Impact of Introductory Pharmacy Experience on Student Learning, Satisfaction, and Clerkship Site Productivity: Assessment of the EPOC Program

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Abstract

Objectives: Our Early Patient-Oriented Care (EPOC) program gives pharmacy students introductory practice experience (IPE) while providing clinical services to hemodialysis outpatients. We assessed the EPOC program to determine if it incorporates the desired attributes of an IPE, estimated its impact on student learning and clerkship site productivity, and evaluated student satisfaction.

Methods: An assessment form was developed and completed by EPOC preceptors (n = 3) and current students (n = 24) to determine if EPOC incorporates characteristics of an ideal IPE. Additionally, EPOC activities were identified and applied to two algorithms that estimate the impact of clerkship activities on student learning opportunities or impact site productivity. Finally, past EPOC students (n = 27) rated their satisfaction with the EPOC experience using a standard clerkship evaluation form.

Results: Preceptors and students similarly ranked EPOC highly as providing the desired characteristics of an IPE. EPOC activities produced optimal learning opportunity scores while having minimal but positive impact on site productivity. Student evaluations indicated a high degree of satisfaction with the EPOC experience.

Conclusion: The EPOC program incorporates the desired characteristics of an IPE, provides students with an optimal learning opportunity, marginally but positively impacts participating dialysis centers and provides students a highly satisfactory learning experience.

Key Words: pharmacy education, clerkship, experiential education, introductory practice experience

Introduction

The American Council of Pharmaceutical Education (ACPE) Accreditation Standards and Guidelines recommend that pharmacy students acquire both introductory and advanced practice experiences of "adequate intensity, breadth, and duration" as a continuum throughout the curriculum. Additionally, introductory practice experiences (IPEs) should be offered early in the curriculum to provide students the opportunity to integrate their knowledge of disease states and therapeutics with practical experience and develop the skills necessary to perform as a pharmacist.[1-3] It has been suggested by Beck et al that IPEs should incorporate certain criteria, which stem from three desired educational outcomes: professional socialization, application of pharmaceutical care philosophy, and lifelong learning.[4]

Our Early Patient-Oriented Care (EPOC) program was designed to provide students with clinical experience early in their pharmacy education while providing limited, but important, pharmacy services to

hemodialysis (HD) outpatients at local dialysis centers. The EPOC experience originally encompassed four semesters and was offered to six students per year who were each assigned 12-15 HD patients. The success of the EPOC program in terms of clinical interventions has been previously reported.[5] Since this last report, the EPOC program has undergone considerable modification. A brief description of the current EPOC program follows.

The EPOC program was developed and is directed by a primary preceptor who is a full-time pharmacy practice faculty member at a private pharmacy college (Albany College of Pharmacy). Post-doctorate fellows, under the primary preceptor's mentorship, also participate as preceptors in the program. EPOC is offered to baccalaureate and doctor of pharmacy students entering the fourth year of the respective five and six year programs. Twelve students are selected per year and each is assigned three HD patients, for whom they provide continuous clinical services. The students spend several hours per week in the dialysis units obtaining medication histories through patient interviews, reviewing patient medical records and laboratory results and interacting with other healthcare professionals. Students meet with preceptors weekly to present patient cases, discuss potential interventions, and review therapeutics.

The EPOC program incorporates a progressive *"see it, do it, teach it"* model over the course of three semesters. During the first (fall) semester, entering fourth year students shadow the fifth year students who are completing their third and final semester of the program. The junior students *see it* while the senior students have the opportunity to *teach it*. In the second (spring) semester, the fourth year students assume responsibility for the patients and enter the *do it* phase. In the following fall semester, the students come full circle and now teach the new group of junior EPOC students.

Although EPOC was designed to comply with the ACPE guidelines , it is important to periodically assess the degree to which these goals are being met. In addition to assessing student learning opportunity, it is important to consider the potential for negative outcomes or consequences of clerkship placement on the productivity of a clerkship site.[6] Therefore, our objectives were to determine, using objective methods, if the EPOC model provides the desired attributes of an IPE and to assess the impact of the EPOC program on student learning and site productivity. Additionally, we evaluated student satisfaction with the EPOC experience.

Methods

Evaluation of the EPOC program as an educational tool was performed using previously published methods and criteria. These included criteria describing the desired requirements of an early pharmacy practice experience and algorithms that estimate the impact of clerkship activities on student learning opportunity and site productivity.[4,6] Additionally, student clerkship evaluations were used to obtain the students' perspective about their experiences in the EPOC program.
The EPOC program was assessed to determine if it encompasses the following criteria: (i) continuous patient care, (*ii*) problem solving, (*iii*) outcome assessment, (*iv*) development of a peer-mentor team, (*v*) opportunity to develop reflective judgment, (*vi*) development of lifelong learning skills, (*vii*) andragogy-based learning, (*viii*) promotion of professional socialization.[4] Using these criteria, an assessment form was developed. The eight-part questionnaire incorporated a five point ranking scale (1 = strongly disagree; 5 = strongly agree). EPOC preceptors, as well as a group of current EPOC students, completed the questionnaire. Preceptors consisted of the primary preceptor, and a current and past post-doctorate fellow. Students were asked to anonymously return the completed questionnaire via campus mail on a voluntary basis.

Algorithms were used to provide categorical results representing both clerkship site (site productivity) and educational (learning opportunity) perspectives.[6] The site productivity algorithm (Figure 1) is based upon four criteria: level of student supervision, who may supervise, time required to train students to perform activities and the necessity of the activities. Application of the site productivity algorithm yields a category letter (A - H) representing a continuum of potential for students to have an impact on the clerkship site (A = positive impact; H = negative impact).

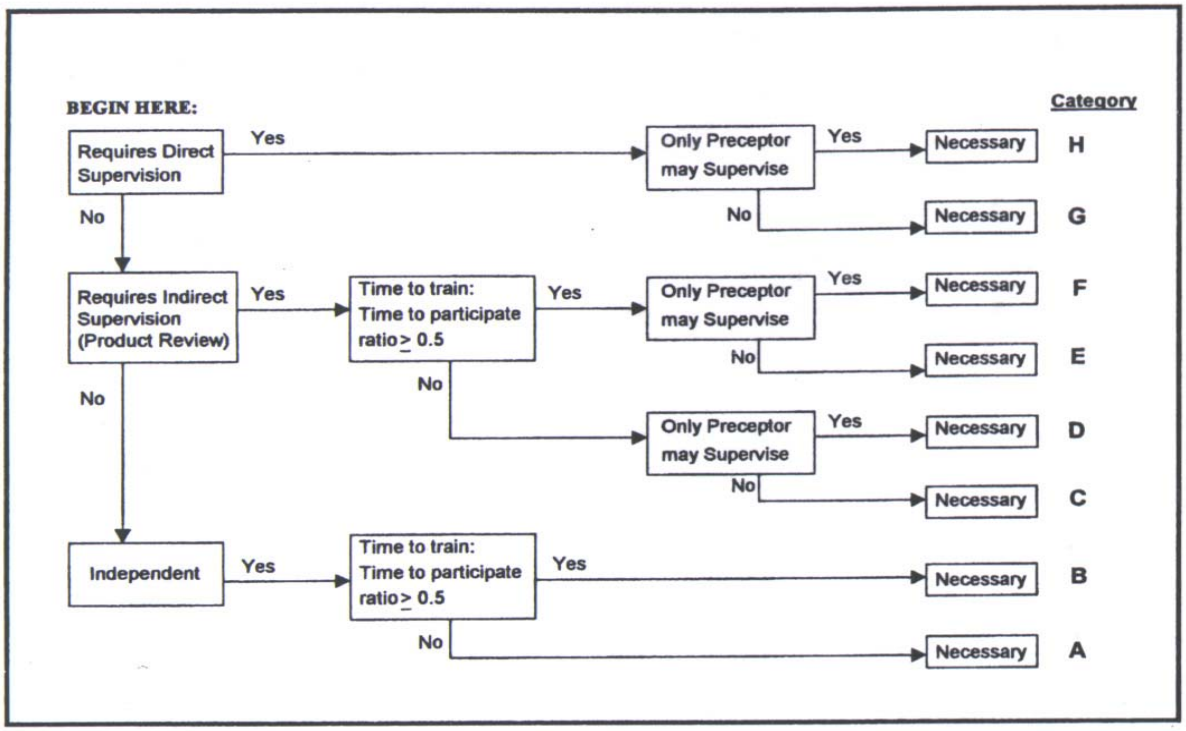

Fig. 1. Site Productivity Impact Algorithm. Use the algorithm to estimate the impact potential of a clerkship activity. The categories represent a continuum from negative (H) to positive (A) impact.

Figure 1. Site impact algorithm. Reprinted with permission from Am J Pharm Educ.[6] Copyright 1998, American Association of Colleges of Pharmacy.

The learning opportunity algorithm (Figure 2) is also based upon four criteria: level of student involvement in an activity, knowledge of the activity outcome, repetition of activity and performance evaluation. Application of the learning opportunity algorithm yields a category letter (A - G) representing a continuum of potential for students to learn (A = optimal opportunity; G = minimal opportunity).

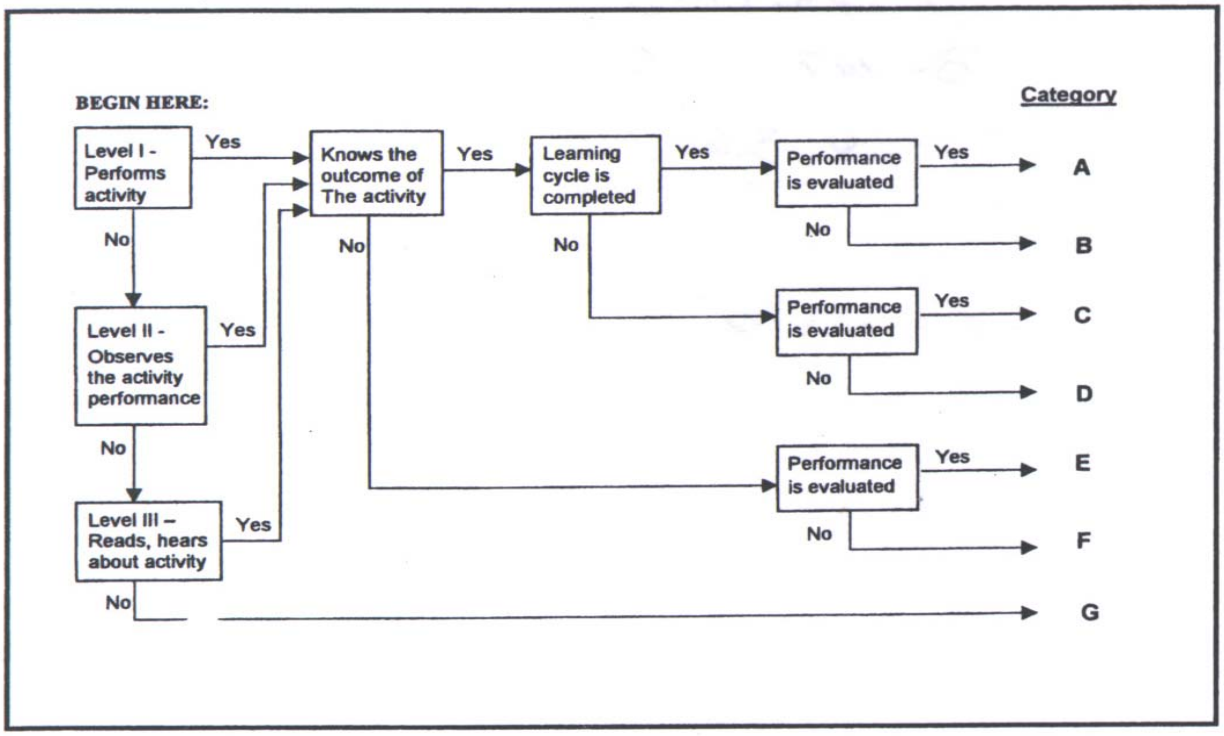

Fig. 2. Learning Opportunity Algorithm. Use the algorithm to estimate the learning opportunity provided by a clerkship activity. The categories represent a continuum from minimal (G) to optimal (A) opportunity.

Figure 2. Learning opportunity algorithm. Reprinted with permission from Am J Pharm Educ.[6] Copyright 1998, American Association of Colleges of Pharmacy.

To use the algorithms, core activities performed by EPOC students were identified by the EPOC preceptors. Each preceptor individually compiled a list of EPOC activities. Consensus between all contributors was reached following discussion and a final comprehensive list was produced. Each of the two algorithms were subsequently applied to each EPOC student core activity.

To obtain the students' perspective about their experiences in the EPOC program, student clerkship evaluations were assessed. Upon completion of the program, students are required to evaluate their EPOC experience using the college's standard clerkship evaluation form. The form asks students to rank various components of their clerkship experience using a scale of one to five (one = inadequate; five = extensive). The components assessed include the overall learning experience, the preceptor's performance as a teacher and practitioner, as well as the contribution to other personnel and resources at the site. All retrievable clerkship evaluations submitted by past EPOC students were reviewed.

Assessment of the desired characteristics of an IPE and student satisfaction with EPOC was carried out using rank scales, which produced ordinal data. Analysis of these data was performed using descriptive statistics and all results are reported as median and mode values. The learning opportunity and site productivity impact algorithms provide a single result for each core activity. These results are categorical and reported as such.

Results

Since its inception in 1996, 44 students have been accepted into the EPOC program. To date, 97 % (31/32) have successfully completed the program. Eleven of the 12 students accepted into the current class are still participating. Only two students have failed to successfully complete the program: one was removed and another voluntarily withdrew.

Assessment of the EPOC program in terms of the desired attributes of an early pharmacy practice experience produced similar results from preceptors (n = 3) and students (n = 20). Student assessments were performed during the fall semester (2001) and both senior students in their final semester (n = 9 of 12) and junior students in their first semester (n = 11 of 11) of the program completed the questionnaire. Scores of preceptors and students were added together. Preceptor, student, and overall results for each criterion are listed in Table 1.

Table 1. Ranking of the EPOC program based upon desired characteristics of an early pharmacy practice experience. (1 = strongly disagree; 5 = strongly agree)

Criteria	Preceptors (n = 3) median	Students (n = 20) median	Total (n = 23) median	mode
1. The program conveys a pharmaceutical care model. Students:				
a) develop pharmacist-patient relationships	5.0	5.0	5.0	5.0
b) develop patient care-based focus	5.0	5.0	5.0	5.0
c) assume responsibility for and manage drug-related problems	4.0	5.0	4.0	5.0
d) provide continuous patient care: they have longitudinal responsibility for a group of patients	5.0	5.0	5.0	5.0
2. Students gain problem-solving experience.	5.0	5.0	5.0	5.0
3. Students have the opportunity to observe and assess patient outcomes over time.	5.0	5.0	5.0	5.0
4. Students are members of a peer-mentor team.				
a) Students are mentored by faculty/practitioners.	5.0	5.0	5.0	5.0
b) Junior students are mentored by senior students.	5.0	5.0	5.0	5.0
5. The program promotes professional socialization. Students interact with:				
a) Faculty/practitioners	4.0	4.0	4.0	4.0
b) Physicians	2.0	2.0	2.0	2.0
c) Nurses	4.0	3.8	4.0	4.0
d) Others (dieticians, physician assistants, social workers, etc.)	4.0	3.0	3.0	3.0
6. Opportunity to develop reflective judgment. Students have time to reflect on their practice experiences.	5.0	4.0	4.0	4.0
7. Active learning.				
a) Learning is active and student-centered.	4.0	5.0	5.0	5.0
b) Students have opportunity to apply newly acquired knowledge to real life experiences.	5.0	5.0	5.0	5.0
8. Development of lifelong learning skills / completion of experiential learning cycle.				
a) Concrete experience: students interact with actual patients.	5.0	5.0	5.0	5.0
b) Review and reflection: students opportunity/time	5.0	5.0	5.0	5.0

to reflect on patient encounters.				
c) Abstract conceptualization: students are motivated to research and better understand complex therapeutic issues.	5.0	5.0	5.0	5.0
d) Active experimentation: students have opportunity to apply new knowledge.	5.0	5.0	5.0	5.0

Overall (n = 23) a median score of 5.0 was reported for the majority of criteria. Exceptions were noted regarding students' responsibility for and management of drug-related problems (criterion # 1.c.) and opportunity for reflective judgment (criterion # 6), both of which received median scores of 4.0. Under professional socialization, student interaction with faculty/practitioners and other health care professionals (criterion #5.a.) received a median score of 4.0, while interaction with physicians (5.b.), nurses (5.c.), and others (5.d.) received median scores of 2.0, 4.0, and 3.0, respectively.

Nine core EPOC student activities were identified by preceptors (Table 2), to which the student learning opportunity and site productivity algorithms were applied. All activities produced a learning opportunity score of "A". Site impact scores were "D" for activities 1 through 7. Activities 8 and 9 were not evaluated for site impact, as they took place at the college, not at EPOC sites.

Table 2. Core EPOC student activities and corresponding results of learning opportunity and site impact algorithms.

EPOC Student Activities	Learning Opportunity*	Site Impact**
1. Conduct patient medication histories	A	D
2. Update patient medication list	A	D
3. Monitor/evaluate drug therapy	A	D
4. Provide medication counseling	A	D
5. Document pharmaceutical care activities	A	D
6. Retrieve pertinent patient information (chart, computer)	A	D
7. Communicate with health care providers (RPh, RN, RD, MD)	A	D
8. Participate in weekly classroom discussions with preceptor(s)	A	N/A
9. Provide therapeutics/case presentations to peers	A	N/A

* Learning opportunity: A = optimal opportunity, G = minimal opportunity.
** Site impact: A= positive impact, H = negative impact.

Assessment of past student clerkship evaluations (n = 26) demonstrated a high degree of satisfaction with the EPOC program (Table 3). The overall learning experience was rated high, as was the preceptor for being both a teacher and practitioner. Each of these categories received a median score of 5.0. Evaluation of the variety of experiences offered and other personnel at the clerkship site each produced median scores of 4.0. All students reported that they would recommend the EPOC program to other students.

Table 3. Students' (n = 26) evaluation of the EPOC program using the college's standard clerkship evaluation form. (1 = Inadequate; 5 = Extensive)

Pharmacy Clerkship Evaluation	**Median**	**Mode**
Learning Experience at Site		
Please rate:		
1. the value of the experience obtained at your site	5	5
2. the variety of experiences at your site	4	4
3. the degree to which you feel your experiences met the specified goals and objectives	5	5
4. the degree to which you feel your experiences helped you prepare for practice	5	5
5. your degree of satisfaction with your experience	5	5
6. the overall value of your site	5	5
Evaluation of your preceptor as a teacher		
Rate the degree to which you feel your preceptor:		
1. assisted you in individualizing program objectives	5	5
2. assisted your attainment of the goals of this rotation	5	5
3. helped you integrate knowledge of drug therapy with patient care	5	5
4. performed as a teacher	5	5
Evaluation of your preceptor as a practitioner		
Rate the degree to which you feel your preceptor:		
1. keeps up with changes in pharmacy practice	5	5
2. practices pharmacy in a patient-oriented manner	5	5
3. interacts with other members of the health-care team	5	5
4. is a role-model for pharmacy practice	5	5
5. helped you prepare for pharmacy practice	5	5
Evaluation of other personnel at your site		
Rate the degree to which other personnel at your site:		
1. understood the goals and objectives of this rotation	4	4
2. understood your role as a student	4	4
3. assisted you in attaining the goals of this rotation	4	4
Would you recommend this rotation to another student?	100 % YES	

Discussion

The principal goal of this assessment was to objectively determine the educational value of the EPOC program. To carry out our assessment, we used previously published methods. However, there is no commonly accepted method for assessing an IPE. As a result, we used a compilation of established criteria to produce a useful and comprehensive method for the assessment of any IPE.

Based on our results, we are confident that we are providing an excellent learning experience via the EPOC program. The optimal learning opportunity and high level of student satisfaction provided by EPOC demonstrates the potential educational value of an IPE and lends support to the ACPE recommendation that these types of experiences be offered to pharmacy students. Furthermore, although not the focus of this assessment, the clinical value of the IPE should not be overlooked. We have previously reported that students in the early stages of their pharmacy education can significantly impact patient care through participation in an IPE.[5]

In addition to validating the utility of the EPOC learning model, and perhaps more importantly, we have identified some areas for improvement. We are currently attempting to improve the professional socialization of our students by increasing their opportunities to interact with other health care professionals. We are also in the process of exploring opportunities to expand the EPOC program to other clinical settings to provide early pharmacy practice experience to more students at our institution.

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Limitations

Although we are pleased with the overall results of our assessment, there are several limitations to our methods, which should be considered. Foremost is the relatively low number of students included. The questionnaire assessing EPOC in terms of desired attributes was completed by 20 of 23 (87%) current EPOC students. Although we would have preferred a higher number, this represented the largest group of EPOC students to be involved in the program since its inception. During the previous five years, enrollment was intentionally limited to five or six students per year and 19 students had completed the program. Our inclusion of past clerkship evaluation forms (n = 26) was intended to include these past students. However, clerkship evaluations were retrievable for only 14 of these past students. Additionally, 12 senior EPOC students, who were included as current students in the aforementioned desired attributes assessment, graduated from the program and also completed clerkship evaluation forms during the time this project was being carried out.

A second limitation involves our application of the site impact and learning opportunity algorithms.[6] These algorithms were originally developed to assess traditional advanced clerkship experiences. Although the learning opportunity algorithm is easily applied to various settings, the site impact algorithm is not ideal for evaluating the IPE. There are several limitations to our use of this algorithm. The first concerns the "time to train: time to participate" ratio. One could argue that the entire time of participation in an IPE is training time and thus the ratio is one. However, we chose to use a ratio of less than 0.5 because the students require relatively little directly observed training to actually begin their participation in the EPOC program. Additionally, most of their training takes place in the classroom, which does not adversely affect productivity in the dialysis unit.

Another limitation to our application of the site impact algorithm stems from the questions regarding supervision. As a minimum, our state laws mandate that pharmacy students have indirect supervision by a licensed pharmacist. Since the dialysis centers do not employ staff pharmacists, the preceptor is the only one who may supervise EPOC students. These two factors automatically limit our possible results to a maximum achievable value of "D."

In fact, each activity performed at the dialysis centers did receive a score of "D," which implies only minimal, but positive impact on the dialysis centers' productivity. In the absence of a suitable alternative method for assessing the impact of an IPE on clerkship site productivity, this algorithm still provides useful data. However, because the students are providing an important service, which otherwise would not be provided at all, we believe the actual impact on the dialysis centers is very positive.

Lastly, we acknowledge that a certain level of subjectivity is inherent in any self-assessment. However, in addition to basing our assessment on established criteria/methods, we feel that having students involved in the assessment adds validity to our results. In addition to ranking the program based upon the desired characteristics of an IPE, students were included in the assessment process via their clerkship evaluation forms. Finally, the high degree of cross-validation observed among the various assessments employed lends further creditability to our findings.

Conclusion

Although recommended by ACPE, greater efforts are still needed to provide quality early pharmacy practice experiences to all pharmacy students. Once established, early experience programs should be routinely reviewed to ensure they provide certain criteria and to assess their impact on student learning as well as clerkship site productivity. The EPOC model represents a successful means of incorporating the desired attributes of an IPE and providing students an optimal learning opportunity while positively impacting patient care at local dialysis centers. In addition to these outcomes, past students have expressed a high level of satisfaction with the EPOC experience.

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