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Immunization Tour: Preparing for Mass Immunization through Pharmacy and Nursing Interprofessional Student-led Service-learning

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Abstract:

Pharmacy and nursing students piloted a collaborative student initiative to administer mass influenza immunizations to a large university campus. Through the support of the School of Nursing, College of Pharmacy, and University Health Service this project later turned into a unique service-learning interprofessional one credit elective course promoting public health philosophy and principles, emergency preparedness strategies, clinical skills, and interprofessional team competencies centered around influenza immunizations. Including lessons learned, this article will describe the evolution of this innovative student-led project.

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Introduction

The significance of interprofessional education in clinical practice has been well established by the Interprofessional Education Collaborative (IPEC) 2011 Core Competencies for Interprofessional Collaborative Practice and Team-Based Competencies: Building a Shared Foundation for Education and Clinical Practice documents.^{1,2} These reports support the ideal that a fundamental component of interprofessional learning is “engaging students to work effectively as members of the clinical team.”² IPEC provides a framework for interprofessional education by providing core competencies for interprofessional team-based care and describing the teaching that academic health science programs faculty should be providing to health professional students. The four core competencies include: values/ethics for interprofessional practice, roles/responsibilities for collaborative practice, interprofessional communication and interprofessional teamwork and team-based care.

The literature contains an increasing number of examples demonstrating the implementation of interprofessional education by institutions of higher learning. These examples range from the introductory didactic classroom to the experiential setting, however, there are still challenges in implementation. IPEC describes the roadblocks that prevent

implementation of the ideal system as the: 1) absence of role models, citing that many senior teachers are not in clinical practice and are not familiar with the relevant skills needed to impart to students; 2) lack of funding for developing and implementing new curricula or curricula with team-based care reimbursement; 3) overall resistance to change due to fear of losing power or status, and 4) logistical barriers of finding space and time in the curriculum. All of these concerns create barriers for the core competencies to become widely adopted. In order to succeed, educators and administrators need to innovatively overcome these obstacles.

Service-learning has been a well endorsed mechanism for linking knowledge to practice by engaging students in meaningful community service³ and providing an opportunity to integrate clinical experience and interprofessional education. According to the 2004-2005 Argus Commission Report, service-learning improves pharmacy education and addresses unmet public health needs.⁴ A large public health need of health practitioners is to address immunizations, particularly influenza immunizations. Healthy People 2020 aims to prevent “disease, disability, and death from infectious diseases, including vaccine-preventable diseases.”⁵

Combined, influenza and pneumonia deaths rank eighth for the leading cause of death in the United States.⁶ Fortunately, influenza immunization can prevent and/or reduce serious illness and death; hospitalization rates for adults over age 50 can be reduced by 61%.⁷ Barriers to adult immunizations

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include patients not knowing that immunizations are needed, misconceptions about vaccines, and lack of recommendations from health care providers.⁹ The Advisory Committee on Immunization Practices (ACIP) encourages all vaccinators and public health agencies to schedule influenza clinics that service target populations and help extend the routine vaccination season.⁹

Interprofessional service-learning student experiences have been described in the pharmacy and nursing literature.^{10,11,12} Few pharmacy service-learning experiences are described as student-led.¹³ Although several pharmacist-led and student-led immunizations experiences are reported,^{14,15,16,17} none found have documented an interprofessional approach. The university population presented a public health need to be protected from influenza. This provided an innovative opportunity to create an interprofessional, student-led, service-learning immunization experience.

Background

In early 2000, pharmacy students at the University of Minnesota College of Pharmacy won a national Pharmacy Leadership Society (PLS) pharmacy competition for the creation of a concept called the Immunization Tour (IMT). The concept envisioned pharmacy and nursing students jointly providing influenza clinics for students, staff and faculty at the University of Minnesota. At the time, nursing and pharmacy students had limited opportunities to administer vaccinations and none were interprofessional. In order to implement the project, IMT student leaders partnered with their respective professional faculty advisors and Boynton Health Services (BHS), the University health service. Prior to IMT, BHS had not conducted mobile influenza clinics throughout campus, but had only provided services at their onsite clinic locations. Through this new mobile, student-run interprofessional model, IMT provided all of the education, skills training and clinical staffing. BHS provided the administrative support, clinical experience, universal standing orders and policies, and supplies. In the fall of 2000, the first IMT clinic was conducted for University staff, students, and faculty.

After the first season, the IMT experience was offered as a one-credit elective course that included additional training, credit for student workload, and formal direction by the faculty. Still, the innovative founding feature of student leadership was intentionally maintained. As the IMT grew in complexity and size, more students were needed and additional faculty supervision was required. Now as a course, IMT is limited to 32 pharmacy and 32 nursing students. Class size limits have been created to provide consistent numbers of pharmacy and nursing students and, through trial and

error, appropriate to staff the four clinics. Each team is composed of four teams of eight pharmacy and eight nursing students and led by a pharmacy and nursing student leader pair that are responsible for coordination and management of each clinic. The purpose of this paper is to describe the student-led innovation in developing a service-learning interprofessional mass influenza immunization educational endeavor.

Design

IMT follows the Medical University of South Carolina's conceptual framework for advancing interprofessional education as exemplified in IPEC: 1) prepare oneself as a team member, 2) think as a team member, 3) practice as a team member and 4) act as a team member.¹ The detailed planning process steps to prepare for each fall semester are outlined in Table 1. While planning and logistics are ongoing from season to season, four main components outlined below have evolved:

1. Pre-course Planning and Logistics

Four course faculty, two from each profession, provide an appropriate amount of clinic supervising ratios, interprofessional role modeling, and course coverage. IMT course faculty are interprofessionally paired, one pharmacy and nursing faculty ("course faculty") manage the course logistics and planning, while the other pharmacy and nursing pair ("clinic faculty") manage the clinical training and clinic experiences. Delineating these responsibilities has helped students and faculty identify a point of contact for each unique circumstance that arises during the semester course.

Course faculty work to schedule a class time, room, skills workshop and guest speakers in the spring and summer months prior to the annual North American fall influenza season. They are responsible to update the on-line course management site, which includes: 1) revising the syllabus, 2) updating the required readings, 3) designing an open-book quiz to challenge students to access the current season's CDC recommendations and the BHS standing orders and policies for adverse events, and 4) creating interprofessional student-paired online discussion forums related to CDC's One and Only Campaign (<http://www.oneandonlycampaign.org/>). Course faculty also gather input from clinical faculty, BHS staff and from the 64 student evaluations from the previous semester to improve the course each year.

Clinic faculty and BHS meet regularly throughout the spring and summer months to discuss new recommendations from ACIP, Minnesota Department of Health (MDH) and internal changes that impact clinic planning. BHS describes their

proposed implementation plan for the season (sites, clinic hours and registration), the number of doses ordered (based on previous year data, cost, supply from manufacturers and guidance from MDH), and the route of administration (intramuscular or intranasal). Sites are annually evaluated and discontinued if they have low turnout rates or poor physical spaces. Ideal sites are those where greater than 500 patients are anticipated. Clinic processes and corresponding documents are also reviewed and updated. For the evening experiential training session, clinic faculty meet with the academic health center simulation center staff to revise the simulation and work with BHS to plan for the observed immunizations.

Student leaders are identified in the spring and are volunteers. Nursing faculty invite students to apply for the leadership position. Student leaders are interviewed and selected based on their leadership and clinical experience. The registered pharmacy student leaders are selected by PLS membership, where membership is based on invitation for students that exhibit leadership for their class. Student leadership is core to the design of IMT. Student leaders are given additional responsibilities including: 1) exposure to clinic sites prior to the scheduled day, 2) scheduling peers for clinic shifts, 3) serving as co-manager for their clinic, and 4) acting as a communication link between students and faculty. At the same time, all students are provided the skills and training needed to be immunization providers. Through the IMT design, students feel confident to: manage patients with needle anxiety, screen patients and respond to patients with signs of syncope and anaphylaxis, with limited faculty supervision.

2. Course Implementation

Course planning and logistics occur throughout the year and concentrate in the summer months. The course curriculum focuses on interprofessional collaborative practice, public health interventions, and emergency preparedness in the context of population-based interventions. The course objectives are to: 1) help students understand the interdependent and independent public health role in population-based disease prevention; 2) increase leadership skills by delivering four influenza immunization clinics; and 3) demonstrate proficiency in administering intramuscular and intranasal influenza vaccine to adults.

In order for students to prepare themselves, think, and practice as a team member, the curriculum begins with didactic components. Didactic content includes evidence-based practice recommendations and modules designed with a focus on professional roles and perspectives. Specifically,

IMT requires interprofessional pair-share discussion activities where a pharmacy and nursing student dyad watch eight short on-line public health videos and engage in corresponding interprofessional dialogues regarding their respective professional roles and perspectives. Pharmacy students are required to complete an additional on-line module to address the lack of core introductory public health philosophy and principles taught in the pharmacy curriculum and already present in nursing curriculum.

In addition, students are introduced to the Minnesota Department of Health's Emergency Preparedness mission, goals and strategies to plan and respond to a life-threatening communicable disease. A representative from the Health Commissioner's office presents "Pandemic Influenza" early in the season. During one season's Employee Benefits Fair, where students simultaneously operated an immunization clinic, the current health commissioner, with his public relations officer, interviewed students and their prospective patients about their motivation or roadblocks to getting immunized. The interviews were converted into short video clips that are currently available on the MDH website for the public to access.²¹ The "Mass Immunization Model" with prewritten job descriptions for each of the functions previously described are shared with the students. During the last class, a representative from the University Medical Reserve Corps (MRC) describes their role during a public health emergency and how vaccine distribution to the masses contributes to the response. The representative invites the students to join the MRC as trained medical reserve corps volunteers. This finale provides a fitting completeness to the emergency preparedness training.

The simulation portion of the course begins with: 1) students viewing a faculty produced video on intramuscular injection technique, 2) direct observation of peers administering vaccine to each another, and 3) administering an intramuscular influenza vaccine to a partner. Each student administers one vaccination and observes 3-4 other students. After each administration, the student observers and a single faculty member provide feedback to the administrator. Students also view a demonstration on intranasal vaccine technique and each student practices with a placebo device. In addition, student teams manage a live vaccine anaphylaxis simulation with standardized patients at the simulation center. After the simulation, the students and the standardized patient debrief on professional roles, missteps, how students felt and the simulation is clinically escalated and repeated.

3. Immunization Clinic Operation

During the semester, each student team is expected to staff two clinics. Each clinic is approximately eight hours long and staffed by two teams (5-6 hour shifts each) and two faculty. In order to observe the student's first vaccination, during the first hour of each student's first clinic they are scheduled to screen and administer vaccine to 12 patients. Subsequently, they are scheduled to screen and administer vaccine at a rate of 16 patients per hour. The student leaders, faculty and BHS perform a site visit 1-2 weeks prior to each clinic and schedule the number of students needed to staff the various functions of the clinic: registration, line management, screening and injection, post administration area, supply runner, and clinic manager. Student leaders lead pre and post huddles with their student teams for each clinic. Student leaders communicate their lessons learned to the other team leaders. Students facilitate the setting up and tearing down of each clinic space, while ensuring safety of the supplies. These administrative activities expose the student leaders to the more advanced logistics of implementing an immunization clinic, as opposed to the basic logistics received in class.

BHS provides marketing, electronic registration of patients, vaccines, signage, protocols, laptops, stickers, and snacks for patients. Coolers are equipped with appropriate thermometers and a temperature log to hourly monitor the "cold chain".²² BHS also supplies T-shirts with a unique clinic logo that serves as the clinic uniform.

Post Clinic Debriefing and Evaluation

After the four clinics are completed, students view a presentation about how to conduct a root-cause analysis to determine how a "near miss" or an accident could have happened at the clinics. This "near miss" is one that could lead to a sentinel event or put someone's life at risk (for example, through the transmission of a blood borne pathogen). Teams consider how the environment, medical products, processes, personnel, or administration aspects of this system may have contributed to the error and generate a list of potential solutions to address the event. When appropriate, their solutions are often implemented into the next year's planning.

Each student is required to write a guided three page reflection paper on their learning during the course, recalling patient experiences, and offering suggestions for course improvement. Students are asked specifically to reflect on: their personal goals for success, a direct analysis of the Minnesota Public Health Intervention Wheel, insights on the

interdependent and independent public health roles of health care practitioners, experience working in interprofessional teams, and finally the types of skill-building they acquired, personal highlights, and challenges experienced in this course. Based on these service-learning reflections, course and clinic faculty debrief with the staff of BHS to identify the lessons learned from the season and discuss any future changes to be implemented.

Results

Student Feedback

IMT consistently remains in high demand among students. Student feedback is core to the evolution of this course and as a result many changes have been implemented. Each year students provide positive feedback about their personal confidence, growth, and vaccine administration skill level beyond those developed in the required core curriculum. Students are also very reflective of their healthcare role and the importance of communication and team work once they are practicing.

Examples of student reflection:

"My experience working in an interprofessional team was positive, and I enjoyed collaborating with and helping build a flu clinic up in order to benefit a population. Seeing firsthand how pharmacy and nursing students approach various situations was interesting. It was a highlight to collaborate in the SIMS [simulation] setting, and see how we each acted with the patient in an emergency situation. One of my favorite parts of the class was getting to know my nursing co-leader as a professional and as a person. This experience allowed me the opportunity to learn more about my nursing counterparts as individuals and as healthcare professionals."
- pharmacy student

"I feel extremely satisfied with my individual injection practice and the entire interprofessional experience. After setting, working toward and reaching my goals, I have gained an enhanced sense of accomplishment and a better understanding of the leadership role in a large, fast-paced setting." – nursing student

"Working in an interprofessional team was one of the most rewarding and beneficial experiences of this course. As a future nurse, I understand the value of collaborating with individuals from different professions. In order to successfully and safely deliver patient care, interprofessional relationships must be respectful and trusting. This course provided me with my first experience working side-by-side with pharmacy students. In brainstorming, collaborating, and planning with my co-team leader, I developed a deeper sense of appreciation and gratitude for those with a different set of

skills and knowledge. Aside from working with my student peers, I also had the opportunity to collaborate with instructors from different areas in the academic health center and a registered nurse from Boynton. Overall, the essence of interprofessional teamwork was tremendously evident and essential part of the Immunization Tour.” – nursing student

“I enjoyed taking this course and I feel that I not only accomplished my goals, but learned a great deal about myself and working in a team. I would recommend this course to other students for the wide amount of experiences I gained as well as having a great time along the way.” – pharmacy student

“My personal goals for this course were to mainly become more comfortable with giving injections to patients. I often struggled with having shaky hands, feeling very nervous, and not injecting fast enough, thus causing my patients unnecessary pain. I know that I will likely be giving injections as a pharmacist so my main goal was to minimize my nerves. I also wanted to learn more about the nursing program and learn to work effectively in an interprofessional team. I feel that I accomplished both of these goals in this course. I learned a great deal from my nursing school classmates. I really enjoyed discussing what each school learns regarding medications. In terms of my immunization technique I feel infinitely more comfortable. I feel that I know more about how the vaccines are made, which formulation to choose for different patient populations, and feel confident in my abilities to deliver vaccines. I felt extremely accomplished when patients told me that I was very good at giving the shot.” – pharmacy student

Clinical Impact

The IMT clinics have received positive feedback from the students, staff and faculty they served. IMT students administer approximately 4,000 influenza vaccinations per season, approximately 18 -30% of the total immunizations delivered by BHS. IMT provides a valuable free resource to BHS, expanding their reach on campus. In 2008, the IMT in collaboration with a BHS clinic set the Guinness Book of World Records by administering over 10,000 vaccinations in a single day, IMT administered over 5,000 of those. BHS now routinely uses mobile clinics as a model to increase immunization rates for the University community.

Political Impact

At the onset of the IMT, Minnesota pharmacists were not allowed to administer vaccines. In support of the professional practice expansion, students were taught immunization technique in the core didactic curriculum the year before IMT began. Under a Board of Pharmacy waiver,

and with direct faculty supervision, pharmacy students in the IMT were allowed to vaccinate adult patients for influenza. Based on this unique immunization experience, the Minnesota Pharmacists Association recruited an IMT student leader and a pharmacy faculty advisor to testify during a senate hearing committee. This testimony helped influence the 2003 inclusion of pharmacist administered adult vaccinations in the state of Minnesota.

Discussion

Interprofessional Education

Our University follows the Centre for the Advancement of Interprofessional Education (CAIPE) definition of interprofessional education, “when two or more professions learn with, from and about each other to improve collaboration and the quality of care.”²³ As the University began their advancement of interprofessional education, the IMT was one of the first interprofessional opportunities for pharmacy and nursing students. In this IMT experience, students perform equally “with” one another in virtually interchangeable roles. Addressing the “from” and the “about” each other proved more challenging over the years as introductory interprofessional courses became required in the academic health center and our content became somewhat redundant. Simply having two different professional students within one course does not equal interprofessional education, but provided great opportunities for new learning activities. In 2008, as the University sought to track experiences, the IMT was formally endorsed as an interprofessional course by the academic health center.

The course learning activities paired with the clinical experience help the IMT meet the four competency domains of collaborative practice as described by IPEC in a variety of mechanisms. Some examples include:

- Values/Ethics competency occurs from the beginning through the team member relationship building activities (interprofessional paired-shared discussions, simulation training center experience) and patient relationship building skills.
- Roles/Responsibilities competency is met throughout and specifically in the interprofessional pair-share discussion forums where students are asked to respond according to their professional role and outline methods for working better with other health professionals.
- Interprofessional communication occurs through built in team activities (root-cause analysis, clinic operations) that required pharmacy and nursing to build relationships and team functioning.
- Interprofessional teamwork and team-based care is instilled by asking students to reflect upon their

professional roles in specific care situations, work together to manage anaphylaxis (simulation) and perform in clinic together.

Challenges and Lessons Learned

Vaccine

Due to the nature of influenza manufacturing, two course years (2004 and 2009) were modified as a result of vaccine shortages. In 2004, a major manufacturer and supplier of the flu vaccine recalled the vaccine because of suspected contamination during the manufacturing process.^{18,19} In 2009, an H1N1 influenza outbreak resulted in a shortage of H1N1 vaccine.²⁰ Because of the shortages, the four planned clinics were collapsed into one smaller clinic where high-risk students, staff and faculty were vaccinated on a first-come-first-serve basis.

Administration of vaccine also provided some logistical challenges. Due to working with unlicensed students, each drawn up dose needed to be checked by faculty and this subsequently increased the amount of time for each administration. BHS recently made the switch to single dose syringes that decreased the number of steps for potential errors at a minimal cost increase. For our contracted prices, intranasal formulation is more expensive than intramuscular and creates an ordering preference from BHS to promote intramuscular. From our experiences and for unknown reasons, IMT utilizes more intranasal immunizations than any other BHS clinic and we have subsequently ordered larger quantities each year.

Space

Over the years there have been multiple IMT mobile clinic locations within the University. Surprisingly, a dormitory clinic conducted during the dinner hour was repeatedly one of the lowest turnout sites and despite recruitment efforts, has since been discontinued as a student run site. The largest of the IMT clinics is operated in conjunction with the annual University employee health benefits fair. The space is divided with one half dedicated to the health fair and the other to the IMT clinic. One of the busiest clinics has been located in a large coffee shop and lounge area within the academic health center building.

Each clinic location has its unique challenges. For example, there is often a lack of refrigeration necessitating vaccine storage in a temperature-controlled cooler. Also, post administration areas are in close proximity to the vaccine administration area. So if a patient has a medical event, such as syncope or an anaphylactic reaction, the care for that person occurs in direct view of others.

Educational Differences

All of our students have varied educational years of training. Third year pharmacy students are typically in their seventh academic year compared to baccalaureate nursing students who are in their fourth academic year and post-baccalaureate nursing students may have had multiple years of experience in the non-nursing social or natural science settings. The background preparation of students in the course added a layer of complexity when creating interprofessional activities. For example, the pharmacy curriculum provides less education on public health principles than the nursing curriculum. This gap will continue to narrow through pharmacy curriculum revision efforts, but will need constant reassessment. Also, due to the variety of previous training experiences with the intramuscular injection, students raised questions about the correct technique. Faculty responded by creating a training video with an "IMT approved" process standardizing the intramuscular administration technique for all students.

Experiential Education

Performing any live clinical experience creates a variety of teaching and learning challenges. These challenges can impede the students' personal confidence and mastery of the course objectives. To address these factors, we continue to adjust the timing, frequency, and amount of didactic and simulation content we offer. For example, we used to spend significant class time going over steps to creating an immunization clinic de novo. With our established relationship with BHS, we found most of this content to be less applicable to the students and their experience in the course. In its place, we have inserted expanded content on BHS's role and understanding what protocols we follow and how they were created.

Faculty

Due to the interprofessional nature of this course, students look to the faculty to role-model respectful interprofessional relationships. In the past, students have commented on instances where they interpreted the other professional faculty member's words or actions as disrespectful. These interactions provided great opportunities for student and faculty growth and cultural awareness. Faculty need to be prepared to be more critically observed and open to feedback. Also, faculty serve an important role to support the student-led aspects of this course. Although it can sometimes be easier to shield the student leaders from some clinic decisions, faculty need to balance education with efficiency.

Scheduling

As IPEC suggests, identifying a common class time that accommodated different academic programs was challenging. To avoid conflicting with other core curricular requirements, class was scheduled initially during a lunch hour. However, due to student committees and organizational meetings that were held over lunch, the time was changed. In addition, clinic hours often overlap with other required class and required clinical times. All IMT faculty strive to minimize these student conflicts by surveying students at the beginning of the semester to find the best team/clinic assignment for each of them.

BHS Partnership and Communication

As this course has evolved, so has our relationship with BHS and constant communication is integral to the operation of the clinics. BHS has experimented with different staffing of administrative support to BHS and have found that having one BHS point person was ideal. Frequent communication and transparency between the BHS staff and University faculty about the expectations of clinic procedures, protocols, liability, and training is essential. BHS communicates directly with clinical faculty who in turn gives directions to the student leaders involved.

Student Leaders

Learning clinical management skills are an important part of understanding the immunization clinic. Due to time constraints, we have found that requiring student leaders to be true clinic managers as they would be in the “real world” can lead to burn out. Instead, the students are exposed to the manageable details of the needs in conducting an immunization clinic. For example, rather than have the student leaders secure dates and locations for the on-site clinics and attend all of the planning meetings, the clinic faculty work with BHS to identify the best dates and locations for student run clinics several months before the course begins. Faculty relay the significant decisions (i.e. changes in vaccine administration process or quantity of vaccine acquired) to the student leaders, who communicate critical information to their student teams electronically and in student leader meetings. We have also found that pairing a nursing and pharmacy student leader together creates an additional opportunity for interprofessional collaborative practice.

Conclusions

Over the previous ten years and with 50,000 persons immunized for influenza, we are committed to seeking continual improvement for our experience. The keys to our success include our partnership with BHS, the student-led model, honest feedback from all stakeholders, a meaningful

service-learning opportunity and faculty engagement. Conducting multiple student-administered immunization clinics provides an amazing opportunity for pharmacy and nursing students to have an interprofessional experience that is intentional and addresses the four core IPEC competencies for interprofessional collaborative practice. Additionally, students leave the course prepared to respond to public health emergencies involving distribution of mass immunizations as a voluntary member of a Medical Reserve Corp in this country.

References

1. Interprofessional education collaborative expert panel. (2011). Core competencies for interprofessional collaborative practice: Report of an expert panel. Washington, D.C.: *Interprofessional Education Collaborative*. Retrieved from: <http://www.aacn.nche.edu/education-resources/IPECReport.pdf>
2. Team-based competencies: Building a shared foundation for education and clinical practice document (2011). *Interprofessional Education Collaborative*. Retrieved from: http://macyfoundation.org/docs/macy_pubs/Team-Based_Compencies.pdf
3. Bandy J. What is service learning or community engagement? Retrieved from: <http://cft.vanderbilt.edu/guides-sub-pages/teaching-through-community-engagement/#what>, (Accessed 7/11/14).
4. Smith R, Kerr R, Nahata M, Roche V, Wells B, Maine L (2005). Engaging communities: Academic Pharmacy Addressing Unmet Public Health Needs Report of 2004-05 Argus Commission. Report of the 2004-05 Argus Commission. *American Journal of Pharmaceutical Education* 69(5) Article S22.
5. Centers for Disease Control and Prevention. (2013). *Immunization and Infectious Diseases:2020 goals and objectives*. Retrieved on July 8' 2014 from HealthyPeople.gov: <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=23>
6. Deaths Leading Cause. National Vital Statistics Reports, Vol. 61, No. 7, October 26, 2012.
7. Effectiveness of seasonal vaccine in preventing confirmed influenza-associated hospitalizations in community dwelling older adults. Talbot HK, Griffin MR, Chen Q, Zhu Y, Williams JV, Edwards KMJ. *Infectious Disease*. 2011 Feb 15; 203(4):500-8.

8. Johnson DR, Nichol KL, Lipczynski K (2008). Barriers to adult immunization. *The American Journal of Medicine*. Volume 121, Issue 7, Supplement 2, July 2008 (S28-S35).
9. Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP) — United States, 2012–13 Influenza Season. *MMWR*. August 17, 2012, 61(32):613-618. Retrieved from: <http://www.cdc.gov/mmwr/pdf/wk/mm6132.pdf>
10. Lee ML, Hayes PA, McConnell P, Henry RM (2013). Students delivering health care to a vulnerable Appalachian population through interprofessional service-learning. *Gerontology & Geriatrics Education*. 34(1):43-59.
11. Dacey M, Murphy JI, Anderson DC, McCloskey WW (2010). An interprofessional service-learning course: uniting students across educational levels and promoting patient-centered care. *Journal of Nursing Education*. 49(12):696-9.
12. Horne C, Medley F (2001). An interdisciplinary community-based clinical experience for beginning students. *Nurse Educator*. 26(3):120-1 May-Jun.
13. Meierhofer J, Baumgartner L, Howard K, Lounsbury J, Reidt, S, Moon J (2013). Facilitating student pharmacist learning through student-led development of a service-learning opportunity. *Currents in Pharmacy Teaching and Learning*. 5(6):611-615.
14. Bounthavong M, Christopher ML, Mendes MA, Foster EB, Johns ST, Lim L, Rubin LM, Patel JJ, Stewart AG (2010). Measuring patient satisfaction in the pharmacy specialty immunization clinic: A pharmacist-run immunization clinic at the Veterans Affairs San Diego Healthcare System. *International Journal of Pharmacy Practice*. Apr;18(2):100-7.
15. Hagemann TM, Johnson EJ, Conway SE (2014). Influenza vaccination by pharmacists in a health sciences center: A 3-year experience. *Journal of American Pharmacists Association*. Apr 12:e225-e231.
16. Dang CJ, Dudley JE, Truong HA, Boyle CJ, Layson-Wolf C (2012). Planning and implementation of a student-led immunization clinic. *American Journal of Pharmaceutical Education*. Jun 18;76(5):78.
17. Turner CJ, Ellis S, Giles J, Altieri R, Sintek C, Ulrich H, Valdez C, Zadvorny E (2007). An introductory pharmacy practice experience emphasizing student-administered vaccinations. *American Journal of Pharmaceutical Education*. Feb 15;71(1):3.
18. New York Times (2004a). Officials Found Earlier Contamination at Flu Vaccine Plant. Accessed August 12, 2014. Retrieved from: <http://www.nytimes.com/2004/11/18/health/18flu.html>
19. New York Times (2004b). In Minnesota, Flu Vaccines Go Waiting. Accessed August 12, 2014. Retrieved from: <http://www.nytimes.com/2004/11/12/national/12flu.html?fta=y>
20. Center for Infectious Disease Research & Policy (CIDRAP) (2004). CDC says vaccine shortage likely to outlast current H1N1 wave. Accessed August 12, 2014. Retrieved from: <http://www.cidrap.umn.edu/cidrap/content/influenza/swineflu/news/nov0409hearing.html>
21. Minnesota Department of Health. Prevent the Flu: Videos. Accessed August 12, 2014. Retrieved from: <http://www.health.state.mn.us/divs/idepc/diseases/flu/videos/index.html>
22. Centers for Disease and Control Prevention: Vaccine storage and handling (May 2014). Retrieved from: <http://www.cdc.gov/VACCINES/RECS/storage/default.htm>
23. Centre for the Advancement of Interprofessional Education. Defining IPE. Accessed August 12, 2014. Retrieved from: <http://caipe.org.uk/about-us/defining-ipe/>

Table 1. Immunization Tour Course Planning with Faculty, Boynton Health Services and Student Leaders

Planning & Logistics	Item	Responsibility	Month of Meeting
Pre Course	Order seasonal vaccine	BHS	January – February
	Review and revise policies, procedures and standing order as needed	BHS	January – July
	Articulate seasonal goals for upcoming immunization season	Faculty & BHS	March –April
	Incorporate recommendations actions from previous season; clarify roles and responsibilities	BHS & faculty	March –April
	Identify fall dates and locations of 4 mobile clinics	BHS & faculty	April – May
	Recruit students into elective class and set up process to identify student leaders from each undergraduate program	Faculty	April – May
	Set up online registration and number of patients per injector per hour	BHS	June – July
	Schedules rooms for didactic classes & evening workshop	Faculty	July
	Revise course syllabus, reading materials, and activities	Faculty	July – August
	Set up and revise course management web site	Faculty	July – August
	Survey students for clinic uniform T- shirt sizes with annual logo	Faculty	September
	Organize screening, immunization, documentation, recovery and emergency supplies to distribute in carts and coolers	BHS	September
	Market clinic dates, times, and method to register	BHS	September
	Assign teams, faculty, and BHS representatives to staff each mobile clinic	Faculty & BHS	August – September
Course Implementation	Meet with new students about student run clinic operations and student responsibilities	BHS & faculty	September
	Recruit freshman nursing volunteer students to work, as a service project, in registration during clinic operations	Faculty	September
	Order lunches for all students working in clinic	BHS	October
	Clarify reporting responsibilities with students to faculty; faculty to BHS during clinic operations	Faculty, BHS and student leaders (SL)	October
	Schedule students to work clinic and to rotate through registration, screening & immunization, post administration, supply runner and line manager	SL & BHS	September – October
	Schedule pre clinic visits to review logistics and emergency communication strategies unique to each mobile site	Faculty, BHS & SL	October
	Communicate about pickup and return of supplies and management of the “cold chain” for each clinic	SL & BHS	October – November
Immunization Clinic Operation	Monitor processes for safety and quality control; debrief after each team completes a 4-5 hour segment of a clinic; inform next team	Faculty, BHS & SL	Ongoing
	Perform an immediate “root cause analysis” on adverse events	Representative group	Ongoing
	Institute recommendations for improvement immediately	Faculty, BHS & SL	Ongoing
Post Course Debriefing and Evaluation	Identify lessons learned	Faculty, BHS & SL	December
	Recommend actions for next season based on successes, lessons learned and new information	Faculty & BHS	December
	Prepare final tally from each clinic	BHS	December

Table 2. Number of Immunizations per Year Provided by Immunization Tour Students

Fall	Intramuscular Injections	Intranasal	Immunization Tour Totals	% of BHS Total
2000 – 2005*	N/A	N/A	N/A	N/A
2006	4689	N/A	4689	34%
2007	4013	N/A	4013	28.6%
2008**	5104	N/A	5104	30%
2009	Limited supply***			
2010	N/A	N/A	N/A	N/A
2011	3992	59	4051	25%
2012	3707	62	3769	20%
2013	3412	203	3615	18%

*2004 – vaccine was not available due to commercial contamination. **Immunization Tour site in collaboration with one other campus site qualified for Guinness Book of Records for the most influenza vaccinations given in one day.

***Influenza vaccine in short supply during H1N1 pandemic. BHS, in their role as Incident Commander, redirected their limited supply of vaccine that season.