

Letter to the editor

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COVID-19 laboratory biosafety guide



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To the Editor,

As is the case all over the world, we are faced with a very contagious virus outbreak: Coronavirus disease (COVID-19) pandemic [1]. In the pandemic conditions, unavoidably, specimens from the patients with COVID-19 or suspected ones have been sent to clinical chemistry laboratories.

Although there is limited information regarding the vitality and infectivity of COVID-19, the virus is thought to spread mainly from person-to-person via respiratory droplets, so respiratory specimens such as nasopharyngeal and oropharyngeal swabs, sputum, and/or endotracheal aspirate or bronchoalveolar lavage fluid carry a high viral load. However, we have to accept potentially infectious materials such as blood, urine, stool, etc. specimens of patients with confirmed COVID-19.

In addition, most of these specimens will be received from intensive care units where there is a high level of patient contact, and therefore the outer surface of these specimens might be contagious for COVID 19. Table 1 summarizes the key transmission findings.

This document has been posted on the Turkish Biochemical Society website and all topics will be updated as new evidence becomes available and our peer review process is completed.

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Eventually, all laboratory staff is at risk of contamination of the new coronavirus [1]. Therefore, as clinical chemistry specialists, we have to ensure both our safety and the safety of other laboratory personnel. This is also the ethical responsibility of all of us.

Previously, we have shortened and translated the “Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19) interim guidance” published by the World Health Organization on laboratory biosafety related to COVID 19 and shared it with the medical laboratory community in Turkey [2].

However, we think that there is a necessity for an outline and a list of preventative measures compatible with the realities of our country.

Highlights of COVID-19 laboratory biosafety [3, 4]

- (1) Prohibit unauthorized entrance. Only laboratory personnel should be allowed to enter the laboratory working areas.
- (2) Get laboratory coats, wear gowns and/or uniforms, and do not go home with these coats. Wash your uniform at over 60 °C.
- (3) Do not put your uniform in the same place (hanger, locker) together with your other coats.
- (4) Do not enter break rooms or dining halls with your laboratory coats.
- (5) Use different hospital shoes, do not take them home.
- (6) Keep your nails short.

Table 1: Key findings in mode of transmission.

Source	RNA detected	Live virus
Nasopharynx	Yes	Yes
Sputum	Yes	Yes
Saliva	Yes	Yes
Stool	Yes	Yes
Blood	Yes	No
Conjunctiva	Yes	Yes
Vertical	Yes	N/A
Semen/vaginal fluids	Yes	
Urine	Yes	Yes
Cats	Yes	Yes

- (7) Wear personal protective equipment (gloves, masks, goggles/glasses/face shields, uniforms long enough to cover the knees, gowns) when working.
- (8) Implement different procedures for specimens of patients with COVID-19 and separate them from the others. Ensure the laboratory is informed about these specimens before they are sent to the laboratory.
- (9) Ensure that sample transport staff and laboratory employees working in units of specimen acceptance, processing, and centrifugation wear personnel protective equipment such as gowns, N95 masks, gloves, and surgical headgears, etc.
- (10) Ideally, ensure that the pneumatic system is not used for samples of patients with COVID-19. If this is not completely possible, assuming that the pneumatic system is used for patients with COVID-19 as well, take the following measures:
 - a. Ensure not to be sent the specimens of the patients with COVID-19 in the same canister with the specimens of other patients.
 - b. If possible, open the pneumatic system canister in class I or class II biosafety cabinet. (It should be ideally preferred a class II biosafety cabinet for this process).
 - c. Certainly wear gloves, mask (ideally N95), surgical cap, and goggles when opening the pneumatic system canister.
 - d. Open the canister cap as slowly as possible and keeping your face as far away as possible.
- (11) Take the following measures in centrifugation processes:
 - a. If possible, use a separate centrifuge device for samples of patients with COVID-19.
 - b. Always wear gloves, masks, and goggles during centrifugation processes. Centrifuge the samples by closing the caps of the centrifugal buckets.
 - c. Wait at least 15 min after the centrifugation process without opening the lid of the centrifuge device.
 - d. If any breakage, scattering, spillage occurs during the centrifugation process, clean the centrifuge rotor, buckets, and lids with 1/10 diluted bleach or 75% alcohol solution with taking into consideration protection measures being biosafety level 3, and discard the waste separately in the medical waste container.
- (12) If possible, it is recommended that caps of evacuated tubes or containers should be opened in class I or class II biosafety cabinet (ideally, a class II biosafety cabinet should be used). However, we know that most biochemistry laboratories do not have a biosafety cabinet. Therefore, it would be appropriate to take the following measures:
 - a. Keep your face as far away as possible when opening the caps of evacuated tubes or vacutainer or containers.
 - b. When opening the cap, use gauze bandage soaked with disinfected liquid and put on gloves, mask (ideally N95), surgical cap, and goggles during the process.
- (13) Specimens of COVID-19 positive or presumptive patients should be placed in separate tube racks. If possible, use a different analyzer for these specimens. Specimen container caps should be kept as closed as possible. After completing analyses, the caps of these specimens have to be closed immediately and be kept until the result validation by laboratory specialists or laboratory technicians. These specimens should not be mixed with the other specimens at the outlet of the analyzer or when the analysis is finished. Sample waste must be collected in separate labeled medical waste bins. If possible, the waste decontamination should be done for the samples by an autoclave. When this is not the case, waste should be thrown into different medical waste bins in the same way.
- (14) Instrument covers have to be kept closed during the analyzes.

Table 2: The biosafety levels and application areas [5].

Safety level	Protective equipment	Application
BSL-1	<ul style="list-style-type: none"> – Surgical mask – Surgical cap – Scrub suit – Latex gloves 	– General medical laboratory application area
BSL-2	<ul style="list-style-type: none"> – N95 mask – Surgical cap – Scrub suit – Lab coat – Medical safety glasses – gloves 	<ul style="list-style-type: none"> – Specimen transfer – Specimen reception – Centrifugation – Opening sample container caps and stoppers
BSL-3	<ul style="list-style-type: none"> – N95 mask – Surgical cap – Scrub suit – Lab coat – Medical safety glasses – Gloves – Full body medical coverall suit 	– Working on the nasopharyngeal swabs/the bronchoalveolar lavage fluid of the COVID-19 positive patients (molecular diagnostic).

BSL, Biosafety level.

- (15) Pay attention to hand washing. Wash your hands after removing gloves. Remove any jewelry (rings, wrist, watches, etc.) which could prevent hand-washing efficacy.
- (16) Tie your long hair or use disposable surgical caps.
- (17) Avoid touching your face.
- (18) After work, wash your hands up to the elbow, for at least 20 s with soap and water.
- (19) Keep mobile electronic devices outside the laboratory environment. After work, these devices should be wiped with warm soapy water or disinfectant.
- (20) All laboratory counters, desks, furniture, and the outer surfaces of analyzers should be cleaned with bleach diluted in water at 1:100 (75% alcoholic solution can be used for this purpose, too).
- (21) Don't eat or drink in the place where samples are analyzed.
- (22) In case of a spill, the contaminated area should be wiped with bleach (from outward to inward) and the contaminated material should be thrown into the medical waste bin.
- (23) Clean your eyeglasses daily with an alcoholic solution (75%).
- (24) When the work is completed, disinfect the working places (specimen reception units, analyses units) with a UVC lamp at least for an hour.
- (25) Table 2 shows the scope of the required biosafety levels.

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