

# Ethical and legal aspects of clinical and forensic autopsy

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## Abstract

This narrative review analyzed ethical and legal aspects of clinical and forensic autopsy, compiling studies from various methodologies published between 2000 and 2023 in the LILACS, PubMed, Scopus, Web of Science, and SciELO databases, providing a comprehensive view of the topic. The findings were categorized into clinical autopsy, forensic autopsy, and autopsy during the pandemic, highlighting the effects of COVID-19. Both types are essential for improving medical care, clarifying causes of death, and providing legal evidence, yet they face challenges such as a decline in cases due to technological advancements and cultural and religious barriers. The pandemic intensified these challenges, leading to procedural adaptations and increased recognition of alternative methods. Balancing the need for reliable information while respecting cultural beliefs remains an ongoing challenge, emphasizing the importance of ethical approaches. The evolution of autopsy reflects medical advancements and the complex interplay between science, ethics, culture, and legality.

**Keywords:** Autopsy. Legislation. Ethics. Covid-19.

## Resumo

### Aspectos éticos e legais da autópsia clínica e forense

Esta revisão narrativa analisou aspectos éticos e legais da autópsia clínica e forense, reunindo estudos de diversas metodologias publicados entre 2000 e 2023 nas bases de dados LILACS, PubMed, Scopus, Web of Science e SciELO, o que proporcionou uma visão abrangente do tema. Os resultados foram categorizados em autópsia clínica, forense e durante a pandemia, destacando os efeitos da covid-19. Ambas as autópsias são cruciais para melhorar cuidados médicos, esclarecer causas de morte e fornecer provas legais, mas enfrentam desafios como a redução de casos devido ao avanço tecnológico e obstáculos culturais e religiosos. A pandemia intensificou esses desafios, levando a adaptações nos procedimentos e valorização de métodos alternativos. Equilibrar a necessidade de informações seguras com o respeito a crenças culturais é um desafio constante, que evidencia a importância de praticar abordagens éticas. A evolução da autópsia reflete avanços médicos e a complexa interação entre ciência, ética, cultura e legalidade.

**Palavras-chave:** Autópsia. Legislação. Ética. Covid-19.

## Resumen

### Aspectos éticos y legales de la autopsia clínica y médico-legal

Esta revisión narrativa analizó los aspectos éticos y legales de la autopsia clínica y médico-legal, recopilando estudios de diversas metodologías publicados entre 2000 y 2023 en las bases de datos LILACS, PubMed, Scopus, Web of Science y SciELO, lo que aportó una visión integral del tema. Los resultados se categorizaron en autopsia clínica, médico-legal y durante la pandemia, destacando los efectos de la COVID-19. Ambas autopsias son cruciales para mejorar la atención médica, esclarecer las causas de muerte y proporcionar pruebas legales, pero enfrentan desafíos como la reducción de casos debido al avance tecnológico y los obstáculos culturales y religiosos. La pandemia ha intensificado estos desafíos, lo que ha llevado a adaptaciones en los procedimientos y a la apreciación de métodos alternativos. Equilibrar la necesidad de información segura con el respeto a las creencias culturales es un desafío constante, lo que pone de relieve la importancia de adoptar enfoques éticos. La evolución de la autopsia refleja los avances médicos y la compleja interacción entre la ciencia, la ética, la cultura y la legalidad.

**Palabras clave:** Autopsia. Legislación. Ética. Covid-19.

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Clinical autopsies confirm suspicions and answer questions that were unclarified during care while the patient was alive. In cases of violent death, autopsies help clarify legal implications and responsibilities. Both procedures must adhere to legal regulations and high ethical principles to preserve respect and credibility within the medical community and society in general<sup>1-3</sup>.

Over the years, there has been a global decline in the number of autopsies performed. However, autopsies remain the best method to determine causes of death. They are also an important tool for medical education and quality assessment of healthcare services<sup>3,4</sup>.

The COVID-19 pandemic brought significant changes in the performance of autopsies, requiring all autopsy services to adapt to the new reality and introducing additional challenges to their execution. Given this scenario, this review aimed to analyze the literature on the ethical and legal aspects that regulate and guide autopsy procedures, including cultural and religious influences, as well as the impact of the pandemic on the recommendation and execution of autopsies.

## Method

This is a narrative literature review<sup>5</sup> guided by the following question: What does the literature reveal about the ethical and legal aspects of autopsies, both currently and during the COVID-19 pandemic? This review synthesized and analyzed studies that employed various methodological approaches on the topic. The inclusion of a large sample enabled evaluation, critical discussion of the findings, and evidence-based conclusions.

Between January and December 2023, the article selection process took place. The literature search was conducted online using the Latin American and Caribbean Literature on Health Sciences (LILACS), PubMed, Scopus, Web of Science, and the Scientific Electronic Library Online (SciELO) databases. In addition to scientific articles, select academic books were consulted to provide a solid theoretical foundation.

The search terms were used in two stages, derived from the Health Sciences Descriptors (DeCS), and combined in pairs by the Boolean operators AND or OR. In the first search, the following were used: "(autopsy) AND (legislation) OR (ethics) OR (culture)." In the second search, the following were used: "(COVID-19) AND (autopsy)." The database search followed these inclusion criteria: articles available in full, published in the national and international literature from 2000 to 2023, addressing the ethical and legal aspects of autopsies worldwide.

## Review development

The included studies address the ethical and legal aspects of autopsies and the impacts caused by the COVID-19 pandemic. The results of this review were organized into the following thematic units: clinical autopsy, forensic autopsy, and autopsy during the COVID-19 pandemic.

### Clinical autopsy

Clinical autopsy plays a role in quality control of diagnosis and treatment provided to the population. By understanding the autopsy findings, the healthcare team that treated the patient can identify potential failures and their causes, determining any necessary corrections to care provided to future patients<sup>6-11</sup>.

In recent years, the value of autopsies has been questioned globally<sup>12-15</sup>, leading to a decline in its practice across countries with different socioeconomic contexts<sup>12,16</sup>. Among the reasons for this decline are diagnostic factors, characterized by significant advances in imaging technology. Furthermore, there is a growing concern over legal actions against physicians, as autopsy findings may reveal professional errors.

According to a publication by the World Health Organization (WHO), clinical autopsy rates had a significant decline over a 33-year assessment period in 12 European countries<sup>17</sup>. In the United States (US), the Joint Commission on Accreditation of Healthcare

Organization—a nonprofit organization authorized to accredit healthcare facilities—removed the requirement for a minimum autopsy rate of 20% to 25% of deaths for these facilities to operate. This measure has contributed to the decline in autopsy rates since 1971, with a significant drop from approximately 19.3% in 1972 to 8.5% in 2007<sup>18,19</sup>.

In the US, the costs of hospital autopsies—which may not be covered by insurance, creating a debt for hospitals—is another factor influencing this decline<sup>19</sup>. Additionally, the recent removal of mandatory hospital autopsy programs to qualify for Medicare reimbursements by the Centers for Medicare and Medicaid Services (CMS) have further contributed to this trend<sup>20</sup>.

### Clinical autopsy and the COVID-19 pandemic

During the COVID-19 pandemic, autopsy findings were essential to guide diagnostic methods, establishing conducts and prognostic groups. These findings include diffuse alveolar damage as the most frequent cause of death, evidence that was only confirmed after post-mortem examination<sup>21,22</sup>. Therefore, autopsies are fundamental in reducing medical errors by identifying them, providing learning opportunities to prevent mistakes, educating new physicians, and unveiling new pathologies and their mechanisms<sup>20</sup>.

However, at the beginning of the pandemic, autopsies were reduced based on recommendations from health authorities to prevent viral spread. Those that were performed had to follow guidelines requiring modifications in procedures and work environments to improve safety for professionals<sup>23,24</sup>. Furthermore, the development of infection control protocols led to a shortage of qualified professionals to conduct autopsies<sup>25</sup>. The issue became more complex with the evident decline in the number of pathologists willing to perform the procedure. In the US, this gap was filled by private companies, in response to the demands of families seeking answers. Private autopsies come at a high cost, which is not covered by health insurance<sup>23,26</sup>.

### Clinical autopsy and cultural and religious aspects

In some countries, autopsy procedures still face obstacles due to prohibitions based on traditions, religious principles, and regulations<sup>27,28</sup>. Among monotheistic religions, only Christianity—including Roman Catholicism and non-fundamentalist Protestantism—offers less resistance to clinical or forensic autopsies. However, Greek Orthodox Christians express restrictions regarding post-mortem examinations that are not required by law. Similarly, Shintoists also oppose such procedures<sup>27</sup>.

Out of respect for their sacred scriptures, especially the belief that the body is a divine gift and must be buried intact, followers of Judaism and Islam often oppose autopsies<sup>28-30</sup>. In both religions, the body must undergo a ceremonial treatment, which could be disrupted by autopsies. According to religious laws—Halakha in Judaism and Sharia in Islam—cutting the body during an autopsy is considered desecration, as well as a disrespect of the rights of the deceased's family members. This desecration is also believed to cause suffering to the soul, preventing it from resting in peace<sup>31</sup>.

Hindu followers consider autopsies highly distressing, whereas Buddhists usually do not oppose to it. However, these restrictions are not absolute.

Despite their ancient norms and traditions, religions are dynamic systems that can adapt to contemporary societal needs. Family consent may be obtained by adopting specific precautions and preserving key principles inherent to each religion. A frank discussion, led by an experienced physician—preferably one with some knowledge of the family's culture and religion—could reassure relatives about the respectful handling of their loved one's body. Such authorization might help solve a crime or identify an unknown disease, provided religious authorities grant permission and ritual elements are maintained without compromising the quality of the examination. These considerations may include restricting the examiner's gender to match that of the deceased and minimizing unnecessary

exposure of the body<sup>1,4,27,32</sup>. If authorization is still denied, other approaches may be considered, such as minimally invasive autopsies supported by radiological examinations<sup>21</sup>.

An example that reflects the strong influence of cultural factors in the decline of autopsy rates can be observed in Japan. Over the past 35 years, autopsy rates have decreased nationwide: from 45% to 9.2% in public hospitals and from 45% to 5.6% in private hospitals between 1985 and 2012<sup>33</sup>. A study conducted by Maeda and collaborators<sup>34</sup> showed that families have increasingly refused to authorize autopsies, stating they do not want their relative's body to be damaged by the procedure. Furthermore, doctors have been requesting autopsies less frequently, fearing accusations of professional error, even when none has occurred.

### Clinical autopsy and legal aspects

The request for a clinical autopsy may vary depending on the country and the cause of death (natural or due to external and violent causes). In the US, laws regarding autopsy authorization differ between states. In cases of natural death, in most states, it is up to the spouse or closest relative to decide on the performance and extent of the procedure<sup>14,35</sup>.

Brazilian legislation establishes a priority order among family members who have the power to authorize the examination. Exceptionally, in some states, a person without a family bond but who knew the deceased and assumes responsibility for the funeral may grant authorization. In cases of unclaimed bodies without relatives, public officials can take on this responsibility. Legal requirements for recognizing the right to decide on the procedure also vary. Some states require family members to present official documents and formally sign an authorization detailing the autopsy objectives. Others have more flexible regulations, accepting authorizations sent by electronic means or even by telephone<sup>36,37</sup>.

Given the ethical and, in some cases, legal requirement to obtain consent for an autopsy, caution and a humanized approach are essential

when requesting authorization from responsible parties<sup>14,15</sup>. In special situations in which the collective interest outweighs individual interest, family authorization for an autopsy may be waived.

The prevailing legal norm in most Western countries considers that when public administration's primary interest aligns safeguarding the population, it is granted the authority to override individual consent. Thus, if a physician suspects that a patient died of natural causes due to an infectious disease posing a public health risk, the state has the power to mandate an autopsy, even against the wishes of relatives and/or legal representatives<sup>1</sup>.

### Forensic autopsy

In cases of violent death requiring police investigation and prosecution, legislation in most countries determines the victim's body undergo a forensic examination, conducted by a legal medicine specialist<sup>35,38,39</sup>. Therefore, forensic autopsy differs from clinical autopsy, as it does not require authorization from a close relative or legal representative.

This legal requirement may face cultural and religious resistance, especially when the victim has Jewish or Islamic heritage, since both religions consider the human body sacred and inviolable. When approaching clinical autopsy, opposition by family members can be overcome by adopting previously discussed measures. In cases of violent death, determining cause of death and legal nature of the death can often be ascertained by external examination of the body, with a detailed and meticulous evaluation of the traumatic injuries observed<sup>31</sup>.

Violent death is understood as one resulting from an external and harmful action, regardless of whether the death is immediate or delayed, as long as there is a cause-and-effect relationship between aggression and death<sup>37</sup>. This circumstance varies among countries, but generally pertains to deaths caused with a certain likelihood of involving a traumatic event (such as gunshot or stabbing, mechanical asphyxiation, accidents of all kinds,

falls, drug overdose or other types of poisoning, explosions, or burns).

Hence, whenever there is any history or suspicion of violence, the body must be sent for forensic autopsy<sup>35,37,40</sup>. Corpses with external injuries or signs of violence, such as contusions, abrasions, bruises, traumatic wounds, or other injuries suggesting unnatural causes, should be sent to services that perform forensic autopsies. Also, in cases of deaths considered suspicious, which occur suddenly, unexpectedly, and without evident cause, and the possibility of violence cannot be ruled out, an autopsy is necessary<sup>35-37</sup>.

The forwarding of the body for forensic autopsy may occur even if there is no evident external signs of violence. If witness statements or environmental traces raise reasonable doubt that the death was not due to natural causes, the police authority will order the body to be sent to the forensic medical expert's care. This could happen, for example, in cases of suspected poisoning or mechanical asphyxiation by direct suffocation with a soft body<sup>39</sup>. In the US, individuals sentenced to serve time in a prison institution who die under state custody are also required by law to have their bodies undergo an autopsy<sup>41</sup>.

Worldwide, the autopsy, conducted by a forensic expert, is a procedure of great value for administration of justice and preservation of the rule of law<sup>35</sup>. There are disagreements about who should perform autopsies, with forensic pathologists being considered ideal practitioners. However, a critical shortage of such professionals is observed in all countries, except for some with small geographical size and population, such as Denmark, Switzerland, and Belgium, or nations with a strong medico-legal tradition, where access to important and self-sufficient centers of this specialty is easy, such as Germany, Great Britain, Italy, and France<sup>7</sup>.

A study conducted in the US, at the end of the 20th century, identified less than 200 active physicians specialized in forensic pathology, with only 40 exclusively dedicated to the field. Legislation varies across American states

regarding the professional qualified to conduct criminal investigations and autopsies, which may include forensic pathologists, a medical examiners, or coroners. Since 1960, the country has gradually transitioned from the coroner system to that of medical examiners. However, this process slowed after 2000. At the time, 12 states maintained the coroner system, 19 states adopted the medical examiner system, three states had regional or county-based medical examiner offices, and 16 states combined both systems. Although the medical examiner system has increasingly replaced coroners over the years, the latter still covers a significant proportion of the US population, and the number of autopsies in the country has continued to decline<sup>39,41,42</sup>.

### **Autopsy in times of pandemic: verbal autopsy and minimally invasive autopsy**

During the COVID-19 pandemic, due to the high risk of contamination for professionals involved in performing autopsies, the WHO launched its Interim Guidelines for Infection Prevention and Control for the Safe Management of a Dead Body in the Context of COVID-19, published on March 24, 2020, whose safety procedures require special biosafety measures<sup>23,24,43-45</sup>. Since most institutions conducting clinical or forensic autopsies in various countries did not meet the sanitary requirements specified, the performance of invasive autopsies was almost entirely suspended.

Governments and associations of pathology and forensic medicine specialists, aiming to protect the health of professionals who work in these units, recommended the suspension of invasive autopsies. In cases of natural death, due to the risk of contamination, pathologists who perform clinical autopsies were instructed to replace invasive autopsies with verbal autopsies<sup>46,47</sup>. This procedure includes conducting interviews with the deceased's close family members, evaluating clinical and laboratory information provided by the requesting medical service, and external examination of the body. In fact, verbal autopsy has been used in developing countries since 2005<sup>48</sup>.



The goal of verbal autopsy is to clarify the causes of poorly defined deaths. It should be applied mainly in areas with high underreporting and low coverage of mortality information systems<sup>48-50</sup>. The verbal autopsy methodology includes standardized interviews with people close to the deceased about the circumstances that led to death. These interviews are conducted by certifying physicians, who are general practitioners or doctors in public health programs.

The process involves three data collection instruments (interview forms): one for deaths of children under 28 days old; one for deaths of children aged 28 days to under 10 years; and one for deaths of individuals aged 10 years or older. The information collected includes identification of the deceased, pre-existing conditions, symptoms of the disease that led to death, and history of healthcare services usage. Ideally, two certifying physicians independently assess the verbal autopsy and subsequently meet to reach a consensus. A third physician may be invited to break a tie<sup>51</sup>. A limitation of verbal autopsy is that it may not always be sufficient to identify all causes of death. Additionally, its effectiveness varies depending on factors such as cause of death, geographic area, access to healthcare services and complementary exams, and the population's educational level<sup>51,52</sup>.

Minimally invasive autopsy has been introduced in several countries as a methodological alternative to complement or even replace conventional invasive autopsy<sup>17,53</sup>. In this procedure, the body undergoes a thorough examination using imaging technologies such as magnetic resonance imaging, computed tomography, and even ultrasound. Tissue samples are also collected using needle puncture. This eliminates the need for an autopsy room, and the examination could be conducted within the hospital itself. Thus, this procedure may increase the safety of the medical team performing the post-mortem examination, as it reduces contact with the body. Since no incisions or opening are made, families are much less likely to oppose the procedure. Those who defend this investigative methodology guarantee its efficiency and accuracy, claiming results similar to those of traditional invasive autopsy<sup>17</sup>.

In the forensic field, minimally invasive autopsy can be particularly useful to identify fractures, visceral lesions, hemorrhages, gas collections, and foreign objects such as firearm projectiles, including determining their trajectory within the body and distinguishing entry from exit wounds. Consequently, virtual autopsy has gained relevance in medico-legal cases, but still presents some disadvantages, such as high costs due to the advanced technology and the need for specialized training. On the other hand, it offers significant psychological and cultural advantages for religions and community groups who believe the body and soul are inseparable and oppose conventional autopsy<sup>54,55</sup>.

In a study published in 2019, Brazilian researchers demonstrated substantial agreement between minimally invasive autopsy diagnoses and full diagnostic autopsies, with an 85% concordance rate<sup>56</sup>. A similar result was observed in a study conducted in Mozambique, published in 2016, in which researches agreed between minimally invasive autopsy diagnoses and complete diagnostic autopsy in 75.9% of cases<sup>57</sup>.

## Final considerations

Autopsy, whether in the clinical or forensic field, is fundamental, as it improves medical care, clarifies causes of death, and provides legal support in judicial matters. However, it faces significant challenges, from its declining frequency due to technological advances to cultural and religious barriers that vary across communities. The COVID-19 pandemic heightened these challenges, leading to procedural adaptations and the growing emphasis on alternative methods, such as verbal and minimally invasive autopsies.

Thus, the pursuit of balance between the need for accurate information and respect for cultural beliefs and practices remains a constant challenge, highlighting the importance of ethical and sensitive approaches in conducting these procedures. Ultimately, the evolution of autopsies not only reflects advances in medicine, but also reveals the complex interplay between science, ethics, culture, and legality.

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Horácio Mário Fittipaldi Júnior participated in all stages of the study, from the literature search to the editing of the manuscript. Betuel Gomes da Silva and Etienne Oliveira da Silva Fittipaldi collaborated with the analysis and synthesis of the literature, the writing of the review, the structuring of the text and references, and the review and editing of the manuscript.

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