

Report and Recommendations of the Association of Pathology Chairs' Autopsy Working Group

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Abstract

Autopsy has been a foundation of pathology training for many years, but hospital autopsy rates are notoriously low. At the 2014 meeting of the Association of Pathology Chairs, some pathologists suggested removing autopsy from the training curriculum of pathology residents to provide additional months for training in newer disciplines, such as molecular genetics and informatics. At the same time, the American Board of Pathology received complaints that newly hired pathologists recently certified in anatomic pathology are unable to perform an autopsy when called upon to do so. In response to a call to abolish autopsy from pathology training on the one hand and for more rigorous autopsy training on the other, the Association of Pathology Chairs formed the Autopsy Working Group to examine the role of autopsy in pathology residency training. After 2 years of research and deliberation, the Autopsy Working Group recommends the following:

1. Autopsy should remain a component of anatomic pathology training.
2. A training program must have an autopsy service director with defined responsibilities, including accountability to the program director to record every autopsy performed by every resident.

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3. Specific entrustable activities should be defined that a resident must master in order to be deemed competent in autopsy practice, as well as criteria for gaining the trust to perform the tasks without direct supervision.
4. Technical standardization of autopsy performance and reporting must be improved.
5. The current minimum number of 50 autopsies should not be reduced until the changes recommended above have been implemented.

Keywords

autopsy, pathology training, residency, anatomic pathology, autopsy service director, entrustable activities, rapid autopsy

Received April 30, 2018. Received revised July 11, 2018. Accepted for publication July 16, 2018.

Introduction

The autopsy has been the foundation of pathology training for generations, but since 1971, when The Joint Commission no longer required autopsy utilization for hospital accreditation, the number of hospital autopsies in the United States has steadily declined.¹ At the 2014 meeting of the Association of Pathology Chairs (APC), some pathologists suggested that it was time to remove autopsy from the training curriculum of pathology residents. The rationale given for this recommendation was 2-fold. Firstly, fewer autopsies are performed by resident and attending pathologists, which has challenged some training programs to provide residents the number of autopsies required by the American Board of Pathology (ABP) to sit for the basic qualifying examination in anatomic pathology (currently 50 autopsies).² Secondly, removal of autopsy from the residency curriculum would provide several additional months for resident training in newer disciplines in pathology, such as molecular genetics and informatics. At the same time, the ABP has received complaints from some established pathologists that newly hired pathologists recently certified in anatomic pathology by the ABP are unable to perform an autopsy when called upon to do so as a professional component of their new position.

In response to the call to abolish autopsy from pathology training on the one hand and the call for more rigorous autopsy training on the other, the APC formed the Autopsy Working Group to examine the role of autopsy in pathology residency training. The APC wanted this work to be a joint effort between experts in pathology training and in autopsy practice, and so the group had 2 co chairs—Gayle L. Winters representing the Pathology Program Directors (PRODS) and Gregory G. Davis representing the National Association of Medical Examiners (NAME). The members of the Autopsy Working Group represented various organizations concerned with resident training, resident evaluation, and autopsy practice, including the Accreditation Council for Graduate Medical Education (ACGME) and its Review Committee for Pathology, the ABP, the APC with its Residency Program Directors Section (PRODS), the College of American Pathologists (CAP), and the NAME. By virtue of their appointments, various members were able to communicate the insights and concerns of the

ACGME, ABP, APC, PRODS, CAP, and NAME. Following is the list of the scope of tasks that the APC envisioned for the Group.

1. Assess what systems are used to determine that autopsy training is adequate or inadequate.
2. Collect data on how autopsy training is accomplished by the programs doing it most effectively.
3. Identify more specifically what the limiting factors are where training is not effective.
4. Evaluate whether the requirement of 50 autopsies consumes a disproportionate amount of resident training time.
5. Review whether and how programs can continue to comply with the 50 autopsy requirement while autopsy numbers are declining.
6. Explore whether new paradigms of training could be deployed to support the weaker training programs.
7. Develop tools to assist programs in addressing relevant issues (live workshops, online resources, webinars).

The Autopsy Working Group addressed these tasks during its existence from 2014 to 2016. In 2016, the Autopsy Working Group submitted its final report to the APC. The members of the Autopsy Working Group have now revised their 2016 report into a format suitable for publication as an article in *Academic Pathology*, with the members of the Autopsy Working Group listed as authors of this article.

Materials and Methods

The Autopsy Working Group met 14 times in person or by conference call during its 2-year existence. Much of the information that the Autopsy Working Group had to work with was anecdotal in nature, as formal studies of efficacious pathology training are lacking. The members of the Autopsy Working Group agreed on the following points.

Background

1. Performing an autopsy is the practice of medicine. As such, autopsy has been central to the development of the

science of medicine for centuries. Autopsy has been similarly central to the development of pathology as a discipline and to pathology training for over a century.

2. An ABP survey indicates few practicing pathologists perform autopsies at a rate sufficient to maintain skills in autopsy practice. (Specifically, 46% perform no autopsies, and another 30% of all responders to the survey perform 1-5 autopsies per year.)³
3. Autopsy is unsurpassed as a method of quality assurance for assessing sensitivity and specificity of clinical diagnoses.
4. Autopsy is an essential component of competent medico-legal death investigation.
5. With a proper autopsy permit, an autopsy can allow training in aspects of pathology beyond autopsy alone, such as performing a bone marrow biopsy or a fine needle aspirate.
6. After peaking in the mid-20th century at approximately 50%, hospital autopsy rates have been decreasing since then, in part related to the decision by The Joint Commission to remove the requirement of a minimum number of autopsies for hospital accreditation.⁴
7. Hospital autopsy has no direct method for reimbursement from the Centers for Medicare & Medicaid Services or third-party payers because it is “medically unnecessary.”

Residency Training

1. Pathology is becoming more complex and more diverse. Subspecialties within pathology may have little or no relationship to other subspecialties with respect to daily practice.
2. Assuming combined training in anatomic and clinical pathology, residents have 48 months to train. More diversity means fiercer competition for training time during the 48 months. In one study, 16 programs (21% of all survey respondents) no longer have a dedicated autopsy rotation, but combine autopsy with other rotations.⁵
3. Currently, 50 autopsies are required to qualify for ABP certification in anatomic pathology/clinical pathology (AP/CP), anatomic pathology/neuropathology (AP/NP), or AP only.
4. Fifty autopsies can require months of assigned rotations in some institutions, limiting months spent training in newer, developing fields.
5. Forensic pathology performs a vital function in an ordered society. Resident training in hospital and forensic autopsy pathology is vital to maintain an influx of interested and qualified trainees into the currently critically short-staffed field of forensic pathology.

In attempting to address its charge, the Autopsy Working Group sensed the need to better understand the present state of autopsy training in US residency programs. Not only was

there no current information about how autopsy training is accomplished in US programs, but also there was no available list of autopsy service directors who would be the parties with the most direct knowledge of how such autopsy training is performed. To address these needs, the Autopsy Working Group contacted 142 program directors of pathology residency training programs in April 2016 using a SurveyMonkey poll from the APC to collect the names of persons serving the role of autopsy service director for their program. These 142 requests led to 120 responses and 113 named autopsy service directors. In June 2016, the named autopsy service directors were asked to complete a second SurveyMonkey poll about autopsy training in their programs. The 113 requests yielded 66 at least partial responses (58% of requests). Of the nonresponders, 4 opened the survey but did not respond, 42 did not open the survey, and 1 request could not be delivered through e-mail. The autopsy service director survey was conducted with the identity of the programs known, but not to be individually disclosed. Publically available statistics about the numbers of trainees in the programs were obtained from the web site of the ACGME and were used to interpret the survey results. Of the responding autopsy service directors, 28% also served in the capacity of residency program director.

The Autopsy Service Director Survey addressed several key features of autopsy training, including annual case volumes and distribution of special autopsy types (fetal, pediatric, or forensic—not intended to be mutually exclusive) on the main service. Case volumes were combined with numbers of residents in the program to estimate the number of autopsies available per resident on the main autopsy service ($4 \times$ annual autopsy volume/total number of residents in the program on the ACGME roster). No correction was made for the number of residents in a clinical pathology-only track who do not have an autopsy requirement, for residents in an anatomic pathology-only track (who may progress through training in only 3 years), for residents in an anatomic-neuropathology (who may progress through anatomic pathology in only 2 years), or for programs covering more than 1 autopsy service. The percentage of cases shared by 2 residents on the main service was solicited and was then used to extend the estimated number of autopsies available per resident, multiplying the above estimate by $(1 + \% \text{ of autopsies shared})$.

The survey collected specific data about who usually performs evisceration procedures and the most frequent dissection method used on the main service. For autopsy service directors who were not also the residency program director, the autopsy service director was asked whether a list of autopsy cases completed by each resident was transmitted to the residency program director. Autopsy service directors were also asked about the fraction of autopsies on their services where they serve as the attending pathologist of record. Autopsy service directors were asked questions about the roles of board-certified forensic pathologists and neuropathologists on the main autopsy service.

The sharing of teaching responsibilities on the autopsy service among various parties (autopsy service director, other

faculty, fellow, other residents, pathologist assistant, or other staff) was solicited for a list of entrustable activities that comprise the performance of a complete autopsy. For each entrustable activity, the autopsy service director was asked to respond which party most often teaches how to perform the entrustable activity, with an additional option for each activity to respond that the activity is not taught.

Autopsy service directors were asked about their opinions about the current requirement that residents perform or share at least 50 autopsies, whether the number 50 is too many, too few, or about right, and then whether residents in their department have trouble completing the required 50 autopsies. The results of these opinion questions were further stratified by the number of residents in the program, either fewer than 18 total residents or 18 or more residents.

All members of the Autopsy Working Group agreed that autopsy training is an essential component in transforming a newly graduated physician into a competent anatomical pathologist. The various members of the Autopsy Working Group differed in their opinions of how many autopsies were necessary to achieve competency in autopsy, so much time was spent discussing methods of documenting competency in performing an autopsy. The current model requires 50 autopsies for all residents, which includes a limited number of fetal and single-organ autopsy examinations. This one number ignores the truth that some residents are more naturally gifted at autopsy techniques and assimilating data to enable a sound diagnosis, but the number has the advantage of being a discrete measure that is easily assessed. Some members of the Autopsy Working Group strongly advocate developing a competency model for assessing residents, so that a resident needs to perform no more autopsies than are necessary for the resident to demonstrate competence in autopsy procedures and diagnosis. No one could offer a satisfying model for a competency-based training system, however.

Results

Soliciting responses about autopsy training from autopsy service directors provided the Autopsy Working Group with important perspectives from which to make its recommendations. The 66 responding programs ranged from over 35 residents to as few as 7 residents and showed good geographic distribution (data not shown).

There was an enormous difference in the available number of autopsies for resident education, with a range from 900 to 14 cases per year (Figure 1). Normalizing the available number of autopsies per resident, without accounting for sharing, showed a range from 3 to 275 cases per resident. Only 18 of the 59 programs responding to this question attained 50 available autopsies on the main service without sharing (Figure 2).

Sharing of autopsies at rates ranging from 1% to 100% was reported by 42 of the 60 program respondents (data not shown). Eighteen programs explicitly stated that there was no sharing of autopsies by residents. Extending the number of available

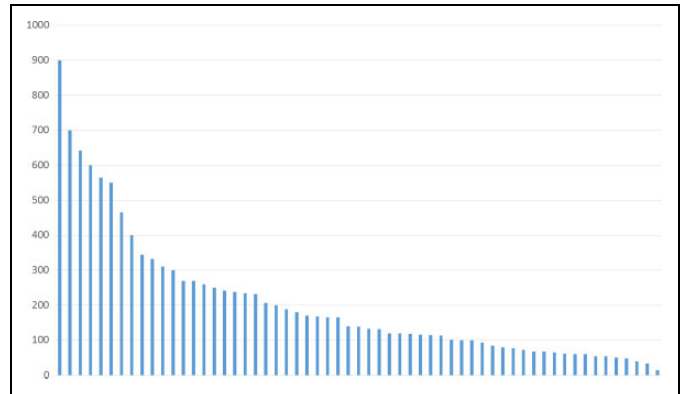


Figure 1. What was the total autopsy case volume of the service you direct for calendar year 2015? Each bar on x-axis represents 1 of the 59 programs that responded to this question.

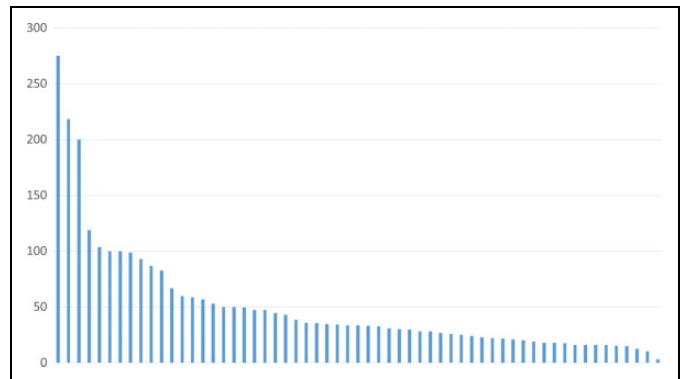


Figure 2. Number of available autopsies in main service per resident. $4 \times$ total autopsies on main service/residents on Accreditation Council for Graduate Medical Education (ACGME) roster. Each bar on x-axis represents 1 of the 59 programs that responded to this question.

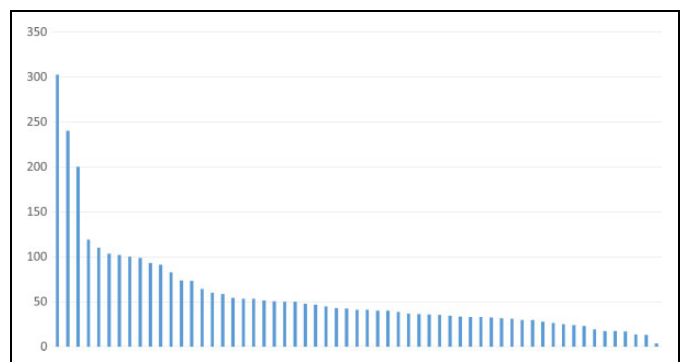


Figure 3. Available autopsies on main service per resident, extended by sharing. Resident \times (1 + % shared). Each bar on x-axis represents 1 of the 59 programs that responded to this question.

autopsies per resident using the reported rate of sharing allowed 24 of 59 programs to attain 50 autopsies per resident on the main service (Figure 3). It is clear that in order to reach the required 50 autopsies per resident, many programs depend upon residents sharing autopsies.

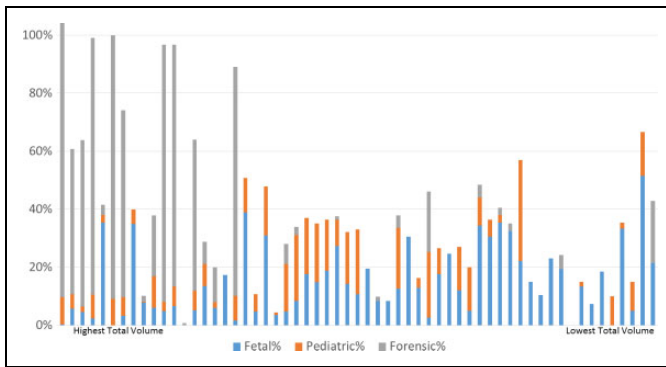


Figure 4. Distribution of fetal, pediatric, and forensic cases, percent of total. The order of the programs is identical to that in Figure 1. Because the categories are not mutually exclusive, some totals exceed 100%. Each bar on x-axis represents 1 of the 59 programs that responded to this question, including the space.

Special autopsies (fetal, pediatric, and forensic) showed striking variation in distribution (Figure 4). Although it is clear that forensic autopsies predominate in most of the programs with the highest case volumes, several programs with fewer total autopsies have relatively high numbers of fetal cases and few pediatric or forensic autopsies.

Questioning autopsy service directors about usual practices on their services showed remarkable heterogeneity. Of 60 respondents, only 15 indicated that residents performed the majority of eviscerations, with 45 indicating that the task is usually performed by the assistant and 5 indicating that evisceration is usually performed by the attending. The most common dissection technique was en bloc evisceration followed by dissection for 42 of 60 respondents, organ-by-organ removal for 17, and in situ examination of organs for 1 respondent. Of the 46 responding autopsy service directors who were not also the residency program director, 28 (60.8%) stated that they do not provide the residency program director a list of autopsies completed by each resident.

The distribution of teaching activities on autopsy services showed interesting trends. Autopsy service directors reported that they were the main teachers for many of the entrustable activities comprising a complete autopsy, with the exception of sampling the brain, removal of the brain and spinal cord, and restoration of the body for disposition (Figure 5). Other faculty played important roles teaching neuropathology, histologic diagnosis, and interpretation of laboratory results (Figure 6). Other trainees in the program were most involved in teaching how to review the medical record and to perform organ dissection and sampling (Figure 7). Support staff were instrumental in teaching restoration of the body as well as opening and evisceration techniques (Figure 8). The most common entrustable activities that were noted as not taught to residents were those of interviewing caregivers, restoring the body, removing the brain and spinal cord, and reviewing the medical record (Figure 9).

The role of forensic autopsies on the main teaching services showed considerable variation. Only 25 of 60 respondents

	Service Director	Other Faculty	Fellow	Other Residents	Path Asst	Diener	Other Staff	Not Taught
Compose a preliminary report	43	13	0	4	0	0	0	0
Compose a final report	43	16	0	0	0	0	1	0
Formulate a Cause of Death	41	17	1	0	1	0	0	0
Interview caregivers about concerns to be addressed by the autopsy	38	8	0	5	1	1	2	5
Review the patient's medical record	33	10	0	16	0	0	0	1
Review histologic slides	33	23	0	4	0	0	0	0
Safety practices for autopsy (biohazard, chemical hazard, physical hazard)	30	5	0	2	13	4	6	0
Review other laboratory data (toxicology, post-mortem cultures, etc.)	30	21	2	6	1	0	0	0
Confirm the identity of the body before starting the autopsy	28	4	0	4	10	14	0	0
Dissect and sample organs for examination	28	9	1	11	10	1	0	0
Eviscerate the neck, thorax, abdomen and pelvis	19	4	0	1	10	25	1	0
Perform appropriate opening incisions	16	5	0	1	11	26	1	0
Sample a brain for examination	12	44	2	0	1	0	1	0
Extract the brain and spinal cord	11	12	1	1	11	22	1	1
Restore a body to release for disposition	5	1	0	0	15	35	1	3

Figure 5. Entrustable tasks most often taught by the autopsy service director. Numbers shown in bold text under bold text heading.

	Service Director	Other Faculty	Fellow	Other Residents	Path Asst	Diener	Other Staff	Not Taught
Sample a brain for examination	12	44	2	0	1	0	1	0
Review histologic slides	33	23	0	4	0	0	0	0
Review other laboratory data (toxicology, post-mortem cultures, etc.)	30	21	2	6	1	0	0	0
Formulate a Cause of Death	41	17	1	0	1	0	0	0
Compose a final report	43	16	0	0	0	0	1	0
Compose a preliminary report	43	13	0	4	0	0	0	0
Extract the brain and spinal cord	11	12	1	1	11	22	1	1
Review the patient's medical record	33	10	0	16	0	0	0	1
Dissect and sample organs for examination	28	9	1	11	10	1	0	0
Interview caregivers about concerns to be addressed by the autopsy	38	8	0	5	1	1	2	5
Safety practices for autopsy (biohazard, chemical hazard, physical hazard)	30	5	0	2	13	4	6	0
Perform appropriate opening incisions	16	5	0	1	11	26	1	0
Confirm the identity of the body before starting the autopsy	28	4	0	4	10	14	0	0
Eviscerate the neck, thorax, abdomen and pelvis	19	4	0	1	10	25	1	0
Restore a body to release for disposition	5	1	0	0	15	35	1	3

Figure 6. Entrustable tasks most often taught by the other faculty. Numbers shown in bold text under bold text heading.

	Service Director	Other Faculty	Fellow	Other Residents	Path Asst	Diener	Other Staff	Not Taught
Review the patient's medical record	33	10	0	16	0	0	0	1
Dissect and sample organs for examination	28	9	1	11	10	1	0	0
Review other laboratory data (toxicology, post-mortem cultures, etc.)	30	21	2	6	1	0	0	0
Interview caregivers about concerns to be addressed by the autopsy	38	8	0	5	1	1	2	5
Confirm the identity of the body before starting the autopsy	28	4	0	4	10	14	0	0
Review histologic slides	33	23	0	4	0	0	0	0
Compose a preliminary report	43	13	0	4	0	0	0	0
Extract the brain and spinal cord	11	12	1	1	11	22	1	1
Safety practices for autopsy (biohazard, chemical hazard, physical hazard)	30	5	0	2	13	4	6	0
Sample a brain for examination	12	44	2	0	1	0	1	0
Perform appropriate opening incisions	16	5	0	1	11	26	1	0
Eviscerate the neck, thorax, abdomen and pelvis	19	4	0	1	10	25	1	0
Formulate a Cause of Death	41	17	1	0	1	0	0	0
Restore a body to release for disposition	5	1	0	0	15	35	1	3
Compose a final report	43	16	0	0	0	0	1	0

Figure 7. Entrustable tasks most often taught by other trainees. Numbers shown in bold text under bold text heading.

indicated that forensic autopsies were a part of the experience on the main teaching service. Of the services performing forensic autopsies, 12 indicated that a board-certified forensic

	Service Director	Other Faculty	Fellow	Other Residents	Path Asst	Diner	Other Staff	Not Taught
Restore a body to release for disposition	5	1	0	0	15	35	1	3
Perform appropriate opening incisions	16	5	0	1	11	26	1	0
Eviscerate the neck, thorax, abdomen and pelvis	19	4	0	1	10	25	1	0
Extract the brain and spinal cord	11	12	1	1	11	22	1	1
Confirm the identity of the body before starting the autopsy	28	4	0	4	10	14	0	0
Safety practices for autopsy (biohazard, chemical hazard, physical hazard)	30	5	0	2	13	4	6	0
Dissect and sample organs for examination	28	9	1	11	10	1	0	0
Interview caregivers about concerns to be addressed by the autopsy	38	8	0	5	1	1	2	5
Sample a brain for examination	12	44	2	0	1	0	1	0
Review other laboratory data (toxicology, post-mortem cultures, etc.)	30	21	2	6	1	0	0	0
Formulate a Cause of Death	41	17	1	0	1	0	0	0
Compose a final report	43	16	0	0	0	0	1	0
Review histologic slides	33	23	0	4	0	0	0	0
Compose a preliminary report	43	13	0	4	0	0	0	0
Review the patient's medical record	33	10	0	16	0	0	0	1

Figure 8. Entrustable tasks most often taught by support staff. Numbers shown in bold text under bold text heading.

	Service Director	Other Faculty	Fellow	Other Residents	Path Asst	Diner	Other Staff	Not Taught
Interview caregivers about concerns to be addressed by the autopsy	38	8	0	5	1	1	2	5
Restore a body to release for disposition	5	1	0	0	15	35	1	3
Review the patient's medical record	33	10	0	16	0	0	0	1
Extract the brain and spinal cord	11	12	1	1	11	22	1	1
Dissect and sample organs for examination	28	9	1	11	10	1	0	0
Review other laboratory data (toxicology, post-mortem cultures, etc.)	30	21	2	6	1	0	0	0
Confirm the identity of the body before starting the autopsy	28	4	0	4	10	14	0	0
Review histologic slides	33	23	0	4	0	0	0	0
Compose a preliminary report	43	13	0	4	0	0	0	0
Safety practices for autopsy (biohazard, chemical hazard, physical hazard)	30	5	0	2	13	4	6	0
Sample a brain for examination	12	44	2	0	1	0	1	0
Perform appropriate opening incisions	16	5	0	1	11	26	1	0
Eviscerate the neck, thorax, abdomen and pelvis	19	4	0	1	10	25	1	0
Formulate a Cause of Death	41	17	1	0	1	0	0	0
Compose a final report	43	16	0	0	0	0	1	0

Figure 9. Entrustable tasks most often not taught. Numbers shown in bold text under bold text heading.

pathologist always supervised forensic autopsies, while 7 stated that a forensic pathologist never supervised the forensic autopsies. The resident was responsible for completion of the forensic autopsy report in 16% of responding programs, had a variable role for reporting in 37%, and had no role for reporting in 54%, with 6% indicating that the forensic experience was purely observational.

The role of neuropathologists in teaching autopsy was more uniform, with 92% of respondents either having a board-certified neuropathologist on-site or visiting to support the autopsy service.

The opinions of autopsy service directors about the current rule requiring residents to complete 50 autopsies indicated that most (41 of 58 responding) felt that 50 autopsies were about right, with 12 indicating that 50 cases were too few and 7 that 50 autopsies were too many. The responses to these questions did not show significant differences between autopsy service directors from small programs (fewer than 18 residents) or large programs (18 or more residents; Figure 10). Although most autopsy service directors did not feel that their residents

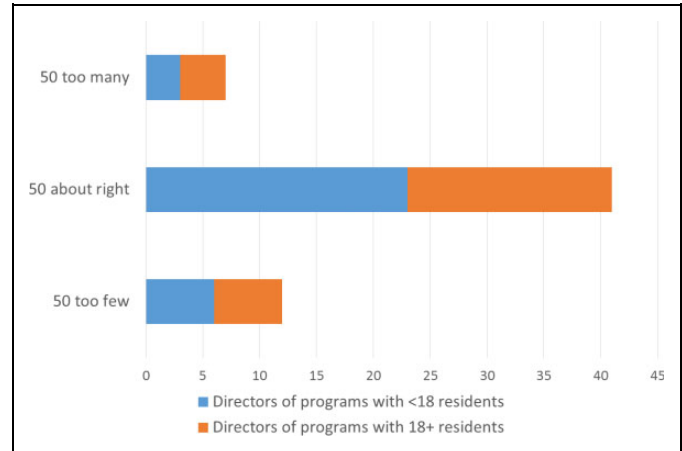


Figure 10. What is your view of the American Board of Pathology (ABP) requirement that residents perform 50 autopsies? 58 responses; 8 skipped this question.

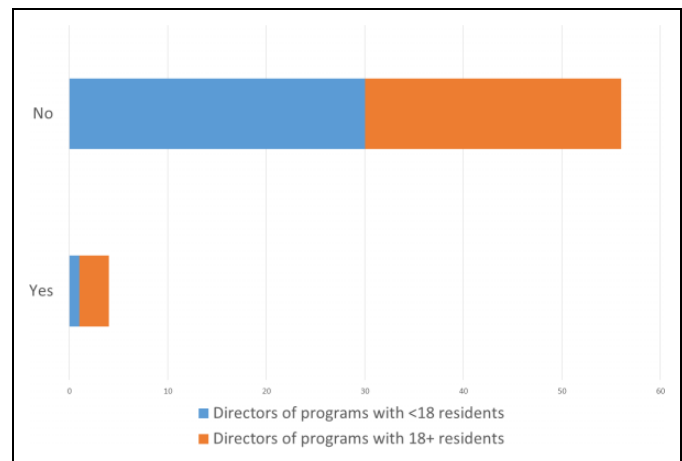


Figure 11. Do your residents have trouble getting the required 50 cases? 60 responses; 6 skipped this question.

had trouble reaching the required 50 autopsies (56 of 60 respondents), 3 of the 4 responses indicating that residents had trouble performing 50 autopsies came from larger programs (Figure 11).

Discussion

In surveying autopsy service directors, the Autopsy Working Group has gathered the most complete information to date about the current state of pathology resident autopsy education in the United States. Although the rate of response was favorable, there are important limitations that must be considered in interpreting the data. First, the fact that the identity of respondents was used in order to include program size statistics in calculations and comparisons may create a bias in the responses, dissuading responses from struggling programs or eliciting more positive responses in cases where the respondent may have doubts. The survey therefore reflects a reality that is most likely not better than is reflected by the data presented.

Second, in surveying autopsy service directors, we understand fully that the respondents in many cases have a vested career interest in the role of the autopsy in graduate medical education in particular, as well as in the practice of medicine in general. The Autopsy Working Group itself shares the same bias because of its members. Any recommendations that are put forward should consider carefully the needs of other stakeholders, including those of our trainees, the body of employers of newly trained pathologists, clinical colleagues who from time to time request autopsy services with a reasonable expectation that a satisfactory examination will be conducted, and the public, who ultimately benefit from understanding advances in medicine through postmortem surveillance. Third, for the sake of simplicity, it was assumed in performing calculations and making comparisons based on the total numbers of residents that all residents were in 4-year anatomic and clinical pathology programs. Even though the great majority of residents do train in both anatomic and clinical pathology, the residents in straight clinical pathology, who are not required to train in autopsy, have the effect of making more autopsies available for their colleagues. Residents in straight anatomic pathology programs or in anatomic–neuropathology programs, who are exposed to the incoming volume of autopsies for 3 or 2 years, respectively, rather than 4, have a slight opposite effect on the availability of cases for their colleagues.

With the limitations of the survey understood, the Autopsy Working Group was able to draw several important conclusions:

There is Great Variation Among Programs in the Availability of Autopsies for Training Residents

Our results indicate that not only do total numbers of autopsies on the main service under the direction of an autopsy service director vary by orders of magnitude, there is also considerable variation in the mix of cases available for this training. Both of these factors may affect the training of residents on service. Even extending the numbers of autopsies available per resident by the reported rates of sharing autopsies, most responding programs could not achieve the required 50 autopsy quota on their main services alone. In many cases, residents are sent offsite to perform forensic autopsies, which do complement the hospital autopsy experience, but should not replace it.

Autopsy Training is a Team Sport

In learning to perform autopsies, pathology residents should learn to master many component entrustable activities. Although much of the teaching comes from faculty (whether a service director and others), very significant teaching contributions are made by other trainees, as well as by participating support staff.

The sharing of responsibility for autopsy, instituted to prolong the number-based criterion, has created a dialogue between residents working together to complete their complex task, which is a valuable team experience to be gained in residency.

Because, as noted above, it is likely that residents learn to perform autopsies in more than one setting, they may be exposed to a variety of procedures and philosophies.

Resident Education in Autopsy is Not Conducted in a Standardized Fashion

One predicate of a number-based criterion for assessing competency in autopsy is that each counted autopsy should have a similar instructive value from resident to resident and from program to program. In addition to the previously noted differences in available cases and in the mixture of specialized cases on different services, the very act of sharing cases fundamentally changes the unit value of every case for an individual resident. Sharing of cases has allowed for the number-based criterion of 50 cases to last for a few more years on the basis that all residents are required to participate in 8 broadly defined component parts of the autopsy.⁶ The reality is that cases cannot be completely shared at the most basic level. Only one person in a team will remove the brain, only one will run the bowel, and only one person will draft the report for the first time. On the other hand, as noted above, sharing autopsies does permit for a positive social interaction among residents, who might otherwise be left alone to complete the complex task.

Perhaps more importantly, our results show great variation in the technical aspects of autopsy training among programs. It is true that there is more than one way to perform an autopsy, but familiarity with in situ examination only will ill serve a resident hired by a pathology group that practices en bloc dissections. A number-based criterion that admits as equivalents en bloc dissection as the standard protocol in one program, organ-by-organ dissection as the standard protocol in a second program, and in situ examination as the standard protocol in a third program seems to have missed its mark.

There is Need for Accountability for Autopsy Training to the Residency Program Director

A relative minority of autopsy service directors are also residency program directors (28%). As a part of the present application to sit for credentialing by the ABP, the resident must represent, and the program director must attest to the Board, that a stated number-based training requirement has been met. It is concerning that the majority of autopsy service directors who are not concurrently the residency program director do not provide a list of cases completed by each resident to the program director. More concerning still is that in trying to collect the list of autopsy service directors, it became apparent that no such person existed in some programs.

Recommendations

On the basis of the foregoing, the Autopsy Working Group makes the following recommendations:

1. Autopsy Should Remain a Component of Anatomic Pathology Training

Although the numbers of autopsies have decreased in hospital settings, and many new-in-practice pathologists perform few autopsies, if any, the ability to review a medical record, interview clinical colleagues, perform a thorough examination, and make a meaningful report add value to the education of residents. This is their main contact with common entities in cardiovascular pathology, neuropathology, and renal pathology that are less frequently seen in surgical pathology. The autopsy provides excellent opportunity to review anatomy and gain skills handling tissues of every type.

The Autopsy Working Group endorses the practice of autopsy as relevant to the practice of medicine and as an essential component of pathology training, now and in the future. Autopsy integrates medical knowledge with clinical history, scientific observation, and pathological test results more thoroughly than any other procedure in pathology. A solid foundation in autopsy practice catalyzes the transformation of a medical student into a practicing pathologist able to assess data in a given case and synthesize this information so that the appropriate analyses are performed to provide the correct diagnosis. Autopsy remains essential for pathology training because autopsy practice makes one a better pathologist in any aspect of anatomical pathology practice and informs clinical pathology practice too, for those pathologists with combined training in AP and CP. For those individuals focused on molecular genetics, remember that rapid autopsy allows pathologists to procure tumor samples for research in molecular genetics. Without autopsy training and an active autopsy service, this important component of molecular genetic research becomes impossible.

2. A Training Program Must Have an Autopsy Service Director With Defined Responsibilities, Including Accountability to the Program Director to Record Every Autopsy Performed by Every Resident

Proper autopsy training requires the participation of a team, and setting standards for the performance of autopsies and the education of residents requires oversight to prevent progressive cutting of corners.

An autopsy service director manages the autopsy service in a teaching hospital with a residency training program. The successful autopsy service director is active in teaching, service work, and research and is also the primary liaison for internal and external questions and problems that must be resolved for the continuing function of the autopsy service. The successful autopsy service director recognizes and acts upon appropriate opportunities for improvement in the autopsy service. At a minimum, an autopsy service director should have the following qualifications:

- Be certified by the ABP in anatomic pathology
- Possess experience in practicing anatomic pathology, preferably with recent experience in autopsy practice.

- Demonstrate an ability to resolve disputes fairly with diplomacy and tact.
- Believe in and advocate for value of the hospital autopsy to medical practice and public health.

A competent autopsy service director will provide hands-on teaching of residents in autopsy performance, from gathering information prior to autopsy, to examination and evisceration of the body, to the interpretation of findings, autopsy reporting, including composition of the report, and communication of findings to treating physicians and at conferences. The director will encourage research by the residents in training; manage quality assurance, staff, and supplies (ultimately); participate in maintaining laboratory and residency training accreditation; and keep abreast of the future direction of the autopsy, both scientifically and socially. A more complete description of the ideal autopsy service director is presented in Supplemental Appendix 1. Some of the qualities listed in Supplemental Appendix 1 are aspirational—it is unlikely that any one person would embody all these traits as an autopsy service director, but these are the traits that a pathologist appointed as autopsy service director should work to embody.

To the extent that any number-based criterion exists in the future, the numbers of cases performed by each resident on each service where residents rotate should be independently verifiable by the program director.

The residency program director is accountable to the ABP for resident training in autopsy pathology, including performance of at least 50 autopsies currently and ensuring that the resident has appropriately participated in all aspects of the autopsy. Because the residency program director (unless also the autopsy director) may not have first-hand knowledge of residents' autopsy experiences, enhanced communication between an attending pathologist who has been involved with the resident on the autopsy service and the program director is necessary. Ideally, this role should fall to the director of the autopsy service. It is in this specific way that the Autopsy Working Group recommends that an autopsy service director be accountable to the program director.

The Autopsy Working Group recommends the form in Supplemental Appendix 2 as a means of enhancing communication between the residency program director and the autopsy director or the director's designee. This form was derived from program requirements of the ABP and ACGME and is taken from a program that has been using it successfully to succinctly document resident competence in autopsy performance.

3. Specific Entrustable Activities Should be Defined That a Resident Must Master in Order to be Deemed Competent in Autopsy Practice, as Well as Criteria for Gaining the Trust to Perform the Activities Without Direct Supervision

Entrustable Professional Activities in pathology training have recently been put forward as a more acceptable model for defining and evaluating the progress of residents in pathology residencies. Unlike many other clinical residencies, pathology

training comprises a number of mini-residencies with knowledge, skills, and attitudes that residents acquire in different orders based upon their program and rotation schedule. The autopsy experience is only one of those areas where residents gain the trust of their teachers. We have broadly defined several such skills in conducting and interpreting our survey (Figures 5-9). Other sets of entrustable Professional Activities have been proposed (McCloskey et al and Supplemental Appendix 3.)⁷

4. Technical Standardization of Autopsy Performance and Reporting Must be Improved

There is a great need to define the expectations of what it means to perform and report an autopsy as a resident. The standards may be incorporated in definition of Entrustable Professional Activities, or in a procedure manual that can be agreed upon by key stakeholders. Being able to compare the autopsies performed in one program with those performed in another program is mandatory for any number-based criterion that may be adopted in the future.

A degree of standardization in the teaching and performance of autopsies throughout the nation would help ensure adequate training of pathologists. The Autopsy Working Group recommends communicating the expectations for autopsy training in America in a white paper concerning the role of autopsy in pathology training, including discussion of technical standards of autopsy.

Online learning modules can supplement resident training and experience in autopsy practice, provide a means for self-assessment, and offer standard training education that would be available to all pathology residents. Finally, incorporating some questions that test knowledge of autopsy technique into the anatomic pathology examinations, such as the Resident In-Service Examination or the examination by the ABP, will reinforce the importance of learning autopsy techniques.

5. The Current Minimum Number of 50 Autopsies Should Not be Reduced Until the Changes Recommended Above have Been Implemented

Whatever its shortcomings, the current minimum number of 50 autopsies was endorsed as appropriate for residency training by the majority of autopsy service directors who responded to the survey (70%). Any move to a competency-based model would require agreement among stakeholders on what constitutes competency in performing and reporting an autopsy. Agreement will require more standardization than currently exists regarding the responsibilities of an autopsy service director, the technical skills that constitute competency at performing an autopsy, a means of assessing these skills, and the responsibility and mechanism for reporting achievement of competency to the ABP and ACGME. The Autopsy Working Group recommends retaining 50 autopsies as the minimum number required for residency training until the stakeholders (see below) agree to standards of autopsy performance and reporting that will allow confidence that an assertion of competence

from one training program is equivalent to assertion of competence from another training program.

Future Developments

Any change as basic as altering the role of autopsy in pathology training will require discussion among stakeholders, including some or all of the following:

- Program directors
- Autopsy service directors
- Department chairs
- Private practice pathology groups
- Hospital administrators/Chief Quality Medical Officers
- Accreditation Council for Graduate Medical Education
- American Board of Pathology
- American Association of Neuropathologists
- American Society for Clinical Pathology
- College of American Pathologists
- National Association of Medical Examiners
- Society for Pediatric Pathology
- United States and Canadian Academy of Pathology
- American College of Medical Quality

As stated above, the Autopsy Working Group endorses the practice of autopsy as relevant to the practice of medicine and as an essential component of pathology training, now and in the future. Competent autopsy practice requires integration of medical knowledge with clinical history, scientific observation, and pathological test results more thoroughly than any other consultation in pathology. Autopsy has remained a bedrock for pathology training for this very reason—a thorough foundation in autopsy practice makes one a better pathologist in any aspect of anatomical pathology practice and informs clinical pathology practice too, for those pathologists with combined training in AP and CP.

Nevertheless, pathologists must reform autopsy to make it relevant to current practice. An autopsy report that took a month to complete may have been useful 50 years ago, but medicine is practiced at a much faster pace today, and pathologists must adjust to this demand by clinicians and patients alike. Reports that do not provide clinicopathological correlation are of little use to clinicians. Other users of autopsy data exist—quality assurance officers, public health agencies, family members of the decedent, insurance companies, and attorneys—and autopsy reports should address all these users, not primarily pathologists and clinicians.

Beyond this, pathology is positioning itself as the specialty best suited to manage vast data through informatics and computational algorithms. Autopsies generate a tremendous amount of data, but to be useful in the 21st century, these data must be reported electronically in a uniform format. Thus, it behooves pathologists to work together, and quickly, to agree to a standardized format for all autopsies so that all the autopsy data from the nation can be converted to a structured data format that can be mined as a uniquely powerful database for improving health care.

All things change. Even the autopsy is undergoing a transformation. Medical examiner and coroner offices in the United States are gaining access to computed tomography (CT) scanners for use in their autopsy work. Research in the use of CT imaging as an adjunct to autopsy pathology to determine the cause of death is still in its first decade, but it is already clear that autopsy and CT are complementary examination modalities. Computed tomography imaging is superior to autopsy pathology in demonstrating some diseases and injuries, while autopsy pathology is superior to CT imaging in showing other types of disease and injury.^{8,9} Together these approaches to examining a body provide the fullest account yet of the diseases and injuries that lead to death. These changes are coming to the hospital autopsy, too, as some of the offices acquiring CT scanners are joint forensic and hospital autopsy services. This model of postmortem examination represents a possible future in which pathologists and radiologists work more closely together as diagnostic specialists.

The autopsy still provides a wealth of information that can benefit medical practice and improve patient care. It is interesting that a nonpathology specialty recognizes this truth.¹⁰ Autopsy remains relevant to medical practice, and therefore, it remains relevant to pathology training. The saying “*Hic locus est ubi mors gaudet succurrere vitae.*” remains true.

Acknowledgments

The authors thank the Association of Pathology Chairs and Dr Donald Karcher, who led the call for this work.

Declaration of Conflicting Interests

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Supplemental Material

Supplemental material for this article is available online.

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