The Educational Value of Autopsy in a Residency Training Program

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**Background:** Historically, the autopsy has been an indispensable educational tool. Over the past several decades, however, the national autopsy rate has declined and the educational role of autopsy in modern medicine is being questioned.

**Objective:** To assess the educational value of autopsy attendance in an internal medicine residency program.

**Methods:** We performed a retrospective review of all autopsies performed on the general internal medicine teaching service between October 1996 and September 1998. Premortem and postmortem diagnoses were determined and compared and attending physician surveys were reviewed.

**Results:** Eighty-eight deaths occurred during the study period. Twenty-nine (33%) patients underwent autopsy. All autopsies were observed by the primary team and the attending physician completed an autopsy survey on each patient. An unexpected pathological diagnosis directly contributing to death was detected in 10 (34%) patients at autopsy. Additional unexpected pathological diagnoses were discovered in 23 (79%) cases. Attending physician surveys revealed that all 10 unexpected diagnoses contributing to death were observed by the primary team at the time of autopsy. Autopsy attendance was rated as a valuable educational experience in 27 cases (93%).

**Conclusion:** Autopsy is a valuable educational tool and autopsy attendance should remain an integral part of internal medicine residency training.

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Historically, the autopsy has made invaluable contributions to medicine from the discovery of new disease processes to answering patient management issues and assisting with medical quality control. The value of autopsy in detecting diagnostic errors has been confirmed in several studies. Despite this evidence and recommendations to continue performing autopsies by the American Medical Association, the Accreditation Council for Graduate Medical Education, and the Residency Review Committee for medical specialties, national autopsy rates have continued to decline. Approximately one half of deaths were autopsied in the 1950s, but today autopsies are performed on less than 11% of deaths. Many reasons are cited for the national decline in autopsy rate, including certainty of the cause of death due to enhanced diagnostic testing, lack of reimbursement, fear of malpractice suits, changing standards for accrediting hospitals, and altered public perceptions. Despite major advances in medicine from the 1960s to the present, major misdiagnoses for which treatment may have resulted in prolonged survival continue to be detected on autopsy.

To better understand the educational value of autopsy in an internal medicine residency program, we reviewed the results of our autopsy reporting system, which was implemented in October 1996. This system tracks autopsy attendance and educational content using an attending physician autopsy survey form.

**RESULTS**

A total of 88 deaths occurred on the internal medicine teaching service during the study period. Twenty-nine (33%) deceased patients underwent autopsy with 27 patients (93%) having a complete autopsy. One deceased patient had an autopsy limited to the abdomen and pelvis, and another had an autopsy limited to the chest.

The 29 autopsy cases had a mean age of 61 years and 20 (69%) were male.
PATIENTS AND METHODS

Wright Patterson Medical Center is an Air Force Regional Medical Center in Ohio that provides primary and tertiary care to its beneficiaries, which include active-duty and retired military members and their dependents. Wright Patterson Medical Center is the primary teaching hospital for its internal medicine residency program, which has 24 categorical internal medicine residents. The policy in our Department of Medicine is that permission for an autopsy be requested from the families of all patients who die on our inpatient internal medicine teaching service and that primary team members including the attending physician attend their patients' autopsies. Each autopsy is performed by a board-certified pathologist from Wright Patterson Medical Center. All final autopsy reports contain a summary paragraph stating the pathologist's conclusion on the patient's cause of death based upon gross and microscopic findings.

For purposes of the study, a major diagnosis was defined as a diagnosis that directly contributed to the patient's death, eg, myocardial infarction. A minor diagnosis was defined as a significant diagnosis that did not directly contribute to a patient's death, eg, occult pancreatic cancer in a patient who died of myocardial infarction. Each patient had up to 3 major diagnoses and up to 14 minor diagnoses identified by the investigators at the time of the study. Premortem major and minor diagnoses were compared with postmortem major and minor diagnoses for each autopsy case. The hospital's mortuary records were reviewed from October 1, 1996, to September 30, 1998, to identify all in-hospital deaths on the internal medicine service. A list of these deceased patients who had autopsies performed was generated and their charts were pulled for review. Each autopsy chart was reviewed in its entirety to include physician progress notes, orders, laboratory and radiographic studies, and death certificates. Premortem major and minor diagnoses were determined from this chart review. Final autopsy reports were obtained from the Department of Pathology and these were reviewed. Postmortem diagnoses were obtained from this report and the postmortem major diagnoses were determined based upon the pathologist's summary of cause of death. An unexpected postmortem major diagnosis was a diagnosis not identified premortem by the primary team that the pathologist identified as directly causing the patient's death. Unexpected postmortem minor diagnoses were also recorded from this report.

An autopsy survey was completed by the primary team attending physician at the time of the autopsy for all study cases. The autopsy survey is used to collect patient data, document primary team member attendance, and list causes of death. It also contains a comment section for lessons learned at the time of the autopsy, including unexpected findings and the overall value of the experience. This survey has been a requirement since its institution in October 1996. The autopsy was classified as a valuable educational experience by the study investigators when an unexpected finding directly contributing to death, ie, a major diagnosis, was observed at the time of the autopsy by the primary team and documented on the survey, or the comments specifically stated that autopsy attendance was a valuable educational experience. Of the 29 autopsy cases, 27 (93%) were rated as a valuable educational experience by the reviewers based upon the completed attending physician survey. The attending physician autopsy survey comments section stated that autopsy attendance was a valuable educational experience for the primary team in 25 cases (86%). Eight of the 10 autopsy cases with an unexpected major diagnosis fulfilled both educational criteria by specifically stating on the autopsy survey that the procedure was a valuable educational experience. In the 2 autopsy cases that were not rated as a valuable educational experience, one survey did not contain any comments and in the second survey the cause of death was not certain after the autopsy.

Twenty-one (72%) patients died in the intensive care unit, 11 (38%) died during a cardiopulmonary arrest, and 14 (48%) had a premortem diagnosis of malignant disease. The average premortem length of stay was 8 days for patients who underwent autopsy. These epidemiological findings are similar to those of a prior study at a university setting.2

In 19 cases (66%), all premortem major diagnoses matched all postmortem major diagnoses. The autopsy detected an unexpected major diagnosis in 10 (34%) cases. These diagnoses were infection (n = 3), pulmonary embolus (n = 2), subdural hematoma (n = 1), ventricular wall rupture (n = 1), bowel infarction (n = 1), portal vein thrombosis (n = 1), and myocardial infarction (n = 1). The 3 cases of infection were later identified as fungal sepsis (2 patients) and bacterial sepsis (1 patient) by microbiologic data. All 10 (100%) of these unexpected major findings were observed by the primary team at autopsy and listed on the autopsy survey. The final autopsy report also identified significant unexpected postmortem minor diagnoses in 23 cases (79%).

Eighteen different attending physicians completed the autopsy survey. At least 3 team members were in attendance at every autopsy, with an average of 5 primary team members present per autopsy. The attending physician, senior resident, and intern caring for the patient were present at every autopsy. Other members present included medical students and subspecialty physicians involved with the deceased patient's care.

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Historically, the autopsy has been an indispensable tool for medical education. In fact, the autopsy was developed for the purpose of education,8 allowing the physician caring for the patient "to see with one's own eyes."11 Over the past several decades, however, the national autopsy rate has declined and the educational role of autopsy in modern medicine is now being questioned. Despite tremendous advances in medical science, misdiagnoses are frequently detected at autopsy. Goldman et al4 found no appreciable difference in the detection of unexpected diagnoses during 3 eras (1959-1960, 1969-1970, and 1979-1980), suggesting that modern technology has not improved the overall
accuracy of premortem diagnoses. Furthermore, physicians have been shown to be unable to predict from clinical data which autopsies are likely to yield unexpected diagnoses. To study the importance of autopsy, and in particular autopsy attendance for internal medicine training, we retrospectively reviewed patient charts, final autopsy reports, and attending physician surveys with the goal of assessing the educational value of the experience. This review was aided by our formal autopsy reporting system that facilitates tracking of autopsies, autopsy attendance, and retrieval of final autopsy reports.

The leading causes of death were known premortem in the majority of patients undergoing autopsy on our general internal medicine teaching service. Our percentage of unknown diagnoses that directly contributed to the cause of death was comparable to other studies. Also, our rate of identification of other significant diagnoses was similar to those of prior published studies. Discovery of unexpected diagnoses is of significant educational value for the physicians who care for these patients especially when these diagnoses are a cause of the patient’s death. Furthermore, knowledge of these diagnoses may have changed therapy and thus might have changed patient outcomes.

Unlike prior studies that only document unexpected diagnoses found at autopsy, our study reveals that autopsy attendance is educational for the primary team. Autopsy surveys completed by the primary team attending physician clearly demonstrate that autopsy attendance is of educational value at our institution. In all but 2 autopsies, the attending physician commented that the autopsy was educational and/or an unexpected major finding was observed by the primary team at the time of autopsy. A key component of this educational experience likely involves the interaction between the primary team and the pathologist who is performing the autopsy. This real-time interaction improves clinicopathologic correlation by facilitating discussion between the primary team and the pathologist and providing immediate visual confirmation of pathological findings.

The autopsy rate in our study is similar to that reported in prior studies. One of the reasons cited for a national decline in autopsy rates is a lack of financial incentives for pathologists, including no reimbursement for this procedure. At our institution, these financial considerations do not play a role in the decision to perform an autopsy, yet our autopsy rate was comparable to civilian studies at university settings.

We acknowledge several limitations with our study. Patient selection for autopsy was not random, but was determined by family members. This may have led to bias in that families with unanswered questions were probably more likely to give consent. Also, providers with unanswered questions may have been more persuasive in obtaining permission for autopsy. This may account for our higher rate of unexpected diagnoses. In addition, our small sample size limits the applicability of our results. Our results are strengthened by our comparable percentages of major and minor unexpected diagnoses with prior published studies.

Despite tremendous advances in medical knowledge and technology, autopsy continues to play a vital role in medical education. Our study confirms the importance of autopsy in medical education and reveals that autopsy attendance fulfills an essential educational role for residency training programs.

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REFERENCES


**Correction**

**Missing Disclaimer.** In the article by Durning and Cation titled “The Educational Value of Autopsy in a Residency Training Program” published in the April 10 issue of the ARCHIVES (2000;160:997-999), a disclaimer was omitted from the acknowledgments in the right-hand column on page 999. Preceding the Reprints address, the disclaimer paragraph should have read as follows: “The views expressed herein are those of the authors and do not reflect the official policy or position of the US Air Force, the US Department of Defense, or the US government.” The journal regrets the error.