Children's Hospital of Philadelphia PolicyLab

Evaluation of COVID-19 Testing Strategies for Repopulating College and University Campuses: A Decision Tree Analysis

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The optimal approach to identify SARS-CoV-2 infection among college students returning to campus is unknown. Recommendations vary from no testing to two tests per student. This research determined the strategy that optimizes the number of true positives and negatives detected and reverse transcription polymerase chain reaction (RT-PCR) tests needed. A decision tree analysis evaluated five strategies: (1) classifying students with symptoms as having COVID-19, (2) RT-PCR testing for symptomatic students, (3) RT-PCR testing for all students, (4) RT-PCR testing for all students and retesting symptomatic students with a negative first test, and (5) RT-PCR testing for all students and retesting all students with a negative first test. The number of true positives, true negatives, RT-PCR tests, and RT-PCR tests per true positive (TTP) was calculated. Strategy 5 detected the most true positives but also required the most tests. The percentage of correctly identified infections was 40.6%, 29.0%, 53.7%, 72.5%, and 86.9% for Strategies 1-5, respectively. All RT-PCR strategies detected more true negatives than the symptom-only strategy. Analysis of TTP demonstrated that the repeat RT-PCR strategies weakly dominated the single RT-PCR strategy and that the thresholds for more intensive RT-PCR testing decreased as the prevalence of infection increased. Based on TTP, the single RT-PCR strategy is never preferred. If the cost of RT-PCR testing is of concern, a staged approach involving initial testing of all returning students followed by a repeat testing decision based on the measured prevalence of infection might be considered.

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