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| **Model** | **Reference** | **R0** | **Test Frequency** | **Test Sensitivity** | **Test Delay** | **Conclusions** |
| ***Cohort Level - University*** | | | | | | |
| SEIR | Paltiel | 1.5, 2.5, 3.5 | 1, 2, 3, and 7 days | 70-99% | 8 hours | A highly specific test given to each student regardless of symptom status at least weekly can help mitigate infections in a college campus. |
| Larremore | 1.5, 2.5, 5 | None, 3 ,7, 14 days | LOD 103,105,106 | 0, 1, 2 days | Results demonstrate that effective screening depends largely on frequency of testing and the speed of reporting and is only marginally improved by high test sensitivity. |
| Martin | 2.0, 2.5, 3.0 | 0-100% of population tested monthly | 85% | N/A | Widespread testing of 100% of the campus population every month is required to detect an outbreak when there are fewer than 9 detectable infections. |
| Hartvigsen | 2.4 | 0, 1, 2, 3, 7, 14, 28, 105 days | 90% | 1 day | In a college population, proportion of masking and test frequency had the most substantial impact on reduction of infections, with daily testing resulting in the fewest number of cases. |
| Rogers | 2.00, 2.25, 2.50, 2.75, 3.00 | 0-20% of population tested daily | 60-90% | 0, 1, 2 days | Frequency of testing was more important than sensitivity, behavioral compliance, contact tracing capacity, and time between testing and results for minimizing epidemic size. |
| SUPR | Mukherjee | Approximately 1-5.5a | Daily tests: 1K, 5K, 10K, 15K | 92% | Immediately | The key to designing an effective reopening strategy is a combination of rapid testing and effective preventative measures such as mask wearing and social distancing. |
| Stochastic | Brook | 2.2 | Twice weekly, weekly, 14 days | LOD 101, 103, 105, 107 | 1-5, 10 days | Surveillance testing can overcome uncertainty surrounding asymptomatic infections, with the most effective approaches prioritizing frequent testing with rapid turnaround time to isolation over sensitivity. |
| Time-Varying Poisson | Chang | 1, 1.5, 1.6, 2.0, 2.5 | 3, 7 days | 60%, 80%, 100% | 1, 2, and 3 days | Testing frequently while minimizing the delay from testing until isolation for those found positive are the most controllable levers for preventing large  residential college outbreaks. |
| ***Cohort Level - Healthcare*** | | | | | | |
| SEIR | Chin | 1.5, 2, 2.5 | Daily to monthly | Time-varying: 50-80%  Ideal: 100% | 0, 1, 3, 5 days | Routine testing substantially reduces risks of outbreaks but may need to be as frequent as twice weekly. |
| Delaunay | 1.5, 2, 3 | Weekly (50%, 100% of population)  Twice a week (50%, 100%)  Daily (14%)  Weekdays (20%)  Every two weeks (100%) | 75%, 90%, 100% | 0, 5 days | Weekly testing of 50% of residents and staff should be used if low transmission rates. 100% of residents should be tested in higher infectiousness contexts. |
| Holmdahl | N/A | 1, 7 days & 2.3x/week | LOD 103 (PCR), 105, 107 (antigen) | 0 days (antigen), 1,2,7 days (PCR) | In a simulated nursing home population, more frequent antigen testing at the LOD 105 was more effective than higher sensitivity PCR testing with longer delays. |
| Obama | 3.2, 3.4 (seasonal average) | 1, 5 days | 85% (antigen),  95% (PCR) at peak probability of detection | 0.5-4 days | In a closed facility, testing every 5 days with a 24-hour delay resulted in up to a 40% reduction in the number of infections. |
| Stochastic | See | 1.366689 | 1, 3, 7 days | 50%, 85%, 95% | 0, 1, 2 days | Outbreak testing could prevent 54% to 92% of SARS-CoV-2 infections. Non-outbreak testing could prevent up to an additional 8% of infections. |
| Bayesian | Hellewell | N/A | 1, 2, 4, 7, 14 days | 64% (lateral flow test), 77% (PCR) at peak probability of detection | 1, 2 days | PCR testing every 2 days in a population of UK healthcare workers would detect 57% of symptomatic cases prior to onset and 94% of asymptomatic cases within 7 days, given a one-day reporting delay. |
| ***Cohort Level - Workplace*** | | | | | | |
| SIR | Lying | 2.5 | 1, 3, 7, 14 days | 60%, 80%, 98% | 0, 2 days | Key characteristics of viable testing strategies include high frequency testing with a moderate or high sensitivity test and minimal results delay. |
| SEIR | VanderWaal | 2, 4 | 3, 7, 14, 28 days | 90% | 1, 3, 5 days | In a simulated meat processing plant, testing every 3 days averted 25-40% of COVID cases, with test frequency having a more substantial impact on reduction in cases than delay, R0, or background community transmission. However, testing may not be enough to prevent an early outbreak, as results were seen to be most effective with residual immunity. |
| Stochastic | Chowell | 9-16 (ship)  0.6-1.6 (shore) | Once or daily | 80-95% at peak probability of detection | Within hours | PCR testing at embarkation and daily testing of all individuals aboard, together with increased social distancing and other public health measures, should allow for rapid detection and isolation of COVID-19 infections and reduce the probability of onboard COVID-19 community spread. |
| Other | Meier | N/A | Daily and weekly | 60%, 70%, 80%, 90%, 95% | 1, 2 days | The primary factors determining the effectiveness of a screening program are test sensitivity and frequency of testing, with repeat testing able to compensate for lower sensitivity. |
| ***Population Level*** | | | | | | |
| SEIR | Paltiel | 0.9-2.1 | 1-15 days | 70%-95% | 0 days | High frequency home testing using an inexpensive imperfect test could contribute to pandemic control at justifiable cost. |
| Bosetti | 1.2, 1.3, 1.4, 1.6 | 1 to 30 days | 60%, 75%, 90% | N/A | One round of mass testing could reduce expected infections by up to 20-30%, with more frequent testing resulting in greater reductions in infections. |
| SIR | Atkeson | N/A | 0-3 days | 97% | Approximately 2 days | Fiscal, macroeconomic and health benefits of rapid testing programs far exceed their costs. |
| SIDHRE-Q | Nash | Estimated from data | 1, 3, 7, 14, 21 days | 30%-90% | 0 days | High frequency, strategic population-wide rapid testing at various accuracy levels diminishes COVID-19 infections, hospitalizations, and deaths. |
| CEACOV | Neilan | 0.9-2.0 | 1, 3, 14, 30 days | 30%-100% | 1 day | Assuming the cost of PCR testing ($51), symptomatic and monthly asymptomatic testing became cost-effective at a Re greater than or equal to 1.6. When using a test costing $5, repeat testing was cost-effective in all epidemic scenarios. |
| Time Dependent Weibull | Bootsma | 1.3, 2.0, 2.5 | 1, 3, 5, 7, 9, 11, 13 days | Time-dependent, 80% | 0 days | Regular universal random screening is not a viable strategy, but targeted screening approaches are needed to better use rapid testing. |
| Stochastic | Bergstrom | 2.5 | 1, 2, 3.5, 7 days | 50%, 60%, 70%, 80%, 90% | 0, 0.5, 1, 2, 3, 5 days | Less sensitive tests administered at higher frequencies can be effective at the population level compared to less frequent tests with higher sensitivity. |

a The Ro values were not provided in this article but were estimated using the base infectivity levels that were provided.