

# Interprofessional Education in Anatomy: Learning Together in Medical and Nursing Training

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Teamwork and the interprofessional collaboration of all health professions are a guarantee of patient safety and highly qualified treatment in patient care. In the daily clinical routine, physicians and nurses must work together, but the education of the different health professions occurs separately in various places, mostly without interrelated contact. Such training abets mutual misunderstanding and cements professional protectionism, which is why interprofessional education can play an important role in dismantling such barriers to future cooperation. In this article, a pilot project in interprofessional education involving both medical and nursing students is presented, and the concept and the course of training are described in detail. The report illustrates how nursing topics and anatomy lectures can be combined for interprofessional learning in an early phase of training. Evaluation of the course showed that the students were highly satisfied with the collaborative training and believed interprofessional education (IPE) to be an important experience for their future profession and understanding of other health professionals. The results show that the IPE teaching concept, which combines anatomy and nursing topics, provides an optimal setting for learning together and helps nurses and doctors in training to gain knowledge about other health professionals' roles, thus evolving mutual understanding. *Anat Sci Educ* 00: 000–000. © 2014 American Association of Anatomists.

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## INTRODUCTION

An efficient health care system, including safe and highly qualified patient care, requires key competencies, such as teamwork and collaboration, among all health professionals on the staff. The needs of patients are interprofessional, and, thus, improving health care calls for interprofessional efforts (Headrick et al., 1998). In daily clinical routine, physicians and nurses must work together. However, health professional education takes place in learning silos without interprofessional contact (Barnsteiner et al., 2007). In many countries, patient-oriented interprofessional collaboration in health care

education plays a minor role (Stössel et al., 2006). The curricula of health care departments and medical schools differ and students following a particular career path are socialized in their own environment, mostly without knowledge of the roles of other professions. Students in health care professions, such as nursing and medicine, achieve expertise and skills that are important to carry out their own profession, but preparation for teamwork in terms of interprofessional collaboration is inadequate. This results in mutual misunderstanding and abets professional protectionism (Carlisle et al., 2004). Lack of knowledge about the different roles of other health care professions, lack of skills in teamwork, as well as negative attitudes and varying levels of respect can be influenced by education (McNair, 2005).

Interprofessional education (IPE) is recognized as a good method for overcoming these barriers and serves to develop and improve teamwork and communication between different health care professionals to avoid misunderstandings and mistakes.

Interprofessional education occurs when members of two or more professions learn about, from, and with each other to achieve effective teamwork and collaboration and thus to

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improve the quality and safety of patient care (Zwarenstein et al., 2001, WHO, 2010). Interprofessional education brings students from different health professions together. In such a context, students can learn more about the role of the other occupational groups. More knowledge about each other supports teamwork and improves communication and collaboration between different professional groups of health care.

In 1990s, preliminary interprofessional education initiatives were established. Today, in many countries, IPE projects are an inherent part of the health care curriculum. However, in Switzerland, as in other German-speaking countries, little consideration is given to IPE.

Interprofessional education takes place in both postgraduate and undergraduate education (Hamilton et al., 2008; Hays, 2008; Reeves et al., 2012; Mellor et al., 2013). Many interprofessional education programs are voluntary and only a fraction of students participate. Most IPE settings for undergraduate students are embedded in a clinical environment (McNair, 2005); IPE settings for first- and second-year students are rarely described. However, the interaction and learning together of beginning students of different health care professions has the potential to initiate interprofessional collaboration at that early stage in their education (Hamilton et al., 2008).

In this article, a pilot IPE project of the medical faculty of the University of Bern and the Bern Centre for Higher Education in Nursing is presented, its procedures are described, and its benefits and drawbacks are discussed.

## DESCRIPTION

To foster IPE in Switzerland, a pilot project was started with first- and second-year nursing and medical students. The goal of the project was for students to gain insight into the curriculum of another health profession program by learning and working together, to learn about similarities and differences in training programs, and to get an idea about both the roles and the learning and working environment of the others. Finding out more about the work of other health professions can help students to think positively about other professionals, providing a good basis for later collaboration in clinical practice.

### Concept of the Modules

Before starting the project, the faculties of both institutions developed a shared vision of the goal of IPE. From this, the framework of this IPE was evolved, and the practical settings of the modules for first- and second-year students were designed. Different teaching methods, such as lecture, cognitive apprenticeship, standardized patient and feedback (Ortwein et al., 2006; Schlegel et al., 2012), skills laboratory (Van Dalen et al., 1998), and small group skills were used.

The process of the modules was similar for first- and second-year students. Each module consisted of two half-day sessions. Students met to learn and to work together, first in the Bern Centre for Higher Education in Nursing and then in the Institute of Anatomy at the University of Bern. To learn about each other and to facilitate mutual knowledge, students presented their curriculum to each other in an informal atmosphere on the first day. Subsequently, to learn with and from each other, students practiced nursing skills together in the skills laboratory. For the second session, students met in the Institute of Anatomy to learn anatomy together. Anatomy

is an excellent topic for IPE because its importance is key to many health care professions.

## Evaluation and Data Analysis

**Instrument.** To evaluate the project, the students provided oral feedback; additionally, a 15-item questionnaire based on the Readiness for Interprofessional Learning Scale (RIPLS) (Parsell and Bligh, 1999) was used. The questionnaire responses were arranged on a six-point Likert scale ranging from 6 (strongly agree) to 1 (strongly disagree). The students also had the opportunity to comment freely.

**Analysis.** The data were analyzed using descriptive and inferential statistics (nonparametric tests: Mann–Whitney U-test to examine differences in attitudes toward IPE between medical and nursing students, and the Wilcoxon test to examine differences in pre- and postexperience attitudes within the two groups). Data were analyzed with the Statistical Package for Social Sciences (SPSS), version 22 for Windows (SPSS, Inc., Chicago, IL).

**Ethical approval.** Ethical approval was obtained from the ethics committee of the Canton of Bern, Switzerland. Informed consent was obtained from all participating students. Participation in the study was voluntary. All participants were free to leave the study at any time without any repercussions.

## REALIZATION OF THE IPE MODULES

### First-Year Module

The central topic of the first-year module was nutrition. At the school of nursing, the students practiced feeding a simulated disabled patient. At the Institute of Anatomy, students learned the anatomy of the gastrointestinal tract.

**First session.** The first meeting took place in the Bern Centre for Higher Education in Nursing. Prior to the start of collaborative learning, all students had to be dressed in professional nursing uniforms. Next, all students met in a classroom and received a short introduction to the goal of the IPE and were informed about the procedure of the practical training session and its educational objectives. Then, they started the practical part of the module by forming small groups consisting of students of both professions. The members of the group introduced themselves and presented their curriculum to each other. Students prepared the presentation of their curriculum beforehand. This informal discussion served as an “ice breaker” and was meant to facilitate group formation (Krause et al., 2014). Subsequently, students undertook skills training; they practiced feeding a “patient” in small groups of three. In this, one student acts as patient, a second student functioned as a nurse and practiced helping the patient to eat. The third student observed the situation. During the training, the students rotated, so they experienced all perspectives. After each round, students reflected on their own action and received feedback from their colleagues. In this profession-specific setting, the medical students learned from the nursing students and all learned more about each other.

**Second session.** The second meeting took place in the Institute of Anatomy at the University of Bern. In this part of the IPE module, the nursing students gained insight into the specificity of medical students’ education. All nursing and medical students were given study material in advance to prepare for the module. At the beginning, all students listened to



**Figure 1.**

In the Institute of Anatomy students examine samples under a microscope. Students first learn together how to use a light microscope by watching a video and by practical training. Medical and nursing students microscopically examine a sample of esophagus.

a short introduction to the anatomy of the gastrointestinal tract. Then, they split into two large mixed groups: one group visited the anatomical collection of the institute and the other group moved to the microscope room. After the first half of the session, the two groups swapped locations. In the two rotations, students received learning instruction with practical exercises to solve. At the end of the day, two selected groups presented their results in plenum.

In the anatomical collection, a tutor demonstrated the organs of the gastrointestinal tract, explained the macroscopic anatomy of the esophagus, stomach, small and large intestines, liver and pancreas, and discussed the function of these organs with the students. Then, students worked together in small groups to improve their knowledge of the anatomy of the alimentary tract by answering questions on the topic.

The other students worked in small groups in the microscope room. Initially, the tutor gave a brief introduction on how to use a light microscope and provided theoretical information on the histology of the esophagus, demonstrating the different tissues forming the esophageal wall. Then, the medical students peer-taught the nursing students, helping them become familiar with the light microscope. They watched a video from the e-learning program “MorphoMed” (Herrmann and Woermann, 2013) and then practiced using the microscope (Fig. 1). Finally, they studied the microscopic anatomy of the esophagus, specified the tissue staining, analyzed the different tissues and layers of the organ, drew the study object and discussed the results. In this setting, the nursing students learned from the medical students, and they all learned more about each other.

## Second-Year Module

The main topics of this IPE module were talking to a (simulated) patient and investigating the anatomy of one’s own body by ultrasound.

**First session.** On the first day, the students met in the Bern Centre for Higher Education in Nursing. As in the first-

year module, prior to the start of skills training, all students wore nurses’ uniforms. Then, students were given a brief introduction to the aims of the IPE and about communication training with a simulated patient. Afterward, medical and nursing students exchanged their first experiences in a doctor’s office or in a hospital. The informality of exchange of views helped them to know about each other.

For the practical part of the communication training, the students worked together in groups of about ten. At the beginning, the individual groups discussed the patient problem to be solved in the presence of a tutor. Their instructions were to conduct a conversation with a patient suffering from anorexia about her situation on the basis of ethical principles that they have learned. First, the students discussed the problem, analyzed the potential conflicts in the discussion with the patient, and worked out a strategy for the simulated patient encounter. Then, the communication training with a simulated patient was recorded. Using video feedback, the roles of trainee nurses and physicians were analyzed and discussed.

**Second session.** The students met in the preparation room of the Institute of Anatomy. At the beginning of the meeting, the students received a short introduction to the activity and listened to a short lecture on the technique of ultrasound. For their practical laboratory experience, the students formed mixed groups and circulated through a three-station circuit: at first station, sonography of the abdomen was taken; at second station, demonstration of the anatomy of the abdomen was carried out; at third station, procedure for the insertion of stomach tube, anatomy, and practice on a model were done.

In preparation for the second day of the IPE, medical students were trained beforehand in how to use an ultrasonic device. Parallel to this training, medical students learned about the anatomy of the gastrointestinal tract in the dissection course, listened to lectures on the topic, and discussed the issue in PBL tutorials.

During the IPE session, at the first station, students investigated the organs of the abdomen, including liver, kidneys, and spleen, and major vessels such as the aorta abdominalis and vena cava inferior by ultrasonically scanning each other. Thus, nursing students learned to use the ultrasonic device from the medical students, and all students learned the ultrasonic anatomy of the abdomen together (Fig. 2). At the second station, the students studied the 3-D anatomy of the abdomen, including the topographical anatomy of its organs, and were encouraged to compare this with their ultrasound session, which showed a dynamic anatomy of the same organs. The anatomy of abdomen was demonstrated by a tutor and supplemented with “MorphoMed”, the e-learning program developed at the University of Bern (Herrmann and Woermann, 2013). At the third station, the students answered diverse questions concerning the anatomy associated with the insertion of a gastric tube. First, they tried to insert a tube on a model. Here, students learned from each other by peer teaching based on previous experience. Medical students knew the anatomy of the oral and nasal cavity better, but the nursing students had practical knowledge about the technique of introducing a stomach tube and were already trained in this skill. At the end of the day, students presented their results in plenum.

## Evaluation of the Two IPE Settings

Sixty students, 15 medical students and 15 nursing students in each of two study years, participated in the pilot project.





**Figure 2.**

Second year students teach each other to use an ultrasound device and investigate other students' abdominal anatomy by ultrasound.

Before and after the IPE session, the students received the evaluation questionnaire. Overall, 48 students returned the questionnaire, 26 of the first-year students, and 22 of the second-year students. Analysis of responses to the questionnaire showed that the majority of medical and nursing students were positive about the benefits of shared learning. They rated positively loaded items with a high score (6 or 5) and negatively loaded items with a low score (1 or 2) both before and after the IPE (Table 1). While the difference between pre- and postexperience responses within the groups was not significant, responses to some items differed significantly between the groups (Table 1). Item 1 showed that the nursing students were more skeptical before shared learning. The nursing students' mean score ( $5.19 \pm 0.57$ ) was significantly lower than the medical students' mean score ( $5.63 \pm 0.49$ ) before IPE ( $P < 0.008$ ). After two sessions of shared learning, the mean scores of both groups were closer (MD:  $5.58 \pm 0.50$ ; nursing:  $5.46 \pm 0.64$ ). In addition, significant differences in postexperience responses to items 11, 13, and 14 were found (Table 1); because of high SDs, though, the results should be interpreted with caution. The mean scores on item 15 before IPE (MD:  $3.83 \pm 1.46$ ; nursing:  $3.27 \pm 1.00$ ) and after IPE (MD:  $4.58 \pm 0.78$ ; nursing:  $3.00 \pm 0.96$ ) were low and differ significantly ( $P < 0.0001$ ). Generally speaking after IPE, medical students considered that they had more knowledge and skills to acquire in the course of their studies, while nursing students felt the converse. Numerous students' oral and written feedback showed that IPE provides valuable experience for their future profession, provides insight into the education of other health professions, contributes to the development of a mutual understanding for other professionals and is a lot of fun.

## DISCUSSION

In Switzerland, the education of future physicians and members of other health professions occurs in different educational institutions. Such a monoprofessional approach to health profession education is insufficient in supporting effective

collaboration later on (Reeves et al., 2012). During their education, students in different institutions usually have no contact with each other and the assimilation of professional identity occurs in their own environment, much like profession-specific knowledge, skills, and culture. Monoprofessional curricula provide no room for learning and understanding each other's roles and practicing collaboration and teamwork, thus further supporting undervaluing and misunderstanding each other (Barnsteiner et al., 2007).

The IPE project was started, because it was hypothesized that integrating medical and nursing students at the beginning of their training would help students to understand the importance of their future interprofessional collaboration. Physicians and nurses work together in the daily care of patients, and knowing, understanding, and accepting the competences of another health profession is the basis of good interprofessional teamwork. This is important because misunderstanding or abuse of power (McNair, 2005) can impair patient outcomes and in the worst case can lead to the death of patients (Kennedy, 2001).

IPE is an accepted method that can contribute to abolishing prejudice and to changing attitudes toward other health professions in order to build functioning interprofessional teams in clinical practice (McPherson et al., 2001; Barnsteiner et al., 2007; Thistlethwaite, 2012, Thistlethwaite and Dallest, 2014). The shared learning of anatomy is a promising IPE setting for the two groups of students because both groups require profound knowledge of human anatomy and its role in the pathogenesis of disease (Hamilton et al. 2008).

Students' reactions to this interprofessional learning experience were in general positive. They came to the IPE event with high expectations and their expectations were fulfilled. During the collaborative training, there was a harmonious atmosphere of mutual respect and appreciation. Students approached each other without bias and learned more about, from and with each other. The responses to the questionnaire and the additional written comments as well as the student's oral feedback were generally positive. Most of the students agreed that shared learning would help them in future teamwork with other health professionals. The feedback indicated that the two groups knew more about the other profession and had obtained valuable insight into the education and field of work of the others. In particular, the medical students were surprised at the practice-oriented education of nurses and at the practical skills and competences of nursing students at this early level of training. The responses to the majority of items did not change following shared learning. Significant differences were found in four items. Because of the small sample and the large SDs, the interpretation of these differences is difficult.

In the IPE settings described here, medical and nursing students alternate between acting as peer-tutors and as tutees. Peer teaching is a frequently and successfully used instruction method in health profession education, including in anatomy courses for undergraduates (Youdas et al., 2008). It is a useful method that offers myriad opportunities to practice effective communication, increase knowledge, and gain experience in teaching (Evans and Cuffe, 2009; Naeger et al., 2013). Teaching is an important skill for future health professionals in their daily work, but opportunities to learn this skill are generally rare in undergraduate training (Naeger et al., 2013). In an interprofessional setting, peer teaching can additionally serve to practice an appropriate and constructive dialog with members of the other profession (Shields

**Table 1.**

Item Mean Scores ( $\pm$ SD) from Pre- and Post-Experience Questionnaire for Medical (MD) and Nursing Students

Items	Pre-Experience		Post-Experience	
	MD Mean ( $\pm$ SD)	Nursing Mean ( $\pm$ SD)	MD Mean ( $\pm$ SD)	Nursing Mean ( $\pm$ SD)
1. Learning with other students will help me become a more effective member of a health care team. <sup>a</sup>	<b>5.63 (<math>\pm</math>0.49)</b>	<b>5.19 (<math>\pm</math>0.57)</b>	5.58 ( $\pm$ 0.50)	5.46 ( $\pm$ 0.64)
2. Patients would ultimately benefit if health care students worked together to solve patient problems.	5.83 ( $\pm$ 0.38)	5.73 ( $\pm$ 0.45)	5.92 ( $\pm$ 0.28)	5.73 ( $\pm$ 0.45)
3. Learning among health care students before qualification would improve working relationships after qualification.	5.29 ( $\pm$ 0.62)	5.19 ( $\pm$ 0.80)	5.58 ( $\pm$ 0.65)	5.35 ( $\pm$ 0.56)
4. Communication skills should be learned with other health care students.	5.33 ( $\pm$ 0.56)	5.23 ( $\pm$ 0.65)	5.33 ( $\pm$ 0.81)	5.38 ( $\pm$ 0.64)
5. Shared learning will help me to think positively about other professionals	5.29 ( $\pm$ 0.86)	5.00 ( $\pm$ 0.80)	5.38 ( $\pm$ 0.65)	5.42 ( $\pm$ 0.64)
6. For small group learning to work, students need to trust and respect each other	5.58 ( $\pm$ 0.58)	5.58 ( $\pm$ 0.64)	5.58 ( $\pm$ 0.58)	5.80 ( $\pm$ 0.41)
7. Team-working skills are essential for all health care students to learn	5.79 ( $\pm$ 0.41)	5.77 ( $\pm$ 0.43)	5.79 ( $\pm$ 0.41)	5.81 ( $\pm$ 0.40)
8. Shared learning will help me understand my own limitations.	4.83 ( $\pm$ 0.70)	4.72 ( $\pm$ 0.74)	5.13 ( $\pm$ 0.74)	5.04 ( $\pm$ 0.73)
9. I am not wasting my time when I learn with other health care students.	2.33 ( $\pm$ 0.56)	2.35 ( $\pm$ 0.74)	2.13 ( $\pm$ 0.90)	2.12 ( $\pm$ 0.59)
10. It is not necessary for undergraduate health care students to learn together	2.50 ( $\pm$ 0.83)	2.31 ( $\pm$ 0.84)	2.29 ( $\pm$ 0.86)	2.28 ( $\pm$ 0.46)
11. Shared learning with other health care students will help me to communicate better with patients and other professionals <sup>b</sup>	<b>5.38 (<math>\pm</math>0.58)</b>	<b>4.92 (<math>\pm</math>0.69)</b>	5.29 ( $\pm$ 0.55)	4.96 ( $\pm$ 0.108)
12. I would welcome the opportunity to work on small-group projects with other health care students	4.92 ( $\pm$ 0.58)	5.12 ( $\pm$ 0.59)	5.00 ( $\pm$ 0.66)	5.31 ( $\pm$ 0.55)
13. Shared learning before qualification will help me become a better team worker <sup>c</sup>	5.25 ( $\pm$ 0.73)	4.77 ( $\pm$ 0.95)	<b>5.50 (<math>\pm</math>0.59)</b>	<b>4.92 (<math>\pm</math>0.98)</b>
14. I am not sure what my professional role will be. <sup>d</sup>	3.54 ( $\pm$ 0.97)	3.23 ( $\pm$ 1.34)	<b>3.42 (<math>\pm</math>0.93)</b>	<b>2.35 (<math>\pm</math>0.69)</b>
15. I have to acquire much more knowledge and skills than other health care students. <sup>e</sup>	<b>3.83 (<math>\pm</math>1.46)</b>	<b>3.27 (<math>\pm</math>1.00)</b>	<b>4.58 (<math>\pm</math>0.78)</b>	<b>3.00 (<math>\pm</math>0.96)</b>

Note: All responses were recorded on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). Statistically significant values are in boldface.

<sup>a</sup>The difference in pre-experience mean scores between MD and Nursing students is significant (U = 192; P < 0.008)

<sup>b</sup>The difference in pre-experience mean scores between MD and Nursing students is significant (U = 203.5; P < 0.019)

<sup>c</sup>The difference in post-experience mean scores between MD and Nursing students is significant (U = 202.5; P < 0.02)

<sup>d</sup>The difference in post-experience mean scores between MD and Nursing students is significant (U = 119; P < 0.0001)

<sup>e</sup>The difference in pre- and post-experience mean scores between MD and Nursing students is significant (U < 203; P < 0.03; U = 70; P < 0.0001)

et al., 2015) and to receive feedback from peers (Hamilton et al., 2008).

The question for feedback was as follows: When is the best point in the curriculum to introduce IPE? Based on the feedback reports, it was observed that some think it is better to begin early in training, while others suggest that postgrad-

uate IPE is more effective because participants have a stable understanding of their own professional identity and role (Reeves et al., 2012).

Early interaction of future physicians and nurses may positively influence them toward collaboration in the care of patients. Younger people have open minds and are still open

to new experiences and relationships. Learning together at this early point in training facilitates the development of an atmosphere of mutual respect and appreciation and can help to better understand the competency and role of the other health care professions (Barnsteiner et al., 2007) as well as prevent the formation of negative interprofessional attitudes, which may impede future interprofessional collaboration. Students' readiness for IPE is high at the beginning of training but declines significantly over time (Coster et al., 2008; Reeves et al., 2012).

Hamilton et al. (2008) formulate the following three essential factors that are important for successful implementation of IPE:

1. Teams of faculty from the participating health care professional schools should be engaged in IPE,
2. There should be space and time in the curricular programs,
3. Formal and informal interaction between disciplines.

The experience from this pilot project confirmed the importance of these factors.

For successful project implementation and maintenance, one needs a solid interprofessional network, permanent staff with enthusiasm for IPE and also the support of decision makers (Ho et al., 2008). In the planning of IPE, all institutions involved should contribute to the project. The main obstacles when planning an IPE setting are curricular differences and dissimilar schedules. Therefore, placements and dates should be planned with diligence and timeliness. When the project is being planned, little or no attention is often paid to the informal interaction of students. Informal communication can nurture positive group dynamics and can help to overcome prejudice (Freeth et al., 2005; Barr, 2009; Reeves et al., 2012). Planning such informal interactions at the beginning of IPE sessions has a positive influence on the collaborative activities and fosters the social learning process of the participants (Stössel et al., 2006).

## Limitations

A major limitation in evaluation of the pilot project was the small number of participants, which only allowed descriptive statistics. Another limitation could well be self-selection bias. Students chose to take the course voluntarily because they were interested in the approach. This self-selection can lead to a biased sample with nonprobability sampling. Further studies with more representative samples should be conducted to investigate the change in student's attitudes to IPE in depth.

## CONCLUSIONS

In conclusion, IPE teaching modules combining anatomy and nursing topics provided an optimal setting for collaborative learning and were a good way to spread knowledge about the role of other health professionals and to develop mutual understanding of the other health profession. Students of different health care professions were given the opportunity to recognize the importance of IPE for their future working life at the beginning of training. Their positive attitudes to IPE should be preserved and consolidated by continuous IPE training during their entire undergraduate education. The experience with this IPE setting showed that anatomy is an

excellent topic for IPE because its importance is key to many health care professions. Unfortunately, there is little research on IPE's long-term impact. However, training institutions and faculties should be encouraged to integrate IPE into their curricula so that more research can be done as to its effect on the cooperation of health care professionals and, ultimately, the improvement of health care.

## NOTES ON CONTRIBUTORS

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