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BRIEF REPORT

Incidence of Health Care–Associated COVID-19 During Universal Testing of Medical and Surgical Admissions in a Large US Health System

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Concerns about severe acute respiratory syndrome coronavirus 2 exposure in health care settings may cause patients to delay care. Among 2992 patients testing negative on admission to an academic, 3-hospital system, 8 tested positive during hospitalization or within 14 days postdischarge. Following adjudication of each instance, health care–associated infection incidence ranged from 0.8 to 5.0 cases per 10 000 patient-days.

Keywords. COVID-19; emerging infections; hospital epidemiology; nosocomial infection; SARS-CoV-2.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiologic agent of coronavirus disease 2019 (COVID-19), which in 2020 has caused >180 000 deaths in the United States [1]. Concerns related to the risk of SARS-CoV-2 exposure within health care environments have caused patients to avoid seeking care. In Italy, for example, rates of hospital admission for acute coronary syndrome were one-quarter lower during the COVID-19 outbreak compared with rates earlier in 2020 or in the same period during 2019 [2]; in the United States, at the beginning of the pandemic, emergency room visits declined 42% compared with the same period in the year prior [3]. As the United States moves into the next phase of the pandemic, patients may continue to exercise discretion with respect to seeking needed and elective medical care, due to concerns about transmission of the virus within health care settings. Such decisions have considerable implications for outpatient and inpatient medical and surgical care [4, 5] and for the financial viability of health systems continuing to provide health care services. Thus, we sought to better understand the risk of health care–associated SARS-CoV-2 acquisition in the context of current infection control practices. The University of Washington (UW) medical system initiated universal testing of all admitted surgical patients on March 30, 2020, and all admitted medical patients on April 13, 2020, and serves as a regional referral laboratory for SARS-CoV-2 tests. These factors enable measurement of incident health care–associated SARS-CoV-2 acquisition among a cohort of patients known to be test-negative at the time of admission to a health care environment.

METHODS

UW Medicine is a 3-hospital academic health system located in Seattle, Washington. Results of all SARS-CoV-2 tests performed on admission to UW Medicine hospitals from April 2, 2020, through May 14, 2020 were analyzed. During this period, universal testing of patients entering these hospitals was required (a) within 72 hours before planned surgical procedures and (b) beginning April 13th, at the time of all other inpatient admissions. All screening tests were collected using nasopharyngeal swabs and analyzed by reverse transcriptase polymerase chain reaction (RT-PCR) on the following platforms: the UW Virology emergency use authorized (EUA) laboratory-developed test; Panther Fusion SARS-CoV-2 assay (Hologic, Marlborough, MA, USA); Roche RT-PCR (Basel, Switzerland); DiaSorin (Saluggia, Italy). The clinical indication for all SARS-CoV-2 RT-PCR tests during this period was captured as a required element, at the time of order entry, within the electronic health record. Exposure time at risk was calculated as the time from admission to discharge or death, with censoring at the time of the first newly positive test among cases before discharge. Postadmission testing was conducted for the following indications: discharge planning (eg, destination facility required multiple negative tests before transfer), preprocedural, and clinical suspicion based on new symptoms concerning for COVID-19. Repeat test results were evaluated through an observation period extending 14 days beyond discharge to account for health care–associated infections that may have occurred just before discharge. (Patients who may have been readmitted after the 14-day post-discharge monitoring period only contributed exposure time during the initial admission.) Test results were extracted for analysis on May 28 to allow a full 14-day observation period for all included patients.

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Potential health care–associated COVID-19 infections detected using this approach were cross-checked with an institutional database of clinical reviews maintained by the UW Infection Prevention and Control program. The frequency of short-term (within 7 days) SARS-CoV-2 NP test discordance among initially test-negative patients in the UW system during a similar period has been estimated at 4.1% and was similar to 1 other large academic medical system [7]. All patients with potential newly positive tests were subject to structured chart review. Final determinations (health care–associated vs non–health care–associated) were made by the UW Infection Prevention and Control program and confirmed by a subset of authors (D.L., C.B.C., J.S.) independently using a Likert 1–5 scale: (1) "definitely not HAI"; (2) "likely not HAI"; (3) "possibly HAI"; (4) "likely HAI"; (5) "definitely HAI" (see Supplementary Table 1 for more details on the approach to classification). Scores were averaged (mean), with final determinations based on the average's nearest integer (there were no discrepancies greater than 1 point).

During the period under study, UW Medicine maintained comprehensive infection control policies [8]. In brief, these included specific areas designated for patients with COVID-19, universal masking precautions for patients and staff, a comprehensive testing infrastructure for patients and staff, restricted visitation policies, COVID-19 transport guidelines, and multiple service line–specific clinical protocols for patients with COVID-19 and patients under investigation.

RESULTS

Initial screening test results from 3053 patients entering the health system during the study period were reviewed. Those with a documented prior positive result (n = 33) were excluded. The remaining 3020 patients had no record of previous SARS-CoV-2 positivity at the time of admission testing and entered the health care system as a result of an inpatient medical admission (n = 1962) unrelated to COVID-19 or an urgent surgical procedure (n = 1058). Initial screening test results were negative in 99.1% of this asymptomatic population (99.4% preprocedural, 98.9% medical admissions). Surgical procedures were deferred for all 6 patients with positive preoperative screening tests until documentation of disease resolution, per institutional protocol.

Among the 2992 asymptomatic individuals with negative screening tests at the time of entrance into the health system, the median length of inpatient stay (interquartile range) was 3.7 (1.8-7.8) days, representing a range of 11 971 to 11 981 patient-days at risk within an inpatient environment, dependent on results of consensus classification of health care–associated infection status. Of these 2992 patients, 28.1% were retested 1 or more times during the observation period (12.4% during hospitalization, 11.9% within 14 days of discharge, and 3.9% both). Repeat testing in this initially negative group was most often performed for ongoing procedural or discharge surveillance (90%), but occasionally due to new onset of symptoms concerning for COVID-19 (10%).

During the study period, 8 cases of possible incident SARS-CoV-2 positivity were observed among patients who tested negative at the time of admission. After consensus review, 2 patients were classified as "definitely not HAI"; 3 patients were classified as "likely not HAI"; 2 patients were classified as "possibly HAI"; 1 patient was classified as "likely HAI"; and 0 patients were classified as "definitely HAI." Accounting for these cases, during the study period, there was a range from 1 to 6 potential cases among this study population, indicating a range of 0.8 to 5.0 cases per 10 000 patient-days. Of note, none of these cases were related, and no outbreak/cluster of COVID-19 was suspected among patients within UW Medicine hospitals during the period under investigation.

DISCUSSION

In this work, it was observed that the incidence of hospital-acquired SARS-CoV-2 infection within a single large health system during a period of universal admission testing was relatively low. Other reports have found annualized hospital-associated respiratory viral infection rates to be ~4.9 (95%, 4.7–5.2) cases per 10 000 patient-days [9], consistent with the upper range of our estimate for SARS-CoV-2. As health systems and public health authorities communicate the need to avoid foregoing necessary clinical care, transparent enumeration of the risks of SARS-CoV-2 transmission within health care settings will be essential. Such communication is important, as patients delay or avoid seeking care for several time-sensitive indications, including childhood vaccination [3], acute coronary syndrome [2], and stroke [4].

There are limitations to this study. These results represent the experience of 3 hospitals of 1 major academic medical system; as infection control practices vary widely, these results may not be generalizable to other health systems. Approximately 1 in 4 patients were retested following their negative admission RT-PCR result; among retested patients not undergoing mandated surveillance for administrative indications (ie, before facility transfer or before a procedure), the chance of subsequent testing may have favored patients with concern for SARS-CoV-2, which could have biased these results toward a higher health care–associated infection rate. Conversely, despite all patients undergoing admission testing, retesting was driven by clinical assessment of new symptoms and by administrative indications in the absence of new symptoms, but was not universal. It cannot be ruled out that some patients may have developed asymptomatic infections and were not retested within the hospitalization through 14-day postdischarge window, which would lead to underestimation of the true event rate. Similarly, postdischarge surveillance may have failed to capture results from some who sought postdischarge testing in external facilities not utilizing UW testing services, although the impact of this phenomenon is limited by the fact that UW Virology processed approximately half of the SARS-CoV-2 RT-PCR tests performed in Washington State during this period. In addition, the manual review process accounted for the possibility of false-negative initial admission tests, which have the potential to result in overestimation of the event rate. Of the 8 total cases of incident SARS-CoV-2 reviewed for the possibility of hospital acquisition, the majority of newly positive tests occurred within 5 days of admission. We specifically considered time from admission to first positive test in the classification process (Supplementary Table 1) and utilized contextual data on institutional rates of short-term nasopharyngeal test discordance (ie, testing negative initially then testing positive shortly thereafter) to interpret such cases [7]. Finally, the period under investigation occurred after the cases in King County, Washington, surpassed their peak and the overall census of UW Medicine inpatients with COVID-19 had begun to decline. It is possible that the risk of health care–associated COVID-19 infection was higher during this earlier period when overall disease prevalence was increasing and before the standardization of current infection control procedures.

Ongoing evaluation of hospital-acquired transmission rates is critical to ensuring patient and staff safety, earning patient trust, and identifying and addressing any risk factors for transmission as they emerge. As health systems and patients adapt to the ongoing US COVID-19 crisis, patients will continue to seek information regarding the risks of presenting for necessary medical and surgical care in this new environment. These data indicate that, in health systems with comparable infection control practices, the risk of health care–associated SARS-CoV-2 transmission may be relatively low.

Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

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