

The Decline of the Autopsy in Rhode Island and Nationwide: Past Trends and Future Directions

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ABSTRACT

The autopsy has long been a fundamental aspect of medical practice and research. However, in the last 50 years, the proportion of deaths for which an autopsy is performed has decreased dramatically. Here we examine some of the reasons for the decline of the autopsy, as well as several interventions that have been proposed to revive it. We also present autopsy utilization data from the Lifespan system, which mirrors nationwide trends.

KEYWORDS: autopsy, pathology, medical education

INTRODUCTION

The importance of the autopsy, or post-mortem examination, to the practice of medicine is difficult to overstate. In the clinical setting, autopsy provides information to providers, researchers, and students that cannot be gleaned from living patients. In the forensic setting, it continues to play a critical role in medico-legal cases. However, in the past several decades, the autopsy rate in US hospitals has declined precipitously. Many have voiced their opinion about 'the death of the autopsy', and the detriment thereof to clinicians, particularly to the pathologists who perform them. Still others have offered suggestions for the revival of the autopsy as well as its transformation to a more modern, less invasive, and timelier procedure. Here we provide commentary on the past, present, and future of the autopsy, as well as data from the Lifespan system about recent autopsy trends. We argue that the autopsy remains a critical aspect of modern medicine, and should remain a part of the training of the next generation of physicians.

WHAT IS AN AUTOPSY?

Autopsy has its roots as far back as 5000 years ago in ancient Greece, Babylonia, and Egypt. In fact, the word autopsy comes from the Greek roots *autos* (meaning self) and *optos* (meaning sight). Thus an autopsy, literally translated, is an opportunity to see for oneself.¹ The modern autopsy originated when Renaissance physicians such as Vesalius and Morgnani began to more reliably correlate autopsy findings with clinical disease processes, and it is Virchow who is credited with integrating the use of the microscope into common autopsy practice.² Today, the full autopsy includes a detailed external examination, as well as full dissection and investigation of the cranial, thoracic, abdominal, and pelvic

cavities. Medical, or hospital, autopsies are usually performed at the request of a physician or family member of the deceased in order to answer a specific clinical question or as part of a research effort to investigate new diagnostic or therapeutic interventions. In addition, medical autopsies often have the added benefit of providing a sense of closure to family members, and also identifying any hereditary factors that could have consequences for relatives of the patient.³ These autopsies require the informed consent of legal next of kin.¹

On the other hand, forensic autopsies are performed in cases of death suspected to be due to injury, poisoning/intoxication, or unexpected natural death. They are often more focused in nature, and include detailed documentation of injuries, quantification of substances within the body, determination of the ultimate cause of death, or other investigations as required by the criminal justice system. These autopsies are requested by the coroner or medical examiner, and do not require the consent of legal next of kin.¹

THE DECLINE OF THE AUTOPSY

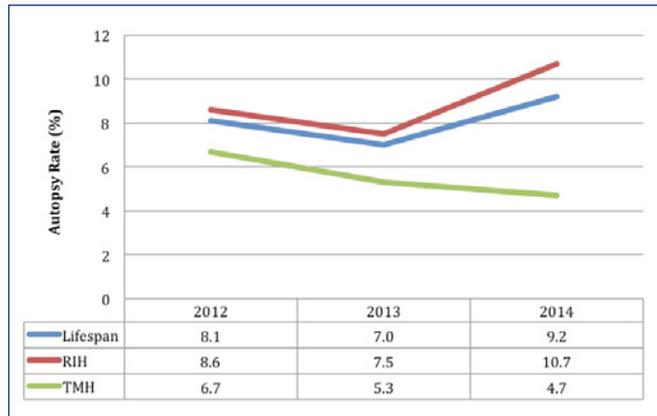
In the years following World War II, nearly 50% of US hospital deaths underwent an autopsy.^{2,4} Since then, the autopsy rate in the US and other western nations has steadily declined. In 1971, the Joint Commission on Accreditation of Hospitals eliminated the performance of a minimum number of autopsies as a requirement for accreditation, which fueled a further decline in the autopsy rate.¹ Today, the autopsy rate in academic hospitals hovers around 10%, while many non-teaching hospitals no longer perform any autopsies.^{1,5}

Furthermore, the leading indications for autopsy and the ages of those autopsied have changed significantly. The proportion of autopsies performed for deaths from disease decreased from 16.9% in 1972 to 4.3% in 2007, while the proportion of autopsies performed for deaths from external causes increased from 43.6% to 55.4% during the same time period.⁶ Of the ten most common causes of death autopsied in 2007, all but one (pregnancy, childbirth, and puerperium) were related to external causes.⁶ Elderly patients are now much less likely to undergo autopsy: in 1972, 37% of those autopsied were aged 64 or greater, that figure decreased to 17% in 2007.⁶

Data from the Lifespan system mirror nationwide statistics. Approximately 90% of autopsies performed within the Lifespan system take place at Rhode Island Hospital, with the remainder occurring at The Miriam Hospital. Only rarely are autopsies performed at Newport Hospital (usually one or two cases per year). For the years 2012 through 2014,

Figure 1. Autopsy rates in the Lifespan hospital system.

Autopsy rate, shown as the percentage of total deaths for which an autopsy was performed, for the Lifespan system, Rhode Island Hospital, and The Miriam Hospital from the years 2012 through 2014. The data for the Lifespan system represent the summation of data from RIH and TMH; Newport Hospital is not included in this analysis. Notably, the autopsy rate at RIH actually increased in 2014 compared with previous years; it is unclear if this represents a new trend or a normal variation.



approximately 10% of deaths at RIH and 5% of deaths at TMH underwent autopsy, resulting in an overall autopsy rate around 8%. Autopsy rates from these years are shown in **Figure 1**.

DISCUSSION

Over the years, several reasons have been offered for the decline in autopsy rate. Often first among them is the belief that advances in ante-mortem diagnosis have made autopsy unnecessary. However, several studies have shown this to be an invalid assumption. The most robust of these was a 2003 review of 53 autopsy series from 1966 to 2002, which examined both major missed diagnoses (those relating to the cause of death) and class I errors (defined as major errors that, had they been detected during life, would or could have affected patient prognosis or outcome). They concluded that the rate of major missed diagnoses decreased at a rate of 19.4% per decade, while the rate of class I errors decreased at a rate of 33.4% per decade. However, they estimated that a contemporary institution with an autopsy rate as low as 5% could experience rates of major missed diagnoses and class I errors as high as 24.4% and 6.7%, respectively.⁷ Another, a 2007 retrospective review of cancer patients dying in the ICU at a tertiary cancer center where the autopsy rate was 13%, revealed a 26% rate of major missed diagnoses and a 14% rate of class I errors.⁸

Another frequently cited cause for the decline of the autopsy is the belief that autopsy reports will initiate and fuel malpractice lawsuits. Again, pathologists have supplied studies to counter these claims. A 2002 review of court reviews of malpractice cases showed that defendant physicians were acquitted in 61% of cases when the autopsy report favored the *plaintiff*, and in 100% of cases when the autopsy favored the defendant.⁹ Furthermore, in 17% of cases the autopsy findings were deemed to be important or

critical to acquitting the physician.⁹

There remains the belief that family members are increasingly opposed to autopsy. It is important to note that patients cannot legally give consent for an autopsy before their death. It is not uncommon for a patient to express a desire to undergo autopsy, only to have the next of kin refuse consent once the patient is deceased. The reasons for this are numerous. Common motives for family members' refusal of autopsy include concerns about mutilation, concerns about delaying the funeral, objections expressed by the patient before death, and religious or cultural beliefs.¹⁰ Unfortunately, these concerns are often not properly dispelled by clinicians. Shortcomings in the obtaining of consent for autopsy include: consents being performed by inadequately trained staff, use of outdated forms, failure to provide sufficient information, and consent being obtained from the incorrect family member.¹¹ One study found that among family members of recently deceased patients, only 42% demonstrated satisfactory knowledge of what the autopsy entails.¹⁰ Logistical issues often present another barrier to autopsy. For instance, clinicians or other personnel are sometimes not available at the proper time to sign consent forms, which can delay or prevent the autopsy.

The financial burden of the autopsy must also be considered. Although performing an autopsy comes at a mean cost of \$1,275, this cost is rarely covered by managed care organizations or third-party insurers.^{12,13} Thus, the cost is frequently passed on to the patient's next of kin, at times making it prohibitive to perform the autopsy. Poor reimbursement rates are also to blame for pathologists' decreased enthusiasm to perform autopsies. Payments for some components of the autopsy are made to hospitals through Medicare Part A; however, there is no specific reimbursement figure for autopsies under the Medicare resource-based relative value scale fee schedule.¹³ Deaths occurring outside the hospital present another level of complexity, in that transportation must be arranged and other additional costs are incurred by the next of kin. Although data are sparsely available, the autopsy rate for out-of-hospital deaths is far lower than that for in-hospital deaths.

Despite the decreasing rate at which it is utilized, the autopsy remains a vital part of medical science. Perhaps more than any other organ systems, knowledge of diseases of the heart and brain relies heavily on autopsy. There are multiple reasons for this: first, diseases of the brain and heart are responsible for the majority of deaths in developed nations, and second, these organs are among the least amenable to tissue investigation during life.¹⁴ Autopsy is of critical importance to research efforts in which death is an outcome measure, particularly when it is necessary to determine whether an intervention may have contributed to, or helped prevent, a patient's death.

Concurrent with the decline of the autopsy rate has been a similar decline in the use of autopsy as an instrument of medical education, such that many medical students no longer observe any autopsies during their training.¹⁵ However, medical students who do have the opportunity to view an

autopsy consistently describe it as a valuable aspect of their education.^{15,16,17} Although viewing an autopsy can at times be difficult and may produce a wide variety of psychological responses in a trainee, it remains the duty of the pathologist to minimize these reactions and impart a basic understanding of how and why autopsies are obtained.

In an attempt to increase the dwindling autopsy rate, numerous efforts have been made to improve and modernize the autopsy. These include performing limited autopsies, primarily by endoscopy, laparoscopy, needle, or some combination of these three.¹⁴ Both computed tomography and magnetic resonance imaging have been studied as methods of noninvasive, or virtual, autopsy. However, it has been a struggle to demonstrate that these modalities can be as accurate as the conventional autopsy. A prospective study of 182 cases comparing CT and MRI to autopsy found the discrepancy rate between cause of death identified by radiology and autopsy to be 32% for CT, 43% for MRI, and 30% for combined CT-MRI. The most common missed diagnoses were ischemic heart disease, pulmonary embolism, pneumonia, and intra-abdominal lesions.¹⁸ It is also important to note that imaging is useless for almost all neurodegenerative disorders. Currently, it appears that imaging is best used as a complement to, rather than a replacement for, the conventional autopsy.

Of course, no endeavor to revive the autopsy will be successful without considering the multitude of medical, legal, and societal factors that are responsible for its decline. Some have called for the Joint Commission to reinstate its minimum autopsy rate as a requirement for hospital accreditation.⁵ Others have emphasized the need to standardize autopsy reporting and optimize workflow in order to deliver results to clinicians in a timelier manner.¹ It will be necessary to improve training, both for medical students and pathology residents, in order to increase their familiarity with, and inclination to utilize, the autopsy. Finally, a greater effort will need to be made to educate the public regarding the autopsy and the crucial role it plays in public health, research, and myriad other areas.

CONCLUSION

The autopsy is a vital aspect of modern healthcare. However, rates of autopsy utilization have been in decline for more than half a century. The Lifespan system is no exception to this trend. Although many different reasons have been offered to explain the decline, nearly all agree that it is a detriment to practice of medicine. A multidisciplinary effort will be necessary to prevent the death of the autopsy.

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