This article was posted on the Archives Web site as an Early Online Release. Note: Due to the extremely time sensitive nature of the content of this article, it has not been copyedited or formatted per journal style. Changes or corrections may be made to this article when it appears in a future print issue of the Archives. Early Online Release articles are citable by using the Digital Object Identifier (DOI), a unique number given to every article.

The DOI for this manuscript is doi: 10.5858/arpa.2020-0341-LE

The final published version of this manuscript will replace the Early Online Release version at the above DOI once it is available.
COVID-19 Autopsies and Personal Protective Equipment

Bing Han, MBBS; Ritu Bhalla, MD; Fernanda da Silva Lameira, MD; Richard Stuart Vander Heide, MD, PhD, MBA; Gordon Lee Love, MD

All authors are in the Department of Pathology, Louisiana State University Health Science Center, New Orleans, Louisiana

Corresponding author:

Gordon Love, MD,
Chairman, Department of Pathology, LSU School of Medicine
Jack Perry Strong MD Endowed Chair of Pathology
Professor-Clinical Pathology
LSU Health Sciences Center,
1901 Perdido Street, P5-1,
New Orleans, LA 70112
Email: glove2@lsuhsc.edu

The authors have no relevant financial interest in the products or companies described in this article.
In February 2020, the facilities manager of our hospital was tasked to evaluate our morgue airflow for compliance with the Centers for Disease Control (CDC) standards for coronavirus disease 2019 (COVID-19) autopsies. The morgue had been built in 2015 to incorporate negative airflow that is exhausted to the outside of the hospital at a rate of six room air-exchanges per hour. After compliance was proven, the Medical Director of the laboratory approved the morgue for COVID-19 autopsies. Our pathology residents had safety concerns. Some asked: “Is it worth taking the risk to perform a known cause-of-death autopsy?” A frank and open discussion ensued between pathology residents and faculty. We decided that a pathologist who performs an autopsy is similar to a clinician who treats a patient in the clinic, and there is some risk of infection with both activities. Our goal as pathologists is to explore the mechanism of the disease, which coincides with our responsibility to the community and to the family of the deceased. At the same time, we must ensure the safety of all the participants in the autopsy. Our senior resident (BH) had a video call with a frontline volunteer physician in Wuhan, China (personal communication, 03/19/2020) asking about the details of their personal protective equipment (PPE). Our Wuhan colleague recommended three complete layers of PPE (surgical scrubs [inner], full-body, biohazard suit with hood [middle], and surgical gown [outer]) that exceeded the then-current CDC recommendation of two layers (surgical scrubs and apron), and he also recommended wrap-around goggles to protect the eyes. He referenced the Chinese Healthcare Authority as having indicated that no infections of medical personnel in China ever occurred with such dress. Wrap-around goggles were purchased from Home Depot (Home Depot, Inc.). Otherwise, CDC PPE recommendations including use of N95 respirators, gloves, boots, and plastic face shield were followed (Figure 1) with the addition of post-procedure doffing of PPE with showering. We made sure that autopsy participants were familiar with donning and doffing the PPE with practice drills before the actual autopsy. All resident and faculty pathologists contributed to our autopsy service without coercion. After 24 COVID-19 autopsies, three residents, two attending pathologists and an autopsy assistant never had any symptoms and remain comfortable with the PPE measures.

As we were prepared to start our first COVID-19 autopsy, we noted the recommendation of the Occupational, Safety, and Health Administration (OSHA) against performing autopsies on COVID-19 patients noting the unknown hazards of transmission. We decided to proceed to perform autopsies, and
now OSHA has dropped their opposition to autopsy of COVID-19 decedents to mirror the CDC autopsy recommendations.

We recommend communication with all relevant departments and personnel before starting COVID-19 autopsies including the inspection of morgue ventilation and of disinfection and cleaning procedures. Supplies such as formalin, appropriately sized specimen containers, and disinfectant need to be inventoried for sufficient availability.

We were unable to use an oscillating saw to open the skull because we did not have the vacuum shroud to contain aerosols. Therefore, our initial autopsies lacked brain tissue.

Acknowledgement:
We would like to thank Sharon Fox, MD, PhD (autopsy faculty) and our three outstanding first-year residents, Aibek Akmatbekov, MD, Jack Herbert, MD, and Fernanda Da Silva Lameira, MD. We also want to thank Jing Li, MD in Wuhan, China. We hope our experiences can help other people and we express thanks to those families who have consented for autopsies on their loved ones to better understand this disease.
Reference:


FIGURE LEGEND:

A first-year pathology resident with full Personal Protective Equipment (PPE) including N95 respirator, face shield, coverall biohazard suit, surgical gown, double gloves over a cut-resistant glove, and boots. Laminar air flow about the autopsy table direct aerosols away from personnel