

## Pooled Testing for SARS-CoV-2 for Resource Conservation in the Hospital: A Dynamic Process

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Pooled testing for SARS-CoV-2 has been proposed as a strategy to facilitate testing and conserve scarce laboratory resources in a variety of settings. Previously in the *Journal of Hospital Medicine*, we reported our initial experience with pooled testing in low-risk admitted patients from April 17, 2020, to May 11, 2020, at Saratoga Hospital, Saratoga Springs, New York.<sup>1</sup> Early in the pandemic, when testing resources were critically short, pooling allowed us to meet our clinical goal of testing all admitted inpatients. We now present our subsequent experience to emphasize the dynamic nature of this strategy when used to offer testing while conserving resources within a hospital system.

From April 17, 2020, to December 10, 2020, pooled testing using the GeneXpert system (Cepheid) was performed as previously described on all patients admitted from the emergency department (ED) of Saratoga Hospital who met criteria for being at low risk for SARS-CoV-2 infection.<sup>1</sup> During this period, we had a low community prevalence (<1%-2%). In our low-risk admitted patients, an overall positive rate of 0.5% allowed us to expand the pool size from our initial reported size of three samples to a maximum of five samples. As ED volumes changed, pool sizes could be adjusted by clinical leaders as supplies allowed the demands of throughput to be met. These adjustments were facilitated by regular discussion of aggregate testing results, pool size, patient-flow issues, and supply levels among our staff. In December 2020, we experienced a marked increase in community prevalence and hospital admissions. This surge ended our use of pooling and required us to test each admitted patient with a single cartridge, which fortunately had become available.

During our period of pooling, we tested 7755 low-risk patients using 1738 cartridges (1177 pools of five samples; 211 pools of four samples; 326 pools of three samples; and 24 pools of two samples). We had 39 positive pooled cartridges, which required the use of 174 additional single cartridges. The instructions for use of this system with single cartridges report a negative percent agreement (sensitivity) of 95.6% and a positive percent agreement (specificity) of 97.8% in the lab.<sup>2</sup> We did not have any

patients who tested negative in a pool subsequently turn positive during admission unless they had a known in-hospital exposure; however, our public health service alerted us to several patients with high-risk exposures who were excluded from pooling. Our pooling strategy resulted in use of 5843 fewer cartridges than if each test had been performed on a single patient. The total savings on cartridges was \$225,000. Pooling did not directly increase staff costs, but required significant individual and organizational energy and commitment. At times, pooling could delay throughput of admitted patients from the ED to inpatient beds. The testing process often added 60 to 90 minutes to throughput time. During the night, waiting for admissions to create a pool could also cause delay. Close and ongoing communication among our ED, inpatient teams, nursing, and laboratory was required to minimize these negative effects.

Pooling can be an effective method of resource conservation in low-risk populations. The theoretical benefits of pooling have been calculated in various scenarios<sup>3</sup> and recently comprehensively reviewed with emphasis on selecting the pooling method.<sup>4</sup> Practically, pooling has been aptly described as a complex undertaking that should be one part of a broad approach to achieving various COVID-19 control goals.<sup>5</sup> Our experience is that, in the hospital setting, it is a dynamic process that requires repeatedly balancing clinical goals, organizational realities, laboratory and mathematical parameters, and competing staff duties. The potential costs and benefits may change over time. We found success was highly dependent on our staff, who were highly motivated by strongly agreeing with our commitment to test all inpatients and our desire to maintain adequate supplies to accomplish this goal.

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