

- 1 Additional File 1. Simulation study parameter combinations. Simulation study parameter  
 2 combinations for evaluating the effectiveness of different sampling and biological parameters.

Parameter	Type	Low	Medium	High	Justification
Number of repeat tests	Sampling	2		5	Arbitrary
Proportion of sampled individuals with repeat tests	Sampling	0.10	0.50	1.0	Arbitrary
Proportion of sampled individuals	Sampling	0.001	0.01	0.05	U.S. average daily testing rate ~0.1% of population/day in May 2020 (1,2), Harvard "Massive Scale Testing" plan calls for testing 2 - 6% of population per day (3)
Test sensitivity (detection probability)	Sampling	0.30		0.78	Reports in the literature are highly variable (4-16). A literature review by (16) found that sensitivity for nasal swabs averaged 73.3% (95% CI 68.1–78.0%) when using RT-qPCR. There are, however, reasons to believe that these values may be biased high when compared to

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samples taken from random and therefore primarily non-symptomatic patients. Some proportion of the sample will have just contracted the disease and will likely have low viral loads in their nasal passages. Similarly, some proportion of the population will be asymptomatic: we know little about this group but can assume that viral loads in their nasal passages will likely be lower than those that are either presymptomatic or symptomatic. If this is the case, tests on asymptomatic patients would be expected to have lower sensitivity than indicated by published results. We assume that there would be a group of recently infected people in our sample, entirely asymptomatic, who would be sick, but would seldom test positive (17).

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Probability of being infected ( $\psi_i$ )	Biological	0.001	0.01	0.10	Total confirmed positive overall in the US is ~2.3% (7,894,768 U.S. cases confirmed positive (18), 330,455,538 U.S. population (19)). Range of values were selected to be relevant for surveillance.
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