Repopulating Campus

Key Considerations for De-Densification of Campus and Containment of Infections

EAB Research

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1 The Present Situation

2 Containing Infections on Campus

3 De-Densifying Campus

4 Persisting Challenges

Caught Between a Rock and a Hard Place

Universities Simultaneously Confront a Financial Abyss and a Pandemic

Business Model Under Stress

- **Non-tuition student revenue** collapsed in the spring due to room and board refunds and campus shutdowns
- **Fall enrollment** is a total unknown and could potentially decline dramatically
- **State funding** is under siege by budget shortfalls and austerity measures
- The **Federal Government** has too many financial fires to put out in the private sector and has deprioritized higher ed

Risks of Bringing Students Back

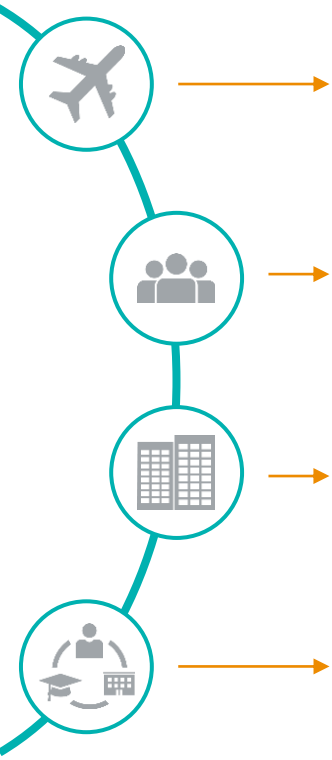
- **Students, faculty, and staff are more at-risk** from a resumption of in-person activities than they would be otherwise
- **Public health investments** to make campus COVID resilient will be **expensive** and highly **disruptive** to university operations
- Even if we do everything right, it **may not be possible to prevent a repeat of spring semester shutdowns**

How to safely return to campus?

Source: EAB interviews and analysis.

All Colleges Face Shared Challenges

Campuses are Unique, but COVID Strikes at the Common Core of Higher Ed



Campus communities have **highly mobile populations,** with many students arriving from outside the locality

Students, faculty, and staff are in **close contact with hundreds of peers**

Students live in **high-density housing**, on or off campus

Impossible to **isolate campus from town/city**

> "A college dorm is pretty much like a cruise ship in terms of spreading disease."
>
> *Dr. Jen Kates, SVP Kaiser Family Foundation*

Rural Schools not Exempt

- Most hotspots now in rural locations
- Rural schools recruit urban students
- Rural locations have less hospital capacity and higher-risk populations than metro areas

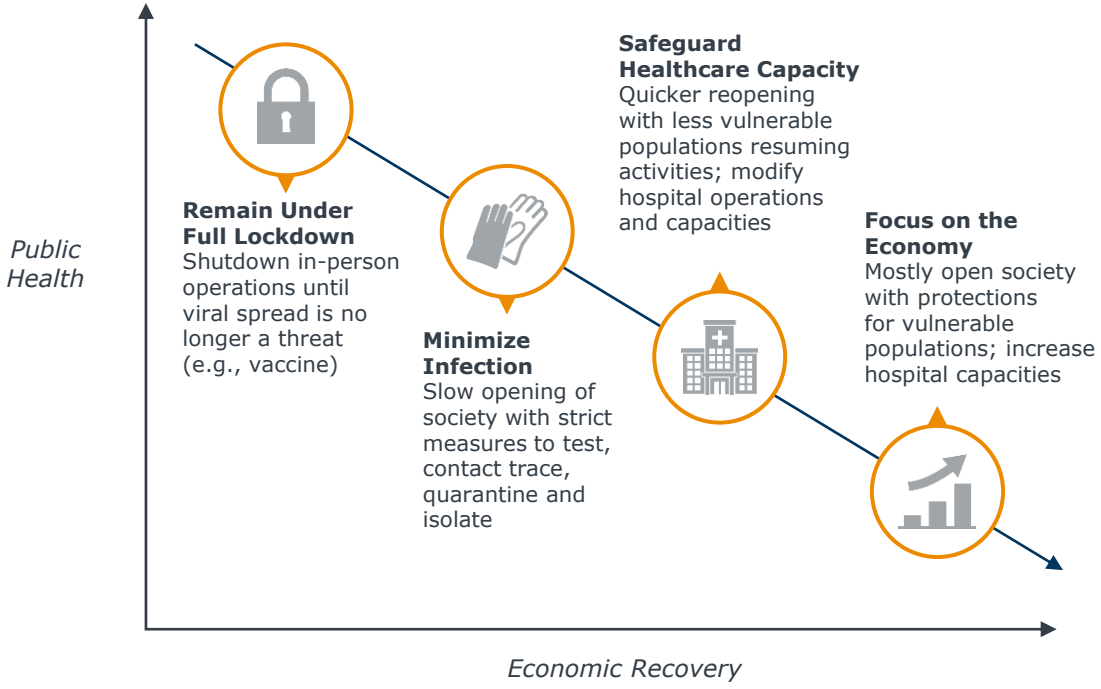
Commuter Schools not Exempt

- Commuter students more likely to have denser networks from work and home life, increasing chances of contracting an infection

Source: https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html; https://www.healthsystemtracker.org/brief/urban-and-rural-differences-in-coronavirus-pandemic-preparedness/; EAB interviews and analysis.

Four Scenarios for Reopening Society

Options Mapped by Public Health and Economic Recovery



Source: CIDRAP; EAB interviews and analysis.

Making Sense of Repopulation Plans

Institutions Have Released Preliminary Roadmaps for Return to Campus

CSU The California State University

Virtual Fall 2020

- All 23 campuses of the Cal State University system will offer most courses virtually for Fall 2020.
- Cal State system educates nearly 500,000 students with a large commuter population
- Testing at scale estimated to cost $25M per week

PURDUE UNIVERSITY

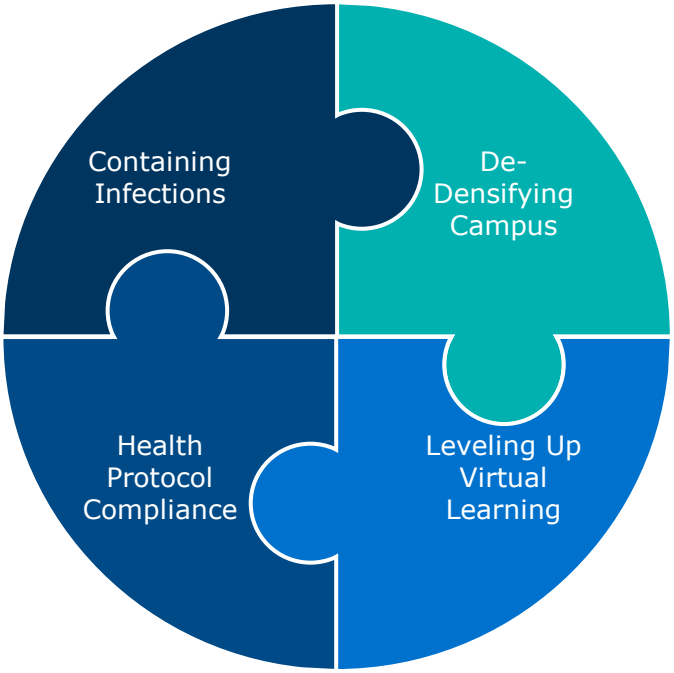
Safeguard the Vulnerable

- Purdue announced plans to operate at typical capacity with efforts made to protect vulnerable populations.
- Academic calendar to cancel fall break and complete face-to-face instruction by Thanksgiving
- Crowdfunding alumni donations for PPE and COVID-19 response initiatives

Source: CIDRAP, CSU Fall Reopening Plan; Purdue Reopening Plan; EAB interviews and analysis.

A Pathway to Repopulation

Key Components of Institutional Plans to Bring Student Back



Our Focus Today

- **Containing Infections**
  Identify and isolate COVID cases before the emergence of substantial campus outbreaks
- **De-Densifying Campus**
  Lower transmission opportunities through physical distancing and reduced population size
- **Health Protocol Compliance**
  Create a culture of prevention where students, faculty, and staff buy in to and follow public health guidance
- **Leveling Up Virtual Learning**
  Invest in improving digital education provide operational flexibility and instructional resilience

Source: EAB interviews and analysis.

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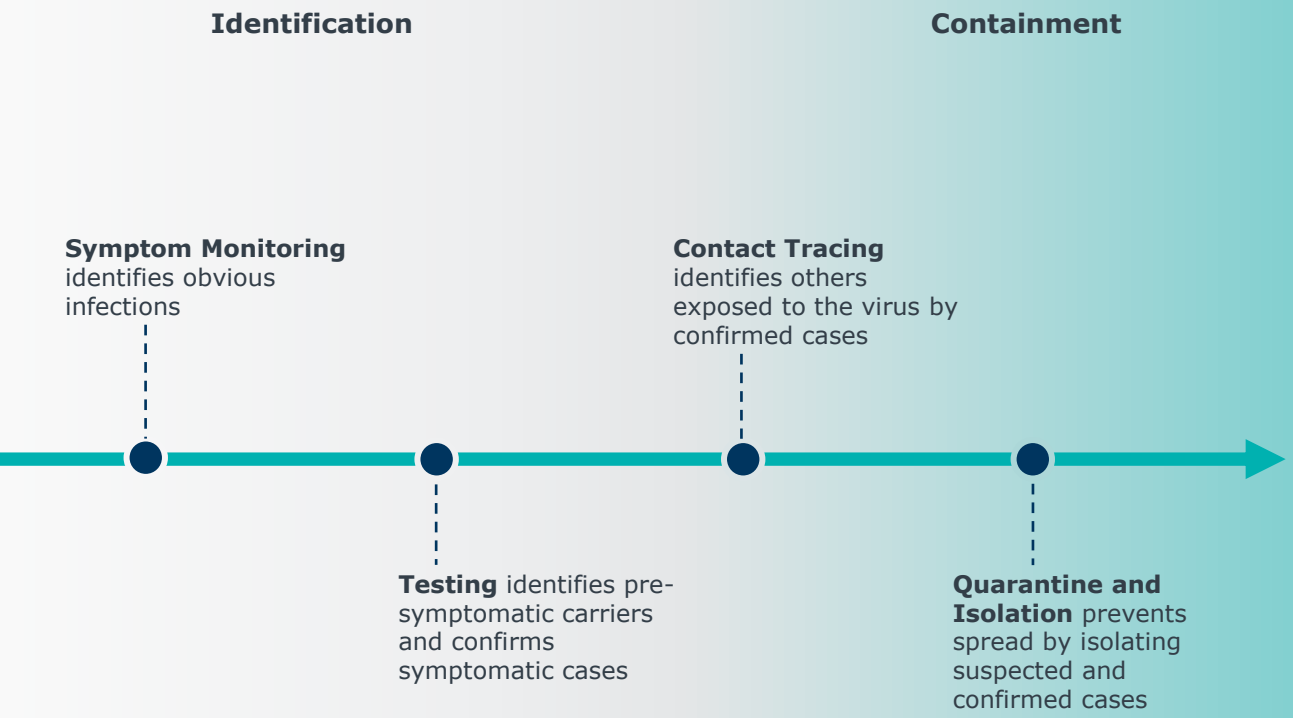
Containment: Identify and Isolate Infections

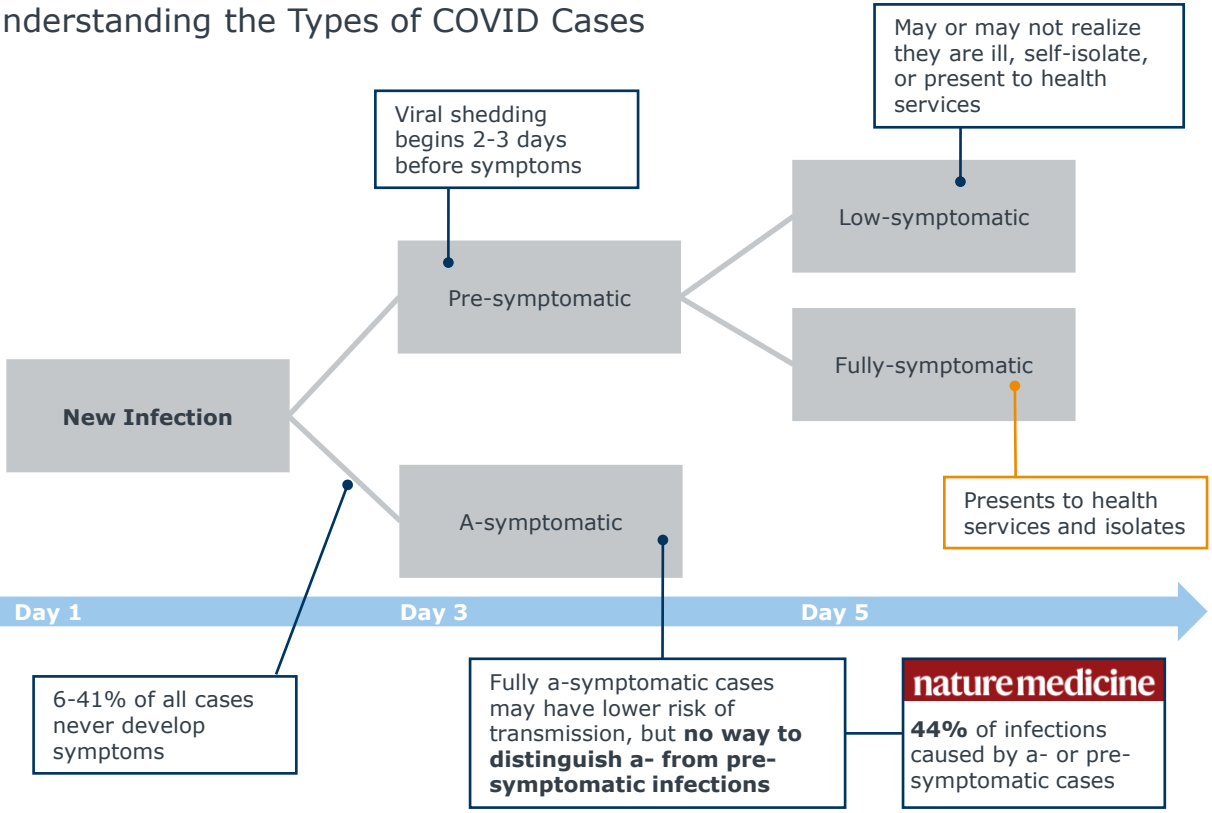
Four Key Steps in the Pandemic Containment Playbook



Source: EAB interviews and analysis.

The High Risk of Symptomless Spread

Understanding the Types of COVID Cases



Source: WHO, "Advice on the Use of Masks in the Context of COVID-19," https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak; https://www.nature.com/articles/s41591-020-0869-5; EAB research and analysis.

Symptom Monitoring: Groundwork for Containment

Necessary but not Sufficient to Identify Infections

Scale Monitoring with Self-Reported Checks

Self-reported questionnaires are inexpensive

Use app or web form to ask faculty, staff, and students if they have common symptoms

Temperature checks are costly and catch fewer cases

Self-reported, or install stations across campus

Use Reports to Isolate Students

Immediately prompt students to stay in room, participate remotely in classes

Health Services triages reports to decide if testing or further isolation is merited

Health Services follows up with student about next steps

Monitoring Can Help ID Outbreak…

Triages likely infections for testing

Encourages students with mild symptoms to isolate

. . . But Faces Obvious Limits

Students don't notice all mild symptoms

Students don't report symptoms accurately to avoid isolation and stigma

Monitoring won't catch pre-symptomatic or a-symptomatic cases

Source: https://www.bbc.com/news/uk-52840763; https://science.sciencemag.org/content/early/2020/06/08/science.abc6197#ref-5; https://www.chronicle.com/article/Does-Anthony-Fauci-Think/248839; EAB interviews and analysis.

Key Considerations for COVID Testing

The Crucial Tool to Identify an Outbreak before It Grows

Three Types of Test

1 PCR Tests

- Gold standard for diagnosis
- Only detects active infections
- Requires time-intensive lab work

2 Rapid Diagnostic Tests

- 5-45 minute processing time
- Special machine processes one test at a time
- Controlled supply, with first responders and medical centers having priority

3 Antibody Tests

- Detects evidence of past infection
- Poorly designed tests abound
- Even the best tests are more likely to return a false positive than a true positive

PCR Tests Best Viable Option at Scale

Still faces capacity uncertainty

Cost

$50-150 per test, but lower if you can manufacture in house

Supply

Capacity is improving, but bottlenecks in lab capacity and test-kit manufacture

Scale

Testing all student at Northeastern *once* would require half the tests conducted in Massachusetts over the last week.

Will testing capacity be adequate in the fall, given increased demand from businesses, K-12, and higher ed?

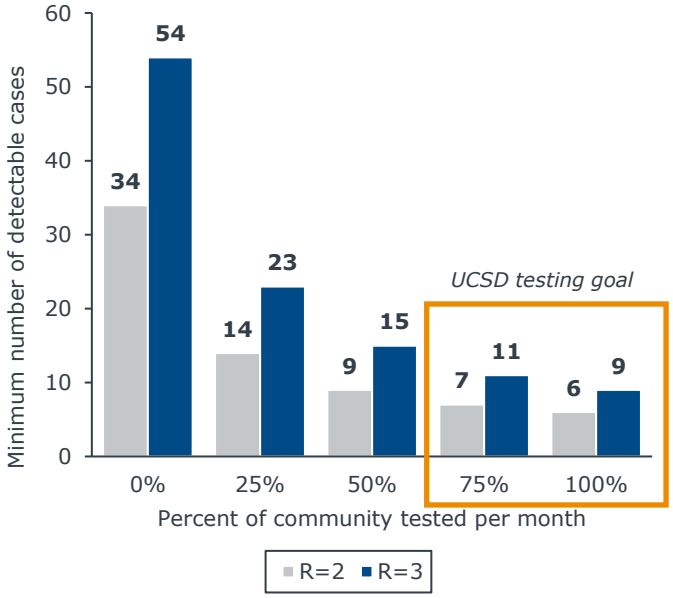
Source: https://eab.com/insights/expert-insight/enrollment/covid-testing-allow-campus-return/;; https://medicine.wustl.edu/news/experts-urge-caution-in-interpreting-covid-19-antibody-tests/; EAB research and analysis.

Surveillance Testing at UC San Diego

"Return to Learn" Program Identifies Cases before They Spread

UCSD Models the Impact of Periodic Testing

Minimum number of detectable cases in the UCSD community when there is a >90% probability of detecting at least one case



1) Assumes 5% of cases present to health services

Key Takeaways

- Even testing 25% per month halves undetected cases
- UCSD aims to test at least 75% of campus community per month

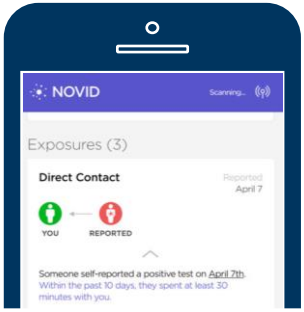
Combine Lower Cost, Higher Risk Alternatives

- Test at 25% per month, or about one test per student per semester
- Target surveillance testing to populations with high risk of transmission
- Test everyone on arrival
- Use robust symptom monitoring to increase number of mildly symptomatic cases that are tested

Source: Martin NK, Degruttola V, and Schooley RT, "Return to Learn: UCSD COVID campus reopening modeling"; EAB interviews and analysis.

Implement Robust Manual Contact Tracing

Low-Tech Contact Tracing is Cheap and Effective



Much-Hyped Contact Tracing Apps Fall Short

- Require **60% usage** to be effective, which has proven impossible in democratic countries
- **Cost of up to ~$100K** to develop or license a new system
- Require **buy-in from state or local public health agency** to be published to the Google and Apple stores
- Still need manual tracing

Manual Contact Tracing has Minimal New Costs

Build Flex Capacity

- Recruit staff from divisions like athletics who will remain underemployed
- Train staff using free online courses
- Training takes 5-8 hours

Leverage Existing Data

- Pull data like course schedules, residence hall assignments, or building swipes
- Staff conduct interviews with confirmed cases and reach out to contacts

Source: https://eab.com/insights/expert-insight/business-affairs/contact-tracing-lessons-higher-education/; EAB interviews and analysis.

Isolation and Quarantine Units (I/Q)

Confirmed case

Exposure to confirmed case

Self-reported symptoms

Isolation

An *isolation unit* separates individuals with a confirmed case.

Symptomatic

Release after:
- 3 days with no fever **AND**
- Symptoms have improved **AND**
- 10 days since symptoms first appeared

Asymptomatic

Release after:
- 10 days have passed since test
- Received 2 negative test results in a row, at least 24 hours apart

Quarantine

A *quarantine unit* separates individuals exposed to an infected person but have yet to be confirmed as infected.

Initial Positive

Send to an isolation unit

Initial Negative

Quarantine for incubation period and test. Positive cases should isolate.

Key Questions to Consider:

1. Who will have access to I/Q units? (e.g., resident students, off-campus students, staff)
2. How will you triage individuals into quarantine?
3. How many units can you arrange for isolation and/or quarantine?

Sources: CDC Guidelines; EAB interviews and analysis.

Approaches to Isolation and Quarantine on Campus

CDC Recommended Isolation Unit Conditions

Infrastructure

- Individual living quarters
- Individual restrooms
- Negative pressure ventilation system

Accommodations

- Meal delivery
- Basic medical supplies
- Laundry and sanitation
- *Academic support**

Behavior

- Standard hygiene
- No/limited sharing equipment
- No visitation

Isolation in room (*no sanctioned units*)

Cost ● ● **Risk** ● ●

- Higher risk of spread to roommate(s)
- Decentralized isolation increases burden of providing accommodations

Isolation in facility, quarantine in room

Cost ● ● **Risk** ● ●

- Requires attentive triage system
- Multiple confirmed cases can be cohorted into an isolation room
- High risk of spread among quarantined roommate(s)

Isolation and quarantine facilities on campus

Cost ● ● **Risk** ● ●

- Centralized facilities simplifies logistics
- Institutions preparing 1:7 I/Q units based on student interaction data
- Must balance I/Q inventory to rapidly convert units

Need more space? Some universities are contracting off-campus hotels and recreational venues as ersatz quarantine and isolation units.

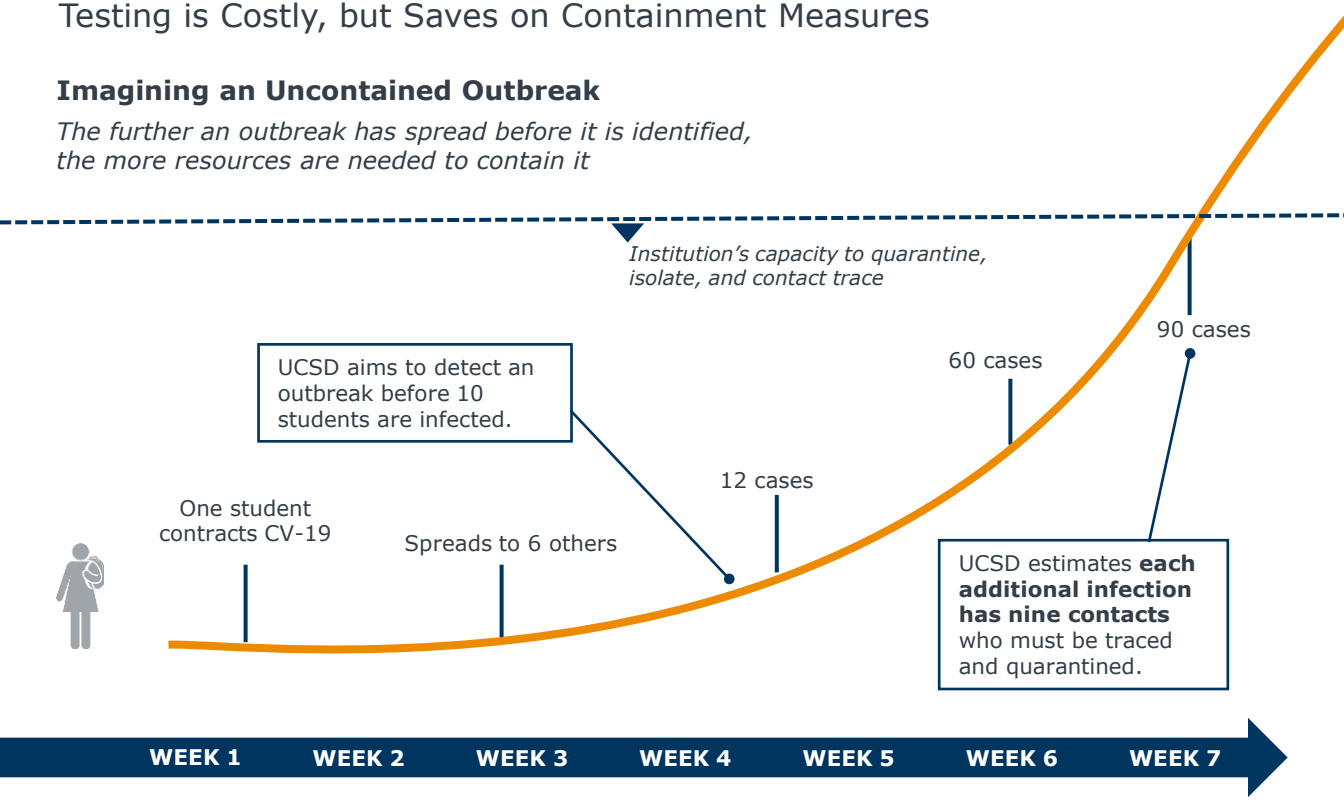
Sources: CDC Guidelines; EAB interviews and analysis.

Balancing Up-Front and Downstream Costs

Testing is Costly, but Saves on Containment Measures

Imagining an Uncontained Outbreak

The further an outbreak has spread before it is identified, the more resources are needed to contain it



Source: EAB interviews and analysis.

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The Challenges of De-Risking Campuses

The Deck is Stacked Against Institutions Trying to Prevent Disease Spread

Universities Have a Dense-by-Design Environment…

Networked campus means average student shares courses with 500 peers

Residence halls designed for maximum efficiency and socialization

Classrooms seat students closely to optimize limited academic space

…Combined with a High Prevalence of Transmission Risk Factors

1. **Activities Center Around Discussion**
   Speaking at length releases two to ten times as much virus as one cough
2. **Mostly Indoor Spaces**
   Chance of an individual infecting others almost 19 times greater indoors versus outdoors
3. **Time-Intensive Courses**
   Chance of contracting illness increases after ~15 minutes of exposure
4. **Lots of Close Contact**
   Research suggests most transmission occurs person-to-person

Source: https://www.insidehighered.com/news/2020/04/14/sociologists-say-their-findings-student-interconnectedness-suggest-caution-needed; https://www.nature.com/articles/s41598-019-38808-z); https://www.doh.wa.gov/Portals/1/Documents/1600/coronavirus/COVIDexposed.pdf; https://www.medrxiv.org/content/10.1101/2020.02.28.20029272v2.full.pdf; EAB interviews and analysis.

Personal Protective Equipment (PPE)

Colleges and Universities Struggle to Acquire PPE

Obstacles

- Tight supply chains
- Bidding wars and competition from other schools, states, hospitals, and nursing homes—to name just a few
- Price increases of up to 1000% since January (e.g., masks, hand sanitizer)
- Unclear and changing guidelines on how much PPE is needed
- Spike in campus need if there is significant outbreak
- Single-use vs. reusable equipment
- Practical distribution and use enforcement challenges

Potential Solutions

Centralize university PPE procurement

- *University at Buffalo will centrally source all PPE*

Partner with state and local governments and peer institutions to identify and secure supply chains

- *Connecticut's Reopening Plan calls for the state to lead PPE procurement for universities*

Develop in-house PPE production capabilities

- *Stony Brook University plans to use 3D printing to make critical PPE items*

Survey department PPE needs and identify redundancies

- *Virginia Tech surveyed their units to determine PPE demand and waste*

Source: McKnight, Analysis: PPE costs increase over 1,000% during COVID-19 crisis; University of Buffalo, Connecticut Reopening Plan; Stony Brook University; Virginia Tech; EAB interviews and analysis.

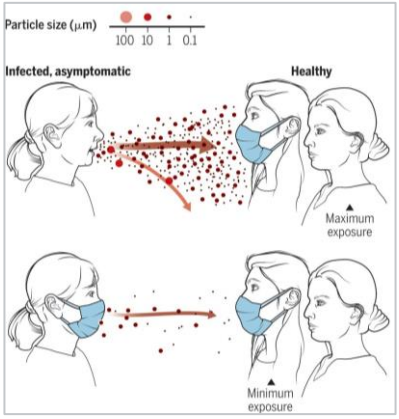
The Era of the Ubiquitous Mask

Mask-Wearing Will Become a Fixture of Campus Life

Masks Mitigate COVID Transmission

- Scientific evidence demonstrates that masks, even cloth ones, lower particle production
- Widespread usage diminishes both symptomatic and asymptomatic spread
- Benefits are maximized in spaces where physical distancing cannot be maintained

Visualizing the Mitigation



Creating a Mask-Wearing Campus Norm

State and Local Policies

Assume as minimum threshold and build campus expectations on top of them

Scope and Circumstance

Prioritize higher-risk spaces based on:

- Number of people
- Airflow
- Duration
- Extent of physical separation

Usage Expectations

Communicate clearly when masks must be used and "nudge" norms through signs and cues

Mask Type and Supply

Allow students to elect to use their own masks, but set minimum mask types (e.g., cloth) and make masks available to all students

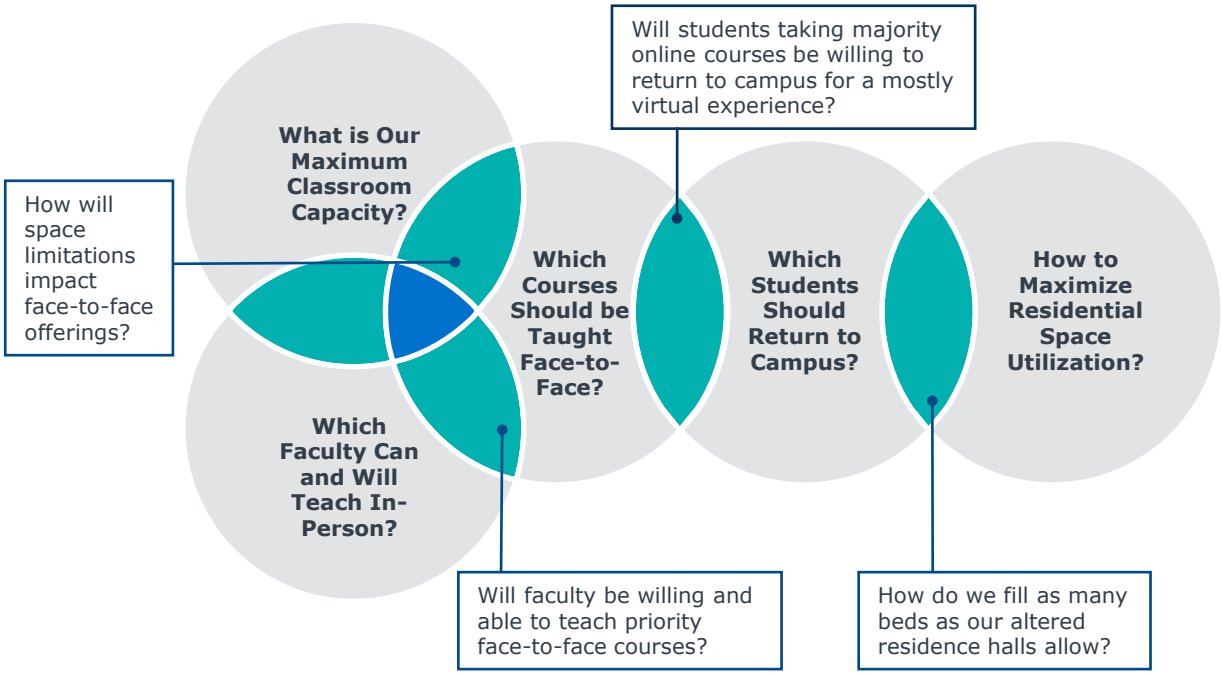
Encouragement and Enforcement

Use student conduct procedures to teach norm and provide incentives for compliance (e.g., incorporate into attendance policy)

Source: Science, Reducing transmission of SARS-CoV-2; EAB interviews and analysis.

Key Questions Guiding Campus De-Densification

Coordination Across Sub-Groups Essential For a Cohesive Repopulation Plan



Source: EAB interviews and analysis.

Academic Space Changes Possible, but Challenging

Most Effective Options Drastically Reduce Capacity; Other Fixes Expensive

1 Identify Alternative Spaces

In Practice

Convert ballrooms, quads, or performance spaces to classrooms.

Rationale

Greater volume of air per person lowers risk of transmission.

Downsides

Nontraditional classroom spaces must be identified and modified.

2 Social Distance in Classroom

In Practice

Rearrange furniture in classroom to allow for at least six feet of distance between individuals.

Rationale

Greater distance between individuals reduces transmission risk, especially in closed environment.

Downsides

Reduces capacity by 50-80%; extra furniture must be taped off or stored; fixed furniture rooms difficult to modify.

3 Improve Ventilation

In Practice

Open windows; modify or replace HVAC to increase air exchange with outside.

Rationale

Increasing air exchange with outside decreases concentration of virus in air.

Downsides

HVAC modifications extremely expensive; not all classrooms have operational windows; occupants likely to be uncomfortable.

4 Separate Instructors from Students

In Practice

Instructor teaches from behind a plexiglass or plastic sheeting barrier.

Rationale

Faculty at higher risk due to age and health; faculty also more likely to spread virus while lecturing.

Downsides

Faculty may resist being cordoned off; amplification systems may be needed; student/instructor rapport could be impacted by barrier.

Source: EAB interviews and analysis.

Alternative Course Schedules Help De-Densify

Reducing Contact In and Between Classes to Minimize Spread

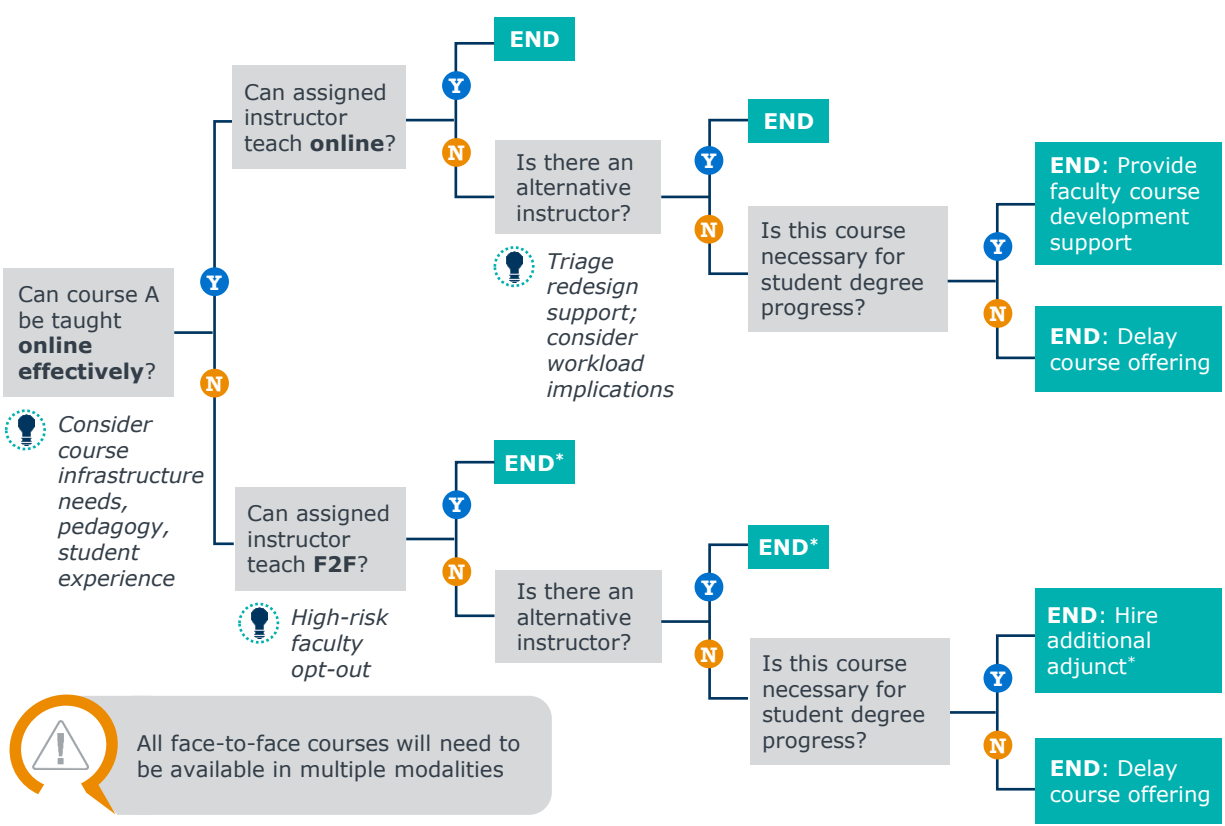
Academic Scheduling Changes Necessary, but Not Without Downstream Consequences

	Student re-registration	Logistical challenges (e.g., calendar overhaul, SIS[1] limitations)	Course redesign	Equity concerns (e.g., working students, student parents)
Stagger class start and end times across the day	✓	✓		
Increase time between classes	✓	✓		
Cohort F2F[2] students by week or time of day		✓		
Alternate between F2F[2] and online instruction			✓	✓
Extend scheduling across more hours in the day	✓	✓		✓
Extend scheduling across more days in the week	✓	✓		✓

1) Student information system
2) Face-to-face instruction

Source: EAB interviews and analysis.

Decision Tree to Prioritize F2F Instruction



* Indicates courses to prioritize for face-to-face instruction

Source: EAB interviews and analysis.

Maximize Capacity for F2F Instruction Safely

Develop Clear Prioritization Guide to Assign Excess Class Space

Formula to Determine Maximum Capacity Given Academic De-Densification Strategies

Assign Classroom Space Based on Academic and Institutional Priorities

Assign based on:

- Faculty preference
- Priority student populations (e.g., first year students)
- Course redesign support limitations

Source: EAB interviews and analysis.

Which Students Should Come Back to Campus?

No Silver Bullet for Repopulating Campus; All Options Carry Risks

1 Prioritize Students Taking F2F Courses

In Practice

Students taking all or most of their courses F2F are brought back first.

Rationale

Students who must take a high proportion of their classes online will not have a meaningful campus experience.

Downsides

Most likely to leave out students taking lower-division course, which could impact future retention.

2 Prioritize by Grade Level

In Practice

Students brought back by class year (e.g., graduate students, upperclassmen, freshmen).

Rationale

Holds cohorts together; targets groups likely to graduate soon (upperclassmen, graduate students) or in need of engagement (freshmen).

Downsides

Prioritizing one group over another can alienate excluded students.

3 Prioritize Based on Equity

In Practice

Students who are housing-insecure, at-risk at home, or international get on-campus housing first.

Rationale

Ensures students most in need of housing receive it; increases likelihood of international student retention.

Downsides

Does not necessarily optimize housing or tuition revenue; still must decide who to prioritize next.

Source: EAB interviews and analysis.

What to Do with Residence Halls

Emerging Science on Transmission Shows High Risks of Shared Living Space

The Difficulties of Containing Viral Spread in Residence Halls

In a recent study, **coronavirus was found on 15% of bathroom surfaces in homes of infected individuals,** compared to just 3% of other surfaces.

A CDC study of the *USS Roosevelt's* outbreak revealed **berthmates of infected individuals were twice as likely to be diagnosed with COVID-19.**

A Tale of Two (Hypothetical) Campuses: the Public Health Tradeoffs of Filling Res Halls

	Fauci U Prioritizing Public Health Guidance Above All	**Average U** Weighing Both Financial and Public Health Concerns
Overall Capacity	Capped at 50%	Capped at 90%
Hall Bathrooms	Limited to as few students as possible	15-20 students per bathroom
Single Rooms	Guaranteed to every student upon request	Reserved only for students with health conditions
Non-Single Rooms	No bedroom houses more than two students	
Quarantine /Isolation Units	10 beds per infected student	One bed per infected student

Source: https://www.medrxiv.org/content/10.1101/2020.05.28.20114041v1; https://www.cdc.gov/mmwr/volumes/69/wr/mm6923e4.htm?s_cid=mm6923e4_w#F1_down; EAB interviews and analysis.

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Not a One-Time "Go or No-Go" Decision

Institutions Will Need to Continually Evaluate Their Plans' Viability

Criteria for Return to Campus and Potential Alterations to Operations

Government Guidelines

- CDC best practices
- State safety and regulatory guidance
- Local public health agency resources and capacity

Disease Spread

- Daily new cases
- Rate of change in cases
- Acceleration of case growth

Health System Capacity

- Positive test rate
- Daily hospitalization rate
- Intensive care unit bed capacity

Public Sentiment

- Student and parent confidence
- Faculty and staff feedback
- Local community input and perception

No Great Options Should Outbreak Arise

1 Temporary Shelter-in-Place

- Close campus for 5-7 days and then reassess
- Only viable for small, localized outbreaks

2 Expand Interventions

- Roll out aggressive testing, physical distancing, and quarantine provisions
- Requires preexisting capacity

3 100% Virtual with Campus Open

- Keep campus open but end F2F courses
- Students will resist and likely would not control outbreak

4 100% Virtual and Close Campus Again

- Repeat of what happened this spring
- Damage to auxiliary revenue and student confidence

Source: Global Center for Health Security; EAB interviews and analysis.

Upholding Commitments to Diversity and Inclusion

Equity Pitfalls of Proposed Risk-Reduction Modifications to Campus Operations

Cost	Housing	Campus Life	Access
Mandatory infection tests without subsidization burdens students with insufficient healthcare.	Charging more for single rooms leaves lower SES[1] students at greater risk of transmission.	Students may be reluctant to cooperate with contact tracing, either due to potential implications of quarantine or removal from campus.	Students without access to computers or internet will struggle to complete coursework in an online or hybrid learning modality.
Eliminating on-campus employment deprives students of needed income.	Lowering housing capacity could displace some students to crowded or unsafe situations off-campus.	Enforcing mask-wearing may result in bias and discrimination incidents, especially regarding BIPOC[2] campus members.	Insufficient sick leave policies disincentivize student workers and non-tenured instructors from taking time off.
Extending class hours penalizes students who work or have caretaker responsibilities.			Restricting campus to young, healthy students discriminates against nontraditional students or ones with health conditions.

1) Socio-economic status.
2) Black, indigenous, people of color.

Source: EAB interviews and analysis.

Student Compliance Required for Any Plan to Work

Students Have to Do Their Part… But It's a Lot to Ask


Limits on social event size and frequency


Physical distancing when in groups


Sustained mask wearing


Elimination of shared items


Suspension of some student activities, facilities, and traditions


Proper personal hygiene measures (e.g., handwashing)


Testing regime and symptom reporting compliance


Self-isolation and quarantine protocols

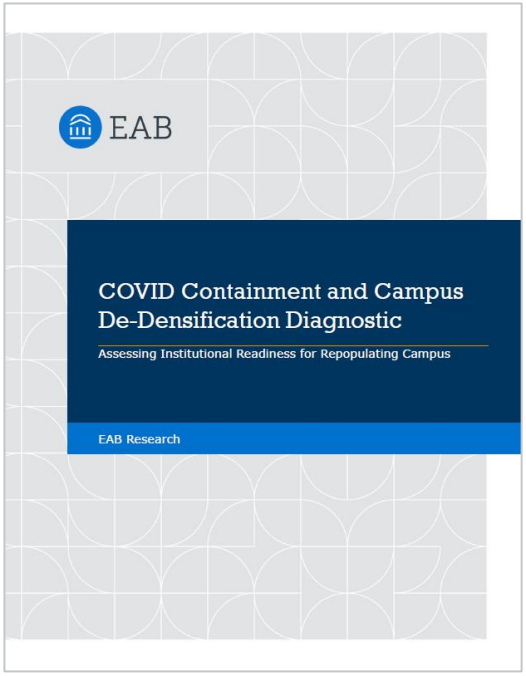
Cultivating a Community Public Health Responsibility

- Educate students on public health measures and community expectations
- Myth-bust "young person invincibility" and emphasize risk to peers, faculty, staff, and community
- Launch student health pledges to build buy-in and foster peer accountability
- Revise student conduct codes to incorporate public health guidance
- Craft enforcement plans with focus on education and individual responsibility

Take EAB's Social Distancing Education and Enforcement Survey

Source: EAB interviews and analysis.

Further EAB Resources



COVID Containment and Campus De-Densification Diagnostic

- Strategic assessment of institutional readiness for the fall
- A multidisciplinary audit of the key public health strategies needed to operate a COVID-19-resilient campus
- Expert conversations with campus leadership group on reopening plans
- Customized recommendations and prioritized framework for what actions to take to bring students back safely

Coming Soon:
Repopulating Campus Resource Center

- Latest information and resources on containment measures, campus de-densification, public health protocol compliance, and digital learning

Interested in using the Diagnostic on your campus plan?
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Source: EAB interviews and analysis.

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