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Fostering Interprofessionalism Through Experiential Learning: A Prosection Lab for Clinical Laboratory Science Students

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Abstract

Background: Interprofessional collaboration between clinical laboratory scientists and pathologists' assistants is important when developing a strong supportive network for the medical field. These professions work closely together in the daily clinical setting; however, in the academic setting, the education delivered through these individual programs occurs separately without interdisciplinary contact. Building an interdisciplinary foundation or partnership between these two programs early in a student's academic preparation will cement future professionalism in the workplace as well as provide a deeper understanding of each other's disciplines and professional practice and, in this case, of the intricacies of anatomy through a prosection experience.

Methods: The goal of the interprofessional experience was to improve the understanding of anatomy for the undergraduate Clinical Laboratory Science student population (n=19) through a cadaver-based prosection experience led by the Pathologists' Assistant faculty at Wayne State University. After the prosection, each student wrote a post-activity reflection, which was collected and analyzed.

Results: The students' written post-activity reflections revealed they were highly satisfied with the experience and believed that cadaver-based learning not only increased their knowledge of content matter, but also their understanding of a different health profession.

Conclusion: The use of a cadaver-based teaching strategy that integrates anatomy to achieve relevant laboratory outcomes in both clinical laboratory science and pathology can provide an optimal learning experience to solidify the bond between these two laboratory professions.

Keywords: Interprofessional education, collaboration, autopsy, prosection, cadaver

1. Impact Statement

This article discusses a novel approach to breaking down silos in clinical education by providing students with an anatomy learning experience that is relevant across several health professions. A greater understanding of laboratory professions is important to promoting system-thinking in health care, as it creates collaboration with other health care disciplines. Such learning experiences can be leveraged across all health-care fields and contribute to the dearth of knowledge about interprofessional education in smaller health-care fields. As a result, students seeking careers in clinical laboratory science or pathology will gain a much better understanding of the purpose, methodology, and outcomes of these professions and be more likely to work collaboratively to achieve mutual patient outcomes.

2. Introduction

Interprofessional collaboration is rapidly gaining importance as a means of promoting safe, high-quality patient care (Smilski & Parrott, 2019). Educators recognize that students must have opportunities to acquire the skills and knowledge necessary to work collaboratively in different health care settings. Physicians and nurses work in highly visible health care teams, but other types of providers and allied health professionals work behind the scenes to implement quality care. Pathology assistants (PA) and clinical laboratory scientists (CLS) are two professional groups that regularly interact in the clinical setting. PAs examine tissue for evidence of disease or cause of death, while CLSs perform laboratory tests that include blood, body fluid, and tissue, and report the results to physicians. The academic training for PA students includes the autopsy or prosection of cadavers and cadaveric specimens, while CLS students study organ system functions via a laboratory testing (Mayo Clinic, n.d.).

Despite their future interactions in the hospital setting, students in PA and CLS programs rarely connect and work together in the academic environment, where interprofessional activities could foster a greater understanding of and respect for each other's work as well as highlight the medical knowledge in each field. For example, following a collaborative learning activity, students in seven health care education programs, including laboratory science, reported feeling sufficiently confident to manage complex health care situations (Berger et al., 2019). Hence, establishing a curricular foundation between the PA and CLS programs can aid future professionalism in the workplace and help CLS students gain contextualized knowledge of anatomy (Thistlethwaite, 2015).

In the clinical setting, autopsies are highly valued for determining accuracy in diagnosis and the outcomes of therapy. Autopsies and cadaver prosections are poised to enhance medical education as a curricular offering (Khan et al., 2017). This paper describes a PA faculty-led, cadaver-based anatomy lab for CLS students at a research university in the U.S. Midwest. Given the frequent interactions between PAs and CLSs in the clinical setting, this lab activity was an opportunity to foster communication and collaboration between the two student groups. The objective was to provide CLS students with an experiential learning experience beyond their traditional exposure to anatomy and the opportunity to gain interprofessional collaboration skills (Gillette et al., 2019). Specifically, the aims for this activity focused on enabling CLS students to:

1. Understand/respect the roles, responsibilities, and scope of practice for both the CLS profession and the PA profession.
2. Acquire anatomy and physiology knowledge via organ manipulation and a three-dimensional evaluation of organ relationships.
3. Correlate anatomy and physiology content matter with clinical practice
4. Communicate with another professional group in the laboratory setting.

Background

Wayne State University (WSU) in Detroit, Michigan, USA, is a publicly funded urban university that serves nearly 27,000 students and offers more than 380 degree programs across thirteen schools and colleges. The health-related disciplines comprise the divisions of Applied Sciences, Health Care Sciences, and Pharmacy, which are housed within the Eugene Applebaum College of Pharmacy and Health Sciences. The laboratory professions housed in the health-related disciplines include the Clinical Laboratory Sciences (CLS) and the Pathologists' Assistant programs (PA). In this study, participants included students of the CLS program led by PA faculty.

3. Method

Cadaver-Based Learning Experience

A complete cadaver autopsy with organ prosection was created by the PA faculty as an experiential learning opportunity for CLS students in the Department of Applied Health Sciences at WSU. All of the current CLS students from the junior and senior cohorts were invited to participate in the autopsy of an embalmed male cadaver. To ensure the students' psychological and physical welfare, approval was obtained for the three-hour prosection from the university's Institutional Review Board (IRB). Each study participant received a clear explanation of the activity including a description of the procedures, protection of confidentiality, and the role of the facilitator/instructor. Participation was voluntary, and students understood they could leave the lab at any time without repercussion.

Overview of the Interprofessional Collaboration activity

Nineteen students (10 juniors and 9 seniors) accepted the invitation to participate in the prosection experience and signed the informed consent. The lab took place in WSU's Mortuary Science building. The instructor, a PA faculty member, provided a short introduction to the autopsy process and a brief training on the appropriate use of personal protective equipment (De Los Santos, McFarlin, & Martin, 2014). The autopsy began with an external examination of the deceased followed by an explanation about the importance of conducting an initial external assessment for obvious

gross physical signs of disease. Next, the instructor demonstrated the evisceration of the cadaver brain and identified key anatomical landmarks and structures. While students manipulated the brain and located the landmarks and structures, the instructor correlated common clinical pathologic findings with these anatomical regions, giving students the opportunity to discuss the organ in clinical settings. This exchange is in line with current theoretical frameworks of best practices for student learning of clinical anatomy, where contextualization of content matter creates meaning from which knowledge is derived (Smith, Finn, & Border, 2017).

The autopsy process continued with the Letulle technique of en masse removal of all the viscera. This technique, which preserves the anatomical relationships between organs and facilitates subsequent dissection of the viscera into organ blocks, is ideal to correlate an extension of disease processes organ-to-organ, discuss diagnostic testing that can corroborate a disease state or cause of death, and describe surgical procedures that justify potential findings. Once dissected, the organs were placed in separate stations where students, in groups of five, manipulated the organ, identified anatomical landmarks, and discussed anatomy in the clinical setting. The instructor facilitated the discussion at each station by drawing on significant clinical findings from the literature.

At the lab's conclusion, a modified version of the Brief Attitudes Survey for Interprofessional Collaborative Learning (BASIC-L) survey was used as a qualitative means of collecting data (Schneider, Lage, Fairclough, Raventos & De Los Santos, 2021). The survey was given online within the learning management system, students had the option to participate. The questions taken from this survey included understanding the roles and responsibilities from another profession, acquiring knowledge from another profession, and communication with another professional group to explore if this activity would further enhance the students' understanding of anatomical relationships as well as their perceptions of the interprofessional education experience.

Assessment of Student Responses to the Experience

A qualitative approach was used to assess learning and growth in professionalism (e.g., communication, respect). In addition to their verbal responses during the activity and follow-up, students voluntarily wrote responses to questions modified from the BASIC-L survey as a post-lab reflection on what they learned from the exercise in regards to acquiring content and professional knowledge, what could be added to the experience or modified, and if this style of teaching should be incorporated into the CLS curriculum (Da Costa, Vilar de Azevedo, & Reeves, 2014). Assessment included comparing the post-lab results to the activity aims then sorting the reflections into content themes. This was completed by entering the results into a database, using a deductive method based on recurring perceptions and experiences of the activity. The modified BASIC-L survey allowed the authors to come to the data with these predetermined themes based on established questions that were coded manually. Once completed the information was assessed and cross-checked for validity.

4. Results

Eighteen out of the nineteen participants (95%) answered the post-experience reflection questions about the lab activity. Both juniors and seniors were active participants in the prosection and contributed reflections. All the participants expressed positive outcomes for the experience and voiced their support for the addition of similar exercises to the CLS curriculum. Students expressed that learning organ physiology was solidified and strengthened by the opportunity to both closely see and physically handle the cadaver's organs and organ systems. Some participants expressed their appreciation for the opportunity to enhance interprofessional relationships.

Learning Activity Aims and Students' Post-Lab Reflections

Aim 1: Understand/respect the roles, responsibilities, and scope of practice of the CLS and the PA profession. This prompt resulted in a variety of CLS student reflections. Some students noted the working relationship between the PA and CLS: "We work closely with pathology, but I knew very little about the profession. It was a great opportunity to experience and learn about what they do"(student 3); "I believe this interprofessional opportunity is great to be able to see and learn what pathologists do and how both fields are helpful for one another" (student 6). The students' reflections also indicated respect for the PA profession: "It was very interesting to see how hard this process is" (student 9); "One thing that was amazing is the speed of the instructor, she was so fast taking everything apart" (student 13); "I learned more about the pathology assistant profession and the immense work and knowledge required to perform an autopsy" (student 8). Few reflections discussed the role of the CLS in pathology and a desire to learn more about the PA profession: "During a PA shadow experience at a local hospital, I was very lost, as I have too little knowledge and experience in reviewing the pathological tissue slides" (student 11). Reflections also indicated a desire to learn techniques beyond the scope of this exercise: "I would like to see how a pathologist reads the slides, prosection to slide, beginning to end to make a diagnosis" (student 15).

Aim 2: Acquire knowledge of anatomy and physiology via organ manipulation and three-dimensional evaluation of organ relationships. Several student reflections recognized the benefit of the prosection lab for enhancing the learning of anatomy and physiology: "I learned the relationship of organs and organ systems a lot better"(student 1); "We've learned a lot about the physiology of different organs in class and have studied the micro portions of it, but have never gotten to see the organ and organ systems up close" (student 4); "I learned that the organs are not as distinguishable in reality as they are in the textbook: when we physically visualized the organs within the cadaver, they were all mostly the same color and differentiation relied mainly on the shape and size of the organ" (student 19); "It was interesting to see it all connect with a real person" (student 2).

Aim 3: Correlate anatomy and physiology content matter with clinical practice. The students' reflections expressed the benefit of the prosection lab for increasing their competency in their future career. Students commented on their new knowledge of the human body: "I learned that bones are not as dense as I thought they were"(student 5); "It was very interesting to see how organs are affected by certain diseases" (student 7). Students also commented on the desire to learn more about the connections between physiology and causes of death: "I would love to see a prosection of a cadaver that died from a certain condition that we would be able to see on a specific organ if possible, such as kidney, liver, or heart problems"(student 12) ; "It would be nice to see a prosection of patients with visible tumors or aneurysms" (student 14). Some reflections highlighted a change in attitude toward patient care: "The chance to hold [a] human organ between your hands is making me feel more responsible towards patients" (student 18).

Aim 4: Communicate with another professional group in the laboratory setting. Only a few student reflections described the opportunity to communicate with another professional group. A possible reason for this outcome could be that students were focused on watching the autopsy, which was the highlight of the activity. Also, the physical participation during the prosection was a novelty for the CLS students, and they may not have noticed the advantages of communicating with the PA instructor. Two reflections noted the advantage of interprofessional communication: "She showed us every step with very detailed explanation" (student 8) and "I think more interaction with different types of professionals in the more obscure types of sciences would be both interesting and beneficial to our development as students and health care professionals" (student 17).

Content Themes of the Reflections

To discover additional insights in the student reflections, we employed the conventional content analysis technique for discovering themes in text data (Hsieh & Shannon, 2005). We extrapolated the information received to include three more important themes worthy of mention: experiential learning; interprofessional learning, field; and professional enhancement.

Experiential learning. Examples of this theme included: "I also learned that the organs are not as distinguishable in reality as they are in the textbook" 9student 4) and "We've learned a lot about the physiology of different organs in class and have studied the micro portions of it, but have never gotten to see the organ and organ systems up close" (student 11).

Interprofessional learning, field. In addition to the reflections that correlate with Aim 1 of the learning activity, comments indicating this theme included: "Even [though] I have limited knowledge of anatomy pathology, I fully understood everything she performed" (student 12). Several comments indicated an interest in future study of the PA field, for example: "I strongly believe this prosection is very helpful for my classmates who wish to pursue an M.S. degree in the future. As far as I know, many senior CLSs pursue the path after some years of experience working in the clinical pathology labs" (student 15).

Professional enhancement. Students commented on the benefit of the prosection experience for increasing professional knowledge: "The prosection was presented in a way that a CLS student could understand and not geared towards PA students" (student 8); "I honestly learned the entire process of an adult autopsy, which is totally new for me" (student 11); "I had never had a hands-on experience with a cadaver before" (student 18); "I have always been interested in human anatomy and being able to see a prosection in person was an opportunity" (student 14).

5. Discussion

Our prosection lab demonstrated that providing CLS students with a different method of learning anatomy can increase their understanding of both clinical pathology and the work of other health-care providers (Earnest & Pfeifle, 2016). A primary advantage of the lab was that students could develop skills for interprofessional relationships, such as asking questions and engaging in dialogue, prior to their employment in a hospital setting. Once established into the curriculum, this teaching method may help students of other health professions to increase their knowledge of clinical pathology and increase their interprofessional skills (Lehrer et al., 2015).

As an unexpected benefit of the lab, several students noted that the experience piqued their interest in pursuing the

pathology field. The overlap between CLS and PA education programs is a pathway to options for graduate study, as noted by a poster presentation at the 2017 American Society for Clinical Laboratory Science (ASCLS) Clinical Laboratory Educators' Conference.

A limitation of the activity noted in some students' reflections was the physical format of the activity. An experiential prosection lab must plan for the physical proximity of a large number of students and provide accommodations for those with hearing difficulties or other physical challenges. In addition, the lack of comments regarding opportunities for communication with students from other professional areas indicate that a follow-up meeting may be helpful to discuss the lab and share insights.

6. Conclusions

The use of hands-on cadaver-based teaching for CLS students was appropriate to their learning needs and relevant to their future clinical practice. Although communication between student groups were limited during this activity, continuing these practices within academia can decrease communication barriers between health-care groups in the clinical setting and improve training and exposure to different knowledge sets (Mishoe et al., 2018). Experiences like the prosection lab provide CLS and PA students with relatable and essential skills as they hone their professional development for entry into the hospital setting.

Key Guidance Issues

- This important study has opened discussion about the way laboratory professionals learn and process information.
- Collaboration between CLS and PA programs could spark new cross-disciplinary research in either scholarship or teaching.
- Since teaching is the focus for these disciplines that support the medical field, the inclusion of student professional development programs in clinical laboratory courses will strengthen instruction.
- The creation of service opportunities can help build health care teams and allow for cross-collaboration in a multitude of health professions.
- Curriculum changes to add experiential activities could enhance learning.
- Curricular opportunities for CLS students or faculty to contribute to the PA profession to solidify learning from both perspectives.
- Breaking down "silos" in the health professions can occur in academia, prior to getting into clinical practice.

Notes on Contributors

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