

Developing an Optimal COVID-19 Test Program: Strategies and Considerations for Success

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Disclosure Information

- No relationships to disclose

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UHG Public Health Response

- Protect
 - Health Workforce
 - Schools
 - Critical Infrastructure
- Detect
 - Surveillance
 - Testing
- Intercept
 - Data and Prediction
 - Policy
 - Vaccine and Treatment

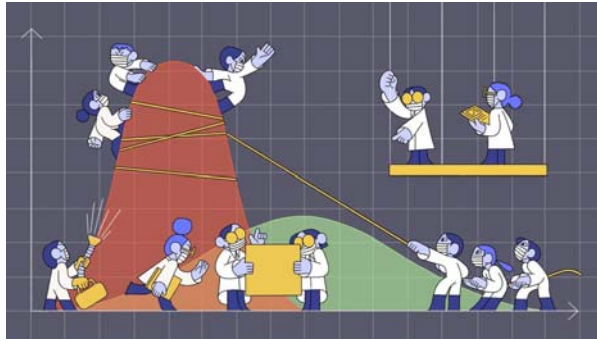
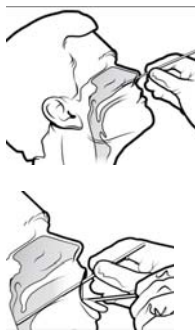


Image: The New Yorker

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Testing for COVID-19

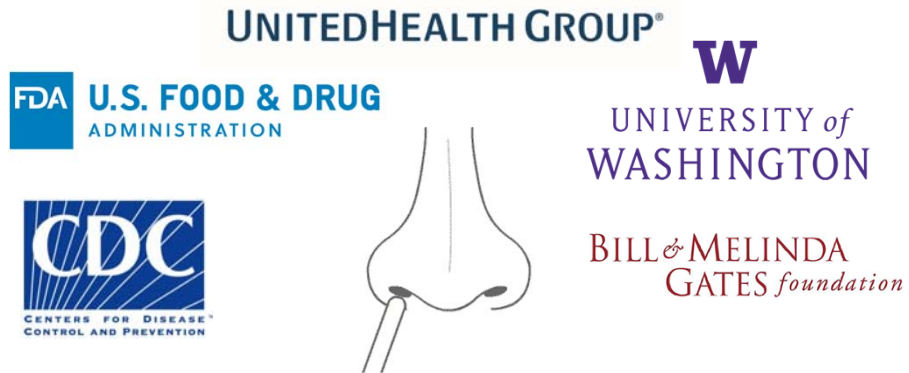


Images: CDC; Video: Adapted from NEJM

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An easier and safer test through partnerships



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Protect the health care workforce – The Everett Clinic



Images: The Everett Clinic, Everett Daily Herald

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Results



The NEW ENGLAND
JOURNAL of MEDICINE

NP vs Tongue

Estimated Sensitivity (97.5% CI):		Tongue		
		Negative	Positive	Total
NP	Negative	450	2	452
	Positive	5	44	49
	Total	455	46	501

Estimated Sensitivity (97.5% CI):		Nasal		
		Negative	Positive	Total
NP	Negative	447	1	448
	Positive	3	47	50
	Total	450	48	498

NP vs Mid Turbinate

Estimated Sensitivity (97.5% CI):		MT		
		Negative	Positive	Total
NP	Negative	452	0	452
	Positive	2	50	52
	Total	454	50	504

N Engl J Med. 2020 Jul 30;383(5):494-496. doi: 10.1056/NEJMc2016321. Epub 2020 Jun 3.

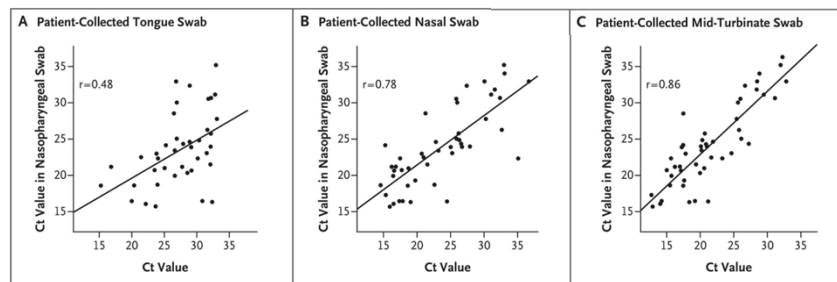
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Results



The NEW ENGLAND
JOURNAL of MEDICINE



N Engl J Med. 2020 Jul 30;383(5):494-496. doi: 10.1056/NEJMc2016321. Epub 2020 Jun 3.

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Next challenge



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Determining the Optimal Testing Strategy

- Test Type
- Test Performance
- Test Frequency
- Time to Results
- Cost
- Community Prevalence
- Pooling or Individual Testing
- Confirmatory Testing

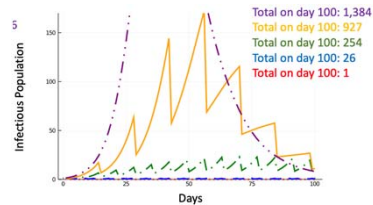
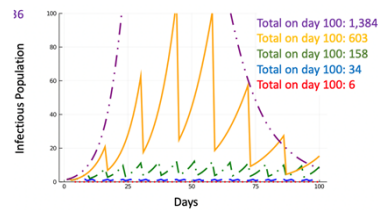
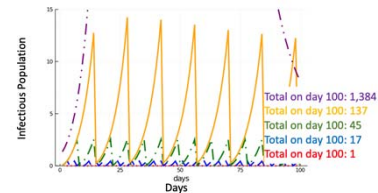
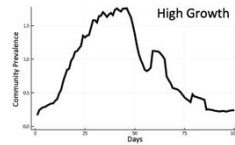
WHAT IS YOUR GOAL?

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Determining the Optimal Testing Strategy

Purple: no testing
Orange: every two weeks
Green: every week
Blue: every 3 days
Red: daily testing.



Identifying Optimal COVID-19 Testing Strategies for Schools and Businesses: Balancing Testing Frequency, Individual Test Technology, and Cost
doi: <https://doi.org/10.1101/2020.10.11.20211011>

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Calculator

United in Research
powered by UNITEDHEALTH GROUP

Detailed calculator

Simple calculator

Resources

COVID-19 Testing Strategy Simulator

Your Population

Population size: 1500
People initially infectious: 1
People initially immune: 0
Percent of people who will comply with isolation: 100%

Your Test

Cost per test: \$125
Cost per confirmatory test: \$100
Sensitivity: 98%
Specificity: 99.5%
Test processing time (days): 7

Your Strategy

Frequency of screening: 7 (weekly)
Individual tests: ☐
Pooled tests: ☒
Pool size: 10
Type of test: ☒ Swab ☐ Saliva

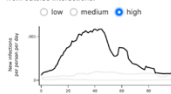
Disease Parameters

With confirmatory testing

Total cost for 100 days: \$431,882
Cost per person per day: \$2.88
Infections prevented: 1305
Infections experienced: 78
Infections missed by testing: 18
Unnecessary quarantines due to false positives: 0
Reduction in infections compared to no testing: 94.34%

Community Prevalence

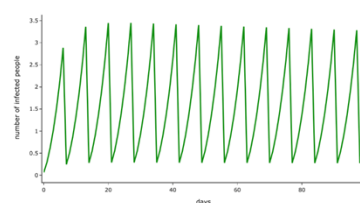
To account for the introduction of infections from the surrounding (non-tested) community, select a profile which represents the rate of infections from outside interactions.



Without confirmatory testing

Total cost for 100 days: \$175,000
Cost per person per day: \$1.17
Infections prevented: 1305
Infections experienced: 78
Infections missed by testing: 18
Unnecessary quarantines due to false positives: 120
Reduction in infections compared to no testing: 94.34%

Infectious Population



The plot above shows the number of infectious people in the population for the duration of the testing period. The jagged nature corresponds to the removal of infectious individuals after they receive a positive test (if they comply with isolation).

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Putting it together

- Better Testing
- Better Surveillance
- Rationalize Testing Strategy
- Predictive Models
- Public Point of View

Achieve Health and Health Equity

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The Challenge

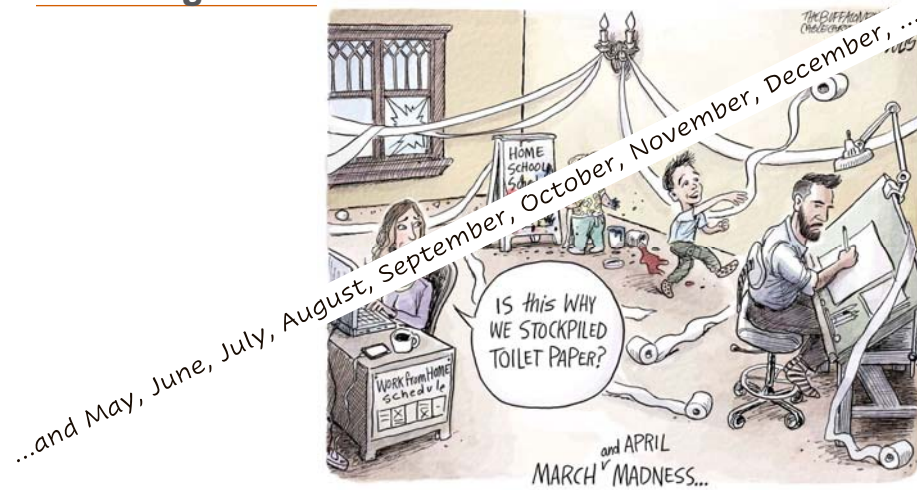


Zyglis, A. Work from home schooled [Cartoon]. March 14, 2020. The Buffalo News. Available at: https://buffalonews.com/opinion/adam-zyglis-work-from-home-schooled/article_baf79631-7e54-54b0-b4fa-1c9ab14de50e.html

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The Challenge



Zyglis, A. Work from home schooled [Cartoon]. March 14, 2020. The Buffalo News. Available at: https://buffalonews.com/opinion/adam-zyglis-work-from-home-schooled/article_baf79631-7e54-54b0-b4fa-1c9ab14de50e.html

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The Challenge

JAMA
Network | **Open**

Original Investigation | Public Health

Estimation of US Children's Educational Attainment and Years of Life Lost Associated With Primary School Closures During the Coronavirus Disease 2019 Pandemic

Dimitri A. Christakis, MD, MPH; Wil Van Cleve, MD, MPH; Frederick J. Zimmerman, PhD

The Washington Post

Democracy Dies in Darkness

Education

In D.C., achievement gap widens, early literacy progress declines during pandemic, data show

- Missed instruction during 2020 could be associated with an estimated 5.53 million years of life lost
- Declines in Early Literacy
 - Kindergarten – 11 % drop
 - 1st Grade – 12% drop
 - 2nd Grade – 7% Drop
- Challenges in mental health for students of all ages
- Risk of teacher attrition

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The Challenge: How to keep schools open safely?

GOALS

- Keeping school open (rather than individual diagnosis)
- Create a protective bubble
- Identify asymptomatic people
- Sustain healthy behaviors
- Ensure teacher safety and comfort



STRATEGIES

- Monitoring local epidemiology
- Choose the learning model (hybrid, distance, full in-person)
- Mitigation
 - Universal masking
 - Hand hygiene
 - Physical distancing
 - Closure of common spaces
 - Reduced density in facility
 - Increased cleaning frequency
 - Optimized HVAC and filtration
- Symptom & Temperature Checking
- **TESTING**

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The Challenges of Testing: Too Many Choices! And not enough choices!

Considerations for Test Selection

- Sensitivity / Specificity
- Turn around time
- Ease of use
- Cost of the test
- Availability of test and supplies
- Regulatory
- Ability to pool

Considerations for Program Implementation

- Testing frequency
- Human resources and training
- Facility to collect samples or perform test
- Data recording and reporting
- Privacy
- Alignment with school policies
- Community acceptance

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Real World Partner: Washington International School

- A not-for-profit, co-ed, independent school
- 900 children (grades pre-school to 12)
- 180 faculty, staff, and contractors
- 2 campuses — Upper School and Primary School
- Hybrid learning model
 - 1 week in person
 - 1 week distance



**Desire for sustainable testing program for
ALL people working or learning on
campus**

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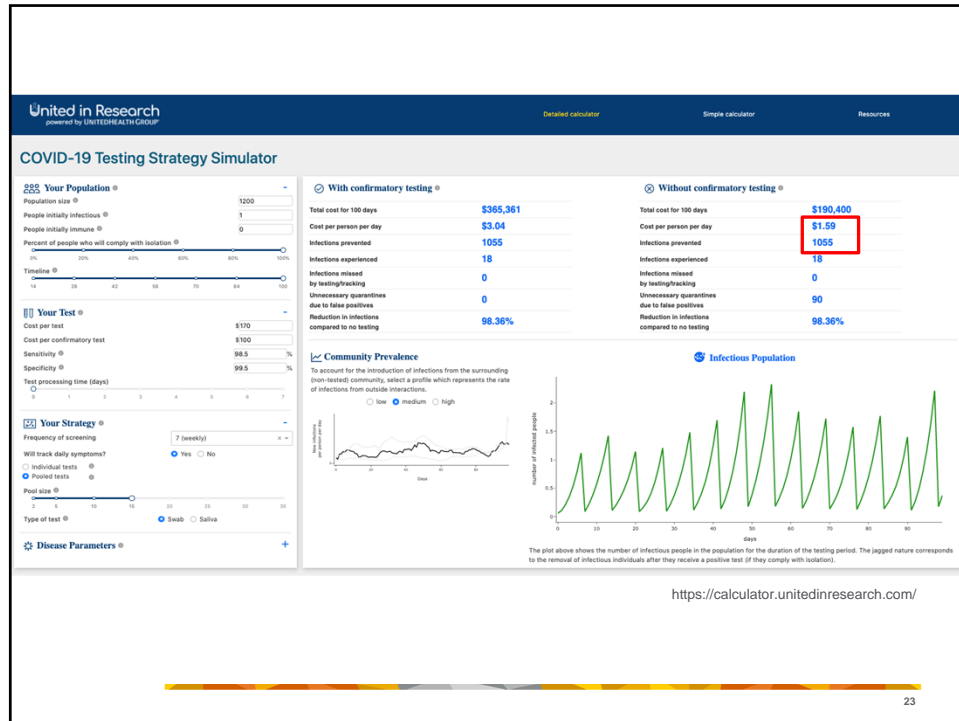
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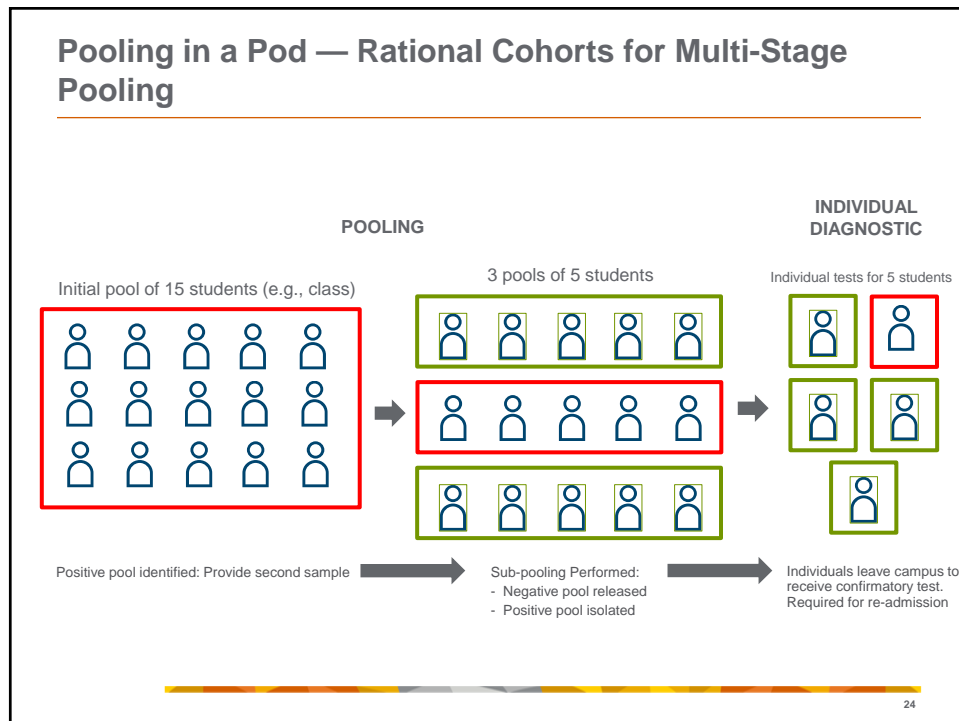
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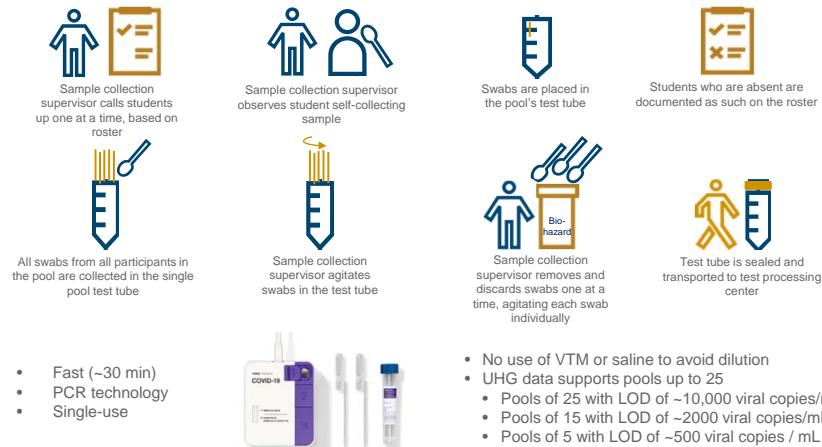


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Visby Medical RT-PCR Device – Direct Swab Method



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Implementation

- On site training, with skills assessment
- Per diem nurses support core staff in supervision of collection and running tests
- Cloud-based lab information system created for managing pooled and individual results
- Full SOPs for PPE use, test interpretation, management of pools, test failures, biohazard spills and disposal
- Signage for testing team and participants

W.S. WASHINGTON SCHOOL DISTRICT Project Iceberg - Looking Beneath the Surface

COLLECT YOUR SAMPLE AND STAY SAFE!

- GET READY!**
Open the swab by tearing the end and peeling the sides of the wrapper (like a band-aid).
- IN IT GOES...**
 - Gently insert the **entire soft tip** of the swab into one nostril
 - Rub the swab slowly around the **inside wall** of your nostril at least **four times** for **5 seconds**
 - The swab tip should be touching the **inside wall** of the nostril through each turn
 - Repeat in your other nostril with the same swab, for 5 more seconds
- HAND IT OFF!**
Hand the swab to the person helping you test.

Don't forget to put your mask back on and wash your hands!

Tough to put in your nose? Try pointing it to the back of your head instead of towards your eyes.

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Results — School Remains Open

- Started the week before Thanksgiving for staff
- Opened early October and have not missed a scheduled school day
- All students and staff tested every week
- Pooling data to date (11/30/20–2/3/21):
 - 3,598 tests to date, 510 pools
 - 181 staff samples per week – (avg. pool size 5.7)
 - 420 student samples per event – (avg. pool size 7.6)
 - Average pooling efficiency gain of 7.1:1
 - 1 positive staff pool of 4 to date (1 individual positive)
- Total daily process time: approximately 2 hours



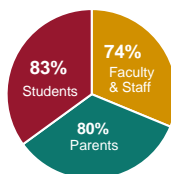
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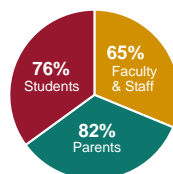
Feedback – Testing is Supported & Builds Confidence

The charts below show respondents who agreed/strongly agreed with the statement.

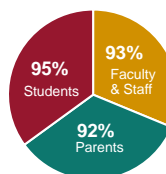
Those who refuse testing should not be allowed to attend class in person.



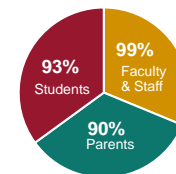
Testing increases my comfort with moving toward full in-person learning, even if other schools remain in hybrid or stay-at-home models.



Testing on a regular basis is important to ensure school can remain open.



Post-launch: I am open to being part of pooled testing once or twice a week, with an individual confirmatory test required if the pool is positive.



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Feedback from our K-5 Citizen Scientists

- **SCERVOUS** (the feeling of being scared and nervous at the same time)
- **NERCITED** (the feeling of being nervous and excited at the same time)



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Socialization and Lessons Learned

- Align school policy to support pooled testing
- Provide choice of learning models and testing access to meet family preference
- Dynamic FAQ to address staff and family concerns
- Address issues of trust and positive intent in groups that experience health inequities
- Be ready to refine processes and adjust as needed
- Be ready to redirect symptomatic people
- Transparent communication to parents, staff, AND students about importance of testing
- Age-appropriate processes and materials
- Communicate all materials in multiple languages
- Rapid reporting of pooled results, with explanations of what next steps are
- Frequent assessment from stakeholders

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Questions?

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Save The Date:

Wednesday, March 10, 2021 1-2 PM ET



Improving Outcomes and Reducing Costs for Diabetic Kidney Disease

*Joseph Vassalotti, MD
Chief Medical Officer
National Kidney Foundation*

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Now available on-demand for up to 1 hour of continuing education credit:

*From the Frontlines of the War on COVID-19
COVID-19 Vaccines
COVID-19 – Neutralizing Antibodies*

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Thank You.

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