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Regular Article

Undergraduate medical student perspectives on the role of autopsy in medical education



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ABSTRACT

Medical autopsy has historically been considered a valued experience in undergraduate medical education; however, student participation has declined in recent years. Medical education literature from the educator point of view supports autopsy as an educational tool, but more data are needed on undergraduate medical students' (UMS) perspectives on autopsy. This study aims to assess UMS opinions on the role of autopsy in undergraduate medical education. A 5-point Likert scale survey concerning autopsy and medical education was offered to all UMS at Sidney Kimmel Medical College. In addition, 28 senior students were assigned a 500 word essay on hospital autopsy and its role in medical education. Senior students were given the opportunity to view an autopsy prior to completing their essays. UMS (n = 87) reported that witnessing an autopsy can improve anatomic knowledge ($\mu = 4.3$), observational skills ($\mu = 4.1$), and clinicopathologic correlation ($\mu = 4.3$) but were neutral in their perceived importance of viewing an autopsy in their pathology education ($\mu = 3.7$). Senior students (n = 27) responding to the essay prompt reported that autopsy is essential in medical education (85.2%) and increases clinical and anatomical understanding (63.0%). This study suggests that many UMS acknowledge the importance and applicability of autopsy in their education. This concurrence of UMS opinion with the medical education literature supports making autopsy participation a widely available component of undergraduate medical education.

Keywords: Autopsy, Pathology education, Undergraduate medical education

Introduction

Medical autopsy (nonforensic) has long been considered a cornerstone of both medical practice and undergraduate medical education (UME).^{1,2} While its value in the clinical and educational medical spheres persists,^{3,4} the prevalence of medical autopsy has seen a sharp decline in recent years.⁵ The reasons for this decline are multifarious, including cost of autopsy, questions about relevance in medical education, difficulties in obtaining family consent, and advances in modern diagnostic modalities.⁶ This decline has resulted in a decrease in Student exposure to and participation in autopsy.⁷⁻⁹ While autopsy is only one facet of a much broader career in pathology, exposure to autopsy may serve as an entry point to pathology as a possible career choice. Consequently, decreased exposure to autopsy is one rationale for a similar drop in interest in pathology as a specialty among medical students.¹⁰

In the UME literature, medical autopsy has been shown to increase undergraduate understanding of pathology and anatomy, turn students to pathology as a career path, and reinforce teaching of the "hidden curriculum."¹¹ Medical education literature from the educator point of view supports autopsy as an educational tool, having been shown to

augment undergraduate medical students (UMS) understanding of anatomy and pathology¹² as well as influence UMS toward pathology as a career choice. Recent research has displayed that UMS value autopsy in their medical education;¹³ however, more data are needed on UMS perspectives and understanding of autopsy and pathology. The present study aims to address this need by assessing preclinical and clinical UMS opinions on the role of autopsy in UME.

This study, conducted at Sidney Kimmel Medical College (SKMC), was performed in two parts: a general survey offered to all UMS, and an essay response by post-clinical UMS. SKMC uses an integrated organ system-based curriculum, and pathology lectures are longitudinally incorporated into this curriculum via lectures by pathologists, team-based learning sessions, and case-based sessions. There are no mandated pathology experiences in the curriculum. Autopsy experience within the preclinical years is provided on a volunteer/per student basis through a student interest group. In the clinical years, medical autopsy experience is gained by taking the general pathology course or the autopsy pathology course, both of which are electives. Autopsy results are generally only incorporated into other departments in Morbidity and Mortality conferences on the medical service.

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Materials and methods

The survey was an optional 51-item questionnaire on autopsy and medical education using a 5 point Likert scale, distributed electronically to all UMS at Sidney Kimmel Medical College (n = 1082); the questionnaire is included as **Supplementary File 1**. Data were collected and analyzed using RedCap from August 2019 to January 2020. Results of the survey were averaged among participants and interpreted for significance within the framework of the Likert scale.

Twenty-eight postclinical UMS at SKMC were asked to create an essay responding to a specific prompt, collected from the 2021–2022 academic year. These senior students had all had at least 10 months of clinical training and were selected by their participation in the pathology elective course offered at SKMC. All senior UMS were given an opportunity to observe an autopsy within 2 weeks prior to the assignment. The prompt included discussion of the following topics: the role of autopsy in patient care, the historical significance of autopsy, potential future roles for hospital/academic autopsy, and recommendations for its role in medical education, if any. Students provided a one page, single-spaced essay with an average of five references to salient publications on the role of autopsy in education. Essay responses were individually analyzed for arguments and content. Responses were categorized based on topics discussed and opinions pertaining to these topics; in total, 20 topics were categorized, and the percentage of student responses addressing these topics was recorded.

Regarding the state of autopsy at SKMC, approximately 150 autopsies are performed per year. Evisceration and dissection are performed with a Physician Assistant and at least one resident, with an attending pathologist assisting as necessary. There is a Director of Autopsy responsible for educating residents and attendings, and the autopsy service is staffed by a small group of pathologists experienced in autopsy. All autopsies attended by UMS during the study were nonvirtual and in-person. UMS witnessed the dissection and were kept in communication as to when the slides were reviewed, the report was signed out, and if the autopsy was presented at M&M.

Results

A total of 147 students responded to the initial survey and 103 completed the survey, a 13.5% response rate and 9.5% completion rate. The mean age of survey completion cohort was 24.4 years; 35% of respondents identified as male, 65% as female; 44% of respondents were first-year students, 40% were second year, 15% were third year, and 1% were fourth year; 7% had previously seen an autopsy, and 85.4% were interested in viewing an autopsy. On Likert scale (1 = strongly disagree; 5 = strongly agree) questions, students generally did not express interest in a career in pathology ($\mu = 2.2$, $SD = 1.07$) (Table 1). Third-year students ($\mu = 1.7$, $SD = 0.49$) were significantly less likely than first-year students ($\mu = 2.6$, $SD = 0.93$) to consider a career in pathology [$p < 0.001$]. Similarly, second-year students ($\mu = 2.0$, $SD = 1.44$) were significantly less likely than first-year students ($\mu = 2.6$, $SD = 0.93$) to consider a career in pathology [$p < 0.026$].

Table 1
Undergraduate medical student perception on autopsy.

Survey responses	μ
Witnessing an autopsy improves clinicopathologic correlation	4.3
Witnessing an autopsy increases understanding of role of pathologists in patient care	4.3
Witnessing an autopsy increases understanding of role of autopsy in patient care	4.3
Witnessing an autopsy improves medical knowledge	4.3
Witnessing an autopsy improves observational skills	4.1
Participating in autopsy is important for pathology education	3.7
Participating in autopsy is important for medical education	3.6

UMS were neutral in their perceived importance of viewing an autopsy in their pathology ($\mu = 3.7$) and overall medical ($\mu = 3.6$) education. They agreed that witnessing an autopsy can improve anatomic knowledge ($\mu = 4.3$), observational skills ($\mu = 4.1$), and clinicopathologic correlation ($\mu = 4.3$). Respondents agreed that it can increase understanding of the role of pathologists ($\mu = 4.3$) and autopsy ($\mu = 4.3$) in patient care; 48.5% of UMS responded “I don't know” when questioned about the indications for autopsy requests (Table 2).

In total, 27 senior UMS responded to the essay prompt and their opinion was categorized into general topics (Table 3). Almost all students were aware of the recent decline in the prevalence of autopsy (96%). A majority of UMS (85%) viewed autopsy as an important and valuable tool for UME. Most respondents felt that autopsy increases clinical and anatomical understanding (63.0%). Some UMS (7%) reported anxiety when participating in an autopsy and viewed it as a neutral or negative experience. UMS were split on their sentiments when discussing whether autopsy should be a mandatory or optional component of the curriculum. UMS demonstrated a strong understanding of the historical significance of autopsy in widening understanding of pathology (70%) and the most frequently cited argument in favor of continued autopsy was its role in uncovering hospital misdiagnoses and errors (78%). Many UMS reported a better understanding of anatomy and pathology after viewing an autopsy (60%).

Discussion

Similar to medical educators, a majority of UMS in this study acknowledge the importance of medical autopsy in both UME and medical practice. UMS are interested in witnessing autopsies and believe they can improve knowledge and skill sets. UMS specifically valued clinical and anatomic knowledge afforded by autopsy participation, as well as a deepened understanding of the role of pathologists in medicine.

In the present study, few senior UMS voluntarily stated in their essays that viewing an autopsy increases the likelihood of pursuing pathology as a career choice. While this was not a specific part of the prompt, it does call into question the possibility that viewing an autopsy increases the likelihood of pursuing pathology as a career choice. However, it should be noted that many UMS have decided on a specialty by their third and fourth years^{14,15} and thus exposure to the field of pathology though autopsy may have less of an impact on these students who have already completed their third-year clinical rotations. A large majority of upper year students who witnessed an autopsy viewed it as a positive experience and as something that should be incorporated into medical education; based on these responses, perhaps exposing preclinical first- and second-year medical students to autopsy early in their education could serve as a positive experience and influence career decisions. Current literature suggests that UMS earlier in their education are more likely to consider a career in pathology but dedicated preclinical courses in pathology do not change rates of students who consider pathology as a career.^{16,17}

Viewing and participating in an autopsy is an exposure to some of the work of a pathologist, as opposed to learning about pathologies as they relate to diseases in a passive lecture-based manner. Furthermore, the time spent together between residents, attendings, and UMS while performing an autopsy represents an opportunity for UMS to learn more about pathology as a career. While autopsy is an important component of

Table 2
Autopsy knowledge assessment.

Survey responses	Percentage responding “I don't know”
Cost to patient's family	79.6
Indications for autopsy requests	48.5
Who to request an autopsy from	42.7
Who is eligible to witness an autopsy	39.8
Who has authority to request an autopsy	35

Table 3
Postclinical undergraduate medical student reflections on autopsy.

Topic discussed:	N (27):	Percentage:
Cites current decline of autopsy/reasons for decline	26	96.3%
Autopsy useful in discovering proper cause of death/validity of clinical diagnosis	24	88.9%
Autopsy is essential/should be increased in medical education	23	85.2%
Useful in clinical refinement of past medical errors/patient care improvement	22	81.5%
Autopsy retains importance in clinical settings	21	77.8%
Cites historical utility	19	70.4%
Useful for understanding novel pathologies/treatments	17	63.0%
Autopsy improves student clinical/anatomical understanding	17	63.0%
Strategies for increasing autopsy rates (either clinical or educational)/autopsy in the future/keeping it relevant	14	51.9%
Medical trainees should witness more autopsies	14	51.9%
Autopsy can provide closure to families and inform them about hereditary diseases for future care	12	44.4%
Provides evidence that students see autopsy as valuable in education	9	33.3%
Determining proper cause of disease has legal/malpractice implications	8	29.6%
Autopsy improves student clinical 'know-how'/'hidden curriculum'	7	25.9%
Autopsy is relevant to the COVID-19 pandemic	6	22.2%
Autopsy helps students understand death and dying	4	14.8%
Viewing autopsy Increases likelihood of pursuing pathology career	2	7.4%
Mentions bias in the pro-autopsy arguments, as the writers are pathologists	1	3.7%
Discusses racial disparities in autopsy rates (higher in black individuals)	1	3.7%
Mentions counter-arguments to autopsy relevance	1	3.7%

pathology, there are concerns about how autopsy may be perceived by UMS as the sole activity of pathologists. Increased exposure to autopsy may only serve to further this perception. However, we posit that autopsy may be useful as a "lure" that is used to inform students about pathology as a career choice. Once exposed to the field, students learn there is more to the specialty than autopsy alone.

UMS in the general population who did not have exposure to autopsy prior to filling out the Likert scale questionnaires did not report that viewing an autopsy was important for medical and pathology education. In contrast, essay respondents who were given the opportunity to witness an autopsy were much more likely to describe the educational importance of autopsy. However, these essay respondents were upper year students who took an elective course in pathology, implying they had a reasonable baseline interest. The essays were also administered by pathology faculty to students in the course, which opens the possibility that students were conditioned to provide responses that were congruous with available publications on the topics covered. Thus, it would be inappropriate to compare these two groups to draw conclusions about the ability of autopsy exposure to correlate with interest in pathology. That being said, the results of this study suggest that autopsy can be a tool by which to expose students to the wider realm of pathology and provide a positive experience in the field. These results are in agreement with recent research on medical students' perceptions of autopsy, in which students convey the value of autopsy.¹³ The literature would benefit from a study that compares similar groups pre- and postautopsy exposure to assess autopsy as a tool to garner interest in pathology.

The response rate for the all-student survey was below expected. Of the students who completed the survey, the vast majority were in their first and second years of study. The significantly lower response rate of third- and fourth-year medical students may reflect the fact that a greater proportion of these students have narrowed down or chosen a medical

specialty and are thus less inclined to respond to a survey about pathology. Twice as many persons identifying as female responded to the survey versus identifying as male, and the male-female ratio of SKMC is approximately 50%. These factors are suggestive of possible selection bias among survey respondents. Importantly, this was a nongraded voluntary survey that was not tied to a specific medical course, and there were no incentives provided for completion. It should also be acknowledged that student populations in this study were gathered from a single institution. The level of exposure to autopsy and pathology at SKMC is assumed to be similar to the level experienced by a typical UMS but in reality may vary.

Despite its decline, the value of the medical autopsy in UME has been well established from an educator perspective. The results of the present study support this notion from the student perspective, evidencing that UMS similarly value autopsy when exposed to it. This concurrence of opinion supports further research into the ability of autopsy to turn students toward pathology as a career choice, and perhaps restoring autopsy participation as a widely available component of UME.

Declaration of competing interest

The authors have no competing interests to declare.

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Supplementary data

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