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Descriptive paper

Learning anatomy in a student-run extracurricular club: an education through recreation initiative.

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ABSTRACT

Didactic and laboratory anatomical education have seen significant reductions in the medical school curriculum due, in part, to the current shift from basic science to more clinically based teaching in North American medical schools. In order to increase medical student exposure to anatomy, with clinical applicability, a student-run initiative called Surgically Oriented Anatomy Prosectors (SOAP) was created within the extracurricular program of our medical school. SOAP invites surgeons and residents from various surgical specialties to demonstrate, on a cadaver, a surgical procedure of their choosing. During the demonstration, the anatomy, as it relates to the surgical procedure, is discussed. The students then break into smaller groups to examine the relevant anatomy on the cadavers, during which time the discussion is broadened. The group continues the conversation in a social environment with refreshments. SOAP is one of the most popular extra-curricular clubs with 65% of first and second year medical students registered as members. Its events fill-up more rapidly than those of any other club. The high demand for SOAP, along with the positive participant feedback, may be due to its utilization of the principle of education through recreation, which seeks to

provide opportunities for learning seamlessly throughout all facets of life. It also demonstrates the desire, amongst certain medical students, to learn applied anatomy, particularly within a surgical context.

Keywords: surgical anatomy, medical education, anatomy education, anatomy laboratory, dissection, clinical correlation, education through recreation.

“A master in the art of living draws no sharp distinction between his work and his play, his labour and his leisure, his mind and his body, his education and his recreation. He hardly knows which is which. He simply pursues his vision of excellence through whatever he is doing and leaves others to determine whether he is working or playing. To himself he always seems to be doing both. Enough for him that he does it well.”(Jacks, 1932.)

Introduction

Medical school curricula in the United States and Canada are an ever-changing entity, undergoing constant revisions to keep pace with the ongoing changes that occur in medicine itself (Drake et al., 2009). As such, the focus has largely shifted away from what was once grounded in the basic sciences, toward to a more clinical approach (Ahmed et al., 2010). Lecture hours are slowly being replaced with small group and team based learning, with emphasis shifting toward student-centered learning experiences (Vasan et al., 2011). An example of this is described by the recently developed program at The Cleveland Clinic Lerner College of Medicine of Case Western Reserve University (Drake, 2007). Despite these initiatives, clinically orientated curricula often come at the cost of reducing teaching hours in certain core disciplines, such as anatomy. Time devoted to anatomy in the medical curriculum in the United States has been reduced by 55% since 1955 (Drake et al., 2009). This has raised concerns regarding the capacity of the modern curriculum to prepare students for clinical practice (Fitzgerald et al., 2008; Smith and

Mathias, 2011).

Despite the dramatic decline in the amount of time devoted to anatomical education, its perceived value remains high among medical students, residents and educators alike (Vasan et al., 2011). A survey evaluating the perceived importance of dissection among first and second year medical students revealed broad agreement that dissections were an important tool for the understanding of anatomy, with students emphasizing that it helped them with the three-dimensional perception of anatomy and with recall (Azer and Eizenberg, 2007). A subsequent study re-emphasized the perceived importance of dissection-based anatomy amongst medical students, with particular focus on the discipline's impact on the development of various professional competencies. (Böckers et al., 2010). Surgical residents from the University of Michigan Medical School reported that an anatomy curriculum with greater emphasis on dissection and traditional methods of teaching would have better prepared them for the challenges faced in residency (Bohl and Gest, 2011).

Computer assisted learning (CAL) has the potential to make up for the reduced amount of time devoted to anatomical instruction in modern curricula (Hopkins et al., 2011). The availability of cadaver-based 3-dimensional reconstructions, such as those seen in the Visible Human Project, as alternatives to idealized and cartoon-like images, may enhance this opportunity (Jastrow and Vollrath, 2003). However, a systematic review of the literature regarding the use of CAL in anatomy education revealed insufficient evidence

to warrant the replacement of traditional teaching methods with these resources (Tam et al., 2009). A more recent study of CAL using virtual 3-dimensional models found no difference in knowledge acquisition between those using prosections, virtual anatomy resources, or both. It did, however, document a social impact, in that students learning in isolation tended to revert to prior memorization (Hopkins et al., 2011).

The undergraduate medical education curriculum at the Schulich School of Medicine and Dentistry (SSMD) at the University of Western Ontario is systems based. Instruction in anatomy is embedded within the study of each system, with laboratory sessions following lectures or being administered in conjunction with online independent learning modules. The total number of instructional hours devoted to anatomy, including neuroanatomy, histology and embryology, adds up to less than 150 hours over the course of the first two years of the medical curriculum.

SSMD has a robust and well-established system of student-run extra-curricular programs, which are both social and educational in nature. In response to informal reports from senior students suggesting that clerkship readiness would be improved by an increased emphasis on anatomy, a group of students applied to the Hippocratic Council, the student governing body at SSMD, for permission to organize a student-run anatomy club within the school's extracurricular club program. A needs analysis revealed concerns, among some students, regarding the limited time available for anatomy in the curriculum. Of 29 student responses, a large majority expressed a belief in the

importance of learning anatomy from cadavers and disagreed with the statement that enough time was devoted to anatomical education (Table 1). The Surgically Orientated Anatomy Prosectors (SOAP) club was, therefore, established. This paper describes the organization and activities of the club, and the subsequent reception by the medical students.

Surgically Oriented Anatomy Prosectors Club: program description

The main purpose of SOAP was to give first and second year medical students an opportunity to observe the clinical relevance of gross anatomy dissection in a relaxed environment, under the guidance and mentorship of surgeons and their residents. Surgeons were asked to demonstrate a surgical procedure on embalmed or fresh-frozen cadavers, highlighting and discussing the relevant anatomy along the way. Access to events was initially limited to 30 students, but this was later increased to 40. Social media was used to reserve spots on a first-come, first-served basis, and the sessions were conducted in the anatomy laboratory during evening hours. At the request of members, the club organizers made an effort to arrange SOAP sessions highlighting each of the major surgical subspecialties in such a way as to align with the systems being studied in the curriculum. Following the demonstration by the surgeon, the students had an opportunity to review, in small groups, the relevant anatomy in other cadavers. Anatomy teaching staff, surgeons and surgical residents circulated among the groups to answer questions. Discussion was not restricted to anatomy but encouraged to be free

ranging, and often regarded surgery, patient care, training and career issues. Once the laboratory component was completed, and the workspace cleaned, the group retired to the post-graduate bar on the university campus to continue the social aspect of the event. Participants were later asked to complete an evaluation of club activities.

Students receive ethical training regarding patient autonomy, privacy, body donation, academic honesty and other issues early in the first year, as part of the regular curriculum. Despite this, first year students had little experience of anatomy prior to the early SOAP sessions. The first two sessions were therefore dedicated to introductory topics: “The Art of Dissection” and “Basic Surgical Technique”. The purpose of the first session was to introduce students to the anatomy laboratory in a tension-free environment. In addition to dissecting skills, respect for the bodies of the donors and care with tissue handling were emphasized. The second session permitted students to differentiate between dissection as performed for anatomical purposes from that required in the operative setting. It also gave them an introduction to surgical repair techniques such as skin suturing, fascial closure and intestinal anastomosis. A feature of these introductory sessions, in particular, was that second year students were encouraged to mentor the junior year.

The first surgical session was titled, “A Surgeon’s Approach to the Whipple’s Procedure”. While Whipple’s procedure, a partial pancreaticoduodenectomy, may sound esoteric or advanced for medical students, it provided an ideal opportunity to review the anatomy of the upper gastrointestinal tract and its blood supply, in addition to that of the liver,

biliary tree and the pancreas. Many of the students had heard of the procedure but were uncertain about its details, and took it as a mark of respect that a complicated surgery should be discussed with them. The surgeon mentor used the opportunity to recall that Allan Oldfather Whipple had first performed this operation as a public demonstration, similar to the current event. The next surgical workshop was labeled, “A Surgeon’s Approach to Shoulder Replacement”. This procedure gave students exposure to the brachial plexus and the relevant shoulder anatomy including the rotator cuff muscles. The third surgical workshop was labeled, “A Surgeon’s Approach to Renal Transplantation,” and it highlighted the kidneys and their anatomical relations, as well as the anatomy of the pelvis, its vessels and urogenital contents. The fourth and final surgical workshop was labeled, “A Surgeon’s Approach to Lateral Rhinotomy and Laryngectomy,” which allowed the group to study face and neck anatomy with particular focus on the nasal cavities, larynx and esophagus.

Surgically Oriented Anatomy Prosectors Club: student reception

Student registration in extracurricular clubs varies at SSMD from 5 to 75% of the student body. The SOAP club was one of the most popular clubs with 65% of first and second year medical students registered as members. All of the 40 spots available for each session were reserved within 10 to 45 minutes of the commencement of enrollment, which is considerably faster than the activities of any other club.

Of the 74 participants in the 2010/2011 series, 32 (43%) completed the evaluations (Table 2). A large majority of participant respondents (81%) either agreed or strongly agreed that their SOAP workshop highlighted the importance of anatomy in medical education overall, and that the SOAP workshop enhanced their appreciation of anatomy in a clinical context. Most of the participants who responded (68%) either agreed or strongly agreed that the SOAP workshop helped them to feel more prepared to attend a surgical observership and 66% of the students agreed or strongly agreed that the SOAP workshop encouraged them to consider a career in surgery. Globally, 31 (97%) of the respondents rated the SOAP workshop as good or excellent, one student was neutral and none were dissatisfied. On qualitative feedback, the following unstructured comments were received:

"Soap is a great club! Probably one of the best at Schulich! Thanks for introducing us to anatomy way better than is done through the curriculum in first year."

"Got a perspective on the economic/clinical side of anatomy and things we don't cover as often during anatomy lab."

"Very nice to see clinical applications of anatomy."

"Good chance to get exposure to surgery, more chances for hands-on experience than the usual anatomy lab."

"The ability to watch a procedure from start to completion with all of the relevant anatomy highlighted along the way."

The following responses were received in reply to the query about how the organizers could improve SOAP events:

“More sessions of the same procedure. The small groups are great but there's only one group - it'd be awesome if there were at least 2 groups for the same topic (at the same or different times).”

“If filming could be done in a way that gives the camera priority, even people who miss sessions could take part in them later by watching the videos.”

“Include in the email of an upcoming session more details of the procedure/topics/relevant anatomy the surgeon is going to cover so those who wish to preread more can do so and get more out of the session.”

Surgeons who participated in the workshop were asked about their experience leading the workshops. Comments were received from two surgeons:

“I have long recognized that medical students in our program have a poor foundation of knowledge in the basic sciences, particularly anatomy. There are increasing pressures from the medical school to decrease lecture time, which further erodes this foundation. In the Respiration and Airways course, we teach all pertinent anatomy of the head and neck in 6 two-hour anatomy labs, taught jointly between anatomists and surgeons. Although these sessions are generally rated highly, it is far too much information in a limited amount of time, especially for those with no prior anatomy background. I am delighted to see that the students have taken their education into their own hands. They

are insightful enough to recognize that more direct instruction is needed in the anatomy lab. These sessions, which are facilitated by surgeons, reflect a truly innovative educational paradigm that is effective and well received."

"Teaching surgical anatomy is an excellent opportunity to review surgical practice and technique from a different perspective. The student is familiar with medical principles but not intimate with the area of interest as a specialty resident would be. The surgeon lecturer therefore has to retreat from the direct area of the operation being discussed to a higher level that teaches the system involved. Once that is established, using anatomy the surgeon lecturer can drill down to fine details. Students will follow because anatomy demonstration allows for spatial understanding that eludes even the best illustrations. Anecdote and discussion are essential to maintain student interest in this voluntary program. Social interaction after the session enhances its lessons"

Discussion

This paper describes a student initiative to address a perceived loss of emphasis on anatomy in a systems-based medical school curriculum. The student-run program of extra-curricular recreational clubs was adapted to hold educational events that placed anatomy in the context of clinical surgery and fostered a relationship between students, residents and staff. This report has several limitations. While we believe SOAP was successful, we cannot exclude selection bias in our evaluations and we have not tested if

SOAP had any impact on educational outcomes. It is quite possible that student motivation to attend the SOAP sessions enhanced their learning and this will be addressed in a follow-up study. We cannot determine if the structure of the program described here is optimal. Selection bias may be less relevant because SOAP, as an adjunct to conventional teaching, is selected by those medical students who perceive a benefit of additional opportunities in anatomy to advancement in the field of medicine they wish to pursue.

We believe that the program is popular because it maintains high educational standards in a relaxed student-run social environment. The concept of education through recreation was first applied to childhood development in the 19th century (Mead, 1896). In the early 20th century, the concept was broadened to include young adults but the emphasis was on physical activities (Johnson, 1916). Educationalist Lawrence Jacks, who was also an early proponent of life-long learning, best described the modern concept of education through recreation in the epigraph of this article, if its language is modernized to include both genders (Jacks, 1932). Education through recreation is the opportunity to learn in a seamless fashion through all of life's activities. The SOAP club program may owe its success to the exploitation of this principle, by offering its participants, students and mentors alike, a seamless integration of demonstration with discussion, of basic science with clinical context and of voices at different stages in a medical career.

Another aspect of the SOAP sessions is that anatomical science is discussed in its clinical

context. It is now generally accepted that learning improves if education is contextualized by its application (Regehr and Norman, 1996). Development of the medical school curriculum at SSMD and elsewhere exploits this strategy. Others have found that surgery is an excellent context in which to set anatomy (Haubert et al., 2009). Most of the initiatives to contextualize anatomy, by using surgery, have integrated these programs into the curriculum itself (Rao and Rao, 2009; Seyfer et al., 2007). Not only have educational outcomes improved in anatomy but also in surgery (Zaid et al., 2010). The positive effect of combining anatomy with surgery persists after the undergraduate program, well into residency itself with several specialties, such as gynecology, returning to the older model of formally teaching relevant anatomy to trainees (Heisler, 2010).

A program similar to SOAP was implemented at the Ohio State University College of Medicine in 2008 (Haubert et al., 2011). Surgeons demonstrated surgical procedures on cadavers, after which students were given the opportunity to dissect. The program was incorporated into the curriculum as one of five initiatives to involve surgeons in undergraduate medical education. While the perception of surgeons as teachers improved, no differences were seen with respect to educational outcomes when compared to the previous class that did not receive this program. One possible difficulty of hosting such a program within the regular curriculum would be that clinicians might find it difficult to attend during regular working hours. It is interesting to note that in the SOAP program, where events occurred in the evening, that surgeon and resident mentors readily accepted invitations to attend.

McBride and Drake describe a program in which medical students teach anatomy to physician assistant trainees at stations with cadavers and prosections (McBride and Drake, 2011). The satisfaction reported is similar to that seen with SOAP. Additionally, the medical students gained confidence and knowledge, in keeping with our own experience when participants mentored junior colleagues. Allowing medical students and residents opportunities to teach anatomy not only makes use of a useful resource, but it may also enhance their own learning experience as they take on the role of teachers (Haubert et al., 2011).

Initially we were concerned that demonstrating procedures such as a Whipple's resection would be too advanced for junior medical students. We were gratified, however, with the positive response. We were also interested to learn that other schools, including the University of Nebraska Medical Center College of Medicine, have used the Whipple procedure to teach successfully teach anatomy (Are et al., 2010). The University of Pittsburgh School of Medicine offers a surgical anatomy course, which involves the performance of surgical procedures performed on cadavers, to final year medical students who have already chosen surgery as their specialty (Rao et al., 2009).

In contrast, the SOAP program was able to deliver clinical anatomy to undifferentiated first and second year medical students. In using the structure of a recreational club, the program did not trivialize anatomy or disrespect body donors. Rather, it used the principle of education through recreation to provide another means for medical

students to understand and appreciate the role that anatomical education plays in the achievement of their medical career ambitions.

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Table 1. Needs analysis: student perception of the importance of anatomy and the amount of time devoted to teaching anatomy in their medical education.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Enough time is given for anatomical education in your medical school curriculum.	0.0% (0)	21.9% (7)	25.0% (8)	37.5% (12)	15.6% (5)
Cadaveric anatomy is absolutely necessary in the context of medical education.	34.4% (11)	43.8% (14)	12.5% (4)	6.3% (2)	3.1% (1)

Table 2: Participant evaluation of Surgically Orientated Anatomy Prosectors Club

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The SOAP session highlighted the importance of anatomy in medical education overall.	40.6% (13)	40.6% (13)	9.4% (3)	6.3% (2)	3.1% (1)
SOAP session enhanced your appreciation for anatomy in a clinical context.	45.2% (14)	38.7% (12)	16.1% (5)	0.0% (0)	0.0% (0)
After the SOAP session, you feel better prepared to attend a surgical observership for a procedure that was covered in your SOAP session.	29.0% (9)	38.7% (12)	22.6% (7)	9.7% (3)	0.0% (0)
The SOAP session encouraged you to consider a career in surgery.	21.9% (7)	43.8% (14)	25.0% (8)	3.1% (1)	6.3% (2)