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GENERAL REVIEW

Post-COVID-19 pandemic: Standard operating procedures for gross anatomy laboratory in the new standard



Pandémie post-COVID-19 : procédures opérationnelles standard au laboratoire d'anatomie macroscopique normale avec la nouvelle norme

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Summary The culture of cadaver dissection remains the most commonly used method of practical teaching and learning of human anatomy. Anatomist and medical professionals considered cadaver dissection as the gold standard for teaching and learning anatomy in detail. The increase seen in the establishment of new medical training institutions globally has consequently led to a proportionate increase in the sourcing for cadavers. Moreover, the surge in mortality rates following the recent coronavirus disease 2019 (COVID-19) pandemic with no cure or approved vaccine has been a source of concern for academia, especially on the safety in the usage of cadavers for dissection. Notwithstanding, several countries continue to depend on unclaimed bodies as the primary source for cadavers, regardless of the cause of death. Besides, body donation is also usually reported to be strained during disease outbreaks thereby putting countries that depend solely on it in a dilemma. This study highlighted the recommended standard operating procedures (SOPs) to be imbibed in gross anatomy dissection halls during and post-COVID-19 pandemic.

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Résumé La culture de la dissection sur cadavres reste la méthode la plus couramment utilisée pour l'enseignement pratique et l'apprentissage de l'anatomie humaine. Les anatomistes et les professionnels de la santé considéraient la dissection de cadavres comme « l'étalon-or » pour l'enseignement et l'apprentissage de l'anatomie en détail. L'augmentation des créations de

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nouvelles institutions de formation médicale dans le monde a par conséquent conduit à une augmentation proportionnelle de l'approvisionnement en cadavres. De plus, la flambée des taux de mortalité suite à la récente pandémie de coronavirus 2019 (COVID-19) sans remède ni vaccin approuvé a été une source de préoccupation pour les universitaires, en particulier sur la sécurité de l'utilisation des cadavres pour la dissection. Néanmoins, plusieurs pays continuent de dépendre des corps non réclamés comme principale source de cadavres, quelle que soit la cause du décès. En outre, le don de corps serait généralement sollicité pendant les épidémies, mettant ainsi les pays qui en dépendent uniquement dans un dilemme. Cette étude a mis en évidence les procédures opératoires standard (SOP) recommandées à imbibier dans les salles de dissection de l'anatomie macroscopique pendant et après la pandémie de COVID-19.

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Introduction

The novel coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is progressively dragging the entire world to a halt with about 30,557,899 confirmed cases and 952,981 deaths recorded worldwide as of September 19, 2020 [1]. COVID-19 is regarded as the largest pandemic ever experienced in recent times. It has resulted in significant effects on global populations, economies, education, and health care systems. Large-scale lockdowns have been imposed on populations, economies have witnessed downward trends, schools have shut down and health systems overwhelmed. Although the health care settings in several nations are gradually changing and reacting to the management of the outbreak in the face of rigorous public health measures, the severity of the COVID-19 outbreak is vast with extensive costs amid the medical education system globally [2].

The effect of the COVID-19 outbreak on medical education globally, with major emphasis on Anatomy teaching and learning, cannot be over-estimated, as the majority of educational institutions were shut down and classroom or in-person learning had shifted to virtual or online mode. This transition has left millions of medical students both undergraduates and postgraduates to either suspend learning or continue their education remotely [2]. The ensuing consequence is that medical students had lost several months of professional experiences such as hands-on anatomy dissection session that is central to their training, education, and career.

Anatomy education at a glance

Anatomy education has always been described as the basis of medical education and not just an adjunct of medicine [3]. The knowledge of anatomy remains the bedrock for all medical and related medical sciences programs. Every student undergoing such programs is required to have some form of training in anatomical science before graduation [4]. Anatomy as a course is distinctly made up of macroscopic (gross) anatomy, microscopic (histology) anatomy, and developmental (embryology) anatomy [5]. These subdivisions are regarded as an imperative aspect of medical training. To appreciate the growing knowledge and the understanding of human anatomy in detail, then, anatomical education is inevitable in the medical curriculum [6].

One of the key global practices in the teaching and learning of anatomy is the use of cadavers [4,7,8]. Human cadaver dissection is an age-long "gold standard" for training and research in anatomical sciences to date [9,10]. Cadaver dissection remained a cogent practical component in the curriculum for many medical students during their medical training [10,11]. The numerous advantages of cadaveric dissection as seen in several studies conducted on medical students in various regions make it to be relevant and preferred, despite the advocacy for its technological integration or replacement [12]. Anatomical differences in individual cadavers help to widen the scope of medical knowledge besides textbooks and anatomical models [13]. Cadaver dissection helps medical students to explore the human body in its lifelike state before performing such surgical procedures on live patients. It also helps them to thrive in psychomotor skills and create emotion during cadaveric dissection classes. [12,13].

Overview of anatomy teaching and learning globally

Anatomy teaching is an age-long integral part of medical education. As a matter of fact, cadaver dissection started in 300 BC and by the 18th century, it became a major aspect of medical education [10]. In Africa, and specifically Nigeria, the commencement of anatomy education as a subject in medicine can be dated far back to 1930 [4]. However, the scope of the program curricula in different countries depends on their respective regulatory councils [4]. Generally, there are no global standards, each country determines what aspects of anatomy is taught and to what depths [4,14]. These depend mostly on the objectives of training which are occasioned by their healthcare needs. Following these disparities in anatomy education between countries, the International Federation of Associations of Anatomists (IFAA) together with the European Federation for Experimental Morphology commissioned the development of core syllabuses to be adopted as standards [14].

Recent reports suggest a decline in credit hours allotted to anatomy teaching in many European and American medical schools [5,15]. At the University of Paris for instance, less than 120 hours are dedicated to teaching gross anatomy with much emphasis placed on classroom lectures and tutorials, then dissection [16]. Besides, some medical schools especially in Australia, prioritize tutorials followed by lectures with little or no dissection [15,16]. In Nigeria medical edu-

cation, about 18 contact hours of anatomy lecture is needed weekly for over 45 weeks by students pursuing the Bachelor of Medicine and Bachelor of Surgery (MBBS) degree program. These hours cut across lectures, practical sessions (in gross anatomy, histology, and embryology) as well as tutorials [4]. University students offering allied medical programs such as Radiography, Physiology, Nursing, Medical Laboratory Sciences among others are also expected to take core courses in the department of Anatomy.

To facilitate the learning of Anatomy, countries have enacted Anatomy Acts which is an enactment that governs and authorizes the practice of anatomy in medical schools including body sourcing and donations. Examples of such Acts include the Anatomy Act of Nigeria (1933) and the Bombay Anatomy Act (1949). It permits medical practitioners, teachers, and students to study and dissect cadavers for teaching, research, and other anatomical purposes [4,12,17]. However, in Nigeria, this law has major shortcomings that are yet to be addressed. There is no regulatory authority to oversee the anatomy practice in the country; no clear procedures for voluntary body donations for medical education; and no ethical principles for cadaver acquisition which may be partly responsible for its scarcity or surplus as the case may be [4,17].

Cadaveric dissection in anatomy education

One of the important issues regarding the use of cadavers for medical training is the sources of the cadavers, specifically unclaimed bodies. Anatomists count on the goodwill of the people to grant their bodies for the advancement of the medical profession and in the training of health professionals towards experiencing the structural details of the human body [9]. The International Federation of Associations of Anatomists (IFAA) likewise advocated for the sole use of donated bodies in teaching and research [18]. However, most countries, especially in Africa, still depend on unclaimed bodies as their major source for cadavers [19,20].

As stated in a two-year survey on sources of cadavers in 71 countries, the result indicated that 32% were from donations while 57% were unclaimed bodies [18]. In the European and North American regions, cadaver donations accounted for about 80–100%, while about 90% of cadaver sources in Africa are unclaimed bodies [21]. In a comparable three-year study conducted in Nigeria, it was reported that 100% of the cadaver sources were unclaimed bodies with no record of voluntary donation [22]. In Africa, North and South America medical schools, cadaver dissection (CD) is a major integral aspect of their undergraduate curricula [11]. In Asia; India, China, Korea, and Thailand make use of cadaver dissection in assisting anatomy teaching [11]. However, in European countries, conventional cadaver dissection is not vigorously used, while the majority of medical schools in Australia make cadaver dissection optional [11].

Summarily, Europe and the Americas depend mostly on body donations, Asia depends on both donations and unclaimed bodies, complemented with the importation of cadavers from other countries while bodies of criminals are the major source for the unclaimed bodies in Africa [8,18–22]. Other sources of unclaimed bodies in Africa,

especially Nigeria, were from the northern parts of the country where most of the residents live below the poverty line. This consequently led to abandoning their deads in the hospital without any claim from either their relatives or friends [17]. More so, the increase seen in the creation of medical schools globally has led to a proportionate increase in the demand for cadavers needed for anatomy dissection [23].

Coronavirus disease 2019 (COVID-19) and sourcing of cadavers

Safety of cadavers

The coronavirus disease 2019 (COVID-19) is regarded as the number three in the line of extremely infectious human coronavirus (such as the Severe Acute Respiratory Syndrome [SARS] and the Middle East Respiratory Syndrome [MERS] coronaviruses) that has surfaced over the last 20 years [24]. During infectious disease outbreaks, the sourcing of bodies and the sustainability of body donor programs is usually pressurized [9]. The unfolding of the novel COVID-19 pandemic has generated a global burden to the medical community and education, specifically in the teaching of anatomy. About 30,557,899 confirmed cases of COVID-19 and 952,981 deaths have been announced globally as of September 19, 2020 [1].

The transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) between individuals according to the World Health Organisation (WHO) is through inhalation of sizeable respiratory droplets, fomites, and proximity with infected persons and facets [25]. Although, as at the time of releasing its report in March 2020, there was no proof of people being infected as a result of exposure to COVID-19 related dead bodies [25]. However, the suspected risk of COVID-19 infection from an individual whose death resulted from COVID-19 to health professionals handling such bodies cannot be overlooked. There is also the possibility of an increase in the chances of disease transmission with direct exposure to body fluids and invasive procedures on the cadaver, such as an autopsy and cadaver dissection or other procedures that generate droplets or aerosols [9,26].

This emanating situation has placed a critical burden on the entire world, especially now that no cure or vaccine has been approved yet [27]. It has also placed diverse variabilities and a new normal for most human activities including education. Thus, medical education in general and particularly cadaveric dissection is not exempted. The most disturbing question is on those countries that depend predominantly on the use of unclaimed bodies, as these bodies may not have any medical records to ascertain their cause of death. This may consequently pose a danger for anatomy education and cadaveric dissection after the coronavirus pandemic subsides. Therefore, the safety in the use of cadavers by medical professionals and students for anatomical teaching and research is of great concern to academia globally; and peradventure the rise in COVID-19 mortalities increases the accessibility of cadavers for training and research, questions such as “what are the safety standard operating procedures to follow?” comes to the forefront on medical educators and learners.

Efficacy of embalming chemicals

Several studies have raised concerns regarding the efficacy of formaldehyde and other readily available embalming chemicals in the gross anatomy laboratory against the novel coronavirus. While some believed that fixatives are effective for the inactivation of infectious agents; others argue that fixed cadavers may still pose infectious to those handling them if caution is not taken [28]. A study conducted by Darnell et al., [29] found that formalin and glutaraldehyde are effective for the inactivation of SARS-CoV depending on the temperature and duration. According to their findings, at a 4°C temperature, the effectiveness of these chemicals appears to have been inhibited. However, at temperature 37°C, formalin seems to effectively decrease the infectivity of the virus within 24 hours. Glutaraldehyde on the other hand was able to completely inactivate severe acute respiratory syndrome coronavirus (SARS-CoV) after incubations between 37°C–25°C for 24–48 hours respectively [29].

A report by Camero [30] stated that people who had passed away from the novel COVID-19 might still be contagious for hours or days. Kampf et al., [31] supported the claim that human coronaviruses on inanimate surfaces could still be contagious at room temperature for about nine days. However, this duration of persistence could be reduced at a temperature of 30°C or higher [31]. The WHO confirmed that human severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) could still be contagious on surfaces for as long as nine days because the SARS-CoV-2 virus was observed for about 72 hours in some trial studies [25]. Pagat et al., [32] argued that SARS-CoV is very resistant to alkaline treatment. They also claimed that the efficacy of formaldehyde fumigation is not seen on the dried virus (based on the conditions tested). Their findings however recommended that heat (autoclave) and hypochlorites are effective for the decontamination of SARS-CoV [32].

IFAA reported that protocols used for histopathology have also been seen to be effective in the inactivation of viruses like Ebola. This is similar to the standard embalming procedures used in gross anatomy. Besides, another study revealed that formalin and glutaraldehyde can deactivate SARS-CoV depending on the temperature and time [9]. Rossi et al., [33] also recommend that histological tissues should stay for extended periods of formaldehyde fixation. On the contrary, Odega et al., [34] kicked against performing frozen sections on suspected coronavirus tissues except such a laboratory is assertive of restraining aerosols in the cryostat. Whether extended periods of preservation will be needed before dissecting formaldehyde embalmed bodies that are tested positive to the COVID-19 will need further pieces of evidence and research [9].

Nonetheless, Shidham et al., [24] maintained that, since there are no cogent proofs available that the COVID-19 virus is not deactivated in an embalmed body; therefore, the routine fixatives such as formaldehyde, and alcohol should remain potent against the coronavirus. Similarly, it is a fact that the majority of the microorganisms responsible for death also have a shorter life-span after the death of the host and the rate of being infectious is highly minimized. Except for hemorrhagic fevers like Ebola, dead bodies are usually not contagious. Although, soft tissues like the lungs

of the cadaver could be infectious if not handled properly during an autopsy [35].

Guidelines for handling cadavers

As a rule in the COVID-19 pandemic, embalment is not advisable for bodies who died from the COVID-19 [25]. Invasive procedures like the standard pathology autopsies especially those methods that produce tiny-particles, such as using an oscillating saw or cleansing of intestines are also discouraged. However, in anatomy departments, embalment is inevitable. The supply of an infectious COVID-19 body to an academic environment will be catastrophic if not properly handled. If it is therefore necessary to perform any of the above procedures, then, full protection with necessary personal protective equipment (PPE) is vital [9,36,37].

The Department of Health of South Africa recently maintained that embalming an infected corpse with the new coronavirus does not present any danger. Nonetheless, they agreed that forced inflation of the lungs during fixation may generate an aerosol. Therefore any procedure that will generate aerosol and smearing of contaminated fluids should be shunned during embalming procedures. This was because the cadaver might still be contagious at the period of arrival in the anatomy laboratory [9].

During the Ebola outbreak in West Africa between 2014–2016, there was a general impression that about 65% of those practicing questionable burial procedures were infected. This consequently contributed to the stretch of the epidemic in the region [35]. Therefore, there is an urgent need to checkmate safety regarding bodies to be used for educational purposes such as anatomical dissection during the COVID-19 pandemic. Adhering to safety measures is vital in preventing accidental transmission of diseases from cadavers, prior to, during, and after dissection. According to standard and professional practice, cadaver dissection involves exploring all the tissues of the body in a manner that is similar to autopsy or post-mortem examination. This predisposes the handler or dissector to a higher risk of being infected.

This study recommends the appropriate medical records of bodies donated to educational facilities should be requested to ensure handling staff has comprehensive access to detailed technical information before handling such bodies. Where medical records are not available, COVID-19 screening or tests should be conducted on such cadavers, though this might be capital intensive and difficult in regions where COVID-19 testing kits are limited for living individuals. In fact, the findings from a study by Ravi [12] reported that negative outcomes of laboratory examination may not eliminate the possibility of COVID-19 infection. Therefore, all anatomy laboratory staff should be properly trained on the transmission and prevention of COVID-19 infection. Furthermore, the authors however note that these aforementioned scenarios may vary from country to country especially as knowledge on the virus is still rapidly evolving.

Standard operating procedures (SOPs)

In the light of the current COVID-19 pandemic, it is pertinent to ensure that COVID-19 safety protocols and the standard

operating procedures (SOPs) recommended for anatomical and cadaveric dissections are strictly followed. In addition, the availability of adequate and necessary personal protective equipment (PPE) such as an impermeable disposable gown or overall, hand gloves, and face protectors (medical mask, shield, and goggles) should be provided for mortuary staff, students, and other personnel that will be handling both the unembalmed bodies and cadaver dissection in the gross anatomy laboratories [9,35,38].

Safety procedures

Hand hygiene

Hands should be scrubbed with antiseptic soap and running water after each contact with dead bodies. This must comply with the WHO sequence for at least 40–60 seconds. However, if the hands are not obviously dirty and water and soap are not accessible, then, an alcohol-based hand sanitizers containing at least 60–95% alcohol should be used. Besides, if hands are obviously dirty, then antiseptic hand-washing must be done before using the hand sanitizer for about 20–40 seconds [38,39].

Use of personal protective equipment (PPE)

Gowns or aprons. Long-sleeved water-resistant gown or disposable gown with an impermeable apron will help to hold out against body fluids penetration. In a situation where disposable gowns or aprons are not accessible, reusable waterproof gowns could be used, provided cleaning and disinfection will be done appropriately [35]. Students should also be prevented from roaming about with their laboratory coats.

Gloves. Double (non-sterile) surgical examination gloves are preferred, but two-fold medical gloves interjected with a layer of cut-proof synthetic mesh is also suitable [38]. A study showed that latex gloves provide about 10 minutes of short term protection against formaldehyde while nitrile gloves provide longer-term protection [35]. Separate gloves must be used for each procedure and antiseptic handwashing should be done immediately after its removal [35].

Mask and Goggles. A filter mask or a fluid-resistant medical mask such as European standard EN 149 FFP2 or US NIOSH standard N95 for specific hazards is highly recommended, while a cloth facemask is not advisable. However, as a result of the likely global scarcity of medical face masks, many countries are turning to utilize cloth face masks as an alternative. Though this may act as a barrier to respiratory droplets and may provide little protection, yet, it may give a false sense of security as it cannot completely protect from the SARS-CoV-2. Nevertheless, they are better than nothing [35,40].

Recently, the WHO suggested that a three-layer fabric mask could also be employed. Besides, it was recommended that the innermost layer should be a hydrophilic material (such as cotton for easy absorption of the droplet), and a light color such as white (for easy determination when soiled or wet). The middle layer should be removable and hydrophilic, while the outermost layer should be hydrophobic (to repel droplets and moisture) [41]. Besides, where a 3-layer fabric mask is not available, a face shield should be put on together with the cloth face masks. Regarding

eye protection, either goggles or face shields should be able to completely safeguard the eyes, mouth, and nose against viral exposure [35].

Boots. It is recommended that a rubber or waterproof boots that can be easily disinfected following usage should be used [39].

Dressing and undressing procedures

Dressing procedures. When dressing up for embalment during and post-COVID-19 pandemic with the assumption that all bodies received are potentially infectious or hazardous, the following steps should be taken by the laboratory personnel:

- all jewellerys must be removed and the integrity of the PPE provided should be checked;
- put on the disposable headgear and overshoes;
- put on the first pair of disposable gloves, followed by wearing the PPE. After wearing the necessary PPE, put on the second pair of disposable gloves [39].

Note: when wearing a medical face mask, the following should be done:

- determine the top and frontal facet of the mask. The edge with a stiff bendable material is the top and it's designed to cast the shape of the nose. The colored facet of the mask is often the front and should face outside while the white side faces inside and touches the face [41,42],
- a face mask tightness test should be performed, followed by an inhalation and exhalation test. An inhalation and exhalation test is done by covering the facial filter with both hands and perform a deep inhalation; if the mask collapses slightly, then the tightness is adequate. However, if the air is perceived from the edges of the mask, then the tightness should be adjusted. If an air leak is felt around the nose, then the upper support, the patch, and the nose clip should be checked and correctly positioned. Lastly, perform a forced exhalation; if there is no air leak, the mask is properly sealed [42].

Undressing procedures. At the end of the procedures, the following sequence should be strictly followed to avoid self-contamination:

- avoid touching any surface before carrying out the undressing procedure. Contacts between potentially contaminated PPE and the face or skin should also be avoided;
- remove the disposable gown and the overshoes and discard them in the special waste container;
- remove the first pair of gloves and discard them in the special waste container;
- remove the protective glasses and masks;
- remove the second pair of gloves and discard them properly;
- perform antiseptic hand washing followed by the use of alcohol-based hand sanitizers [42].

Laboratory buildings

Laboratory buildings should be well ventilated, adequately lightened, have running water, and a good drainage system.

In addition, shower facilities with a constant flow of water should also be installed in the laboratory [9,35]. More importantly, laboratories should be designed or renovated like an Airborne Infection Isolation Rooms (AIIRs) that are at negative pressure to nearby environments with no air recirculation to adjacent spaces. At least, 6 air changes per hour (ACH) or 12 ACH is also recommended. A high-efficiency particulate aerosol (HEPA) filter or portable HEPA recirculation unit could also be used to provide further air filtration in the laboratory room. Laboratory doors should remain closed except during entry and exit [38]. An automated door is preferred during this COVID-19 pandemic. However, where this is not possible, door handles should be frequently sanitized or disinfected. When entering the laboratory, if possible, doors should be opened with the elbow [43].

Cleaning and decontamination

Surfaces, where corpses or cadavers are prepared, should be thoroughly cleaned with water and detergent before applying a disinfectant. Widely used of disinfectants or bleaches such as sodium hypochlorite watered-down to a ratio of 1:100 of 5% sodium hypochlorite were effective disinfectants before the COVID-19 pandemic [31]. However, recent studies on COVID-19 recommended a dilution ratio of 1:50 for such widely used disinfectants like the standard bleach, 0.5% sodium hypochlorite, 0.5% hydrogen peroxide, or ethanol concentration between 62–71%. These disinfectants seem to be effective within 1 minute for suspected coronavirus contaminated surfaces [31,34,44].

Gamble [45] opined that hypochlorite or chlorine-containing bleaches should not be used in rooms where formaldehyde is present. This was on the basis that the chemical reaction between hypochlorite and concentrated formaldehyde could generate a powerful lung carcinogen known as bis-chloromethyl ether (bis-CME) [45]. Furthermore, the European Centre for Disease Prevention and Control (ECDC) has advised against using an ordinary detergent, followed by 70% alcohol on such surfaces that might be destroyed by sodium hypochlorite [26]. Eighty percent 80% alcohol concentration as well as 75% 2-propanol were also proven to be effective against SARS-CoV and MERS-CoV following suspension trials by the WHO [31].

Other disinfectants like 0.02% chlorhexidine digluconate or 0.05% to 0.2% benzalkonium chloride were said to be less efficacious [34]. Thus, it is important that cleaning and waste management staff assigned to the laboratory are also well trained on the recommended methods of cleaning and should be provided with appropriate PPE [9]. In this period, all debris should be considered contagious and processed as category B waste (hazardous biological waste) [26]. As research is still ongoing, the conventional embalming fluid using formalin, phenol, and ethanol should still be viable for the inactivation of the coronavirus until proven otherwise. However, any embalmed body should be allowed to stay for at least a 14 days window period before usage for further anatomical purposes.

Students and dissection

Before students will be allowed to dissect, all the necessary COVID-19 assessments should be done. According to

an empirical study on students, it was reported that students made hand to face contact in approximately 23 times per hour. Skin contacts were seen in 56% of them; followed by mouth in 36%, nose in 31%, and eyes contacts in 31% of the study participants [31]. Hence there is a need for proper education about the mode of transmission of the novel coronavirus. Students should as far as possible avoid any form of skin-skin contact with the cadaver during dissection. The mandatory use of personal protective equipment (PPE) such as 3-layered medical face masks, nitrile disposable gloves, long sleeve laboratory coat with impermeable aprons, and covered shoes amongst other laboratory procedures as discussed earlier should be strictly adhered to. It is a fact that infected living individuals are more infectious than the dead. This is because invading pathogens usually stop multiplying and die as the body of the dead decomposes but can easily multiply and be readily transmitted in living individuals [35].

Based on the fact that some coronavirus carriers are asymptomatic [46], thus, it is advisable to change the widely used manual water taps at the washing hand basins in the laboratories and install automatic touchless sensor taps, touchless hand sanitizer dispensers, and hand dryers. This will help to prevent the possibility of touchpoint cross-contamination [46]. This study also suggests a need to review the widely used student to cadaver dissection ratio which ranges between 6:1 to 9:1, with the latter more adopted [21]. A reduced ratio of about 4:1 will help to observe the COVID-19 social distancing protocols according to the WHO in curbing the spread of the virus. Although, this might lead to an increase in the numbers of cadavers to be dissected and consequently increase the cost of sourcing.

The timetable for dissection sessions should also be rescheduled in a way to reduce overcrowding in the laboratory. Daily records of laboratory activities should be taken seriously this time. The logbook should comprise date, names (staff, students, and visitors), time in, and time out [43]. This will greatly help in case there is a need for contact tracing. More so, as earlier discussed and recommend, good hand hygiene should be strictly adhered to before and after every dissection session, alongside proper removal and disposal of all disposables PPE including used blades and dissected tissues. Furthermore, all laboratory equipment should be sterilized immediately after use, while dissecting equipment should be cleaned in a washer-disinfector and autoclaved. In situations where resources are limited, equipment should be cleaned and then boiled or submerged in a commonly used, non-corrosive disinfectant [35].

In the event of a cut, injury, or accident during dissection, students should report immediately to the personnel present. All laboratory users are required to promptly correct anyone that deviates from any of these SOPs and also report such individual to the personnel on duty [43]. All other laboratory safety precautions and COVID-19 safety guidelines should be strictly observed to prevent accidental disease transmission as the fight against COVID-19 continues.

Conclusion

The impacts of the recent COVID-19 pandemic are unprecedented. It has also been predicted that total recovery from

this impact might take over a decade. As the coronavirus is novel, its disease progression is still under study and not yet entirely clear, therefore, stringent precautionary measures should be imbibed until further information becomes available. The risk of contracting infections when handling cadavers could be high if all the safety measures are not strictly adhered to. There is also a need for collaborative efforts and contributions from all major stakeholders and regulatory agencies in charge of body donations and sourcing. They should ensure that only cadavers that are certified safe are available and used for anatomical purposes. Finally, the novel COVID-19 pandemic might be a pointer towards considering full incorporation of technology into the medical education curriculum, hence boosting and enhancing our preparation and capacities to contain future disease outbreaks.

Authors' contributions

All the authors have equally contributed to the study.

Disclosure of interest

The authors declare that they have no competing interest.

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