

Early Cadaver Lab Exposure Increases Motivation to Pursue Medical Careers in High School Students

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Anatomy is a prototypical subject for hands-on learning. Even with improving virtual tools that display three-dimensional renderings of anatomy, cadaveric dissection remains a foundational hands-on experience and the gold standard for anatomy education for medical students around the world.^{1,2} While the benefits of cadaveric dissection are familiar and well-described within the medical student population, there was much to learn when the author (D.F.P.) supervised eight high school students during an anatomy day experience at Alpert Medical School of Brown University's cadaver lab in December 2022.

For high school students interested in exploring a career in medicine, it is currently standard practice to 'shadow' a physician for a few hours per visit in a purely observational role. While we found a pilot-shadowing program for a small group of Rhode Island high school students to increase interest in a medical career as assessed via a post-experience survey, we believe the hands-on nature of the cadaver lab provides an engaging and memorable experience for students. The pilot initiative was a component of the Pathways to Medicine: Pipeline Mentorship program ("Pathways"), an ongoing collaboration between The Alpert Medical School of Brown University, Physician Assistant programs at Bryant University and Johnson & Wales University, and the University of Rhode Island Colleges of Nursing and Pharmacy, which pairs a health professions' student mentor with a high school mentee to promote exposure to healthcare careers.³ Indeed, research into the kinesthetic ("hands-on") learning style – one of four unique learning styles in the VARK (Visual, Auditory, Reading and writing, and Kinesthetic) model and the preferred unimodal learning style for many first-year medical students^{4,5} – has shown it to boost engagement and increase motivation to learn in the education of healthcare professionals.^{6,7} Allowing high school students to experience medicine in a hands-on manner, such as during a cadaver lab, invokes the proven kinesthetic learning style and may exert maximal impact on outcome markers such as motivation and inspiration to pursue a medical career.

EFFECTS

On medical students, bidirectional teacher-student benefit
It was immensely gratifying to teach anatomy to high school students in the cadaver lab setting. Interestingly, this type of peer teaching in medical education has been shown to be beneficial to both the teacher (medical student) and the

learner (high school student). The medical student benefits from the high-level processing of material required during the preparatory phase of teaching. The high school student benefits from a lesser professional separation between teacher and learner, which fosters additional learning due to cognitive and social congruence.⁸ This effect has been previously demonstrated in medical students teaching anatomy to high school students via cadaveric demonstration.⁹ For medical students, who lack the platform to offer shadowing experiences, cadaveric demonstration to younger students provides an avenue to involve oneself in the education of future providers.

POST-EXPERIENCE SURVEY RESULTS

The cadaver day experience was the culmination of a semester-long course entitled "Human Anatomy and Radiology," a one-time offering taught by author D.F.P. at a high school (grades 9–12) in Providence, Rhode Island. The mean grade level among eight students was 10.6. The students' comments on the pungent odor of formaldehyde and awestruck expressions upon holding a human brain and spinal cord for the first time were expected. Not as obvious an expectation, however, was the considerable learning and increased motivation, confidence, and interest to pursue a medical career reported by the students via a post-experience survey with a 100% response rate (8/8 students). The survey results are summarized in **Table 1**.

Table 1. Results from the post-experience survey

Question (during cadaver day, I...)	Students in category, n (%)				
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Learned a lot	6 (75)	2 (25)	0	0	0
Became more motivated to pursue a medical career	2 (25)	5 (62.5)	1 (12.5)	0	0
Became more confident in my ability to pursue a medical career	4 (50)	2 (25)	2 (25)	0	0
Became more interested in a medical career	2 (25)	4 (50)	2 (25)	0	0

All students (8/8) agreed they learned a lot during cadaver day; 87.5% (7/8) of students agree that cadaver day motivated them to pursue a medical career. For both confidence and interest in pursuing a medical career, 75% (6/8) of students agreed upon an increase in these measures because of cadaver day. These positive results in learning and interest to pursue a medical career, although on a small scale, suggest that early exposure to cadaver labs may augment the interests of and spur motivation for high school students considering a future medical career.

Limitations

The most obvious downside to a cadaver lab experience for high school students is the potential for emotional trauma. Indeed, learning anatomy via cadavers can be nerve-racking and emotionally confusing, especially during one's first time in the lab. From a focus group of 15 Pathways participants who attended a separate, earlier event in the cadaver lab, we received feedback that students would have benefited from a preparatory video or lecture prior to their experience to inform expectations. When asked about their level of comfort in the lab, one Pathways high school student offered, "[Is it really possible] to be comfortable in a cadaver lab?" and another stated, "I didn't eat meat for a whole week after [my time in the lab]." These comments underscore the point that the cadaver lab is a uniquely impactful experience.

MITIGATION STRATEGIES

In response to feedback from the initial cohort of 15 Pathways students, we implemented changes prior to the second iteration of cadaver day. All students in the second cohort (8/8) affirmed that they were at least 'somewhat comfortable' in the cadaver lab, suggesting that our mitigation strategies were successful. Strategies included:

Set expectations before:

- Provide education on what a cadaver is and how it is prepared. Acknowledge the humanity of the person who donated their body to science.
- Acknowledge that student discomfort may occur. Set aside a safe space outside the lab.
- Obtain guardian permission.
- Focus prior educational efforts on content pertinent to the lab (i.e., teaching about renal anatomy prior to viewing kidney dissections may afford greater comfort in the lab).

Safeguard during:

- Discuss lab safety, including sharps handling, chemical exposure, and personal protective equipment.
- Keep the face and genitals of the cadavers covered.
- Periodically check on students throughout the experience.
- Offer chances to ask questions and step outside the lab if needed.

Debrief after:

- Provide opportunities for students to ask questions or talk about their experiences. Follow up with students who feel uneasy; assess whether further education or discussion is indicated.

CONCLUSION

In summary, with proper safeguards in place, early exposure to the cadaver lab is an excellent way to promote interest and garner enthusiasm for future medical careers in high school students. The data reported herein are based on a small sample of Rhode Island high school students; since cadaver lab exposure for high school students is not necessarily standard practice, more experimentation with this concept is warranted.

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Disclosures

Funding: None.

Prior presentations: None.

Conflicts of interest: D.F.P. and K.D. declare no conflicts of interest.

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