19 patients. When non-Covid patients are mixed with confirmed and possible Covid patients on the same unit or same patient care assignment, the potential for transmission of the virus to both staff and patients increases significantly. Separate zones are necessary in all areas of the hospital, including inpatient units, emergency departments, labor and delivery, and procedural areas.

Area-specific considerations »

» **Emergency Departments:** Emergency Departments should take a "universal precautions" approach to prevent transmission in waiting areas, patient care areas, and other spaces. A universal precautions approach assumes each patient has a SARS-CoV-2 infection until they are ruled out using the precautionary testing and screening methodology (Table 1). Measures to prevent transmission of the coronavirus within the Emergency Department include rapid screening and testing of patients, isolation areas for patients with possible or confirmed Covid-19, improved ventilation to prevent recirculation of unfiltered air and to reduce risk of viral transmission, and staff personal protective equipment (PPE), including fit-tested, NIOSH-approved respirators.[4]

» **Inpatient Units:** Prior to admission to an inpatient unit, all patients should be screened using the precautionary methodology in Table 1. Patients who are possible Covid cases should be treated with the same precautions as confirmed Covid cases, including being placed in a negative pressure isolation room or unit and optimal PPE for staff. Mixed units and mixed assignments (with both Covid-positive and non-Covid patients) should not be happening because they increase the potential for transmission. Optimal PPE includes a powered air-purifying respirator (PAPR), coveralls that are impervious to viral penetration with head and shoe coverings, and medical-grade gloves. At minimum, staff should wear an N95 filtering facepiece respirator, eye protection, a fluid-resistant isolation gown, and medical-grade gloves when caring for a possible or confirmed Covid patient.

» **Surgical and Procedural Areas:** Prior to a surgical or medical procedure, all patients should be screened using the precautionary methodology in Table 1. If a patient is classified as a possible or confirmed Covid-19 case, then the procedure should be delayed unless a delay would pose an immediate threat to the patient's health or life. One study found that patients with Covid-19 who underwent surgical procedures were more than nine times more likely to die and more than seven times more likely to develop a serious complication than for non-Covid patients.[5]

» **Outpatient Areas:** Outpatient areas should also adopt a "universal precautions" approach to prevent transmission in waiting areas, patient care areas, and other spaces. A universal precautions approach assumes each patient has a SARS-CoV-2 infection until they are ruled out using the precautionary testing and screening methodology (Table 1). Measures to prevent transmission of the coronavirus within outpatient areas include rapid screening and testing of patients, delayed appointments for patients with possible or confirmed Covid-19, isolation areas for patients with possible or confirmed Covid-19 whose appointments cannot be safely delayed, improved ventilation to prevent recirculation of unfiltered air and to reduce risk of viral transmission, and staff PPE, including fit-tested, NIOSH-approved respirators.[6]

B. VISITOR SCREENING AND TESTING

As many health care facilities are allowing visitors to return to inpatient and procedural settings, it is vital that visitor screening and testing programs are established to prevent introduction of SARS-CoV-2 to the facility. All visitors should be tested and screened for Covid symptoms and recent exposure history per the precautionary methodology outlined in Table 2 prior to entrance to the facility.

Health care facilities should establish visitor sign-in and out procedures to ensure the safety of patients and staff. These sign-in and out procedures should be created in consultation with nurses, other caregivers, and their union in the facility. Responsibility for monitoring visiting hours, visitor adherence to mask requirements, etc. should not be placed on the nurse responsible for patient care.

Table 2. **Visitors: Precautionary Testing & Screening for SARS-CoV-2**

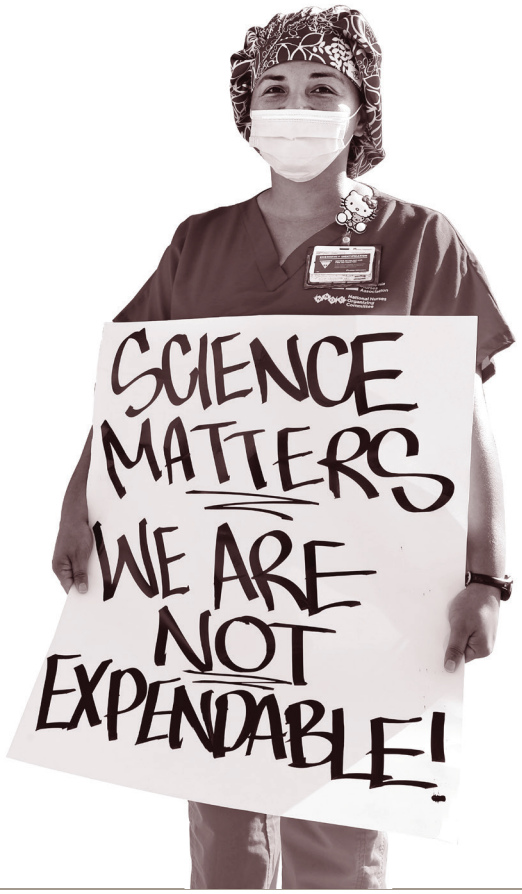
Criteria for Testing and Screening for SARS-CoV-2	*Assessment of Confirmed, Possible, or Non-Covid Status*
(1) Diagnostic test for SARS-CoV-2.	+ If a diagnostic test for SARS-CoV-2 is positive, then the visitor should be considered a **confirmed Covid-19 case and the visit should be delayed until the visitor tests negative twice at least 24 hours apart**. - If a diagnostic test for SARS-CoV-2 is negative, then assess criteria (2) and (3).
(2) Screening for Covid-19 symptoms.	+ If one or more Covid-19 symptoms is reported by a visitor, then the visitor should be considered a **possible Covid-19 case and the visit should be delayed until all three criteria are negative.** - If diagnostic test for SARS-CoV-2 is negative and no Covid-19 symptoms are reported by the patient, then assess criteria (3).
(3) Screening for previous 14-day exposure history to Covid-19.	+ If exposure to a known Covid-19 case in the previous 14 days is reported by a visitor, then the visitor should be considered a **possible Covid-19 case and the visit should be delayed until the all three criteria are negative.** - If diagnostic test is negative, no Covid-19 symptoms are reported, and no exposure to a known Covid-19 case in the previous 14 days is reported by a visitor, then the visitor can be considered a **non-Covid case and visiting can occur as safe and supportive for the patient's care**.

C. HEALTH CARE WORKER TESTING AND SCREENING

Surveillance for SARS-CoV-2 infections among health care workers is an important element in ensuring both staff and patient safety during the Covid-19 pandemic. Early detection of cases is vital to preventing further transmission. Testing should be made readily available to nurses without cost. Nurses and other health care workers must be able to get tested regardless of whether they have developed symptoms or remain asymptomatic.

Testing and screening for health care workers should include »

- Health care facilities should implement routine weekly surveillance testing programs for all staff. If surveillance testing programs are already in place, they should continue regardless of vaccination status. If not in place, they should be implemented.
- Health care facilities should proactively monitor and prevent all staff exposures to Covid-19. Exposure includes any time staff has contact with a patient and is not wearing full PPE (respirator at least as protective as an N95, eye protection, coveralls or gown, and gloves). Staff should be notified as soon as possible if they have been exposed. Any time staff is exposed to the virus, they should be placed on paid precautionary leave for at least 14 days and tested.
- Health care workers should continue to be tested, even after they have been vaccinated. Breakthrough infections can occur and there are still unanswered questions about the Covid-19 vaccines (See Section 2 for additional information).
- Health care employers should ensure that health care workers have non-punitive, paid sick leave when experiencing symptoms of Covid-19 or another illness.



SECTION 2: SCIENTIFIC EVIDENCE AND RATIONALE FOR PRECAUTIONARY SCREENING AND TESTING

This section outlines the rationale and scientific evidence underlying the precautionary screening and testing methodology outlined in Tables 1 and 2.

Approximately half of Covid-19 transmission is from asymptomatic and presymptomatic cases.

Approximately half of Covid-19 transmission events are from cases not currently showing symptoms.[7,8] That means the only way to effectively know if an individual with no symptoms is infected and potentially infectious is via reliable diagnostic testing and effective contact tracing.

Testing for SARS-CoV-2 only when an individual has symptoms fails to effectively detect cases, leading to increased transmission.

Several studies have examined testing programs that only test individuals who develop symptoms congruent with Covid-19. These studies document failure of symptom-based testing to effectively detect Covid-19 cases. For example, one study found that symptom-screening detected none of the infections identified through weekly surveillance testing.[9] Contact tracing data from Singapore showed symptom-based testing missed 62 percent of Covid diagnoses.[10]

Diagnostic tests are important but not perfect; false negatives can occur, especially with asymptomatic cases.

Diagnostic tests for SARS-CoV-2 are a vital public health tool to identify potentially infectious individuals. There are two main categories for SARS-CoV-2 diagnostic tests: PCR and antigen tests. PCR tests identify viral RNA through nucleic acid amplification. Antigen tests detect portions of the viral protein. PCR tests typically take at least multiple hours to conduct while antigen tests are faster and many are designed to be conducted at point-of-care.

It is important to note that, while antigen tests are very specific for the virus, antigen tests are not as sensitive as PCR tests. This means that positive results from antigen tests are highly accurate, but there is a higher chance of false negatives, so negative results do not rule out infection. For example, one study compared PCR tests and one authorized antigen test for SARS-CoV-2 and found that compared to PCR tests, antigen tests detected 79 percent of symptomatic infections but only 44 percent of asymptomatic infections.[11] Negative results from an antigen test may need to be confirmed with a PCR test prior to making treatment decisions or to prevent the possible spread of the virus due to a false negative.

False negatives are an issue with all diagnostic tests. There are several factors that can impact diagnostic test results (both antigen and PCR) — poor sample collection, swab site, and timing of the sample. The virus may not be present in high enough numbers at the swab site to register as a positive test, even though the individual is infected and infectious. Timing of specimen collection with respect to symptom onset is also important as viral load can change over the course of illness.

Key point on diagnostic tests: positive results are useful, but a negative diagnostic test result is not reliable by itself in ruling out Covid-19.

Recent exposure history is key context for interpreting negative diagnostic test results.

Studies have found that false negative diagnostic test results for SARS-CoV-2 are more likely among patients with recent exposure history to a known Covid case.[12] For example, a study from Massachusetts General Hospital found that nearly half of patients with false negatives had recent contact with a known Covid case. Patients with false negatives required two to four diagnostic tests to reach a Covid-19 diagnosis. False negatives were often due to: test being performed too early in disease course for viral detection, test being performed too late in course of infection when upper respiratory tract viral burden declines, and due to

nasopharyngeal swabs being a less reliable sample site for some patients than lower respiratory tract samples.[13] This study underlines the importance of considering recent exposure history to known Covid cases when assessing patients for possible SARS-CoV-2 infection.

Vaccines are an important public health tool to combat the Covid-19 pandemic, but no vaccine is perfect. Protections, including testing and screening, should remain in place regardless of vaccination status.

Vaccines are a very important element to reducing the spread of Covid-19, but we cannot rely on vaccines alone to stop transmission of Covid. It is clear that Covid-19 vaccines are effective at preventing severe Covid-19, hospitalizations, and deaths, but no vaccine is 100 percent effective and there are many unanswered questions about the Covid-19 vaccines, including how long protection will last, what protection against mild and asymptomatic cases looks like, and how effective vaccines will be against variants of concern that are or may become resistant to vaccines.

It is also important to note that, as of June 11, 2021, only 42.6 percent of the U.S. population has been fully vaccinated for Covid-19.[14] Additionally, Covid-19 vaccines are currently authorized for adults and adolescents aged 12 years and older. Children under the age of 12 years comprise 15 percent of the country's population and currently have no access to Covid-19 vaccines.[15]

More transmissible variants that may be or may become resistant to vaccines make measures to reduce and stop transmission of Covid important to maintain even as vaccine roll out continues. Read more at **https://www.nationalnursesunited.org/nnu-urges-cdc-to-revise-its-mask-guidance**.

Additionally, infections among fully vaccinated individuals have been reported— "breakthrough infections." The CDC published a report on vaccine breakthrough infection data gathered from January 1 through April 30, 2021. Among 10,262 breakthrough infections reported, 10 percent of patients were hospitalized and 2 percent died. It is notable that these percentages are similar to those reported for unvaccinated individuals.[16,17,18] Measures that reduce and prevent exposure to the virus remains important after vaccination.

Dedicated and separate Covid and non-Covid units are essential to preventing transmission of the virus within health care facilities.

We have learned that the virus spreads via aerosol transmission—when an infected person breathes, speaks, coughs, or sneezes they release aerosol particles containing infectious virus.[19] These aerosol particles can travel long distances through and stay suspended in the air. An overwhelming amount of scientific evidence indicates that aerosol transmission is the primary mode of transmission for this virus.[20]

Studies have also documented extensive environmental contamination of health care environments where Covid-19 patients are cared for.[21] While the role of contact transmission in the spread of Covid-19 remains unclear, studies have shown that the coronavirus is capable of surviving for long periods of time on a variety of surfaces, depending on environmental conditions.[22]

Units where both Covid-positive and non-Covid patients are housed pose a risk of transmission to patients and staff. One study detected virus in the hallway outside a Covid patient's room, despite the room being under negative pressure for airborne infection isolation, likely opening and closing the door led to mixing with hallway air.[23]

There is clear evidence that establishing dedicated, separate zones for Covid-positive and non-Covid patients is safer for staff and patients. A study from Taiwan documented the effectiveness of establishing separate, designated Covid-positive, suspected Covid, and Covid-negative zones in health care settings at preventing nosocomial transmission of the first SARS coronavirus in 2003.[24] Additionally, one study looked at data from 447 hospitals in 55 countries and found that cancer patients who underwent surgery in facilities where operating rooms and inpatient units were separated by Covid-status had better outcomes than patients who underwent procedures in facilities that had mixed Covid-status operating rooms and/or inpatient units.[25]

ENDNOTES

1 For up-to-date numbers, visit **https://covid.cdc.gov/covid-data-tracker/#datatracker-home**.

2 Hu, S., W. Wang, et al., "Infectivity, susceptibility, and risk factors associated with SARS-CoV-2 transmission under intensive contact tracing in Hunan, China," *Nature Communications*, March 9, 2021, **https://www.nature.com/articles/s41467-021-21710-6**.

3 Subramanian, R., Q. He, and M. Pascual, "Quantifying asymptomatic infection and transmission of COVID-19 in New York City using observed cases, serology, and testing capacity," *PNAS*, March 2, 2021 **https://www.pnas.org/content/118/9/e2019716118**.

4 For additional information on personal protective equipment for Covid-19, see **https://www.nationalnursesunited.org/sites/default/files/nnu/graphics/documents/1220_COVID-19_PPE_ReportUpdate.pdf**.

5 Knisely, A., Z.N. Zhou, et al., "Perioperative Morbidity and Mortality of Patients With COVID-19 Who Undergo Urgent and Emergent Surgical Procedures," *Ann Surg.*, Jan 2021, 273(1): 34-40.

6 For additional information on personal protective equipment for Covid-19, see **https://www.nationalnursesunited.org/sites/default/files/nnu/graphics/documents/1220_COVID-19_PPE_ReportUpdate.pdf**.

7 Hu, S., W. Wang, et al., "Infectivity, susceptibility, and risk factors associated with SARS-CoV-2 transmission under intensive contact tracing in Hunan, China," *Nature Communications*, March 9, 2021, **https://www.nature.com/articles/s41467-021-21710-6**.

8 Subramanian, R., Q. He, and M. Pascual, "Quantifying asymptomatic infection and transmission of COVID-19 in New York City using observed cases, serology, and testing capacity," *PNAS*, March 2, 2021 **https://www.pnas.org/content/118/9/e2019716118**.

9 Letizia, A.G., I. Ramo, et al., "SARS-CoV-2 Transmission among Marine Recruits during Quarantine," *NEJM*, Nov 11, 2020, **https://www.nejm.org/doi/full/10.1056/NEJMoa2029717?query=featured_home**.

10 Ng, O.T., K. Marimuthu, et al., "SARS-CoV-2 seroprevalence and transmission risk factors among high-risk close contacts: a retrospective cohort study," *The Lancet* Infectious Diseases, Nov 2, 2020, **https://www.thelancet.com/article/S1473-3099(20)30833-1/fulltext**.

11 Ford, L., C. Lee, et al., "Epidemiologic characteristics associated with SARS-CoV-2 antigen-based test results, rRT-PCR cycle threshold values, subgenomic RNA, and viral culture results from university testing," *Clin Infect Dis*, April 13, 2021, **https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciab303/6224406**.

12 Mackenzie, Hareza, et al., "Clinical Characteristics of False Negative SARS-CoV-2 Test Results Amongst Hospitalized Patients," *Infect Control & Hosp Epidem*, April 21, 2021, **https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/clinical-characteristics-of-false-negative-sarscov2-test-results-amongst-hospitalized-patients/ACEAC918B019EB8C9234A5E5BBEC5D93**.

13 Dugdale, C.M., M.N. Anahtar, et al., "Clinical, Laboratory, and Radiologic Characteristics of Patients With Initial False-Negative Severe Acute Respiratory Syndrome Coronavirus 2 Nucleic Acid Amplification Test Results ," *Open Forum Infectious Diseases*, January 2021, 8(1), **https://academic.oup.com/ofid/article/8/1/ofaa559/5999190**.

14 U.S. Centers for Disease Control and Prevention, COVID Data Tracker, **https://covid.cdc.gov/covid-data-tracker/#datatracker-home** (Accessed May 16, 2021).

15 Population of children aged under 12 years: 48.9 million, Total population: 332.3 million.

Forum on Child and Family Statistics, "POP1 CHILD POPULATION: NUMBER OF CHILDREN (IN MILLIONS) AGES 0–17 IN THE UNITED STATES BY AGE, 1950–2019 AND PROJECTED

2020–2050," https://www.childstats.gov/americaschildren/tables/pop1.asp (Accessed May 17, 2021).

U.S. Census Bureau, "U.S. and World Population Clock," https://www.census.gov/popclock/ (Accessed May 17, 2021).

16 Based on CDC's COVID Data Tracker, 1.4% of reported Covid-19 cases died in the U.S. between January 1 and April 30, 2021. The CDC reported 11,635,254 Covid-19 cases between January 1 and April 30, 2021. Between January 14 (to account for lag-time in mortality following infection) and April 30, 2021, the CDC reported 162,217 Covid-19 deaths. CDC, COVID Data Tracker, https://covid.cdc.gov/covid-data-tracker/#datatracker-home (Accessed May 28, 2021).

17 Among a cohort of unvaccinated adults living in non-congregate settings in Connecticut, the overall Covid-19 infection hospitalization rate and infection fatality rate were estimated to be 6.86% (90% CI, 4.58%-13.72%) and 0.95% (90% CI, 0.63%-1.90%). Mahajan, S., C. Caraballo, et al., "SARS-CoV-2 Infection Hospitalization Rate and Infection Fatality Rate Among the Non-Congregate Population in Connecticut," *Am J Med*, Feb 19, 2021, https://www.amjmed.com/article/S0002-9343(21)00099-1/fulltext.

18 Analysis of data from New York state (outside New York City) from March 2020 found that among 229 cases diagnosed by March 12, 2020, 13% were hospitalized and 2% died by March 30. Rosenberg, E.S., E.M. Dufort, et al., "COVID-19 Testing, Epidemic Features, Hospital Outcomes, and Household Prevalence, New York State—March 2020," *Clinical Infectious Diseases*, May 8, 2020, https://academic.oup.com/cid/article/71/8/1953/5831986?login=true.

19 NNU Fact Sheet on Aerosol Transmission of Covid-19 https://www.nationalnursesunited.org/sites/default/files/nnu/graphics/documents/0720_COVID19_aerosolTransmission.pdf

20 Scientific evidence is summarized in this NNU document https://www.nationalnursesunited.org/sites/default/files/nnu/documents/0321_CDC_aerosol%20transmission_03312021_final.pdf.

21 Santarpia, J.L., D.N. Rivera, et al., "Aerosol and surface contamination of SARS-CoV-2 observed in quarantine and isolation care," *Scientific Reports*, July 29, 2020, https://www.nature.com/articles/s41598-020-69286-3.

Chia, P.Y., K.K. Coleman, et al., "Detection of air and surface contamination by SARS-CoV-2 in hospital rooms of infected patients," *Nature Communications*, May 29, 2020, https://www.nature.com/articles/s41467-020-16670-2.

22 Riddell, S., S. Goldie, et al., "The effect of temperature on persistence of SARS-CoV-2 on common surfaces," *Virology Journal*, Oct 7, 2020, https://virologyj.biomedcentral.com/articles/10.1186/s12985-020-01418-7.

Chin, A.W.H., J.T.S. Chu, et al., "Stability of SARS-CoV-2 in different environmental conditions," *The Lancet* Microbe, April 2, 2020, https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(20)30003-3/fulltext.

23 Santarpia, J.L., D.N. Rivera, et al., "Aerosol and surface contamination of SARS-CoV-2 observed in quarantine and isolation care," *Scientific Reports*, July 29, 2020, https://www.nature.com/articles/s41598-020-69286-3.

24 Yen, M.-Y., Y.-E. Lin, et al., "Taiwan's traffic control bundle and the elimination of nosocomial severe acute respiratory syndrome among healthcare workers," *J Hosp Infect*, Apr 2011, 77(4): 332-7.

25 Glasbey, J.C., D. Nepogodiev, et al., "Elective Cancer Surgery in COVID-19-Free Surgical Pathways During the SARS-CoV-2 Pandemic: An International, Multicenter, Comparative Cohort Study," *J Clinical Oncology*, Jan 1, 2021, https://pubmed.ncbi.nlm.nih.gov/33021869/.