ABSTRACT
This article describes the process of using an interprofessional team project to address one of the most commonly occurring challenges in health care delivery—medication reconciliation. We describe the planning and execution of the process and the lessons learned from the experience. The intent of this article is to document the significance of each process and the importance of each member involved in the process, and to act as a guideline for institutions planning similar interprofessional team project experiences for students.

The Institute of Medicine (2003, 2010) has identified competencies required for successful nursing practice in the coming years. In parallel, a movement to define and encourage interprofessional education has been underway (Interprofessional Education Collaborative, 2011). In both cases, teamwork and communication are fundamental skills needed by nurses. The Institute of Medicine (2003, 2010) reports also identified the ability to execute quality and safety improvements as a critical nursing skill. To enhance the opportunities available to our students in these areas, we held a semester-long interprofessional team competition that is described in this article, including lessons learned.

Interprofessional team projects are not new to nursing. Indeed, many studies report the benefits of such educational activities (Dacey, Murphy, Anderson, & McCloskey, 2010; Roberts, Robinson, Steward, & Smith, 2009). However, those studies define interprofessional team as a collection of health care providers. In addition, the educational activities involved fictitious problems (Swanton & Varkey, 2008) or focused exclusively on care delivery (Erkel, Nivens, & Kennedy, 1995; Roberts et al., 2009). Rarely do studies include non-health care providers as team members or examine real-world activities. Notable exceptions to this are the studies by Atack, Parker, Rocchi, Maher, and Dryden (2009), who included police officers, and Dacey et al. (2010), in which students developed health promotion programs. We address these gaps in nursing education by broadening the scope of interprofessionalism and undertaking a real-world project. Specifically, teams of nursing, pharmacy, business, and industrial engineering students devised a medication reconciliation process (i.e., a process to avoid inconsistencies in medication administration across transitions of care in which patient medication profiles are reviewed at the time of admission, transfer, and discharge to assist with ensuring the patient is receiving the correct medications) for a critical-access hospital (CAH).

The competition was mutually beneficial. On the one hand, students brought fresh perspectives to the medication reconciliation problem, as many had little or no experience with it, nor were they hindered by any perceived institutional difficulties that often impede practicing health care professionals. On the other hand, students’ educational experiences were enriched, as many problems they will face in their future professional lives will be difficult to solve and will require collaboration across disciplines. Specifically, several skills that are directly linked to the competencies recommended by the Institute of Medicine...
(2003, 2010) and the Interprofessional Education Collaborative (2011) were addressed:

- Discipline-specific skills. Team members were expected to represent their disciplinary perspective as they designed their medication reconciliation systems. In doing so, they had the opportunity to hone their expertise, as they recognized how it applies to a multifaceted problem, while at the same time learning “with, from, and about other disciplines,” which is one of the principle tenants of interprofessional education (Bainbridge, Nasmith, Orchard, & Wood, 2010, p. 8).

- Critical-thinking skills. Students had to (a) understand the problem through discussions of medication reconciliation problems and issues specific to the CAHs with their leaders and health care professionals, the evidence base, and experience; (b) synthesize often contradictory information and perceptions about the problem; and (c) apply this synthesis to their system designs.

- Teamwork skills. The individuals had to incorporate their unique expertise and perspectives as they developed the best system possible. This effort required many teamwork behaviors, including mutual respect, coordinated activity, collective decision making, and flexibility.

- Communication skills. The students’ skills were honed as they communicated with (a) each other, which required bridging unique professional vocabularies and communicating virtually (i.e., via the Internet, telephone, text messaging), as the pharmacy students reside on a different campus; (b) the CAH providers to ensure a thorough understanding of medication reconciliation in that specific context; and (c) an audience, including judges and subject matter experts, when they presented their solutions.

**Planning Phase**

The competition was planned by an interprofessional organizing team, which consisted of a nurse and physician from the Rural and Community Health Institute at Texas A&M Health Science Center, and two faculty from Industrial Engineering at Texas A&M University. The organizing team engaged in planning the interprofessional project for approximately 8 months. We highlight the team’s primary activities in this article.

**Selecting a Problem**

The first challenge was to select a problem that requires interprofessional expertise, is interesting to the participants, and is useful to the CAHs where the projects would be completed. Medication reconciliation was selected, as it is a well-documented problem in health care delivery systems (Barnsteiner, 2005; Pippins et al., 2008; Pronovost et al., 2003). Moreover, it is a pervasive problem that is relatively easy to describe verbally and in print; however, it is a difficult problem to solve. From an expertise perspective, the problem requires practitioner involvement (nursing and pharmacy), systematic assessment (industrial engineering) and cost-benefit analyses (business) to devise a solution.

**Recruiting Faculty Advisors and Mentors**

Faculty from the participating disciplines were recruited to support the student teams throughout the competition. These individuals identified the students who would participate and interacted with their curriculum committees and program coordinators to determine how academic credit would be awarded. During the competition, faculty had two primary functions: (a) mentor to one team throughout the semester to provide continuity and (b) advise all teams to ensure that the teams’ solutions represented the respective disciplines.

**Determining the Competition Size**

The number of competing teams was another decision that had to be made. This type of education activity was new to Texas A&M; therefore, the organizing team elected to keep the number of competing teams small for this initial effort. Given that four disciplines would be involved, and one faculty member from each discipline would be recruited, the number of teams was limited to four (i.e., four students from each discipline; 16 students total). With this competition team size, faculty would advise one team throughout the semester and mentor one team each week.

**Identifying the Critical-Access Hospitals**

Four similarly sized CAHs within 60 miles of Texas A&M’s College Station campus were asked to be the competition sites. Management at all four CAHs expressed immediate enthusiasm and willingness to participate. This enthusiasm is extremely important for success, as the student teams need a positive learning environment that realizes the importance of the problem and an environment that is willing to work with the teams to develop a meaningful solution. Management at each CAH identified a principal point of contact for the team assigned to that facility. This individual was advised of the strict 15-week semester time frame available for project completion.

**Recruiting Students**

The faculty developed their own strategies to recruit students from their respective disciplines. The recruiting strategy ranged from asking students to write an essay describing why they wanted to participate in the competition and why they should be considered to simply approaching students and asking or inviting them to participate in the competition. Some programs have a rigid structure (e.g., pharmacy and nursing), where students are required to enroll in a predefined set of courses and have few elective opportunities. Therefore, the projects had to be incorporated into existing courses in a meaningful way. Other programs are more flexible. For example, the industrial engineering program allowed the participating students to receive credit for their capstone senior design project due to the interprofessional nature of the project and the application of design and analysis to the problem of medication reconciliation.

**Other Activities**

Several additional activities were required to ensure success. We garnered generous financial support from the Annenberg Foundation to fund prize monies (first place, $500 per team member, plus an estimate of the corresponding taxes; second place, $100 per team member, plus taxes), small faculty stipends to compensate for time spent recruiting and supporting the student teams, event meals, and travel expenses. Judges were so-
licit who could assess the project outcomes from a range of perspectives, such as administrative, care delivery, and systems engineering. The organizing team also established the rules and policies governing the competition, which they distributed to the students and faculty prior to the competition’s start.

**Execution Phase**

**Kick-Off Meeting**

A one and one-half day event was planned to kick off the competition in the week prior to the start of the students’ regular semester that included the students, organizing team members, faculty advisors, and mentors. Everyone assembled on a Thursday evening for a social event that included introductions, team building, refreshments, and an overview of the next day’s activities.

The following day was divided into two sessions. In the morning, the students were briefed about the purpose of the competition, the critical nature of medication reconciliation, the faculty interaction that would support their efforts, the grading rubric that would be used, and their hospital assignments. The teams were also advised of the deliverables required for the semester and the competition rules and regulations. The deliverables were a presentation for the mid-semester progress review, a final report for the hospital, a final presentation, and a poster. The competition rules were: (a) every team member must participate in generating the team’s entry, (b) the design must meet the needs of the hospital to which the team is assigned, (c) the design must be a feasible solution for CAHs with limited resources, (d) the teams cannot replicate any other system in its entirety as their entry into the competition, and (e) the teams may use information from published documents, best practices, or experts, as long as it is properly cited.

Next, a brief presentation was given to instruct the students about functioning effectively as a team. Following Kyle’s (1999) guidelines, the students were encouraged to (a) assign the role of project leader, designer, users’ representative, and administrator to each of the four team members and (b) develop an objective statement that documents the scope of their project and how they will assess their performance. Teams were encouraged to develop an inventory of the members’ skills and discuss them in accordance with the roles they were assigned and the tasks they had to complete.

During the day’s second session, the team members and faculty mentors traveled to their respective CAHs. The purpose of this initial visit was to allow the teams to meet with their principal point of contact, familiarize themselves with the hospital systems associated with medication reconciliation, and identify corresponding problems encountered by the facility’s clinicians and patients.

**Weekly Progress Meetings**

The teams attended two weekly meetings. The first was with their faculty mentor, where the team gave progress updates and discussed issues. The second was a meeting with subject-matter experts, including the faculty advisors, a nurse practitioner responsible for his or her hospital’s medication reconciliation, an expert in health policy and management, and a physician. The faculty advisors and nurse practitioner met with the teams twice during the semester (once before and once after the midterm review) on a rotating schedule; others met once.

**Midterm Review**

The midterm review was planned around the eighth week of classes. Each team made a 30-minute presentation to the organizing team describing the nature and extent of the medication reconciliation problem in their CAH, the strategies they used to model and solve the problem, preliminary results, and their plan for completing the remaining work, including a timeline. The pharmacy students joined in the presentations via Skype®. The other teams and the faculty mentors were not invited to these presentations to maintain the spirit of the competition. In other words, we wanted to ensure that each team was working on their solution independently without being influenced by novel techniques or ideas introduced by other teams. Moreover, the organizing team wanted to ensure that the team members, and not the faculty mentors, were driving the projects. Extensive feedback was provided, both orally at the end of the presentation and in writing, to the teams and their mentors.

**Final Presentations**

The final presentations were held during the week prior to final examinations. The pharmacy students travelled to Texas A&M’s College Station campus on the evening before the final presentation to allow the teams an opportunity to meet face to face. Attendees at the presentations included the judges, the CAH representatives, the faculty advisors and mentors, and the university administrators.

The teams arrived with a poster and were prepared to make a 30-minute presentation, followed by 10 to 15 minutes allotted for questions. The presentation order was determined by a random drawing. The primary judging criteria were an overall solution’s practicality, its applicability to the CAH to which the team was assigned, and generalizability to other facilities. The secondary criteria were the team’s demonstrated understanding of the issue being addressed; the team’s conveyed professionalism, including the presentation and the team’s appearance; and the preparation of a professional poster that presented a cohesive story. Winners were announced after the judges’ deliberations.

**Lessons Learned**

Overall, this inaugural interprofessional competition was a resounding success. Nevertheless, the organizing team learned several lessons based on observations and feedback.

**Distributing Information**

We sent detailed information to the students prior to the start of the competition. Several students commented that they did not have enough information about expectations. We plan to send shorter, more frequent correspondence for future competitions.

**Determining Appropriate Academic Credit**

For participating in the competition, industrial engineering students earned three credits for their capstone senior design course. At the other extreme, nursing students earned minimal credit because this interprofessional project was one component
of a required course. This imbalance led to differing expectations about the effort required of team members. Future competitions will require negotiating more equitable credit across disciplines.

Improving Mentor Involvement

In their mentoring roles, faculty had different notions about the amount of involvement they should have in the teams’ activities. One struggling team was left to its own devices for several weeks because the faculty mentor took a hands-off approach and did not want to intervene, as the team was in a competition. Another faculty mentor took an active role with the team to ensure that it won the competition. Neither approach was right. For the next competition, the organizing team will work with the faculty to (a) develop a collective expectation about involvement, (b) establish a means of sharing information about the teams’ progress because, during debriefing conversations with the faculty, the organizing team discovered that all faculty knew the aforementioned team was struggling, but they did not notify its mentor, and (c) underscore the importance of providing meaningful, timely feedback and domain expertise.

Encouraging Team Effectiveness

The organizing team observed that the choice of a team leader plays an important role in team functioning. Specifically, teams with a strong leader functioned and performed in a more effective, cohesive manner that may be attributable to better delegation of effort and accountability among all members. Team building at the beginning of the semester will include information about leader selection for future efforts.

Listening to Student Feedback

The students provided excellent feedback that could be implemented immediately or improve future competitions. For example, the organizing team decided to allow the teams to watch all presentations because their competition work was completed (versus at the midterm where their projects were still in development). However, the students overwhelmingly expressed a desire not to watch, stating that the activity was a competition and they did not wish to see the other teams’ performances; the organizing team believed that the students thought watching would increase their nervousness. Therefore, plans were adjusted in real time to accommodate their wishes.

A second example of feedback was that team members found a second meeting during the semester with content experts was less useful, and they would have preferred to use this time for project work. Therefore, in future competitions, meetings with content experts will be scheduled only during the first half of the semester.

Conclusions and Future Plans

The organizing team is committed to offering more interprofessional competitions for students, as these activities enhance their learning experiences by demonstrating that no single, right solution exists to organizational problems and that multiple factors must be considered. In addition, students are provided with excellent opportunities to hone their discipline-specific, critical-thinking, teamwork, and communication skills. The health care domain is rife with challenges requiring interprofessional expertise that brings unique, discipline-specific perspectives to model, solve, and analyze such problems using systems approaches.

Scaling up the project and making it sustainable in the long term will require planning, as well as institutional support. Identification of enthusiastic and committed faculty members from the participating disciplines is an important task and must be done with due diligence. Different academic units within an institution have different mechanisms to support interprofessional student projects and provide sufficient academic credit for their students. Therefore, including faculty members on the organizing team from the participating disciplines may be beneficial. For instance, organizing team members can provide the necessary input from and regular feedback to their curriculum committees or equivalents and propose possible academic credits for the participating students based on their program requirements. Institutional support in the form of academic support, faculty and program recognition, and financial commitment are recommended. The funds can be used to support travel, team recognition, participating faculty honoraria, and other needs. Such support is currently being sought to continue this enriching educational experience for students.

References


