Fighting COVID-19 at Cornell

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also, Anneliese Markus, Robert Zhang, Bonnie Akhavan, Henry Robbins

Colleges with coronavirus cases since the pandemic began

● Fewer than 100 cases ● 100-999 ● 1,000 or more

Double-click to zoom into the map. Drag to pan.



The New York Times

Over 1,000 students have tested positive for Covid-19 at University of Alabama since classes resumed

By Hollie Silverman and Dakin Andone, CNN (1) Updated 5:06 PM ET, Sat August 29, 2020



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Coronavirus: Notre Dame to move classes online for 2 weeks; Yale saliva test may miss some infections

CNBC.com staff



North Carolina's flagship university moves online after 130 Covid-19 cases

The University of North Carolina at Chapel Hill changes course after coronavirus spreads during the first week of classes





What's different at Cornell



- Asymptomatic screening 1-2x / week
- Contact tracing + adaptive testing on positive cases

Decisions supported by science and operations research

- PCR testing done at vet school lab
- **Pooled testing** for surveillance samples



Simulated COVID Progression



We worried endlessly about uncertainty



Results from our compartmental simulation model

Testing seemed able to protect us against parameter uncertainty, if we could test often enough



Fall 2020: There were fewer infections than predicted



Aug 16

Dec 10

Our focus turned from robustness to accuracy: Parameter calibration improved model accuracy



Contact tracing enables targeted testing

- Understand the transmission network
- Identify clusters and high-risk groups
- Target testing at high-risk groups to maximize protection



Spring 2021 and beyond: Transitioning into a vaccinated world

Reasons for hope:

- Vaccines offer significant protection against severe infection
- 99% Vaccination rate among the student body
- Data can lead the way

Reasons for caution:

- More transmissible variants
- Waning vaccine effectiveness
- Lack of vaccine access in some parts of the world

We used data to quantify the effect of vaccines on transmission



Vaccines improve campus safety, asymptomatic screening still important to keep infections low





What's different at Cornell

- Test all students on arrival
- Test students with symptoms
- Test students <u>without</u> symptoms 1x to 2x per week (asymptomatic screening)
- Do contact tracing + adaptive testing on positive cases
- Socially distanced classrooms
- Better compliance with social distancing & masking

Massive # of tests with is enabled by:

- Large PCR capacity at the Vet College
- Pooled testing
- Collaboration with local hospital

Decisions supported by science and operations research

Fall 2020: This strategy was effective



Cornell Local Population

- 12K UG
- 7K grad students
- 9K staff + faculty

Overall statistics (students + employees)

- 258 cases
- 0.9% infected

Compare, e.g., to Syracuse University:

- Nearby (1h drive)
- Same # students + employees (28K)
- 800 cases detected
- Many more undetected

You get the most protection with a given test capacity by targeting your testing



- We enumerate assignment of groups to testing frequencies
- For each, we use a comparental simulation to predict infections
- Each letter corresponds to a collection of test frequency assignments
- E.g., "B" means:
 UG in high-density housing 2x
 / week

Off-campus staff 1x / month Everyone else 1x / week



Testing Resources vs. Infections