

Opinion

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Universal Screening with Sample Pooling in Preoperative Patients as Long-term Strategy in the COVID-19 Pandemic

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Universal screening for severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) may be critical for protecting vulnerable patients and the operating rooms, especially if the prevalence of asymptomatic patients is expected to be high.¹ A recent study on the screening of the San Francisco Bay Area showed that in 292 pools comprising 2,888 individual samples, the positive rate for SARS-CoV-2 was 0.07% (2/2,888).² Similarly, Ben-Ami et al.³ reported that of a total of 26,576 samples with 8 sample pooling from asymptomatic individuals, 31 (0.12%) were SARS-CoV-2 positive in Israel. However, there are limited data on the pooling strategy for universal screening of SARS-CoV-2 in other clinical settings or geographic regions.

In Korea, a massive community outbreak of coronavirus disease 2019 (COVID-19) occurred in mid-February; therefore, since February 24th, we have implemented a polymerase chain reaction (PCR)-based universal preoperative screening for SARS-CoV-2 in patients requiring general anesthesia at Asan Medical Center, a tertiary care center in Korea. In parallel with this policy, we delayed elective operations for two weeks for patients with epidemiologic links to COVID-19 cases. On April 1st, we changed the screening protocol to pool five specimens before testing for saving resources. As of April 28th, a total of 9,778 pre-operation screening tests had been performed at Asan Medical Center, none of which were positive for SARS-CoV-2 (0%; 95% confidence interval, 0.00–0.04). During this period, a total of 37,127 SARS-CoV-2 PCR tests had been performed at our hospital, which revealed 128 (0.3%) positive results from 8 confirmed cases of COVID-19. Preoperative screenings accounted for approximately 26% of the test volume at our hospital. From April 1st to April 28th, when pooled testing was performed, a total of 16,277 PCR tests had been performed, of which 3,994 (25%) were preoperative screening test. Therefore, practical burden of preoperative screening decreased from 25% to 6% ($799/[16,277 - 3,994 + 799]$).

In our experience, universal preoperative screening of the individual samples from patients with low epidemiologic risks was not particularly cost-effective as it did not reveal any positive cases of COVID-19. However, the intubation procedure is a well-known risk for airborne infection of SARS-CoV-2,⁴ and the operation room is vulnerable to the spreading of virus-containing aerosols due to the positive-pressured condition.⁵ The COVID-19 pandemic is projected to be long-lasting and multiple subsequent outbreaks are expected—as such, further preventive strategies should be sustainable and cost-effective. Wacharapluesadee et al.⁶ calculated cost-effectiveness of pooling strategy based on disease prevalence rates.

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Disclosure

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Author Contributions

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Pooled-specimen testing of 1,000,000 subjects in a population with 1% COVID-19 prevalence would save approximately USD 28.15 million, assuming evenly distributed positive specimens in each pool.

Pooled sample testing may be a reasonable option for universal screening as a long-term strategy depending on the local epidemiological risk for COVID-19 and the resources for screening, by preventing the potential catastrophic harm resulting from the failure to detect asymptomatic patients prior to surgery.

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