

## Regular Article

## Challenges in autopsy training for pathology residents: A survey of autopsy directors



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## A B S T R A C T

Resident training in autopsy provides a foundation of knowledge and skills for forensic pathologists and anatomic pathologists, but obstacles are present in ensuring quality training. A survey of US autopsy service directors at sites with pathology residency programs was used to identify common challenges in resident autopsy training. Respondents ( $n = 29$ ) largely believed that negative attitudes from residents, faculty, training programs, and/or the medical system at large (34%) and time limitations (34%) were the most significant challenges for residency autopsy training. Regarding the Accreditation Council for Graduate Medical Education's decreased autopsy requirements from 50 to 30 required cases, respondents noted decreased difficulty (38% to 7%) for residents to achieve the minimum of cases but increased concerns regarding competency at this minimum (7% to 76%). Other impacts of this reduced requirement included decreased interest from residents after meeting minimum requirements, shortened autopsy rotations, increased resident-free autopsies, and increased use of pathologist assistants. Two programs (7%) described a decreased need for residents to share cases, but no other potential benefit was described. In addition to the value provided to the community through autopsies, autopsy training during residency provides knowledge and skills relevant to anatomic pathologists generally and forms a necessary foundation on which forensic pathology fellows and future autopsy attendings can develop proficiency. Continued effort is needed to promote the importance of autopsies to pathology residents and others and to provide sufficient training to produce pathologists competent in autopsy pathology.

**Keywords:** Autopsy, Entrustable professional activities, Forensic pathology, Medical education, Resident

### Introduction

The methods and role of the autopsy examination have changed over time but continue to provide important information regarding human anatomy, physiology, and disease.<sup>1,2</sup> In modern academia, the hospital-based autopsy examination represents a form of quality assurance for hospitals, serves as an interdisciplinary educational platform for learners across different stages of training, and is central to many clinical and bench research efforts. Since The Joint Commission stopped requiring hospitals to perform autopsy examinations to maintain accreditation in 1971, hospital utilization has steadily declined.<sup>3,4</sup> In 2019, the Centers for Medicare and Medicaid Services also eliminated their requirement to attempt to obtain an autopsy in unusual or educational cases.<sup>5</sup> However, autopsy pathology affords a unique area of knowledge and skills relevant to all anatomic pathology trainees (e.g., anatomy, systemic diseases, non-neoplastic conditions), as well as building essential skills for future forensic pathologists and autopsy

pathologists. Reflecting its value, demonstration of competence in autopsy pathology is a requirement set forth by the Accreditation Council for Graduate Medical Education (ACGME).<sup>6</sup> Despite this demonstrated value, in the face of decreased hospital autopsy examination rates and the wake of the COVID-19 pandemic, effective July 1, 2022, the number of autopsy examinations required to be eligible for board certification in anatomic pathology by the American Board of Pathology (ABPath) was reduced from 50 to 30 cases, retaining the permissibility of sharing cases between a maximum of two residents.<sup>6</sup>

Defining or measuring autopsy competence remains a hurdle. Previous studies published by the Association for Academic Pathology's (formerly the Association of Pathology Chairs') Autopsy Working Group in 2018 and 2019 highlighted variations in autopsy teaching across the United States and described the use of entrustable professional activities (EPAs) to evaluate residents performing autopsy examinations.<sup>7,8</sup> The current survey aims to collect more detailed information on autopsy rotation structures and evaluations of

**Abbreviations:** ABPath American Board of Pathology; ACGME Accreditation Council for Graduate Medical Education; CAP College of American Pathologists; EPA entrustable professional activity.

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residents, as well as explore initial consequences related to the ACGME's decrease in autopsies required to sit for the basic qualifying examination in anatomic pathology.

## Materials and methods

University of Washington Institutional Review Board determined that this study was exempt. An online questionnaire was constructed in Microsoft Forms consisting of 44 questions spread over three sections, regarding autopsy rotation structure, evaluation of residents, and challenges in autopsy education ([Supplemental Material 1](#)). The survey was distributed in July–August 2022 via the COVID autopsy listserv, a freely accessible online forum where questions and issues related to autopsies are discussed, which includes many autopsy service directors and instructors in the United States and around the world.<sup>9</sup> Inclusion criteria were completion of the form by a self-identified autopsy director or representative at a U.S. pathology residency program. No responses were excluded. Statistical analyses were conducted in Microsoft Excel.

## Results

### Overall

Twenty-nine responses were received, out of nearly 250 members of the listserv. A majority of respondents provided an email address (optional), demonstrating that at least 22 U.S. institutions were represented.

### Section 1: Autopsy Service Information

#### Workplaces

Of the 29 respondents, 86% (n = 25) worked at an academic institution, 10% (n = 3) at an academic medical center with integrated forensic pathology, and 3% (n = 1) at a community hospital. These pathologists oversaw 194 total anatomic pathology residents per year, representing seven anatomic pathology residents in each annual cohort on average (range = 2–16, median = 6). Anatomic pathology residents include those in anatomic pathology-only training programs or those in combined training programs with clinical pathology or neuropathology.

#### Types of autopsies

Respondents' institutions collectively performed 4699 non-forensic adult autopsy examinations, 195 non-forensic pediatric autopsy examinations, 1062 fetal and perinatal autopsy examinations, and 1577 forensic autopsy examinations each year. This represents an average of 162 non-forensic adult autopsies (range = 35–550, median = 140), 7 non-forensic pediatric autopsies (0–50, 3), 37 fetal and perinatal autopsies (0–100, 30), and 54 forensic autopsies (0–525, 0) per training institution per year.

#### Autopsy rotations

Nineteen institutions reported only dedicated autopsy rotations, whereas four had combined autopsy–surgical pathology rotations and six had both dedicated and combined rotations. Most institutions concentrate their autopsy experiences within the first two postgraduate years (PGY) of training. At 25 institutions with dedicated autopsy rotations, residents had an average of 7.7 weeks of autopsy pathology as a PGY-1 (0–12), 2.7 weeks as a PGY-2 (0–12), 1.2 weeks as a PGY-3 (0–8), and 0.3 weeks as a PGY-4 (0–4). Similarly, in 10 institutions with a combined autopsy rotation, residents had an average of 11.0 weeks of combined autopsy pathology as a PGY-1 (0–36), 8.3 weeks as a PGY-2 (0–24), 3.7 weeks as a PGY-3 (0–12), and 1.4 weeks as a PGY-4 (0–8). Dedicated forensic pathology rotations were present at 90% of training institutions (n = 26), most commonly existing as a rotation lasting 4 weeks (2–8) in the second or third year of training. (See [Supplemental Fig. 1](#)).

### Autopsy service structure

At 23 institutions, at least one resident was always scheduled on the autopsy service. Most institutions had one or two residents covering the service at a time, with roughly one-third of cases (31.4%) shared between residents. Residents were involved in the majority of autopsies (average: 94%, range: 40–100%) in all but one institution (the outlier at 40% resident involvement was notable for having a substantial forensic caseload). Over half of institutions (n = 18) had autopsies performed outside of the standard workday, including nights and weekends, and most of these (78%, n = 14) expected resident involvement in these autopsies.

The autopsy director served as an attending physician for autopsies in all institutions that responded (n = 28). Postmortem examinations were overseen by an average of 8 (range: 1–26, median = 6) pathologists, corresponding to 27% (2–100%) of all staff pathologists at these institutions. On average, less than half (46%, range: 0–100%) of attending pathologists on the autopsy service were perceived to be comfortable working without a resident.

### Section 2: Resident Training

#### Autopsy pathology education

The most commonly cited ways residents learned autopsy pathology included hands-on training during evisceration and dissection (n = 29), preparing an autopsy-related presentation for peers or others (n = 26), training from autopsy pathologists, senior residents, technicians, and/or pathologist assistants (n = 25), training from the autopsy service director (n = 24), recommended and required reading (n = 24), autopsy service conferences (n = 22), didactics throughout residency (n = 22), and internet-based resources (n = 17). Less commonly, residents learned about autopsy through participation in research (n = 14), case studies provided by professional organizations (n = 10), examples of death certification (n = 9), didactics while on the autopsy service (n = 8), slide sets (n = 7), and additional resources on the forensics rotation (n = 2).

Autopsy directors and autopsy pathologists were the most likely designated people to teach residents about autopsy pathology ([Fig. 1](#)). Specifically, autopsy directors were the most frequent individuals to teach about consent for examination, jurisdiction, quality assurance, and research, whereas other autopsy pathologists were the most likely to teach about medical record review, formulating cause and manner of death statements, writing a final report, evaluating and sampling the brain and spinal cord, histologic interpretation of postmortem tissues, and communicating findings with clinicians and family. Conversely, the topics of accurately identifying a body, evisceration including removal of the brain and spinal cord, and safety were most likely to have autopsy staff as the designated teachers. Although other residents and fellows were involved in autopsy training, a senior resident or fellow was the designated teacher of any autopsy skill in a minority of cases. Skills for which there was a higher number of institutions without an established teacher included discussing the autopsy with the decedent's caregivers or family, photography and preparation of teaching specimens, and preparation of the body for release. Four respondents commented that a combination of people, including senior residents and staff, share teaching responsibilities and that four respondents noted that they utilize autopsy pathologist assistants to aid in resident instruction.

#### Resident evaluation

Overwhelmingly, residents were evaluated for competency through a combination of written feedback (n = 24), verbal feedback (n = 23), one-on-one interactions with attending pathologists (n = 23), and the number of cases performed (n = 19). Accreditation Council for Graduate Medical Education guidelines (e.g., the six core competencies) were commonly used for autopsy evaluations (n = 21). Less frequently, CAP guidelines (n = 9), participation in quality assurance or research (n = 9), turn-around time (n = 1), and the ability to teach effectively (n = 1) contributed to the assessment of resident competency in autopsy pathology.

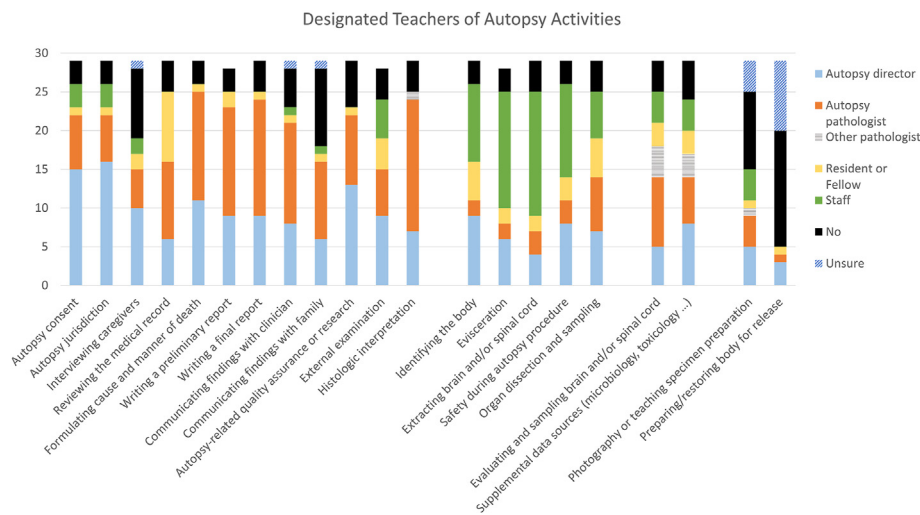


Fig. 1. Frequency and identity of designated instructors in various aspects of autopsy pathology education.

### Section 3: Challenges in autopsy education

#### Challenges in autopsy pathology education

Consistently reported as the most significant challenge in resident education in autopsy pathology were negative attitudes toward the service ( $n = 13$ ), including those from residents ( $n = 6$ ), other pathologists ( $n = 2$ ), the residency program or chair ( $n = 4$ ), and the greater medical community ( $n = 1$ ). Two respondents discussed that service responsibility was being shared with many faculty members who did not participate in a “sufficient number of cases per year to really maintain or develop expertise.” Multiple specifically mentioned the availability of the autopsy director being a challenge, with three listing time constraints of this position and one that a lack of passion were challenges for the service. Less common challenges included the availability and time of autopsy pathologists ( $n = 2$ ) and staff ( $n = 1$ ), the number of autopsies available ( $n = 3$ ), the length of the autopsy rotation ( $n = 2$ ), and difficulty signing out cases after the rotation ended ( $n = 1$ ). Interestingly, one institution with a high-volume autopsy service where residents graduate with 80–90 cases on average, found that the ACGME’s lowered autopsy requirements created pushback from trainees and the residency program against completing more than 30 cases. Another institution cited that uneven timing and quantity of autopsies made it hard to plan didactics and expanded case reviews. Two institutions reported no challenges in autopsy education at their institution; at one of these, the autopsy rotation was highly regarded by pathology residents due to staff quality and resident autonomy.

#### Skills of autopsy pathologists

For pathologists who perform autopsies, maintenance and improvement of autopsy-related skills were most commonly obtained through the autopsy service conference ( $n = 22$ ), participation in research ( $n = 17$ ), recommended readings ( $n = 15$ ), internet-based resources ( $n = 15$ ), preparation of presentations for peers and other healthcare providers ( $n = 15$ ), and completing the College of American Pathologists (CAP) Performance Improvement Program ( $n = 14$ ). Less common sources for honing skills included training from the autopsy service director ( $n = 6$ ) and other autopsy pathologists ( $n = 5$ ), slide sets ( $n = 5$ ), American Society for Clinical Pathology case studies ( $n = 4$ ), examples of death certification ( $n = 3$ ), and required readings ( $n = 2$ ). Additional opportunities utilized to maintain skills included attendance of national meetings ( $n = 2$ ), bimonthly service meetings ( $n = 1$ ), and *per diem* employment in forensic pathology ( $n = 1$ ). Three respondents reported dissatisfaction with opportunities for skill maintenance or improvement.

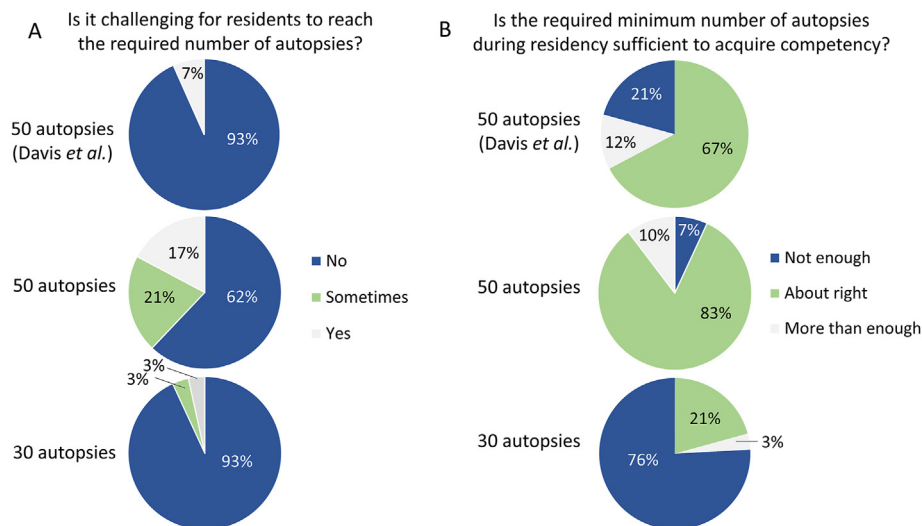
#### Change to 30 required autopsies

The majority of respondents (62%) did not find it difficult for residents to perform the previous minimum of 50 autopsies during their training, and 93% did not find it a challenge to meet the new minimum of 30 autopsies (Fig. 2). A great majority (83%) felt that completing 50 autopsies during residency was sufficient to acquire competency in autopsy practice compared to only 21% who thought 30 autopsies was sufficient to acquire this competency. Furthermore, 48% did not expect this ABPath-initiated change in autopsy requirements to affect autopsy training at their institution, compared to 31% who did and 21% who were unsure. Effects on autopsy training attributed to the change in autopsy requirements included decreased rotation lengths, either enacted or proposed ( $n = 5$ ), decreased proportion of autopsies with resident participation ( $n = 3$ ) with concomitant increased faculty and/or pathologist assistant roles, and worsened resident attitudes ( $n = 2$ ). One respondent voiced concern that the lower number of required autopsies would lead to a population of autopsy pathologists not as well equipped to train future pathologists in autopsy. Additionally, two programs described a decrease in the number of shared cases among residents.

### Discussion

This survey provides insight into autopsy training at a subset of pathology residency programs across the United States (>130 programs), including the duration and timing of autopsy rotations, the number of autopsies that have resident involvement, and challenges in teaching autopsy practice to residents and maintaining competency in attendings. This publication also presents the first survey of autopsy service directors following the implementation of the lowered minimum autopsy requirement. While autopsy education is treated as a core component of pathology training in some ways (concentrated in the first two years of residency, required for boards), negative attitudes from residents and attending pathologists are a major hurdle in autopsy education. Institutions with higher caseloads, where the gap between the number of autopsies residents complete and the number of autopsies required is greatest, may find these negative attitudes particularly challenging.

Teachers of autopsy skills were similar in this survey compared to a prior survey.<sup>7</sup> We note that there are relatively high levels of no designated educator regarding interactions between the autopsy pathologist and caregivers (e.g., discussing the reason for the autopsy) and the family (e.g., discussing the findings of the autopsy). Lack of training and practice in communicating about the utility of and findings from an autopsy to relevant parties may contribute to negative perceptions about autopsies in general (*vide infra*).



**Fig. 2.** Survey results regarding A) ability of residents to reach the required number of autopsies for board eligibility and B) perceived adequacy of the required number to acquire competence. (Percentages may not add to 100% due to rounding.)

The inclusion of autopsy as a necessary component of pathology residency reflects its importance. However, determining autopsy competency is a perennial problem. A prior survey of autopsy directors found that a majority (68%) thought 50 autopsies was about right for residency, and of those who disagreed, more felt that this number was too low rather than too high (20% vs 12%).<sup>7</sup> In this survey, a majority of respondents also thought 50 autopsies was about right (83%) but that 30 autopsies was insufficient for residency training (76%). In 2016, the Association of Pathology Chairs' Autopsy Working Group advised against changing the minimum number of required autopsies in the absence of accepted autopsy competency measures.<sup>7</sup> Autopsy competency remains difficult to evaluate, and the recent change to a 30-case minimum carries risk as any change in resident competence in response to the altered standard will be challenging to characterize. Some autopsy directors noted decreased resident interest in autopsy cases and a shift toward decreased resident involvement in cases following the change. On the other hand, two institutions thought this change would permit more resident autonomy in cases via less case sharing.

Although this survey did not evaluate the adequacy of current systems of evaluation of autopsy skills, it does highlight strong concerns among autopsy directors that autopsy competency is not achieved during residency with a 30-case minimum. A lower degree of autopsy pathology skill acquired during residency has multiple impacts. The current forensic pathology workforce is insufficient to meet demand, and additional time and energy are needed to bring trainees up to the expected level for rotations and fellowship in forensic pathology. Pathology trainees are potential future autopsy attendings; although many pathology trainees do not plan to focus on autopsy pathology, they may find a position where they are expected to perform autopsies and even to train pathology residents in autopsy, perpetuating a cycle of lack of expertise. Additionally, families may experience diminished access to autopsy, decreased quality of autopsy reports, or increased turnaround times if expert consultation is sought.

Over the past years, there has been increased emphasis in the medical world on quality control, assurance, and improvement (QC) as well as on identifying and addressing healthcare disparities. Competent autopsy performance and reporting is well suited to contribute to these areas. QC activities are a required component of residency training in all specialties, and QC activities are assessed as part of maintaining certification by the ABPath.<sup>6,10,11</sup> Autopsy serves as a critical form of institutional QC, for instance, providing important information to hospital QC committees and mortality review boards, and lack of autopsies can limit understanding of why a patient died and how the institution can improve

practices for future patients. Autopsies also play a role in understanding healthcare disparities among different populations. For instance, in vulnerable populations who do not seek or receive health care during life due to socioeconomic, linguistic, and/or mental health issues, an autopsy may be the best way to determine the prevalence of disease and causes of mortality. The field of autopsy pathology requires skilled practitioners to contribute to these important areas.

While recognizing the challenges associated with autopsy training, the authors would like to suggest some possible ways to improve autopsy training, even in the setting of a decreased minimum threshold required during residency.

- 1) Prioritization of autopsy teaching skills.** An autopsy director should be someone who is enthusiastic about teaching and is recognized for contributions in this area. Because much of pathology training uses an apprenticeship model, those who train residents should be passionate teachers. Additionally, for some academic pathologists who perform autopsies but do not focus on this field, it can be difficult to maintain or develop new expertise. An autopsy director may also serve as a peer educator and provide hands-on assistance to colleagues as they handle rare or challenging cases. Forensic pathologists interested in teaching could also be encouraged to become educators, through individual lectures, locum-style work in hospitals, or co-appointments at medical examiner offices and academic centers.
- 2) Improving evaluation of autopsy competency.** The number of required autopsies during residency has decreased. Because achieving competence is still expected, maximizing teaching potential for each autopsy is appropriate.<sup>12</sup> However, there remains no accepted method to measure such competence. Related to the preceding point that autopsy pathologists must serve as educators, a focus on improving the training of pathology residents by assessing their competence at autopsy skills and providing feedback on how to advance could be useful. Feedback for different rotations during residency is often based on ACGME milestones (including broad categories such as Patient Care, Medical Knowledge, Systems-based Practice, Practice-based Learning and Improvement, Professionalism, and Interpersonal and Communication Skills), but the development of an EPA framework offers an opportunity to more specifically evaluate autopsy skills such as those listed in Fig. 1.<sup>7,8,13</sup> We (KPS and NRJ) have recently used an EPA for autopsy evaluations at our institution in seeking to provide trainees with feedback which is more rapid, frequent, and specific to autopsy practice and skills (Supplemental Material 1). This has come with the benefit of streamlining the



evaluation for autopsy attendings by decreasing the number of assessment questions that are not directly related to autopsy practice

- 3) **Increasing autopsy rotation opportunities.** Many residents have autopsy training focused in the first two years of residency. While elective time can theoretically include additional autopsy rotations, this is not commonly used in the authors' experience. Suggesting to interested residents that they pursue additional autopsy training during an elective could help to increase their skills. Senior residents on an autopsy rotation could benefit from gaining familiarity with less common techniques, pursuing research, or honing teaching skills. Autopsy fellowships apart from forensic pathology are rare but could also help to increase competence in autopsy practice.
- 4) **Recognition of autopsy efforts.** Similar to evaluating resident competency, accounting for the work of attending pathologists in performing, reporting, supervising, and teaching autopsy pathology is a challenging undertaking, although attempts have been made.<sup>14-16</sup> The work of autopsy pathologists often has a different timeframe and scope compared to that of surgical pathologists, and there is dissimilarity in the lack of direct reimbursement by insurance payments for autopsies. While recognizing the work of autopsy pathologists, for instance, allotting relative value units or clinical full-time equivalents, may not overcome negative attitudes; it could be a step toward improving their time constraints and professional satisfaction. Additionally, academic medical centers could recognize efforts associated with autopsy pathology (e.g., teaching, working with other specialties within the institution) among factors when promotion is being considered.

Apart from professional recognition, autopsy pathologists can work to increase the appreciation for and understanding of autopsy among medical professionals and laypeople. Expertise in autopsy practice requires competence in general pathology, anatomy, physiology, pathophysiology, medicine, and surgery, among other disciplines. Autopsy pathology could be recognized and promoted as a subspecialty in pathology, similar to breast or gastrointestinal pathology.<sup>17</sup> Because many medical professionals are unfamiliar with the steps of an autopsy or what entities can be ruled in or out by an autopsy, and because they may struggle to interpret an autopsy report, autopsy pathologists provide helpful context in explaining the limitations and findings of an autopsy. Opportunities for autopsy pathologists to help to interpret autopsy findings do exist, such as participating in hospital QC meetings and mortality review boards. Inviting a decedent's clinical care team to view part of the autopsy or selected organs is an opportunity to highlight the utility of the exam and develop professional relationships within an institution. Autopsy pathologists can become more proactively involved in the dissemination of autopsy findings to the decedent's family members, such as being available for consultation when a clinician reviews autopsy findings with family members or even making pathologist involvement in this step a standard occurrence. Autopsy pathologists should be involved in the education of non-pathology medical trainees who may utilize autopsy findings in their future practice (e.g., internal medicine residents) by offering formal instruction on what to expect from an autopsy, including issues related to obtaining consent, timing, the steps of autopsy performance and reporting, and possible findings. Finally, it would be beneficial for autopsy pathologists to involve pathology trainees in these professional efforts when possible or at least to demonstrate or describe these outreach activities. Medical students are taught about communicating difficult or complex information, but pathology trainees could benefit from practicing these skills.

- 5) **Integration with pathology assistants.** As pathologists receive less training in autopsy and only a few pathologists go on to maintain or increase their autopsy skills, there is a growing need for professionals who will perform numerous autopsies over a long period of time to assist with resident training. Pathology assistants are capable grossers and teachers employed in anatomic pathology laboratories, and they may also be used more commonly in autopsy training for residents.

- 6) **Regional centers of excellence.** As much of the field of pathology has become specialized, the field of autopsy pathology may likewise experience this shift. However, while other areas of anatomic pathology rely largely on physical or digital slides for diagnosis, autopsy requires a more significant in-person component. Large institutions that have high caseloads could become regional centers, enabling faculty who specialize in autopsy to hone their skills and permitting the rotation of pathology residents to learn best practices.<sup>16</sup> This could be envisioned as a parallel to medical examiner offices that host forensic autopsy rotations for pathology residents who would not otherwise encounter forensic training.

Although bringing specialists together to create a vibrant community with increased research and educational opportunities might sound appealing, there are potential negative impacts as well. Eroding local functions in favor of centralized institutions could decrease redundancy and resiliency in nationwide autopsy capabilities. Such a shift could not easily be reversed, as degrading autopsy skills where autopsies are not regularly performed would make it challenging to reinstate local autopsies. Centralization also may reflect current inequities for patients and trainees. Decedents undergoing autopsy at a center of excellence would likely reflect patients who received care at the academic center (e.g., urban, insured population), and access to autopsy could be decreased at other locations. Although bodies can be transported, cost and time delays are limitations. Additionally, external rotations can impose financial restraints or be challenging for pathology trainees with caregiving obligations. Thus while creating regional centers for autopsies could provide benefits, it should be approached with caution.

In conclusion, autopsy training for pathology residents faces varied challenges including predominantly negative attitudes about autopsies from the pathology community and financial and time limitations among those who want to practice autopsy pathology. The change from 50 to 30 required autopsy cases in pathology training raises concerns that residents who complete this minimum level will not acquire competency in autopsy practice, as well as possibly reinforcing negative perceptions of autopsy.

This work has multiple limitations. It is based on data resulting from voluntary responses to a survey and includes information from only a minority of pathology training programs in the U.S. Moreover, data were provided by respondents who self-identified as autopsy directors, who likely have a more positive attitude toward the role of autopsy in medicine than other practitioners. Pathology residents, who arguably have the most at stake in the changing autopsy pathology training requirements, were not included among respondents. Finally, this survey did not assess the varied amount and quality of autopsy exposures across pathology residency training programs, which may utilize autopsy, forensic, and/or combined autopsy and surgical pathology to provide exposure to autopsy practice.

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## Declaration of competing interest

All authors declare they have no competing interests.

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## Supplementary data

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