



Considerations for Handling Potential SARS-CoV-2 Samples

Bench work

- Whole blood, serum and urine
- Rapid respiratory testing performed at the point of care (no nucleic acid isolation)

Laboratory Practices and Technique

- Good (Standard) Microbiological Practices

Primary Barriers and Personal Protective Equipment (PPE)

- PPE: lab coat, single gloves, surgical mask, eye protection, face shield
- Work behind plexiglass screen in an isolated designated area (minimum)
- Notify others in the lab
- Work with samples done over a plastic-backed benchtop pad
- Surface decontamination at every step using EPA List N disinfectants and contact times.
- Potentially infectious materials must be placed in a durable, leak proof container during collection, handling, processing, storage, or transport within a facility.

Administrative Controls:

Training and competency verification on donning and doffing required PPE

* CDC Guidance for Laboratory <https://www.cdc.gov/coronavirus/2019-nCoV/lab/lab-biosafety-guidelines.html>

** WHO Laboratory Guidance <https://apps.who.int/iris/bitstream/handle/10665/331138/WHO-WPE-GIH-2020.1-eng.pdf>

*** The Lancet [https://www.thelancet.com/journals/langas/article/PIIS2468-1253\(20\)30089-3/fulltext](https://www.thelancet.com/journals/langas/article/PIIS2468-1253(20)30089-3/fulltext)

These considerations do not supersede any regulatory or country-specific requirements in your locale.

Laboratory practices, techniques, and administrative controls build upon the previous level. Additional controls are indicated at each level.

BSL2

- Using automated instruments and analyzers (if aerosol containment is a feature) some devices might be older and not contained
 - Staining and microscopic analysis of fixed smears
 - Examination of bacterial cultures
 - Pathologic examination and processing of formalin-fixed or otherwise inactivated tissues
 - Inactivation methods should be validated
 - Molecular analysis of extracted nucleic acid preparations
 - Final packaging of specimens for transport to diagnostic laboratories for additional testing
 - Specimens should already be in a sealed, decontaminated primary container
 - Using inactivated specimens, such as specimens in
 - Nucleic acid extraction buffer
 - Performing electron microscopic studies with glutaraldehyde- fixed grids
- * CDC Source

Additional procedures

- Cytometry – fixed samples

Laboratory Practices and Technique

- Good (Standard) Microbiological Practices
- Access to the laboratory is restricted when work is being conducted
- All procedures in which infectious aerosols or splashes may be created are conducted in BSCs or other physical containment equipment.
- Use safety cups whenever possible to avoid exposure to aerosols.

Primary & Secondary Barriers and PPE

- PPE: surgical mask, single gloves, gown/lab coat, eye protection
- BSCs, if available, are properly maintained and certified
- Mechanical ventilation systems that provide an inward flow of air without recirculation to spaces outside of the laboratory
- A method for decontaminating all laboratory wastes should be available in the facility

Administrative Controls:

- Training and competency verification for each procedure performed
- Laboratory personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures
- Occupational health
 - mandatory reporting of any symptoms, any laboratory exposure
 - consider baseline blood, baseline questionnaire, emergency wallet card
- Demonstrated competency on working in a BSC (if available)

BSL2 with BSL3 practices

- Aliquoting and/or diluting specimens
 - Inoculating bacterial or mycological culture media
 - Performing diagnostic tests that do not involve propagation of viral agents in vitro or in vivo
 - Nucleic acid extraction procedures involving potentially infected specimens
 - Preparation and chemical- or heat-fixing of smears for microscopic analysis
- * CDC Source

Additional procedures

- Respiratory samples and secretions
- Stool***
- Cytometry – non-fixed samples
- Inactivated virus lysate
- Work with ANY sample that may produce an aerosol

Laboratory Practices and Technique

- Good (Standard) Microbiological Practices
- Primary & Secondary Barriers and PPE
- PPE: surgical mask (blood)/N-95 (respiratory secretions), double gloves, impervious gown, eye protection with side shields
- All samples opened inside the BSC in case of spills/leakage. If BSC is not available, don N95 and face shield and work behind plexi-glass screen in an isolated designated area, notify other laboratorians, work with samples done over a plastic-backed benchtop pad
- Surface decontamination at every step using EPA List N disinfectants and contact times.

Administrative Controls:

- Scheduled time for handling SARS-CoV-2 samples (best practice)
- Two-person rule for minimizing withdrawing hands from BSC
- Centrifuging of blood specimens is in safety cups or sealed rotor, loaded and unloaded in a BSC
- Training and competency verification on donning and doffing required PPE
- Specific training on use of N95 respirators, if applicable (includes pulmonary function, medical clearance, and fit testing)

BSL3

Virus isolation in cell culture and initial characterization of viral agents recovered in cultures of SARS-CoV-2 specimens

Additional procedures

- FACS/High Speed Cell Sorting
- Transfer of inactivated samples outside BSL3
- Inactivation by validated methods

Laboratory Practices and Technique

- Good (Standard) Microbiological Practices
 - Follow BSL3 practices and procedures according to CDC BMBL 5th ed.
- Laboratory personnel must receive specific training in handling pathogenic and potentially lethal agents and must be supervised by scientists competent in handling infectious agents and associated procedures.

Primary & Secondary Barriers and PPE

- All procedures involving the manipulation of infectious materials must be conducted within a BSC, or other physical containment devices.
- Respiratory protection is required (N95 or PAPR/CAPR)
- Autoclave waste before disposal
- Facility exhaust system must have HEPA filtration**

Transfer of samples outside BSL3-based on risk assessment by biosafety officer

- Ensure lids are tight
- Decontaminate outside of tubes
- Wrap sample with absorbent material
- Individually place into zip-lock bag
- Seal zip-lock bag and change gloves
- Add all wrapped samples into second bag
- Wrap bagged samples in ample packaging and place into designated carrier, firmly attach lid