Dissecting Through Barriers: Findings from a Pilot Study on the Effect of Interprofessional Education in a Gross Anatomy Course

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ABSTRACT

The implementation of interprofessional education within healthcare programs has been tentatively found to improve patient care and satisfaction, reduce clinical error rates, improve collaborative team behavior, and diminish negative professional stereotypes.

In 2009, an interdisciplinary, problem-based learning (PBL) gross anatomy course was implemented at McMaster University in Hamilton, Ontario. In 2010, a pilot study was initiated to determine if this course, offered in an interprofessional environment, influenced attitudes and perceptions towards students in other health professions. Twenty-four randomly selected students from the medicine, midwifery, nursing, physician assistant and physiotherapy programs at McMaster University participated in the eight-week dissection course. Pre-experience and post-experience surveys of the Interdisciplinary Education Perception Scale (IEPS) and Readiness for Interprofessional Learning Scale (RIPLS) were used to measure differences in attitudes and perceptions towards interprofessional education and collaboration. As well, weekly mandatory evaluations and focus group results were used to qualitatively evaluate these changes.

No significant differences were found between pre- and post-course surveys, which may be attributable to the small sample size, the inexperience of first-year students who may not yet fully comprehend their respective professional roles, and limitations of the IEPS and RIPLS. Overall, however, qualitative feedback was positive regarding the experience and students appreciated the opportunity to learn about other professions and interprofessional roles.

INTRODUCTION

As healthcare delivery progresses towards a team-based approach, there is a growing need for adequate training and development of interprofessional collaboration skills. One of the main requirements for the creation of a collaborative team environment is a mutual understanding of the roles of other health professionals, which in turn helps to promote effective interprofessional communication.

The goal of interprofessional education (IPE) is to educate different healthcare professions about their respective roles and the roles of other professions through interaction, integration, and communication. However, the evidence for the effectiveness of IPE is inconclusive. Four of the six studies of a 2009 Cochrane review found that IPE improved patient satisfaction, the working environment, and clinical error rates in the emergency department. In the field of mental health, IPE was found to augment skills and knowledge of the care providers. However, the review found that inferences could not be made due to the heterogeneity of interventions and methodological limitations between the studies included, and...
more rigorous studies were required. Given the limitations of quantitative outcome measures in measuring the qualitative aspects of IPE, mixed method studies, which use both quantitative and qualitative analysis, are needed to adequately assess the efficacy of IPE in training healthcare professionals to work together effectively.

Recognizing the need for interprofessional learning as well as the value of a gross anatomy course for student learning, an interprofessional PBL gross anatomy course was founded at McMaster University in 2009. This course allowed students to develop teamwork skills, collaborate in learning anatomy and physiology, share their professional perspectives on the management of case studies, and discuss their experiences and respective roles as healthcare professionals. In 2010, a pilot study was initiated to determine if learning in an interprofessional environment influenced perceptions of other health professions among students.

METHODS

An eight-week problem-based learning (PBL) gross anatomy course, involving cadaver dissection by interprofessional teams, was developed in February 2010. Enrolment was offered to all students in the medicine (MD), physician assistant (PA), nursing (RN), physiotherapy (PT), and midwifery (MW) programs at McMaster University. Twenty-four students were selected via random number generator and systematically allocated into four interprofessional groups, each with members from three to four different programs (Figure 1).

Students were given weekly case studies relevant to the dissection and were encouraged to review the anatomy and physiology surrounding the case, as well as their own role and the roles of other healthcare professionals in the care of the patient. A sample case study is shown in Figure 2. These PBL case studies served two purposes: to provide context for the dissection, as well as to provide a platform for students to engage in discussions of interprofessionalism.

A 70-year-old gentleman presents to the ER with severe abdominal pain, abdominal distention and constitutional symptoms (fever, nausea) over the past 24 hours. His last bowel movement was two days ago and he has not passed flatus in the past 12 hours. He was previously healthy, although he has had increased constipation over the past month and has noticed blood in his stool. Abdominal x-ray shows grossly distended loops of large bowel and a CT scan shows fecalization of small bowel, distended loops of large bowel to the descending colon, an acute obstruction and collapsed large bowel distal to this point. The CT scan also showed a 3 x 4cm mass at this point. There was no indication of perforation (i.e. no free air). An NG tube was used to decompress the stomach and small bowel, and intravenous fluids were initiated. A sigmoidoscopy was performed and a diagnosis of obstructive colorectal cancer was made. The patient was counselled and consented to a left hemicolectomy surgery.

1. What are some of the underlying causes for this pathology?
2. What anatomical structures are affected?
3. How would you differentiate between a large bowel obstruction and a small bowel obstruction on x-ray? (Think of the general location and distinctive anatomical features of each).
4. Why do we remove half of the colon if only a small part is affected (consider lymphatic supply)?
5. How would you manage this patient?
6. How do you think each health profession (PT, PA, Midwifery, MD, Nursing) would contribute to the treatment of this patient? Who would you refer to and why?

Figure 2. Sample Case Study (gastrointestinal system)

During the course, the first 15 minutes were allocated to the student coordinators to present the general anatomical principles surrounding the case. Students were then separated into their respective groups, and given 15 minutes to discuss the questions given and to clarify the roles of each profession in the given scenario. Students were then allotted two hours to complete the dissection, enabling collaborative learning and team-building within each interprofessional group.

Pre-IPE and post-IPE surveys consisting of the revised Interdisciplinary Education Perception Scale (IEPS) and Readiness for Interprofessional Learning Scale (RIPLS) were completed by participants who committed to all eight weeks of the course. These scales enabled quantitative measurement of changes in attitudes towards interprofessional education following the course.

Figure 1. Structure of the 2010 McMaster Interprofessional Dissection Course
The IEPS was designed by Luecht et al. and is a content-validated pre-test and post-test tool used to measure changes in students’ attitudes resulting from an interprofessional experience.\(^3\) It is comprised of four subscales: Competence and Autonomy, Perceived Need for Cooperation, Perception of Actual Cooperation, and Understanding of Other’s Value. It was revised in 2007 by Mcfadyen et al. to improve psychometric stability and has shown good test-retest reliability and excellent internal consistency for three of the four subscales.\(^3,4\) This version of the IEPS has been validated in undergraduate students.\(^3\)

The RIPLS is a rating scale that assesses perceptions and attitudes of health care students towards interprofessional learning.\(^5\) The original measure has face, construct, and content validity.\(^5,11\) A revised version published in 2005 by Mcfadyen et al. was used for this study, which divided the original three subscales into four subscales with increased stability and improved psychometrics.\(^6\) The subscales include “team working and collaboration”, “professional identity (positive and negative)\(^\text{\textdagger}\)”, and “professional roles”. The revised RIPLS has high internal consistency and has been validated in both undergraduate and postgraduate healthcare students.\(^5,6,12,13\)

The pre- and post-course surveys of students completing the entire eight-week course (n=22) were analyzed using Mann-Whitney U tests in SPSS 16.0 for Windows to compare pre- and post-subscale and total score means. Nonparametric statistics were used due to the increased variability in small sample sizes and non-pairing of surveys.

In addition to the quantitative surveys, mandatory weekly written evaluations comprising of both Likert scale questions and open-ended questions were completed anonymously by each participant (Figure 3). As well, upon completion of the course, a focus group led by the course professors was held to qualitatively evaluate differences in attitudes and perceptions. Open-ended questions were used to lead the discussion, and topics including course format, group facilitation, relevance of the cases and professional roles were addressed.

The weekly evaluations and focus group data were analyzed by compiling comments and assessing themes and trends. The qualitative data was also used to determine potential areas of improvement and future directions for the course.

**RESULTS**

Comparisons of pre- and post-course subscale and total scores for both the IEPS and RIPLS showed little change and were statistically insignificant (p≥0.05). However, overall qualitative feedback was positive regarding learning about other professions and interprofessional roles. An analysis of weekly feedback indicated that 30.6% of the comments about what students enjoyed the most related to interprofessional collaboration (Table 1). Specifically, 22.6% of comments were about pre-dissection activities such as case discussions, and 8.0% of the comments discussed their interaction with peers from other professions.

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**Figure 3. Weekly Evaluation Form**
For example, students commented on their experience of "working with other healthcare professional students and learning the anatomy together" and "the atmosphere with all of the different professions". In addition, focus group comments indicated that learning anatomy in an interprofessional environment allowed students to not only improve and enrich their knowledge of anatomy and physiology, but also increase their understanding of their respective roles and the roles of other healthcare professionals in patient care. Students appreciated the opportunity to learn about the breadth and depth of each profession, as well as how each profession contributed to disease management in the context of an interprofessional team.

**Table 1. Qualitative Results from Weekly Survey**

<table>
<thead>
<tr>
<th>Aspect of the course found to be most enjoyable</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The hand-on experience with cadaveric material</td>
<td>58.7%</td>
</tr>
<tr>
<td>The pre-dissection activities (opening talks, case discussions)</td>
<td>22.6%</td>
</tr>
<tr>
<td>Interaction with peers from other professions</td>
<td>8.0%</td>
</tr>
<tr>
<td>Other</td>
<td>10.7%</td>
</tr>
</tbody>
</table>

**DISCUSSION**

While quantitative data failed to show any statistically significant results, qualitative data suggest that students found the course to be highly valuable. Students enjoyed the opportunity to work with students from other health professions and to learn clinically relevant anatomy and physiology. A similar initiative by Hamilton et al. showed similar qualitative results for an interprofessional gross anatomy course started at Mayo Medical School in Rochester, Minnesota for 70 first-year students in medicine and physical therapy. However, these students were assessed over a two day span, which was comparatively shorter, and did not look at the integration of a variety of healthcare professions, as it incorporated only students in medicine and physiotherapy.

For this study, the lack of significant quantitative effect is likely attributable to a number of factors. The small sample size, which may diminish course effect, was due to resource and space limitations in the anatomy laboratory. In addition, students who did not complete the course were replaced by another student from their respective profession, which may have disrupted team dynamics. There was also uneven representation of professions in each group, which may have increased the variability of each group’s interprofessional experience. The IEPs and RIPLS have not been assessed for sensitivity to change, and it is possible that these instruments are not sensitive enough to measure changes in interprofessional perceptions and attitudes over an eight-week time period. In addition, these measures may not be suitable for students who are in the initial year of their program as these students may not fully comprehend their respective professional roles and are concurrently undergoing significant changes in their learning.

Despite the lack of significant quantitative effect, the qualitative aspects of the study showed markedly positive results for learning in an interprofessional environment. The focus group results showed that students found that the course greatly improved their understanding of human anatomy and each profession was able to share their respective clinical knowledge in their exploration of the physiology.

The results and findings from this pilot study were instrumental in developing an improved framework and curriculum for subsequent interprofessional dissection courses. For example, revised case studies will include more questions relating to different healthcare professions such as midwifery and nursing. Students also requested more time for interprofessional interaction and case discussions preceding the dissections, which will be addressed in next year’s course. As well, by improving the methodology and design of this study, further research can be performed to assess the effectiveness of an interprofessional anatomy course as an interprofessional teaching tool.

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**REFERENCES**

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