RETURN TO OPERATIONS

NATIONAL BEST PRACTICES AND EVIDENCE-BASED GUIDANCE FOR COVID-19

ECU
COLLEGE OF ALLIED HEALTH SCIENCES
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I. INTRODUCTION

COVID-19 is a severe respiratory disease caused by a virus that appears to be frequently transmitted through airborne particles. COVID-19 has a world-wide case-fatality rate of 7.0% and even in regions with aggressive case finding the case-fatality rate is high. In Australia, which has a history of over 6,500 cases and only 3% diagnosed in the past two weeks (thus indicating that the disease is both under control and the majority of cases have resolved), the case-fatality rate (CFR) is 1.37%. In the USA, COVID-19 is still active, with 327,000 cases diagnosed in the last two weeks (34% of all cases in the USA recorded to date). In North Carolina there are over 16,000 cases and in the 29-county region of eastern North Carolina there are over 2,700 cases. The CFR for the USA overall is currently 5.4% and for North Carolina it is 3.9%. The difference between the CFR between Australia and the United States is likely due to differences in the availability and indications for testing.

During the past week, 14,973 individuals in the U.S. were reported to have died from COVID-19. The number one cause of death in the United States is listed by the CDC as diseases of the heart, with an average weekly mortality of 12,493: less than the number of deaths actually attributed to COVID-19 in the prior seven days. This is a serious disease and the pandemic is ongoing.

As government authorities look to implement business reopening measures, East Carolina University is planning to return employees and students back into operations as COVID-19 business restrictions and state and local stay-at-home orders expire. This handbook is designed as a best practice guide for ECU. It is intended to help plan in implementing work practice controls related to personal protective equipment (PPE), social distancing, surface cleaning, and testing.

Recommendations have been organized into three categories: 1) guidelines that are widely adopted best practices or evidence based, 2) additional guidance from ECU experts recommended to increase the safety of our campus community and vulnerable populations and 3) practical recommendations to reduce the burden and increase compliance with the rules.

This guidance document is neither a policy nor a regulation. The challenges, information, demands and threats of the COVID-19 pandemic evolve rapidly and are highly dependent on jurisdiction- and sector-specific considerations. It is important that all members of the ECU community continue to collaborate in the design and implementation of careful and thoughtful remedies and responses in the upcoming coming days and weeks.
II. DEFINITIONS

SARS-CoV-2: Severe Acute Respiratory Syndrome Corona Virus 2, the novel coronavirus first identified in Hubei Province, China, in December 2019.


Close contact: Two or more people close together for more than a brief interaction. Close contact is often described as when people are less than 6 feet from each other for more than 10 minutes, however the definition can differ depending on the context. For health-care workers, the CDC describes the duration as “any exposure greater than a few minutes” if the contact is with someone who is ill. For the purposes of contact tracing, we recommend that close contact be defined as closer than 10 feet for more than five minutes if indoors, and closer than 6 feet for more than 10 minutes if outdoors. A stricter definition is warranted for contact tracing as we are specifically evaluating the contacts of a person who is ill.


Note that the commonly used 6-foot separation guideline has never been validated and represents only “expert consensus” level of evidence. SARS-CoV-2 has been transmitted more than six feet in many settings.

PPE: According to OSHA, personal protective equipment, commonly referred to as “PPE", is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. https://www.osha.gov/SLTC/personalprotectiveequipment/

Surgical Mask: A surgical mask is a loose-fitting, disposable device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment. Surgical masks are regulated under 21 CFR 878.4040 and are intended for one-time use.

Cloth mask: The CDC defines cloth masks as simple cloth face coverings to slow the spread of the virus and help people who may have the virus and do not know it from transmitting it to others. Cloth face coverings can be made from household materials and are easy to assemble. https://youtu.be/tPx1yqJgf4

N95 mask: N95 masks are respiratory devices designed with a close facial fit and efficient filtration of airborne particles. N95 masks used in industrial and healthcare settings are regulated by the FDA and NIOSH.
III. PERSONAL PROTECTIVE EQUIPMENT (PPE) GUIDELINES & RECOMMENDATIONS

What follow are recommendations for the use of personal protective equipment (PPE) to enable students and employees to return to on-campus activities, focused on those recommendations most likely to make the largest contribution to the safety and health of people on campus.

1. Widely adopted best practices and evidence-based recommendations
   1.1. **Cloth masks, surgical masks or other solid face coverings must be worn at all times.**
       Masks may be homemade or purchased at a store and should be worn by all persons. Masks must be worn at all times indoors with the exception of single-person private offices. Masks must be worn outdoors in situations where there is a risk of close contact.

   1.2. **Other PPE (gloves, etc) is not necessary except as directed by a supervisor.**

   1.3. **If PPE is not available, or if availability of PPE is limited by the needs of critical services (e.g., first-responders, health care) the campus should be closed to any activity for which PPE would otherwise be required.** Until the situation changes, mask use is a requirement for re-opening.

2. Rules and guidelines recommended by the committee
   2.1. **N95 masks should not be used on campus. Cloth masks or paper surgical masks should be required.**
       This will preserve N95 masks for those who need them. Many industrial N95 masks have an exhaust valve that will make the mask ineffective in protecting others from an infected wearer. N95 masks need to be fit-tested and wearers require training to ensure that the specified filtration is achieved and are not appropriate for the general population.

   2.2. **Guidelines on mask use should be posted on campus and distributed before people return to campus.**
       Guidance on mask use should include recommendations on facial hair with masks, the use of a bag or clean towel to rest the mask on when it is temporarily removed to prevent fomite contamination, and used masks should be placed in a bag or container for transport and always in the same orientation noting the clean and potentially contaminated sides. Wearers should wash hands before putting on their masks and before and after touching their masks. Guidance should include diagrams of proper donning and doffing procedures.

3. Practical guidelines for implementation
   3.1. **ECU should distribute surgical masks to students and employees.**

   3.2. **People on campus should have access to more than one mask per trip on campus.**
       They may be instructed to bring two or more masks or masks may be distributed.

   3.3. **Homemade masks should only be used if surgical masks are unavailable. They should consist of at least two layers of fabric and should be changed when soiled or wet.**
       Mask use should not be optional. Expert opinion and some evidence support the preference for surgical masks over homemade masks, however homemade masks or non-surgical face coverings should be required if surgical masks are unavailable.
4. Brief Background and Rationale

- The recommendation that mask wearing on the ECU campus be mandatory in most settings is based on guidance from the Centers for Disease Control and Prevention (CDC).³

- There is an assortment of findings on the effectiveness of wearing surgical or homemade masks to prevent the spread of SARS-CoV-2. It has been proven that infectious SARS-CoV-2 particles can pass through surgical masks. However, masks are efficient at blocking droplets. The primary human infectious route for SARS-CoV-2 is still not clear but transmission via droplet, close contact, and fomites are all considered likely.⁴

- People without symptoms can spread the virus. The combination of pre-symptomatic and asymptomatic cases represents 50% of disease transmission, based on a study of early cases in Wuhan, China (see Figure).³ The proportion of symptomatic spread is likely reduced by greater awareness. Thus, transmission prophylaxis for people unaware of their infection is the most important component of spread mitigation.

- These recommendations focus on droplet precautions. There is some controversy about droplet versus aerosol transmission, however the evidence tends to support droplet-based transmission.⁶ Surgical-style masks and face coverings block larger droplets, not aerosols.

- A face covering will greatly reduce the distance that respiratory particles travel after a sneeze, cough, throat-clearing, laugh, or even general breathing.

- The spread from asymptomatic individuals seems highly likely, and the Ro (“R naught”) value for SARS-CoV-2 appears to be between 2 and 3, which means that each infected individual will infect 2 to 3 others if no infection control measures are in place.

- It appears that countries that enforced strict mask wearing have slowed the spread of disease better than those that have not enforced mask wearing but many factors are likely involved in the observed differences.

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Figure: Contributions to COVID-19 spread by case phenotype. Ferretti, et al. Science. 8 May 2020.
• Mask wearing changes hygiene and interaction habits in both positive and negative ways but accompanying education can make these changes mostly positive. Mask wearing should prevent people from unnecessarily touching their face and remind people to wash their hands more often.

• Many unknowns regarding infection have led to a conservative approach in the development of these recommendations. These recommendations will be updated as new information becomes available.

• The ability of SARS-CoV-2 to spread rapidly among individuals in close contact with each other makes mask wearing by all seem prudent.

• For a more in depth understanding of what we know and do not know about COVID-19 (including mask wearing), please visit the following website and view the most recent PDF that has been posted: https://www.dhs.gov/publication/st-master-question-list-covid-19 Note: this site is updated about once every two weeks and new findings added since the last update are in light blue writing.

5. Mask Use and Care

5.1. Surgical Masks

• Wash your hands or use hand sanitizer prior to putting on the mask.

• For surgical masks, identify the inside - this should be white. This side faces your mouth. The blue or colored side faces out. The noseband should be on the top.

• With the white side facing in and the noseband on the top, place the loops around the ears or tie the straps at the neck and at the crown of your head.

• Pull the top and bottom of the mask to expand the folds. The top of the mask should extend above your nose, and the bottom should extend below your chin.

• Pinch or press the noseband so that it conforms to your nose bridge.

• Do not touch the mask, if possible, while wearing. If you do need to touch it, wash your hands immediately before and after. Always assume that your mask has been contaminated by SARS-CoV-2.

• Do not eat, drink, or smoke while wearing the mask.

• Remove the mask from the face carefully (wash your hands first), touching only the bands and not the outside surface. The outside surface should not come into contact with your face. Avoid pulling the mask up over your forehead or down over your chin.

• Dispose of the mask when soiled or wet. Wash hands or use hand sanitizer before removing your mask and after taking the mask off.
• If a mask is to be reused during the same work period, place the potentially contaminated mask outside down on a paper towel with the straps away from it. Alternatively, place it in a paper bag that is labeled “front” and “back” so that the mask always goes in with the front facing the same direction.

• Remember, the more often you place and remove your mask, the more likely you may accidentally ingest or inhale the virus.

• The following short educational video shows the proper way to put a surgical mask on, take it off, and store it. It also offers guidance on mask handling.
  https://www.youtube.com/watch?v=z-5RYKLYyaw

5.2. Homemade Masks

• Homemade masks should consist of at least two layers of fabric and should be changed when wet or soiled.

• For homemade masks, place the mask into a bag and wash it each night with laundry detergent. Dry it on high heat or follow the manufacturer’s instructions for washing and drying.

• Makeup should not be worn below the eyes when a mask is being worn.

• Guidance on mask wearing, construction, and care is available at:
INTRODUCTION

Individuals become infected by direct (droplet, aerosol) or indirect (fomite) contact with someone infected by SARS-CoV-2. Current CDC guidance recommends maintaining at least a six foot (two meter) distance between individuals to minimize the spread of the disease, however contact tracing in a restaurant in China traced transmission over a distance of approximately four meters, and symptomatic disease in 79 of 124 workers in a large, open floor-plan call center. Both proximity and duration of proximity are factors in disease transmission.

The disease can be transmitted from respiratory droplets when an infected person coughs, sneezes, or talks. The disease is transmitted when people eat together and when people touch a surface or object that has the virus on it and then touch their mouths, noses, or eyes. The disease can be transmitted by people who are not aware they are sick or are showing symptoms.

What follow are recommendations for social distancing on campus to enable students and employees to return to on-campus activities, focused on those recommendations most likely to make the largest contribution to the safety and health of people on campus.

1. Widely adopted best practices and evidence-based recommendations

1.1. “Keep coronavirus at bay by staying six feet away.”
All people should maintain at least a 6-foot distance from any other people. Campus facilities should be adapted to support and encourage this by, for example, arranging all chairs at a minimum of a 6-foot interval. In settings with chairs/desks that are fixed in position (e.g., auditoriums), if alternate chairs are not 6 feet apart then use should be limited such that all individuals are at least 6 feet apart.

1.2. Pedestrian flow should be directed to preserve social distancing.
Because evidence suggests that transmission occurs through the combination of proximity and duration, it is not necessary to enforce 6-foot separation for very short duration contacts (e.g., passing in a doorway). However, entrances and exits to buildings should be designated with clear wayfinding and pedestrian flow patterns should be enforced, especially indoors.

1.3. Social distance should be maintained in elevators and stairs.
Elevators should either be limited to two people or a 6-by-6-foot grid should be marked out on the floor to indicate passenger spacing. (The exception to this rule is when passing on the stairwells and walking in and out of doors.)

1.4. Social distancing does not replace PPE.
Health-care professionals use N95 respirators when in close contact with individuals with COVID-19 or unknown status. Unless using PPE of similar specifications, social distancing...
1.5. **All interior spaces should be assessed for maximum occupancy consistent with social distancing guidelines.**

New occupancy limits should be clearly posted and faculty and staff should be charged with enforcement.

1.6. **Continue telework and distance education options**

Where possible, telework and distance education options need to be available. This will facilitate both social distancing and allow compliance with isolation and quarantine orders.

2. **Rules and guidelines recommended by the committee**

2.1. **Schedules should be staggered to reduce the number of individuals on campus and to distribute pedestrian and commuter traffic evenly**

Pedestrian flow guidelines need to be combined with efforts to eliminate high traffic times. Staggering class start and end times at 10 minute intervals and spreading classes evenly from 8 a.m. to 4 p.m. should be considered.

2.2. **Communal dining should not be allowed.**

Solitary dining options should be combined with COVID-19 safe serving procedures. Diners should be encouraged to reduce times in dining halls to as little as possible.

3. **Practical guidelines for implementation**

3.1. **Six-foot floor and bench marking should be provided to facilitate separation.**

3.2. **Hand sanitizer should be available at entrances, exits, and in rooms for frequent sanitation.**

Hand sanitizer must meet the CDC guidelines for COVID-19. Alcohol wipes should be available for those allergic to hand sanitizer.

3.3. **Frequent hand washing is encouraged.**

The university should ensure that soap and paper towels are always sufficiently stocked in bathrooms, labs, and clinics.

3.4. **Frequent disinfecting should be scheduled and monitored.**

3.5. **Avoid/limit exposure at communal food or beverage stations.**
V. SURFACE CLEANING GUIDELINES & RECOMMENDATIONS

INTRODUCTION

According to the CDC, the spread of SARS-CoV-2 is from person-to-person, most frequently among close contacts within approximately six feet (without wearing PPE). Although transmission of coronavirus occurs more commonly through respiratory droplets than through fomites, evidence suggests that SARS-CoV-2 may remain viable for hours to days on surfaces made from a variety of materials. The virus is stable for several hours to days in aerosols and on surfaces, according to a new study from National Institutes of Health, CDC, UCLA, and Princeton University scientists in The New England Journal of Medicine. The scientists found infectious SARS-CoV-2 for up to three hours in aerosols, four hours on copper, 24 hours on cardboard and two to three days on plastic and stainless steel. These results provided key information about the stability of SARS-CoV-2 and suggest that people may acquire the virus through the air and after touching contaminated objects. Additionally, it is unknown how long the air inside a room occupied by someone with confirmed COVID-19 remains potentially infectious. Data suggest that facilities consider factors such as the size of the room and the ventilation system designs during planning to close off rooms or areas before beginning disinfection.

This surface cleaning task force was organized to focus on evidence-based recommendations an strategies to reduce/and or eliminate the transmission of coronavirus such as proper hand washing, alcohol-based hand sanitizers and cleaning and disinfecting of frequently touched surfaces (i.e. tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks). Engineering and environmental factors are also integrated into our proposal. This comprehensive overview on surface cleaning aims to protect, support, and provide guidance on keeping our ECU faculty, students, and visitors safe as we cautiously reopen during this pandemic.

BACKGROUND

A recent study from the National Institutes of Health (NIH), CDC, UCLA and Princeton University scientists in The New England Journal of Medicine found that SARS-CoV-2 was detectable on surfaces for between one and three days, depending on the material (Figure).

Figure: The virus SARS-CoV-2 was found to decay to the detection limit in 24 hours when applied to copper and cardboard, and within 48 hours on stainless steel. On plastic surfaces, the virus was detectable up to 72 hours after application. Aerosolized particles were detectable in the air for hours. Van Doremalen N, Morris DH, et al., NEJM. 2020. 382:1564-1567.
Current evidence suggests that novel coronavirus, SARS-CoV-2, may remain viable for hours to days on surfaces made from a variety of materials. Cleaning of visibly dirty surfaces followed by disinfection is a best practice measure for prevention of COVID-19 and other viral respiratory illnesses in households and community settings.

In early March 2020, the EPA released a list of disinfectants to use against COVID-19 along with the following introduction and comments. This list is dynamic and continues to be reviewed with the addition of products as they are determined to meet criteria. From *Disinfectants for Use Against SARS-CoV-2*.

Based on the 2016 *Emerging Viral Pathogen* guidance, developed for a rapid response in the event of an emerging viral pathogen outbreak, this program was triggered for the first time on January 29, 2020. Describing the relevance of a pre-COVID-19 guideline to this novel pathogen, the EPA team writes:

Coronaviruses are enveloped viruses, meaning they are one of the easiest types of viruses to kill with the appropriate disinfectant product. Consumers using these disinfectants on an enveloped emerging virus should follow the directions for use on the product master label, paying close attention to the contact time for the product on the treated surface (i.e., how long the disinfectant should remain on the surface).

The surface cleaning team also reviewed guidance from a diverse set of national, state, and academic recommendations, including the following:

- The National Pesticide Information Center through Oregon State University for general information on effective disinfectant use, definitions of materials which might require disinfection, and steps to reduce risks when using disinfectants;
- The EPA’s general information on disinfectants and validation of their disinfectant list;
- The joint guidance from CDC and EPA on Cleaning and Disinfecting – Guidance for Cleaning and Disinfecting Public Spaces, Workplaces, Businesses, Schools and Homes;
- CDC Interim Recommendations for US Community Facilities in areas with Confirmed COVID-19 cases.

**RECOMMENDATIONS**

1. **Across the Health Sciences Campus**
   1.1.1 **Develop a culture of “surface awareness”**

   Surface cleaning of frequently touched surfaces is a shared responsibility between housekeeping and all who work, study and seek care in our common spaces. While housekeeping has been given enhanced training, all individuals will be required to clean personal spaces in offices and classrooms to augment the work being done by housekeeping. Developing a culture of surface awareness and disinfection before and after touching will be important to reduce the risk of spreading the virus on commonly touched surfaces such as doorknobs, elevator buttons, stairwell railings, etc.

   Antiseptic behaviors should be modeled by leaders and communicated by videos displayed on monitors across campus.
1.1.2 *Surface risks survive up to three days*

Surfaces exposed to potentially infected individuals can carry active virus for up to three days as found on plastic surfaces in the *New England Journal* paper.

1.1.3 *Specific surface cleaning guidance should be followed*

The following are a list of specific recommendations:

- High touch surfaces (such as stair railings, elevator buttons, doorknobs, lab surfaces, etc.) should be cleaned according to CDC, EPA, and OSHA guidelines.

- Disinfecting wipes and hand sanitizer should be available at locations including but not limited to: Elevators, classroom entrances, and entrances to stairwells. The current best practice is for facilities management to provide dispensers to departments and for academic units to provide the contents (e.g., hand sanitizer, wipes). We recommend that university Materials Management bulk purchase these supplies, which can be charged to the appropriate unit.

- Signage in restrooms and common areas reinforcing hand hygiene.

- Required training on surface cleaning along with PPE usage.

- Reduce high touch surface contamination during high-volume entry and exit for classrooms and other large capacity spaces by holding doors open, as allowed. Allowances for temporary (e.g. high traffic times) opening of fire doors should be considered.

- Limit entrances to facilitate enhance housekeeping coverage; designate entrances and exits.

- Quarantine received packages and returned library materials for three days.

- Promote social distancing by removing chairs and workstations.

1.1.4 *Investments in a safe environment*

If practicable, the following infrastructure upgrades should be implemented:

- UV Disinfection of classrooms and common spaces;

- HEPA filtration of buildings;

- Cleansable covers for keyboards and computer mouse (if not possible, shared workstations should be removed);

- Modify transactions at service desks to reduce or eliminate surface contact;

- Install sneeze shields at service desks.
1.1.5 

**Everyone must be accountable for a safe environment**

The surface cleaning recommendations are labor intensive. Students and faculty will have to accept responsibility for supplementing staff for many routine cleaning tasks. It is entirely appropriate for students and faculty in clinical disciplines to be assessed for compliance with safety standards, and course and curriculum leaders should consider ways to include compliance with cleaning guidelines in student assessment. **Compliance with safe workplace guidelines cannot be achieved through housekeeping staff efforts alone.**

1.2 

**College of Allied Health Sciences (CAHS)**

CAHS is housed in a facility connecting to Laupus Library on one side and the College of Nursing (CON) on the other, covering 270,000 square feet that we need to keep in mind as we plan about appropriate cleaning.

1.2.1 **Guidance for CAHS:**

CAHS has a large enrollment with typically a large number of students/faculty/staff in the buildings at the same time. This is potentially an issue for (1) classes and classroom occupancy with social distancing; (2) supporting distancing during transitions when people are moving around the building, in particular with respect to elevator and stair use; (3) risks related to air flow, quality and filtration; and (3) appropriate cleaning of the clinics, laboratories (both clinical and computer-based), offices, bathrooms, classrooms, and the feasibility of maintaining the historical approach to shared materials (e.g., books and journals).

Standards set by federal agencies (CDC, OSHA) are applicable here, notably:

- **Communication with students, faculty, and staff on infection control procedures.** This will require appropriate signage regarding procedures throughout the building (e.g., social distancing during transitions and in classrooms, proper handwashing in bathrooms), and providing disinfecting wipes throughout the building and by all entrances/ exits for easy access.

- **Cleaning of traffic areas** (e.g., elevators, handrails on staircases). These must be regularly wiped with disinfectants, and the Purell dispensers must always be kept full and operational.

- **Ensure safe air flow.** Because the windows in the building do not open, air turnover and filtration must be monitored. The team recommends evaluating implementing active purification approaches to sanitize the filtration system.

- **Clean or remove shared work areas and resources.** In computer labs, students and faculty share keyboards. We recommend that input devices be covered with the plastic as is done in clinics, allowing for safe use.

1.3 

**College of Nursing (CoN)**

The primary risk factor in the College of Nursing is the volume of on campus students that participate in laboratory activities or extended classroom lectures. The College of Nursing utilizes four rooms with greater than 100 student capacity to conduct face-to-face lectures and 7,700 square feet of laboratory space.
1.3.1 **CoN main challenge is social distancing**

With large lectures and heavy laboratory use, CoN will require surface cleaning between every use of its facilities. Mask use and strict personal hygiene might allow for re-use of lecture rooms without surface cleaning. Labs should be cleaned at the beginning and end of every use by lab participants, who should supplement with social distancing, mask use, and strict personal hygiene.

Surface cleaning by housekeeping staff would take an extended amount of time during operational times that may extend the on-campus time of students. Further, cleaning times for the limited number of housekeepers in the College of Nursing to disinfect large classrooms would extend the downtime of the classroom. Mitigation of these risks in the large classroom setting may require individual responsibility for disinfecting personal spaces and equipment used in labs during the educational hours and more thorough cleaning in the evening by housekeeping staff. Designated downtimes for classrooms and labs could be identified to allow for intermittent cleaning by housekeeping staff during educational hours. The College of Nursing is currently developing a plan to coordinate testing and lab utilization among BSN, ABSN, and CRNA on campus programs to facilitate cleaning and social distancing.

1.4 **Laupus Library**

1.4.1 **The library should be closed except for 1Card holders or by special permission**

The primary risk factor at Laupus Library is the volume of visitors seen daily. Laupus routinely sees volumes of up to 900 visitors per day, and is open to the public as well as ECU students, staff, and faculty. Within the library there are multiple surfaces that come into contact with library patrons as well as library staff including but not limited to: computer labs, service desks, study cubicles, study tables, study chairs, circulating library materials (anatomical models, books, laptops), study rooms, and meeting rooms. There are two computer classrooms that are heavily used by faculty for class presentations and testing. Each classroom has a capacity of about 30 people. There are 30 study rooms. Most study rooms have a capacity of about four people, but a few could accommodate eight to 10. There are two large meeting rooms each accommodating over 40 people.

Laupus receives materials (books) from other libraries via the mail and manages a loading dock for the Health Sciences Building. This loading dock and the full-time employee who manages it receives and delivers mail to the entire building.

Housekeeping staff began increased cleaning and sanitizing of surfaces like door handles, study tables, etc. prior to the work-from-home order and we anticipate this continuing. Library staff will also clean and sanitize surfaces and circulating material. Books and mailed packages coming back to Laupus will be quarantined before staff will handle them. Masks and gloves have been ordered for all library staff, as well as hand sanitizer and sanitizing wipes. Additional hand sanitizer dispensers and sanitizing wipes in three large dispensers will be available to library patrons in study areas.

In the first phase of reopening, Laupus will have reduced hours of operations and only allow people with an active 1Card to enter the library. (some exceptions will be made as needed, particularly with fellows or residents, or DE students who may not have a 1Card)
1.5 School of Dental Medicine (SoDM) and Brody School of Medicine (BSOM)

1.5.1 Clinical spaces will conform to national, state, local, and professional group standards for safe operation

ECU Physicians and SoDM campus and CSLC clinics will be guided by professional standards, strictly adhered to. To the extent practicable, they will align with the affiliated health system.

1.5.2 Academic activities will conform with the guidance in other schools
VI. TESTING GUIDELINES & RECOMMENDATIONS

INTRODUCTION
Testing for COVID-19 consists of two key steps: screening, or selecting who will be tested, and testing, or looking for biomarkers that indicated disease.

1. Screening
Screening encompasses any approach that might be used to identify people for testing. Examples:

- Health checks for common symptoms of the disease. For COVID-19, these include fever, dry cough, fatigue, shortness of breath, muscle pain, anosmia, and gastrointestinal symptoms such as nausea, vomiting, or diarrhea. These health checks may be done by interview, self-report, regular (e.g., daily) screening, or population surveillance (e.g., infrared camera).

- Exposure screening. People who have been in close contact with a person diagnosed with COVID-19 are considered to be exposed and may be tested. There may be a delay between when a patient might shed enough disease to transmit the virus to a close contact and when a test would return a positive result, and therefore contact with someone else who has been exposed may warrant testing. Other exposures may be considered.

- Environmental testing. Population screening might be conducted by testing environmental samples. Virus RNA has been identified in stool samples from patients, and some communities are exploring community surveillance by testing sewage. Other mass testing options are available for population screening.

- Systematic or random testing. Other approaches to identifying individuals for testing, including comprehensive or random testing, are approaches to screening. Comprehensive testing might be based on the assumption that the school needs a cross-sectional baseline that, subject to the limitations of the test, we know how many cases there were on campus within test detection limits. Random testing is based on the assumption that we need to be able to identify the situation when there are sufficient cases on campus to appear in the sample that meet the detection limits of the test.

2. Testing
At present, there are two principal approaches to COVID-19 testing: reverse transcriptase polymerase chain reaction (RT-PCR) tests and antibody or serological testing.
2.1  **RT-PCR Testing**

Typically shortened to just PCR testing, this approach looks for the viral RNA in a sample. The CDC recommends collecting a nasopharyngeal (NP) swab (Figure 1). This is the gold standard for case diagnosis. Tests are only positive as long as the tested individual is ill with the disease, and the test will be negative upon recovery (Figure 2).  

![Figure 1: An NP swab. (Source: CDC.)](image1)

![Figure 2: Positive result probability versus time since symptom onset. Virus RNA is not detectable after recovery. (Source: Xiao, AT et al, Clin. Infect. Diseases, 2020, ciaa460.)](image2)
However, there also is a delay between infection and a positive test result. This results in a substantial fraction of asymptomatic individuals returning false negative RT-PCR test results (Figure 3). This false negative rate is high enough that using RT-PCR testing to identify presymptomatic cases is unlikely to be effective: individuals typically manifest symptoms by days five or six, and day five is typically when RT-PCR testing first identifies positive cases.

Figure 3: Probability of a RT-PCR negative test in individuals SARS-CoV-2 positive by days since exposures (top), and the probability an individual receiving a negative result after a referral for testing actually was positive for COVID-19 (bottom). Note that on days one and two after infection, the authors predict 100% negative rate and only on day 5 does the probability of a positive test in an infected individual reach 50%.

2.2 Serology Testing

SARS-CoV-2 immunoassays identify individuals with antibodies to the SARS-CoV-2 virus. At present, the “point of care” tests for COVID-19 fall into this category. These tests identify individuals with an “adaptive immune response to SARS-CoV-2” indicating a recent (including active) or prior infection. At present, there are many unknowns about the duration of immunity after recovery from COVID-19. It is likely that individuals who recover from COVID-19, such that they test positive for virus at one point and subsequently test negative, have acquired immunity to the virus SARS-CoV-2. The duration of this immunity is unknown. Coronaviruses that cause the common cold cause only temporary immunity.

The Abbott Labs fact sheet for their SARS-CoV-2 immunoassay shows that their test does not return a positive result for individuals fewer than three days from symptom onset (Figure 4). This could often mean 10 days from infection, as symptoms typically manifest five or more days after infection.

This test is most important to identify people who have recovered from the disease. From three to seven days after symptoms, the test detects only 25% of cases. However, from eight days on, the test is very likely to detect antibodies to the disease. This type of test has successfully identified individuals who recovered from COVID-19 four weeks or more after recovery.

![Figure 4: Likelihood of a positive patient being detected by the Abbott Labs serology test versus time since symptom onset. (Source: Abbott Labs)](image-url)
2.3. **Implications**

Although the prevalence of COVID-19 in rural eastern North Carolina is relatively low at ~2-3%, faculty and students returning to campus may arrive from areas with higher prevalence rates. In the close living conditions of most students, the chances of spreading COVID-19 on campus will be high.

Given that pre-symptomatic and asymptomatic cases may represent 50% of disease transmission, initial PCR testing to identify early and/or asymptomatic infection has been suggested as a method to identify carriers and prevent the spread of COVID-19 in campus communities. Additional retesting at a minimum of every two weeks or immediately with exposure and/or symptoms is also a component of this approach.

However, random or comprehensive testing is unlikely to stop pre-symptomatic spread. The low likelihood of RT-PCR detection before five days and the high likelihood of transmission in days three, four, and five (see Figure in the PPE section), suggests that detection through symptom monitoring, quarantining contacts, and RT-PCR testing six to seven days post contact or serology testing 10 to 14 days post contact would be the most effective way to confirm a new case. This approach to testing, combined with isolation, contact tracing, and quarantine of contacts will be important tools to stop the spread of the disease.

Comprehensive serology testing may be useful to identify clusters of asymptomatic or very mild cases of COVID-19. Using a random sample of the campus for serology testing, a sampling strategy could effectively characterize the campus situation in the absence of a significant clinical burden from infected students.

It should be noted that, while PCR testing is a gold standard for acute infection with SARS-CoV-2, there are gaps in a process that rely on repeated population testing. The information obtained from PCR and antibody testing is not perfect. Therefore, decisions based only these data will also not be perfect. Further, a reliance only on testing may result in discounting other information, such as fatigue or other mild symptoms, while awaiting a test result. Social distancing and wearing of face masks are a must and should be monitored across campus. Student athletes and staff (and other special groups) may require strict testing guidelines not covered in this brief document.

Management of the ECU population must utilize testing effectively to document population exposure and incidence of active cases. As the campus opens in the fall, PCR testing may be the best way to prevent active cases reaching our campus. While an extensive and expensive task, this testing may be completed by personal physicians and county health agencies for all students, staff and faculty in the two weeks prior to arrival on campus and documentation provided. People testing positive, must remain in quarantine off campus until cleared to matriculate by university health officials using applicable CDC guidelines.
With arrival on campus, daily personal health screening and temperature check with attestation and documentation will be required. Minor symptoms such as loss of smell or taste should also be tracked daily for each person. Offsite travel must be reported and tracked especially visits to areas where COVID-19 is more highly prevalent. Failure to attest on an ECU Health Services website should be pursued by trackers and failure to report should result in increasing disciplinary action, including banning participation in campus activities. If symptoms are reported, immediate PCR testing should be completed and isolation established until SARS-CoV-2 infection has resolved according to CDC guidelines. This will require COVID-19 positive housing and support services on campus. Close affiliation with local hospital (Vidant Medical Center) for testing and possible inpatient care should be in place.

Random testing may be a way to follow the increasing prevalence of SARS-CoV-2 exposure in the ECU community. Random symptom assessment at certain sites on campus will provide data, and potentially an early signal of a potential outbreak on campus. In addition, random PCR and antibody testing from a pool of volunteers will also provide data for calculating community risk or trends. It is estimated that 10,000 random subjects would need to be tested to estimate the exposure of SARS-CoV-2 in the United States. Miami/Dade county estimated the prevalence of the antibody using 1,400 people. Given that ECU may test the entire population, prior to the semester initiation, prevalence trends may be followed with only modest testing of residents on campus as well as off campus persons. Leadership may wish to consider testing 100 or more random volunteers every week using PCR and/or serology testing.

3. Recommendations

3.1 Availability of diagnostic testing for people clinically suspected of SARS-CoV-2 infection is a requirement for the university to open for campus operations.

If appropriate health care is not available, students and employees should not be on campus.

3.2 The campus must facilitate isolation and quarantine because cases will come to campus

Individuals diagnosed with COVID-19 must be able to isolate and have access to the care they need, and people who have had contact with those individuals must be able to quarantine and be tested as appropriate. Individuals with COVID-19 and those in quarantine should be able to continue their education if they are healthy enough to do so without penalty, or they will benefit from hiding symptoms.

3.3 Campus activities should be analyzed and assessed for risks, and testing should be integrated into monitoring programs for higher risk activities

Close contact is defined as two people being within less than 10 feet for more than five minutes. People in close contact should be considered at higher risk of transmitting COVID-19. Close contact is further distinguished between (a) internal contacts: close contact within the campus community (students, employees), and (b) external contacts: close contact between university people and the general public.
Risk of COVID-19 transmission differs by groups. The campus community can be divided into five groups based on their activities:

3.3.1 Health-care workers and trainees
People working in a health-care setting should be tested according to the standards of the health system and/or national standards for health-care professionals, as set by the WHO, CDC, professional and accrediting groups, or other recognized standards-setting bodies.

3.3.2 Other university people whose roles require external contacts
Students and employees whose roles require close contact with the public fall into two categories: 1) those whose work may be completed while protected with PPE; 2) those whose work may not be completed with PPE. Asymptomatic testing be provided for category A. The university should not allow the continuation of category B activities.

3.3.3 University people whose roles require internal contacts
Students and employees whose roles require close contacts with other students and employees are also divided by whether they can (category A) or cannot (category B) use PPE during those contacts. It is recommended that asymptomatic testing be available for category B members of the campus community.

3.3.4 University people whose roles require they be on campus without close contact
For individuals whose roles do not require close contact, systematic testing is not recommended. If random testing is adopted, these students and employees may be included in random testing.

3.3.5 University people who remain off campus and continue to telework or enroll exclusively in distance education
These students and employees should only receive testing in a healthcare setting and should not be included in campus-based random testing if such testing risks exposure.

4. Screening and testing recommendations
• As the campus opens in the fall, PCR testing may be the best way to prevent active cases reaching our campus. Testing may be completed by personal physicians and county health agencies for all students, staff and faculty in the two weeks to five days prior to arrival on campus and documentation provided.

• People testing positive, must remain in quarantine off campus until cleared to matriculate by university health officials using applicable CDC guidelines.

• With arrival on campus, daily personal health screening and temperature check with attestation and documentation will be required. Offsite travel must be reported and tracked especially visits to areas where COVID-19 is more highly prevalent. Failure to attest on an ECU Health Services website should be pursued by trackers and failure to report should result in increasing disciplinary action, including banning participation in campus activities.
• If symptoms are reported, immediate PCR testing should be completed and isolation established until SARS-CoV-2 infection has resolved according to CDC guidelines. This will require COVID19 positive housing and support services on campus. Close affiliation with local hospital (Vidant Medical Center) for testing and possible inpatient care should be in place.

• Random testing may be a way to follow the increasing prevalence of SARS-CoV-2 exposure in the ECU community. Random symptom assessment at certain sites on campus will provide data, and potentially an early signal of a potential outbreak on campus. In addition, random PCR and antibody testing from a pool of volunteers will also provide data for calculating community risk or trends. Leadership may wish to consider testing 100 or more random volunteers every week using PCR and/or serology testing.

• Passive screening should be implemented (e.g., IR camera to detect fever) and should reach a minimum of 10% of people on campus daily and should target groups whose activities involve close contact. Passive screening should also be used in settings where university people may have external close contacts.

• Individuals who report symptoms of the disease or whose temperature is greater than 100.4°F (38°C) will be isolated immediately and directed to contact student health or a personal physician as appropriate. Following testing, they will be sent home until the result of the test is known and symptoms resolve. A negative test does NOT mean the person is uninfected. Extreme social distancing may be required in these cases, including working from home.

• Individuals testing positive will follow the latest CDC guidelines for isolation before returning to work or the classroom. Contact tracing is required.

• Contacts of individuals who test positive will be quarantined according to the current CDC guidelines for exposed individuals. At the time of this writing, the recommended quarantine is 14 days following their last exposure.18

• Faculty, students and staff must follow the same control measures as practiced on campus when they are in the greater community off campus.

• Anyone living with someone who is sick should notify their supervisor and follow CDC recommended precautions.

• Formal education and training re: COVID-19 should be mandatory to faculty, staff, and students. This training should include infection prevention and control, signs and symptoms, testing, and transmission, as well as campus-specific policies and practices, health and safety resources, directions to perform daily screening, use of PPE, and actions to follow if individual become ill.
5. Changing Landscape

Testing technologies are changing. A review of potential developments:

- Saliva testing for COVID-19 is a promising technology, but it is not widely available. [https://news.yale.edu/2020/04/24/saliva-samples-preferable-deep-nasal-swabs-testing-covid-19](https://news.yale.edu/2020/04/24/saliva-samples-preferable-deep-nasal-swabs-testing-covid-19)

- DARPA is working on developing a test that could detect the presence of the virus “as early as 24 hours after infection”. This test is not currently approved or available. [https://www.theguardian.com/world/2020/may/01/us-germ-warfare-lab-creates-test-for-pre-infectious-covid-19-carriers](https://www.theguardian.com/world/2020/may/01/us-germ-warfare-lab-creates-test-for-pre-infectious-covid-19-carriers)

- The School of Dental Medicine is investigating having dentists in Ross Hall and at the CSLCs perform these collections, a process similar to what is being done in Japan at this time.

- Students on the Health Sciences Campus could be taught how to collect samples. They would need to be taught to don and doff PPE, how to perform nasopharyngeal swabs correctly, and how to draw blood.

- Antigen tests: FDA has approved under emergency use. A positive result can be trusted, but some antigen test kits can produce false positives in the unlikely event that a person is infected with other coronaviruses. A negative result does not mean the person is uninfected because these tests are not very sensitive. Follow up PCR testing should be done.
VII. FOR MORE INFORMATION

- “The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) developed the following “master question list” that quickly summarizes what is known, what additional information is needed, and who may be working to address such fundamental questions. The Master Question List is intended to quickly to present the current state of available information to government decision makers in the operational response to COVID-19 and allow structured and scientifically guided discussions across the federal government without burdening them with the need to review scientific reports, and to prevent duplication of efforts by highlighting and coordinating research.”

  https://www.dhs.gov/publication/st-master-question-list-covid-19

- See the latest information from the Centers for Disease Control on the Coronavirus outbreak, including:
  - Steps to prevent illness
  - What to do when sick
  - Common questions
  - Situation updates


- WHO provides basic protective measures against COVID-19, including:
  - When and how to use masks
  - Myth-busters
  - Advice for health workers
  - Getting workplace ready

Federal, state, and local government are the best source of information in the event of an infectious disease outbreak, such as COVID-19. It is crucial that ECU members stay informed about the latest developments and recommendations as they may change frequently. For purposes of this handbook there were multiple people that supported efforts to create this material. They are listed below for your reference and to contact as needed:

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IX. APPENDIX

I. Introduction: page 3

1 National and international data is drawn from the WHO situation reports as of May 15th, published on the WHO web site: https://www.who.int

2 State and county data is from the New York Times GitHub repository, accessed May 7th. URL: https://github.com/nytimes/covid-19-data

III. Personal Protective Equipment (PPE) Guidelines and Recommendations: pages 5-8


5 https://science.sciencemag.org/content/368/6491/eabb6936

6 For example: “…COVID-19 affected 10 persons from 3 families (families A–C) who had eaten at the same air-conditioned restaurant in Guangzhou, China…. From our examination of the potential routes of transmission, we concluded that the most likely cause of this outbreak was droplet transmission.” https://wwwnc.cdc.gov/eid/article/26/7/20-0764_article

IV. Social Distancing Guidelines & Recommendations: pages 9-10


8 Park SY, Kim YM, et al. “Coronavirus Disease Outbreak in Call Center, South Korea.” Emerging Infectious Diseases. 2020. 26(8).


Additional Sources:


V. Surface Cleaning Guidelines & Recommendations: pages 11-16

10 https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2


15 CDC Guidelines regarding workplace disinfection can be found at the following web sites:
   • https://ehs.psu.edu/covid19
   • https://communications.catholic.edu/coronavirus/touch-point-cleaning.html

VI. Testing Guidelines & Recommendations: pages 17-25

16 The state of North Carolina has recommended that testing be available for people who have been in contact with a person under investigation for COVID-19 exposure, not just people who have tested positive, as of May 15th, 2020.


