

Pharmacy Students' Professional Skill Development through a Scaffolded Internship

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Abstract

Description of the problem: The establishment of hospital pharmacy internships helps promote the growth of student pharmacists alongside the standard pharmacy curriculum. These programs are vital to helping students expand their clinical knowledge, while also benefiting the host institution. Our objective was to characterize the value of a longitudinal internship program to both the institution and its interns.

Description of the innovation: The Atrium Health Wake Forest Baptist (AHWFB) Pharmacy Intern Program is a unique program designed with a scaffolded concept that directly complements traditional pharmacy school curriculum and provides interns opportunities to complement tasks of health-system pharmacists. Starting with operational responsibilities in the central distribution pharmacy during the first year of the curriculum, the interns transition to more patient-facing roles during the second and third years. Throughout the course of the program, interns are also given opportunities to participate in research and professional development activities. An IRB-approved, retrospective, observational study was conducted to evaluate the benefits of the program to the institution and interns.

Critical analysis: Intern interventions were quantitatively evaluated to determine institutional benefit. From October 2017 to June 2020, 16 interns completed a total of 7,191 interventions, which equates to approximately \$1,295,825 of cost avoidance for the institution. A quality assurance survey was also conducted to evaluate the program's benefit to the interns. Fourteen of the 16 eligible interns participated in the survey. Of the 14 participating interns, 85.7% (n=12) strongly agreed with overall satisfaction of the program. Additionally, 71% (n=10) strongly agreed with feeling more professionally prepared than their classmates.

Next steps: Implementing a scaffolded internship program has positively benefited AHWFB and the participating interns. The program's design allows for clinical and professional development alongside the pharmacy school curriculum.

Keywords: pharmacy internship, healthcare, pharmacy student, professional development, acute care pharm

DESCRIPTION OF THE PROBLEM

The pharmacy profession has grown exponentially over recent years. Specifically, the roles of pharmacists within health care systems have greatly expanded from dispensing medications to providing direct patient care services.^{1,2} Additionally, pharmacy residency programs, which provide postgraduate training opportunities, have become increasingly competitive.³ Consequently, there is an increased need for experiences beyond the pharmacy curriculum, including strong paid internship experiences.

Pharmacy intern programs provide critical training opportunities to student pharmacists.^{4,5} However, previous research, which has been primarily descriptive in nature, has found that some intern programs focus mainly on hospital pharmacy operations and medication distribution, limiting the ability for student pharmacists to utilize their full potential.⁶

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In 2018, Nisly and Brennan called for action in this journal encouraging the profession to elevate the practice of pharmacy interns to allow for further development of clinical knowledge and critical thinking skills, as well as expand clinical services provided to patients.⁶ In the same issue, they published a toolkit with suggestions on how to design, implement, and assess student internship programs.⁷ The present study is in response to this call and designed with suggested concepts and innovations.

The Atrium Health Wake Forest Baptist (AHWFB) Pharmacy Intern Program was established in 2017 to empower student pharmacists with knowledge and skills in hospital pharmacy operations, acute care clinical pharmacy services, research, and professional development. Although relatively new, the program has constantly evolved in its structure, design, and components. This study aims to: 1) describe a novel longitudinal, scaffolded pharmacy intern program at an academic medical center and 2) report the value the program has provided to the institution and its interns.

DESCRIPTION OF THE INNOVATION

The intern program currently enrolls twelve interns annually: four first year (P1) students, four second year (P2) students, and four third year (P3) students. Any student enrolled in an Accreditation Council for Pharmacy Education-accredited pharmacy program is eligible to apply. The foundation of this program relies on the way it effectively complements the standard pharmacy curriculum (Table 1). The structure of the program and partnership with multiple colleges and schools of pharmacy allows for informal near-peer mentoring between interns of different class years, as well as peer networking across different pharmacy programs. Interns rely on each other for training as they progress through the program, creating a self-sustaining onboarding and training process. Interns are expected to work 40 hours per week for a minimum of 8 weeks over the summer break and a minimum of 2 weeks over the winter break. Additionally, interns are required to work two 8 hour shifts every third weekend throughout the entire year. The leadership team for the intern program consists of two pharmacists practicing at AHWFB, including a program director, filled by a clinical faculty member, and a research coordinator, filled by a clinical pharmacist.

Interns are recruited the summer before their P1 year of pharmacy school. During this year, P1 interns work in the central distribution pharmacy, where they assist with system automation, medication deliveries, floor communications, and sterile/non-sterile compounding. Clinically, first-year interns review medications flagged for intravenous to oral conversions and suggest the change, if appropriate. This responsibility is continued throughout the remaining years of the program.

During the P2 year of pharmacy school, interns transition to the Pharmacy Assurance of Care Transitions (PACT) team, where they obtain home medication lists for admitted patients. Intern responsibilities expand beyond the traditional PACT role by also completing medication reconciliations between the updated medication list and current inpatient medications. During this year, interns also begin completing patient education with oversight by P3 interns. In the spring of this year, interns are given the opportunity to apply for one of three available leadership positions for their P3 year of the program - Chief Intern, Research Chair, and Professional Development Chair. The Chief Intern serves as the liaison between interns and the leadership team and assists the program director in creating the intern schedule for the summer months of the program. Responsibilities of the other two leadership positions are described below.

The intern program culminates in the third year of the program, where interns complete clinical profile review for newly admitted patients, record pertinent information in the daily patient monitoring departmental notes, and identify opportunities for therapeutic optimization. As the interns complete each patient review, they are encouraged to focus on renal dose adjustments, antibiotic regimens, venous

thromboembolism prophylaxis, blood glucose, abnormal lab values, and medication reconciliation. Therapeutic recommendations are presented to a decentralized clinical pharmacist, and if approved, the interns then contact the medical team directly to provide the recommendation. Additionally, interns are encouraged to independently identify patients being discharged on high-risk medications, such as anticoagulants and insulin, and provide discharge education.

In addition to their operational and clinical responsibilities, all interns participate in longitudinal research and professional development activities. Each year, one P3 intern serves as Research Chair and works collaboratively with the leadership team to orchestrate a longitudinal Research Boot Camp (Table 2). This programming introduces interns to the basics of the research process and guides them through completion of a large group research project over one academic year. This project allows all twelve interns to gain experience with project development and data collection, as well as provides each intern class the opportunity to share the results through a group poster presentation at three separate professional conferences. The project culminates with the writing of a manuscript. Past projects have explored utilization of substance abuse resources during inpatient treatment of drug-use associated infective endocarditis⁸ and the use of direct oral anticoagulants for treatment of left ventricular thrombus.⁹ Interns also participate in at least one small group project annually with one to three other interns with an end goal of poster presentation and publication. Examples of past small group projects include assessment of pharmacy resident mentorship and feedback skills¹⁰ and description of concentrated student pharmacist learning experiences across 2 health systems.¹¹ In the first 4 years of the program, interns presented a total of 13 posters at professional meetings and contributed to 6 publications. A comprehensive list of scholarly works is available on the program website.¹² In addition to scholarship, interns participate in longitudinal professional development activities. The P3 intern serving as Professional Development Chair designs and executes professional development programming, including book clubs, postgraduate preparation, and clinical shadowing experiences. Each book club consists of bi-weekly to monthly sessions with prepared discussion questions. Previous book clubs have focused on overcoming implicit biases and the power of effective conversations. Postgraduate preparation seminars, including review of curriculum vitae and LinkedIn Profiles, are held annually. Interns also participate in clinical pharmacist shadowing experiences in a variety of clinical specialties. Lastly, interns are given access to other departmental programming, including grand rounds presentations, fourth-year pharmacy student presentations, and clinical topic discussions. Overall, interns gain a multitude of knowledge and experiences as they progress throughout the program.

CRITICAL ANALYSIS

Between 2019 and 2020, a small group of interns, consisting of one P3 intern, one P2 intern, and one P1 intern, conducted the first quality assurance review of the intern program. The study was executed by the interns with oversight by the intern program leadership team, who provided guidance on protocol development, Institutional Review Board (IRB) submission, and study analysis. The review was done in the infancy of the internship to ensure adherence with our program vision of empowering student pharmacists with knowledge and skills in hospital pharmacy operations, acute care clinical pharmacy services, research, and professional development, while making meaningful contributions to the institution. This IRB-approved, retrospective, observational study assessed the value of the program to the institution, through evaluation of interventions documented by interns, as well as value to the interns themselves, through a quality assurance survey. Interns who had completed at least one year of the program between the establishment of the program in 2017 through June 2020 were eligible to participate. A total of 16 past and current interns were eligible for inclusion in the evaluation.

Assessing Value of the Intern Program to the Institution

The first part of the study analyzed the patient care interventions documented by any (P2-P3) intern in the electronic health record from the establishment of the program in 2017 through June 2020. Each intervention was associated with an estimated monetary value in dollars using the ActionOI process.¹³ A total of 7,191 interventions were documented during the study period, resulting in \$1,295,825 of cost avoidance for the institution. Interns made 18 different types of interventions, with clinical profile review as the most prevalent type, accounting for 2,893 (40%) interventions.

The number of interventions made by each class aligned with the respective roles of the interns. A total of 3,140 interventions were associated with higher clinical value, including clinical profile review and therapeutic recommendations. Of these, P3 interns contributed 3,080 (98%) interventions, and P2 interns contributed 60 (2%) interventions. Clinical profile review constituted 90% of all interventions documented by P3 interns, compared to 1% of all interventions documented by P2 interns. Both of these results were expected, as the P2 interns have historically only participated in clinical profile review at the end of their P2 year, while being oriented to the clinical responsibilities they will have during their P3 year. Since the P1 intern responsibilities are primarily operational in nature, their contributions to the institution were not documented as interventions and were not assessed. However, P1 interns provide 0.4 FTE to the central pharmacy annually, contributing a consistent workforce that would otherwise have to be recruited by the department.

Assessing Value of the Intern Program to the Interns

The second part of the study evaluated the interns' perceptions of the program through a quality assurance survey. Study data

were collected and managed using REDCap (Research Electronic Data Capture) tools hosted at Wake Forest School of Medicine. Fourteen of the 16 eligible interns completed the survey, including three P1 interns, three P2 interns, five P3 interns, and three past graduates of the program. This study was authorized as exempt from Wake Forest University School of Medicine IRB Review. However, research participants were notified that they were agreeing to participate by clicking on the link in the survey invitation distributed through REDCap. Of the 14 interns who participated, 12 (86%) strongly agreed, and 2 (14%) agreed with overall satisfaction with the program. Moreover, 10 (71%) strongly agreed, and 4 (29%) agreed with feeling more professionally prepared than their classmates. When asked about the impact of the internship program on feeling more prepared academically than their classmates, 10 (71%) strongly agreed, 3 (21%) agreed, and 1 (7%) was neutral. Furthermore, interns were invited to provide feedback on the program. Suggestions for improvement included training in sterile compounding; consistency in communication between the interns, the leadership team, and decentralized clinical pharmacists; and increased opportunities for connecting with other interns. Finally, for the four (4) interns who completed the program, information on graduation from their respective pharmacy programs and postgraduate plans was also captured. All four (4) interns who completed the intern program in 2019 graduated from their pharmacy program in 2020. Three interns matched to a postgraduate year-1 (PGY1) residency, whereas 1 obtained employment as a pharmacist and later obtained a PGY1 residency.

NEXT STEPS

Findings of the quality assurance review demonstrated that the program met its goals during the early phase of its establishment. Areas for improvement within the program were also identified and several changes have been made. First, training in sterile compounding has been incorporated for P1 interns, in addition to their original operational responsibilities. Second, increased efforts were made to facilitate more consistent communication between interns, the leadership team, and decentralized clinical pharmacists. For example, decentralized clinical pharmacists are now encouraged to provide additional periodic clinical training and feedback to the P3 interns. Finally, since the interns attend different pharmacy programs and work different weekends in various roles, some interns reported that it was difficult to connect with other interns. Consequently, the Chief Intern organized weekend lunches to encourage camaraderie and facilitate opportunities for near-peer mentorship. Moreover, creation of small groups for longitudinal research and professional development activities throughout the academic year, such as leadership focused book club discussions and educational journal clubs, has become more intentional in pairing interns from different pharmacy programs to allow additional opportunities to connect. Continuous quality assurance reviews will be imperative to ensure the program continues to achieve its goals and help identify further opportunities for improvement.

The novel, longitudinal, scaffolded pharmacy intern program at AHWFB trains and prepares student pharmacists as future clinicians through experiences that include operations, clinical pharmacy, research, and professional development. The first quality assurance review of the program demonstrated the value of interns to the pharmacy department and the interns' overall satisfaction with the structure and offerings of the intern program. We encourage continued elevation in student training programs and support continued research in this area.

Conflicts of Interest: None

Funding/support: None

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Table 1. Intern Tasks and Correlating Curriculum Activities

Year (Internship/School)	Internship Tasks	Correlating Curriculum Activities
Year 1/P1	<ul style="list-style-type: none"> - Act as members of the distributive service line - Assist with system automation, medication deliveries, and floor communications - Participate in sterile/non-sterile compounding 	<ul style="list-style-type: none"> - Top 200 medications - Sterile/non-sterile compounding labs
Year 2/P2	<ul style="list-style-type: none"> - Assist PACT with obtaining prior to admission medication histories - Complete medication reconciliations - Conduct patient educations 	<ul style="list-style-type: none"> - Patient care skills labs - Community IPPE
Year 3/P3	<ul style="list-style-type: none"> - Create and update daily patient monitoring departmental notes - Develop and communicate therapeutic recommendations - Conduct patient educations 	<ul style="list-style-type: none"> - Pharmacotherapy courses - Disease states-focused elective courses - Health system IPPE
All years	<ul style="list-style-type: none"> - Review and suggest IV to PO conversions - Participate in research projects - Attend professionalism events 	<ul style="list-style-type: none"> - Leadership and professional development - Literature review, research process, data analysis

Abbreviation: IPPE, introductory pharmacy practice experiences; IV, intravenous; PACT, Pharmacy Assurance of Care Transitions; PO, per os

Table 2. Example Research Boot Camp Schedule

Session	Topic(s)
1	Introduction to Research Boot Camp, Jigsaw Journal Club
2	Research Design I
3	Research Design II
4	REDCap Tutorial I
5	REDCap Tutorial II
6	REDCap Tutorial III
7	Poster Abstracts/Poster Development
8	Presentation Development, Large Group Project Results
9	Manuscript Development I
10	Manuscript Development II
11	Manuscript Development III

Abbreviation: REDCap, Research Electronic Data Capture