Use of Interdisciplinary Simulation to Understand Perceptions of Team Members' Roles

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The aim of this study was to examine the effectiveness of an interdisciplinary approach to learning in helping care providers understand their overlapping roles in the clinical management of asthma. In addition, the perceived usefulness of an interdisciplinary approach for students in the health-care disciplines of nursing, medicine, pharmacy, and respiratory therapy to learn about the clinical management of asthma was explored. The diffusion of innovation framework [Rogers (1995), *Diffusions of Innovations* (5th ed.). New York: Free Press] was used to guide the process of development of CD-ROMs. An interpretative approach was selected for this research because of the emphasis on how a phenomenon is perceived and how meaning is constructed in situations. This approach assumes that multiple ways of interpreting experiences are available through interaction. A convenience sample of health-care practitioners from two rural campuses was selected to participate in this study. The cohort of participants represented students from the population of a large midwestern moderate-sized university that has four geographically distinct campuses. Preliminary results indicate that the use of interdisciplinary learning helps clarify the roles of each discipline and that learning from one another is enhanced. (Index words: Interdisciplinary education; CD-ROM; Asthma; Rogers; Qualitative research) *J Prof Nurs* 21:159–166, 2005. © 2005 Elsevier Inc. All rights reserved.

Quite literally, two opposing disciplinarians can look at the same thing, and not see the same thing.. . .Petrie, 1976

THE CHANGING NATURE of health care today challenges us to evaluate our current preference for teaching health-care professions as distinct independent disciplines and to embrace a model of teaching in which discipline identities become more integrative, perhaps merged. Interdisciplinary education holds the promise of providing cost–effective, high-quality, and efficient health care; provides a way to address the fragmentation of health-care education; and could ultimately improve health care provided to clients (Lindeke & Block, 1998; Maranzo, 1991; Perkins, 1991). Identifying how health-care members' roles are similar and different creates an atmosphere that challenges each professional to analyze unique and overlapping roles.

Two interdisciplinary simulations were developed as teaching strategies to increase the ability of students from multiple disciplines to jointly problem solve an asthmatic client's case scenario. It was hoped that, through this process, the perception of the interdisciplinary nature of the students' role in the care of this client might be clarified. The simulations were designed for compact disk (CD) software. Expert Panel Review II guidelines for managing asthma were used to guide the development of the content of these simulations (National Asthma Education and Prevention Program [NAEPP], 2002; National Heart, Lung, and Blood Institute [NHLBI], 1997). Several vignettes in a variety of different settings were included on the CDs. Each vignette was followed by a question to be answered by the learners. Once an answer was selected, the CD was programmed to provide verbal and video feedback to the learners to help them understand the rationale for the answer. Before developing the final version of the CD-ROM, focus group discussions with students representing the various disciplines portrayed in the simulation were conducted. The focus group discussions were conducted to assist investigators in understanding students' perceptions of the impact of the social systems of the various health-care professions on interdisciplinary learning and the usefulness of the CD-ROM simulation for learning about their overlapping roles in the care of the asthmatic client.

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Interdisciplinary learning entails application of knowledge, principles, and/or values to several disciplines simultaneously (Jacobs, 1990). Galbraith (1991) proposed that the key to facilitating learning is to engage learners in a mutual democratic community by bringing people together in a technological environment. Lowry, Burns, Smith, and Jacobsen (2000) found that communication within an interdisciplinary team fostered respect for the unique contribution of each discipline.

The World Health Organization (1988, p. 2) defines interdisciplinary education in health sciences as:

> The process by which a group of students (or workers) from the health-related occupations with different educational backgrounds learn together during certain periods of their education, with interaction as an important goal, to collaborate in providing preventative, curative, rehabilitative and other health-related services.

Although health-care members interact with one another in the clinical setting, learning how to problem solve in a collaborative manner that has holistic care as a goal may best take place in a simulated environment. The acute nature of client care in a hospital setting is often a barrier to this type of learning. Simulations can provide an alternate teaching venue that allows students and practicing health-care team members to problem solve and identify ways to work together given a particular clinical situation.

Purpose and Aim

The purpose of this study was to examine the effectiveness of an interdisciplinary approach to learning in helping care providers understand their overlapping roles in the clinical management of asthma. Clinical simulations in the form of CDs were used for this purpose. The specific aim of this study was to analyze students' perception of the usefulness of an interdisciplinary approach to learning. Students in the health-care disciplines of nursing, medicine, respiratory therapy, and pharmacy were invited to participate in the study.

Themes identified from this qualitative and interpretive analysis of data obtained from audiotaped transcriptions of the focus group discussions are presented in this article. The aim of this analysis was to describe, interpret, and understand students' perceptions of the usefulness of shared learning experience.

Theoretical Framework

Diffusion is defined as the process by which an innovation such as an interdisciplinary simulation is communicated through channels over time among various health-care professions (Rogers, 1995) (Figure 1). The diffusion theory contains the following four elements that are present in the diffusion of innovation process: (a) innovation, which is identified as an idea, practice, or object that is perceived as new by an individual; (b) communication channels or strategies used to communicate the innovation; (c) time for the innovation decision process; and (d) social system or set of interrelated individuals who are engaged in joint problem solving to accomplish a common goal (Rogers). The last element of this framework, social system, was used to structure the interdisciplinary focus group discussions and is composed of four structures. These structures include (a) the degree of homophily (similarities) or heterophily (differences); (b) norms/values/culture; (c) professional orientation; and (d) hierarchy.

HOMOPHILY

A certain degree of homophily or similarities between group members' interests is important for effective communication. A certain amount of heterophily is also encouraged for multiple perspectives to be gained. Each of the disciplines has a focus for their plan of care. Norms, values, and cultures as well as professional orientation need to be assessed. The degree of homophily and heterophily of the medical hierarchy needs to be examined when multiple health-care disciplines are represented (Rogers, 1995).

NORMS, VALUES, AND CULTURES

Values are principles or standards that provide a sense of direction and meaning (Chitty, 2001). The culture of a group consists of influencing factors such as attitudes, beliefs, and behaviors of group members (Chitty). Stern (1998) identified through content analysis that values of honesty, accountability, compassion, the importance of public health, and self-policing were included in the curriculum for medical students. Nurses have identified honesty, accountability, caring, collaboration, integrity, and promotion of health and others to describe their professional values (Uustal, 1985). Values for respiratory therapists and pharmacists are similar in that they are accountable for managing the respiratory and
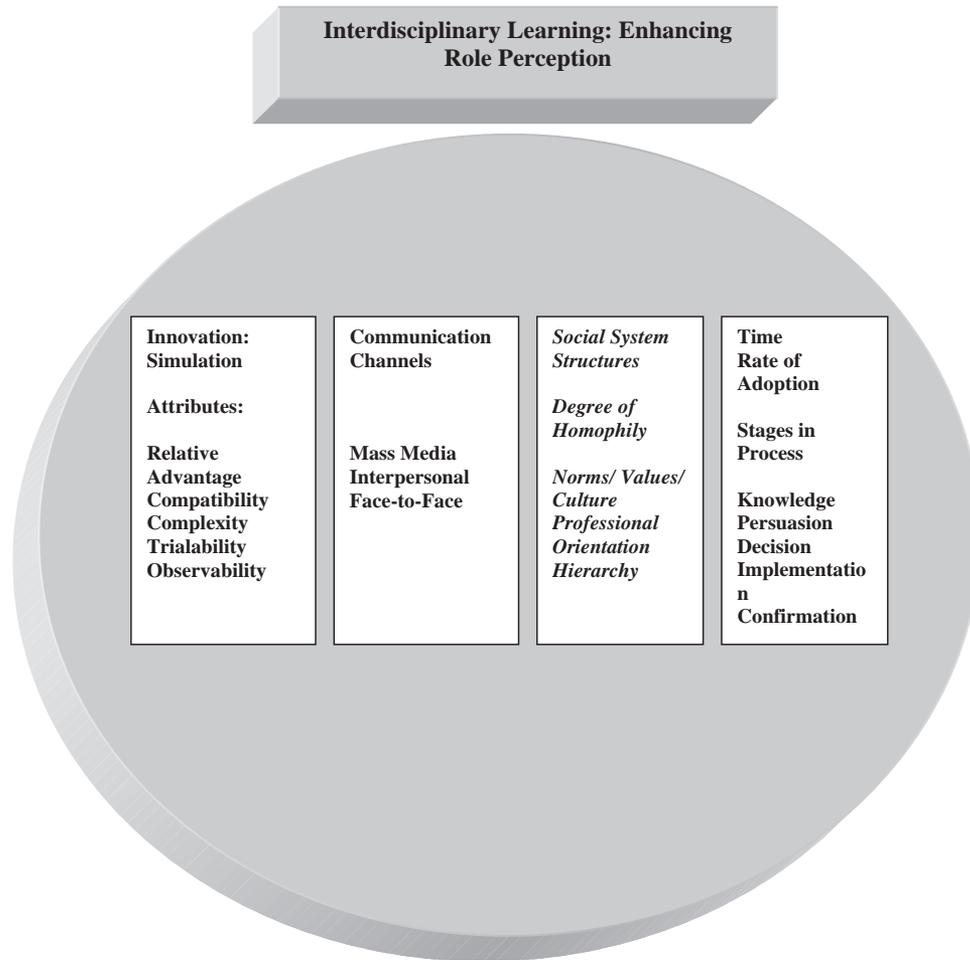
Interdisciplinary Learning: Enhancing Role Perception

Innovation: Simulation	Communication Channels	Social System Structures	Time Rate of Adoption
Attributes:		Degree of Homophily	Stages in Process
Relative Advantage Compatibility Complexity Trialability Observability	Mass Media Interpersonal Face-to-Face	Norms/ Values/ Culture Professional Orientation Hierarchy	Knowledge Persuasion Decision Implementation Confirmation

Figure 1. Diffusion of innovation model (Rogers, 1995). Social system structures that may influence interdisciplinary learning.

pharmacological aspects of care and add to health-care teams' goal of improved patient outcomes and health. Interdisciplinary education affords practitioners an opportunity to gain insight into the roles, professional cultures, and norms that guide a profession. In addition, this understanding can promote respect for each other (Singleton & Hernandez, 1998).

PROFESSIONAL ORIENTATION

If one reviews the definitions of *professional* and *orientation* according to Webster's New Collegiate Dictionary (1998), professional orientation can be defined as a direction of thought, inclination, or interest that is characteristic of a profession. Currently, health-care providers focus on quality of care, access to care, and cost of care (Neale, 1999). Because the professional orientations of health-care providers are similar, collaboration is a way to bring the skills,

expertise, and talents of all health-care team members together so that the best health outcomes, quality of life, and cost–effective care can be provided. Barriers to collaboration include reimbursement, territorialism, and role confusion (Katzman & Roberts, 1988). Role ambiguity and role expectations were also identified as deterrents to collaboration in a study that compared medical and nursing students' attitudes toward physician–nurse alliances (Hojat et al., 1997).

HIERARCHY

Jacox (1993) identified that physicians have been the dominant and most successful participants in the provision of health care. Although physician education espouses teamwork and collaboration, the emphasis on autonomy and authority continues (Kalish & Kalish, 1977).

In the past, nurses have deferred decisions to physicians and communicated with them in a rather

passive way (Stein, 1967; Zelek & Phillips, 2003). However, the sociopolitical climate of health care is changing, and value is placed on the provision of cost–effective quality of care. The increasing number of women moving into the profession of medicine may be contributing to the change in communication among these groups (Stein, Watts, & Howell, 1990; Zelek & Phillips). Although there may be similar interrelationships among physicians and respiratory therapists and pharmacists, there is more in the literature about the nurse–physician relationship. One way to enhance communication, improve relationships among disciplines, and develop mutual respect for the contribution that each discipline brings is to encourage learning in an interdisciplinary group.

Methods

The cohort of participants represented students from the population of a large midwestern moderate-sized university that has four campuses. Although the campuses are geographically distinct, the students on all four campuses were exposed to students in all of the disciplines described in this study. An interpretative approach was selected for this research because of its emphasis on how a phenomenon is perceived and how meaning is constructed in situations. This approach assumes that multiple ways of interpreting experiences are available through interaction.

Sample

After obtaining institutional review board approval, a convenience sample of health-care practitioner students from two rural campuses was selected to participate in this study. The group consisted of 26 participants, with 70% ($n = 19$) between the ages of 19 and 43 years. All participants were currently enrolled in classes in their discipline. Forty-six percent ($n = 12$) were enrolled in nursing, 23% ($n = 6$) in medicine, 4% ($n = 1$) in respiratory therapy training, and 27% ($n = 7$) in pharmacy. Sixty-two percent ($n = 16$) of the participants were women and 38% ($n = 10$) were men.

Thirteen participants had prior assigned readings and clinical experience taking care of clients with asthma. Eight participants had previous experience using CDs as part of their learning experience. These experiences were within their own discipline. Specific types of simulations identified were skills lab and objective structured clinical examinations. Interestingly, but not surprisingly, only 11 students had experienced interdisciplinary learning in courses, classes, or seminars.

Data Collection Procedures

Researchers in each campus distributed an invitation letter/flyer explaining the purpose, benefits, and risks of the study to potential participants. Potential participants were asked to call the researchers if they were interested in participating in the study. Once researchers were called, students were informed of the study and provided with information regarding the meeting place to participate in the focus group discussions. Informed consent was obtained by the researchers at the focus group meetings, before presentation/discussion of the simulation. Kreuger and Casey (2000) recommend 4–6 participants for each focus group. This guideline was used on one campus; however, there were more volunteers than anticipated from the second campus, so 9–11 participants were included in the focus groups.

The original intent was to have students from all disciplines (i.e., nursing, medicine, advanced nursing practice, pharmacy, and respiratory therapy) involved in each focus group. Because of the students' school schedules, the investigators were unable to meet this goal. As an alternative, a decision was made to conduct three focus group sessions that had participants from at least three of the five disciplines. Participants in one of the focus groups included three medical students, three undergraduate nursing students, and three nurse practitioner students. In a more rural, smaller campus, six participants were recruited—with three from nursing and three from medicine. The third focus group consisted of one respiratory therapy student, seven pharmacy students, and three nurse practitioner students.

The focus group sessions were held in small classrooms in each of the campuses. Participants were seated in a circle to encourage interaction once they viewed the simulation. Once demographic information and informed consent were obtained, the participants were provided with a brief description about how the CD was produced and the purpose of the particular teaching/learning strategy used in the CD. All participants then viewed the CD in its entirety, answering the questions that they were prompted to answer throughout the simulation. Approximately 1 hr was needed to view the CD. There was some discussion among the participants as they viewed the simulation. Often, this consisted of

one discipline clarifying the rationale for their answer with another discipline, who answered questions posed in the simulation differently. After the simulation, a semistructured interview was conducted, and all participants were encouraged to contribute to the discussion as it related to their learning experience with the CD. This portion of the focus group session lasted approximately 30 minutes.

Methods of data collection for the focus groups included a semistructured interview and a demographic questionnaire. The questionnaire included information about educational background, age, sex, and past use of clinical simulations and CD-ROMs. The semistructured interview included questions such as "What are your first impressions about the interdisciplinary approach to learning used by the CD-ROM?" and "What was particularly frustrating about the use of clinical simulations for learning as presented by this CD-ROM?" Each focus group session lasted approximately 1.5 hours. Participants were provided lunch in return for their participation in the study. The focus group interviews were tape recorded, transcribed verbatim, and then reviewed by the researchers for accuracy. A nurse experienced in conducting focus group sessions served as a moderator. Another research nurse wrote down field notes during the group interviews to make the data more complete.

Data Analysis

Data were obtained from the demographic questionnaires, transcribed tapes of the focus group discussion, and notes taken during the interviews. Accuracy of the transcribed data was validated by the research nurses who listened to the tapes while reviewing the transcribed report and comparing the transcription with notes taken during the interviews. The data were then entered into Ethnograph (1998) and researchers evaluated the data line by line so that words or clusters of words could be identified and subsequently used to develop themes. Demographic data (Table 1) were analyzed using an SPSS software (Statistical Package for Social Sciences, 2003; SPSS, Chicago, IL).

The first method in establishing trustworthiness of data analysis was to establish credibility. Coded responses were reviewed by the participants for verification of their response and whether the themes that emerged from the data analysis seemed appropriate. Transferability, the second method to establish trustworthiness of data, was implemented by purpo-

TABLE 1. Characteristics of the Sample

Variable	Number
Discipline	
MD	6
RN	6
APRN	6
RT	1
PharmD	7
Previous experience with interdisciplinary learning	11
Previous experience with simulations	8

sive sampling, with the investigators continuing to add to the sample until saturation of the data occurred. This increased the amount of information obtained, thus making it more likely that the data could be transferred to other settings (Talbot, 1995). Students from multiple disciplines and multiple sites were asked to participate to maximize the information received. No new themes emerged during the second (and third) focus group session, so the authors felt that saturation of data had occurred. The third method in establishing trustworthiness of data was establishing dependability of the data or the ability to arrive at the same conclusions if the research were replicated with the same group in the same context. Confirmability or the degree to which the findings of the research can be shown to be the focus of inquiry was also used. An audit of the research was performed to meet both the dependability and confirmability aspects of trustworthiness (Lincoln & Guba, 1985) and was implemented by having another researcher who was not aware that the research was occurring and therefore not invested in the research review the data to determine if the findings were congruent with hers. An experienced qualitative researcher reviewed the data, findings, interpretations, and recommendations and agreed that the study findings were dependable and confirmable.

Findings

Results from this study were categorized into four themes that were representative of the social systems piece of the diffusion of innovation framework of Rogers (1995). These themes included (a) homophily; (b) norms, values, and cultures; (c) professional orientation; and (d) hierarchy.

Interdisciplinary education allows professionals to see their similarities (homophily) yet know their differences so that multiple perspectives about the care of patients can be appreciated. One participant summarized this notion after viewing the CD-ROM:

"I think interdisciplinary learning gives us—the standpoint of being able to look at the same case or same problems from a lot of different perspectives." Another participant felt that the connections made for her in seeing the different scenarios and the interaction between all members of the team were very helpful.

Several participants identified that the overlap of roles between physicians and nurse practitioners may be a challenge to interdisciplinary learning. "The differences are not necessarily as clear in terms of the physician or nurse practitioner standpoint, where you are evaluating and treating a particular problem. It's kind of the same. I mean you each have the same goals... so I'm not sure how you draw the line between that."

Norms, values, and cultures, the second theme identified, addresses each profession's own attitudes, behaviors, and principles. However, members need to work together as a team to promote health and provide quality care. This was exemplified in the following statement made by one of the medical students: "All of the different scenarios [help you] to see the different roles and how we interact." A nursing student identified that learning in an interdisciplinary way with the CD-ROM helped her to "understand what the roles are, because I don't even think about...the physician or nurse practitioner would order the peak flows and the nurse would be getting the peak flow." Similarly, a nurse practitioner identified, "I think [interdisciplinary learning] would increase respect for each other in all of our roles...It is good to see how we interact in our jobs."

Values, behaviors, and norms are learned as students progress through their programs of learning. One of the participants identified that once these are learned, changing them can be difficult. The CD-ROMs were developed using the Expert Panel Review II guidelines (NAEPP, 2002; NHLBI, 1997). One of the scenarios incorporates critical thinking and decision making regarding the care of a child in the emergency department with an acute asthma exacerbation. Medical students' response to the scenario exemplifies how crucial professional behaviors and norms can impact their role and the interdisciplinary team.

> If I was a med student it would be good to review the [EPR II Guidelines] again. I don't know—we are just kind of set in our ways already. I think you find that if you had four nurses with 50 years experience, and would ask them 'Was this valuable?', would this change their management of the patient, I would

think all four of them would say, 'no not really.' But—and the same thing with a family practice doctor that's been in practice for 20 years. But you get the same program [CD-ROM] with new students and it's going to be of much higher value, and it probably will change the way they manage patients.

Interdisciplinary learning can help students see what their role is in a particular situation and what role they play as a team member. Stated expressively by a nursing student, "You not only get exposed to what each individual's role is; it [the CD-ROM] puts things together because we are all out there together and trying to work with real situations."

The third theme, professional orientation, is represented by the thought and inclination or interest that is characteristic of a profession and is another aspect of the social system that one needs to examine when implementing a new program. As students progress through their respective health-care disciplines, they become oriented to their profession. Use of a clinical simulation that is interdisciplinary in nature can help reinforce professional orientation and can help reduce barriers to working together caused by role confusion and role ambiguity. One of the beginning students found it more difficult than the third-year students to relate to the learning situation in the CD-ROM. She identified that, "[we have been] working on family values and family time and all that kind of stuff so that's kind of what was in my head." This participant also identified that although learning in an interdisciplinary manner was helpful in clarifying the roles of team members, her background in nursing had not yet prepared her for this particular learning situation. She suggested that to make this type of learning experience more meaningful, students need to be at the same level of education when participating in interdisciplinary learning. Another participant identified that interdisciplinary learning would be most effective at an introductory level. A nurse practitioner specifically found that it was valuable to "see what someone else is looking at—to see the [care provided] in the different scenarios from different levels."

Hierarchy, the fourth theme identified, is recognized as the social order of health-care decisions/communication and has been discussed earlier in this article. This study revealed that although there is some hierarchy present, most participants identified that they felt that an interdisciplinary approach would help lessen the differences among professional teams and provide them with a sense of community. A

resident stated "what would be most appropriate is to use it kind of at that introductory point for most of the disciplines...to get you introduced to the idea that you're not focused to just your line of thinking but other people who are involved in the same scenario." Learning when and who to interact with was a benefit identified by another participant who said, "[The CD-ROM] broke down everybody's role. I think it kind of helped point out that—what you need to do, and what you need to report and refer." A nurse practitioner agreed, "I agree it gives you a better idea of the entire picture and what's going on and gives you better ideas of the process involved when you are out in the real world. It makes you think of the process and who to talk to."

Discussion

The use of an interdisciplinary approach can enrich students and health-care team members learning through exposure to a number of different perspectives (Gelmon, 1996). Students' involvement in an interdisciplinary approach to learning early in their program has been shown to have a more positive outcome on team functioning (Bassoff, 1983). Typically, team members work in a parallel nature, with the only route of direct interdisciplinary communication being through physicians (Clark, Spence, & Sheehan, 1996). Participants in this study identified that, rather than think about their role as one of unilateral practice, it was helpful to see how all of the practitioners worked together as an interdisciplinary team. Shared learning provided early in educational experience facilitates interdisciplinary collaboration, which is crucial to satisfactory patient outcomes (Horak, O'Leary, & Carlson, 1998). In addition, at least one participant felt that this type of learning should be introduced early in an educational program.

The use of the diffusion of innovation theory of Rogers (1995) was useful in identifying a way to categorize themes that represented the students' perceptions regarding the use of a CD-ROM simulation for learning in an interdisciplinary manner. Because of the nature of the differences between and among the professions included in this research, each of the social system structures found in this theory (Rogers) needs to be addressed when planning and implementing an interdisciplinary learning strategy.

Implications/Conclusions

The results of this study indicate that education provided in a CD-ROM format and presented in an interdisciplinary venue may help students clarify their role and gain perspectives on other health-care team members' roles. Further investigation to determine differences in perception based on students' level of study in their professional discipline is warranted. The findings also suggest that there could also be some benefit to introducing interdisciplinary learning to promote shared responsibility for patient care early in all health-care disciplines. However, research is needed to determine if shared responsibility actually occurs to a higher degree in the clinical setting as a result of interdisciplinary learning. Future studies to determine actual knowledge gained through the use of a CD-ROM are necessary. In addition, conducting follow-up studies to determine if current recommendations for practice are used to manage patients as a result of interdisciplinary learning is another avenue of research. Simulations may provide another way of learning that allows students as well as practicing health-care team members to problem solve and identify ways to work as an interdisciplinary team.

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