

Universal SARS-CoV-2 testing on admission to the labor and delivery unit: Low prevalence among asymptomatic obstetric patients

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During the COVID-19 pandemic surge in New York, several hospitals in New York City and Long Island began testing all women presenting to the labor and delivery units for SARS-CoV-2. They found that 14% of asymptomatic women tested positive.^{1,2} Unidentified, these asymptomatic women were at risk of infecting their newborns following birth, hospital staff, as well as other patients. It is unclear, however, whether the high rate of asymptomatic infections in New York is a reflection of a particularly high prevalence of SARS-CoV-2 during that time period in New York or a more generalizable phenomenon applicable to other high-prevalence areas. Boston followed New York as another high-prevalence metropolitan area (1,628 cases per 100,000 residents vs 2,046 in New York City as of May 1, 2020). We therefore report on the prevalence of asymptomatic SARS-CoV-2 in women presenting to the labor and delivery units in Boston, another high-prevalence community in the United States.

Methods

On April 18, 2020, 2 academic and 2 community hospitals affiliated with Mass General Brigham Health began universally testing all women admitted to their labor and delivery units for SARS-CoV-2 using RT-PCR 53 (nasopharyngeal swab). Prior to this intervention, multiple infection control strategies in addition to those routine in our facilities had been implemented in response to the COVID-19 pandemic: (1) symptom and exposure screening of all patients with implementation of immediate isolation if symptom screen is positive and testing for SARS-Cov-2, (2) universal masking of employees, patients, and visitors on facility premises,³ (3) daily employee symptom attestation with exclusion from work and referral for testing if symptom screen positive; and (4) deferral of all nonessential in-person visits and elective procedures.

Demographic and SARS-CoV-2 test results were abstracted from the electronic medical record for all women admitted to the labor and delivery units between April 18, 2020, and May 5, 2020. All records for women with positive tests on admission were independently reviewed by 2 physicians (I.T.G. and D.K.) to confirm symptom status based on established symptom screening

including fever (subjective or documented), new cough, shortness of breath, sore throat, muscle aches, new rhinorrhea, or new anosmia). The descriptive data are presented as frequencies.

Results

The 4 major hospitals affiliated with Mass General Brigham Health provide maternity care to ~14,750 women per year. Over 18 days of universal testing on the labor and delivery units, 763 women were admitted and 757 (99.2%) were tested. Of those, 139 had symptoms possibly consistent with COVID-19. Of symptomatic women, 11 of 139 (7.9%) tested positive. Among asymptomatic women, 9 of 618 (1.5%) tested positive (Fig. 1). Thus, 9 of 20 patients positive for SARS-CoV-2 at admission (45%) had no symptoms of COVID-19 at presentation. The percentage of asymptomatic women who tested positive varied by hospital: 2.7% and 1.5% in the 2 academic hospitals, 1.8% and 0.6% in the 2 community hospitals. Across the 4 hospitals, none of the positive asymptomatic women developed COVID-19 symptoms during the delivery hospitalization and all 9 newborns tested negative for SARS-CoV-2.

Discussion

In a large healthcare system in metropolitan Boston, we identified a low prevalence of COVID-19 infection among asymptomatic pregnant women presenting for admission to the labor and delivery units. The incidence of asymptomatic infection amongst women admitted to the labor and delivery units in greater Boston was substantially lower than that of New York City despite similar case counts per capita. Notably, the 1%–2% incidence of asymptomatic infection in our population more closely mirrors asymptomatic infection rates in other areas.^{4,5} Several theories may explain the lower prevalence of asymptomatic infection in Boston compared to New York City: (1) we began testing >30 days after physical distancing orders were placed by the state and hence were sampling at a time with declining community transmission, (2) the overall population density of greater Boston is lower than New York City, perhaps leading to less community-based transmission, and (3) some New York hospitals transiently stopped or considered stopping birth partners from attending deliveries, which could have led to some women underreporting symptoms.

Universal testing of women presenting for labor and delivery, as one element of a multipronged approach to reducing the risk of SARS-CoV-2 transmission in healthcare facilities, is likely to remain a core strategy for the foreseeable future to inform both

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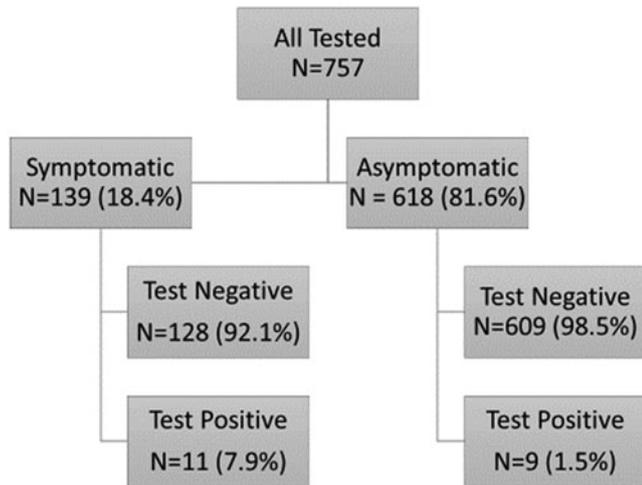


Fig. 1. All women tested for SARS-CoV-2 on the labor and delivery units.

clinical care and infection control operations. Universal testing in this specific patient population is an especially important public health priority given the implications of SARS-CoV-2 on maternal and newborn care at the time of birth and during the postpartum and neonatal period. In addition, testing the asymptomatic obstetric population provides a window into the community prevalence of infection which in turn can inform the timing and effect of when, where, and how to enhance versus relax social distancing measures. Assessing the community-based COVID-19 prevalence rates must take into account the possibility of local clustering of

disease where a community lies within the pandemic curve and the status of contemporaneous mitigation strategies. These data may, therefore, guide decision making about moving between mitigation versus containment measures and thoughtfully resuming both healthcare and nonhealthcare operations.

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Using deep learning and Twitter data to identify outpatient antibiotic misuse

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Outpatient antibiotic misuse is widespread in the United States and has been associated with several patient harms, including *Clostridioides difficile* infections, adverse drug reactions, and rising rates of antibiotic resistance.^{1,2} Recent estimates suggest that ~30% of the >200 million outpatient antibiotic prescriptions in the United States each year may be inappropriate.^{3–5}

Although outpatient antibiotic misuse is common, it remains difficult to identify and study. Prior research has relied on billing claims data or clinic surveys, which may be limited by inaccurate coding, unreliable clinical documentation, and long delays between data collection and analysis.^{3,5} Additionally, these methods focus only on provider behaviors and do not capture the misuse of non-prescribed antibiotics, which occurs frequently but has not been

well studied.⁶ Novel patient-centered approaches are therefore needed to more quickly and accurately characterize inappropriate outpatient antibiotic use.

In this study, we describe the use of Twitter data, natural language processing and deep learning to identify self-reported episodes of antibiotic misuse in the United States.

Methods

Unique English language Tweets describing outpatient antibiotic use in the United States from March 2018 to March 2019 were aggregated via the Twitter developer platform. A search query was designed to find Tweets likely to describe outpatient antibiotic use while excluding retweets and some Tweets describing appropriate antibiotic use (see Appendix A for search details).

Included Tweets were deidentified and then labelled by an infectious diseases physician as either describing possible recent antibiotic misuse or not describing misuse. Possible misuse was defined as antibiotic use for bronchitis, asthma, any viral

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