

# Preclinical Exposure in a Baccalaureate Program in Pharmacy

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This pilot study was conducted in order to determine whether exposure of fifth-year pharmacy students to an early clinical experience would enhance concurrent didactic and subsequent clerkship performance. Ten students participated in a two-week early clinical exposure program during which time they rounded with clinical faculty; utilized patient charts, medication profiles and laboratory tests; were assigned patients to follow; identified and solved drug-related problems; presented patients; and completed a drug information request. Compared to ten matched controls, no differences in subsequent didactic or clerkship performance were detected between the groups. Nonetheless, course evaluations from students and faculty indicated that early exposure of students to a clinical clerkship was beneficial. The results of this pilot program will assist in the development of an early exposure program for our newly approved entry-level PharmD degree curriculum.

## INTRODUCTION

Experiential programs are an integral component of the pharmacy curriculum affording practical experiences as well as a mechanism to ascertain an individual's professional competency. The American Association of Colleges of Pharmacy has recommended including experiential programs early in the pharmacy curriculum in order to better prepare students for contemporary pharmacy practice(1). The rationale is that early exposure will enhance the relevance of student studies, will help identify career opportunities, and will increase students' understanding of pharmacy practice. As pharmacy education embraces the entry-level PharmD

degree(2), an assessment of what effect early exposure to pharmacy practice has on subsequent student performance becomes even more important.

Nearly ten years ago a shadow program designed as a strategy to improve recruitment for hospital pharmacy interns and hospital pharmacists was reported by Saine and Hicks(3). Second professional year pharmacy students from a baccalaureate pharmacy curriculum were given an opportunity to shadow a staff pharmacist for one three-four hour period. The authors reported success in the ability of students to subsequently identify and describe the services of a hospital pharmacy and to describe interactions of hospital

pharmacists with other health professionals.

Subsequently, Rivey *et al.* noted that a mini-externship offered to students in the first professional year of their pharmacy curriculum was considered valuable by students and preceptors and enhanced the students' perception of the profession of pharmacy(4).

Becker reported her experience with an orientation program to hospital pharmacy practice for freshmen pharmacy students as part of an introduction to pharmacy course(5). Students were required to attend one three-hour hospital visitation; hospital pharmacists served as preceptors. Practitioners as well as students felt that the program was successful, that it fostered a positive relationship between the College and hospital pharmacy practitioners, and that it was an effective means of introducing students to one career option.

Bucci *et al.* reported their experience of a shadow program involving freshmen of a 2/4 entry-level degree PharmD program(6). They noted that despite a lack of statistically significant difference in ability to master course objectives, students and preceptors felt that introduction of students to an early pharmacy experiential component in the curriculum was beneficial.

These programs typically (except for Bucci) involved the student in only one exposure to a particular practice site, and none attempted to measure any effect that the experience may have had on subsequent student performance. Additionally, most of the previously reported projects involved a passive involvement of the students. As Medline and International Pharmaceutical Abstracts literature searches were unable to identify information assessing the utility of early clinical exposure, we conducted this pilot study in an attempt to determine if exposing fifth-year pharmacy students to an active early clinical experience might enhance subsequent didactic and clerkship performance. This information would also be used to assist in the development of an early clerkship experience in a proposed entry-level PharmD degree program.

## METHODS

The Albany College of Pharmacy BS curriculum (a 0/5 program) includes a three semester sequence in Clinical Pharmacy and Therapeutics (CPT). CPT is taught in both semesters of the fourth year and the fall semester of the fifth year. In the spring semester of the fifth year, each student completes the Professional Experience Program (PEP). The PEP includes three five-week rotations: one clinical, one community, and one institutional. This project was first presented as an announcement to the fifth-year class during orientation for the final course in the CPT sequence (CPT-III). It was announced by the course coordinator (GML) that we were seeking volunteers for a research project that would involve a significant time commitment in addition to their regular studies. The program would last two weeks. Responsibilities would include the following:

1. rounding with a preceptor three times per week for one hour;
2. meeting with preceptor one additional time each week for approximately one hour to discuss patient related topics;
3. learning how to utilize a patient chart, medication profiles, and laboratory reports for the purpose of providing pharmaceutical care;
4. providing pharmaceutical care for one patient;

5. conducting a literature review in order to provide an answer (oral and written) to one drug information question; and
6. presenting patient data for the one patient whom the student is providing pharmaceutical care for (*i.e.*, discussing therapeutic alternatives, expected outcomes, drug-related problems, etc.) at the end of the second week.

Upon completion of each student's responsibilities, he/she would be awarded 1.0 semester hour of credit with a letter grade assigned. It was agreed by the investigators and the participating faculty that each student successfully completing the assigned responsibilities would receive a letter grade of "A." Of 117 students in the class, 62 volunteered to participate in the study. Due to scheduling conflicts and the limited number of available preceptors in the local area, ten students were randomly chosen to participate (actives). The investigators would have preferred a higher number, (*e.g.*, 30) to increase the statistical power of the study. However, for reasons outside of the investigators' control, ten students was the maximum number possible. From the same group of volunteers, a control group was selected for statistical comparison only. The control group was matched to the active group for grade point average and scheduled site for clinical rotation (the clinical component of the Bachelor of Science in Pharmacy curriculum). The two-week clinical module took place early in the Fall semester of 1994. Upon completion, both students and faculty completed a questionnaire. The two groups (active and control) were compared statistically for CPT-III final grade, and letter grade given in the clinical clerkship the following semester (Spring 1995). Statistical analysis was performed using the paired student t-test.

## RESULTS

All ten of the students that started the early exposure program completed it. Six faculty members participated (five full-time, one adjunct, and residents if applicable) as preceptors of the program. The results of the student questionnaire are shown in Table I; results of the faculty questionnaire are shown in Table II; and statistically analyzed measures are shown in Table III.

## DISCUSSION

This study was designed for several reasons. For several years there has been dissatisfaction among faculty preceptors with regard to student performance during their clinical rotation of the experiential program. The dissatisfaction is based on the perception that there is a poor retention of clinical material taught during the previous year and a half. It has been suggested that providing an earlier exposure to actual patients and disease states may help improve this learning process(1).

The second reason was to stimulate the students learning process by placing them into a situation of actual pharmacy practice. Each year, the students provide feedback after completing their experiential rotations stating such things as "I wish I had known what it would have been like, before actually doing it." Perhaps they would have then known in advance (prior to taking CPT) what types of information are most important, have better understood the application of their didactic work, and realized how they would subsequently be able to effectively utilize their knowledge.

**Table I. Results of Student Questionnaire (n=10)**

	Mean ( $\pm$ SD) <sup>a</sup>
1. This experience was worthwhile.	4.9 (0.32)
2. I received clinical exposure that will help me better prepare in the didactic portion of CPT-III.	4.4 (0.52)
3. I would recommend that this experience be a required part of the CPT sequence.	4.6 (0.60)
4. Where in the curriculum should this experience be provided? with CPT-I (N=0) with CPT-III (N=3) with CPT-II (N=6) Other* (N=1) *with CPT-II or CPT-III	
5. What did you personally gain as a result of the early exposure program? (selected representative comments)	
• "It gave me confidence in my knowledge."	
• "This was a tremendous learning experience."	
• "It helped ease some of my concerns and fears about the following semester (experiential rotations)."	
• "Since we are better oriented toward clinical activities in advance, it allows us to get optimum benefit from the experiential program (Spring semester)."	

<sup>a</sup>1=Strongly disagree; 2=Moderately disagree; 3=Neutral; 4=Moderately agree; 5=Strongly agree.

The third reason was to help in the development of our entry-level PharmD program. The faculty has approved a curriculum which has an early experience program built into it. However, the exact mechanisms as to how it will be taught, or its place in the curriculum are yet to be determined.

As can be seen from Table III, there were no differences between the two groups regarding measured outcomes. However, some parameters can not be measured by statistics, such as the high level of enthusiasm and appreciation for the early experience that was documented by the students in their questionnaires. This is quite noteworthy in light of the fact that the students carried these extra responsibilities, in addition to their normally assigned didactic load. It could be argued that this was a biased group of students, in that they volunteered to participate. However, since so many students volunteered (53 percent of the class), the possibility of selection bias might not be as strong a concern.

While the faculty felt that the experience was worthwhile, there was a strong concern regarding scheduling and available resources. To provide an early exposure for each student in any one year of the baccalaureate program (approximately 120 students), would be an additional burden that concerned the faculty. Additionally, it could be difficult to schedule so many students without having to send them to off-campus sites. While it may be appropriate to send PharmD students to off-campus sites, it may not be appropriate to send full-time didactic students to a different geographical location.

One difference noted was between the faculty and the students. This was with regard to where in the curriculum an early clinical experience should be placed. The majority of faculty responses were in favor of placement either prior to, or early in the CPT sequence. Students were in favor of its placement with CPT-II or CPT-III. The reasons for this difference might be that the faculty are interested in providing an early clinical exposure, in order to help students more fully appreciate the rest of the curriculum to follow. Students

**Table II. Results of faculty questionnaire (n=6).**

	Mean ( $\pm$ SD) <sup>a</sup>
1. This experience seemed worthwhile for the students.	4.2 (0.75)
2. The students received clinical exposure that will help them better prepare in the didactic portion of CPT-III.	4.3 (0.52)
3. I would recommend that this experience be a required part of the CPT sequence.	4.0 (0.90)
4. Where in the curriculum should this experience be provided? with CPT-I (N=3) with CPT-III (N=0) with CPT-II (N=0) Other* (N=3) *with CPT-I or CPT-II (N=1) prior to any CPTs (N=1) not sure it should be in curriculum (N=1)	
5. Please provide any additional comments (selected representative comments):	
• "Concern with regards to scheduling and available resources."	
• "A potentially good utilization of pharmacy residents ( <i>i.e.</i> , help in preceptoring)."	

<sup>a</sup>1=Strongly disagree; 2=Moderately disagree; 3=Neutral; 4=Moderately agree; 5=Strongly agree.

**Table III. Outcome measures of active vs. control students**

	Active	Control
Fourth Year GPA	3.02 ( $\pm$ 0.45)	3.01 ( $\pm$ 0.42)
CPT-III Grade	75.8 ( $\pm$ 7.6)	77.3 ( $\pm$ 7.0)
Clerkship Grade	3.46 ( $\pm$ 0.4)	3.63 ( $\pm$ 0.2)

No differences between groups are statistically significant (paired *t*-test).

might believe a later experience would be more beneficial, in that it would be followed by a greater knowledge base.

While there were no detectable statistical differences in performance between the two groups of students, a difference might be demonstrated if the experience were placed earlier in the curriculum or conducted throughout the curriculum. Additionally, a larger study group would likely be necessary to detect any differences.

Despite the lack of a statistical difference in performance between the groups, it was the unanimous opinion of faculty and student participants that the students who completed the early experience enjoyed it, and felt that it helped them clinically and didactically. Furthermore, those students who volunteered but did not get to participate (52 students), were disappointed at not getting the opportunity.

More information is needed to fully evaluate the potential utility of an early clinical experience. Therefore, we suggest that colleges of pharmacy with adequate resources develop, implement, rigorously evaluate, and share the outcomes of such programs with our profession.

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