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Quantification of curricular content devoted to point-of-care testing for infectious diseases in schools and colleges of pharmacy in the United States

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Abstract

Background: Point of care (POC) testing for infectious diseases represents a potential pharmacy service, but how much education on these tests is included in the professional pharmacy curriculum in the United States (US) is unknown. The aim of this study was to determine the extent to which schools/colleges of pharmacy include such content in their curriculum.

Methods: From August 2012 through June 2013, administrators from 128 schools/colleges of pharmacy were asked to complete an electronic survey.

Results: Complete responses were received from 114 (89.1%) unique institutions. One third (n=38) of responding institutions reported including such content, but the majority (94.7%) of these institutions devoted less than 3 hours to the topic in their curriculum.

Conclusions: United States professional pharmacy programs include little or no educational content regarding POC tests for infectious diseases. Academic pharmacy should explore ways to incorporate practical content regarding POC tests for infectious diseases into the professional curriculum.

Keywords: *infectious disease, point of care tests, pharmacy curriculum*

Introduction

The role of pharmacists in the healthcare system is continually evolving. In addition to serving as drug therapy experts, pharmacists, particularly those in a community practice setting, are at the frontline of patient care (Giberson *et al*., 2011). According to the National Association of Chain Drug Stores (NACDS), 93% of Americans live within five miles of a community pharmacy, and within urban centres, the average distance is considerably shorter (NACDS Drug Store News Briefing Document RxIMPACT, 2013). Given their accessibility, community pharmacies represent an ideal setting to perform point-of-care (POC) testing for infectious diseases (*e.g*., Group A Streptococcus, Hepatitis C Virus (HCV), human immunodeficiency virus (HIV), infectious mononucleosis, influenza A and B). Moreover, as highly trained health care professionals, pharmacists are well positioned to screen and monitor patients with various infectious diseases using Clinical Laboratory Improvement Amendments (CLIA) waived

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POC tests for infectious diseases. When performed in a community pharmacy setting, these tests can enable pharmacists to quickly manage patients in the pharmacy or direct patients to the appropriate medical care. Either action can reduce the time needed to institute correct treatment, improve healthcare resource utilisation, and increase patient satisfaction with healthcare (Crawford *et al*., 2011; Klepser & Klepser, 2012; Greer & Schanzer, 2013; Heath *et al*., 2013; Wang *et al*., 2013). In addition to screening for acute infectious entities such as Group A Streptococcus, POC testing can be utilised to screen for communicable diseases such as HIV, HCV, and influenza and document their trends within the communities (Loubiere & Moatti, 2010 Davies *et al*., 2012; Klepser, 2012; Greer & Schanzer, 2013).

The majority of pharmacy graduates pursue careers within community pharmacy (NACDS Foundation-NCPA-ACPE Joint Task Force 2012). In 2012 a joint task force of the NACDS Foundation, National Community Pharmacists Association (NCPA) and the Accreditation Council for Pharmacy Education (ACPE) promulgated practise competencies for entry level practitioners, which reflect their belief that academic pharmacy must ensure its graduates have the competencies and skills needed for contemporary and future community practise settings. These practise competencies stipulate that entry-level graduates should be able to clinically apply public health policy and among the list of objectives to achieve they specifically include, "*collect, interpret, and make recommendations based on the results of health and wellness screenings and diagnostic tests" and "describe the need for CLIA-waiver and describe documentation of testing done in the community pharmacy*" (NACDS Foundation-NCPA-ACPE Joint Task Force, 2012, pp.3).

Although POC testing for infectious diseases is an emerging opportunity for pharmacy services, it is also an area where pharmacists need education (Centers for Disease Control and Prevention, 2005). Presently, the extent to which education regarding the theory and application of POC tests for infectious diseases is included in the professional pharmacy curriculum in the United States is largely unknown. In a pilot survey of 40 colleges of pharmacy, it was noted that less than 25% of respondent institutions claimed that infectious diseases POC testing was taught in their curricula (Freed *et al*., 2011). Therefore, the purpose of this study was to more completely determine the extent to which schools/colleges of pharmacy included content on the theory and application of POC tests for infectious diseases in their curriculum.

Methods

A link to an electronic survey was sent to deans at all schools/colleges of pharmacy in the United States (US). This list of contacts was obtained from the American Association of Colleges of Pharmacy (AACP) website and cross referenced with the ACPE electronic database. The school/college of pharmacy dean received an invitation email to participate as well as the link to the survey. Reminder emails were sent to the school/college of pharmacy every two weeks after the initial email, followed by a final telephone call to those who had not yet completed the survey after several email reminders. The survey used was modified from a pilot study performed by Freed *et al*., (2006) and consisted of 33 questions (14 multiple choice, 13 yes/no/unsure, two Likert scale, one quantify as percentage, two fill-in the blank, and one rank order). The survey remained open from August 2012 through June 2013.

The exact target population size was determined by obtaining a list of 128 deans of schools or colleges of pharmacy from AACP. A response rate of 80% (*i.e*., 104 unique responding institutions) was the target goal. Descriptive statistical analyses were performed using Microsoft® Excel and Microsoft® Access 2010 Versions (Redmond, WA). The primary endpoint of this study was to quantify the extent that schools/colleges of pharmacy in the United States include education regarding POC tests for infectious diseases in their curriculum. The secondary endpoints were to characterise the methods of instruction that pharmacy students are exposed to POC tests for infectious diseases, what content was included in such education, where the content is delivered in the curriculum, and the perceived importance of the topic to pharmacy practise. Descriptive data analyses including appropriate summary statistics were conducted, compiled, and summarised. Duplicate responses from institutions were examined and excluded prior to analyses. The study was reviewed and approved by the Institutional Review Board at Mercer University.

Results

After removing duplicate responses from the data set, a total of 114 (89.1%) participants completed the electronic survey. Table I provides a demographic summary of the participating institutions. The respondent institutions represented a wide range of schools/colleges of pharmacy in the US. At the end of the study period, the majority 107 (93.9%) of the respondent institutions held "Accreditation Status" from the Accreditation Council for Pharmacy Education (ACPE). This status is granted to professional degree programs that have demonstrated to ACPE that they comply with accreditation standards and there are reasonable assurances in place for continued compliance. The remaining seven (6.1%) of the respondent institutions held "Candidate Status" from the ACPE. This status indicates that students have enrolled in a new professional degree program, but the program has not yet had a graduating class. Nonetheless, the status also signifies that the program is expected to mature in a pre-planned defined period and there are reasonable assurances in place that the program may be accredited by the time the first class graduates. Most participating institutions had been established for more than 20 years, reported a class size of 50-100 students, and had revised their curriculum within four years prior to completing the survey. Although 88 (77.2%) of survey respondents strongly or somewhat agreed that POC tests for infectious diseases

will be a valuable aspect of pharmacy practice in the future, only 18 (15.7%) were aware of pharmacists in their area currently performing such tests in their practise. Even less respondents (8 [7%]) knew for certain whether pharmacists in their state could be reimbursed for providing POC testing services for infectious diseases.

Table I: Institutional Demographics (n=114)

Characteristic	(n)	(%)
Number of years Doctor of Pharmacy programme established		
0-5	24	21.1
6-10	16	14.0
11-20	27	23.7
> 20	47	41.2
Number of years programme accreditation has been maintained		
Candidate status[a]	15	13.2
< 5 years	20	17.5
5-10 years	10	8.8
> 10 years	69	60.5
Number of years since last major curricular revision		
< 1 year ago	33	28.9
1-2 years ago	22	19.3
3-4 years ago	25	21.9
> 4 years ago	34	29.8
Class size as of Spring 2012		
< 50 students	4	3.5
50-100 students	52	45.6
101-150 students	34	29.8
> 150 students	24	21.1

[a] At the end of the survey period, 7 (6.14%) institutions remained in candidate status.

Table II provides a summary of when institutions provide education regarding POC tests for infectious diseases, how much time is devoted to the topic and the most common method the content is presented. Only 38 (33.3%) of the responding institutions reported they included content regarding POC tests for infectious diseases in their curriculum. Eighteen (47.3%) of the responding institutions indicated that education regarding POC tests for infectious diseases was provided in only one year of their curriculum. Whether the content was provided in a single year or in multiple years of the curriculum, the third-professional (P3) year most frequently contained education regarding POC tests for infectious diseases. Education regarding POC tests for infectious diseases was provided only by full-time faculty in 20 (52%) institutions, whereas in 17 (44%) it was provided by full-time faculty and other types of instructors (e.g., adjunct faculty, clinical pharmacists, pharmacy residents, and other health care professionals).

Table II: Summary of Curricular Location, Amount of Time, and Method of Delivery for Content Regarding POC Tests for Infectious Diseases.

Characteristic	n (%)
Professional Year Content Provided	
Single year	18 (47.4)
P1	2 (11.1)
P2	4 (22.2)
P3	12 (66.7)
P4	0
Multiple years	19 (50%)
Unsure	1 (2.6)
Curricular Hours Devoted to Topic	
< 1 hour	18 (47.4)
≥ 1 hour, but < 2 hours	15 (39.5)
≥ 2 hours, but < 3 hours	3 (7.9)
≥ 3 hours, but < 4 hours	1(2.6)
> 4	1 (2.6)
Format of Content Delivery	
Didactic only	18 (47.4)
Didactic and Practical	8 (21.0)
Didactic and Self-Study	2 (5.3)
Didactic, Practical, and Self-Study	7 (18.4)
Unsure	3 (7.9)

Estimated % Breakdown of Format of Content Delivery	n (%)	Mean (%)	Range (%)
Didactic	35	74	10-100
Practical	15	20	0-80
Self Study	9	6	0-50

Thirty-six (94.7%) of the institutions that provide education regarding POC tests for infectious diseases indicated their curriculum devote less than three hours to the topic. Seventeen (44.7%) strongly or somewhat agreed, whereas 13 (34.2%) strongly or somewhat disagreed that the amount of time dedicated to POC tests for infectious diseases in their curriculum is adequate. Only 5 (27.7%) of the respondents from institutions that provided less than one hour of content regarding POC tests for infectious diseases in their curriculum felt that was adequate.

The most common method of providing education regarding POC tests for infectious diseases was via didactic lectures and in nearly half of the institutions, this was the sole approach used. Commonly taught topics of POC testing for infectious diseases included limitations and applications of such tests (35 [92.1%]) and their value to pharmacy practise (30 [78.9%]), whereas topics including reimbursement (5 [13.2%]), how to obtain a CLIA waiver (6 [15.8%]) and regulatory issues surrounding such tests (11 [28.9%]) were taught less often. In addition, 19 (50%) institutions use labs or demonstrations to teach the practical aspects of POC

testing for infectious diseases. Respondents indicated that multiple approaches are employed to teach the practical aspects of POC testing for infectious diseases, but most often it involves students learning about this topic through self-study exercises and observing pharmacists performing tests in practice. The most common POC tests for infectious diseases taught via labs or demonstrations include the rapid tests for Group A streptococcus (17 [89.5%]) and influenza (15 [78.9%]).

Among the institutions without content regarding POC tests for infectious diseases in their curriculum, 17 (22.4%) reported they had considered including such content. Ten of these institutions ranked possible reasons for not including content regarding POC tests for infectious diseases in their curriculum. The two top ranked reasons were a lack of room in the curriculum and a lack of awareness that pharmacists could use POC tests for infectious diseases in practise. Sixty-four (84.2%) respondents from institutions that do not provide education regarding POC tests for infectious diseases felt such content should be included in their curriculum. While these respondents felt this content could be included in their curriculum in a variety of ways, most believed that it should be offered as an elective (50%) or a required course (46.9%). Thirty-six (47.4%) respondents believed their college would be interested in utilising an online or pre-developed module for training regarding POC tests for infectious diseases if such an option were available. Despite their opinions above, 35 (54.7%) respondents also indicated their institutions had not considered including content regarding POC tests for infectious diseases in their curriculum.

Discussion

A recent report to the Surgeon General noted the value of pharmacists in improving cost-effective healthcare (Giberson *et al*., 2011). Community pharmacists are accessible, highly trained but under-utilised healthcare professionals, who if properly trained, could serve an important role by providing POC testing for infectious diseases services (Giberson *et al*., 2011; NACDS Drug Store News Briefing Document RxIMPACT, 2013; NACDS 2011-2012 Chain Pharmacy Industry Profile, 2011). Estimates suggest there are 64,000 community pharmacies in the US; yet, only 14% of them have a CLIA Certificate of Waiver, and only 1% of CLIA-waived sites indicated that their testing personnel were pharmacists (Centers for Disease Control and Prevention, 2005; NCPA Digest, 2012; NACDS Drug Store News Briefing Document RxIMPACT, 2013). Thus, despite being ideally positioned to offer POC testing for infectious diseases services, it is clear such tests are not commonly being performed in pharmacies or by pharmacists (Centers for Disease Control and Prevention, 2005).

A report from the Centers for Disease Control and Prevention (CDC) identified inadequate training on how to perform a test, the interpretation and knowledge of shortcomings of tests, and requirements for the treatment, record keeping, and disease reporting among the primary issues that could lead to errors in performing testing at CLIA waived sites including pharmacies (Centers for Disease Control and Prevention, 2005). Despite the numerous benefits of POC testing for infectious diseases outlined above, our data suggest professional programmes in pharmacy leading to the Doctor of Pharmacy degree provide little, if any content regarding such tests in their curriculum. This is not surprising, according to a survey of academic pharmacy in the US, POC testing in general is not among the common topics addressed in patient assessment instruction (Spray & Parnapy, 2007). Furthermore, data from that survey suggest that when POC testing is addressed in patient assessment courses, the content is typically limited to glucometers, cholesterol, and international normalised ratio (INR) monitoring devices (Spray & Parnapy, 2007).

Whether POC testing for infectious diseases is provided in one or multiple years of the professional pharmacy curriculum, the P3 year typically includes such content. This is consistent with others who have found that the majority of programmes offer patient assessment skills instruction in the later years of the curriculum (da Camara *et al*., 1996: Spray & Parnapy, 2007). Students can gain a better understanding and hone their practical skills more if patient assessment coursework is distributed longitudinally throughout the curriculum (Spray & Parnapy, 2007). However, our finding that nearly half of the institutions that provide education regarding POC tests for infectious diseases in their curriculum do so for less than one hour suggests this content is not longitudinally covered throughout the curriculum. Although nearly half the respondents were content with the amount of time their curriculum devoted to this topic, many were not, particularly those devoting less than one hour to this topic. Additionally, considering the most common content reportedly taught and the amount of time devoted to this topic, it appears only basic information is being presented, rather than material that could provide students a working knowledge of how to apply these tests in their practise (*i.e*., CLIA application processes and state regulatory issues).

Lack of curricular time was a highly ranked reason provided for not including education regarding POC tests for infectious diseases in the professional pharmacy curriculum. Professional pharmacy curricula have a finite amount of time and more recently institutions have had to adjust their curriculums to meet various revisions in accreditation standards and guidelines (Brackett *et al*., 2009; Jungnickel *et al*., 2009). Given the breadth of information in healthcare, it is not reasonable to expect any school/college of pharmacy curriculum to be inclusive for all knowledge of all relevant topics for pharmacists (Jungnickel *et al*., 2009). Instead using an appropriate curricular assessment process schools/colleges of pharmacy should select the representative content, relevant competencies, and effective pedagogical approaches to best achieve the desired outcomes necessary to prepare the next generation of pharmacists (Jungnickel *et al*., 2009). In our study, the majority of

programmes lacking content regarding POC tests for infectious diseases believe it should be included in their curriculum. Moreover, respondents from nearly all of these institutions recognise ways to incorporate such content into their curriculum, and nearly half expressed interest in a pre-developed or online module. However, a majority indicated their programmes have yet to consider the issue.

The lack of awareness of pharmacists utilising POC tests for infectious diseases in practise was another highly ranked reason provided for not including education regarding POC tests for infectious diseases in the professional pharmacy curriculum. This lack of awareness was prevalent regardless of whether the respondent's institution included content regarding POC tests for infectious diseases in their curriculum. Despite this general lack of awareness, regardless of whether their institution included content regarding POC tests for infectious diseases in their curriculum respondents felt that such tests will be a valuable aspect of pharmacy practise in the future. These data suggest although model practises for POC testing of infectious diseases in pharmacies may not be prevalent, administrators in academic pharmacy realise the potential of such services hold for future practise. Additionally, a few studies have recently been completed or are currently underway that examine the use of POC tests including HIV, hepatitis C, influenza, and Group A streptococcus by community pharmacies.

Our study contained several limitations. Although our sample is representative of academic pharmacy, the information was provided by a single administrator at each institution and is therefore dependent upon the veracity of their responses. No attempt was made to verify their responses. Second, the source from which the respondents obtained the information to answer the survey questions is unknown. The source of the information the respondents provided could include institutional curricular map data, colleague input, or it may merely represent their opinion based upon familiarity with their curriculum. To minimise any negative influences of this limitation we sent the invitation to participate to programme deans and allowed them to delegate to individuals they felt were best suited to provide the information. Therefore we assume that if programme deans did not complete the survey, they delegated the task to individuals with administrative responsibilities in academic affairs, curricular oversight or assessment, or to the faculty teaching the infectious diseases modules. Lastly, the survey did not include any questions about POC testing in general (*i.e.*, POC tests for non-infectious chronic diseases). Therefore, whether some responses were based on curricular content regarding non-infectious disease POC testing, and whether elements common to all POC testing were included in the responses cannot be ascertained.

Professional programmes leading to the Doctor of Pharmacy degree in the United States include little or no educational content regarding POC tests for infectious diseases. Content is typically provided by approaches that only passively engage student pharmacists and does not often cover material that would enable them to practically apply their knowledge in practise. Despite curricular time constraints and the apparent lack of pharmacists currently performing these tests, based on the perceived potential benefit POC testing for infectious diseases holds for future practise, academic pharmacy should explore ways to incorporate content regarding these tests into the professional curriculum. In particular, focus should be given to material that would equip students to apply this knowledge to practise.

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