

RESEARCH ARTICLES

Preparing Students for Community Pharmacy Practice During a Drug Information Advanced Practice Experience

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Objective. To determine whether students completing an advanced pharmacy practice experience (APPE) at an academic-affiliated drug information center received questions similar to those received by pharmacists practicing in community settings.

Methods. Graduates of Samford University McWhorter School of Pharmacy residing in Southeastern states were surveyed via US mail to determine the characteristics of inquiries received from health care providers and the public in community practice. Survey results were compared to inquiries received at Samford University Global Drug Information Center (SUGDIS).

Results. The response rate to the survey of graduates was 36% (268 of 738 surveys). Respondents identified nonprescription drugs (65%), adverse drug reactions (62.7%), and drug interactions (62.4%) as the top 3 types of questions answered routinely in community practice, while drug therapy (13.9%), dosing (10.2%), and adverse drug reactions (6.5%) were the 3 types of questions most commonly answered at SUGDIS. The most common resources used to answer questions in the community and SUGDIS were *Drug Facts and Comparisons* and specialty references, respectively.

Conclusions. Differences were noted in types of questions received, expected speed of response, and reference utilization. As a result, activities were incorporated into the drug information APPE to address the disparities noted in the study.

Keywords: community pharmacy, drug information, advanced pharmacy practice experience

INTRODUCTION

The updated 2004 Center for the Advancement of Pharmaceutical Education (CAPE) Advisory Panel on Educational Outcomes includes recommendations that all graduates of doctor of pharmacy (PharmD) programs should be proficient providers of drug information to both health-care providers and the public.¹ The recognition by CAPE that pharmacists require drug information skills (ie, efficiently locating, critically analyzing, and effectively communicating information) for problem-solving and decision-making activities within daily practice has prompted many PharmD programs to incorporate drug information courses in both the didactic and experiential portions of the curriculum. A recent survey evaluating experiential drug information training within US pharmacy schools revealed that 73% of PharmD programs offer a distinct drug information advanced pharmacy practice experience (APPE). These drug information

APPEs may be completed in a variety of settings including a hospital-based drug information center, an academic-affiliated drug information setting, or a setting within the pharmaceutical industry.² A survey of drug information centers in the United States found that 95% served as APPE sites for a PharmD program and that over 72% were affiliated with a hospital or medical center. The most common requestors of drug information from these centers were pharmacists, physicians, and nurses.³

In spite of institutional sites serving as the primary site for drug information APPEs, community pharmacy has consistently been the primary employment site of pharmacy graduates. According to the 2004 National Pharmacist Workforce Survey, 56.4% of pharmacists are employed in a community setting (independent, chain, mass merchandiser, supermarket) while only 24.7% are employed in the hospital setting.⁴ In the community setting, providing drug information to consumers is an expected job function. A consumer-based survey found that 85% of respondents felt it was extremely important that pharmacists be readily available to answer questions.⁵ Based on a comparison between

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the national statistics of the pharmacy workforce and the published characteristics of United States' drug information centers, it appears that pharmacy students may not be trained within drug information courses for community practice.

The PharmD program at Samford University McWhorter School of Pharmacy requires every graduate to complete a 4-week drug information APPE. Although there are several sites where students can complete this APPE, the majority of students (approximately 70%) complete the experience at Samford University's Global Drug Information Center (SUGDIS), a fee-for-service operation that provides drug information to over 50 pharmacies within hospitals, health management organizations, and long-term care facilities. During the drug information APPE, faculty members strive not only to teach students drug information concepts, but also to expose students to experiences in drug information that they are likely to encounter in their postgraduation practice setting. Similar to national trends, over 70% of Samford graduates pursue a career in community pharmacy following graduation. The number and subject of drug information requests, as well as the expected speed of providing drug information responses in the community setting may differ from the characteristics of questions received by pharmacy students during their drug information APPE. Assessment of questions received at SUGDIS during 2004-2005 revealed that only a third of the questions received at the center were classified as community or ambulatory based. As a result, there is a potential disparity for students between academic drug information experiences and future practice experiences. This observation is probably not unique to the Samford PharmD program.

Studies that have evaluated drug information requests in the community practice setting date back to the 1970s before the implementation of the entry-level PharmD program or evaluate the characteristics of health-care professional inquiries received by community pharmacists.^{6,7} Investigators of a recently published study evaluated the types of questions received by pharmacy students completing an APPE in community pharmacy; however, some of the questions received by the students participating in the study were contrived for the practice experience and may not reflect true consumer-based questions.⁸ To our knowledge no comparative analysis has been published in the literature examining potential differences between academic training and career experiences in drug information. Therefore, the primary objective of the present study was to determine the characteristics of community-based drug information requests compared to requests

received at an academic drug information center. A secondary objective was to determine the most commonly used resources to answer community-based drug information questions.

METHODS

In September 2005, McWhorter School of Pharmacy 1998-2005 graduates whose alumni records indicated residence in Kentucky, Tennessee, Florida, Georgia, Mississippi, or Alabama, as well as pharmacists currently serving as community APPE preceptors for Samford's PharmD experiential program, were invited to participate in a survey. A total of 738 survey instruments were mailed to these selected pharmacists. The sample was not randomly surveyed because an a priori calculation determined that 255 completed survey instruments must be returned to achieve 95% confidence ($\pm 5\%$ accuracy) of survey results. As the response rate of mailed surveys is traditionally low, a sample size of over 700 was necessary to receive 255 completed surveys based on published response rates of 38% for mailed surveys.⁹ In addition to the survey instrument, all invited participants received a stamped, self-addressed return envelope and were encouraged to return the survey instrument within 2 weeks of receipt. No reminder notices or additional copies of the survey instrument were sent. All responses were anonymous. Data collection was terminated in November 2005. The research project was approved by the Institutional Review Board of Samford University.

The survey instrument consisted of 11 check-box/multiple-choice questions and 2 fill-in-the blank questions. Questions were designed to assess the most common types of drug information questions received, the number of drug information questions received per day, the expected speed of response, and commonly used drug information resources in the community. On the questions requesting pharmacists to recall the most commonly asked questions at their practice site, pharmacists were provided a checklist of 11 different categories of question types. Question category types were adapted from a data collection form used for drug information requests at SUGDIS and included adverse drug reactions, alternative medicines/herbals, contraindications, dosing, drug administration, drug interactions, therapeutic use of drugs, over-the-counter therapy, tablet identification, pregnancy/lactation, and disease state explanation. On the 2 questions addressing the most commonly received questions in the community, pharmacists could select all applicable question categories on 1 of the 2 questions. On the second question, pharmacists were asked to select the 3 most commonly answered question types. For the most commonly used resources, pharmacists were provided with a checklist

of electronic and text monograph resources and could check all applicable resources. Options for resources included *American Hospital Formulary Service (AHFS)*, *Clinical Pharmacology*, *Drug Information Handbook*, *Drug Facts & Comparisons/E-facts*, *Package insert/Physicians' Desk Reference (PDR)*, *PDA program*, and other.

To determine the characteristics of drug information requests received at SUGDIS, the drug information database created by SUGDIS personnel and employed to document drug information requests was queried for questions received during the 2004-2005 academic year (June 1, 2004 to May 31, 2005). The drug information database stores information on requestor's demographics, the question, classification, response, references used to answer the question, and time to respond.

Analyses of the descriptive statistics collected were performed with *SPSS*, Version 12 (SPSS Inc, Chicago, Ill). Inferential statistics were not performed on the data because the comparison between community pharmacy practice and SUGDIS was conducted primarily as a quality assurance assessment. Fill-in-the-blank survey responses were compiled and analyzed using Microsoft *Excel*.

RESULTS

Of the 738 surveys mailed, 268 were returned for an overall response rate of 36%. The majority of survey instruments were returned by pharmacists practicing in Alabama (71%), followed by pharmacists practicing in Florida (8%), and Kentucky (7%). As the objective of the survey was to collect information on drug information practices in the community setting and alumni records did not indicate practice site, respondents were asked if they practiced in community pharmacy on a regular, part-time, or as-needed basis. Eighty-nine percent of respondents indicated practicing in community pharmacy to some extent. The data from the 29 respondents indicating a practice site other than community pharmacy were included in the analysis because a separate analysis demonstrated that inclusion of responses from non-community practitioners did not have a statistically significant effect on survey outcomes.

A total of 268 respondents identified the most common questions received at their practice site. Pharmacists identified drug interactions, adverse drug reactions, and nonprescription drug therapy as the most common types of questions answered. See Table 1 for a comprehensive list of responses. In a related question, respondents were asked to identify the top 3 types of questions answered on a routine basis. Similar to the results of the previous question, 65% (n = 173), 63% (n = 168), and 62% (n = 166) identified nonprescription drugs, adverse drug reactions,

Table 1. Categories of Drug Information Requests Received by Community Pharmacists (n = 268)

Question Classification	Encountered in Practice, No. (%)
Drug interactions*	229 (85.8)
Adverse drug reactions [†]	229 (85.8)
Nonprescription drugs*	220 (82.4)
Dosing [†]	195 (73.0)
Drug therapy [†]	160 (59.9)
Drug identification [†]	143 (53.6)
Drug administration*	137 (51.3)
Herbals [†]	134 (50.2)
Pregnancy*	128 (47.9)
Contraindications [†]	109 (40.8)
Disease state*	97 (36.3)

*One value missing

[†]Two values missing

and drug interaction questions, respectively, as the most commonly received type of question.

All respondents identified at least one resource commonly used to answer drug information questions. Non-electronic resources were the most frequently utilized resources in the community practice setting. The majority of respondents identified *Drug Facts & Comparisons*, *Package Insert/Physicians Desk Reference*, and/or *Drug Information Handbook* as the drug information resource used in practice to answer questions. Other resources and the cited frequencies of use are listed in Table 2.

Participants were requested to estimate the number of drug information questions received during an average workday. Ninety-two (34%) responding pharmacists reported answering between 1 to 5 questions per day while 100 pharmacists (37%) reported answering 6 to 10 questions per day. Less than 15% of respondents estimated answering either 11-15 or ≥ 16 questions per day.

The expected speed of responding to a drug information request in the community was estimated by 264 pharmacists. The majority of pharmacists (n = 150) reported that on average, patients were willing to wait 5 minutes for a pharmacist to research a question and provide a response. Fifty-two (20%) pharmacists felt patients were not willing to wait to have questions answered and wanted a response immediately. Longer wait times such as half day or next day were only reported by 13 (5%) and 8 (3%) pharmacists, respectively.

The final question of the survey instrument evaluated what methods community practitioners employ when time and/or resources are unavailable to answer a drug information question in a timely manner. One hundred

Table 2. References Used to Answer Drug Information Requests in the Community

References	Resource Used, No. (%)
<i>Drug Facts and Comparisons</i>	185 (69.3)
Package Insert/ PDR	167 (62.5)
<i>Drug Information Handbook</i>	112 (41.9)
Clinical Pharmacology	77 (28.8)
PDA program*	58 (21.7)
<i>American Hospital Formulary Service</i>	18 (6.7)
Micromedex [†]	12 (4.5)
Gold Standard [‡]	9 (3.4)

*PDA programs used included *Lexi-Comp* (n = 35; 60%); *Epocrates* (n = 22; 38%)

[†]Used by 3 community practitioners (25%)

[‡]Gold Standard products include *Alchemy*, *Clinical Pharmacology*, *eMPOWERx*, and *Pharmacy Solutions*

twenty-five (47%) of the 265 respondents reported that the patient was referred to his/her physician. Researching the question at home (n = 75) and contacting a drug information center (n = 71) were cited as methods by less than a third of respondents. Other methods cited included researching the question at work and contacting the patient at a later time, contacting the manufacturer, and consulting with another pharmacist or a pharmacy student.

During the 2004-2005 academic year, 763 drug information requests were answered by SUGDIS. The most common classification aside from "other" was drug therapy (n = 106), representing 13.9% of requests. Dose/dosing (n = 78; 10.2%), adverse drug reactions (n = 50; 6.5%), drug ID/availability (n = 44; 5.7%), and drug interactions (n = 43; 5.6%) rounded out the top 5 most commonly received questions at SUGDIS. Time to respond was highly variable. Although the center receives a number of questions that are answered rapidly (<15-30 minutes), the mean time to answer a question during the study period was 4 hours.

SUGDIS has a large collection of monograph resources including all resources listed on the survey. As the drug information database could not be queried for the overall most commonly used references, the most commonly used resources for individual classification types were analyzed. The resources used to answer questions about nonprescription drugs, adverse drug reactions, and drug interactions were specifically targeted for analysis because these question categories represented the questions community pharmacists were most likely to receive in practice according to the survey results. Only 3 nonprescription drug questions were received during the 2004-2005 academic year, so no meaningful conclusion

regarding reference utilization could be drawn for the question classification. The most common references used to answer adverse drug reactions questions included *Meyler's Side Effects of Drugs* (30%), *Clinical Pharmacology* (30%), and *AHFS* (24%). The majority of drug interaction questions were answered by consulting specialty resources such as *Drug Interaction Facts* (58%), *Hansten and Horn's Drug Interaction Analysis and Management* (44%), and *Lexi-Interact* (42%).

DISCUSSION

This study confirms that answering drug information questions is an important service that pharmacists provide in the community. Seventy-one percent of Southeastern pharmacists responding to the survey reported receipt of 1 to 10 drug information questions per day. The results revealed the most common drug information requests in the community pharmacies surveyed were nonprescription, adverse drug reactions, and drug interactions.

While the potential for recall and regional bias exists, results of the present survey are similar to other studies that have evaluated the characteristics of drug information requests in the community. During a 1-year study, 52 students completing a community pharmacy APPE documented the classifications of health-care professional and consumer-based drug information requests. Study results indicated questions from consumers were most likely to be classified as adverse drug reactions, while questions from health professionals were likely to be classified as dosage and drug administration.⁸ A survey of 162 community and independent pharmacies in Louisiana reported nonprescription medications, adverse drug reactions, and contraindications/warning questions as the top 3 types of questions received from the public and other health professionals.¹⁰

Comparison of the characteristics of community-based drug information questions obtained from the present survey and characteristics of questions received at an academic drug information center revealed notable differences. Surveyed community pharmacists reported nonprescription drug questions as the most frequently asked question, while drug therapy questions were the most frequently documented drug information requests at SUGDIS. The high frequency of requests for drug therapy information is not unique to SUGDIS. A national survey of US drug information centers also confirms the most common information request category is therapeutics.³ Nonprescription questions are rarely received at SUGDIS as evidenced by the receipt of only 3 such questions during the 2004-2005 academic year. The difference in question classifications received between the 2 practice

settings is not unexpected since the center receives most requests from hospitals or the long-term care setting, while presumably most questions posed in the community are from consumers.

In addition to classification, a difference in expected time to respond to drug information requests was also noted. The opinion of surveyed pharmacists was that most patients are only willing to wait 5 minutes for a response while the average time to respond to a question at SUGDIS during 2004-2005 was 4 hours. This difference is most likely a result of SUGDIS becoming increasingly involved in policy/procedure creation and new drug evaluations for P&T committees.

The present survey also revealed that *Drug Facts and Comparisons* is the reference most commonly used to answer drug information requests in the community. A recent survey of 604 Alabama pharmacies demonstrated that over 90% of respondents reported availability of *Drug Facts and Comparisons* in the facility.¹¹ Although Alabama law suggests that pharmacies have the latest edition of *Drug Facts and Comparisons*, any reference or electronic media meeting the level of pharmacy practiced at the site will satisfy state laws for reference availability.¹² Surveys administered to community pharmacies in other states similarly have indicated that *Drug Facts and Comparisons* is the most frequently utilized resource. Results of surveys evaluating resources utilized by pharmacists in Southeastern Michigan, Louisiana, and North Dakota concluded that *Drug Facts and Comparisons* was the resource community pharmacists were most likely to use to answer questions.^{10,13,14} At SUGDIS, students are encouraged to become familiar with a variety of monograph resources in addition to *Drug Facts and Comparisons*. Resources used in answering questions at the center are selected by the student with assistance from a drug information specialist. A review of resources used at SUGDIS to answer question categories regularly received by community pharmacists demonstrated that *Drug Facts and Comparisons* was not 1 of the 3 most commonly used references to answer either adverse drug reactions or drug interaction questions. Of the 6 resources used commonly to answer adverse drug reaction or drug interaction questions at SUGDIS, 5 of 6 references were either specialty resources or monograph resources not readily available in community pharmacies.

As pharmacists desire to be singled out among health care providers as "the drug experts," CAPE has recommended that all graduates of institutions accredited by the Accreditation Council for Pharmacy Education (ACPE) be proficient at providing drug information. This may or may not be occurring in practice. According to the present survey, 47% of respondents refer patients to physicians if

a drug information question cannot be addressed by the pharmacist, regardless of the reason. Pharmacists may not be able to answer questions for a variety of reasons including lack of time, lack of resources, or lack of training. Based on the comparative analysis between community-based questions and questions received at SUGDIS, it may be that academic-affiliated drug information centers with a primarily hospital-based clientele do not receive a sufficient number of community-based questions or utilize community-based resources frequently enough to allow students to become experts at providing responses to drug information inquiries under conditions present in the community setting.

In order to ensure students are provided with learning opportunities within the drug information APPE that expose them to questions and resources they are likely to encounter in the community setting, 2 key areas for improvements were identified at SUGDIS. The first area targeted for improvement was the number of community-based questions received by the center and the emphasis on community-based resources. The 2 categories of questions that are commonly answered in practice, but rarely in the drug information APPE experience are questions concerning nonprescription medications and herbal products. As a result, students have limited opportunities to locate responses to such questions and are not exposed to potential references that can assist the community practitioner in answering these common questions. The first activity developed in response to this identified problem was an herbal/nonprescription drug reference discussion session. The goal of this session is for the student to assess the quality and usefulness of available herbal and nonprescription drug references. Each student is provided with either a nonprescription drug or herbal question that has been solicited from a local community practitioner and assigned a reference. During research of the question, students are expected to evaluate the reference in terms of cost, authorship, special features, strengths and weaknesses, and usefulness of the resource in community practice. During a group session, students report on the answer to their question, describe the reference, and provide a recommendation regarding whether they would purchase the reference to use in their future practice setting.

Another proposed activity in the development to increase student exposure to community-based drug information questions is creation of a databank of community questions. The plan is to identify community practitioners who would be willing to share with SUGDIS questions they have received that have required consultation of reference(s). This databank will allow each APPE student to receive 3 to 4 community-based questions to be discussed individually with a preceptor.

The second area targeted for improvement was the expected speed of responding to a drug information request. Most of the questions received at SUGDIS are complex and require several hours of research. As a result, students are infrequently placed in time-pressured situations that command efficiency in categorizing a question, high familiarity with a reference, and speed in locating a response. The 5-minute question session, a learning activity that was already incorporated in the drug information APPE to help mimic drug information practices in the community, was revised based on the survey results. The goal of the 5-minute question session is for the student to efficiently answer a drug information question in 5 minutes. Students are paired and given a question that can be answered with tertiary literature references available in the community setting. Students are allowed 5 minutes to categorize the ultimate question, develop a search strategy, and locate an answer. After the allotted time, students meet as a group and discuss the answer to the question and references used to assist in answering the question. Based on the results of the survey, an effort has been made to develop drug interactions, adverse drug reactions, and nonprescription drug questions for the exercise.

The survey has also prompted faculty members to incorporate a hands-on tutorial of drug interaction resources during the 5-minute question session. As a group, students receive a drug interaction question and are required to research the question in 4 subscriber-based drug interaction databases. Online references that do not require a subscription and can be utilized to answer drug interactions questions are also mentioned during the discussion (eg, Drugs.com, Express Scripts, Discovery Health, Drugstore.com). Students receive a detailed tutorial on how to use each drug interaction database and the advantages and disadvantages of each database.

The results of this research indicate a need for increasing community-based questions for our students. The new learning experiences incorporated in the drug information APPE at SUGDIS are for students to become familiar with the references and resources available to answer questions during training and future questions as practicing pharmacists.

CONCLUSIONS

The characteristics of community-based drug information inquiries compared to the characteristics of inquiries students receive during the drug information APPE at Samford University were determined. Disparities in categories of received questions, expected speed of response,

and reference utilization were noted between the 2 practice settings. Nationally, there is also likely to be discordance between experiential training and postgraduation drug information experiences because the majority of centers serving as drug information APPE sites are affiliated with a hospital while the majority of pharmacists continue to practice in community pharmacy. If drug information training sites wish to meet the 2004 CAPE goals to train graduating pharmacists to become drug information providers to both health-care professionals and consumers, the discrepancies observed in this study must be removed. At Samford University, this issue is being addressed by incorporating activities into the drug information APPE to expose students to questions, references, and expected response times they are likely to encounter in the community.

REFERENCES

1. The AACP Center for the Advancement of Pharmaceutical Education (CAPE) Advisory Panel on Education Outcomes 2004 Education outcomes. Available at: http://www.accp.org/Docs/MainNavigation/Resources/6075_CAPE2004.pdf. Accessed May 22, 2006.
2. Kendrach MG, Weedman VK, Lauderdale SA, Kelly-Freeman M. Drug information advanced practice experiences in United States pharmacy schools. *ASHP Midyear Clinical Meeting*; 2005;40, PI-75.
3. Rosenberg JM, Koumis T, Nathan JP, Cicero LA, McGuire H. Current status of pharmacist-operated drug information centers in the United States. *Am J Health-Syst Pharm*. 2004;61:2023-32.
4. Mott DA, Doucette WR, Gaither CA, Kreling DH, Pedersen CA, Schommer JC. Pharmacist participation in the workforce: 1990, 2000, and 2004. *J Am Pharm Assoc*. 2006;46:322-30.
5. Levy S. Consumers say thank you. *Drug Top*. 2004;148(6):44-52.
6. Cardoni AA, Palmer HA, Grover R. Drug information and the community pharmacist. *J Am Pharm Assoc*. 1977;17:680-4.
7. Avey SG, Strand LM, Morley PC. The pharmacist as drug information consultant. *NARD J*. 1986;108:131-3.
8. Cerulli J, Zeolla MM, Cottrell J. Drug information questions posed to community pharmacy advanced practice experience students. *Am J Pharm Educ*. 2004;68(3);Article 68.
9. Dillman DA. *Mail and Internet Surveys. The Tailored Design Method*. 2nd ed. New York, NY: John Wiley & Sons, Inc; 2000:247.
10. Rae CE, Rappaport HM, Mahajan P. Drug information sources used by community pharmacists in Louisiana: a preliminary study. *J Pharm Technol*. 1992;8:30-5.
11. Schrimsher RH, Kelly-Freeman M, Kendrach MG. A survey of drug information resources in Alabama pharmacy facilities. *Drug Inf J*. 2006;40:51-60.
12. Title 34. Practice of Pharmacy Act 205. Available at: <http://www.albop.com>. Accessed November 6, 2006.
13. Poirier TI, Ascione FJ. Printed drug information sources used by pharmacists in Southeastern Michigan. *Am J Hosp Pharm*. 1980;37:687-90.
14. Miller DR. North Dakota pharmacists use of drug information. *Drug Inf J*. 1980;14:186-90.