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▲ Transdisciplinary Assignments in Graduate Health Education as a Model for Future Collaboration

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Transdisciplinary health care continues to be at the forefront of patient treatment in the medical arena, in part due to escalating health care costs, an increasing aging population, and the development of multiple chronic diseases. Gaining the knowledge, experience, and principles associated with transdisciplinary teamwork to successfully prepare for modern-day practice is therefore essential for individuals of various health care professions. This report describes an assignment developed and implemented to facilitate professional interaction between graduate physical therapy, nutrition, and nursing students. The objectives of this assignment were to determine through student evaluation the effects of a transdisciplinary experience on students' understanding of the role of another discipline and students' communication skills across disciplines. When evaluating the assignment, students most often remarked that they developed a greater understanding of the roles of the included disciplines and reported a significant increase in communication skills. However, some students did not concur that this assignment was effective due to the scheduling conflicts and lack of teamwork that can occur during a collaborative project. The students' reports of their experiences in completing the assignment provide valuable insights for implementing and/or updating a preparatory transdisciplinary education component in other settings. Additional research can focus on the challenges faced by the majority of the students venturing into actual health care or "real-world" settings for comparative studies. *J Allied Health* 2007; 36:67-71.

TODAY'S MULTIFACETED and growing health care system challenges professionals to develop a wide collection of essential skills to practice proficiently and effectively.¹ Health professionals must keep pace with shifting patient diversity, expectations accompanying changes in health

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care structure, emerging practice requirements, advanced technology, and health care quality improvement.² Health care, once centered on care from a single discipline consisting primarily of a physician, has slowly evolved into a transdisciplinary practice in part due to escalating health care costs, an increasing aging population, and the development of multiple chronic diseases.^{3,4} These current challenges are so complex that no single discipline can offer effective solutions alone.⁴ To date, transdisciplinary health care continues to be at the forefront of patient treatment in the medical arena. Results include improved cost-effectiveness and increased patient satisfaction in addition to enhanced coordination of services, medical treatment outcomes, palliative care outcomes, and quality of life for older adults receiving medical attention.⁵⁻⁸ Gaining the knowledge, experience, and principles associated with transdisciplinary teamwork to successfully prepare for modern-day practice is therefore essential for individuals of various health care professions.

Numerous references in the health care literature indicate that the most critical time for a health practitioner to receive transdisciplinary experience is during his or her educational period.^{3,4,9} In recent years, medical education programs primarily focused their curriculum to educate students in their individualized disciplines.³ In the 1970s, with the origin of interest in interdisciplinary practice, educational instruction began to integrate curricula allowing for students of health care professions to "work together" and be exposed to the concept of interdisciplinary practice.^{4,9}

Sadly, today many programs still follow the older model, with courses being taught only by professionals in the particular field that is being studied. Others continue to enhance the development of transdisciplinary education by modifying curricula and courses and creating programs to allow students to develop an understanding of the responsibilities and background of other colleagues in the health professions as well as the significance of their specialty to the care of the patient.¹⁰ As a result of the incorporation of various transdisciplinary activities among student populations, several important outcomes have been identified. Students experience increased interaction with other disciplines comprising a health care team and develop an understanding of and respect for the significance of the other disciplines. Students also gain the enhancement of personal and professional relationships through improvement of communication skills, listening skills, and interpersonal

Case Study Scenario

K.S. is a 52-year-old man who is 3 days postop from an appendectomy. K.S. was admitted to the hospital with acute right lower quadrant pain and ruled-out appendicitis. During surgery, it was noted K.S.'s appendix had ruptured and he experienced a brief episode of hypotension. Homeostasis was immediately restored and he has been stable since that time. Yesterday, K.S.'s physician recorded in his progress note that K.S. had acute tubular necrosis (ATN). The doctor has referred for ambulation of ADLs.

Your initial assessment reveals that K.S.'s vital signs are 106/70, 88, 12, 100 8°F. His most recent laboratory data are sodium 144 mmol/L, potassium 4.8 mmol/L, chloride 100 mmol/L, blood urea nitrogen 84 mg/dL, glucose 106 mg/dL.

1. What is ATN?
2. What are the implications of K.S.'s diagnosis on medications?
3. K.S. has three potential causes for ATN. What are they?
4. K.S. calls you into his room and states, "My arm hurts where the IV is." What should you do?
5. Because K.S. is on chronic hemodialysis, what are his special nutritional needs?
6. Are these laboratory values and admission values normal? If not, what are the abnormalities? White blood cells 3.2, hemoglobin 8.1, hematocrit 24.3, platelets 333.
7. How will these findings affect your plan of care?
8. What medications would be appropriate for this patient and why?

FIGURE 1. Sample case study assessment.

development and have the opportunity to embrace and express other views. Students also have an improved recognition that each health profession has an area of expertise needed in effective patient health care.^{11,12}

A variety of approaches have been administered to incorporate the academic transdisciplinary education at the graduate and undergraduate level.¹³ A 10-year transdisciplinary educational program incorporated five disciplines from the University of New Mexico Health Science Center and utilized a problem-based learning model in a community-oriented format.¹⁴ At East Carolina University School of Medicine, a transdisciplinary health professional program combined the collaborative efforts of various health science schools at East Carolina University as well as community programs and health centers in the surrounding area. Teams of two or three students, involving a blend of disciplines, were required to review a patient's medical record, visit the patient at least once in the patient's home, and document their findings in a case study. The curriculum offered the students the opportunity to work collaboratively with health professionals in multiple disciplines in rural communities.¹⁵ As a result, 71% of the participants found the educational program to be effective in improving patient care skills.

To incorporate a preparatory transdisciplinary educational experience at the University of North Florida, an assignment was developed and implemented to facilitate professional interaction between graduate physical therapy, nutrition, and nursing students. The objectives of this assignment were to determine through student evaluation the effects of a transdisciplinary experience on students' understanding of the role of another discipline and students' communication skills across disciplines.¹⁶ This assignment was designed to prepare students for later, more

intensive transdisciplinary team work on additional case studies and actual patient care.

Description of the Preparatory Transdisciplinary Assignment

Several case scenarios were developed to incorporate physical therapy, nutrition, and nursing concerns. Figure 1 shows an example of one of the case scenarios used in the assignment. The scenarios were then distributed to six teams, each consisting of one or two physical therapy, nutrition, and nursing graduate students from the same university. The students were required to answer case scenario questions during two mandatory face-to-face meetings, which they were instructed to attend during the time allotted for completion of the assignment. Each scenario included a variety of questions, with each question containing relativity to one or more of the three disciplines.

The student(s) of each discipline acted as a transdisciplinary team member, contributing data and input with the goal of providing the most effective plan of care for the team's particular case patient. In addition, the students were required to provide discipline-specific information concerning patient impairments addressed, functional limitations addressed, the short-term and long-term goals for each discipline, and two evidence-based research articles supporting the plan of care for the particular discipline. Lastly, the students were asked to discuss the role of each discipline and identify the personal/professional knowledge that was gained from the collaboration project. Following the face-to-face meeting sessions, each team member was responsible for preparing a written paper presenting the information collected with supporting references.

1. Briefly list what skills or competencies you learned as a result of working with another discipline on the specific case study.

Teamwork; professional behavior and communication; specific treatments for each specialty; roles of the various disciplines; time management; coordinating opposing schedules; benefits for the patient of interdisciplinary team work; extract important information from documents; listen to other people's ideas; integrate findings and recommend treatment; good reminder that we are all here for the same reason.

2. Describe any difficulties you had in completing the assignment.

Organizing meeting times; difficulty getting in touch with other students; difficulty receiving all necessary information from all members of the group; understanding what was expected from each discipline; effective time management with the group; receiving open-ended responses; inaccuracy of other disciplines information; condensing each discipline's information.

3. What did you like best about this assignment:

Learning the roles of other disciplines; working with and meeting other students; seeing the viewpoints and approach methods of the different specialties; discussing the care of a patient with other disciplines; learning from other disciplines; the research, the criteria sheet was clearly explained; the overall experience; ability to show other students what advanced nurse practitioners do; learning new information.

4. What did you like least about the assignment?

Difficulty with meeting times; lack of face-to-face interaction; condensing the information; supplying other discipline's articles; individual papers; excessive journal articles; frustration that comes with trying to collaborate; miscommunication between group members; vague instructions; lack of teamwork; inconsistency of due dates among disciplines; lack of time.

5. Would you recommend using this type of assignment again? Why or why not?

Yes: it was a positive assignment for learning to collaborate with other students; it is a great learning experience; good way to learn how other disciplines interact to treat the patient, good preparation for team communication; it provides the "full picture" of patient care and real-life experience; it taught negotiation.

FIGURE 2. Student interdisciplinary survey results from 2004.

This assignment incorporated the physical therapy, nutrition, and nursing master's-degree programs for 2004 and 2005. Seventy master's-level students participated in the assignment: 25 in physical therapy (mean age, 27.5 years; six men and 19 women), 21 in nutrition/dietetics (mean age, 27 years; two men and 19 women), and 24 in nursing (mean age, 32 years; four men and 20 women). Upon completion of the assignment, the students completed a five-item survey regarding their experiences. Analysis of student answers was completed with identification of common themes.

Summary of Student Feedback

The survey results of both years are displayed in Figures 2 and 3. In 2004, follow-up questionnaires were returned from 35 master's-level students: 11 in physical therapy, 10 in nutrition, and 14 in nursing. In 2005, follow-up questionnaires were returned from 35 master's-level students: 10 in nursing, 11 in nutrition, and 14 in physical therapy. When evaluating the project, students most often cited that they developed a greater understanding of the roles of the included disciplines: "I gained a clearer view of the role of

physical therapy and nursing," "I learned how important the nutritional and nursing aspects are since they significantly influence the physical therapy treatment plan," "I enjoyed learning the scope of practice as well as the role of each discipline," "It was interesting to see the different points of view from the various disciplines," "I was especially happy to work with a nutrition student, because up until this point, I have not experienced any collaborative contact with a nutritionist in regard to a patient's health," and "I learned that nutrition entails a lot more than I realized."

Students also reported a significant increase in communication skills: "Communication was a large part of this project," "This project enhanced my intercollaborative communication skills," "I learned how to communicate and merge different information," "I learned how to communicate important information with multiple disciplines," and "I learned how difficult communication can be among various members of a group as well as ways to overcome that obstacle."

Students reported relating the new information received from various team members and from new research to their specific patient: "I learned a lot about nutrition intervention as well as medications and interactions," "I learned

1. Briefly list what skills or competencies you learned as a result of working with another discipline on the specific case study.

Learning about other specialties; teamwork with other professions; diplomacy; time scheduling and management; how the various disciplines overlap; I was able to look at the case from a different perspective; communication and listening skills; difficulties in teamwork; patience; professionalism; researching skills; professional speaking skills; learning other approaches to a disease; determining how to address the other disciplines prior to meeting with them.

2. Describe any difficulties you had in completing the assignment.

Getting together as a group; it was a difficult semester to have this project; lack of group preparation; writing multiple papers instead of just one for the entire group; lack of organization among team members; getting in contact with the various group members; the lack of directions/instructions for the assignment.

3. What did you like best about this assignment?

Learning about other disciplines; reading the assessments from other team members; the overall experience; meeting new people; proving information to other disciplines; getting the perspective of multiple disciplines; learning about renal insufficiency; being in the interdisciplinary setting; learning the holistic approach to patient treatment.

4. What did you like least about this assignment?

Difficulty arranging meeting times; vague criteria and instructions; lack of communication among group members; lack of organization; the extra campus time; irresponsibility of other group members; not having the time to learn how the other disciplines approach the patient problem.

5. Would you recommend this type of assignment again? Why or why not?

Yes: it was a good project for students to learn about other disciplines; it's a good teamwork experience; good project for students to learn other aspects of the patient care process; students need to learn the importance of the roles of other disciplines.

Maybe: with better instruction; if all team members are willing to participate; would be better on-line due to scheduling difficulties.

FIGURE 3. Student interdisciplinary survey results from 2005.

how to relate other information provided by other disciplines and apply it to physical therapy," "I learned how to extract important information from documents created by other health care professionals," "I learned the proper dietary intake and medications for a patient with renal failure," and "This project enhanced my research skills."

Almost all students stated they would recommend this project be assigned again. However, some students did not concur that this assignment was effective due to the scheduling conflicts and lack of teamwork that can occur during a collaborative project. For example, "The goal of learning about other disciplines cannot be achieved in just one or two visits," "It is too difficult to coordinate meeting times between the various schedules," "There are too many other things going on," "I did not have a positive experience because I feel that my discipline did all of the work," and "It gave me a negative attitude toward the other disciplines."

Benefits and Outcomes

Three broad outcomes were identified that support the value of transdisciplinary assignments in facilitating skills and attitudes useful to students after graduation. First, clearly the

data in Figures 2 and 3, based on the nursing, nutrition, and physical therapy students' survey responses, are not only conclusive in supporting a transdisciplinary assignment, but they also reflect the results of the pilot study¹⁶ reported by the initial two participating disciplines: nutrition and physical therapy. Second, the students' reports of their experiences in completing the assignment provide valuable insights for implementing and/or updating a preparatory transdisciplinary education component in other settings. Third, additional research can focus on the challenges faced by the majority of the students venturing into actual health care or "real-world" settings for comparative studies.

With the inclusion of the nursing discipline along with the physical therapy and nutrition disciplines, the appreciation of other disciplines and practice in working cooperatively with them was reported as successfully achieved by the participants. Students' understanding of the role of the other disciplines was increased, with students reporting they enjoyed "learning from the other disciplines" and "getting the perspective of multiple disciplines." An increase in the ability to work together with other disciplines relating to patient care was the second objective achieved, as both "teamwork" and "learning other approaches to a disease"

were listed as benefits derived from the assignment. Additionally, growth was reported by the students in negotiation skills. Increased student communication skills across disciplines was a major competency resulting from the assignment, specifically reported from the students' experiences of "discussing the care of a patient with other disciplines" and at the conclusion of the assignment "condensing each discipline's information."

Positive survey responses demonstrated that the objectives of the assignment were met, and challenges faced and facets of the assignment that students disliked could be classified into common themes often observed in the real world of transdisciplinary patient care: time and group dynamics. Timing constraints were reported in terms of scheduling difficulties, such as "lack of time," "extra campus time" required, and minimal "face-to-face interaction" with group members.

Implications for Research Related to the Transdisciplinary Assignment Project

The challenges in group dynamics present an opportunity for future research. Certainly the basic group issues the students reported, such as "frustration that comes with trying to collaborate," "lack of teamwork," and "inaccuracy of other disciplines' information," may be found in any professional transdisciplinary setting.^{3,9,15,16} The means of overcoming these problems may be effectively addressed in the education curricula as part of the overall preparation for future transdisciplinary teamwork. Future studies, quantitative and qualitative, may identify the experiences and effects of instructional activities designed to facilitate transdisciplinary health care.

Students' understanding of the role of the other disciplines grew along with an increased ability to work together with other disciplines relating to patient care. Frustrations faced by the students are consistent with real-world challenges of transdisciplinary patient care: time and group dynamics. Preparatory assignments such as this one lay the groundwork for more extensive transdisciplinary teamwork using real patients and for longer collaborative periods. Future research may focus on delineating the role of health care education in addressing identified barriers in practice.

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