Management of bodies of deceased persons with suspected or confirmed COVID-19

13 June 2020

Yosef Gebreyohannes, Firmaye Bogale, Dagmawit Solomon, Zelalem Kebede, Sabit Ababor, Ermias Wolde, Tsegaye Getachew, Samson Mideksa, Desalegn Ararso, Getachew Tollera

Question

What is the best available evidence regarding transmission of SARS-CoV-2 through the handling of bodies of deceased persons and considerations related to the safe management of bodies of deceased persons with suspected or confirmed COVID-19?

Background

Based on current evidence, the COVID-19 virus is mainly transmitted between people through droplets, fomites, and close contact, but other modes of transmission (i.e. airborne and faeco-oral) have also been proposed (ECDC, 2020; WHO, 2020). As this is a new virus whose source and disease progression are not yet entirely clear, more precautions may be used until further information becomes available (WHO, 2020).

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes the COVID-19, has been characterized as highly contagious compared with other viral respiratory infections (Lai et al., 2020; WHO, 2020). To date evidence is limited if persons having become infected from exposure to the bodies of persons who died from COVID-19 (WHO, 2020). This has created anxiety about the preparation and the burial of the bodies of deceased persons with suspected or confirmed COVID-19 (Yaacoub et al., 2020).
There are reports by the WHO and Pan American Health Organization (PAHO) that states dead bodies are not generally infectious except in cases of hemorrhagic fevers (such as Ebola, Marburg) and cholera. According to these reports only the lungs of patients with pandemic influenza, if handled improperly during an autopsy, can be infectious. Otherwise, cadavers do not transmit disease (Pan American Health Organization, 2004; WHO, 2020). On the other hand previous studies reported that healthcare workers in contact with deceased cases of a severe acute respiratory syndrome (SARS) contracted the disease (Liu W, 2009), and Middle East respiratory syndrome (MERS) was detected in nasal secretions of a dead case (Mahallawi W, 2018). There is also one report on a forensic practitioner in Thailand who had contact with biological samples and corpses of COVID-19 and contracted the virus (Sriwijitalai W, 2020). Similarly, there are confusions about how to handle or safely perform autopsies on those bodies. Considering the uncertainties about the transmission and how to handle the bodies of deceased persons with confirmed or suspected COVID-19 cases, answers to these questions are on the priority list for authorities around the globe including Ethiopia, in which the numbers of deaths from COVID-19 are rising both from the community and health care settings.

The objective of this review is, therefore, to summarize the best available evidence related to:

1) The transmission of SARS-CoV-2 through the handling of bodies of deceased persons,

2) Safe management of the bodies of deceased persons with suspected or confirmed COVID-19.

How this Evidence Summary was prepared?
The methods used to prepare in this rapid evidence review was adopted from the JBI Evidence summary. The evidence in this summary comes from systematic reviews and guidelines. It was prepared based on structured searches of the literature and selected evidence-based healthcare databases (Cochrane Library, PubMed, PDQ-Evidence, Epistemonikos, Health systems evidence, and JBI Database of Systematic Reviews). Following the search, all studies were assessed for internal validity using a set of critical appraisal tools.

Levels of evidence for the effectiveness
(Munn, Lockwood and Moola, 2015)

Level 1- Experimental Designs:
(Systematic review of RCTs, systematic review of RCTs and other study designs, & RCTs)

Level 2- Quasi-experimental Designs:
(Systematic review of quasi-experimental studies & systematic review of quasi-experimental and other lower study designs)

Level 3- Observational analytic designs:
(Systematic review of comparable cohort studies)

Level 4- Observational descriptive studies:
(Systematic review of descriptive studies, cross-sectional studies, case studies)

Level 5- Expert Opinion:
(Systematic review of expert opinion, expert consensus)

Grades of Recommendation (JBI, 2013)

Grade A: A ‘strong’ recommendation, where there is evidence of adequate quality supporting its use

Grade B: A ‘weak’ recommendation, where there is evidence supporting its use, although this may not be of high quality
Evidence regarding the transmission of SARS-CoV-2 through the handling of bodies of deceased persons

- According to recent systematic review finding, there is scarce evidence on the transmission of coronavirus disease 2019 (COVID-19) and other coronaviruses from the dead bodies of confirmed or suspected cases (Yaacoub et al., 2020). (Level 3)

However, the systematic review revealed there might be significant harms from the transmission of COVID-19 from the bodies of deceased persons considering the number of deaths currently observed and anticipated in the COVID-19 pandemic. Individuals at risk include healthcare workers, morgue staff, transport staff, family members, burial staff, and religious staff. There is also a cultural challenge, as some cultural aspects and religious practices may influence how the bodies are handled and the associated risk of transmission. Moreover, the acceptability of different management strategies might vary across cultural and religious groups (Yaacoub et al., 2020). This shows the need for contextualizing of suggestions and evidence without compromising infection prevention and control.

- The technical report by the European Centre for Disease Prevention and Control (ECDC) indicated that the potential risk of transmission related to the handling of bodies of deceased persons with suspected or confirmed COVID-19 is considered low. However, as viable SARS-CoV-2 may persist on surfaces for days, and there is the possibility that the virus also persists on deceased bodies. Therefore, transmission related to the handling of bodies of deceased persons with suspected or confirmed COVID-19 might be possible and it can be related to i) direct contact with human remains or bodily fluids where the virus is present ii) direct contact with contaminated fomites (ECDC, 2020). (Level 5)

According to the ECDC, during standard handling, the risk associated with the transmission of droplets or aerosol from the airways of the deceased is considered low. Conversely, aerosol-generating procedures or procedures that can lead to splashes during post-mortem examinations carry a higher risk (ECDC, 2020).

- According to a guide on forensic pathology practice for death cases related to coronavirus disease, other coronaviruses in the same genus, it is inferred that the SARS-CoV-2 virus has strong persistence in the external environment, especially at low temperatures (Mao et al., 2020). (Level 5)

The included studies in the guide showed the coronavirus that causes severe acute respiratory syndrome (SARS), can survive for 2 days in hospitals or domestic sewage and dechlorinated tap water, for 3 days in faeces, 14 days in normal saline and 17 days in urine at 20°C away from light. However, at 4°C, the virus can survive longer than 14 days in the abovementioned water settings, and longer than 17 days in faeces. The coronavirus that causes Middle Eastern respiratory syndrome (MERS) also showed that as the virus was detected in nasal secretions even 3 days after death (Mao et al., 2020).
Evidence regarding the management of the bodies of deceased persons with suspected or confirmed COVID-19

- A systematic review by Yaacoub et al showed that gaps exist in the evidence base for different safe management strategies of the bodies of deceased persons for coronaviruses in general, and COVID-19 in particular (Yaacoub et al., 2020). (Level 3)

However, given the gaps, the authors of this systematic review proved the usefulness of indirect evidence on COVID-19 from different guidance documents. The guidance documents can help in identifying discrete steps in the management of bodies of deceased persons with suspected or confirmed COVID-19 (e.g. WHO interim guide on infection prevention and control for the safe management of a dead body in the context of COVID-19). The interpretation of these findings needs to consider that the guidance are not supported by direct evidence.

The authors also noted that, as there was variability in the strategies adopted for the different steps across different guidance documents. One limitation of the guidance documents is the lack of consideration of cultural practices around death (eg, burial, peri-burial practices, and cultural preferences). Still, and given the lack of primary research, these documents can be helpful to governmental or non-governmental entities when developing such kind of guidance.

Based on the systematic review of 23 included guidance documents, the authors also illustrated that while the risk of infection from dead bodies is deemed to be low, a precautionary approach using PPE including gloves, gown, mask, and goggles would be reasonable where direct contact with dead bodies or fluid spray from dead bodies is possible. Only two guidance documents recommended the use of N95 respirators for the handling of dead bodies. Given the absence of direct research evidence, any recommendations on PPE use for handling bodies of deceased people in different settings must balance the uncertainty of the benefits and harms with feasibility considerations, such as PPE stock and availability (Yaacoub et al., 2020).

Infographic reported from the guidance documents that illustrate the different steps in the management of bodies of the deceased person with suspected or confirmed COVID-19 is annexed in this document (Figure 1). The infographic can also be accessed through the following link:
https://gh.bmj.com/content/bmjgh/5/5/e002650/F2.large.jpg

- We found one primary evidence that provides very low certainty of evidence that the specific approach used by Li et al to set up the autopsy laboratory reduced the risk of transmission to the person handing dead bodies (Li et al., 2005). However, this study was limited only to the management of autopsies and does not cover the main steps of handling dead bodies. Besides, the availability of BSL-3 laboratories
and autopsy rooms may be a barrier in many settings, especially for low-resource settings. (Level 5)

- **WHO** has developed *interim guidance* for infection prevention and control for the safe management of a dead body in the context of COVID-19 (WHO, 2020). The interim guidance is for all those, including managers of health care facilities and mortuaries, religious and public health authorities, and families, who tend to the bodies of persons who have died of suspected or confirmed COVID-19. (Level 5)

  The WHO interim guidance indicated people might die of COVID-19 in the health care facilities, home, or in other locations. Thus, the safety and well-being of everyone who tends to bodies should be the priority. Before attending to a body, people should ensure that the necessary hand hygiene and personal protective equipment (PPE) supplies are available. The dignity of the dead, their cultural and religious traditions, and their families should be respected and protected throughout.

  The WHO guidance also specified that authorities should manage each situation on a case-by-case basis, balancing the rights of the family, the need to investigate the cause of death, and the risks of exposure to infection. The WHO interim guidance is available at: [https://apps.who.int/iris/bitstream/handle/10665/331538/WHO-COVID-19-IPC_DBMgmt-2020.1-eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/331538/WHO-COVID-19-IPC_DBMgmt-2020.1-eng.pdf)

- **ECDC** has released *guidance* related to the safe handling of bodies of deceased persons with suspected or confirmed COVID-19 (ECDC, 2020). The guidance supports public health preparedness planning and response activities on the safe handling of bodies of deceased persons with suspected or confirmed COVID-19: at the site of death, during transport, storage, and preparation before burial/cremation, and during burial/cremation. (Level 5)

  The guide indicates, those in direct contact with deceased cases of COVID-19 (both suspected or confirmed) should be protected from exposure to infected bodily fluids, contaminated objects, or other contaminated environmental surfaces through wearing appropriate PPE. Minimum requirements include gloves and a long-sleeved water-resistant gown.

  The guide also directs aerosol-generating procedures or procedures that can lead to splashes during post-mortem examinations carry higher risk and require appropriate PPE (e.g. eye protection and facial filter piece (FFP) respirators). The ECDC guidance is available at: [https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-safe-handling-of-bodies-or-persons-dying-from-COVID19.pdf](https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-safe-handling-of-bodies-or-persons-dying-from-COVID19.pdf)
Unites States Center for Disease Control and Prevention (CDC) has interim guidance related to the collection and submission of postmortem specimens from deceased persons with known or suspected COVID-19 (US CDC, 2020). (Level 5)

The guidance provides recommendations for biosafety and infection control practices during specimen collection and handling, including during autopsy procedures. The guidance is used by medical examiners, coroners, pathologists, other workers involved in providing postmortem care, and local and state health departments in the Unites States. The guidance also recommends postmortem activities should be conducted with a focus on avoiding aerosol-generating procedures and ensuring that if aerosol generation is likely (e.g., when using an oscillating saw) that appropriate engineering controls and personal protective equipment (PPE) are used. These precautions and the use of standard precautions are appropriate to work practices to help prevent direct contact with infectious material, percutaneous injury, and other hazards related to moving human remains and handling embalming chemicals (US CDC, 2020). The CDC guidance is available at:

Conclusion and Recommendations

☞ We did not find evidence on the transmission of COVID-19 through handling of bodies of deceased persons of confirmed or suspected cases. Even when expanding to consider indirect evidence, we found scarce literature related to the transmission of other coronavirus diseases of the same genus (SARS and MERS infections).

☞ Since COVID-19 is a new virus whose source and disease progression are not yet entirely clear, there is a need for further evidence on the modes of transmission of COVID-19 from bodies of deceased persons. (Grade A)

☞ Although the potential risk of transmission related to the handling of bodies of deceased persons with suspected or confirmed COVID-19 is considered low, there might be significant harm from the transmission of COVID-19 from the bodies of deceased persons considering the number of deaths currently observed and anticipated in the COVID-19 pandemic. Therefore, more precautions might be useful for individuals handling bodies of deceased persons who died from confirmed or suspected COVID-19 until evidence become available. (Grade A)
We did not find any direct evidence related to strategies for the management of the bodies of deceased persons with suspected or confirmed COVID-19. However, indirect evidence on COVID-19 from different guidance documents could help in identifying distinct steps in the management of bodies of deceased persons with suspected or confirmed COVID-19. The interpretation of these conclusions needs to consider that the guidance are not supported by direct evidence. (Grade B)

Although there are uncertainties about how to handle the bodies of deceased persons with confirmed or suspected COVID-19 governmental entities are advised to develop infection prevention and control for the safe management of a dead body in the context of COVID-19 that considers cultural practices around death (eg, burial, peri-burial practices, and cultural preferences). (Grade A)

In addition, a precautionary approach using PPE including gloves, gown, mask, and goggles would be reasonable where direct contact with dead bodies or fluid spray from dead bodies is possible. Given the absence of direct research evidence, any recommendations on PPE use for handling bodies of deceased people in different settings must balance the uncertainty of the benefits and harms with feasibility considerations, such as PPE stock and availability. (Grade A)

References

ECDC (2020) Considerations related to the safe handling of bodies of deceased persons with suspected or confirmed COVID-19.


Conflict of interest: The authors declare no conflicts of interest

## Appendix

### Safe Management of Bodies of Deceased Persons with Suspected or Confirmed COVID-19

**Rapid Systematic Review**

<table>
<thead>
<tr>
<th>STEPS ADDRESSED</th>
<th>HANDLING OF DEAD BODY</th>
<th>PPE OF INDIVUALS HANDLING DEAD BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BODY PREPARATION</strong></td>
<td>Remove IV tubes and lines. Disinfect puncture holes. Disinfect surfaces where body was resting. Manage as a specific risk category. Universal precautions of material used.</td>
<td>Gloves, long-sleeved water resistant gown, mask, goggles, limit direct personnel involvement.</td>
</tr>
<tr>
<td><strong>PACKING</strong></td>
<td>Two-layer cover of the body using leak-proof bag. Disinfect outer packing.</td>
<td>Full complement of PPE (e.g. gloves and long-sleeved water-resistant gown).</td>
</tr>
<tr>
<td><strong>TRANSPORT TO STORAGE SITE</strong></td>
<td>Standard local routine procedure. No special transport required. Decontaminate vehicle and minimize contact with human remains. If moving to another country check restrictions on importing bodies with confirmed/suspected COVID-19.</td>
<td>Gloves, disposable nitrile gloves, surgical mask, triple-layer medical mask, long-sleeved water-resistant gown.</td>
</tr>
<tr>
<td><strong>STORAGE SITE</strong></td>
<td>Should remain clean and disinfected. Facility properly ventilated and illuminated. Cold chambers at 4°C. Practice safe waste disposal.</td>
<td>Direct contact with human remains or bodily fluids should be minimized during reception at designated body storage sites. Strict PPE procedures (e.g., gloves, gown, long-sleeved water-resistant gown, hand hygiene, goggles/face shield, mask). No aerosol generating procedures should be allowed.</td>
</tr>
<tr>
<td><strong>VIEWING</strong></td>
<td>Only by close relatives in a pre-designated area. Use standard precautions to allow viewing of the body. Provide support in appropriate PPE use for mourners. Advise mourners not to touch the body.</td>
<td>PPE is not needed for relative viewing, yet, they should limit any contact with the body. If relatives have touched the body use recommended hygiene procedures.</td>
</tr>
<tr>
<td><strong>EMBALKING</strong></td>
<td>Mostly not recommended. If performed, use standard precautions and protective measures, and only by trained personnel.</td>
<td>Hand hygiene and standard PPE (e.g., gloves and long-sleeved water-resistant gown) if the procedure is allowed.</td>
</tr>
<tr>
<td><strong>BURIAL</strong></td>
<td>Can be performed regularly. Sensitize burial staff about COVID-19 and standard precautions. Religious rituals allowed as long as there is no contact with the body.</td>
<td>The minimum requirements include gloves and long-sleeved water-resistant gown for staff. Avoid any crowding during funeral services, and advise participants to maintain physical distancing and hand hygiene.</td>
</tr>
<tr>
<td><strong>CREMATION</strong></td>
<td>Can be performed if facilities are available. Cremate within 24 hours without taking the body home. Sensitize staff. Relatives can view dust. Follow local procedures.</td>
<td>Follow protective measures and standard precautions. Avoid any crowding at crematorium grounds.</td>
</tr>
<tr>
<td><strong>PLANNING</strong></td>
<td>Establish preparedness plan for handling dead bodies, access to trained staff, transport, equipment, and body storage. Review national contingency plans and communicate.</td>
<td>Assess the need for PPE in healthcare professionals and the need for training on its use.</td>
</tr>
<tr>
<td><strong>OTHER</strong></td>
<td>Consult with stakeholders (e.g. religious representatives) to ensure acceptability of changes to standard practice. Provide counseling to family members.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1:** Infographic illustrating the different steps in the management of bodies of a deceased person with suspected or confirmed COVID-19.