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Commentary/Letter to Editor

Considerations of coronavirus (COVID-19) impact and the management of the dead in Brazil

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ABSTRACT

During a pandemic such as COVID-19, the forensic community plays a key role in the management of the crisis, both nationally and internationally. Much has been written and disseminated regarding protocols for death investigation, infection mitigation and risks, and management of dead. However, in many contexts, the ability of forensic practitioners to follow best-practice procedures is limited by the resources available to them. This article examines some of the impact of the novel coronavirus (COVID-19) in Brazil, with emphasis on management of the dead and challenges faced by medicolegal services.

1. Introduction

Forensic practitioners are important professionals whose work have legal, social, and economic consequences for communities, deceased individuals, and families of the deceased. During a pandemic such as COVID-19, the forensic community plays a key role in the management of the crisis, both nationally and internationally. The challenge for forensic practitioners has been twofold: first, to minimize the spread of the virus and, second, to advise authorities, hospitals, and funerary workers on proper protocols when deaths risk exceeding the capacities of local medicolegal services.

Much has been written and disseminated regarding protocols for death investigation, infection mitigation and risks, and management of dead [1–5]. However, in many contexts, the ability of forensic practitioners to follow best-practice procedures is limited by the resources available to them. The capacity of forensic experts often depends on a large bureaucratic chain of events and many existing guidelines are predicated on a fully functioning laboratory or necropsy area and the availability of personal protective equipment (PPE) and other materials. The reality for some countries, or regions within a country, is much different. Particularly, for Brazil, the current pandemic is likely to intensify the country's political and socioeconomic disparities.

The goal of this article is to examine the impact of the novel coronavirus (COVID-19) in Brazil, with emphasis on management of the dead and challenges faced by medicolegal services.

2. Coronavirus and politics

COVID-19 has been spreading rapidly across Brazil, prompting concerns over the potential collapse of the healthcare system. From

February 27th to May 18th 2020, there were 241,080 confirmed cases of COVID-19 with 16,118 deaths [6]. On April 8th 2020, the state of Amazonas was the first to declare that the collapse of its healthcare system was imminent, with its capital, Manaus, having 95 % of the 293 ICU beds occupied at both private and public hospitals [7]. Bruno Covas, mayor of São Paulo, the capital of the state with the same name, declared on May 17th that the city's public hospitals had reached 90 % capacity and can potentially run out of space in two weeks [8]. São Paulo is the country's epicenter with almost 3000 deaths [8].

Concurrent with these potentially devastating impacts of the pandemic, federal government officials have downplayed the public health threat posed by the virus, with the current President Jair Bolsonaro calling COVID-19 a "little flu" and encouraging both the reopening of the country for the sake of the economy and the use of hydroxychloroquine as a medicine to treat COVID-19 [9,10].

Although the federal government introduced measures such as a welfare stimulus package to contain the imminent financial fallout of the crisis [9], more rigorous health measures, such as a "stay at home" or social distancing order, were held back. Rather, local officials, such as governors and mayors, are at the forefront of holding the population accountable for staying at home and engaging in social distancing. These officials have been publicly denounced as taking "extreme measures" by the President. In addition, two officials left the post of the Minister of Health in Brazil, leaving the country now facing a pandemic without a person appointed for such post [8].

Brazil is one of the countries garnering international media attention for the repercussions resulted from the country's Presidential pressure for policies that disregard guidelines issued by international public health authorities and deviate from actions taken by most other nations. Other leaders, such as President Alexander Lukashenko from Belarus, President Andrés Manuel López Obrador from México, President John Magufuli from Tanzania, President Gurbanguly Berdimukhamedov from

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Turkmenistan, and Kim Jong-Un from North Korea have either denied the existence of the disease, or downplayed the effects of coronavirus in their respective countries [11].

3. Coronavirus and the management of the dead

On March 25th 2020, the Brazilian Ministry of Health published a guideline on the management of the dead in the context of COVID-19 [12]. Many important points can be drawn from this document, including:

- Transmission of infectious disease can occur through the management of dead bodies, especially if workers are not in possession of adequate personal protective equipment (PPE).
- Funerals of confirmed or suspected patients of COVID-19 are not recommended due to the agglomeration of people. This recommendation is valid for the quarantine and social distancing period.
- Autopsies must not be performed, and it is unnecessary in case of a confirmed COVID-19 case.
- It is necessary to provide information and explanation to the family of the deceased regarding the care of the body.

The document details the PPE and procedures to be followed for cases of death in hospital facilities, domicile, and public spaces. For hospital facilities, the directions are straightforward, with a physician in charge of signing the death certificate *in situ*. The PPE recommended for those who manage bodies in hospitals are:

- Hair cover
- Goggles or face shield
- Fluid-resistant or impermeable gown with long sleeves
- Surgical mask (N95, PFF2, or equivalent)
- Nitrile gloves
- Impermeable boots

The management of the body follows directives given by the World Health Organization (WHO) and the International Committee of the Red Cross (ICRC) [1,12,13]. This includes the non-recommendation of embalming, the correct use of PPE, and the use of sheets, impermeable body bags, and a second body bag cleaned with 70 % ethanol, bleach solution 0.5–1.0 %, or another type of sanitizer approved by ANVISA, the regulatory sanitary agency in Brazil.

For domicile or public spaces deaths, the recommendation is that a health department team investigates the case, verifying the need to collect samples to attest for the cause of death (in case of suspected COVID-19).

In case autopsy is deemed necessary, the autopsy must be conducted in a room with an adequate air treatment system (negative pressure with a minimum of six air exchanges). The number of professionals must be limited to one technician and one forensic pathologist. The use of regular autopsy equipment such as oscillating saws is discouraged, with manual methods being preferred. Practitioners must avoid the use of techniques that might produce residues, or protect the space with a vacuum cover. If the collection of soft tissue is necessary, it must be done through a minimally invasive autopsy technique (image and percutaneous intervention). For autopsy staff, the PPE required is:

- Double surgical gloves interposed with a layer of cut-proof synthetic mesh gloves
- Fluid-resistant or impermeable gown, or aprons over gowns
- Goggles or face shields
- Shoe covers or impermeable boots
- N95 masks or superior

For other body handlers the PPE recommended are:

- Non-sterile nitrile gloves while handling infectious materials
- In case cuts or perforations are a risk, wear heavy duty gloves over the nitrile ones.

It is clear that the measures disseminated through the Ministry of Health guidelines follow the information by the WHO and other health and international organizations [1–5,12–14]. However, the reality of Brazil is threefold:

- 1 Brazil, and other nations in Latin America and Africa, are scrambling for supplies while countries such as the United States and European countries are buying most stocks or simply rerouting them.
- 2 The country lacks the volume of trained personnel needed to deal with bodies following an infectious disease outbreak.
- 3 There is a lack of a coordinated and standardized manner of investigating and managing the dead throughout the country.

Until the release of the guidelines by the Ministry of Health in Brazil on March 25th 2020, there were no protocols for the care of bodies during the novel coronavirus outbreak. Furthermore, the guidelines presuppose that the materials and equipment needed are available, when in reality there is an acute lack and disproportionate distribution of PPE and healthcare equipment in the country [15,16].

For instance, the equipment necessary to perform a minimally invasive autopsy is not available in adequate numbers throughout Brazil, with some regions not having the equipment at all. The result is that many cases that required autopsy or collection of biological material for the confirmation of death by COVID-19 will not be performed. Therefore, current numbers are not a reflection of the real number of cases. Ultimately, it means that the numbers of deceased persons by COVID-19 will probably be an epidemiological assessment based on overall numbers of deaths compared with the average for the same period in the past two to five years. The exceeding numbers can then be assumed to be related to COVID-19. Therefore, the crucial problem with postmortem testing is the contribution to the underestimation of cases today, which also means that families are not properly informed, and opportunities to trace contact and help control the epidemic, are neglected.

The Adolfo Lutz Institute, an analytical laboratory accredited as a National Laboratory of Public Health and Reference Laboratory Macro-regional by the Brazilian Ministry of Health, and current reference in coronavirus testing in São Paulo, had allegedly a backlog of 16,000 tests waiting to be finalized by April 1st 2020 [17]. According to the unofficial platform *worldometer*, Brazil has 3462 coronavirus tests performed for every one million people [18].

Many forensic workers, especially those in funerary services, have been struggling to balance following correct procedures for victims of coronavirus while still handling deaths non-related to the virus. The Public Ministry of Rio de Janeiro, for instance, has received reports of improper management of the dead by funerary services, who are reportedly not following the WHO recommendations for the proper preparation of bodies for burial of deaths occurring the pandemic. [19]. One problem is that some bodies arrive with death certificates describing “respiratory disease” with an observation “awaiting results.” Funerary service workers have reported being threatened by families who wish to pursue traditional burial services for deceased individuals who have no explicit confirmation of COVID-19 as their cause of death.

Other cases might be documented as “cause of death undetermined,” which results in the same problem for postmortem examination and handling. The delay in exams and tests to confirm the infection, even after the death of someone possibly infected, has affected how forensic personnel follow the management of the dead procedures and leads to a probable underreporting of deaths by the new coronavirus.

4. Coronavirus and reporting procedures

The underreporting of COVID-19 cases in Brazil has been a cause for investigation in some states. A funeral home in Belo Horizonte, Minas Gerais received 41 bodies in 48 h, some with the cause of death stated as COVID-19. However, the state of Minas Gerais at that point had not yet reported any cases of death by coronavirus. Another funeral home in the

same state had 73 bodies during the days of 20 to 22nd of March. The State Secretary of Health explained that many of the bodies with notations of COVID-19 might not necessarily have died of the new coronavirus, but that the death occurred during the pandemic period, causing again confusion among forensic personnel [20].

The underreporting of COVID-19 deaths in Brazil is especially evident after the release of a more flexible way of certifying deaths during the pandemic. The Resolution SS 32, passed on March 20th 2020 by the São Paulo state government, established that the cause of death by coronavirus cannot be attested by autopsies, due to risk of contamination. Therefore, many deaths due to COVID-19 will never be documented if they are not readily attested in a hospital prior to death. With the lack of tests and personnel to run the exams, it is possible that the real number of COVID-19 deaths will never be known [21,22].

The São Paulo government has determined that:

“(. . .) every cadaver, with or without the suspicion of coronavirus infection (COVID-19), in external or internal hospital environment, without any indication of violent death, are now the responsibility of the City Death Verification Services (SVOM). The Medical Legal Institutes, which in normal instances perform autopsies of natural deaths of unidentified persons, is now only performing investigations of bodies related to violent deaths” [22]

However, because the new guidelines in place do not recommend the autopsy of bodies, the SVOM has up to 24 h after an individual’s death to collect swabs from the cadaver suspected of being infected. This would allow for the possible infection to be confirmed at a later time through postmortem exams. Alternately, the death can be certified by a verbal questionnaire in which the family provides information about the deceased’s health. One problem regarding the second certification of death is that sometimes the family will still not have a confirmation of a possible death by COVID-19, especially if no swab was collected to accompany the questionnaire.

5. Coronavirus and burials

The main problem with burial during this pandemic in Brazil is the lack of space in cemeteries and an insufficient number of body handlers. According to the mayor’s office in São Paulo city, the number of daily burials increased around 30 % in the biggest cemetery of Latin America, the Vila Formosa. Since April 1st 2020, cemetery workers have been digging approximately 100 new graves a day, doubling the amount in relation to pre-pandemic levels. Because any death caused by respiratory problems in São Paulo is being treated as a potential COVID-19 case, all cemetery staff needs to work with proper recommended PPE. However, cemetery staff and body handlers have been speaking out against the lack of proper PPE, with funeral staff refusing to perform burials due to fear of contamination. Cemetery staff are threatening to strike over the conditions they have been experiencing during this time [23,24]. Nevertheless, it is important to stress that there is a lack of evidence regarding the transmissibility of COVID-19 from bodies of deceased persons of confirmed or suspected cases [25].

6. Coronavirus and the new missing persons

Another risk is an emergence of a new type of missing persons, the “disappeared via the pandemic.” The rise of these disappeared would be due to unintentional errors such as documentation being lost or misplaced, which may happen when services are in a crisis and operating above capacity. Such errors hinder the positive identification of the dead or cause bodies to be moved without following a proper chain of custody. Examples of such problems have already been found in Brazilian cities. During the pandemic crisis, two families received unsettling news regarding their loved ones after they were informed of their death. In one case, the body of the deceased could not be located in the hospital, and on the other case the family received the death certificate with the name of

another deceased person [26]. Another case reports that two bodies were swapped in the hospital. Due to funerals and burials being done with closed and sealed coffins, the family of one of the deceased was only informed of the error once the procedures were finalized [27].

The Procuradoria Federal dos Direitos do Cidadão (Federal Prosecution for Citizen’s Rights – *free translation*), in the capital Brasília, stated that the rights of families, descendants and heirs, as well as the correct identification of the dead during the pandemic, must be guaranteed. The document¹ described that it is equally important to guarantee that unidentified bodies and unclaimed bodies can, in a reasonable time, be buried without the loss of any rights to the family. The family has the right to the death certificate, with clearly documented causes and circumstances, and information regarding the burial location of the remains. Such directives are to uphold dignity and respect of the deceased, and to allow the possibility of mourning to the families. The document references internationally recognized organizations such as WHO, Pan-American Health Organization (PAHO) ICRC, International Federation of the Red Cross (IFRC), and Interpol, emphasizing guidelines such as the Management of Dead Bodies after Disasters and the Disaster Victim Identification Guide and the International Humanitarian Law.

The existence of such recommendations highlights the needs that are anticipated to emerge due to the coronavirus pandemic, such as the need to exhume remains for future identification or proper postmortem examination such as the recovery of projectiles. Some of the recommendations are:

- That bodies of unidentified or unclaimed remains are not cremated but buried
- Buried bodies must have water-proofed identification tags, following the guidelines by the ICRC, WHO, and IFRC, and Interpol manuals.
- The use of standardized forms for the identification of remains (making direct reference to forms provided by WHO and ICRC).
- That all the personal effects are buried together with the remains, in plastic bags matching the identification tag of the remains.
- That funeral services maintain a precise identification of the graves with an easy access for matching of data with the burial registry.
- That a unique database is used to insert the identification form data as well as the burial location of the remains.
- That the collection of fingerprints or genetic material (via nasopharyngeal swabs) becomes mandatory and is accompanied by photographs.
- That professionals are trained in a standardized manner to perform procedures and that the data collected (swab, photographs, and fingerprints) are entered in the unified database.
- That in cases where exhumation is needed to free space in cemeteries, unidentified or unclaimed bodies are not destroyed but instead individually placed in ossuaries or equivalent places following guidelines for eventual retrieval (traceability).

7. Additional considerations of the Brazilian reality

Brazil is the world’s fifth-largest country by area, and the sixth most populous (over 211 million people). According to the National Council of the Public Ministry (CNMP), in 2019 Brazil had 727,227 incarcerated persons [28]. Many prisons are operating at or over their capacity, with the overall system operating at 166 % capacity according to data released by the Public Ministry in 2019. Therefore, the prison environment, especially instances of overcrowding, makes individuals susceptible for the transmission of diseases such as tuberculosis, HIV, measles, and other bacterial and viral illnesses [29]. According to the National Penitentiary Department (DEPEN), 483 incarcerated persons have confirmed cases of coronavirus, 303 are suspected cases, and 22 persons have died due to the disease [30].

¹ Procuradoria Federal dos Direitos do Cidadão. April 6th 2020. Ofício number 114/2020/PFDC/MPF. Brasília/DF.

The overburdened Brazilian healthcare system, aggravated by the deep inequality in the country, will also disproportionately affect the population of the *favelas*. Favelas are informal, unregulated settlements of low to middle-income people. Favela neighborhoods and communities have historically been neglected by government, and have limited access to security, water, sanitation, health care, public education, and formal employment, making the coping mechanism of the residents regarding COVID-19 worrisome. According to the 2010 census, 14 million Brazilians were estimated to live in favelas across the country [31]. Many of these individuals do not have the luxury of quarantine. They are informal employers, street vendors, delivery drivers or domestic workers, all still working while living in a highly dense environment.

To monitor the real situation of the pandemic in the favelas of Rio de Janeiro, inhabitants of the favelas have collected data that indicate that the number of deaths caused by coronavirus in the favelas is 41 % higher than the number reported by the Mayor's Office [32]. The underreporting of cases and deaths have brought NGOs that act on those communities to launch initiatives to collect data inside the favelas [33]. The community newspaper of the Complexo do Alemão, one of the most famous favelas in Rio de Janeiro, organized a database panel with the data collected from 13 communities [34]. The data is collected from the family clinics and Rapid Appointment Units (UPAs), of the regions, providing a better precision for the area where the patient came from. The numbers are discrepant to the ones released by the Mayor's Office because the latter only releases it by neighborhoods, and many favelas intersect between multiple neighborhoods of the city. As of May 19th 2020, 504 cases of coronavirus have been confirmed in the favelas of Rio de Janeiro, with 172 deaths, a death rate of 34.1 % [34].

Another population who needs to be highlighted are the Native Brazilians. The coordinator of the Xingu Project, at the Federal University of São Paulo, states that the COVID-19 might have an impact comparable to previous epidemics, such as measles [35]. Many practices disseminated to prevent the spread of coronavirus, such as the cleaning of hands with 70 % alcohol, are impracticable in many Native Brazilian villages. Moreover, PPEs are not distributed throughout different rural or remote communities. According to the FUNAI, the national foundation for the Native Brazilians, 107 indigenous groups in the Brazilian Amazon are still deprived of contact with the modern society [36]. According with the Special Secretary of Indigenous Health (SESAI) and the Brazil's Indigenous People Articulation (APIB), around 81,000 indigenous people from 230 territories are threatened by the coronavirus pandemic. Many of the territories occupied by native groups are targeted by missionaries, hunters, and people who want to extract wood. This creates risk for native individuals who travel out of indigenous villages to gather resources (food, supplies, etc.) and may come into contact with outsiders who might carry the virus. In addition, many villages are isolated from governmental health systems. Until May 12th, APIB reported that 308 indigenous people were infected by the disease, and 77 individuals died from it. A death rate of 25 % [37].

It is important that in addition to knowledge regarding public health measures to mitigate the coronavirus spread, we also take into consideration the reality of many of novel coronavirus reaches these vulnerable populations or others such as displaced communities, migration camps, or prison environments in different parts of the world the result will be a humanitarian crisis. The containment of the spread will be impossible, and the death toll caused by the disease will be unprecedented for modern times.

8. Last comments

While other countries face or will face some or many of the challenges detailed above, Brazil illustrates a constellation of factors that create unique problems and exceptional risk. The country is in a current political crisis, with acute socioeconomical disparities, it has a large territory and voluminous population, and unequal availability of basic services.

It is imperative for professionals across disciplines to work together to share and disseminate accurate and precise information to the public and each other. For the forensic community, these partnerships include but are not limited to the fields of health, public health, medico legal, public policy, law enforcement, and scientific institutions. Special attention must be paid to vulnerable populations who are on the verge of being disproportionately impacted by the spread of COVID-19.

The rights of families and the deceased must be upheld to the extent that these rights do not jeopardize public health or the safety of forensic staff. Professionals involved with management of the dead must provide families with information regarding their deceased relatives, including death certificates and any protocols that must be followed for the care and handling of the body.

Effectively and ethically managing large numbers of dead from COVID-19 requires an increase of human and material resources, including building local capacity and supporting and/or carrying out recovery and identification processes. It is imperative that authorities anticipate and prepare for the grave challenges they might encounter regarding managing those who died during the pandemic.

Declaration of Competing Interest

The authors declare that there are no conflicts of interest.

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