



The Development and Assessment of a Point-of-Care Testing (POCT) Laboratory Course in a Doctor of Pharmacy Program

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ABSTRACT

Objective: This innovative, required laboratory course introduces the concepts and processes associated with Point-of-Care Testing (POCT), and empowers students to use effective technology to aid their decision making at the “point-of-care” to improve patient care.

Methods: This required POCT laboratory course is taken by the first year PharmD students. The lab is structured into three major sections. An initial basic laboratory section introduces the student to key foundational concepts of physical assessment, and provides hands-on experience. The second section includes biologic sample collections, such as blood (Hepatitis C), oral swab (HIV), throat swab (Group A Strep) and nasal swab (influenza). A final section includes practical considerations such as risk management, development of POCT testing services, and testing limitations.

Results: Assessment results and student evaluations from the Fall 2016 semester guided refinements to the course for the Fall of 2017. The mean score on the cumulative exam in 2016 was 81.3%. The pedagogy of the class was changed in 2017 to a “flipped classroom” style with Kahoots® quizzes used each week to assess understanding. The mean score on the cumulative POCT exam in 2017 was 86.2%, indicating improved understanding, and student satisfaction scores improved as well.

Implications: This course helps to prepare students for both the basic science and clinical portions of the curriculum, making this an invaluable tool to help the students see the connection between the two, and how each can help them make a positive impact on future patients.

BACKGROUND

- Pharmacists' scope of practice is continually expanding to include services to better promote patient well-being and increasing the impact pharmacists have on patient care.
- Point-of-Care Testing (POCT) is a diagnostic test used to screen patients for various health parameters and diseases. POCT was originally performed primarily by clinical staff members, but now pharmacists can perform these tests as well.¹
- Blood glucose, blood pressure, and INR are the main POCT services pharmacists are associated with. The community and pharmacy students may not be aware that pharmacists have an emerging role in testing for infectious diseases such as influenza, Group A streptococcus, hepatitis C, and HIV.
- Influenza is one of the most contagious and rapidly spreading viral infections attacking the lungs, nose, and throat. Due to its ease of airborne transmission, early detection is crucial in preventing spread.²
- Group A streptococcus (GAS) is a bacterium found in the throat or skin that can cause pharyngitis, rheumatic fever, valvular damage, impetigo, necrotizing fasciitis, and bacteremia among many other serious conditions. In 2005, the World Health Organization (WHO) estimated about 18.1 million cases of severe GAS and greater than half a million deaths per year globally.³
- Hepatitis C is the most common cause of liver transplant in adults. The WHO estimated about 3% of the world population was infected with hepatitis C, and over 170 million people were chronic carriers in 2013.⁴
- Human immunodeficiency virus (HIV) was the cause of about 1.1 million deaths worldwide in 2015 with 2.1 million new infections. In 2009, an estimated 18.1% of those living with HIV were undiagnosed.⁵ HIV transmission risk is primarily dependent on behavior (sexual and injection drug use).⁶
- In the fall semester of 2016, the University of Charleston School of Pharmacy in Charleston, WV, offered a one-credit hour core course to allow first year student pharmacists to become certified in conducting POCT for influenza, Group A streptococcus, hepatitis C, and HIV. This course introduces the key foundational concepts of physical assessment and overview on these infectious diseases, offers a hands-on experience in obtaining various types of patient samples, and presents the technicalities of POCT such as limitations of the tests, the laws involved with testing, and how to set up a practice with POCT service.

METHODS

UC-IRB Approval Number: 17-0005

Before conducting this research, the project was approved as exempt by the University of Charleston's Institutional Review Board.

Course Methods

- This certificate program developed by the National Association of Chain Drug Stores (NACDS) was offered as a course to first year PharmD students during the 2016 and 2017 fall semesters as a way to promote the importance of obtaining this skill set early in pharmacy students' careers.
- The course is taught by several faculty members of the school of pharmacy using a PowerPoint presentation, videos, and in-class patient case examples for a hands-on experience. The topics covered in this course are displayed in table 1 below. At the end of the course, students' competency of the material presented is assessed through hands-on activities as well as a standardized NACDS final examination.
- A total of 58 students participated in the certificate course in 2016, and 48 in 2017. The course was evaluated via a survey that assessed the course materials, each subject presented, the hands-on experience, and their level of confidence in knowledge and ability to perform the various POCT methods. The survey results and comments were collected and made available to the faculty, to encourage course improvement.
- Following the 2016 course, student comments and survey results suggested a desire for more time to be spent on the physical assessment and sample collection pieces. In response, the faculty altered the course pedagogy in 2017 to a “flipped classroom” style. In 2017, students were expected to review PowerPoint slides and assigned documents prior to arriving in class. At the start of each class, a Kahoots® quiz was utilized to assess student understanding of the assigned topics. Once any points of confusion were addressed, the remainder of the class time was spent on physical assessment and sample collection practice. In this way, students were able to practice hands-on skills more often to increase their comfort level.

Topic	Sections Covered	Learning Experience
Key Foundational Concepts	<ul style="list-style-type: none"> Introduction and use of POCT by pharmacists Physical assessment competency Disease state overview <ul style="list-style-type: none"> Influenza Group A streptococcus Hepatitis C HIV 	<ul style="list-style-type: none"> PowerPoint presentation Patient cases Videos
Hands-On Portion	<ul style="list-style-type: none"> Specimen collection for: <ul style="list-style-type: none"> Influenza Group A streptococcus Hepatitis C HIV 	<ul style="list-style-type: none"> PowerPoint presentation Videos Hands-on activities <ul style="list-style-type: none"> Nasal swab Throat swab Whole blood collection Oral fluid collection
Law and Risk Management	<ul style="list-style-type: none"> CLIA Laws and regulations Developing and implementing a practice with POCT service POCT limitations 	<ul style="list-style-type: none"> PowerPoint presentation

Table 1: POCT course breakdown

RESULTS

- Using a Likert scale assessment with “Strongly Agree” valued at 5 and “Strongly Disagree” valued at 1, the average score for course assessment increased from 4.2 in 2016 to 4.7 in 2017 (see Figures 1 and 2).
- Specifically, greater than 50% of the students chose “Strongly Agree” on questions with regards to their perception of the importance and relevance of the course to pharmacy practice and its impact on their knowledge and understanding (see Figures 1 and 2).
- Students rating the overall course as “Excellent” increased from 52% in 2016 to 67% in 2017 (see Figures 3 and 4).
- Cumulative examination scores increased from 81.3% in 2016 to 86.2% in 2017.

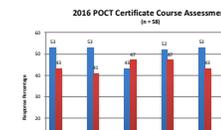


Figure 1: Student POCT certificate course assessment based on Likert survey responses

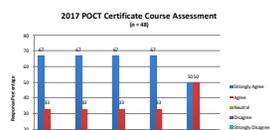


Figure 2: Student POCT certificate course assessment based on Likert survey responses

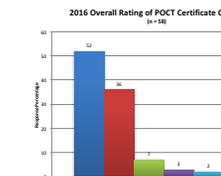


Figure 3: Student POCT certificate course overall rating based on Likert survey responses

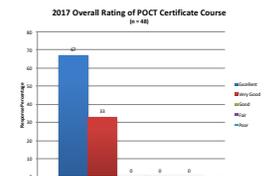


Figure 4: Student POCT certificate course overall rating based on Likert survey responses

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CONCLUSION

- Further research is necessary in order to determine the impact this certificate course will have on students when they actually get to perform Point-of-Care Testing in the community as pharmacists.
- What is apparent from the results is that the students do appear to appreciate that Point-of-Care Testing is important and relevant to their future practice as pharmacists.
- In addition, the “flipped classroom” pedagogy appears to increase student retention of material, and increase overall satisfaction of the course.
- Pharmacists are continually playing a greater role in healthcare, and it is important to prepare student pharmacists early in their education, so that they can feel comfortable and hone the necessary skills to provide the numerous services that pharmacists are able to offer.